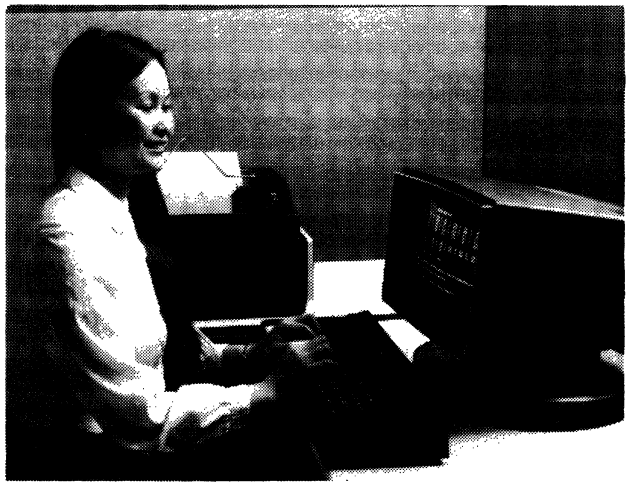
Teletype 4400 Series Data Terminals



The 4420 Buffered Display Terminal offers full editing and formatting capabilities and modularity. The microprocessor, drive logic, and power supply are all housed in the unit's 15-inch circular display base.

Teletype Corporation's 4400 Series display terminals feature ergonomic design and ASCII compatibility.

MODELS: 4420, 4424, and 4430.
DISPLAY: A 13-inch display screen mounted on a tiltable display stand is standard.
KEYBOARD: A detached keyboard with a typewriter-style keyboard is standard.
COMPETITION: Anderson Jacobson, ADDS, Hewlett–Packard, Lear Siegler.
PRICE: $3,997 to $4,207 in single quantity units.

MANAGEMENT SUMMARY

In October 1980, the Teletype Corporation introduced the Model 4420 Data Terminal. Since that time, two additions have been added to the Teletype 4400 Series display terminal family, Models 4424 and 4430. All three units feature ergonomic design and ASCII compatibility.

Model 4420 is a standalone terminal for point-to-point and general purpose applications. This unit offers user-friendly operating features and ergonomic design. Model 4424 offers the same basic features as Model 4420, plus interactive buffering capabilities.

Model 4430 is a standalone terminal for multipoint operation. The unit features user-friendly features, ergonomic design, and modularity.

COMPETITIVE POSITION

Teletype is one of the leaders in the alphanumeric display terminal market, both in the asynchronous segment and in the IBM 3270-compatible segment. Teletype, formed in 1907, has been part of the AT&T family as a wholly-owned subsidiary of Western Electric. Deregulation will affect Teletype in that it no longer will need to obtain tariffed pricing on its products, as it has in the past. However, as part of Computer Inquiry II, Teletype will not be permitted to sell new customer-premise equipment to commercial end-users starting in 1983. Teletype products will now be sold to end-users through AT&T Information Systems and through other third-party resellers and lessors. Besides the asynchronous 4400 Series, Teletype's display terminal product line also includes the 4540 Series display terminals, which compete against second generation IBM 3270 components, and the recently announced 5000 Series, which includes both asynchronous and synchronous display terminal models.

CHARACTERISTICS

VENDOR: Teletype Corporation, 5555 Touhy Avenue, Skokie, Illinois 60076. Telephone (312) 982–2000.

DATE OF ANNOUNCEMENT: Model 4420—October 1980; Model 4424—October 1981; Model 4430—June 1981.

DATE OF FIRST DELIVERY: Model 4420—November 1980; Model 4424—January 1982; Model 4430—December 1981.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: Teletype Corporation.

CONFIGURATION

The 4400 Series display terminals are standalone units featuring a display mounted on a tiltable 15-inch circular base and a detached keyboard. The display base houses the terminal control unit. A typewriter-style keyboard is standard, with a numeric keypad optionally available. Printers available for use with all models include the Model 40 tractor-feed line printer, and the Model 43 pin- or tractor-feed serial matrix printer.

The three models can be distinguished as follows:

- ***Model 4420*—Features a 13-inch display screen, 10 programmable function keys, and three pages of display memory as standard. Point-to-point transmission is supported.**
- ***Model 4424*—Features a 13-inch display screen, 16 programmable function keys, and two pages of display memory as standard. Point-to-point transmission is supported.**
- ***Model 4430*—Features a 13-inch display screen, one programmable function key, and three pages of display memory as standard. Multi-point transmission is supported.**

TRANSMISSION SPECIFICATIONS

***4420*—Asynchronous in half- or full-duplex mode at speeds up to 9600 bits/second. The 8-level ASCII transmission code is used; odd, even, mark, or space generation and detection parity is included. An RS–232–C interface is standard; a 20/60mA current loop is optional. The commu-**

Teletype 4400 Series Data Terminals

ADVANTAGES AND RESTRICTIONS

Teletype's products have a well-deserved reputation for quality and reliability. It is still somewhat unclear, however, how the deregulation of AT&T will affect Teletype in the long run. The company's recent display terminal product introductions would seem to indicate that it will not have a negative affect, and may very well be advantageous to the company. Pricing is the one restriction evident in the Teletype units, because other terminals in the marketplace offer similar features at a lower end-user cost.□

nications interface is compatible with Bell 103, 108, 113, 201, 208, 209, and 212 type modems.

4424—Asynchronous in half-duplex mode at speeds up to 9600 bits/second. The 8-level ASCII transmission code is used; odd, even, mark, or space generation and detection parity is included. An RS–232–C interface is standard; a 20/60mA current loop is optional. The communications interface is compatible with Bell 103, 108, 113, 201, 208, 209, and 212 type modems.

4430—Asynchronous/isochronous in half- or full-duplex mode at speeds up to 4800 bits/second. The 8-level ASCII transmission code is used; odd, even, mark, or space generation and detection parity is included. An RS–232–C or 20/60mA current loop interface is provided. The communications interface is compatible with Bell 108, 201, 202, and 202 type modems.

DEVICE CONTROL

All models transmit data character-by-character as it is keyed, by line, or in block/page mode.

Manual cursor controls position the cursor up, down, left, and right. Additional controls include: cursor return, which moves the cursor to the initial position of the next line; cursor home, which moves the cursor to the initial position of the first line; cursor index, which moves the cursor to the same position on the next line; and cursor XY addressing, which allows the cursor to be positioned to any row and column with a single command.

All models include an extensive editing capability as a standard feature. Edit functions include both character and line insertion and deletion. Character insertion and deletion, both repeatable functions, affect all data to the right of the cursor up to the end of the line or the beginning of a protected field. The displayed text expands (to the right) for each character entered and contracts for each character deleted. Character insertion is inhibited if no blank spaces are present to the right of the cursor. Line insertion and deletion affect all lines of text from the cursor to the end of display memory or a line occupied by a protected field. On all models, an attempted line insertion is inhibited when display memory has been filled with partial or complete lines of data, or when the insertion is attempted into a segment preceding a protected field where all lines are occupied; i.e., the line containing the protected field will not move downward. Character, line, and screen erase functions are standard on all units.

Scrolling Memory adds one or two additional 1920-character (24-line) segments to the basic 1920-character display memory to provide storage for a total of 48 or 72 lines of data. Data storage is divided into two or three consecutive but continuous 24-line segments. By means of the Scroll Up and Scroll Down key functions, any consecutive 24 lines of memory can be displayed at one time; data is moved continuously on one line from each key depression. The Display Advance key function displays each consecutive 24-line segment of the display memory through successive key depressions. Split screen configurations of one scrolling area and up to two static display regions are user selectable.

The protected format feature permits the use of fixed formats for data entry applications that require the operator to key pertinent data into blank spaces within a displayed format. The feature restricts key entry to unprotected or variable fields within the fixed format. Format descriptors are protected from inadvertent data entry and remain displayed until erased by computer message or by the operator. Only unprotected fields are transmitted or erased, while the format remains displayed. Fields can be highlighted, blanked, restricted to numeric entry only, and displayed at half the normal intensity. The operator moves from one unprotected field to another via the tab function.

Tabulation can be computer-controlled or controlled from the keyboard. Tab stops, each displayed as a dot, are line-independent; i.e., individual tab stops can be located at different positions on each line. When setting tab stops, all stops are simultaneously set in a column, at and immediately below the cursor, in a manner analogous to setting tabs on a typewriter. When clearing, all tab stops immediately below and to the right of the cursor are cleared. The operator can tab to the first tab stop to the right, to the beginning of the next line, or to the beginning of the next unprotected field, whichever comes first.

COMPONENTS

CRT DISPLAY UNIT: A 13-inch (diagonal measurement) CRT with a viewing area 11.25 inches wide by 5.25 inches high is standard. The screen is arranged in 24 lines of 80 characters each, totalling 1920 character positions. Characters are displayed in white phosphor on a dark background. On Models 4420 and 4430, characters are formed via a 7-by-9 dot matrix in a 9-by-14 field; an 8-by-14 dot matrix in a 9-by-14 field is utilized in Model 4424 units. All models provide the 128-character ASCII set, including upper- and lower-case alphabetics, numerics, and special symbols.

KEYBOARD: All models feature a detached keyboard with a typewriter-style layout. The Model 4420 keyboard offers 10 programmable function keys; Model 4424 includes 16 programmable keys; and Model 4430 offers one programmable function key as standard. An 18-key numerics keypad is a standard feature of Model 4424 units. It is optionally available for 4420 and 4430 models.

PRICING

Teletype 4400 Series display terminals can be obtained from Teletype on a purchase basis only. Maintenance is available through the Teletype Corporation's nationwide service organization, with over 80 local maintenance centers. A maintenance training program is available for customers who wish to perform their own maintenance.

	Purchase Price
Model 4420 Buffered Multi-purpose Display Terminal	$4,105
Model 4424 Interactive Buffered Display Terminal	4,207
Model 4430 Buffered Multi-point Display Terminal	3,997

■

Teletype Model 42 & 43 Teleprinters

The Basic Model 42 Automatic Send/Receive terminal is shown here with paper tape punch/reader module.

Two models of tabletop teleprinters in buffered and unbuffered versions.

Designed with Telex compatibility, the Model 42 Series units are five-level Baudot printers. The Model 43 Series uses the eight-level ASCII code. Selectable transmission speeds are from 45 to 255 cps on the Model 42; Model 43 transmits from 110 to 2400 bps. Printer speed for both models is 30 cps.

Features on the various models include 80-, 100-, and 132-column printing and 8½-inch friction feed, 3- to 12-inch tractor feed, or 12-inch pin feed paper support mechanisms. A 4K or 16K buffer is available on both models.

Prices for unbuffered models range from $1,272 for the Basic Model 43 to $3,673 for the Model 42 ASR with V.21 interface; buffered terminals range in price from $1,842 to $3,618. Teletype teleprinters are available for lease or purchase through distributors, dealers, leasing companies, or OEMs.

MANAGEMENT SUMMARY

Teletype Corporation, established in 1907 as the Mokrum Company and renamed Teletype in 1928, became part of AT&T's regulated domain in 1930. Until recently, Teletype has marketed its tarriffed products to the Bell System, which used the products internally or sold them to their customers. Due to the divestiture of AT&T, this arrangement has changed drastically in recent months, and we discuss the present situation in the Competitive Position section of this report.

Teletype Corporation has sold over 250,000 Model 42 and 43 teleprinters since delivery of the products began in the late 1970s. The initial member of the Model 43 family, a keyboard send/receive (KSR) terminal, was introduced in 1976 as a new transportable teleprinter that was compatible with the existing Model 33 and 35 teletypewriters for use on the public telephone switched network. In 1978, Teletype made a number of announcements that broadened the Model 43 product line. The company also introduced the Model 42, a family of 5-level Baudot terminals featuring compatibility with the CCITT #2 character code and the international and domestic Telex environments.

The Model 43 line was further expanded to include a buffered model (May 1979) and a buffered variable tractor feed version (May 1980). In May 1982, two additions to the Model 42 line were announced: the Basic ASR and the Basic BSR with 4K memory.

The Model 42 and 43 are identical in appearance. They are tabletop units occupying approximately the same amount of space as an office typewriter.

The Model 43 family currently consists of three series: Basic, Buffered, and Buffered Multipoint. The Basic Series ➢

CHARACTERISTICS

VENDOR: Teletype Corporation, 5555 Touhy Avenue, Skokie, Illinois 60077. Telephone (312) 982-2000.

CANADIAN SALES: AT&T International, Building B, Mt. Kemble Avenue, Route 202, Basking Ridge, New Jersey 07920. Telephone (201) 953-7000.

DATE OF ANNOUNCEMENT: Model 43 (basic)—November 1976; Model 43 (buffered)—May 1978; Model 42—May 1978.

DATE OF FIRST DELIVERY: Model 43 (basic)—January 1977; Model 42 & Model 43 BSR (buffered)—2nd quarter 1978.

NUMBER DELIVERED TO DATE: 250,000 (all models).

SERVICED BY: Teletype Corporation, telephone company, or leasing company, depending upon source of the terminal.

MODELS

The Model 42 is available in three versions:

- **Unbuffered Basic Automatic Send/Receive (ASR), with paper tape punch/reader.**
- **Basic Buffered Send/Receive (BSR), with 4K or 16K memory.** ➢

Teletype Model 42 & 43 Teleprinters

is available in three versions: RO (Receive Only); KSR (Keyboard Send/Receive); and ASR (Automatic Send/Receive) with paper tape punch/reader. The Buffered Send/Receive version includes 4K or 16K storage and is designed for point-to-point communications over switched or private lines. The Multipoint BSR, designed to work over dedicated facilities in a poll/select environment, includes 16K of storage and an auxiliary port for optional connection of a Teletype Model 40 line printer or a Model 43 teleprinter.

The Model 43 printers are available as pin feed, friction feed, or tractor feed units. Pin feed versions print 132 characters per line; friction feed, 80 characters per line; and tractor feed, either 100 or 132 characters per line.

The Model 42 product line currently includes three models: an unbuffered Basic ASR (Automatic Send/Receive) with paper tape punch/reader; buffered Basic BSR (Buffered Send/Receive) with either 4K (or optionally 16K) memory; and a Multipoint BSR with 16K memory and an auxiliary port (for the connection of a Teletype Model 40 line printer or another Model 42/43 teleprinter).

The Model 42s are normally friction feed units which print 80 characters per line on 8½-inch wide roll paper. The Model 42 buffered multipoint version is also available with a tractor feed mechanism, which prints either 100 or 132 characters per line.

All units are equipped with a high-resolution, impact matrix printer that prints true upper and lower case alphabetics. The 9-wire printhead can produce an original and three copies, depending on paper/carbon weight and finish.

Buffering enhances operating efficiency, capability, and flexibility. Besides supporting send/receive transmission rates up to 2400 bps, the editing feature allows a string of text to be located, retrieved, and edited via character insertion, deletion, or replacement. Transmitted text is temporarily stored in case it is not properly received, and can be resent. Internal diagnostics are provided to help isolate problems to a major component.

COMPETITIVE POSITION

Teletype Corporation has always been a teleprinter industry leader. To date, the company has sold over three quarters of a million teleprinters. Teletype's major competition in the teleprinter market comes from Digital Equipment Corporation (DEC), General Electric, and Texas Instruments; together the four companies have sold over two million teleprinter terminals.

As a subsidiary of AT&T's manufacturing affiliate, Western Electric, Teletype has over the years garnered substantial revenues from a large built-in market; the Bell System has both used Teletype products in its own operations and resold them to end users on a tariffed basis. In addition, Teletype has always offered its products on a non-tariffed basis through a large network of dealers, distributors, leas-

- **Multipoint Buffered Send/Receive (MBSR), with 16K memory and auxiliary send/receive port.**

The Model 43 is available in three series:

- **Basic Series, including Receive Only (RO), Keyboard Send/Receive (KSR), and Automatic Send/Receive versions.**
- **Buffered Series, with 4K or 16K memory.**
- **Buffered Multipoint Series, with 16K of storage and auxiliary send/receive port.**

TRANSMISSION SPECIFICATIONS

Transmission in the Model 42 is asynchronous in the half- or full-duplex mode at selectable rates of 45.5, 50, 75, 100 or 225 bits per second. The transmission code is 5-level, 7.5 unit Baudot, (CCITT #2). The terminals are equipped with a simplified RS-232-C interface, with optional units available to provide TTL, Hi-Level Polar, F1-F2, and V.21 interfaces. Telex dialing can be performed from the numeric keypad or top row of the keyboard.

Transmission in the Model 43 is asynchronous in half- or full-duplex mode. The unbuffered models operate at selectable rates of 110 to 300 bits per second. The buffered models operate at selectable rates of 110, 200, 300, 600, 1200, 1800, or 2400 bits per second. The transmission code is 8-level, 10- or 11-unit ASCII, including character parity. Parity detection can be selected or deselected. A parity error symbol is printed when an error is detected. Automatic answer is a standard feature. The basic models are available with an RS-232-C interface, a current loop (20 or 60 mA) interface, an integral 103-type modem, or a TTL digital interface. The buffered models are equipped with an RS-232-C interface. The Model 43 units are designed for either point-to-point operation over a dial-up or leased line facility, or multipoint operation over dedicated lines.

DEVICE CONTROL

Transmission is performed on a character-by-character basis as characters are keyed on the bufferless terminals. Buffered terminals can also transmit entire prepared messages. ASR models can transmit directly from paper tape.

The basic models are equipped with a 64-character line buffer for received data. The line buffer precludes the necessity of transmitting fill characters at the end of a line to allow for carriage return and line feed functions. The printer operates at a rate of 47 cps when data is waiting in the buffer, to give true 30 cps throughput.

The buffered models are equipped with a 4K- or 16K-byte internal memory divided into edit, send, was sent, and receive segments. Each editing function has its own control key—e.g., String Enter, Search, Retrieve, Insert, Delete, and Message Clear. Entered text can be located via string search, retrieved, edited, and then transmitted. The buffer also makes possible the simultaneous local message preparation and on-line operation.

The buffered models have a number of keyboard selectable options which permit the terminal to be tailored to a particular application.

Standard features on all models include: local and line modes, automatic carriage return and line feed on received data, automatic answer, interrupt, an audible margin alert (eight characters before end of line), keyboard inhibit (pre-

Teletype Model 42 & 43 Teleprinters

ing companies, and OEMs, as well as selling directly to larger users on a purchase-only basis.

It is impossible to predict just how the divestiture of AT&T and recent FCC rulings will affect Teletype's competitive position. The FCC has ruled that, beginning January 1, 1983, Bell Operating Companies may no longer provide new customer-premise equipment, including Teletype products, to commercial end users; however, they can offer Teletype maintenance and service on already-installed products. An FCC order, effective January 29, 1983, also prohibits Teletype from selling its products directly to end users. Thus, the company can now market its equipment only through its network of distributors, dealers, leasing companies, and OEMs.

Teletype has a good product reputation and a large installed base; these facts will contribute to the company's future success. Teletype can now respond more directly to the demands of the marketplace because it has been freed to offer new products. In fact, Teletype expects to spend 25% more on research and development in the coming year.

ADVANTAGES AND RESTRICTIONS

The Model 42 and 43 teleprinters are fairly rugged machines that require minimal maintenance. Teletype equipment is a little more expensive than its competitors' comparable models, but users we contacted felt that the quality of the teleprinters was worth the additional price.

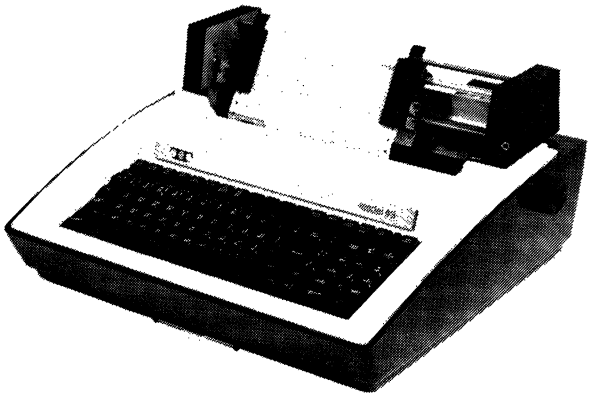
The Model 42s and 43s print only up to 30 cps; some users might want a faster-speed printer. In addition, prospective buyers should note that they now must purchase or lease their Teletype printers from distributors or dealers who might charge more or less for the products, depending upon geographic location and prevailing market conditions.

In general, the product, service, and documentation provided by Teletype Corporation are excellent, and prospective buyers should not anticipate any problems with these teleprinters, which have withstood the test of time in the marketplace.

USER REACTION

In May, 1983, Datapro contacted five Teletype terminal users; four users reported their experiences with 157 Model 43s, and one user reported on 20 Model 42s. Teletype Corporation supplied the names of the Model 43 users, and Datapro contacted a Model 42 user who had answered a previous terminal user's questionnaire. The users included one electric company, one food company, a retail store, and two non-Bell-affiliated telephone companies.

The Model 42s had been installed for two years; the average installed time for the Model 43s was 2½ years. Four of the users had acquired their terminals directly from Teletype Corporation, and one user had purchased from a distributor. The teleprinters performed a variety of tasks, e.g., interactive timesharing, billing, and transmitting Telex messages.



Teletype's Model 43 BSR, shown here with the variable tractor feed option, features a full ASCII keyboard and a 4K or 16K buffer.

vents overtyping when right margin is reached), 8-character keyboard burst buffer, N-Key rollover, last character visibility, ribbon cartridge for easy replacement, modular components for easy replacements, and diagnostic testing. Answerback is standard on buffered models and optional on basic models.

The Model 42 has the following additional standard features: capability to distinguish between received and transmitted data by printing received data in smaller characters, 4-row typewriter-like keyboard with automatic figures/letters shift, 9 keys for automatic dialing of frequently called numbers or recall of frequently used phrases, horizontal tabs, directory key for printing summary of messages in all buffer segments.

The Model 43 has the following additional standard features: caps lock (provides upper case alphabetics and numerics without shifting), and locally or remotely set margins. The buffered Model 43 has the following additional standard features: form feed (top of form), horizontal and vertical tabs, right margin release, single or double line feed.

ASR models are equipped with automatic punch and reader controls that respond to received control codes. Via the control codes, the punch and reader can be switched on and off from a remote source.

COMPONENTS

PRINTER: An impact matrix printer which prints at 30 cps and is available with a friction, pin feed, or variable tractor feed platen. The friction feed printer on the basic Model 42 prints up to 72 or 80 characters per line at 10 characters per inch and 6 lines per inch on standard 8½-inch wide roll paper.

The pin feed printer on the basic Model 43 prints up to 72, 80, or 132 characters per line at 13 characters per inch and 6 lines per inch on paper 12 inches wide and up to 8.5 inches long with a .5-inch left and right tear-off strip. Margins are adjustable. An original and up to three copies can be produced.

The tractor feed version of the Model 43 prints 100 characters per line at 10 characters per inch (which can be modified to 132 characters per line at 13 characters per inch) at six lines per inch. Forms can be from 3 to 12 inches wide, 22 inches long, and up to 4-ply.

Characters are formed by a 9-wire matrix printhead; each character is formed within a 7-by-9 dot matrix. Model 43 is equipped with a character set of 94 ASCII upper and lower

Teletype Model 42 & 43 Teleprinters

The users rated the teleprinters in seven categories. Their responses follow:

	Excellent	Good	Fair	Poor	WA*
Overall performance	5	0	0	0	4.0
Ease of use	3	2	0	0	3.6
Keyboard feel & usability	3	2	0	0	3.6
Print quality	3	2	0	0	3.6
Noise level	2	3	0	0	3.4
Hardware reliability	2	3	0	0	3.4
Maintenance service	4	1	0	0	3.8

*Weighted Average based on a scale of 4.0 for Excellent.

All of the users cited the reliability of the teleprinters. Two users noted the excellent assistance provided by Teletype's product service representatives. One user, who performed most maintenance in-house, said that the teleprinters' cards and components were easy to replace. In addition, three users praised Teletype's documentation. Another commented, "The printers do their job and do it well. They are clean and quiet. They function."

Only one criticism of the products arose during our discussions with these users. A user who had been involved in training operators noted a problem with the Model 43 buffered terminal: data goes into one of three memory segments, and it is difficult to determine which segment holds the data, thus making retrieval for editing cumbersome and difficult to explain to trainees, who generally mastered the problem only after about three months.

All of the users recommended the Teletype printers to prospective buyers. Everyone believed the Models 42 and 43 were good, solid machines.□

case symbols plus a parity error symbol. Model 42 is equipped with a character set of 50 CCITT #2 symbols. The printer features last character visibility, a continuous inking replaceable ribbon cartridge, a print position indicator, a paper-out alarm, left and right margin set and clear, and single or double line feed.

MODEL 43 KEYBOARD: A typewriter-style format with numeric pad/editing controls on the buffered versions. Key functions include Caps Lock Repeat, Backspace, Space, Carriage Return, Line Feed, Delete, Interrupt (Breaks), Local, Line Parity On/Off, Printer Test, Half- /Full Duplex, Shift, Control Shift, and 10/30 cps operation. The keyboard generates all 128 ASCII character codes.

MODEL 42 KEYBOARD: A typewriter-style format with four rows of keys with numeric pad/editing controls and automatic figures/letters shift. Key functions include In Service, Local Preparation, Memory, Start, Stop, Send, Local Paper Feed, Repeat, Here Is, WRU, Figures, Letters, Space, Line Feed, Carriage Return, Tab and Control keys. The keyboard generates all 50 CCITT #2 characters codes.

MODEL 43 PAPER TAPE READER/PUNCH: Accommodates 8-level, 1-inch fully perforated oiled paper tape and operates at 10 to 30 cps. The unit is equipped with a 1000-foot paper tape supply and tape-out alarm.

MODEL 42 PAPER TAPE READER/PUNCH: Accommodates 5-level, 11/16-inch fully perforated oiled paper tape and operates at 30 cps maximum. The unit is equipped with a 1000-foot paper tape supply and tape-out alarm.

PRICING

Teletype now sells Model 42 and 43 teleprinters only to distributors, dealers, leasing companies, and OEMs, who may sell or lease the products to end users. AT&T International was not able to provide Canadian pricing, but a representative of the company noted that teleprinters sold in Canada would be subject to exchange rates, duty, federal taxes, and transportation and brokerage fees. He noted also that there is no duty on Model 43 printers.

Given below are the suggested list prices supplied by Teletype Corporation. Pricing may vary depending on geographic location and prevailing market conditions.

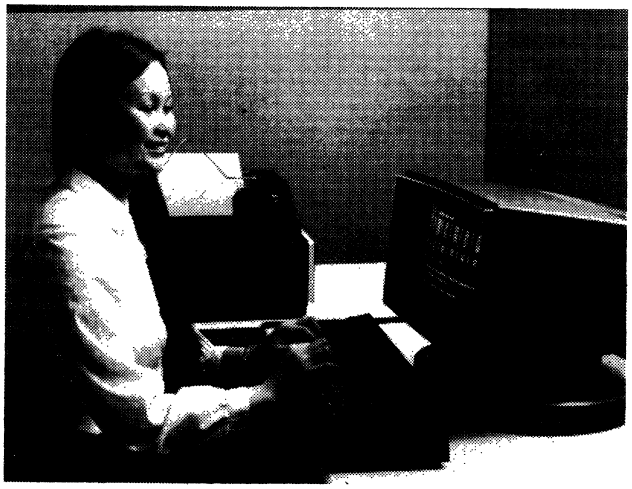
A separate maintenance contract is available for the purchased units. Prime-shift maintenance (8 hours/day, 5 days/week) within a Prime Service Area is priced at $17 per month (per terminal) for the unbuffered Model 43 terminals and $24 per month (per terminal) for the buffered Model 42 and 43 terminals. Teletype defines a Prime Service Area as that within one and one-half hours round trip from a Teletype service center. Teletype currently has 88 service centers. Installation and deinstallation is priced at $45 for the unbuffered units and $70 for the buffered units. Installation/deinstallation prices are lower for multiple-terminal installations.

	List Price
Model 42	
Unbuffered Basic ASR Tabletop Unit with 80-column Friction Feed, punch reader, and—	
RS-232-C Interface	$3,373
Hi-Level Polar Interface	3,815
F1-F2 Interface	3,627
V.21 Interface	3,673
Buffered Basic BSR Tabletop Unit with 80-column Friction Feed, 4K Character Buffer, and—	
RS-232-C Interface	1,987
TTL Interface	1,842
Hi-Level Polar Interface	2,428
F1-F2 Interface	2,230
V.21 Interface	2,280

Teletype Model 42 & 43 Teleprinters

	List Price
Buffered BSR Tabletop Unit with 80-column Friction Feed, 16K Character Buffer, and—	
RS-232-C Interface	$3,177
Hi-Level Polar or Neutral Interface	3,618
Buffered BSR for Multipoint Private Line with—	
80-column Friction Feed	3,177
100-column Tractor Feed	3,278
Model 43	
Unbuffered RO with 132-column Pin Feed and —	
TTL Interface	1,272
103-Type Integral Modem	1,782
RS-232-C or Current Loop (20/60mA) Interface	1,388
Unbuffered KSR with Interface 132-column Pin Feed and—	
TTL Interface	1,442
103-Type Integral Modem	1,952
RS-232-C or Current Loop (20/60 mA) Interface	1,558
Dual RS-232-C and Current Loop (20/60 mA) Interface	1,612
Unbuffered ASR with RS-232-C or Current Loop/Interface and—	
132-column Pin-Feed 80-column Friction Feed	3,168
80-column Friction Feed	3,177
100-column Variable Tractor Feed	3,278
Answerback Feature	201
KSR/RO Pedestal	175
ASR Pedestal	295
Copyholder	57.10
APL Conversion Kit	128
Buffered Model 43 Tabletop Unit BSR with 16K Character Buffer, RS-232-C Interface, and—	
132-column Pin Feed	3,142
80-column Friction Feed	3,177
100-column Friction Feed	3,278■

Teletype Model 40, 4420 & 4430 Data Terminals



The 4420 Buffered Display Terminal is the planned replacement for the older Models 40/1 and 40/2. The 4420 offers full editing and formatting capabilities, and operating characteristics can be changed through the use of the options group key. The 4420 offers improvements, not only in operating features, but in modularity over it's predecessors. The microprocessor, drive logic, and power supply are all housed in the 15-inch circular display base.

A family of keyboard/display/printer terminals and their eventual successors.

Covered in this report are three asynchronous stand-alone models, the 40/1, 40/2, and 40/3, and the newer models intended to replace them, the 4420 and 4430. Improvements on the newer models inlcude a detached keyboard, function keys, higher line speeds, expanded transmission modes, and a controller integrated into the display base. Also covered is the 40/4, a synchronous stand-alone model offering IBM 3270 compatibility via BSC protocol.

Purchase prices for the 4420 range from $3,928 to $4,038. The 4430 sells for $4,969. Model 40 prices depend on the configuration chosen.

MANAGEMENT SUMMARY

The Teletype Model 40 communications terminal was introduced by AT&T at the International Communications Association conference in May 1973 and exhibited on a grander scale by both AT&T and Teletype at the 1973 National Computer Conference in June. The terminal is available on a purchase-only basis from Teletype, a subsidiary of AT&T's Western Electric Company, and as the Dataspeed 40 Service, a tariffed service offered by AT&T and its Bell System operating companies.

The Teletype Model 40 family of Data Terminals consists of four models that include:

- Three asynchronous, single-station, stand-alone terminals for general purpose, interactive applications and
- One synchronous model designed for IBM 3270 compatibility via BSC protocol, available in stand-alone configurations.

Models 40/1, 40/2, and 40/3 are asynchronous ASCII terminals that, except for differences among transmission parameters and usage, provide essentially the same features. The 40/1, the original Model 40, is intended for dial-up operation. Model 40/3 was introduced about a year after Model 40/1 as the multi-point version of the 40/1 and is intended for leased-line operation. Model 40/2, introduced about 8 months after the 40/3, is an improved version of the basic Model 40 that can be used on dial-up or leased lines.

CHARACTERISTICS

VENDOR: Teletype Corporation, 5555 Touhy Avenue, Skokie, Illinois 60076. Telephone (312) 982-2000.

DATE OF ANNOUNCEMENT: Model 40/1, 40/2, 40/3—May 1973; Model 40/4 (stand-alone)—October 1977; Model 4420—November 1980; Model 4430—May 1981.

DATE OF FIRST DELIVERY: Model 40/1, 40/2, 40/3—October 1973; Model 40/4 (stand-alone)—November 1977; Model 4420—November 1980; Model 4430—October 1981.

NUMBER DELIVERED TO DATE: Information not available.

SERVICED BY: Teletype Corporation, telephone company, or leasing company, depending on source.

MODELS:

The Teletype Model 40 product line is a family of four models:

- **Model 40/1—A stand-alone terminal for point-to-point operation and general purpose applications.**
- **Model 40/2—A stand-alone terminal for point-to-point operation especially suited for teleprinter-replacement for time-sharing applications.**
- **Model 40/3—A stand-alone terminal for multi-point operation.**
- **Model 40/4—A stand-alone IBM 3270-compatible terminal for point-to-point or multi-point operation.**

Also available are Teletype's two newest models:

- **4420—Intended to replace Models 40/1 and 40/2, offering improvements in operating features, ergonomic features, and modularity.**
- **4430—Intended to replace Model 40/3, offering the same improvements as the 4420.**

CONFIGURATION

The equipment confugurations for the four models of the Teletype 40 are described on the following page.

Teletype Model 40, 4420 & 4430 Data Terminals

FEATURE COMPARISON

	4420	40/1	40/2
TRANSMISSION FEATURES			
Microprocessor-driven	Yes	No	No
Character, line, or block mode	All	Line/ block	Char.
Line speeds	To 9600 bps	To 2400 bps	To 4800 bps
Buffering: 2K to display, 2K to printer, 1K from line	Yes	No	No
Built-in diagnostics	Yes	Yes	Yes
Keyboard bit paring	Yes	No	No
Auto high/low speed control with 212 data set	Possible	No	No
Model 43 printer compatibility	Yes	No	No
DISPLAY FEATURES			
7 x 9 character matrix	Yes	Yes	Yes
Protected format	Std.	Opt.	Opt.
Highlighting	Std.	Opt.	Opt.
Blinking, underscore, reverse video	Yes	No	No
Destructive scrolling	Yes	No	Yes
Cursor addressing/read-out	Yes	No	No
KEYBOARD FEATURES			
Detached keyboard	Yes	No	No
Numeric pad keyboard	Opt.	No	No
Programmable function keys	Yes	No	No
Keyboard programmable options	Yes	No	No
Horizontal tab	Std.	Opt.	Opt.
Cursor back tab	Yes	No	No
Large NL or return key option	Yes	No	No
Integrated tab set/clear key	Yes	No	No
Repeat key	Yes	No	No
View controls key	Yes	No	No
Automatic answer	Yes	No	Yes
Integrater answerback (40 chars.)	Yes	No	No
Operator alternate option group select	Yes	No	No
ERGONOMIC FEATURES			
Three segment display	Std.	Opt.	Opt.
Tilt tube	Yes	Yes	Yes
Non-glare smudge resistant tube	Yes	Yes	Yes
Monitor brightness control	Yes	Yes	Yes
Power consumption	113 watts	260 watts	260 watts

Model 40/4, which was designed for IBM 3270-compatibility, is available in a stand-alone (single station) arrangement. The Model 40/4 provides software compatibility with the IBM 3270 with respect to communications protocol (restricted to BSC), commands and command code structure, and addressing sequence. The clustered versions of the 40/4 have been replaced by the newer 4540 Series (report C25-830-201). A stand-alone SDLC model is also available in the 4540 Series.

In November 1980, Teletype introduced the Model 4420 Buffered Display Terminal. The 4420 is intended to

Models 40/1, 40/2, and 40/3—There are three basic equipment configurations: KDP—includes keyboard, display, and printer; KD—includes keyboard and display; and RO—includes printer only. The KD and KDP configurations are each available in different physical arrangements that include table-top and pedestal mounts. In the table-top KDP arrangement, the keyboard can be attached to the front of either the electronics package or the printer, with the display on top; the other module (printer or electronics package) can be located up to 1000 feet away. In the pedestal arrangement, keyboard and printer are combined and the logic module is located in the base of the pedestal. A multi-point Station Controller is required for Model 40/3 Configurations, and is also located in the pedestal. The Model 40 can accommodate the Teletype Model 4210 Magnetic Tape Data Terminal, which can be used in both on- and off-line modes.

4420 and 4430—Both models are stand-alone units featuring the display mounted on a 15-inch circular base, and a detached keyboard. The base houses the display controller. A typewriter-style keyboard is standard, and a numeric pad is optional. Printers available for use with the 4420 and 4430 include the Model 40 tractor feed line printer, and the Model 43, pin feed or friction feed, receive-only printer.

Model 40/4 (stand-alone version)—The single-display configuration consists of a Single Display Controller (SDC), one keyboard/display (KD) and an optional printer. The SDC is contained within a pedestal. The KD is available with an attached or detached keyboard. The detached keyboard version has a pedestal-mounted monitor.

TRANSMISSION CHARACTERISTICS

Models 40/1, 40/2, 40/3, 4420, and 4430 are asynchronous terminals; Model 40/4 is a synchronous terminal. The communications parameters for each of the models are presented below.

Models 40/1 and 40/3—Asynchronous in the half-duplex mode at 1050, 1200, or 2400 (40/1 only) bits/second (105, 120, or 240 char./second). The 8-level (with parity) ASCII transmission code is used; the unit code structure is 10 bits/character, including unity start and stop bits. The modem interface is compatible with EIA Standard RS-232-C and connects to the communications facility via a Bell System 202 or equivalent modem, Model 40/1 is designed for point-to-point operation over the dial network. Model 40/3 is designed for multi-point operation on leased or private lines.

Model 40/2—Asynchronous in the half-duplex mode at 110, 150, 300, 600, 1200, 2400, or 4800 bits/second (15 to 480 char./second). Any two specified speeds can be switch-selected. The 8-level (with odd or even parity) ASCII transmission code is used. The unit code structure is 11 bits/character at 110 bits/second and 10 or 11 bits/character (as specified) at all higher transmission speeds, and includes 7 data bits, a parity bit, a start bit, and one or two stop bits. A 20 or 60mA DC interface or RS-232-C interface can be specified. Depending on operating speed, a Bell System 103, 113, or 202 type modem or an equivalent modem must be specified.

4420—Asynchronous in half- or full-duplex mode at speeds up to 9600 bits/second. The 8-level ASCII transmission code is used; odd, even, mark, or space generation and detection parity is included. An RS-232-C interface is standard; a 20/60mA current loop is optional. The communications interface is compatible with Bell 103, 108, 113, 201, 208, 209, and 212 type modems.

4430—Asynchronous in half- or full-duplex mode at speeds up to 4800 bits/second. The 8-level ASCII transmission code is used; odd, even, mark, or space generation and detection parity is included. An RS-232-C or 20/60mA current loop

Teletype Model 40, 4420 & 4430 Data Terminals

eventually replace the 40/1 and 40/2 units. The newer model provides enhanced features, including an integral controller housed in the display's 15-inch circular base. The accompanying chart compares the features offered on the 4420 with those offered by the older 40/1 and 40/2 models (Teletype continues to manufacture these units).

Likewise, in May 1981, Teletype unveiled another new model, the 4430 Buffered Display Terminal. The 4430 supports the same asynchronous multi-point operations supported by the 40/3 (which it will eventually replace), and the Model 33, 35, and 43 teleprinter families. Like the 4420, the 4430 is microprocessor-driven and contains a controller housed in the circular base. The unit's keyboard is detached. Other standard features include: line speeds up to 4800 bps; full formatting and editing capabilities; automatic generation and appendage of message control characters; built-in diagnostics; and more than 90 cursor selectable options.

Also like the 4420, the 4430 contains ergonomic features such as the 20° tube tilt feature, and the non-glare screen. As many as five on-line buffers are available, with approximately 14K of storage. The 4430 is equipped with two ports—a printer port, and an auxiliary send/receive port that can accommodate another display, a teleprinter, or a compatible storage device.

Teletype is by no means a neophyte in the CRT terminal industry. Though long dedicated to the production of teleprinters and punched tape equipment, Teletype gained experience with CRT terminals in the late 1960's, when development began on communication display terminals which were produced and used within the AT&T organization for in-house applications such as order entry.

USER REACTION

In Datapro's 1981 survey of alphanumeric display terminal users, six responses were received from users of Teletype Model 40 Data Terminals. These users reported on their experiences with 64 terminals (including one user with 50 units installed). Their ratings are summarized in the following table:

	Excellent	Good	Fair	Poor	WA*
Overall performance	3	3	0	0	3.5
Ease of operation	1	5	0	0	3.2
Display clarity	3	3	0	0	3.5
Keyboard feel & usability	3	3	0	0	3.5
Hardware reliability	3	2	1	0	3.3
Maintenance service	3	2	0	1	3.2
Technical support	3	3	0	0	3.5

*Weighted Average based on a scale of 4.0 for Excellent.

All of the users reported that they were using the Teletype 40 terminals in conjunction with the Bell System Dataspeed 40 service. When asked what the most frequent applications for the terminals were, all six users indicated data entry/interactive inquiry. Other applications

interface is provided. The communications interface is compatible with Bell 108, 201, 202, and 202 type modems.

***Model 40/4*—Synchronous in the half-duplex mode at 1200 to 4800 bits/second (150 to 600 char./second) for the Single Display Controller (SDC). The 8-level (with odd parity) ASCII or EBCDIC transmission code is used. The Binary Synchronous Communication (BSC) line protocol is used. The BSC protocol conforms to ANSI X3.28-1971/2.4B2 for private line multi-point operation and to ANSI X3.28-1971/2.2B2 for point-to-point dial-up operation. An EIA Standard RS-232-C interface accommodates a Bell System 212 (1200 bps), 201 (2400 bps), 208 (4800 bps), or 209 (9600 bps) or equivalent modem.**

DEVICE CONTROL

The Teletype Model 40 is an interactive terminal that, except for Model 40/2, transmits and receives data in message blocks. (Model 40/2 transmits data by character only.) Transmission performed on a message block basis transmits the entire contents or a selected part of the display memory upon operator command (and after receipt of a polling message in the case of Model 40/4). Messages are composed and edited prior to transmission.

The 4420 transmits data character-by-character as it is keyed, or in a block/page from display memory. Data is received in blocks at the display or printer. Display memory consists of 2K characters; the printer has 2K characters of buffering, and 1K characters are available from the line. Local modes consist of keyboard to display and display to printer. The 4430 transmits data in a block or page from the display send buffer or the optional auxiliary send buffer. Messages are received in a block or page at the buffers. Approximately 14K storage is available. Local modes consist of display to printer, display to auxiliary device, auxiliary device to display, and auxiliary device to printer.

Manual cursor controls position the cursor up, down, left, right, to the initial position of the next line (return), to the initial position of the first line (home), or spaced forward or backward. Repetitive operation is provided for these cursor functions. The cursor can also be moved to any character position by received series of two-character cursor command sequences that correspond to the cursor functions provided by the manual controls. The newer 4420 and 4430 models provide cursor XY addressing and readout. The cursor can be controlled remotely and positioned to any row or column via a single command.

On Models 40/1, 40/2, and 40/3, cursor movement in any one direction is inhibited when the cursor reaches the edge of the screen. Model 40/4, however, provides cursor wraparound. If the cursor is moved off the screen to the right or left, it reappears on the left or right, one line lower or higher, respectively. On the 4420 and 4430, the cursor automatically skips to the next unprotected field, once an unprotected field is completed.

Models 40/1, 40/2, and 40/3 differ functionally from Model 40/4. The 40/4 is designed for on-line data entry applications as a directly compatible replacement for the IBM 3270 Information Display System (BSC version only) and provides protected format, tabbing, highlighting (programmable brightness levels), and numeric field delineation as standard features. The other models are intended for inquiry-response interactive applications, but can be equipped for data entry applications. These models offer the above features as options.

All models include an extensive editing capability as a standard feature. Edit functions include both character and line insertion and deletion. Character insertion and deletion, both repeatable functions, affect all data to the right of the

Teletype Model 40, 4420 & 4430 Data Terminals

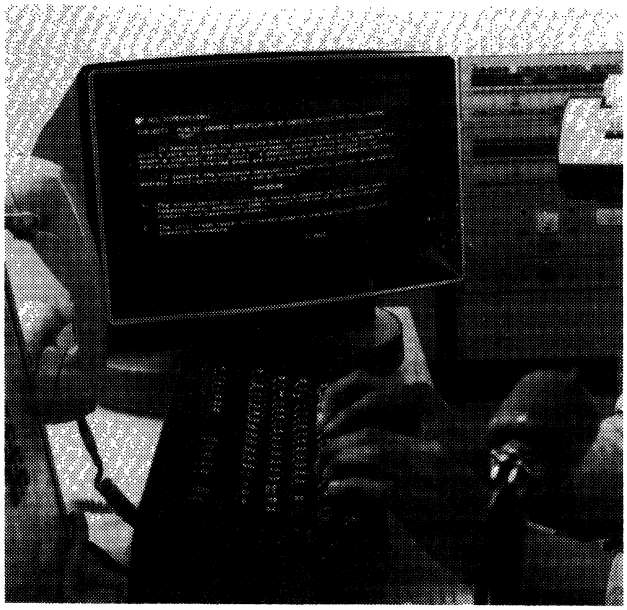
mentioned were: intracompany message traffic (four users); text editing/word processing (two); and program development (two). Two users reported that they received maintenance service from in-house personnel, while the remaining two users obtained maintenance from Bell.□

cursor up to the end of the line or the beginning of a protected field. The displayed text expands (to the right) for each character entered and contracts for each character deleted. Character insertion is inhibited if no blank spaces are present to the right of the cursor. Line insertion and deletion affect all lines of text from the cursor to the end of display memory or a line occupied by a protected field. On all models except 40/4, an attempted line insertion is inhibited when display memory has been filled with partial or complete lines of data, or when the insertion is attempted into a segment preceding a protected field where all lines are occupied; i.e., the line containing the protected field will not move downward. On Model 40/4, line insertion or deletion is inhibited if any formatted fields exist on the screen.

Erasure is restricted to screen erasure only. The entire contents of display memory (excluding protected fields when the protected format feature is activated) are erased, beginning at the first character position to the right of the cursor. On Model 40/4, the operator can erase the unprotected fields only or the entire screen. If the entire screen is erased, the cursor is automatically positioned at Home and the format is transmitted when the terminal is polled.

Model 40/4 operates under the control of the program stored at the host computer and provides complete compatibility with the addressing sequence, command code structure, and line discipline employed by the IBM 3270 Information Display Screen. The 40/4 responds to and executes the full repertoire of IBM 3270 commands, including Read Buffer, Read Modified, Write, Erase-Write, Copy, Erase All Unprotected, Start Field, Set Buffer Address, Insert Cursor, Program Tab, Repeat to Address, and Erase Unprotected to Address. Attribute characters can define fields as protected, highlighted, numeric, and non-displayed.

The Model 40/4 stand-alone version is equipped with dual 1920-character buffers. One buffer is assigned to the keyboard/display, the other to the printer; each has its own device address. This technique permits data to be prepared on the display, that data to be sent to the host computer for processing, and the results to be returned to the printer without interrupting operator preparation of a subsequent page of data. Also, the printer is available for local printing of displayed data or remote printing of host computer data without interrupting display operation. The printer can copy protected and/or unprotected displayed data.



Teletype's 4430 Buffered Display Terminal is a poll/select terminal for use with asynchronous multi-point private line systems. The unit will eventually replace the older Model 40/3.

Scrolling Memory, an optional feature for Models 40/1, 40/2, and 40/3, adds one or two additional 1920-character (24-line) segments to the basic 1920-character display memory to provide storage for a total of 48 or 72 lines of data. Data storage is divided into two or three consecutive but continuous 24-line segments. By means of the Scroll Up and Scroll Down key functions, any consecutive 24 lines of memory can be displayed at one time; data is moved continuously on one line from each key depression. The Display Advance key function displays each consecutive 24-line segment of the display memory through successive key depressions.

The protected format feature permits the use of fixed formats for data entry applications that require the operator to key pertinent data into blank spaces within a displayed format. The feature restricts key entry to unprotected or variable fields within the fixed format. Format descriptors are protected from inadvertent data entry and remain displayed until erased by computer message or by the operator. Only unprotected fields are transmitted or erased, while the format remains displayed. Fields can be highlighted, blanked (40/4), or restricted to numeric entry only (40/4). Models 40/1, 40/2, 40/3, 4420, and 4430, display protected fields at half the normal intensity. The operator moves from one unprotected field to another (forward or backward) via the tab function, which permits the operator to move to the next unprotected field (tab) or on the 40/4, to the previous unprotected field (backtab). Formats are received only via computer message on the 40/4, but they can also be received from magnetic tape (via the Teletype 4210) or keyed by the operator on the other models.

Highlighting is used to direct the operator's attention to significant information. On the 40/4, fields can be made to blink, displayed at higher than normal brightness, or a combination of both functions. Specified fields can also be blanked (non-displayed) for security reasons. On all other models, highlighting is restricted to blinking a character or field between full and half intensity once every second.

Tabulation is a computer-controlled function on the 40/4, but it can also be controlled from the keyboard on all other models. Tab controls on the 40/4 permit the operator to tab (move the cursor) to the beginning of the next unprotected field, to the beginning of the next unprotected field with erasure of all unprotected data between the existing and new cursor positions, and to the beginning of the present or previous unprotected field. On the other models, tab stops can be set and cleared from the keyboard. Tab stops, each displayed as a dot, are line-independent; i.e., individual tab stops can be located at different positions on each line. When setting tab stops, all stops are simultaneously set in a column, at and immediately below the cursor, in a manner analogous to setting tabs on a typewriter. When clearing, all tab stops immediately below and to the right of the cursor are cleared. The operator can tab to the first tab stop to the right, to the beginning of the next line, or to the beginning of the next unprotected field, whichever comes first.

SOFTWARE SUPPORT: Model 40/4 is supported under existing IBM software support for the IBM 3270, which includes the following IBM access methods: BTAM under DOS, DOS/VS, OS, or OS/VS2; TCAM under OS; and VTAM under DOS/VS, OS/VS1, or OS/VS2. Model 40/4

Teletype Model 40, 4420 & 4430 Data Terminals

is also supported for use with the following IBM Program Products: VIDEO/370, DATA/370, IMS, IQF, CICS, and TSO.

COMPONENTS

CRT DISPLAY: A 13-inch (diagonal measurement) CRT with a viewing area 11.25 inches wide by 5.25 inches high. The screen is arranged in 24 lines of 80 characters each, totaling 1920 character positions. Models 40/1, 40/2, 40/3, 4420, and 4430 provide a character set of 128 ASCII characters, including upper and lower case alphabetics, numerics, and special symbols. Model 40/4 has a character set of 64 or 96 (optional) characters, including upper case alphabetics, numerics, and symbols; lower case letters are included in the optional 96-character set. All models display data in white against a dark background. Characters are formed by a 7-by-9 dot matrix. The viewing screen can be vertically tilted through 20 degrees of rotation (±10 degrees from the horizontal) to compensate for glare and ease operator viewing.

MODEL 40 KEYBOARDS: The typewriter-style keyboard for Models 40/1, 40/2, and 40/3 can generate any of 128 ASCII character codes, including upper and lower case alphabetics, numerics, specials, and control codes. A choice of three typewriter-style keyboards is offered for the 40/4: one with no numeric cluster, one with an internal numeric cluster, and one with an external numeric cluster located to the right of the main keygroup. Each of the 40/4 keyboards can generate 96 upper and lower case ASCII or EBCDIC characters. Control codes are printed on their respective keytops on all models. A character repeat function can be user-implemented to permit repetitive entry of data or control functions.

4420 & 4430 KEYBOARDS: Both models feature a detached keyboard with a typewriter-style layout. An 18-key numeric pad can be added as an option. The 4420 includes 10 user-programmable function keys. The 4430 includes one user-programmable function key that can be optioned for character strings up to 15 characters. All 128 ASCII code characters are generated.

MODEL 40 PRINTERS: A full-character impact belt printer rated at 300 lines/minute with the standard 64-character set of ASCII upper-case symbols or 220 lines/minute with the optional 94-character set of ASCII upper and lower case symbols. The printer is available as an 80-column, friction-feed unit; an 80-column, tractor-feed unit; as a 132-column, tractor-feed unit; or an 80-column forms access unit. The forms access unit contains a tractor feed located *below* the print line, so that a form that has just been printed can be removed without destroying the next (unprinted) form. Horizontal and vertical spacing is 10 characters/inch and 6 lines/inch, respectively. Friction feed employs standard 8½-inch wide single-ply rolled paper. Tractor feed accommodates pin-fed, 6-part, continuous forms from 4⅛- to 9½-inches wide for the 80-column unit or from 4⅛- to 15-inches wide for the 132-column unit. Form lengths is controlled by a "forms out belt;" the standard belt prints forms of 2¾, 3-2/3, 5½, or 11 inches in length; optional belts can accommodate forms from 2.5 to 22 inches in length.

4420 & 4430 PRINTERS: Two models are optionally available: the Model 40 line printer, and the Model 43 receive-only character printer. The Model 40 features 80 or 132 column printing at 300 lines per minute speeds. Forms are fed via a tractor feed mechanism. Horizontal and vertical tabulation is standard. The printer can be located up to 2000 feet from the display. The Model 43 is available with either pin feed or friction feed mechanism. The unit can print 80 columns using the friction feed, or 132 columns using the pin feed. Print rate is 30 characters per second. The Model 43 can be located up to 50 feet from the display. Printer and paper alarms are standard, and pedestal stands are optional.

PRICING

The Model 40 can be obtained from Teletype on a purchase only basis. Functional discounts are available to qualified customers.

Monthly maintenance and installation prices are as follows:

	Monthly Maint.	Installation
Models 40/1, 40/2, & 40/3:		
4025 KD	$30	$ 45
4030 KDP	39	145
Model 40/4	20 to 35	70
4420 Keyboard Display	19 to 31	82
4430 Keyboard Display	19 to 31	82

Model 40 Receive-Only Printer/Controllers (for Model 40/1 and 40/2 Configurations)

	Purchase Price
4010 Receive-Only Printer/Controller (ROP) (includes 80 print positions, upper or upper/lower case ASCII, 6 or 8 lines per inch; four models available)	$6,942

Model 40/1 Stand-Alone Configurations

4025 Tabletop Keyboard Display (KD) (includes 24-, 48-, or 72-line display; tab control, highlighting, protected data, conversation mode, and printer port available; 12 models available)	$5,118 to 6,607

Model 40/2 Stand-Alone Configurations

4025 Tabletop Keyboard Display (KD) (includes 24-, 48-, or 72-line display; tab control, highlighting, protected data, and printer port available; 12 models available)	$5,883 to 6,778

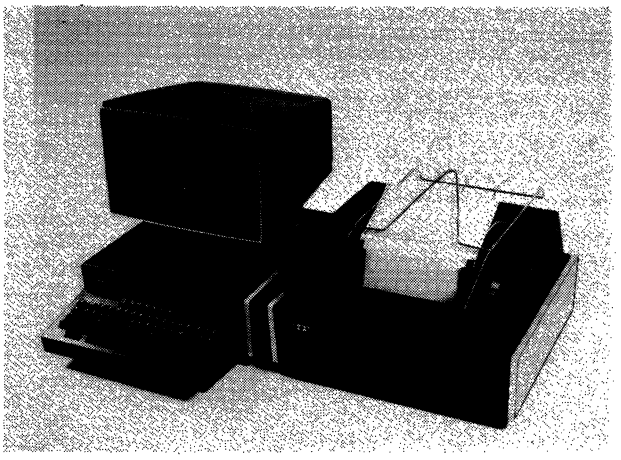
Model 40/3 Stand-Alone Configurations

4000 Station Controller (double pedestal; 105 or 120 cps)	$1,665 to 1,671

Teletype Model 40, 4420 & 4430 Data Terminals

	Purchase Price
Model 40/3 Stand-Alone Configurations (Continued)	
4030 Keyboard Display Printer (KDP) Printer Beside Display (includes friction feed, 80 print positions, upper or upper/lower case ASCII, 24-, 48-, or 72-line display, tab control, highlighting, and protected data; single or double pedestal)	$10,155 to 10,960
4030 Keyboard Display Printer (KDP) Printer Beside Display (includes tractor feed, 80 print positions, upper or upper/lower case ASCII, 24-, 48-, or 72-line display, tab control, highlighting, and protected data; single pedestal)	$10,815 to 11,345
Model 40/4 Stand-Alone Configurations	
4004 Single Display Controller (SDC); for multi-point private line facilities; provides support for:	
One Keyboard Display and one printer with 29-inch top	$3,420
One Keyboard Display and one printer with 27-inch slotted top	3,423
4005 Single Display Controller (SDC); for switched network facilities; provides support for:	
One Keyboard Display and one printer with 29-inch top	3,420
One Keyboard Display and one printer with 27-inch top	3,423
4010 Receive-Only Printer/Controller (includes 80- or 132-column tractor feed, 48-char. ASCII/EBCDIC set, 64-char. ASCII or EBCDIC set, 96-char. ASCII or EBCDIC set)	$6,170 to 7,295
4025 Single Display Controller & Keyboard Display (SDC & KD) with attached keyboard (for multi-point or switched network facilities; includes typewriter keyboard; internal or internal numeric cluster available; six models available)	$4,785 to 5,012
4026 Keyboard Display (KD) (includes detached typewriter keyboard; integral or external numeric cluster available)	$1,565 to 1,712
Model 40 Printers	
4011 Printer (P) (includes friction, tractor, or forms access feed; 80 or 132 print positions; ASCII or EBCDIC code; 6 or 8 lines per inch available; ribbon mechanism available)	$3,820 to 5,170
Model 4420 Stand-Alone Configuration	
4420 Keyboard Display (KD) (includes detached keyboard; numeric pad available)	$3,928 to 4,038
Model 4430 Stand-Alone Configuration	
4430 Keyboard Display (MPPL)	$4,969
Model 4400 Printers	
Model 43 RO (pin feed, 132 print positions)	$1,388
Model 40 Line Printer (tractor feed, 132 print positions)	$5,133 ■

Teletype Model 40 Data Terminals



A typical Model 40 KDP configuration includes the four basic modules: display monitor, electronics package, keyboard, and printer. The 40/4 above is shown with a tractor feed printer.

A family of CRT keyboard/display/printer terminals that includes stand-alone asynchronous terminals and clustered/stand-alone synchronous terminals that provide compatibility with IBM's 3270 using BSC protocol.

Configurations available on each model are ROP (receive-only printer), KD (keyboard and display), and KDP (keyboard, display and printer). Stand-alone asynchronous models operate at from 110 bps up to 4800 bps. The IBM 3270-compatible 40/4 can support up to 24 keyboard/displays and as many as 30 printers.

Typical purchase prices range from $4,170 for a basic Model 40/1 in a KD configuration to $137,079 for a Model 40/4 configured with 24 keyboard/displays and 12 printers with all options.

These systems are also available through AT&T under the Dataspeed 40 Service as well as from leasing companies and other common carriers.

MANAGEMENT SUMMARY

The Teletype Model 40 family of Data Terminals consists of four models that include:

- Three asynchronous, single-station, stand-alone terminals for general purpose, interactive applications and
- One synchronous model designed for IBM 3270 compatibility via BSC protocol, available in cluster or stand-alone configurations.

All models of the Teletype 40 family are available from Bell System telephone companies under Dataspeed 40 service.

In December, 1978, Teletype announced major price increases affecting all of its terminal product lines. The price hike primarily affects end-user customers, since it was accompanied by an increase in the OEM discount from 20 to 40 percent.

Models 40/1, 40/2, and 40/3 are asynchronous ASCII terminals that, except for differences among transmission parameters and usage, provide essentially the same features. The 40/1, the original Model 40, is intended for dial-up operation. Model 40/3 was introduced about a year after Model 40/1 as the multi-point version of the 40/1 and is intended for leased-line operation. Model 40/2, introduced about 8 months after the 40/3, is an improved version of the basic Model 40 that can be used on dial-up or leased lines.

Model 40/1 transmits a line or block at a time and is available with Conversation mode, which automatically switches the terminal between send and receive modes for each line transmitted or received. However, the 40/1 is limited to transmission speeds of 1050, 1200, or 2400 bps and is available only with an RS-232C interface.

CHARACTERISTICS

VENDOR: Teletype Corporation, 5555 Touhy Avenue, Skokie, Illinois 60076. Teletype (312) 982-2000.

DATE OF ANNOUNCEMENT: Model 40/1, 40/2, 40/3 — May 1973; Model 40/4 (cluster) — November 1975; Model 40/4 (stand-alone) — October 1977.

DATE OF FIRST DELIVERY: Model 40/1, 40/2, 40/3 — October 1973; Model 40/4 (cluster) — March 1976; Model 40/4 (stand-alone) — November 1977.

NUMBER DELIVERED TO DATE: Over 22,000 keyboard/displays and over 22,000 printers.

SERVICED BY: Teletype Corporation, telephone company, or leasing company, depending on source.

MODELS

The Teletype Model 40 product line is a family of four models:

- **Model 40/1 — A stand-alone terminal for point-to-point operation and general purpose applications.**
- **Model 40/2 — A stand-alone terminal for point-to-point operation especially suited for teleprinter-replacement for time-sharing applications.**
- **Model 40/3 — A stand-alone terminal for multipoint operation.**
- **Model 40/4 — Available as a stand-alone or clustered IBM 3270-compatible terminal for point-to-point or multipoint operation.**

Teletype Model 40 Data Terminals

The more versatile 40/2 transmits a message in either character or block mode at seven selectable rates ranging from 110 to 4800 bps, and is available with an RS-232C or current loop interface. As a standard feature, the 40/2 provides the same conversational switching function (in the character mode) as the 40/1, but via ASCII control codes. When transmitting in the character mode, the 40/2 can be operated in half-duplex mode or in a true full-duplex mode where the transmitted data differs from the received data. A destructive scrolling feature permits displaying unlimited amounts of received data; the received data is scrolled down the screen and is lost once the memory capacity is exceeded. An application of this feature would be monitoring extensive messages as they are printed.

Other features of the Model 40/2 include Automatic New Line and Line Break/Interrupt. The Automatic New Line feature returns the cursor to the beginning of the next line and the 40/2 continues to display received data in the event the New Line character has not been received. The Line Break/Interrupt feature permits the operator to interrupt the transmission from the remote sender on either half- or full-duplex transmissions. Added printer features include Automatic Answer, which permits the printer to automatically answer a call and print a received message when the terminal is in the local mode and message composition is in progress; Remote Control, which controls whether transmitted data is printed or not; and a print speed feature for KDP configurations that restricts print speed from falling below 120 cps when the printer is in local mode, regardless of lower line speeds. Local printing is performed at line rates for higher line speeds, and on-line printing is always performed at line rates.

The asynchronous members of the Model 40 family of terminals are composed of interactive terminal modules that can be arranged in various configurations ranging from a receive-only printer to a full-blown terminal including keyboard, display, and printer. Four modules form the basic building blocks of the Model 40: keyboard, display, printer, and terminal logic. Many physical arrangements are possible, with the electronics package and/or printer located up to 1000 feet away from the CRT/keyboard. Table-top or pedestal mount can be specified.

Salient features of the three asynchronous members of the Model 40 family include:

- A 1920-character screen arranged in 24 lines of 80 characters.
- A full set of cursor controls that permit local or remote cursor manipulation. (Character addressability, however, is not provided.)
- A full set of ASCII characters, including upper-and-lower-case alphabetics, that can be displayed or keyed.
- A complete editing capability, including character and line insertion and deletion.

CONFIGURATION

The equipment configurations for the four models of the Teletype 40 are described below.

***Models 40/1, 40/2, and 40/3*—There are three basic equipment configurations: KDP—includes keyboard, display, and printer; KD—includes keyboard and display; and RO—includes printer only. The KD and KDP configurations are each available in different physical arrangements that include table-top and pedestal mounts. In the table-top KDP arrangement, the keyboard can be attached to the front of either the electronics package or the printer, with the display on top; the other module (printer or electronics package) can be located up to 1000 feet away. In the pedestal arrangement, keyboard and printer are combined and the logic module is located in the base of the pedestal. A multipoint Station Controller is required for Model 40/3 Configurations, and is also located in the pedestal. The Model 40 can accommodate the Teletype Model 4210 Magnetic Tape Data Terminal, which can be used in both on- and off-line modes.**

***Model 40/4 (cluster version)*—Two cluster configurations are available: Maxi-Cluster and Mini-Cluster. The Maxi-Cluster consists of a controller and 1 to 36 devices, including 1 to 24 keyboard/display units (KD's) and 1 to 30 printers. The controller consists of a Station Cluster Controller (SCC) with up to 6 Device Cluster Controllers (DCC's). Each DCC can accommodate 1 to 4 KD's, and 1 to 5 printers, up to a total of six devices per DCC. The Mini-Cluster consists of a Mini-Cluster Controller (MCC) and up to three devices, including 1 or 2 KD's and 1 or 2 printers. At least 1 KD is required in a Maxi- or Mini-Cluster configuration. The SCC or MCC connects to the communications facility via an external modem.**

The Maxi- or Mini-Cluster Controller physically resides in a 24-inch-high pedestal cabinet. Two different pedestals are available: one with slotted top, the other without the slot. The slotted pedestal is intended to support a printer, and provides a paper slot at the top front to allow paper to be fed from bin to printer. Two physical arrangements are available for the keyboard/display (KD) units: base mount or cabinet mount. In the base mount arrangement a flat disk base supports the CRT display portion of the KD; the keyboard is physically separate. In the cabinet mount arrangement, the CRT display and keyboard are mounted to the electronics package to provide a single unit. Each KD can be located up to 100 or 600 feet with optional amplifier (KDA) from the Device or Mini-Cluster Controller, and each printer can be located up to 2000 feet from the controller. The Device Cluster Controller can be separated from the Station Cluster Controller by 2000 feet, and the SCC can be located up to 50 feet from the modem.

***Model 40/4 (stand-alone version)*—The single-display configuration consists of a Single Display Controller (SDC), one keyboard/display (KD) and an optional printer. The SDC is contained within a pedestal. The KD is available with an attached or detached keyboard. The detached keyboard version has a pedestal-mounted monitor.**

Synchronous Model 40/4 versions of the 40/1 and 40/2 KD and RO configurations are also available.

Configuration details are presented in the diagrams and Price List at the end of this report.

TRANSMISSION CHARACTERISTICS

Models 40/1, 40/2, and 40/3 are asynchronous terminals; Model 40/4 is a synchronous terminal. The communications parameters for each of the models are presented below.

Teletype Model 40 Data Terminals

- A formatting option that features protected fields for format descriptors.

- A paging option that increases the size of display memory to 48 or 72 80-character lines (2 or 3 pages) and, through scrolling, displays any consecutive 24 lines or complete 24-line memory segments.

- A horizontal tab option that permits any number of tab positions to be established.

- A highlighting option that flashes selected segments of data between half and full intensity.

- A high-speed impact page printer that prints up to 314 80-character lines per minute on ordinary teleprinter roll paper or sprocket-fed, multi-part forms. Friction feed, tractor feed, or forms access feed can be selected. Upper-case-only or upper-and-lower-case alphabetics can also be specified.

- A transmission speed of 1050, 1200, or 4800 bits per second in Model 40/1, 1050 or 1200 bits per second in Model 40/3, and of 110 to 4800 bits per second in Model 40/2.

- The capability to interface with a Teletype Model 4210 Magnetic Tape Data Terminal.

Model 40/4, which was designed for IBM 3270-compatibility, is available in a cluster or stand-alone (single station) arrangement. The single-station arrangement is the most recent addition to the family. The Model 40/4 provides software compatibility with the IBM 3270 with respect to communications protocol (restricted to BSC), commands and command code structure, and addressing sequence. The Model 40/4 also provides many of the features and functions of the IBM 3270, although it is not available with a light pen or operator ID card reader. (The new Teletype 4500, introduced in June 1978, provides more of the 3270 features and functions.)

A key feature of the single-station version is its dual 1920-character buffer, which permits data to be prepared on the display, that data to be sent to the host computer for processing, and results to be returned to the printer without interrupting operator preparation of a subsequent page of data.

The salient features of Model 40/4 are as follows:

- Display capacity—Available in a 1920-character screen size only.

- System configuration—Available in three configurations: a Mini-Cluster that accommodates up to three devices including one or two keyboard/display units and one or two printers; a Maxi-Cluster that accomodates 36 devices, in any combination of up to 24 keyboard/display units and up to 30 printers; and a stand-alone version with 1 keyboard/display unit and

Models 40/1 and 40/3—Asynchronous in the half-duplex mode at 1050, 1200, or 2400 (40/1 only) bits/second (105, 120, or 240 char/second). The 8-level (with parity) ASCII transmission code is used; the unit code structure is 10 bits/character, including unity start and stop bits. The modem interface is compatible with EIA Standard RS-232C and connects to the communications facility via a Bell System 202 or equivalent modem, Model 40/1 is designed for point-to-point operation over the dial network. Model 40/3 is designed for multipoint operation on leased or private lines.

Model 40/2—Asynchronous in the half- or full-duplex mode at 110, 150, 300, 600, 1200, 2400, or 4800 bits/second (15 to 480 char/second). Any two specified speeds can be switch-selected. The 8-level (with odd or even parity) ASCII transmission code is used. The unit code structure is 11 bits/character at 110 bits/second and 10 or 11 bits/character (as specified) at all higher transmission speeds, and includes 7 data bits, a parity bit, a start bit, and one or two stop bits. A 20 or 60 ma DC interface or RS-232C interface can be specified. Depending on operating speed, a Bell System 103, 113, or 202 type modem or an equivalent modem must be specified.

Model 40/4—Synchronous in the half-duplex mode at 2400 or 4800 bits/second (300 or 600 char/second) for the Mini-Cluster Controller (MCC), at 1200 to 4800 bits/second (150 to 600 char/second) for the Single Display Controller (SDC), and at 2400 to 9600 bits/second (300 to 1200 char/second) for the Station Cluster Controller (Maxi-Cluster). The 8-level (with odd parity) ASCII or EBCDIC transmission code is used. The Binary Synchronous Communication (BSC) line protocol is used. The BSC protocol conforms to ANSI X3.28-1971/2.4B2 for private line multipoint operation and to ANSI X3.28-1971/2.2B2 for point-to-point dial-up operation. An EIA Standard RS-232C interface accommodates a Bell System 212 (1200 bps), 201 (2400 bps), 208 (4800 bps), or 209 (9600 bps) or equivalent modem.

DEVICE CONTROL

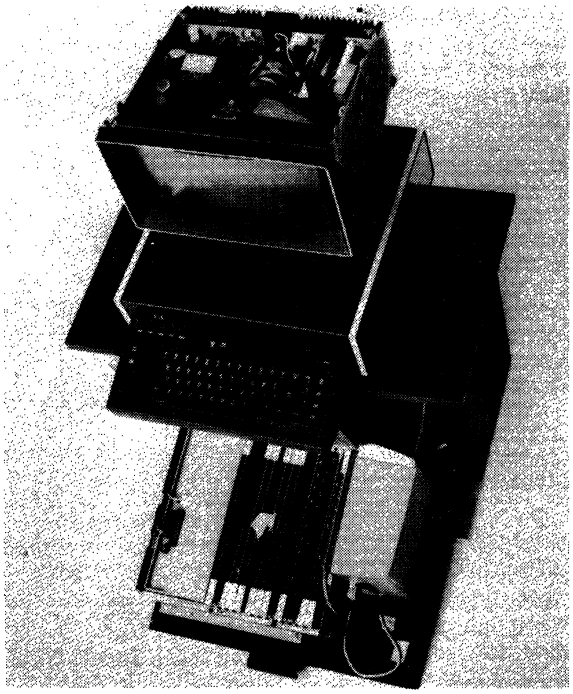
The Teletype Model 40 is an interactive terminal that, except for Model 40/2, transmits and receives data in message blocks. (Model 40/2 transmits data by character only.) Transmission performed on a message block basis transmits the entire contents or a selected part of the display memory upon operator command (and after receipt of a polling message in the case of Model 40/4). Messages are composed and edited prior to transmission.

Manual cursor controls position the cursor up, down, left, right, to the initial position of the next line (return), to the initial position of the first line (home), or spaced forward or backward. Repetitive operation is provided for these cursor functions. The cursor can also be moved to any character position by received series of two-character cursor command sequences that correspond to the cursor functions provided by the manual controls.

On Models 40/1, 40/2, and 40/3, cursor movement in any one direction is inhibited when the cursor reaches the edge of the screen. Model 40/4, however, provides cursor wrap-around. If the cursor is moved off the screen to the right or left, it reappears on the left or right, one line lower or higher, respectively.

Models 40/1, 40/2, and 40/3 differ functionally from Model 40/4. The 40/4 is designed for on-line data entry applications as a directly compatible replacement for the IBM 3270 Information Display System (BSC version only) and provides protected format, tabbing, highlighting (programmable brightness levels), and numeric field delineation as standard features. The other models are

Teletype Model 40 Data Terminals



This overhead view of a pedestal-mounted keyboard/display terminal illustrates the accessibility of the Model 40 circuitry. All of the controller logic is located on the easily replaceable circuit cards in the pedestal.

1 optional printer. The Maxi-Cluster is expandable in sets of one to six devices, made up of one to four keyboard display units and one to five printers.

- Printed output—Teletype's full-character printer prints up to 314 lines per minute using a 64-character set or 220 lines per minute using a 96-character set of upper and lower case alphabetics, and is available as an 80-column friction-feed unit, an 80- or 132-column tractor-feed unit, or an 80-column forms access unit. The forms access unit permits a newly-printed document to be removed from the printer without destroying the next (unprinted) form.

- Displayed output—Essentially the same display characteristics as the IBM 3270. Clarity and sharpness (resolution) of the displayed characters are equivalent to those of the IBM 3270, since both form each character via a 7-by-9 dot matrix. Lower case alphabetics are included in the 40/4's 96-character display option. Like its IBM counterpart, the 40/4 provides two beam intensity levels to highlight important information and beam banking to mask confidential data for security purposes. Unlike the rigidly mounted IBM 3270 display unit, the 40/4 display unit can be tilted to eliminate glare and to satisfy the viewing convenience of individual operators.

- Editing—Provides both character and line insertion and deletion.

intended for inquiry-response interactive applications, but can be equipped for data entry applications. These models offer the above features as options.

All models include an extensive editing capability as a standard feature. Edit functions include both character and line insertion and deletion. Character insertion and deletion, both repeatable functions, affect all data to the right of the cursor up to the end of the line or the beginning of a protected field. The displayed text expands (to the right) for each character entered and contracts for each character deleted. Character insertion is inhibited if no blank spaces are present to the right of the cursor. Line insertion and deletion affect all lines of text from the cursor to the end of display memory or (Models 40/1, 40/2, and 40/3 only) a line occupied by a protected field. On Models 40/1, 40/2, and 40/3, an attempted line insertion is inhibited when display memory has been filled with partial or complete lines of data, or when the insertion is attempted into a segment preceding a protected field where all lines are occupied; i.e., the line containing the protected field will not move downward. On Model 40/4, line insertion or deletion is inhibited if any formatted fields exist on the screen.

Erasure is restricted to screen erasure only on Models 40/1, 40/2, and 40/3. The entire contents of display memory (excluding protected fields when the protected format feature is activated) are erased, beginning at the first character position to the right of the cursor. On Model 40/4, the operator can erase the unprotected fields only or the entire screen. If the entire screen is erased, the cursor is automatically positioned at Home and the format is transmitted when the terminal is polled.

Model 40/4 operates under the control of the program stored at the host computer and provides complete compatibility with the addressing sequence, command code structure, and line discipline employed by the IBM 3270 Information Display System. The 40/4 responds to and executes the full repertoire of IBM 3270 commands, including Read Buffer, Read Modified, Write, Erase-Write, Copy, Erase All Unprotected, Start Field, Set Buffer Address, Insert Cursor, Program Tab, Repeat to Address, and Erase Unprotected to Address. Attribute characters can define fields as protected, highlighted, numeric, and non-displayed.

The newer Model 40/4 stand-alone version is equipped with dual 1920-character buffers. One buffer is assigned to the keyboard/display, the other to the printer; each has its own device address. This technique permits data to be prepared on the display, that data to be sent to the host computer for processing, and the results to be returned to the printer without interrupting operator preparation of a subsequent page of data. Also, the printer is available for local printing of displayed data or remote printing of host computer data without interrupting display operation. The printer can copy protected and/or unprotected displayed data.

Scrolling Memory, an optional feature for Models 40/1, 40/2, and 40/3, adds one or two additional 1920-character (24-line) segments to the basic 1920-character display memory to provide storage for a total of 48 or 72 lines of data. Data storage is divided into two or three consecutive but continuous 24-line segments. By means of the Scroll Up and Scroll Down key functions, any consecutive 24 lines of memory can be displayed at one time; data is moved continuously on one line from each key depression. The Display Advance key function displays each consecutive 24-line segment of the display memory through successive key depressions.

The protected format feature permits the use of fixed formats for data entry applications that require the operator

Teletype Model 40 Data Terminals

- Key entry—Available with either ASCII or EBCDIC typewriter-style keyboards or an EBCDIC typewriter-style keyboard with numeric pad.

- Communications—Transmission speeds from 2400 to 9600 bps (1200 to 4800 bps for the single-station version) and ASCII or EBCDIC coding and BSC protocol are used.

- Software support—The 40/4 is compatible with and can utilize all existing IBM host software that supports the 3270.

The Model 40's page printer sharply contrasts with conventional teleprinter design and construction. In contrast to the single print actuator technique used by Teletype's Model 33 and 35 teleprinters, the Model 40 printer employs 80 or 132 print actuators, one for each print position. It produces printed copy by means of a continuous moving belt that contains imbedded metal type pallets, and a commercially available ribbon. The printer is designed to average 2500 hours of operation between failures.

All members of the Model 40 family feature MOS construction and boast a self-diagnostic capability that will serve as a powerful aid to the user for quickly locating a faulty component through visual inspection. Component failures are identified by lighted neon lamps concealed behind access panels and by printed or displayed test patterns activated by keyed diagnostic sequences. To minimize down-time, Teletype encourage the user himself to replace faulty components (easily done thanks to a high degree of component interchangeability), but still maintains strong service support to satisfy user requirements.

The Teletype Model 40 communications terminal was introduced by AT&T at the International Communications Association conference in May 1973 and exhibited on a grander scale by both AT&T and Teletype at the 1973 National Computer Conference in June. The terminal is available on a purchase-only basis from Teletype, a subsidiary of AT&T's Western Electric Company, and as the Dataspeed 40 Service, a tariffed service offered by AT&T and its Bell System operating companies.

Teletype is by no means a neophyte in the CRT terminal industry. Though long dedicated to the production of teleprinters and punched tape equipment, Teletype gained experience with CRT terminals in the late 1960's, when development began on communication display terminals which were produced and used within the AT&T organization for in-house applications such as order entry.

USER REACTION

In Datapro's 1979 survey of Alphanumeric Display Terminal users, 12 users reported on their experience with 246 Teletype Model 40 terminals. Their ratings are presented below.

to key pertinent data into blank spaces within a displayed format. The feature restricts key entry to unprotected or variable fields within the fixed format. Format descriptors are protected from inadvertent data entry and remain displayed until erased by computer message or by the operator. Only unprotected fields are transmitted or erased, while the format remains displayed. Fields can be highlighted, blanked (40/4), or restricted to numeric entry only (40/4). Models 40/1, 40/2, and 40/3 display protected fields at half the normal intensity. The operator moves from one unprotected field to another (forward or backward) via the tab function, which permits the operator to move to the next unprotected field (tab) or on the 40/4, to the previous unprotected field (backtab). Formats are received only via computer message on the 40/4, but they can also be received from magnetic tape (via the Teletype 4210) or keyed by the operator on the other models.

Highlighting is used to direct the operator's attention to significant information. On the 40/4, fields can be made to blink, displayed at higher than normal brightness, or a combination of both functions. Specified fields can also be blanked (non-displayed) for security reasons. On all other models, highlighting is restricted to blinking a character or field between full and half intensity once every second.

Tabulation is a computer-controlled function on the 40/4, but it can also be controlled from the keyboard on all other models. Tab controls on the 40/4 permit the operator to tab (move the cursor) to the beginning of the next unprotected field, to the beginning of the next unprotected field with erasure of all unprotected data between the existing and new cursor positions, and to the beginning of the present or previous unprotected field. On the other models, tab stops can be set and cleared from the keyboard. Tab stops, each displayed as a dot, are line-independent; i.e., individual tab stops can be located at different positions on each line. When setting tab stops, all stops are simultaneously set in a column, at and immediately below the cursor, in a manner analogous to setting tabs on a typewriter. When clearing, all tab stops immediately below and to the right of the cursor are cleared. The operator can tab to the first tab stop to the right, to the beginning of the next line, or to the beginning of the next unprotected field, whichever comes first.

On Models 40/1, 40/2, and 40/3, protected format (the Protected Data feature), tabulation (Tab Control), and Highlighting are features of the optional Display Option Group.

The printer operates in either on- or off-line mode when used in the KDP configuration. When operating on-line, all received messages are printed; since printing is performed from the display memory, the received messages are also displayed. When operating off-line, the printer is under operator control as a local-copy printer. Displayed messages are printed only when the Print Local key is depressed.

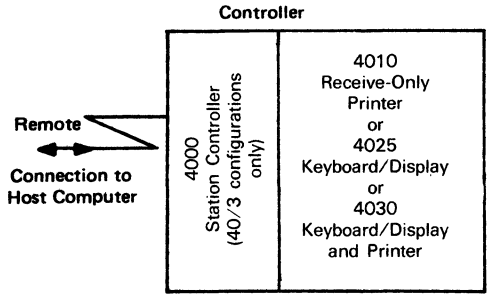
SOFTWARE SUPPORT: Model 40/4 is supported under existing IBM software support for the IBM 3270, which includes the following IBM access methods: BTAM under DOS, DOS/VS, OS, or OS/VS2; TCAM under OS; and VTAM under DOS/VS, OS/VS1, or OS/VS2. Model 40/4 is also supported for use with the following IBM Program Products: VIDEO/370, DATA/370, IMS, IQF, CICS, and TSO.

ERROR CONTROL: Character parity is generated for each keyed character and accompanies the transmitted characters. Parity checking is performed on received data, except on the 40/2. A character found to be in error can be replaced with a special symbol, which is printed and/or displayed on the screen in place of the incorrect character.

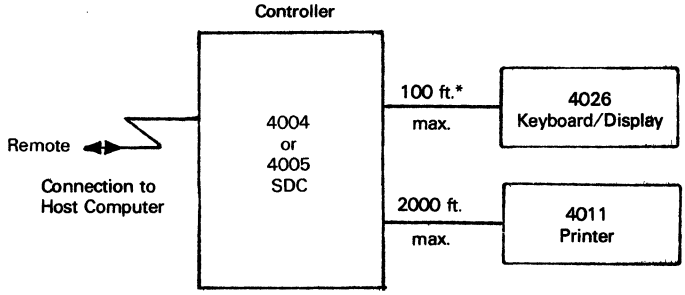
Teletype Model 40 Data Terminals

TELETYPE MODEL 40 CONFIGURATION

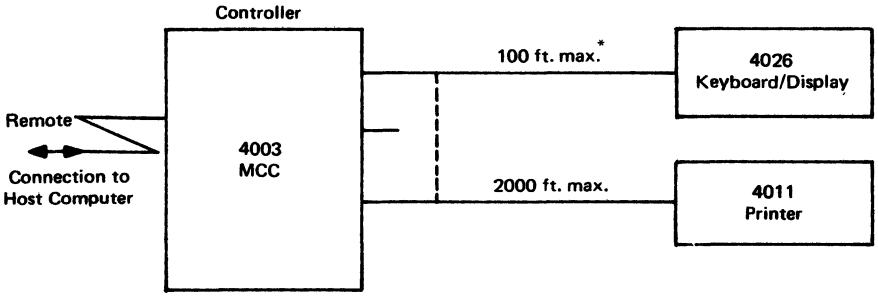
Model 40/1, 40/2, 40/3 (asynchronous)
Model 40/4 (synchronous)



Model 40/4 Single Display

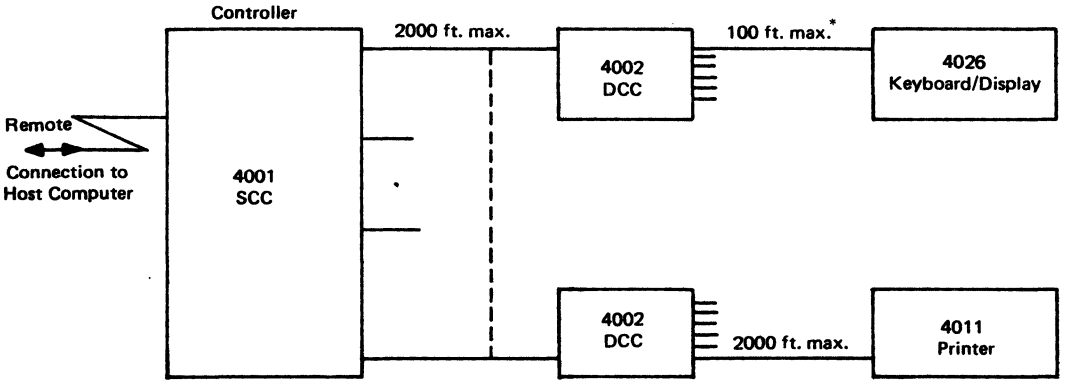


Model 40/4 Mini-cluster



1 or 2 Keyboard/Displays and 0 to 2 Printers. At least 1 Keyboard/Display is recommended for diagnostic purposes.

Model 40/4 Maxi-Cluster



Basic Controller can accommodate 1-24 Keyboard/Displays and 0-30 Printers.

Each Device Controller handles up to 6 devices including up to 4 Keyboard/Displays and up to 5 printers

Maximum of 6 Device Controllers per basic controller.

At least 1 Keyboard/Display is recommended for diagnostic purposes.

MCC – Mini-Cluster Controller
SCC – Station Cluster Controller
DCC – Device Cluster Controller

* Up to 600 feet with Keyboard/Display Amplifier (KDA).

Teletype Model 40 Data Terminals

	Excellent	Good	Fair	Poor	WA*
Overall performance	2	9	0	0	3.2
Ease of operation	1	8	2	0	2.9
Display clarity	3	7	1	0	3.2
Keyboard feel and usability	2	3	6	0	2.6
Hardware reliability	1	9	0	1	2.9
Maintenance service	1	8	1	1	2.8
Software & technical support	0	5	4	1	2.4

*Weighted Average on a scale of 4.0 for Excellent.

These scores reflect a significant decrease in satisfaction compared to users responding to the 1978 survey, in which ratings in all categories were between 3.2 and 3.8. The key advantages of the Model 40, as cited by these users, are lack of site restrictions (5 responses) and compact physical size (6 responses). Six users mentioned low cost as an advantage, while five others felt the cost was high enough to be a disadvantage. No other disadvantages were consistently noted.□

COMPONENTS

CRT DISPLAY: Via a 13-inch (diagonal measurement) CRT with a viewing area 11.25 inches wide by 5.25 inches high. The screen is arranged in 24 lines of 80 characters each, totaling 1920 character positions. Models 40/1, 40/2, and 40/3 provide a character set of 127 ASCII characters, including upper and lower case alphabetics, numerics, and special symbols. Model 40/4 has a character set of 64 or 96 (optional) characters, including upper case alphabetics, numerics, and symbols; lower case letters are included in the optional 96-character set. All models display data in white against a dark background. Characters are formed by a 7-by-9 dot matrix. The viewing screen can be vertically tilted through 20 degrees of rotation (±10 degrees from the horizontal) to compensate for glare and ease operator viewing.

KEYBOARD: The typewriter-style keyboard for Models 40/1, 40/2, and 40/3 can generate any of 128 ASCII character codes, including upper and lower case alphabetics, numerics, specials, and control codes. A choice of three typewriter-style keyboards is offered for the 40/4: one with no numeric cluster, one with an internal numeric cluster, and one with an external numeric cluster located to the right of the main keygroup. Each of the 40/4 keyboards can generate 96 upper and lower case ASCII or EBCDIC characters. Control codes are printed on their respective keytops on all models. A character repeat function can be user-implemented to permit repetitive entry of data or control functions.

PRINTER: A full-character impact belt printer rated at 300 lines/minute with the standard 64-character set of ASCII upper-case symbols or 220 lines/minute with the optional 94-character set of ASCII upper and lower case symbols. The printer is available as an 80-column, friction-feed unit; an 80-column, tractor-feed unit; as a 132-column, tractor-feed unit; or an 80-column forms access unit. The forms access unit contains a tractor feed located *below* the print line, so that a form that has just been printed can be removed without destroying the next (unprinted) form. Horizontal and vertical spacing is 10 characters/inch and 6 lines/inch, respectively. Friction feed employs standard 8½-inch wide single-ply rolled paper. Tractor feed accommodates pin-fed, 6-part, continuous forms from 4⅛- to 9½-inches wide for the 80-column unit or from 4⅛- to 15-inches wide for the 132-column unit. Form lengths is controlled by a "forms out belt"; the standard belt prints forms of 2¾, 3 2/3, 5½, or 11 inches in length; optional belts can accommodate forms from 2.5 to 22 inches in length.

Printing is performed by means of a row of 80 or 132 print actuators, one per print position, and a continuous arrangement of type pallets which are imbedded into a moving belt. When energized, each actuator strikes its respective pallet, which impacts the paper through a ribbon. The 64-character set is repeated three times around the belt; the full ASCII set is repeated two times.

PRICING

The Model 40 can be obtained from Teletype on a purchase basis only. Teletype now provides functional discounts only; quantity discounts have been discontinued. Functional discounts of 10 percent are available to nonprofit educational institutions (public and private) and to state, county, and municipal governments and their Canadian equivalents. Functional discounts of 40 percent are available to resellers (OEM's), lessors, and common carriers (communications and transportation), and to United States and Canadian Federal Governments and their prime contractors (including subcontractors).

Monthly maintenance and installation prices for the four models of the Teletype 40 are as follows:

	Monthly Maint.	Installation
Models 40/1, 40/2, & 40/3:		
4010 ROP	$30	$100
4025 KD	30	45
4030 KDP	39	145
Model 40/4:		
4001 SCC	17 to 22	74
4002 DCC	16 to 21	69
4003 MCC	16 to 18	79
4004 SDC*	18	156
4011 Printer	21	89
4026 KD	14	54

*Includes KD.

Model 40 Receive-Only Printer/Controllers (for Model 40/1 and 40/2 Configurations)

Model Number			Purchase Price	
Table Model	Pedestal Mounted		Table Model	Pedestal Mounted
		4010 Receive-Only Printer/Controller with:		
-3HOO	-3HOF	Tractor feed, 80 print positions, and upper case ASCII	$5,075	$5,232
-3KOO	-3KOF	Tractor feed, 80 print positions, and upper/lower case ASCII	5,075	5,232
-3LOO	-3LOJ	Tractor feed, 132 print positions, and upper case ASCII	6,167	6,328
-3MOO	-3MOJ	Tractor feed, 132 print positions, and upper/lower case ASCII	6,167	6,328
-3COO	-3COD	Friction feed, 80 print positions, and upper case ASCII		
-3FOO	-3FOD	Friction feed, 80 print positions, and upper/lower case ASCII		

Teletype Model 40 Data Terminals

Model Number		Purchase Price
	4010 Receive-Only Printer/Controller with:	
-3AON	Forms access feed, 80 print positions, upper case ASCII, 6 lines per inch	$5,392
-3AON2	Forms access feed, 80 print positions, upper case ASCII, 8 lines per inch	5,392
-3DON	Forms access feed, 80 print positions, upper/lower case ASCII, 6 lines per inch	5,392
-3DON2	Forms access feed, 80 print positions, upper/lower case ASCII, 8 lines per inch	5,392

Model 40/1 Stand-Alone Configurations

Model Number		Purchase Price
	4025 Tabletop Keyboard Display (KD) with:	
-1OAO	A 24-line display	$4,170
-1ODO	A 24-line display; tab control, highlighting, & protected data features	4,463
-1OBO	A 48-line display	4,338
-1OEO	A 48-line display; tab control, highlighting, & protected data features	4,673
-1OCO	A 72-line display	4,507
-1OFO	A 72-line display; tab control, highlighting, & protected data features	4,883
-IPAO	A 24-line display, Conversation mode, & printer port	4,388
-IPDO	A 24-line display; tab control, highlighting, protected data features, Conversation mode, & printer port	4,682
-IPBO	A 48-line display, Conversation mode, & printer port	4,557
-IPEO	A 48-line display; tab control, highlighting, protected data features, Conversation mode, & printer port	4,892
-IPCO	A 72-line display, Conversation mode, & printer port	4,725
-IPFO	A 72-line display; tab control, highlighting, protected data features, Conversation mode, & printer port	5,102

Model 40/2 Stand-Alone Configurations

Model Number		Purchase Price
	4025 Tabletop Keyboard Display (KD) with:	
-5OAO	A 24-line display	$4,565
-5ODO	A 24-line display; tab control, highlighting, & protected data features	4,607
-5OBO	A 48-line display	4,733
-5OEO	A 48-line display; tab control, highlighting, & protected data features	4,817
-5OCO	A 72-line display	4,902
-5OFO	A 72-line display; tab control, highlighting, & protected data features	5,027
-5PAO	A 24-line display & printer port	4,792
-5PDO	A 24-line display; tab control, highlighting, protected data features, & printer port	4,833
-5PBO	A 48-line display & printer port	4,960
-5PEO	A 48-line display; tab control, highlighting, protected data features, & printer port	5,043
-5PCO	A 72-line display & printer port	5,128
-5PFO	A 72-line display; tab control, highlighting, protected data features, & printer port	5,253

Model 40/3 Stand-Alone Configurations

Model Number			Purchase Price	
Single Pedestal	Double Pedestal		Single Pedestal	Double Pedestal
		4000 Station Controller:		
-2AAC	—	120 cps; for 4010 Receive-Only Printer	$1,187.30	—
-2ABC	—	105 cps; for 4010 Receive-Only Printer	1,188.40	—
-2AAD	—	120 cps; for 4010 Receive-Only Printer in KD or KDP and ROP configuration (for simultaneous send/receive)	1,286.10	—
-2ABD	—	105 cps; for 4010 Receive-Only Printer in KD or KDP and ROP Configuration (for simultaneous send/receive)	1,287.20	—
-2AAA	—	120 cps; for 4030 Printer Under Display Configuration	1,214.00	—
-2ABA	—	105 cps; for 4030 Printer Under Display Configuration	1,215.10	—
—	-2AAB	120 cps; for 4030 Printer Beside Display Configuration and 4025 Configurations	—	$1,275.50
—	-2ABB	105 cps; for 4030 Printer Beside Display Configurations and 4025 Configurations	—	1,276.60
		4010 Receive-Only Printer (ROP) with:		
-1BOA	—	Friction feed, 80 print positions, and upper case ASCII	4,947	—
-1COA	—	Friction feed, 80 print positions, upper case ASCII, and 1000-character buffer	5,230	—
-1EOA	—	Friction feed, 80 print positions, and upper/lower case ASCII	4,947	—
-1FOA	—	Friction feed, 80 print positions, upper/lower case ASCII, and 1000-character buffer	5,230	—
-1HOB	—	Tractor feed, 80 print positions, and upper case ASCII	5,382	—
-1GOB	—	Tractor feed, 80 print positions, upper case ASCII, and 1000-character buffer	5,665	—
-1KOB	—	Tractor feed, 80 print positions, and upper/lower case ASCII	5,382	—
-1JOB	—	Tractor feed, 80 print positions, upper/lower case ASCII, and 1000-character buffer	5,665	—

Teletype Model 40 Data Terminals

Model 40/3 Stand-Alone Configuration (Continued)

Model Number			Purchase Price	
Single Pedestal	Double Pedestal		Single Pedestal	Double Pedestal
		4025 Keyboard Display (KD) with:		
-2ODA	—	A 24-line display; tab control, highlighting, & protected data features	4,635	—
-2OEA	—	A 48-line display; tab control, highlighting, & protected data features	4,845	—
-2OFA	—	A 72-line display; tab control, highlighting, & protected data features	5,055	—
		4025 Keyboard/Display (KD)—(for use with 4010 Receive-Only Printer (ROP) in a KD-ROP configuration) with:		
-2PDA	—	A 24-line display; tab control, highlighting, & protected data features	4,862	—
-2PEA	—	A 48-line display; tab control, highlighting, & protected data features	5,072	—
-2PFA	—	A 72-line display; tab control, highlighting, & protected data features	5,282	—
		4030 Keyboard Display Printer (KD) Printer Under Display; includes friction feed, 80 print positions, and upper case ASCII, with:		
-2ADA	—	A 24-line display; tab control, highlighting, & protected data features	7,568	—
-2AEA	—	A 48-line display; tab control, highlighting, & protected data features	7,778	—
-2AFA	—	A 72-line display; tab control, highlighting, & protected data features	7,988	—
		4030 Keyboard Display Printer (KDP) Printer Under Display; includes friction feed, 80 print positions, and upper/lower case ASCII with:		
-2DDA	—	A 24-line display; tab control, highlighting, & protected data features	7,568	—
-2DEA	—	A 48-line display; tab control, highlighting, & protected data features	7,778	—
-2DFA	—	A 72-line display; tab control, highlighting, & protected data features	7,988	—
		4030 Keyboard Display Printer (KDP) Printer Beside Display; includes friction feed, 80 print positions, and upper case ASCII with:		
-2BDC	-2BDG	A 24-line display; tab control, highlighting, & protected data features	7,473	7,683
-2BEC	-2BEG	A 48-line display; tab control, highlighting, & protected data features	7,683	7,893
-2BFC	-2BFG	A 72-line display; tab control, highlighting, & protected data features	7,893	8,103
		4030 Keyboard Display Printer (KDP) Printer Beside Display; includes friction feed, 80 print positions, and upper/lower case ASCII with:		
-2EDC	-2EDG	A 24-line display; tab control, highlighting, & protected data features	7,473	7,683
-2EEC	-2EEG	A 48-line display; tab control, highlighting, & protected data features	7,683	7,893
-2EFC	-2EFG	A 72-line display; tab control, highlighting, & protected data features	7,893	8,103
		4030 Keyboard Display Printer (KDP) Printer Beside Display; includes tractor feed, 80 print positions, and upper case ASCII with:		
—	-2GDH	A 24-line display; two controls, highlighting, & protected data features	—	8,172
—	-2GEH	A 48-line display; tab control, highlighting, & protected data features	—	8,382
—	-2GFH	A 72-line display; tab control, highlighting, & protected data features	—	8,592
		4030 Keyboard Display Printer (KDP)—Printer Beside Display; includes tractor feed, 80 print positions, and upper/lower case ASCII with:		
—	-2JDH	A 24-line display; tab control, highlighting, & protected data features	—	8,172
—	-2JEH	A 48-line display; tab control, highlighting, & protected data features	—	8,382
—	-2JFH	A 72-line display; tab control, highlighting, & protected data features	—	8,592

Teletype Model 40 Data Terminals

Model 40/4 Cluster and Stand-Alone Configurations

Model Number				Purchase Price
			4001 Station Cluster Controller (SCC) with support for:	
-4ZAA			One to four device cluster controllers; contains a 29-inch top	$4,822
-4ZAL			One to four device cluster controllers; contains a 27-inch slotted top	4,825
-4ZBA			One to six device cluster controllers; contains a 29-inch top	5,250
-4ZBL			One to six device cluster controllers; contains a 27-inch slotted top	5,253

Model Number				
ASCII* code	EBCDIC* code	EBCDIC** code		
			4002 Device Cluster Controller (DCC) with support for:	
-4BAA	-4FAA	-4FEA	One Keyboard Display and one or two printers with 29-inch top	5,990
-4BAL	-4FAL	-4FEL	One Keyboard Display and one or two printers with 27-inch slotted top	5,993
-4DAA	-4HAA	-4HEA	One Keyboard Display and up to five printers with 29-inch top	6,418
-4DAL	-4HAL	-4HEL	One Keyboard Display and up to five printers with 27-inch slotted top	6,422
-4ABA	-4EBA	-4EFA	One or two Keyboard Displays and one printer with 29-inch top	6,372
-4ABL	-4EBL	-4EFL	One or two Keyboard Displays and one printer with 27-inch slotted top	6,375
-4BBA	-4FBA	-4FFA	One or two Keyboard Displays and up to four printers with 29-inch top	6,800
-4BBL	-4FBL	-4FFL	One or two Keyboard Displays and up to four printers with 27-inch slotted top	6,803
-4BCA	-4FCA	-4FGA	One to three Keyboard Displays and up to three printers with 29-inch top	7,182
-4BCL	-4FCL	-4FGL	One to three Keyboard Displays and up to three printers with 27-inch slotted top	7,185
-4BDA	-4FDA	-4FHA	One to four Keyboard Displays and one or two printers with 29-inch top	7,563
-4BDL	-4FDL	-4FHL	One to four Keyboard Displays and one or two printers with 27-inch slotted top	7,567
			4003 Mini-Cluster Controller (MCC) with support for:	
-4BAA	-4FAA	-4FEA	One Keyboard Display and one or two printers with 29-inch top	6,987
-4BAL	-4FAL	-4FEL	One Keyboard Display and one or two printers with 27-inch slotted top	6,990
-4ABA	-4EBA	-4EFA	One or two Keyboard Displays and one printer with 29-inch top	7,368
-4ABL	-4EBL	-4EFL	One or two Keyboard Displays and one printer with 27-inch slotted top	7,372

Model Number		
	4004 Single Display Controller (SDC); for multipoint private line faclities; provides support for:	
-4EAA	One Keyboard Display and one printer with 29-inch top	3,503
-4EAL	One Keyboard Display and one printer with 27-inch slotted top	3,507
	4005 Single Display Controller (SDC); for switched network facilities; provides support for:	
-4EAA	One Keyboard Display and one printer with 29-inch top	3,380
-4EAL	One Keyboard Display and one printer with 27-inch top	3,383

Model Number			Model Number	
80-Column Tractor Feed	132-Column Tractor Feed		80-Column Tractor Feed	132-Column Tractor Feed
		4010 Receive-Only Printer/Controller with:		
-4WZO	-4YZO	48-character ASCII/EBCDIC character set	$4,878	$5,970
-4HOO	-4LOO	64-character ASCII character set	4,878	5,970
-4HZO	-4LZO	64-character EBCDIC character set	4,878	5,970
-4KOO	-4MOO	96-character ASCII character set	4,878	5,970
-4KZO	-4MZO	96-character EBCDIC character set	4,878	5,970

Model Number		Purchase Price
	4025 Single Display Controller & Keyboard Display (SDC & KD) with attached keyboard:	
-4ZAO	Typewriter keyboard; for multipoint facilities	4,498
-4ZEO	Typewriter keyboard with internal numeric cluster; for multi-point facilities	4,498
-4ZJO	Typewriter keyboard with external numeric cluster; for multi-point facilities	4,740
-4ZAZ	Typewriter keyboard; for switched network facilities	4,498
-4ZEZ	Typewriter keyboard with internal numeric cluster; for switched network facilities	4,498
-4ZJZ	Typewriter keyboard with external numeric cluster; for switched network facilities	4,740

*Typewriter-style keyboard with or without external numeric pad.
**Typewriter-style keyboard with internal numeric pad.

Teletype Model 40 Data Terminals

Model 40/4 Cluster and Stand-Alone Configuration (Continued)

Model Number		Purchase Price
	4026 Keyboard Display (KD):	
-4ZAO	With attached typewriter keyboard	1,335
-4ZEO	With attahed typewriter keyboard and integral numeric cluster	1,335
-4ZJO	With attached typewriter keyboard and external numeric cluster	1,577
-4ZAR	With detached typewriter keyboard	1,282
-4ZER	With detached typewriter keyboard and intergral numeric cluster	1,282
-4ZJR	With detached typewriter keyboard and external numeric cluster	1,448

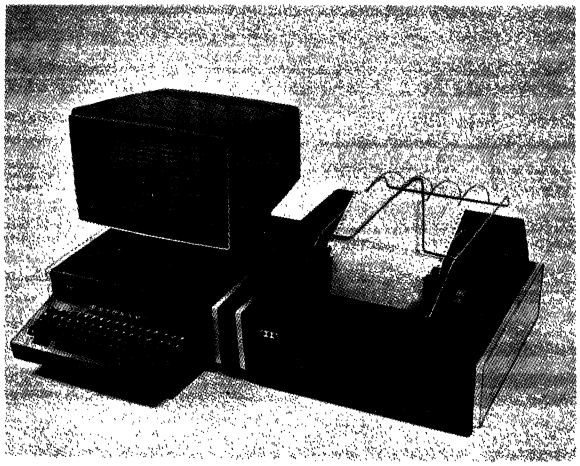
Model 40 Printers

Model Number			
Upper Case	Upper/Lower Case		Purchase Price
		4011 Printer (P):	
-3BOO	-3EOO	With friction feed, 80 print positions, and ASCII code	$2,712
-3BZO	-3EZO	With friction feed, 80 print positions, and EBCDIC code	2,712
-4GOO	-4JOO	With tractor feed, 80 print positions, and ASCII code	2,950
-4GZO	-4JZO	With tractor feed, 80 print positions, and EBCDIC code	2,950
-4LOO	-4MOO	With tractor feed, 132 print positions, and ASCII code	4,048
-4LZO	-4MZO	With tractor feed, 132 print positions, and EBCDIC code	4,048
-4AON	-4DON	With forms access feed, 80 print positions, ASCII code, 6 lines per inch, ribbon mechanism	3,247
-4AON2	-4DON2	With forms access feed, 80 print positions, ASCII code, 8 lines per inch, ribbon mechanism	3,247
-4AON3	-4DON3	With forms access feed, 80 print positions, ASCII code, 6 lines per inch, no ribbon mechanism	3,192
-4AZN	-4DZN	With forms access feed, 80 print positions, EBCDIC code, 6 lines per inch, ribbon mechanism	3,247
-4AZN3	-4DZN3	With forms access feed, 80 print positions, EBCDIC code, 6 lines per inch, no ribbon mechanism	3,192

Model 40 Pedestals (for Model 40/1, 40/2, and 40/4 Configurations)

Model Number		Purchase Price
	4000 Pedestals (empty):	
-4OOF	A 20-inch wide pedestal with 20-inch top and 11-inch slot	$157
-4OOD	A 24-inch wide pedestal with 24-inch top	210
-400E	A 24-inch wide pedestal with 24-inch top and 11-inch slot	213
-4OOL	A 24-inch wide pedestal with 27-inch top and 17-inch slot	213
-4OOA	A 24-inch wide pedestal with 29-inch top	210
-4OOB	A 24-inch wide pedestal with 31-inch top and 11-inch slot	213
-4OOC	A 24-inch wide pedestal with 34-inch top	210
-4OOJ	A 24-inch wide pedestal with 27-inch top and 17-inch slot	162 ■

Teletype Model 40 Data Terminals



A typical Model 40 KDP configuration includes the four basic modules: display monitor, electronics package keyboard, and printer. The 40/4 above is shown with a tractor feed printer.

A family of CRT keyboard/display/printer terminals that includes stand-alone asynchronous terminals and clustered/stand-alone synchronous terminals that provide compatibility with IBM's 3270 using BSC protocol.

Configurations available on each model are ROP (receive-only printer), KD (keyboard and display), and KDP (keyboard, display and printer). Stand-alone asynchronous models operate at from 110 bps up to 4800 bps. The IBM 3270-compatible 40/4 can support up to 24 keyboard/displays and as many as 30 printers.

Typical purchase prices range from $3,441 for a basic Model 40/1 in an ROP configuration to $96,522 for a Model 40/4 configured with 24 keyboard/displays and 12 printers with all options.

These systems are also available through AT&T under the Dataspeed 40 Service as well as from leasing companies and other common carriers.

MANAGEMENT SUMMARY

The Teletype Model 40 family of Data Terminals consists of four models that include:

- Three asynchronous, single-station, stand-alone terminals for general purpose, interactive applications and
- One synchronous model designed for IBM 3270 compatibility via BSC protocol, available in cluster or stand-alone configurations.

All models of the Teletype 40 family are available from Bell System telephone companies under Dataspeed 40 service.

Models 40/1, 40/2, and 40/3 are asynchronous ASCII terminals that, except for differences among transmission parameters and usage, provide essentially the same features. The 40/1, the original Model 40, is intended for dial-up operation. Model 40/3 was introduced about a year after Model 40/1 as the multi-point version of the 40/1 and is intended for leased-line operation. Model 40/2, introduced about 8 months after the 40/3, is an improved version of the basic Model 40 that can be used on dial-up or leased lines.

Model 40/1 transmits a line or block at a time and is available with Conversation mode, which automatically switches the terminal between send and receive modes for each line transmitted or received. However, the 40/1 is limited to transmission speeds of 1050, 1200, or 2400 bps and is available only with an RS-232C interface.

The more versatile 40/2 transmits a message in either character or block mode at seven selectable rates ranging from 110 to 4800 bps, and is available with an RS-232C or current loop interface. As a standard feature, the 40/2 provides the same conversational switching function (in

CHARACTERISTICS

VENDOR: Teletype Corporation, 5555 Touhy Avenue, Skokie, Illinois 60076. Teletype (312) 982-2000.

DATE OF ANNOUNCEMENT: Model 40/1, 40/2, 40/3 — May 1973; Model 40/4 (cluster) — November 1975; Model 40/4 (stand-alone) — October 1977.

DATE OF FIRST DELIVERY: Model 40/1, 40/2, 40/3 — October 1973; Model 40/4 (cluster) — March 1976; Model 40/4 (stand-alone) — November 1977.

NUMBER DELIVERED TO DATE: Over 22,000 keyboard/displays and over 22,000 printers.

SERVICED BY: Teletype Corporation, telephone company, or leasing company, depending on source.

MODELS

The Teletype Model 40 product line is a family of four models:

- **Model 40/1 — A stand-alone terminal for point-to-point operation and general purpose applications.**
- **Model 40/2 — A stand-alone terminal for point-to-point operation especially suited for teleprinter-replacement for time-sharing applications.**
- **Model 40/3 — A stand-alone terminal for multipoint operation.**
- **Model 40/4 — Available as a stand-alone or clustered IBM 3270-compatible terminal for point-to-point or multipoint operation.**

Teletype Model 40 Data Terminals

the character mode) as the 40/1, but via ASCII control codes. When transmitting in the character mode, the 40/2 can be operated in half-duplex mode or in a true full-duplex mode where the transmitted data differs from the received data. A destructive scrolling feature permits displaying unlimited amounts of received data; the received data is scrolled down the screen and is lost once the memory capacity is exceeded. An application of this feature would be monitoring extensive messages as they are printed.

Other features of the Model 40/2 include Automatic New Line and Line Break/Interrupt. The Automatic New Line feature returns the cursor to the beginning of the next line and the 40/2 continues to display received data in the event the New Line character has not been received. The Line Break/Interrupt feature permits the operator to interrupt the transmission from the remote sender on either half- or full-duplex transmissions. Added printer features include Automatic Answer, which permits the printer to automatically answer a call and print a received message when the terminal is in the local mode and message composition is in progress; Remote Control, which controls whether transmitted data is printed or not; and a print speed feature for KDP configurations that restricts print speed from falling below 120 cps when the printer is in local mode, regardless of lower line speeds. Local printing is performed at line rates for higher line speeds, and on-line printing is always performed at line rates.

The asynchronous members of the Model 40 family of terminals are composed of interactive terminal modules that can be arranged in various configurations ranging from a receive-only printer to a full-blown terminal including keyboard, display, and printer. Four modules form the basic building blocks of the Model 40: keyboard, display, printer, and terminal logic. Many physical arrangements are possible, with the electronics package and/or printer located up to 1000 feet away from the CRT/keyboard. Table-top or pedestal mount can be specified.

Salient features of the three asynchronous members of the Model 40 family include:

- A 1920-character screen arranged in 24 lines of 80 characters.
- A full set of cursor controls that permit local or remote cursor manipulation. (Character addressability, however, is not provided.)
- A full set of ASCII characters, including upper-and-lower-case alphabetics, that can be displayed or keyed.
- A complete editing capability, including character and line insertion and deletion.
- A formatting option that features protected fields for format descriptors.

CONFIGURATION

The equipment configurations for the four models of the Teletype 40 are described below.

***Models 40/1, 40/2, and 40/3*—There are three basic equipment configurations: KDP—includes keyboard, display, and printer; KD—includes keyboard and display; and RO—includes printer only. The KD and KDP configurations are each available in different physical arrangements that include table-top and pedestal mounts. In the table-top KDP arrangement, the keyboard can be attached to the front of either the electronics package or the printer, with the display on top; the other module (printer or electronics package) can be located up to 1000 feet away. In the pedestal arrangement, keyboard and printer are combined and the logic module is located in the base of the pedestal. The Model 40 can accommodate the Teletype Model 4210 Magnetic Tape Data Terminal, which can be used in both on- and off-line modes.**

***Model 40/4 (cluster version)*—Two cluster configurations are available: Maxi-Cluster and Mini-Cluster. The Maxi-Cluster consists of a controller and 1 to 36 devices, including 1 to 24 keyboard/display units (KD's) and 1 to 30 printers. The controller consists of a Station Cluster Controller (SCC) with up to 6 Device Cluster Controllers (DCC's). Each DCC can accommodate up to 4 KD's and 1 to 5 printers. The Mini-Cluster consists of a Mini-Cluster Controller (MCC) and up to three devices, including 1 or 2 KD's and 1 or 2 printers. At least 1 KD is required in a Maxi- or Mini-Cluster configuration. The SCC or MCC connects to the communications facility via an external modem.**

The Maxi- or Mini-Cluster Controller physically resides in a 24-inch-high pedestal cabinet. Two different pedestals are available: one with slotted top, the other without the slot. The slotted pedestal is intended to support a printer, and provides a paper slot at the top front to allow paper to be fed from bin to printer. Two physical arrangements are available for the keyboard/display (KD) units: base mount or cabinet mount. In the base mount arrangement a flat disk base supports the CRT display portion of the KD; the keyboard is physically separate. In the cabinet mount arrangement, the CRT display and keyboard are mounted to the electronics package to provide a single unit. Each KD can be located up to 100 or 600 feet with optional amplifier (KDA) from the Device or Mini-Cluster Controller, and each printer can be located up to 2000 feet from the controller. The Device Cluster Controller can be separated from the Station Cluster Controller by 2000 feet, and the SCC can be located up to 50 feet from the modem.

***Model 40/4 (stand-alone version)*—The single-display configuration consists of a Single Display Controller (SDC), one keyboard/display (KD) and an optional printer. The SDC is contained within a pedestal. The KD is available with an attached or detached keyboard. The detached keyboard version has a pedestal-mounted monitor.**

Configuration details are presented in the diagrams and Price List at the end of this report.

TRANSMISSION CHARACTERISTICS

Models 40/1, 40/2, and 40/3 are asynchronous terminals; Model 40/4 is a synchronous terminal. The communications parameters for each of the models are presented below.

***Models 40/1 and 40/3*—Asynchronous in the half-duplex mode at 1050, 1200, or 2400 (40/1 only) bits/second (105, 120, or 240 char/second). The 8-level (with parity) ASCII transmission code is used; the unit code structure is 10 bits/character, including unity start and stop bits. The modem interface is compatible with EIA Standard RS-232C and connects to the communications facility via a Bell System**

Teletype Model 40 Data Terminals

- A paging option that increases the size of display memory to 48 or 72 80-character lines (2 or 3 pages) and, through scrolling, displays any consecutive 24 lines or complete 24-line memory segments.

- A horizontal tab option that permits any number of tab positions to be established.

- A highlighting option that flashes selected segments of data between half and full intensity.

- A high-speed impact page printer that prints up to 314 80-character lines per minute on ordinary teleprinter roll paper or sprocket-fed, multi-part forms. Upper-case-only or upper-and-lower-case alphabetics can be specified.

- A transmission speed of 1050 or 1200 bits per second in Models 40/1 and 40/3, and of 110 to 4800 bits per second in Model 40/2.

- The capability to interface with a Teletype Model 4210 Magnetic Tape Data Terminal.

Model 40/4, which was designed for IBM 3270-compatibility, is available in a cluster or stand-alone (single station) arrangement. The single-station arrangement is the most recent addition to the family. The Model 40/4 provides software compatibility with the IBM 3270 with respect to communications protocol (restricted to BSC), commands and command code structure, and addressing sequence. The Model 40/4 also provides many of the features and functions of the IBM 3270, although it is not available with a light pen or operator ID card reader. (The new Teletype 4500, introduced in June 1978, provides more of the 3270 features and functions.)

A key feature of the single-station version is its dual 1920-character buffer, which permits data to be prepared on the display, that data to be sent to the host computer for processing, and results to be returned to the printer without interrupting operator preparation of a subsequent page of data.

The salient features of Model 40/4 are as follows:

- Display capacity—Available in a 1920-character screen size only.

- System configuration—Available in three configurations: a Mini-Cluster that accommodates up to three devices including one or two keyboard/display units and one or two printers; a Maxi-Cluster that accomodates up to 24 keyboard/display units and up to 30 printers; and a stand-alone version with 1 keyboard/display unit and 1 optional printer. The Maxi-Cluster is expandable in increments of one to four keyboard display units and one to five printers.

- Printed output—Teletype's full-character printer prints up to 314 lines per minute using a 64-character set

202 or equivalent modem, Model 40/1 is designed for point-to-point operation over the dial network. Model 40/3 is designed for multipoint operation on leased or private lines.

Model 40/2—Asynchronous in the half- or full-duplex mode at 110, 150, 300, 600, 1200, 2400, or 4800 bits/second (15 to 480 char/second). Any two specified speeds can be switch-selected. The 8-level (with odd or even parity) ASCII transmission code is used. The unit code structure is 11 bits/character at 110 bits/second and 10 or 11 bits/character (as specified) at all higher transmission speeds, and includes 7 data bits, a parity bit, a start bit, and one or two stop bits. A 20 or 60 ma DC interface or RS-232C interface can be specified. Depending on operating speed, a Bell System 103, 113, or 202 type modem or an equivalent modem must be specified.

Model 40/4—Synchronous in the half-duplex mode at 2400 or 4800 bits/second (300 or 600 char/second) for the Mini-Cluster Controller (MCC) and the Single Display Controller (SDC) and at 2400 to 9600 bits/second (300 to 1200 char/second) for the Station Cluster Controller (Maxi-Cluster). The 8-level (with odd parity) ASCII or EBCDIC transmission code is used. The Binary Synchronous Communication (BSC) line protocol is used. The BSC protocol conforms to ANSI X3.28-1971/2.4B2. An EIA Standard RS-232C interface accommodates a Bell System 201 (2400 bps), 208 (4800 bps), or 209 (9600 bps) or equivalent modem.

DEVICE CONTROL

The Teletype Model 40 is an interactive terminal that, except for Model 40/2, transmits and receives data in message blocks. (Model 40/2 transmits data by character only.) Transmission performed on a message block basis transmits the entire contents or a selected part of the display memory upon operator command (and after receipt of a polling message in the case of Model 40/4). Messages are composed and edited prior to transmission.

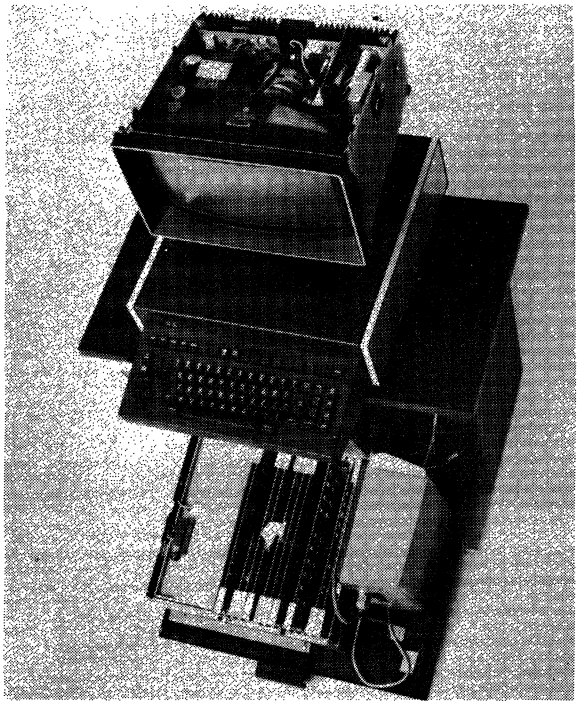
Manual cursor controls position the cursor up, down, left, right, to the initial position of the next line (return), to the initial position of the first line (home), or spaced forward or backward. Repetitive operation is provided for these cursor functions. The cursor can also be moved to any character position by received series of two-character cursor command sequences that correspond to the cursor functions provided by the manual controls.

On Models 40/1, 40/2, and 40/3, cursor movement in any one direction is inhibited when the cursor reaches the edge of the screen. Model 40/4, however, provides cursor wrap-around. If the cursor is moved off the screen to the right or left, it reappears on the left or right, one line lower or higher, respectively.

Models 40/1, 40/2, and 40/3 differ functionally from Model 40/4. The 40/4 is designed for on-line data entry applications as a directly compatible replacement for the IBM 3270 Information Display System (BSC version only) and provides protected format, tabbing, highlighting (programmable brightness levels), and numeric field delineation as standard features. The other models are intended for inquiry-response interactive applications, but can be equipped for data entry applications. These models offer the above features as options.

All models include an extensive editing capability as a standard feature. Edit functions include both character and line insertion and deletion. Character insertion and deletion, both repeatable functions, affect all data to the right of the cursor up to the end of the line or the beginning of a protected field. The displayed text expands (to the right) for each character entered and contracts for each character deleted. Character insertion is inhibited if no

Teletype Model 40 Data Terminals



This overhead view of a pedestal-mounted keyboard/display terminal illustrates the accessibility of the Model 40 circuitry. All of the controller logic is located on the easily replaceable circuit cards in the pedestal.

or 220 lines per minute using a 96-character set of upper and lower case alphabetics, and is available as an 80-column friction-feed unit or an 80- or 132-column tractor-feed unit.

- Displayed output—Essentially the same display characteristics as the IBM 3270. Clarity and sharpness (resolution) of the displayed characters are equivalent to those of the IBM 3270, since both form each character via a 7-by-9 dot matrix. Lower case alphabetics are included in the 40/4's 96-character display option. Like its IBM counterpart, the 40/4 provides two beam intensity levels to highlight important information and beam banking to mask confidential data for security purposes. Unlike the rigidly mounted IBM 3270 display unit, the 40/4 display unit can be tilted to eliminate glare and to satisfy the viewing convenience of individual operators.

- Editing—Provides both character and line insertion and deletion.

- Key entry—Available with either ASCII or EBCDIC typewriter-style keyboards or an EBCDIC typewriter-style keyboard with numeric pad.

- Communications—Transmission speeds from 2400 to 9600 bps (up to 4800 bps for the single-station version) and ASCII or EBCDIC coding and BSC protocol are used.

- Software support—The 40/4 is compatible with and can utilize all existing IBM host software that supports the 3270.

blank spaces are present to the right of the cursor. Line insertion and deletion affect all lines of text from the cursor to the end of display memory or (Models 40/1, 40/2, and 40/3 only) a line occupied by a protected field. On Models 40/1, 40/2, and 40/3, an attempted line insertion is inhibited when display memory has been filled with partial or complete lines of data, or when the insertion is attempted into a segment preceding a protected field where all lines are occupied; i.e., the line containing the protected field will not move downward. On Model 40/4, line insertion or deletion is inhibited if any formatted fields exist on the screen.

Erasure is restricted to screen erasure only on Models 40/1, 40/2, and 40/3. The entire contents of display memory (excluding protected fields when the protected format feature is activated) are erased, beginning at the first character position to the right of the cursor. On Model 40/4, the operator can erase the unprotected fields only or the entire screen. If the entire screen is erased, the cursor is automatically positioned at Home and the format is transmitted when the terminal is polled.

Model 40/4 operates under the control of the program stored at the host computer and provides complete compatibility with the addressing sequence, command code structure, and line discipline employed by the IBM 3270 Information Display System. The 40/4 responds to and executes the full repertoire of IBM 3270 commands, including Read Buffer, Read Modified, Write, Erase-Write, Copy, Erase All Unprotected, Start Field, Set Buffer Address, Insert Cursor, Program Tab, Repeat to Address, and Erase Unprotected to Address. Attribute characters can define fields as protected, highlighted, numeric, and non-displayed.

The newer Model 40/4 stand-alone version is equipped with dual 1920-character buffers. One buffer is assigned to the keyboard/display, the other to the printer; each has its own device address. This technique permits data to be prepared on the display, that data to be sent to the host computer for processing, and the results to be returned to the printer without interrupting operator preparation of a subsequent page of data. Also, the printer is available for local printing of displayed data or remote printing of host computer data without interrupting display operation. The printer can copy protected and/or unprotected displayed data.

Scrolling Memory, an optional feature for Models 40/1, 40/2, and 40/3, adds one or two additional 1920-character (24-line) segments to the basic 1920-character display memory to provide storage for a total of 48 or 72 lines of data. Data storage is divided into two or three consecutive but continuous 24-line segments. By means of the Scroll Up and Scroll Down key functions, any consecutive 24 lines of memory can be displayed at one time; data is moved continuously on one line from each key depression. The Display Advance key function displays each consecutive 24-line segment of the display memory through successive key depressions.

The protected format feature permits the use of fixed formats for data entry applications that require the operator to key pertinent data into blank spaces within a displayed format. The feature restricts key entry to unprotected or variable fields within the fixed format. Format descriptors are protected from inadvertent data entry and remain displayed until erased by computer message or by the operator. Only unprotected fields are transmitted or erased, while the format remains displayed. Fields can be highlighted, blanked (40/4), or restricted to numeric entry only (40/4). Models 40/1, 40/2, and 40/3 display protected fields at half the normal intensity. The operator moves from one unprotected field to another (forward or backward) via the tab function, which permits the operator to move to

Teletype Model 40 Data Terminals

The Model 40's page printer sharply contrasts with conventional teleprinter design and construction. In contrast to the single print actuator technique used by Teletype's Model 33 and 35 teleprinters, the Model 40 printer employs 80 or 132 print actuators, one for each print position. It produces printed copy by means of a continuous moving belt that contains imbedded metal type pallets, and a commercially available ribbon. The printer is designed to average 2500 hours of operation between failures.

All members of the Model 40 family feature MOS construction and boast a self-diagnostic capability that will serve as a powerful aid to the user for quickly locating a faulty component through visual inspection. Component failures are identified by lighted neon lamps concealed behind access panels and by printed or displayed test patterns activated by keyed diagnostic sequences. To minimize down-time, Teletype encourage the user himself to replace faulty components (easily done thanks to a high degree of component interchangeability), but still maintains strong service support to satisfy user requirements.

The Teletype Model 40 communications terminal was introduced by AT&T at the International Communications Association conference in May 1973 and exhibited on a grander scale by both AT&T and Teletype at the 1973 National Computer Conference in June. The terminal is available on a purchase-only basis from Teletype, a subsidiary of AT&T's Western Electric Company, and as the Dataspeed 40 Service, a tariffed service offered by AT&T and its Bell System operating companies.

Teletype is by no means a neophyte in the CRT terminal industry. Though long dedicated to the production of teleprinters and punched tape equipment, Teletype gained experience with CRT terminals in the late 1960's, when development began on communication display terminals which were produced and used within the AT&T organization for in-house applications such as order entry.

USER REACTION

In Datapro's 1978 survey of Alphanumeric Display Terminal users, 18 users reported on their experience with 257 Teletype Model 40 terminals. Their ratings are presented below.

	Excellent	Good	Fair	Poor	WA*
Overall performance	12	5	0	0	3.7
Ease of operation	8	8	1	0	3.4
Display clarity	13	4	0	0	3.8
Keyboard feel and usability	9	6	2	0	3.4
Hardware reliability	13	4	0	0	3.8
Maintenance service	14	2	1	0	3.5
Software & technical support	6	8	3	0	3.2

*Weighted Average on a scale of 4.0 for Excellent.

These high scores reflect well satisfied users. The key advantages of the Model 40, as cited by these users,

the next unprotected field (tab) or on the 40/4, to the previous unprotected field (backtab). Formats are received only via computer message on the 40/4, but they can also be received from magnetic tape (via the Teletype 4210) or keyed by the operator on the other models.

Highlighting is used to direct the operator's attention to significant information. On the 40/4, fields can be made to blink, displayed at higher than normal brightness, or a combination of both functions. Specified fields can also be blanked (non-displayed) for security reasons. On all other models, highlighting is restricted to blinking a character or field between full and half intensity once every second.

Tabulation is a computer-controlled function on the 40/4, but it can also be controlled from the keyboard on all other models. Tab controls on the 40/4 permit the operator to tab (move the cursor) to the beginning of the next unprotected field, to the beginning of the next unprotected field with erasure of all unprotected data between the existing and new cursor positions, and to the beginning of the present or previous unprotected field. On the other models, tab stops can be set and cleared from the keyboard. Tab stops, each displayed as a dot, are line-independent; i.e., individual tab stops can be located at different positions on each line. When setting tab stops, all stops are simultaneously set in a column, at and immediately below the cursor, in a manner analogous to setting tabs on a typewriter. When clearing, all tab stops immediately below and to the right of the cursor are cleared. The operator can tab to the first tab stop to the right, to the beginning of the next line, or to the beginning of the next unprotected field, whichever comes first.

On Models 40/1, 40/2, and 40/3, protected format (the Protected Data feature), tabulation (Tab Control), and Highlighting are features of the optional Display Option Group.

The printer operates in either on- or off-line mode when used in the KDP configuration. When operating on-line, all received messages are printed; since printing is performed from the display memory, the received messages are also displayed. When operating off-line, the printer is under operator control as a local-copy printer. Displayed messages are printed only when the Print Local key is depressed.

SOFTWARE SUPPORT: Model 40/4 is supported under existing IBM software support for the IBM 3270, which includes the following IBM access methods: BTAM under DOS, DOS/VS, OS, or OS/VS2; TCAM under OS; and VTAM under DOS/VS, OS/VS1, or OS/VS2. Model 40/4 is also supported for use with the following IBM Program Products: VIDEO/370, DATA/370, IMS, IQF, CICS, and TSO.

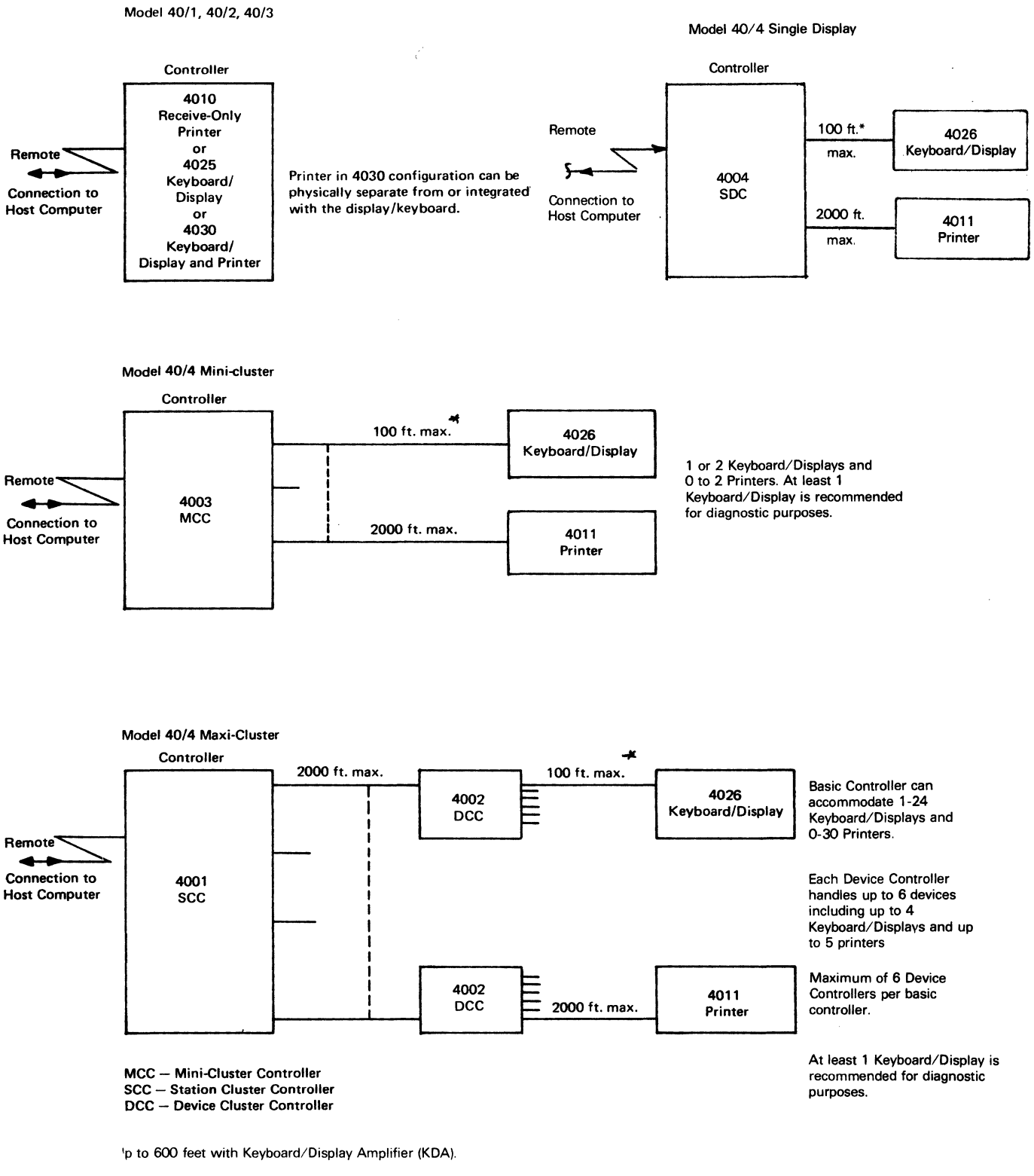
ERROR CONTROL: Character parity is generated for each keyed character and accompanies the transmitted characters. Parity checking is performed on received data, except on the 40/2. A character found to be in error can be replaced with a special symbol, which is printed and/or displayed on the screen in place of the incorrect character.

COMPONENTS

CRT DISPLAY: Via a 13-inch (diagonal measurement) CRT with a viewing area 11.25 inches wide by 5.25 inches high. The screen is arranged in 24 lines of 80 characters each, totaling 1920 character positions. Models 40/1, 40/2, and 40/3 provide a character set of 127 ASCII characters, including upper and lower case alphabetics, numerics, and special symbols. Model 40/4 has a character set of 64 or 96 (optional) characters, including upper case alphabetics, numerics, and symbols; lower case letters are included in the optional 96-character set. All models display data in white against a dark backfround. Characters are formed by

Teletype Model 40 Data Terminals

TELETYPE MODEL 40 CONFIGURATION



Teletype Model 40 Data Terminals

are low cost (11 responses), reliability (13 responses), and strong vendor support (14 responses). Operating flexibility was cited by 7 respondents.

Few disadvantages were mentioned. Non-programmability, cited by 9 respondents, indicates users' growing awareness of the usefulness of programmable terminals. Three users noted performance limitations as a disadvantage, one cited high cost, and one noted inflexibility.□

a 7-by-9 dot matrix. The viewing screen can be vertically tilted through 20 degrees of rotation (+10 degrees from the horizontal) to compensate for glare and ease operator viewing.

KEYBOARD: The typewriter-style keyboard for Models 40/1, 40/2, and 40/3 can generate any of 127 ASCII character codes, including upper and lower case alphabetics, numerics, specials, and control codes. The 40/4 keyboard can generate 96 upper and lower case ASCII or EBCDIC characters. The EBCDIC keyboard is available with an embedded numeric pad. Control codes are printed on their respective keytops on all models. A character repeat function can be user-implemented to permit repetitive entry of data or control functions.

Program Function and Program Attention keys, a standard feature of the IBM 3270, are also standard on Model 40/4. Each of these keys generates a unique code that is recognized by the controlling software as a specific program request or data identifier. Program Function codes accompany the display data as it is transmitted to the computer, while Program Attention codes are transmitted separately.

PRINTER: An impact belt printer rated at 300 lines/minute with the standard 64-character set of ASCII upper-case symbols or 220 lines/minute with the optional 94-character set of ASCII upper and lower case symbols. The printer is available as an 80-column, friction-feed unit; an 80-column, tractor-feed unit; or as a 132-column, tractor-feed unit. Horizontal and vertical spacing is 10 characters/inch and 6 lines/inch, respectively. Friction feed employs standard 8 ½-inch wide single-ply rolled paper. Tractor feed accommodates pin-fed, 6-part, continuous forms from 4⅛- to 9½-inches wide for the 80-column unit or from 4⅛- to 15-inches wide for the 132-column unit. Form lengths can be 2¾, 3 2/3, 5½, or 11 inches.

Printing is performed by means of a row of 80 or 132 print actuators, one per print position, and a continuous arrangement of type pallets which are imbedded into a moving belt. When energized, each actuator strikes its respective pallet, which impacts the paper through a ribbon. The 64-character set is repeated three times around the belt; the full ASCII set is repeated two times.

PRICING

The Model 40 can be obtained from Teletype on a purchase basis only. Teletype now provides functional discounts only; quantity discounts have been discontinued. Functional discounts of 10 percent are available to nonprofit educational institutions (public and private) and to state, county, and municipal governments and their Canadian equivalents. Functional discounts of 20 percent are available to resellers (OEM's), lessors, and common carriers (communications and transportation), and to United States and Canadian Federal Governments and their prime contractors (including subcontractors).

Monthly maintenance and installation prices for the four models of the Teletype 40 are as follows:

	Monthly Maint.	Installation
Models 40/1, 40/2, & 40/3:		
4010 ROP	$30	$ 89
4025 KD	30	100
4030 KDP	39	130
Model 40/4:		
4001 SCC	17 to 22	74
4002 DCC	16 to 21	69
4003 MCC	16 to 18	79
4004 SDC*	18	156
4011 Printer	21	89
4026 KD	14	54

*Includes KD & P.

Model 40/1 Stand-Alone Configurations

Model Number			Purchase Price	
Table Model	Pedestal Mounted		Table Model	Pedestal Mounted
—		4010 Receive-Only Printer (ROP) with:		
—	-1BOA	Friction feed, 80 print positions, and upper case ASCII	—	$3,441
—	-ICOA	Friction-feed, 80 print positions, upper case ASCII, and 1000-character buffer	—	3,654
—	-1EOA	Friction-feed, 80 print positions, and upper/lower case ASCII	—	3,441
—	-IFOA	Friction-feed, 80 print positions, upper/lower case ASCII, and 1000-character buffer	—	3,654
—	-1HOB	Tractor feed, 80 print positions, and upper case ASCII	—	3,751
—	-1GOB	Tractor feed, 80 print positions, upper case ASCII, and 1000-character buffer	—	3,964
—	-1KOB	Tractor feed, 80 print positions, and upper/lower case ASCII	—	3,751
—	-1JOB	Tractor feed, 80 print positions, upper/lower case ASCII, and 1000-character buffer	—	3,964
		4025 Keyboard Display (KD) with:		
-10A0	-10AA	A 24-line display	$2,940	3,091
-10DO	-10DA	A 24-line display; tab control, highlighting, & protected data features	3,151	3,303
-10BO	-10BA	A 48-line display	3,066	3,218
-10EO	-10EA	A 48-line display; tab control, highlighting, & protected data features	3,309	3,460
-10CO	-10CA	A 72-line display	3,193	3,344
-10FO	-10FA	A 72-line display; tab control, highlighting, & protected data features	3,466	3,618

Teletype Model 40 Data Terminals

Model 40/1 Stand-Alone Configurations (Continued)

Model Number			Purchase Price	
Table Model	Pedestal Mounted		Table Model	Pedestal Mounted
-IPAO	-IPAA	A 24-line display & Conversation mode	$3,071	$3,223
-IPDO	-IPDA	A 24-line display; tab control, highlighting, protected data features, & Conversation mode	3,315	3,466
-IPBO	-IPBA	A 48-line display & Conversation mode	3,198	3,349
-IPEO	-IPEA	A 48-line display; tab control, highlighting protected data features, & Conversation mode	3,473	3,624
-IPCO	-IPCA	A 72-line display & Conversation mode	3,324	3,475
-IPFO	-IPFA	A 72-line display; tab control, highlighting, protected data features, & Conversation mode	3,630	3,781
		4030 Keyboard Display Printer (KDP) Printer Under Display; includes friction feed, 80 print positions, upper case ASCII, and Conversation mode with:		
-1AAO	-1AAA	A 24-line display	5,089	5,155
-1ADO	-1ADA	A 24-line display; tab control, highlighting, & protected data features	5,333	5,399
-1ABO	-1ABA	A 48-line display	5,215	5,281
-1AEO	-1AEA	A 48-line display; tab control, highlighting, & protected data features	5,490	5,556
-1ACO	-1ACA	A 72-line display	5,341	5,408
-1AFO	-1AFA	A 72-line display; tab control, highlighting, & protected data features	5,648	5,714
		4030 Keyboard Display Printer (KDP) Printer Under Display; includes friction feed, 80 print positions, upper/lower case ASCII and Conversation mode with:		
-1DAO	-1DAA	A 24-line display	5,089	5,155
-1DDO	-1DDA	A 24-line display; tab control, highlighting, & protected data features	5,333	5,399
-1DBO	-1DBA	A 48-line display	5,215	5,281
-1DEO	-1DEA	A 48-line display; tab control, highlighting, & protected data features	5,490	5,556
-1DCO	-1DCA	A 72-line display	5,341	5,408
-1DFO	-1DFA	A 72-line display; tab control, highlighting, & protected data features	5,648	5,714

Model Number				Purchase Price		
Table Model	Single Pedestal	Double Pedestal		Table Model	Single Pedestal	Double Pedestal
			4030 Keyboard Display Printer (KDP) Printer Beside Display; includes friction feed, 80 print positions, upper case ASCII, and Conversation mode with:			
-1BAO	-1BAC	-1BAG	A 24-line display	$4,934	$5,085	$5,236
-1BDO	-1BDC	-1BDE	A 24-line display; tab control, highlighting, & protected data features	5,178	5,329	5,480
-1BBO	-1BBC	-1BBG	A 48-line display	5,060	5,211	5,363
-1BEO	-1BEC	-1BEG	A 48-line display; tab control, highlighting, & protected data features	5,335	5,486	5,638
-1BCO	-1BCC	-1BCG	A 72-line display	5,186	5,338	5,489
-1BFO	-1BFC	-1BFG	A 72-line display; tab control, highlighting, & protected data features	5,493	5,644	5,795
			4030 Keyboard Display Printer (KDP) Printer Beside Display; inludes friction feed, 80 print positions, upper/lower case ASCII, and Conversation mode with:			
-1EAO	-1EAC	-1EAG	A 24-line display	4,934	5,085	5,236
-1EDO	-1EDC	-1EDG	A 24-line display; tab control, highlighting, & protected data features	5,178	5,329	5,480
-1EBO	-1EBC	-1EBG	A 48-line display	5,060	5,211	5,363
-1EEO	-1EEC	-1EEG	A 48-line display; tab control, highlighting, & protected data features	5,335	5,486	5,638
-1ECO	-1ECC	-1ECG	A 72-line display	5,186	5,338	5,489
-1EFO	-1EFC	-1EFG	A 72-line display; tab control, highlighting, & protected data features	5,493	5,644	5,795

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

> As can be seen from the Weighted Averages, users were very pleased with the Teletype Model 40. They were particularly satisfied with the overall performance and general appearance of the terminal. Other advantages cited included sharpness of screen, fast printer speeds, convenience of the integral arrangement of components, flexibility and reliability.

There were no significant disadvantages cited except for a few isolated complaints of maintenance service or technical support. However, these cases represented problems with a particular leasing company (e.g. a time-sharing service) rather then with Teletype. □

► memory to provide storage for a total of 48 or 72 lines of data. Data storage is divided into two or three consecutive but continuous 24-line segments. By means of the Scroll Up and Scroll Down key functions, any consecutive 24 lines of memory can be displayed at one time; data is moved continuously on one line from each key depression. The Display Advance key function displays each consecutive 24-line segment of the display memory through successive key depressions.

The printer operates in either on- or off-line mode when used in the KDP configuration. When operating on-line, all received messages are printed; since printing is performed from the display memory, the received messages are also displayed. When operating off-line, the printer is under operator control as a local-copy printer. Displayed messages are printed only when the Print Local key is depressed.

SOFTWARE SUPPORT: Model 40/4 is supported under existing IBM software support for the IBM 3270, which includes the following IBM access methods: BTAM under DOS, DOS/VS, OS, or OS/VS2; TCAM under OS; and VTAM under DOS/VS, OS/VS1, or OS/VS2. Model 40/4 is also supported for use with the following IBM Program Products: VIDEO/370, DATA/360, IMS, IQF, CICS, and TSO.

ERROR CONTROL: Character parity is generated for each keyed character and accompanies the transmitted characters. Parity checking is performed on received data. A character found to be in error is replaced with a special symbol, which is printed and/or displayed on the screen in place of the incorrect character.

COMPONENTS

CRT DISPLAY: Via a 13-inch (diagonal measurement) CRT with a viewing area 11.25 inches wide by 5.25 inches high. The screen is arranged in 24 lines of 80 characters each, totaling 1920 character positions. Models 40/1, 40/2, and 40/3 provide a character set of 127 ASCII characters, including upper and lower case alphabetics, numerics, and special symbols. Model 40/4 has a character set of 64 or 96 (optional) characters, including upper case alphabetics, numerics, and symbols; lower case letters are included in the optional 96-character set. All models display data in white against a dark background. Characters are formed by a 7-by-9 dot matrix. The viewing screen can be vertically tilted through 20 degrees of rotation (±10 degrees from the horizontal) to compensate for glare and ease operator viewing.

KEYBOARD: The typewriter-style keyboard for Models 40/1, 40/2, and 40/3 can generate any of 127 ASCII character codes, including upper and lower case alphabetics, numerics, specials, and control codes. The 40/4 keyboard can generate 96 upper and lower case ASCII or EBCDIC characters. Control codes are printed on their respective keytops on all models. A character repeat function can be user-implemented to permit repetitive entry of data or control functions.

Program Function and Program Attention keys, a standard feature of the IBM 3270, are also standard on Model 40/4. Each of these keys generates a unique code that is recognized by the controlling software as a specific program request or data identifier. Program Function codes accompany the display data as it is transmitted to the computer, while Program Attention codes are transmitted separately.

PRINTER: Two impact page printers are available; both are full-character printers; the 80-column printer is rated at 314 lines/minute for a 64-character subset of ASCII symbols (upper case alphabetics only) and at 220 lines/minute for a full complement (127 characters) of ASCII symbols, including upper and lower case alphabetics. The 80-column printer is available with a friction or tractor feed mechanism and prints 10 chars./inch and 6 lines/inch; printing is adjustable for double line-feed printing. The friction-feed printer prints on standard 8½-inch single-ply rolled paper. The tractor-feed printer prints on standard fan-fold, continuous forms up to 6-ply (1 original and 5 copies), and is adjustable to accommodate forms from 4 to 9½-inches wide and from 3-2/3 to 5½ or 11 inches long.

A newer tractor-feed printer is available with 80 or 132 print positions. The printer is rated at 300 lines/minute with the standard 64-character set of ASCII symbols and at 220 lines/minute for the full upper and lower case character set. Horizontal and vertical spacing is 10 chars./inch and 6 lines/inch, respectively; as an option printing is adjustable for single- or double-line feed. The printer accommodates standard fanfold 6-part forms from 4 to 9½ (80-column unit) or 15 inches wide and from 2½ to 22 inches long.

Printing is performed by means of a row of 80 or 132 print actuators, one per print position, and a continuous arrangement of type pallets which are imbedded into a moving belt. When energized, each actuator strikes its respective pallet, which impacts the paper through a ribbon. The 64-character set is repeated three times around the belt; the full ASCII set is repeated two times.

PRICING

The Model 40 can be obtained from Teletype on a purchase basis only. Teletype now provides functional discounts only; quantity discounts have been discontinued. Functional discounts of 10 percent are available to nonprofit educational institutions (public and private) and to state, county, and municipal governments and their Canadian equivalents. Functional discounts of 20 percent are available to resellers (OEM's), lessors, and common carriers (communications and transportation), and to United States and Canadian Federal Governments and their prime contractors (including subcontractors).

List prices are presented below. The price ranges for Models 40/1, 40/2, and 40/3 reflect the difference between a basic model and a model with all options, including buffering and a full ASCII character set for the Model 4010 Receive-Only Printer; display memory capacity and the inclusion of the Display Option Group for the Model 4025 Keyboard Display (KD); and a combination of the printer and display options for the Model 4030 Keyboard Display Printer (KDP). ►

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

Stand-Alone Configuration—

	Model 40/1	Model 40/2	Model 40/3*
4010 ROP	$3,236-3,449	$3,575-3,983	$3,236-3,798
4025 KD	3,121-4,460	3,573-4,361	3,699-4,430
4030 KDP	5,185-6,793	5,534-7,581	5,660-6,087

*Requires Station Controller priced at $1,094 to $1,160 which is not subject to discounts.

The price range for the 4210 Magnetic Tape Data Terminal is $3,409 to $3,548.

40/4 Cluster Configuration—	List Price
Model 4026 Keyboard Display	$ 999-$1,181
Model 4011 Printer	1,739-2,858
Model 4001 Station Cluster Controller (SCC)	4,388-4,705
Model 4002 Device Cluster Controller (DCC)	4,713-6,405
Model 4003 Mini-Cluster Controller (MCC)	5,143-6,126
Model 4000 Pedestal	238-239

In the 40/4 cluster configurations, the price range for the 4026 Keyboard Display reflects base or cabinet mounting (more expensive); the price range for the printer reflects friction (basic) or tractor feed; the price range for the Station Cluster Controller reflects the number of Device Cluster Controllers that can be accommodated (4 or 6) and the type of pedestal used (plain or slotted top); the price range for the Device Cluster Controller reflects the number of Keyboard Displays and Printers that can be accommodated and the type of pedestal; the price range for the Mini-Cluster Controller also reflects the number of Keyboard Displays and Printers that can be used and the type of pedestal employed.

Dataspeed 40 Service, offered by AT&T through its 22 individual Bell System operating companies, is priced in the first table below for stand-alone Models 40/1, 40/2, and 40/3. Pricing for the cluster Model 40/4 is presented in the second table. The price ranges reflect the differentials among the *intrastate* tariffs written by the various operating companies. The approximate range of lease prices, excluding all options, is as follows:

Stand-Alone Configuration Intrastate Rates—

	Model 40/1	Model 40/2*	Model 40/3*
4010 ROP	$105 to 137/mo.	—	$160 to 194/mo.
4025 KD	110 to 157/mo.	$135 to 189/mo.	180 to 234/mo.
4030 KDP	175 to 235/mo.	200 to 261/mo.	245 to 311/mo.

*Requires the Display Option Group, which includes protected format, horizontal tab, and highlighting.

Model 40/4 Cluster Configuration Intrastate Rates—

Model 4011 Printer*	$ 75 to 110/mo.
Model 4026 KD	62 to 76/mo.
Model 4001 SCC	160 to 250/mo.
Model 4002 DCC	140 to 225/mo.
Model 4003 MCC	170 to 195/mo.

*The new 132-column printer is priced at $175/mo.

The prices do not include the cost of a modem or communications facility.

Each additional 24 lines (or page) of display memory is priced at $8/month. Options including protected format, horizontal tab, and highlighting total $15/month. The Send/Receive option is priced at $5/month. A 1000-character buffer for the RO version is priced at $10/month.

The 4210 Magnetic Tape Data Terminal for use with the Dataspeed 40 Service is avaialble for $1000 to $125/month.

Interstate tariffs for Dataspeed 40/4 Service were filed January 5, 1977 and became effective on January 19, 1977. Monthly rates and installation fees are presented below.

Dataspeed 40/4 Interstate Rates—

	Monthly Charge	Installation
4011 Printer	$102	$ 50
4026 KD	68	50
4001 SCC:		
First 4 units	100	100
Each additional 2 units	20	40
4002 DCC:		
First 2 units	157	100
Each additional 4 units	33	40
4003 MCC:		
With 1 Printer and 1 KD	185	100
Each additional Printer or KD	21	40
Pedestal	7.20	41.20*

*After initial installation.■

Teletype Model 40 Data Terminals

Model 40/1 Stand-Alone Configurations (Continued)

Table Model	Single Pedestal	Double Pedestal		Table Model	Single Pedestal	Double Pedestal
			4030 Keyboard Display Printer (KDP) Printer Beside Display; includes tractor feed, 80 print positions, upper case ASCII, and Conversation mode with:			
-1GAO	—	-1GAH	A 24-line display	$5,280	—	$5,584
-1GDO	—	-1GDH	A 24-line display; tab control, highlighting, & protected data data	5,524	—	5,828
-1GBO	—	-1GBH	A 48-line display	5,406	—	5,710
-1GEO	—	-1GEH	A 48-line display; tab control, highlighting, & protected data features	5,681	—	5,985
-1GCO	—	-1GCH	A 72-line display	5,533	—	5,836
-1GFO	—	-1GFH	A 72-line display; tab control, highlighting, & protected data features	5,839	—	6,143
			4030 Keyboard Display Printer (KDP) Printer Beside Display; includes tractor-feed, 80 print positions, upper/lower case ASCII, and Conversation mode with:			
-1JAO	—	-1JAH	A 24-line display	5,280	—	5,584
-1JDO	—	-1JDH	A 24-line display; tab control, highlighting, & protected data features	5,524	—	5,828
-1JBO	—	-1JBH	A 48-line display	5,406	—	5,710
-1JEO	—	-1JEH	A 48-line display; tab control, highlighting, & protected data features	5,681	—	5,985
-1JCO	—	-1JCH	A 72-line display	5,533	—	5,836
-1JFO	—	-1JFH	A 72-line display, tab control, highlighting, & protected data features	5,839	—	6,143

Model 40/2 Stand-Alone Configurations

Model Number			Purchase Price	
Table Model	Pedestal Mounted		Table Model	Pedestal Mounted
		4010 Receive-Only Printer with:		
-3HOO	-3HOF	Tractor feed, 80 print positions, and upper case ASCII	$3,686	$3,796
-3KOO	-3KOF	Tractor feed, 80 print positions, and upper/lower case ASCII	3,686	3,796
-3LOO	-3LOJ	Tractor feed, 132 print positions, and upper case ASCII	4,426	4,540
-3MOO	-3MOJ	Tractor feed, 132 print positions and upper/lower case ASCII	4,426	4,540
		4025 Keyboard Display (KD) with:		
-50AO	-50AA	A 24-line display	3,214	3,365
-50DO	-50DA	A 24-line display; tab control, highlighting, & protected data features	3,245	3,396
-50BO	-50BA	A 48-line display	3,340	3,491
-50EO	-50EA	A 48-line display; tab control, highlighting, & protected data features	3,403	3,554
-50CO	-50CA	A 72-line display	3,466	3,618
-50FO	-50FA	A 72-line display; tab control, highlighting, & protected data features	3,560	3,711

Model Number				Purchase Price		
Table Model	Single Pedestal	Double Pedestal		Table Model	Single Pedestal	Double Pedestal
			4030 Keyboard Display Printer (KDP) Printer Beside Display; includes friction feed, 80 print positions, and upper case ASCII with:			
-5BAO	-5BAC	-5BAG	A 24-line display	$5,246	$5,398	$5,549
-5BDO	-5BDC	-5BDG	A 24-line display; tab control, highlighting, & protected data features	5,278	5,429	5,580
-5BBO	-5BBC	-5BBG	A 48-line display	5,373	5,524	5,675
-5BEO	-5BEC	-5BEG	A 48-line display; tab control, highlighting, & protected data features	5,435	5,586	5,738
-5BCO	-5BCC	-5BCG	A 72-line display	5,499	5,650	5,801
-5BFO	-5BFC	-5BFG	A 72-line display; tab control, highlighting, & protected data features	5,593	5,744	5,895

Teletype Model 40 Data Terminals

Model 40/2 Stand-Alone Configurations (Continued)

Table Model	Single Pedestal	Double Pedestal		Table Model	Single Pedestal	Double Pedestal
			4030 Keyboard Display Printer (KDP) Printer Beside Display; includes friction feed, 80 print positions, and upper/lower case ASCII with:			
-5EAO	-5EAC	-5EAG	A 24-line display	$5,246	$5,398	$5,549
-5EDO	-5EDC	-5EDG	A 24-line display; tab control, highlighting, & protected data features	5,278	5,429	5,580
-5EBO	-5EBC	-5EBG	A 48-line display	5,373	5,524	5,675
-5EEO	-5EEC	-5EEG	A 48-line display; tab control, highlighting & protected data features	5,435	5,586	5,738
-5ECO	-5ECC	-5ECG	A 72-line display	5,499	5,650	5,801
-5EFO	-5EFC	-5EFG	A 72-line display; tab control, highlighting, & protected data features	5,593	5,744	5,895
			4030 Keyboard Display Printer (KDP) Printer Beside Display; includes tractor feed, 80 print positions, and upper case ASCII with:			
-5GAO	—	-5GAH	A 24-line display	5,593	—	5,896
-5GDO	—	-5GDH	A 24-line display; tab control, highlighting, & protected data features	5,624	—	5,928
-5GBO	—	-5GBH	A 48-line display	5,719	—	6,023
-5GEO	—	-5GEH	A 48-line display; tab control, highlighting, & protected data features	5,781	—	6,085
-5GCO	—	-5GCH	A 72-line display	5,845	—	6,149
-5GFO	—	-5GFH	A 72-line display; tab control, highlighting, & protected data features	5,939	—	6,243
			4030 Keyboard Printer Display (KDP) Printer Beside Display; includes tractor feed, 80 print positions, and upper/lower case ASCII with:			
-5JAO	—	-5JAH	A 24-line display	5,593	—	5,896
-5JDO	—	-5JDH	A 24-line display; tab control, highlighting, & protected data features	5,624	—	5,928
-5JBO	—	-5JBH	A 48-line display	5,719	—	6,023
-5JEO	—	-5JEH	A 48-line display; tab control, highlighting, & protected data features	5,781	—	6,085
-5JCO	—	-5JCH	A 72-line display	5,845	—	6,149
-5JFO	—	-5JFH	A 72-line display, tab control, highlighting, & protected data features	5,939	—	6,243
			4030 Keyboard Printer Display (KDP) Printer Beside Display; includes tractor feed, 132 print positions, and upper case ASCII with:			
-5NAO	—	-5NAK	A 24-line display	6,338	—	6,603
-5NDO	—	-5NDK	A 24-line display; tab control, highlighting, & protected data features	6,369	—	6,634
-5NBO	—	-5NBK	A 48-line display	6,464	—	6,729
-5NEO	—	-5NEK	A 48-line display; tab control, highlighting, & protected data features	6,526	—	6,791
-5NCO	—	-5NCK	A 72-line display	6,590	—	6,855
-5NFO	—	-5NFK	A 72-line display; tab control, highlighting, & protected data features	6,684	—	6,949
			4030 Keyboard Printer Display (KDP) Printer Besides Display; includes tractor feed, 132 print positions, and upper/lower case ASCII with:			
-5QAO	—	-5QAK	A 24-line display	6,338	—	6,603
-5QDO	—	-5QDK	A 24-line display; tab control, highlighting, & protected data features	6,369	—	6,634
-5QBO	—	-5QBK	A 48-line display	6,464	—	6,729
-5QEO	—	-5QEK	A 48-line display; tab control, highlighting, & protected data features	6,526	—	6,791
-5QCO	—	-5QCK	A 72-line display	6,590	—	6,855
-5QFO	—	-5QFK	A 72-line display; tab control, highlighting, & protected data features	6,684	—	6,949

Teletype Model 40 Data Terminals

Model 40/3 Stand-Alone Configurations

Model Number			Purchase Price	
Single Pedestal	Double Pedestal		Single Pedestal	Double Pedestal
		4010 Receive-Only Printer (ROP) with:		
-1BOA	—	Friction feed, 80 print positions, and upper case ASCII	$3,441	—
-1COA	—	Friction feed, 80 print positions, upper case ASCII, and 1000-character buffer	3,654	—
-1EOA	—	Friction feed, 80 print positions, and upper/lower case ASCII	3,441	—
-1FOA	—	Friction feed, 80 print positions, upper/lower case ASCII, and 1000-character buffer	3,654	—
-1HOB	—	Tractor feed, 80 print positions, and upper case ASCII	3,751	—
-1GOB	—	Tractor feed, 80 print positions, upper case ASCII, and 1000-character buffer	3,964	—
-1KOB	—	Tractor feed, 80 print positions, and upper/lower case ASCII	3,751	—
-1JOB	—	Tractor feed, 80 print positions, upper/lower case ASCII, and 1000-character buffer	3,964	—
-2AAC	—	Station Controller, 120 cps; for 4010 Receive-Only Printer	1,084	—
-2ABC	—	Station Controller, 105 cps; for 4010 Receive-Only Printer	1,085	—
-2AAD	—	Station Controller, 120 cps, for 4010 Receive-Only Printer in KD or KDP and ROP configuration (for simultaneous send/receive)	1,175	—
-2ABD	—	Station Controller, 105 cps; for 4010 Receive-Only Printer in KD or KDP and ROP Configuration (for simultaneous send/receive)	1,176	—
		4025 Keyboard Display (KD) with:		
-2ODA	—	A 24-line display; tab control, highlighting, & protected data features	3,275	—
-2OEA	—	A 48-line display; tab control, highlighting, & protected data features	3,433	—
-2OFA	—	A 72-line display; tab control, highlighting, & protected data features	3,590	—
		4025 Keyboard/Display (KD)—(for use with 4010 Receive-Only Printer (ROP) in a KD-ROP configuration) with:		
-2PDA	—	A 24-line display; tab control, highlighting, & protected data features	3,445	—
-2PEA	—	A 48-line display; tab control, highlighting, & protected data features	3,603	—
-2PFA	—	A 72-line display; tab control, highlighting, & protected data features	3,760	—
-2AAB	—	Station Controller, 120 cps	1,165	—
-2ABB	—	Station Controller, 105 cps	1,166	—
		4030 Keyboard Display Printer (KDP) Printer Under Display; includes friction feed, 80 print positions, and upper case ASCII with:		
-2ADA	—	A 24-line display; tab control, highlighting, & protected data features	5,379	—
-2AEA	—	A 48-line display; tab control, highlighting, & protected data features	5,536	—
-2AFA	—	A 72-line display; tab control, highlighting, & protected data features	5,694	—
		4030 Keyboard Display Printer (KDP) Printer Under Display; includes friction feed, 80 print positions, and upper/lower case ASCII with:		
-2DDA	—	A 24-line display; tab control, highlighting, & protected data features	5,379	—
-2DEA	—	A 48-line display; tab control, highlighting, & protected data features	5,536	—
-2DFA	—	A 72-line display; tab control, highlighting, & protected data features	5,694	—
2AAA	—	Station Controller, 120 cps; for 4030 Printer Under Display Configuration	1,109	—
2ABA	—	Station Controller, 105 cps; for 4030 Printer Under Display Configuration	1,110	—
		4030 Keyboard Display Printer (KDP) Printer Beside Display; includes friction feed, 80 print positions, and upper case ASCII with:		
-2BDC	-2BDG	A 24-line display; tab control, highlighting, & protected data features	5,308	5,459
-2BEC	-2BEG	A 48-line display; tab control, highlighting, & protected data features	5,465	5,616
-2BFC	-2BFG	A 72-line display; tab control, highlighting, & protected data features	5,623	5,774
		4030 Keyboard Display Printer (KDP) Printer Beside Display; includes friction feed, 80 print positions, and upper/lower case ASCII with:		
-2EDC	-2EDG	A 24-line display, tab control, highlighting, & protected data features	5,308	5,459
-2EEC	-2EEG	A 48-line display; tab control, highlighting, & protected data features	5,465	5,616
-2EFC	-2EFG	A 72-line display; tab control, highlighting, & protected data features	5,623	5,774
		4030 Keyboard Display Printer (KDP) Printer Beside Display; includes tractor feed, 80 print positions, and upper case ASCII with:		
—	-2GDH	A 24-line display; two controls, highlighting, & protected data features	—	5,806
—	-2GEH	A 48-line display; tab control, highlighting, & protected data features	—	5,964
—	-2GFH	A 72-line display; tab control, highlighting, & protected data features	—	6,121
		4030 Keyboard Display Printer (KDP)—Printer Beside Display; includes tractor feed, 80 print positions, and upper/lower case ASCII with:		
—	-2JDH	A 24-line display; tab control, highlighting, & protected data features	—	5,806
—	-2JEH	A 48-line display; tab control, highlighting, & protected data features	—	5,964
—	-2JFH	A 72-line display; tab control, highlighting, & protected data features	—	6,121
—	2AAB	Station Controller, 120 cps; for Printer Beside Display Configuration	—	1,165
—	2ABB	Station Controller, 105 cps; for Printer Beside Display Configuration	—	1,166

Teletype Model 40 Data Terminals

Model 40/4 Cluster and Stand-Alone Configurations

Model Number		Purchase Price
	4001 Station Cluster Controller (SCC) with support for:	
-4ZAA	One to four device cluster controllers; contains a 29-inch top	$3,985
-4ZAL	One to four device cluster controllers; contains a 27-inch slotted top	3,986
-4ZBA	One to six device cluster controllers; contains a 29-inch top	4,306
-4ZBL	One to six device cluster controllers; contains a 27-inch slotted top	4,308

Model Number				
ASCII code	EBCDIC code	EBCDIC* Code		
			4002 Device Cluster Controller (DCC) with support for:	
-4BAA	-4FAA	-4FEA	One Keyboard Display and one or two printers with 29-inch top	4,484
-4BAL	-4FAL	-4FEL	One Keyboard Display and one or two printers with 27-inch slotted top	4,485
-4DAA	-4HAA	-4HEA	One Keyboard Display and up to five printers with 29-inch top	4,805
-4DAL	-4HAL	-4HEL	One Keyboard Display and up to five printers with 27-inch slotted top	4,806
-4ABA	-4EBA	-4EFA	One or two Keyboard Displays and one printer with 29-inch top	4,770
-4ABL	-4EBL	-4EFL	One or two Keyboard Displays and one printer with 27-inch slotted top	4,771
-4BBA	-4FBA	-4FFA	One or two Keyboard Displays and up to four printers with 29-inch top	5,091
-4BBL	-4FBL	-4FFL	One or two Keyboard Displays and up to four printers with 27-inch slotted top	5,093
-4BCA	-4FCA	-4FGA	One to three Keyboard Displays and up to three printers with 29-inch top	5,378
-4BCL	-4FCL	-4FGL	One to three Keyboard Displays and up to three printers with 27-inch slotted top	5,379
-4BDA	-4FDA	-4FHA	One to four Keyboard Displays and one or two printers with 29-inch top	5,664
-4BDL	-4FDC	-4FHC	One to four Keyboard Displays and one or two printers with 27-inch slotted top	5,665
			4003 Mini-Cluster Controller (MCC) with support for:	
-4BAA	-4FAA	-4FBA	One Keyboard Display and one or two printers with 29-inch top	5,231
-4BAL	-4FAL	-4FEL	One Keyboard Display and one or two printers with 27-inch slotted top	5,233
-4ABA	-4EBA	-4EFA	One or two Keyboard Displays and one printer with 29-inch top	5,518
-4ABL	-4EBL	-4EFL	One or two Keyboard Displays and one printer with 27-inch slotted top	5,519

Model Number		Purchase Price
	4004 Single Display Controller (SDC) with support for:	
-4EAA	One Keyboard Display and one printer with 29-inch top	2,619
-4EAL	One Keyboard Display and one printer with 27-inch slotted top	2,620
	4025 Single Display Controller & Keyboard Display (SDC & KD) with attached keyboard:	
-4ZAO	Typewriter keyboard	3,350
-4ZEO	Typewriter Keyboard with numeric cluster	3,350
	4026 Keyboard Display (KD):	
-4ZAO	With attached typewriter keyboard	1,001
-4ZEO	With attached typewriter keyboard and integral numeric cluster	1,001
-4ZAR	With detached typewriter keyboard	960
-4ZER	With detached typewriter keyboard and integral numeric cluster	960
	4011 Printer (P):	
-3BOO	With friction feed, 80 print positions, and ASCII code	1,935
-3BZO	With friction feed, 80 print positions, and EBCDIC code	1,935
-4GOO	With tractor feed, 80 print positions, and ASCII code	2,105
-4GZO	With tractor feed, 80 print positions, and EBCDIC code	2,105
-4L00	With tractor feed, 132 print positions, and ASCII code	2,850
-4LZO	With tractor feed, 132 print positions, and EBCDIC code	2,850
	4000 Pedestals (empty):	
-400F	A 20-inch wide pedestal with 20-inch top and 11-inch slot	110
-400D	A 24-inch wide pedestal with 24-inch top	151
-400E	A 24-inch wide pedestal with 24-inch top and 11-inch slot	153
-400L	A 24-inch wide pedestal with 27-inch top and 17-inch slot	153
-400A	A 24-inch wide pedestal with 29-inch top	151
-400B	A 24-inch wide pedestal with 31-inch top and 11-inch slot	153
-400C	A 24-inch wide pedestal with 34-inch top	151
-400J	A 24-inch wide pedestal with 27-inch top and 17-inch slot	114

*Typewriter-style EBCDIC keyboard with integral numeric pad.■

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

MANAGEMENT SUMMARY

Now you can get your "IBM 3270" display terminals from Teletype—or from the Bell System (under Dataspeed 40 Service). In November 1976, the FCC overturned the March 1976 rejection of a proposed Dataspeed 40 tariff by the chief of its Common Carrier Bureau. (The tariff was rejected on the basis that the Teletype 40/4 was "inextricably intertwined with data processing.") The FCC reversal will permit the Bell System to tariff its hotly contested terminal for *interstate* (across state lines) service as a data communications device. *Intrastate* tariffs for the 40/4 have already been approved by most states. The FCC reversal was made contingent on the outcome of the pending Computer Inquiry rulemaking (Docket 20828). The FCC made it clear that this was not a final policy decision on the 40/4, but it's unlikely that the FCC would rescind such an authorization.

The interstate tariff for the 40/4 was challenged by IBM, the Computer Industry Association (CIA), and the Computer and Business Equipment Manufacturers Association (CBEMA). The challenge by the three factions was based on arguments that the 1956 antitrust consent decree forbids AT&T from going into an *unregulated* business. The three had alleged that the 40/4 terminal is "not simply a communications terminal, but is actually an intelligent, programmable computer terminal."

Teletype's new addition to the Model 40 family of data terminals is an alternative to the remote version of the IBM 3270 Information Display System. The Model 40/4 provides software compatibility with the IBM 3270 with respect to communications protocol (which for now is restricted to BSC), commands and command code structure, and addressing sequence. The Model 40/4 also provides most of the features and functions of the IBM 3270, although it is currently not available with a light pen or operator ID card reader.

A family of printer and display terminals, which include stand-alone units and clustered systems.

Configurations available on each model are ROP-receive only printer, KD-keyboard and display, and KDP-keyboard, display and printer. Stand alone models operate asynchronously at from 110 bps up to 4800 bps. The newest model, the 40/4, emulates the IBM 3270 and can support up to 24 keyboard displays plus up to 12 printers.

Typical prices (equipment is available on a purchase only basis from Teletype) range from $3,236 for a basic Model 40/1 in an ROP configuration to $55,240 for a Model 40/4 configured with 12 keyboard/displays and 6 printer with all option. Pricing is configuration sensitive.

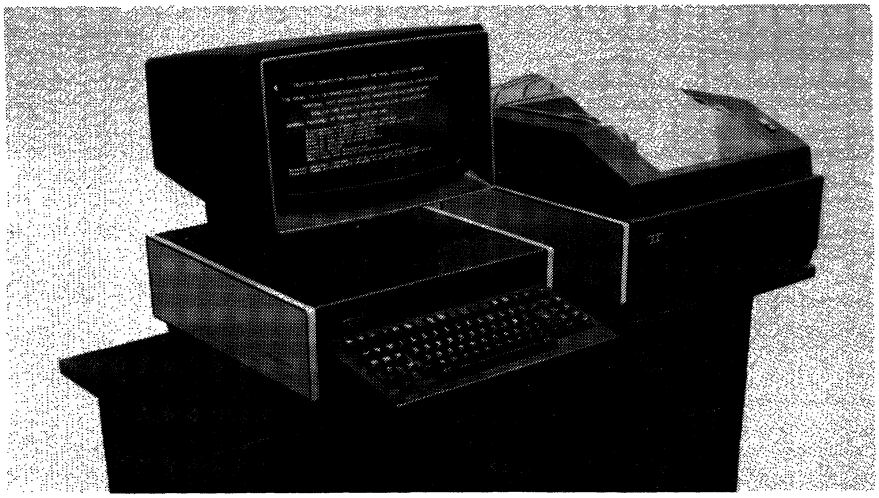
These systems are also available through AT&T under the Dataspeed 40 Service as well as from leasing companies, and other common carriers.

CHARACTERISTICS

VENDOR: Teletype Corporation, 5555 Touhy Avenue, Skokie, Illinois 60076. Telephone (312) 982-2000.

DATE OF ANNOUNCEMENT: Model 40/1, 40/2, 40/3 – May 1973; Model 40/4 – November 1975.

DATE OF FIRST DELIVERY: Model 40/1, 40/2, 40/3 – October 1973; Model 40/4 – March 1976.



This KDP configuration includes the four basic Model 40 functional modules: display, keyboard, printer, and terminal logic. The printer can be located up to 1000 feet from the keyboard/display unit. Teletype's new 132-column tractor feed printer is shown.

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

The salient features of the Teletype Model 40/4 are compared with those of the IBM 3270 system in the following paragraphs.

- *Display capacity*—The Teletype 40/4 is available in a 1920-character screen size only. IBM offers two screen sizes: 480 and 1920 characters.

- *System configuration*—The Teletype 40/4 is available in two configurations: a Mini-Cluster that accommodates up to three devices including any mix of printers and keyboard/display units; and a Maxi-Cluster that accommodates up to 24 keyboard/display units and up to 12 printers. The Maxi-Cluster is expandable in increments of one to four keyboard display units and one or two printers. By contrast, IBM's 3270 accommodates up to 32 devices in increments of four devices, including any mix of display units and printers.

- *Printed output*—The Model 40/4's printing capability provides a substantial increase in print performance over that of the IBM 3270. Teletype's full-character printer prints up to 314 80-character lines per minute using a 64-character set. By contrast, the IBM 3270 is available with either of two 120- to 132-column matrix printers rated at 40 or 66 cps using a 64-character set, and with a 132-column line printer rated at 120 lpm using a 64-character set. IBM currently provides wider print lines than the Teletype printer, but Teletype plans to introduce a 132-column tractor feed mechanism by mid-1976.

- *Displayed output*—The Teletype 40/4 has essentially the same display characteristics as the IBM 3270. Clarity and sharpness (resolution) of the displayed characters are equivalent to those of the IBM 3270, since both form each character via a 7-by-9 dot matrix. Lower case alphabetics are included in the 40/4's 96-character display option, whereas lower case alphabetics for the IBM 3270 are available only as an RPQ. Like its IBM counterpart, the 40/4 provides two beam intensity levels to highlight important information and beam blanking to mask confidential data for security purposes. Unlike the rigidly mounted IBM 3270 display unit, the 40/4 display unit can be tilted to eliminate glare and to satisfy the viewing convenience of individual operators.

- *Editing*—The 40/4 provides both character and line insertion and deletion. The IBM 3270 provides character insertion and deletion only.

- *Key entry*—The 40/4 is now available with either ASCII or EBCDIC typewriter-style keyboards or an EBCDIC data entry keyboard.

- *Communications*—Transmission speeds for the 40/4 are 2400 or 4800 bps, and ASCII or EBCDIC coding and BSC protocol are used. IBM's 3270 transmits at 1200 to 7200 bps and is available with ASCII or EBCDIC coding and BSC or SDLC protocol.

NUMBER DELIVERED TO DATE: Over 22,000 keyboard/displays and over 22,000 printers.

SERVICED BY: Teletype Corporation, telephone company, or leasing company, depending on source.

MODELS

The Teletype Model 40 product line is a family of four models: the 40/1, 40/2, 40/3, and 40/4. Models 40/1, 40/2, and 40/3 are stand-alone units; while Model 40/4 is a clustered terminal system. All models are available in several equipment configurations. The 40/2 is essentially an improved version of the 40/1 with added features and expanded communications capabilities.

CONFIGURATION

The equipment configurations for the four versions of the Teletype Model 40 are described below.

Models 40/1, 40/2, and 40/3—**There are three basic equipment configurations: KDP—includes keyboard, display, and printer; KD—includes keyboard and display; and RO—includes printer only. The KD and KDP configurations are each available in different physical arrangements that include table-top and pedestal mounts. In the table-top KDP arrangement, the keyboard can be attached to the front of either the electronics package or the printer, with the display on top; the other module (printer or electronics package) can be located up to 1000 feet away. In the pedestal arrangement, keyboard and printer are combined and the logic module is located in the base of the pedestal. The Model 40 can accommodate the Teletype Model 4210 Magnetic Tape Data Terminal, which can be used in both on- and off-line modes.**

Model 40/4—**Two cluster configurations are available: Maxi-Cluster and Mini-Cluster. The Maxi-Cluster consists of a controller and 1 to 36 devices, including 1 to 24 keyboard/display units (KD's) and 1 to 12 printers. The controller consists of a Station Cluster Controller (SCC) with up to 6 Device Cluster Controllers (DCC's). Each DCC can accommodate up to 4 KD's and 1 or 2 printers. The Mini-Cluster consists of a Mini-Cluster Controller (MCC) and up to three devices, including 1 or 2 KD's and 1 printer or 3 printers. At least 1 KD is recommended for diagnostic purposes. The SCC or MCC connects to the communications facility via an external modem.**

The Maxi- or Mini-Cluster Controller physically resides in a 24-inch-high pedestal cabinet. Two different pedestals are available: one with slotted top, the other without the slot. The slotted pedestal is intended to support a printer, and provides a paper slot at the top front to allow paper to be fed from bin to printer. Two physical arrangements are available for the keyboard/display (KD) units: base mount or cabinet mount. In the base mount arrangement a flat disk base supports the CRT display portion of the KD; the keyboard is physically separate. In the cabinet mount arrangement, the CRT display and keyboard are mounted to the electronics package to provide a single unit. Each KD can be located up to 100 feet from the Device or Mini-Cluster Controller, and each printer can be located up to 2000 feet from the controller. The Device Cluster Controller can be separated from the Station Cluster Controller by 2000 feet, and the SCC can be located up to 50 feet from the modem.

Configuration details are presented in the diagrams and Price List at the end of this report.

TRANSMISSION CHARACTERISTICS

Models 40/1, 40/2, and 40/3 are asynchronous terminals; Model 40/4 is a synchronous terminal. The communications parameters for each of the models are presented below.

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

- *Software support*–The 40/4 is compatible with and can utilize all existing IBM software for the 3270.

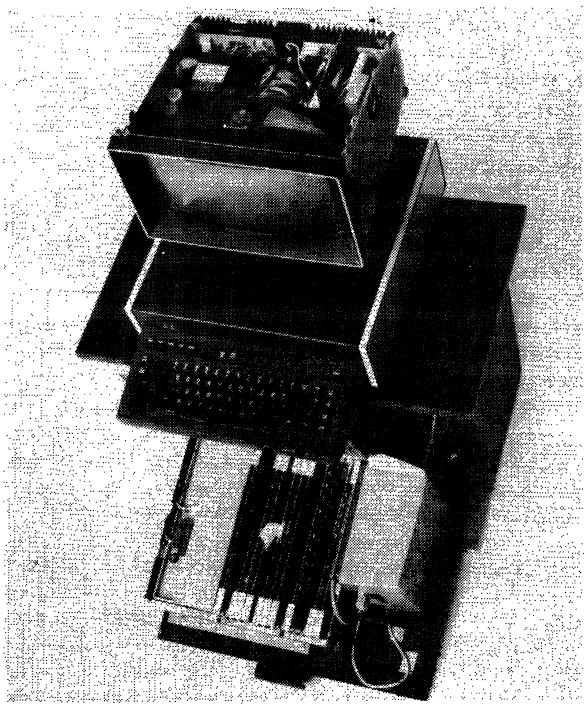
Deliveries of the Teletype Model 40/4 began in March 1976. Initial lead time on orders is quoted as 5 to 6 months.

The Teletype Model 40 communications terminal was introduced by AT&T at the International Communications Association conference in May 1973 and exhibited on a grander scale by both AT&T and Teletype at the 1973 National Computer Conference in June. The terminal is available on a purchase-only basis from Teletype, a subsidiary of AT&T's Western Electric Company, and as the Dataspeed 40 Service, a tariffed service offered by AT&T and its Bell System operating companies.

Teletype has since expanded its original Model 40 into four versions. Models 40/1, 40/2, 40/3, and 40/4. The 40/1, 40/2, and 40/3 are asynchronous terminals and are virtually the same except for minor differences. The 40/1 is the original Model 40, which is intended for dial-up operation. Model 40/3 was introduced about a year after Model 40/1 as the multi-point version of the 40/1, intended for leased-line operation. Model 40/2, introduced about 8 months after the 40/3, is an improved version of the basic Model 40 that can be used on dial-up or leased lines. Model 40/4, the latest number of the Model 40 family, is a synchronous terminal designed for compatibility with IBM Binary Synchronous Communications protocol.

The Model 40/2 improvements relate primarily to communications features, although some changes are reflected in the printer and display control. The maximum transmission speed has been extended to 4800 bps, and an RS-232 or Teletype current interface can be specified. The 40/2 can transmit a message in either block or character-by-character mode. In the character mode, the 40/2 can be operated in half-duplex mode or in a true full-duplex mode where the transmitted data differs from the received data. A destructive scrolling feature permits displaying unlimited amounts of received data; the received data is scrolled down the screen and is lost once the memory capacity is exceeded. An application of this feature would be monitoring extensive messages as they are printed.

Other features of the Model 40/2 include Automatic New Line and Line Break/Interrupt. The Automatic New Line feature returns the cursor to the beginning of the next line and the 40/2 continues to display received data in the event the New Line character has not been received. The Line Break/Interrupt feature permits the operator to interrupt the transmission from the remote sender on either half- or full-duplex transmissions. Added printer features include Automatic Answer, which permits the printer to automatically answer a call and print a received message when the terminal is in the local mode and message composition is in progress; Remote Control, which controls whether transmitted data is printed or not; and a print speed feature for KDP configurations that



This overhead view of a pedestal-mounted keyboard/display terminal illustrates the accessibility of the Model 40 circuitry. All of the controller logic is located on the easily replaceable circuit cards in the pedestal.

Models 40/1 and 40/3–**Asynchronous in the half-duplex mode at 1050 or 1200 bits/second (105 or 120 char/second). The 8-level (with parity) ASCII transmission code is used; the unit code structure is 10 bits/character, including unity start and stop bits. The modem interface is compatible with EIA Standard RS-232C and connects to the communications facility via a Bell System 202 or equivalent modem. Model 40/1 is designed for point-to-point operation over the dial network. Model 40/3 is designed for multipoint operation on leased or private lines.**

Model 40/2–**Asynchronous in the half- or full-duplex mode at 110, 150, 300, 600, 1200, 2400, or 4800 bits/second (15 to 480 char/second). Any two specified speeds can be switch-selected. The 8-level (with odd or even parity) ASCII transmission code is used. The unit code structure is 11 bits/character at 110 bits/second and 10 or 11 bits/character (as specified) at all higher transmission speeds, and includes 7 data bits, a parity bit, a start bit, and one or two stop bits. A 20 or 60 ma DC interface or RS-232C interface can be specified. Depending on operating speed, a Bell System 103, 113, or 202 type modem or an equivalent modem must be specified.**

Model 40/4–**Synchronous in the half-duplex mode at 2400 or 4800 bits/second (300 or 600 char/second). The 8-level (with odd parity) ASCII or EBCDIC transmission code is used. The Binary Sychronous Communication (BSC) line protocol is used. The BSC protocol conforms to ANSI X3.28-1971/2.4B2. An EIA Standard RS-232C interface accommodates a Bell System 201 (2400 bps) or 208 (4800 bps) or equivalent modem.**

DEVICE CONTROL

The Teletype Model 40 is an interactive terminal that, except for Model 40/2, transmits and receives data in message blocks. (Model 40/2 can transmit and receive data either by character or by block.) Transmission performed

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

restricts print speed from falling below 120 cps when the printer is in local mode, regardless of lower line speeds. Local printing is performed at line rates for higher line speeds, and on-line printing is always performed at line rates.

The asynchronous members of the Model 40 family of terminals are composed of interactive terminal modules that can be arranged in various configurations ranging from a receive-only printer to a full-blown terminal including keyboard, display, and printer. Four modules form the basic building blocks of the Model 40: keyboard, display, printer, and terminal logic. Many physical arrangements are possible, with the electronics package and/or printer located up to 1000 feet away from the CRT/keyboard. Table-top or pedestal mount can be specified.

All members of the Model 40 family feature MOS construction and boast a self-diagnostic capability that will serve as a powerful aid to the user for quickly locating a faulty component through visual inspection. Component failures are identified by lighted neon lamps concealed behind access panels and by printed or displayed test patterns activated by keyed diagnostic sequences. To minimize down-time, Teletype encourages the user himself to replace faulty components (easily done thanks to a high degree of component interchangeability), but still maintains strong service support to satisfy user requirements.

Salient features of the three asynchronous members of the Model 40 family include:

- A 1920-character screen arranged in 24 lines of 80 characters.
- A full set of cursor controls that permit local or remote cursor manipulation. (Character addressability, however, is not provided.)
- A full set of ASCII characters, including upper-and-lower-case alphabetics, that can be displayed or keyed.
- A complete editing capability, including character and line insertion and deletion.
- A formatting option that features protected fields for format descriptors.
- A paging option that increases the size of display memory to 48 or 72 80-character lines (2 or 3 pages) and, through scrolling, displays any consecutive 24 lines or complete 24-line memory segments.
- A horizontal tab option that permits any number of tab positions to be established.
- A highlighting option that flashes selected segments of data between half and full intensity.
- A high-speed impact page printer that prints up to 314 80-character lines per minute on ordinary teleprinter

on a message block basis transmits the entire contents or a selected part of the display memory upon operator command (and after receipt of a polling message in the case of Model 40/4). Messages are composed and edited prior to transmission.

Manual cursor controls position the cursor up, down, left, right, to the initial position of the next line (return), to the initial position of the first line (home), or spaced forward or backward. Repetitive operation is provided for these cursor functions. The cursor can also be moved to any character position by received series of two-character cursor command sequences that correspond to the cursor functions provided by the manual controls.

On models 40/1, 40/2, and 40/3, cursor movement in any one direction is inhibited when the cursor reaches the edge of the screen. Model 40/4, however, provides cursor wraparound. If the cursor is moved off the screen to the right or left, it reappears on the left or right, one line lower or higher, respectively.

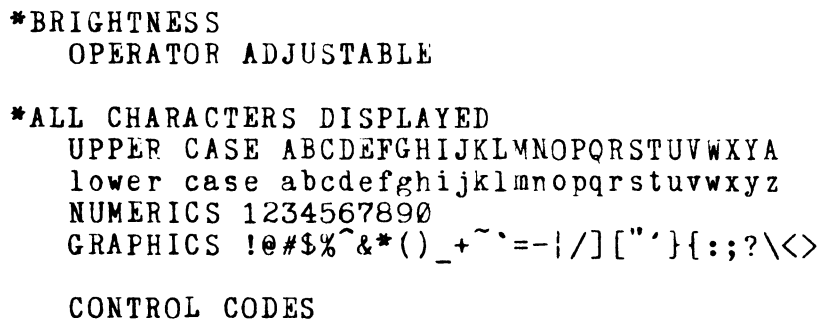
Models 40/1, 40/2, and 40/3 differ functionally from Model 40/4. The 40/4 is designed for on-line data entry applications as a directly compatible replacement for the IBM 3270 Information Display System (BSC version only) and provides protected format, tabbing, highlighting (programmable brightness levels), and numeric field delineation as standard features. The other models are intended for inquiry-response interactive applications, but can be equipped for data entry applications. These models offer the above features as options.

The protected format feature permits the use of fixed formats for data entry applications that require the operator to key pertinent data into blank spaces within a displayed format. The feature restricts key entry to unprotected or variable fields within the fixed format. Format descriptors are protected from inadvertent data entry and remain displayed until erased by computer message or by the operator. Only unprotected fields are transmitted or erased, while the format remains displayed. Fields can be high-lighted, blanked (40/4), or restricted to numeric entry only (40/4). Models 40/1, 40/2, and 40/3 display protected fields at half the normal intensity. The operator moves from one unprotected field to another (forward or backward) via the tab function, which permits the operator to move to the next unprotected field (tab) or, on the 40/4, to the previous unprotected field (backtab). Formats are received only via computer message on the 40/4, but they can also be received from magnetic tape (via the Teletype 4210) or keyed by the operator on the other models.

Highlighting is used to direct the operator's attention to significant information. On the 40/4, fields can be made to blink, displayed at higher than normal brightness, or a combination of both functions. Specified fields can also be blanked (non-displayed) for security reasons. On all other models, highlighting is restricted to blinking a character or field between full and half intensity once every second.

Tabulation is a computer-controlled function on the 40/4, but it can also be controlled from the keyboard on all other models. Tab controls on the 40/4 permit the operator to tab (move the cursor) to the beginning of the next unprotected field, to the beginning of the next unprotected field with erasure of all unprotected data between the existing and new cursor positions, and to the beginning of the present or previous unprotected field. On the other models, tab stops can be set and cleared from the keyboard. Tab stops, each displayed as a dot, are line-independent; i.e., individual tab stops can be located at different positions on each line. When setting tab stops, all stops are simultaneously set in a column, at and immediately below

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals



This sample output from the Model 40 printer (left) illustrates its ability to produce high-quality printing in both upper and lower case.

roll paper or sprocket-fed, multi-part forms. Upper-case-only or upper-and-lower-case alphabetics can be specified.

- A transmission speed of 1050 or 1200 bits per second in Models 40/1 and 40/3, and of 110 to 4800 bits per second in Model 40/2.

- The capability to interface with a Teletype Model 4210 Magnetic Tape Data Terminal.

The Model 40's page printer sharply contrasts with conventional teleprinter design and construction. In contrast to the single print actuator technique used by Teletype's family of teleprinters, the Model 40 printer employs 80 print actuators, one for each print position. It produces printed copy by means of a continuous moving belt that contains imbedded metal type pallets, and a commercially available ribbon. The printer is designed to average 2500 hours of operation between failures.

Teletype is by no means a neophyte in the CRT terminal industry. Though long dedicated to the production of teleprinters and punched tape equipment, Teletype gained experience with CRT terminals in the late 1960's, when development began on communication display terminals which were produced and used within the AT&T organization for in-house applications such as order entry.

USER REACTION

In June 1976, Datapro talked with 10 users of Teletype Model 40's (representing 429 terminals) about their experience with this equipment. Their ratings are summarized in the following table.

	Excellent	Good	Fair	Poor	WA*
Overall performance	7	3	0	0	3.7
Ease of operation	6	3	1	0	3.7
Display clarity	6	4	0	0	3.6
Keyboard feel and usability	5	4	1	0	3.4
Hardware reliability	5	3	2	0	3.3
Maintenance service	6	3	1	0	3.7
Software & technical support	6	3	1	0	3.7

*Weighted Average on a scale of 4.0 for Excellent.

the cursor, in a manner analogous to setting tabs on a typewriter. When clearing, all tab stops immediately below and to the right of the cursor are cleared. The operator can tab to the first tab stop to the right, to the beginning of the next line, or to the beginning of the next unprotected field, whichever comes first.

On Models 40/1, 40/2, and 40/3, protected format (the Protected Data feature), tabulation (Tab Control), and Highlighting are features of the optional Display Option Group.

All models include an extensive editing capability as a standard feature. Edit functions include both character and line insertion and deletion. Character insertion and deletion, both repeatable functions, affect all data to the right of the cursor up to the end of the line or the beginning of a protected field. The displayed text expands (to the right) for each character entered and contracts for each character deleted. Character insertion is inhibited if no blank spaces are present to the right of the cursor. Line insertion and deletion affect all lines of text from the cursor to the end of display memory or (Models 40/1, 40/2, and 40/3 only) a line occupied by a protected field. On Models 40/1, 40/2, and 40/3, an attempted line insertion is inhibited when display memory has been filled with partial or complete lines of data, or when the insertion is attempted into a segment preceding a protected field where all lines are occupied; i.e., the line containing the protected field will not move downward. On Model 40/4, line insertion or deletion is inhibited if any formatted fields exist on the screen.

Erasure is restricted to screen erasure only on Models 40/1, 40/2, and 40/3. The entire contents of display memory (excluding protected fields when the protected format feature is activated) are erased, beginning at the first character position to the right of the cursor. On Model 40/4, the operator can erase the unprotected fields only or the entire screen. If the entire screen is erased, the cursor is automatically positioned at Home and the format is transmitted when the terminal is polled.

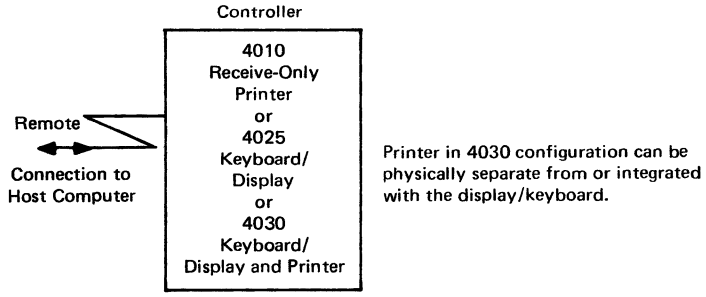
Model 40/4 operates under the control of the program stored at the host computer and provides complete compatibility with the addressing sequence, command code structure, and line discipline employed by the IBM 3270 Information Display System. The 40/4 responds to and executes the full repertoire of IBM 3270 commands, including Read Buffer, Read Modified, Write, Erase-Write, Copy, Erase All Unprotected, Start Field, Set Buffer Address, Insert Cursor, Program Tab, Repeat to Address, and Erase Unprotected to Address. Attribute characters can define fields as protected, highlighted, numeric, and non-displayed.

Scrolling Memory, an optional feature for Models 40/1, 40/2, and 40/3, adds one or two additional 1920-character (24-line) segments to the basic 1920-character display

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

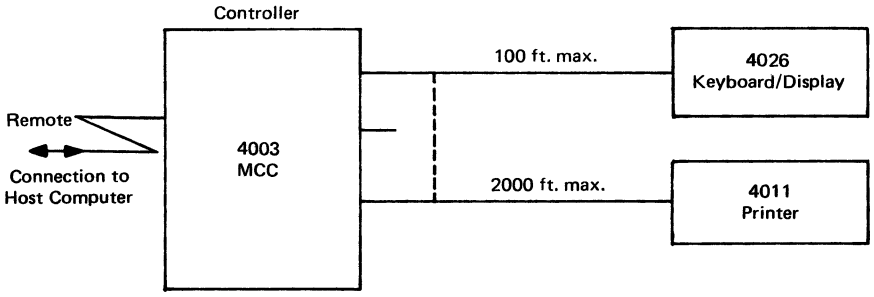
TELETYPE MODEL 40 CONFIGURATION

Model 40/1, 40/2, 40/3



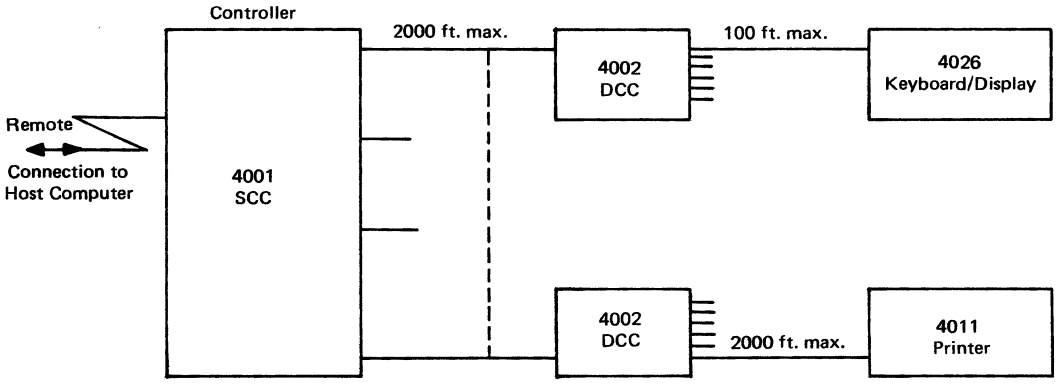
Printer in 4030 configuration can be physically separate from or integrated with the display/keyboard.

Model 40/4 Mini-cluster



1 or 2 Keyboard/Displays and 1 Printer or 3 Printers (no Keyboard/Display). At least 1 Keyboard/Display is recommended for diagnostic purposes.

Model 40/4 Maxi-Cluster



Basic Controller can accommodate 1-24 Keyboard/Displays and 0-12 Printers.

Each Device Controller handles up to 4 Keyboard/Displays and 2 Printers.

Maximum of 4 Device Controllers per basic controller.

At least 1 Keyboard/Display is recommended for diagnostic purposes.

MCC — Mini-Cluster Controller
SCC — Station Cluster Controller
DCC — Device Cluster Controller

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

> As can be seen from the Weighted Averages, users were very pleased with the Teletype Model 40. They were particularly satisfied with the overall performance and general appearance of the terminal. Other advantages cited included sharpness of screen, fast printer speeds, convenience of the integral arrangement of components, flexibility and reliability.

There were no significant disadvantages cited except for a few isolated complaints of maintenance service or technical support. However, these cases represented problems with a particular leasing company (e.g. a time-sharing service) rather then with Teletype. □

➤ memory to provide storage for a total of 48 or 72 lines of data. Data storage is divided into two or three consecutive but continuous 24-line segments. By means of the Scroll Up and Scroll Down key functions, any consecutive 24 lines of memory can be displayed at one time; data is moved continuously on one line from each key depression. The Display Advance key function displays each consecutive 24-line segment of the display memory through successive key depressions.

The printer operates in either on- or off-line mode when used in the KDP configuration. When operating on-line, all received messages are printed; since printing is performed from the display memory, the received messages are also displayed. When operating off-line, the printer is under operator control as a local-copy printer. Displayed messages are printed only when the Print Local key is depressed.

SOFTWARE SUPPORT: Model 40/4 is supported under existing IBM software support for the IBM 3270, which includes the following IBM access methods: BTAM under DOS, DOS/VS, OS, or OS/VS2; TCAM under OS: and VTAM under DOS/VS, OS/VS1, or OS/VS2. Model 40/4 is also supported for use with the following IBM Program Products: VIDEO/370, DATA/360, IMS, IQF, CICS, and TSO.

ERROR CONTROL: Character parity is generated for each keyed character and accompanies the transmitted characters. Parity checking is performed on received data. A character found to be in error is replaced with a special symbol, which is printed and/or displayed on the screen in place of the incorrect character.

COMPONENTS

CRT DISPLAY: Via a 13-inch (diagonal measurement) CRT with a viewing area 11.25 inches wide by 5.25 inches high. The screen is arranged in 24 lines of 80 characters each, totaling 1920 character positions. Models 40/1, 40/2, and 40/3 provide a character set of 127 ASCII characters, including upper and lower case alphabetics, numerics, and special symbols. Model 40/4 has a character set of 64 or 96 (optional) characters, including upper case alphabetics, numerics, and symbols; lower case letters are included in the optional 96-character set. All models display data in white against a dark background. Characters are formed by a 7-by-9 dot matrix. The viewing screen can be vertically tilted through 20 degrees of rotation (±10 degrees from the horizontal) to compensate for glare and ease operator viewing.

KEYBOARD: The typewriter-style keyboard for Models 40/1, 40/2, and 40/3 can generate any of 127 ASCII character codes, including upper and lower case alphabetics, numerics, specials, and control codes. The 40/4 keyboard can generate 96 upper and lower case ASCII or EBCDIC characters. Control codes are printed on their respective keytops on all models. A character repeat function can be user-implemented to permit repetitive entry of data or control functions.

Program Function and Program Attention keys, a standard feature of the IBM 3270, are also standard on Model 40/4. Each of these keys generates a unique code that is recognized by the controlling software as a specific program request or data identifier. Program Function codes accompany the display data as it is transmitted to the computer, while Program Attention codes are transmitted separately.

PRINTER: Two impact page printers are available; both are full-character printers; the 80-column printer is rated at 314 lines/minute for a 64-character subset of ASCII symbols (upper case alphabetics only) and at 220 lines/minute for a full complement (127 characters) of ASCII symbols, including upper and lower case alphabetics. The 80-column printer is available with a friction or tractor feed mechanism and prints 10 chars./inch and 6 lines/inch; printing is adjustable for double line-feed printing. The friction-feed printer prints on standard 8½-inch single-ply rolled paper. The tractor-feed printer prints on standard fan-fold, continuous forms up to 6-ply (1 original and 5 copies), and is adjustable to accommodate forms from 4 to 9½-inches wide and from 3-2/3 to 5½ or 11 inches long.

A newer tractor-feed printer is available with 80 or 132 print positions. The printer is rated at 300 lines/minute with the standard 64-character set of ASCII symbols and at 220 lines/minute for the full upper and lower case character set. Horizontal and vertical spacing is 10 chars./inch and 6 lines/inch, respectively; as an option printing is adjustable for single- or double-line feed. The printer accommodates standard fanfold 6-part forms from 4 to 9½ (80-column unit) or 15 inches wide and from 2½ to 22 inches long.

Printing is performed by means of a row of 80 or 132 print actuators, one per print position, and a continuous arrangement of type pallets which are imbedded into a moving belt. When energized, each actuator strikes its respective pallet, which impacts the paper through a ribbon. The 64-character set is repeated three times around the belt; the full ASCII set is repeated two times.

PRICING

The Model 40 can be obtained from Teletype on a purchase basis only. Teletype now provides functional discounts only; quantity discounts have been discontinued. Functional discounts of 10 percent are available to nonprofit educational institutions (public and private) and to state, county, and municipal governments and their Canadian equivalents. Functional discounts of 20 percent are available to resellers (OEM's), lessors, and common carriers (communications and transportation), and to United States and Canadian Federal Governments and their prime contractors (including subcontractors).

List prices are presented below. The price ranges for Models 40/1, 40/2, and 40/3 reflect the difference between a basic model and a model with all options, including buffering and a full ASCII character set for the Model 4010 Receive-Only Printer; display memory capacity and the inclusion of the Display Option Group for the Model 4025 Keyboard Display (KD); and a combination of the printer and display options for the Model 4030 Keyboard Display Printer (KDP). ➤

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

Stand-Alone Configuration	Model 40/1	Model 40/2	Model 40/3*
Model 4010 Receive-Only Printer	$3,236-3,449	$3,575-3,983	$3,236-3,798
Model 4025 Keyboard Display	3,121-4,460	3,573-4,361	3,699-4,430
Model 4030 Keyboard Display Printer	5,185-6,793	5,534-7,581	5,660-6,087

* Requires Station Controller priced at $1,094 to $1,160 which is not subject to discounts.

The price range for the 4210 Magnetic Tape Data Terminal is $3,409 to $3.548.

40/4 Cluster Configuration	List Price
Model 4026 Keyboard Display	$999-$1,181
Model 4011 Printer	1,739-2,858
Model 4001 Station Cluster Controller (SCC)	4,388-4705
Model 4002 Device Cluster Controller (DCC)	4,713-6,405
Model 4003 Mini-Cluster Controller (MCC)	5,143-6,126
Model 4000 Pedestal	238-239

In the 40/4 cluster configurations, the price range for the 4026 Keyboard Display reflects base or cabinet mounting (more expensive); the price range for the printer reflects friction (basic) or tractor feed; the price range for the Station Cluster Controller reflects the number of Device Cluster Controllers that can be accommodated (4 or 6) and the type of pedestal used (plain or slotted top); the price range for the Device Cluster Controller reflects the number of Keyboard Displays and Printers that can be accommodated and the type of pedestal; the price range for the Mini-Cluster Controller also reflects the number of Keyboard Displays and Printers that can be used and the type of pedestal employed.

Dataspeed 40 Service, offered by AT&T through its individual Bell System operating companies, is priced below. The price ranges reflect the differentials among the tariffs written by the various operating companies. The approximate range of lease prices, excluding all options, is as follows:

	Model 40/1	Model 40/2*	Model 40/3*
ROP	$105 to 125/mo.	–	$160 to 180/mo.
KD	110 to 135/mo.	$135 to 160/mo.	180 to 205/mo.
KDP	175 to 205/mo.	200 to 230/mo.	245 to 275/mo.

* Requires the Display Option Group, which includes protected format, horizontal tab, and highlighting.

The prices do not include the cost of a modem or communications facility.

Each additional 24 lines (or page) of display memory is priced at $8/month. Options including protected format, horizontal tab, and highlighting total $15/month. The Send/Receive option is priced at $5/month. A 1000-character buffer for the RO version is priced at $10/month.

The 420 Magnetic Tape Data Terminal for use with the Dataspeed 40 Service is available for $100 to $125/month.■

Teletype Model 40/4 (AT&T Dataspeed 40) Data Terminal

New Product Announcement

Teletype Corporation announced the Model 40/4 stand-alone terminal in October 1977. A single-terminal version of its clustered Model 40/4 terminals, the terminal features microprocessor control and provides all of the features of the 40/4 cluster versions.

The terminal consists of the same basic components, including keyboard, CRT monitor, and printer, as the cluster versions. And like its cluster counterparts, the stand-alone 40/4 provides full IBM command compatibility. Transmission rates of 2400 or 4800 bps are also the same as the cluster models. The new stand-alone version is designed for point-to-point or multipoint private line systems using BSC protocol.

A key feature of the terminal is its dual 1920-character buffers; one is assigned to the keyboard/display, the other to the printer. Each has its own device address. This technique permits data to be prepared on the display, sent to the host computer for processing, and the results returned to the printer without interrupting operator preparation of a subsequent page of data. Also, the printer is available for local printing of displayed data or remote printing of host computer data without interrupting display operation. The printer can copy protected and/or unprotected displayed data.

Two typewriter-style keyboards are available—with or without a numeric cluster. Operator aid key functions include Caps Lock, Tab, Back Tab, Numeric Lock, and Duplicate. The keyboards are available with up to 14 special function keys (12 Program Function and 2 Program Attention keys).

Options include choice of ASCII or EBCDIC code, upper only or upper and lower case character set, and alarms. Three field blink options and station addresses are operator selectable; selection is made by keying the desired option from a displayed table.

Diagnostics are the same as those provided with the cluster versions of the 40/4. Built-in diagnostic test all components of the 40/4, including individual circuit boards within the controller. Diagnostic testing can extend to the remote end with loop back, thereby testing terminals, modems, and communications line.

The 40/4 stand-alone terminal is priced at $2,803 for a Keyboard/Display (KD) unit and $4,194 to $5,089 with added printer. The same functional discounts that apply to the 40/4 cluster versions also apply to the stand-alone model. AT&T Dataspeed tariffs are expected to be $200 per month for the keyboard/display terminal and $90 to $100 per month for the printer. Tariffs will be filed in some states in the first quarter of 1978, and service will be available upon effectiveness of the tariffs.

Prime shift maintenance is priced at $30 per month for the Keyboard/Display (KD) unit and $39 per month for the Keyboard/Display Printer unit. Maintenance prices are for installations within local service areas.

Installation is priced at $175 for the KD and $130 for the KDP.

Initial Deliveries were made in November 1977.□

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

MANAGEMENT SUMMARY

The apprehension of display vendors in May 1973 when Teletype (and AT&T) introduced the Teletype Model 40 and Dataspeed 40 service was nothing compared to the controversy aroused with the November 1975 introduction of the clustered Model 40/4.

You will be able to get your IBM 3270 display terminals from Teletype–or from Ma Bell herself (under Dataspeed 40 Service) *if* AT&T wins its current battle before the FCC against IBM, the Computer Industry Association (CIA), and the Computer and Business Equipment Manufacturers Association (CBEMA). The challenge by the three factions is based on arguments that the 1956 antitrust consent decree forbids AT&T from going into an *unregulated* business. The three have alleged that the new Teletype terminal is "not simply a communications terminal, but is actually an intelligent, programmable computer terminal."

The controversy centers around *interstate* (across state lines) service. The 40/4 is currently tariffed in almost all states for *intrastate* service. This anomaly is created because different regulatory agencies have responsibility for the different service types.

Teletype's new addition to the Model 40 family of data terminals is an alternative to the remote version of the IBM 3270 Information Display System. The Model 40/4 provides software compatibility with the IBM 3270 with respect to communications protocol (which for now is restricted to BSC), commands and command code structure, and addressing sequence. The Model 40/4 also provides most of the features and functions of the IBM 3270, although it is currently not available with a light pen or operator ID card reader.

A family of printer and display terminals, which include stand-alone units and clustered systems.

Configurations available on each model are ROP-receive only printer, KD-keyboard and display, and KDP-keyboard, display and printer. Stand alone models operate asynchronously at from 110 bps up to 4800 bps. The newest model, the 40/4, emulates the IBM 3270 and can support up to 24 keyboard displays plus up to 12 printers.

Typical prices (equipment is available on a purchase only basis from Teletype) range from $2,974 for a basic Model 40/1 in an ROP configuration to $40,586 for a Model 40/4 configured with 12 keyboard/displays and 6 printers. Pricing is configuration sensitive.

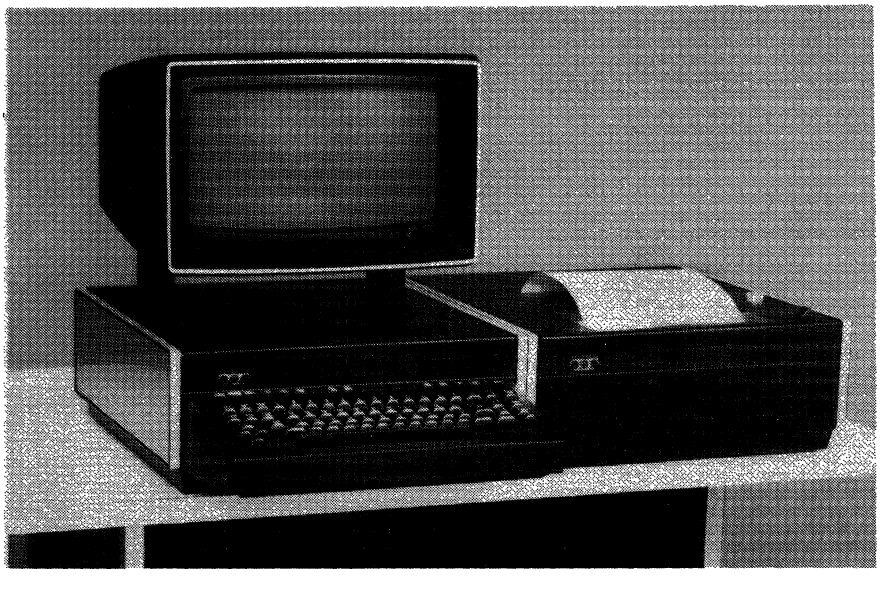
These systems are also available through AT&T under the Dataspeed 40 Service as well as from leasing companies, and other common carriers.

CHARACTERISTICS

VENDOR: Teletype Corporation, 5555 Touhy Avenue, Skokie, Illinois 60076. Telephone (312) 982-2000.

DATE OF ANNOUNCEMENT: Model 40/1, 40/2, 40/3 – May 1973; Model 40/4 – November 1975.

DATE OF FIRST DELIVERY: Model 40/1, 40/2, 40/3 – October 1973; Model 40/4 – March 1976.



Included in this compact table-top KDP configuration are the four basic Model 40 functional modules: display, keyboard, printer, and terminal logic. The printer can be located up to 50 feet away from the keyboard/display unit.

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

The salient features of the Teletype Model 40/4 are compared with those of the IBM 3270 system in the following paragraphs.

- *Display capacity*—The Teletype 40/4 is available in a 1920-character screen size only. IBM offers two screen sizes: 480 and 1920 characters.

- *System configuration*—The Teletype 40/4 is available in two configurations: a Mini-Cluster that accommodates up to three devices including any mix of printers and keyboard/display units; and a Maxi-Cluster that accommodates up to 24 keyboard/display units and up to 12 printers. The Maxi-Cluster is expandable in increments of one to four keyboard display units and one or two printers. By contrast, IBM's 3270 accommodates up to 32 devices in increments of four devices, including any mix of display units and printers.

- *Printed output*—The Model 40/4's printing capability provides a substantial increase in print performance over that of the IBM 3270. Teletype's full-character printer prints up to 314 80-character lines per minute using a 64-character set. By contrast, the IBM 3270 is available with either of two 120- to 132-column matrix printers rated at 40 or 66 cps using a 64-character set, and with a 132-column line printer rated at 120 lpm using a 64-character set. IBM currently provides wider print lines than the Teletype printer, but Teletype plans to introduce a 132-column tractor feed mechanism by mid-1976.

- *Displayed output*—The Teletype 40/4 has essentially the same display characteristics as the IBM 3270. Clarity and sharpness (resolution) of the displayed characters are equivalent to those of the IBM 3270, since both form each character via a 7-by-9 dot matrix. Lower case alphabetics are included in the 40/4's 96-character display option, whereas lower case alphabetics for the IBM 3270 are available only as an RPQ. Like its IBM counterpart, the 40/4 provides two beam intensity levels to highlight important information and beam blanking to mask confidential data for security purposes. Unlike the rigidly mounted IBM 3270 display unit, the 40/4 display unit can be tilted to eliminate glare and to satisfy the viewing convenience of individual operators.

- *Editing*—The 40/4 provides both character and line insertion and deletion. The IBM 3270 provides character insertion and deletion only.

- *Key entry*—The 40/4 is currently available with an ASCII typewriter-style keyboard only. IBM provides EBCDIC or ASCII keyboards in typewriter or data entry styles.

- *Communications*—Transmission speeds for the 40/4 are 2400 or 4800 bps, and ASCII coding and BSC protocol are used. IBM's 3270 transmits at 1200 to 7200 bps

NUMBER DELIVERED TO DATE: Over 8,000.

SERVICED BY: Teletype Corporation, telephone company, or leasing company, depending on source.

MODELS

The Teletype Model 40 product line is a family of four models: the 40/1, 40/2, 40/3, and 40/4. Models 40/1, 40/2, and 40/3 are stand-alone units; while Model 40/4 is a clustered terminal system. All models are available in several equipment configurations. The 40/2 is essentially an improved version of the 40/1 with added features and expanded communications capabilities.

CONFIGURATION

The equipment configurations for the four versions of the Teletype Model 40 are described below.

Models 40/1, 40/2, and 40/3—**There are three basic equipment configurations: DKP—includes keyboard, display, and printer; DK—includes keyboard and display; and RO—includes printer only. The KD and KDP configurations are each available in different physical arrangements that include table-top and pedestal mounts. In the table-top KDP arrangement, the keyboard can be attached to the front of either the electronics package or the printer, with the display on top; the other module (printer or electronics package) can be located up to 1000 feet away. In the pedestal arrangement, keyboard and printer are combined and the logic module is located in the base of the pedestal. The Model 40 can accommodate the Teletype Model 4210 Magnetic Tape Data Terminal, which can be used in both on- and off-line models.**

Model 40/4—**Two cluster configurations are available: Maxi-Cluster and Mini-Cluster. The Maxi-Cluster consists of a controller and 1 to 36 devices, including 1 to 24 keyboard/display units (KD's) and 1 to 12 printers. The controller consists of a Station Cluster Controller (SCC) with up to 6 Device Cluster Controllers (DCC's). Each DCC can accommodate up to 4 KD's and 1 or 2 printers. The Mini-Cluster consists of a Mini-Cluster Controller (MCC) and up to 3 devices, including any mix of KD's and printers; at least one KD is required for diagnostic purposes. The SCC or MCC connects to the communications facility via an external modem.**

The Maxi- or Mini-Cluster Controller physically resides in a 24-inch-high pedestal cabinet. Two different pedestals are available: one with slotted top, the other without the slot. The slotted pedestal is intended to support a printer, and provides a paper slot at the top front to allow paper to be fed from bin to printer. Two physical arrangements are available for the keyboard/display (KD) units: base mount or cabinet mount. In the base mount arrangement a flat disk base supports the CRT display portion of the KD; the keyboard is physically separate. In the cabinet mount arrangement, the CRT display and keyboard are mounted to the electronics package to provide a single unit. Each KD can be located up to 100 feet from the Device or Mini-Cluster Controller, and each printer can be located up to 2000 feet from the controller. The Device Cluster Controller can be separated from the Station Cluster Controller by 2000 feet, and the SCC can be located up to 50 feet from the modem.

Configuration details are presented in the diagrams and Price List at the end of this report.

TRANSMISSION CHARACTERISTICS

Models 40/1, 40/2, and 40/3 are asynchronous terminals; Model 40/4 is a synchronous terminal. The communications parameters for each of the models are presented below.

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

and is available with ASCII or EBCDIC coding and BSC or SDLC protocol.

- *Software support*–The 40/4 is compatible with and can utilize all existing IBM software for the 3270.

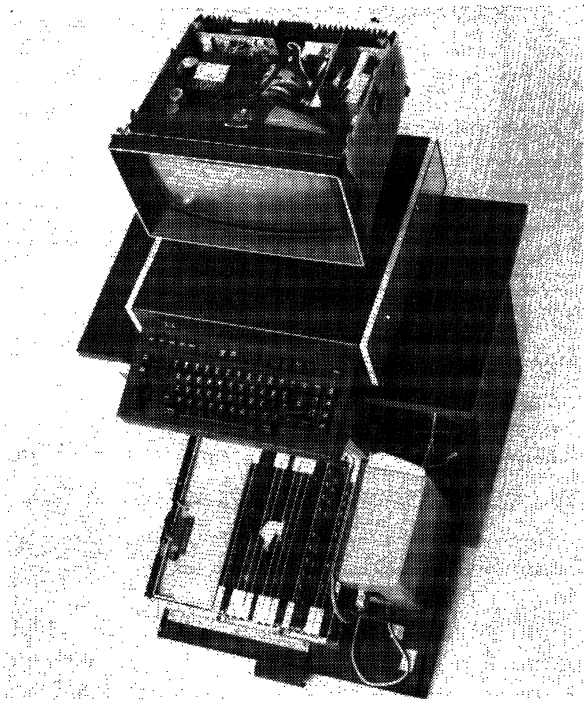
Deliveries of the Teletype Model 40/4 began in March 1976. Initial lead time on orders is quoted as 5 to 6 months.

The Teletype Model 40 communications terminal was introduced by AT&T at the International Communications Association conference in May 1973 and exhibited on a grander scale by both AT&T and Teletype at the 1973 National Computer Conference in June. The terminal is available on a purchase-only basis from Teletype, a subsidiary of AT&T's Western Electric Company, and as the Dataspeed 40 Service, a tariffed service offered by AT&T and its Bell System operating companies.

Teletype has since expanded its original Model 40 into three versions: Models 40/1, 40/2, and 40/3. All three models are asynchronous terminals and are virtually the same except for minor differences. The 40/1 is the original Model 40, which is intended for dial-up operation. Model 40/3 was introduced about a year after Model 40/1 as the multi-point version of the 40/1, intended for leased-line operation. Model 40/2, introduced about 8 months after the 40/3, is an improved version of the basic Model 40 that can be used on dial-up or leased facilities.

The Model 40/2 improvements relate primarily to communications features, although some changes are reflected in the printer and display control. The maximum transmission speed has been extended to 4800 bps, and an RS-232 or Teletype current interface can be specified. The 40/2 can transmit a message in either block or character-by-character mode. In the character mode, the 40/2 can be operated in half-duplex mode or in a true full-duplex mode where the transmitted data differs from the received data. A destructive scrolling feature permits displaying unlimited amounts of received data; the received data is scrolled down the screen and is lost once the memory capacity is exceeded. An application of this feature would be monitoring extensive messages as they are printed.

Other features of the Model 40/2 include Automatic New Line and Line Break/Interrupt. The Automatic New Line feature returns the cursor to the beginning of the next line and the 40/2 continues to display received data in the event the New Line character has not been received. The Line Break/Interrupt feature permits the operator to interrupt the transmission from the remote sender on either half- or full-duplex transmissions. Added printer features include Automatic Answer, which permits the printer to automatically answer a call and print a received message when the terminal is in the local mode and message composition is in progress; Remote Control, which controls whether transmitted data is printed or not; and a print speed feature for KDP configurations that



This overhead view of a pedestal-mounted keyboard/display terminal illustrates the accessibility of the Model 40 circuitry. All of the controller logic is located on the easily replaceable circuit cards in the pedestal.

Models 40/1 and 40/3–**Asynchronous in the half-duplex mode at 1050 or 1200 bits/second (105 or 120 char/second). The 8-level (with parity) ASCII transmission code is used; the unit code structure is 10 bits/character, including unity start and stop bits. The modem interface is compatible with EIA Standard RS-232C and connects to the communications facility via a Bell System 202 or equivalent modem. Model 40/1 is designed for point-to-point operation over the dial network. Model 40/3 is designed for multipoint operation on leased or private lines.**

Model 40/2–**Asynchronous in the half- or full-duplex mode at 110, 150, 300, 600, 1200, 2400, or 4800 bits/second (15 to 480 char/second). Any two specified speeds can be switch-selected. The 8-level (with odd or even parity) ASCII transmission code is used. The unit code structure is 11 bits/character at 110 bits/second and 10 or 11 bits/character (as specified) at all higher transmission speeds, and includes 7 data bits, a parity bit, a start bit, and one or two stop bits. A 20 or 60 ma DC interface or RS-232C interface can be specified. Depending on operating speed, a Bell System 103, 113, or 202 type modem or an equivalent modem must be specified.**

Model 40/4–**Synchronous in the half-duplex mode at 2400 or 4800 bits/second (300 or 600 char/second). The 8-level (with odd parity) ASCII transmission code is used. The Binary Synchronous Communication (BSC) line protocol is used. The BSC protocol conforms to ANSI X3.28-1971/2.4B2. An EIA Standard RS-232C interface accommodates a Bell System 201 (2400 bps) or 208 (4800 bps) or equivalent modem.**

DEVICE CONTROL

The Teletype Model 40 is an interactive terminal that, except for Model 40/2, transmits and receives data in message blocks. (Model 40/2 can transmit and receive data either by character or by block.) Transmission performed

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

restricts print speed from falling below 120 cps when the printer is in local mode, regardless of lower line speeds. Local printing is performed at line rates for higher line speeds, and on-line printing is always performed at line rates.

The asynchronous members of the Model 40 family of terminals are composed of interactive terminal modules that can be arranged in various configurations ranging from a receive-only printer to a full-blown terminal including keyboard, display, and printer. Four modules form the basic building blocks of the Model 40: keyboard, display, printer, and terminal logic. Many physical arrangements are possible, with the electronics package and/or printer located up to 1000 feet away from the CRT/keyboard. Table-top or pedestal mount can be specified.

All members of the Model 40 family feature MOS construction and boast a self-diagnostic capability that will serve as a powerful aid to the user for quickly locating a faulty component through visual inspection. Component failures are identified by lighted neon lamps concealed behind access panels and by printed or displayed test patterns activated by keyed diagnostic sequences. To minimize down-time, Teletype encourages the user himself to replace faulty components (easily done thanks to a high degree of component interchangeability), but still maintains strong service support to satisfy user requirements.

Salient features of the three asynchronous members of the Model 40 family include:

- A 1920-character screen arranged in 24 lines of 80 characters.
- A full set of cursor controls that permit local or remote cursor manipulation. (Character addressability, however, is not provided.)
- A full set of ASCII characters, including upper-and-lower-case alphabetics, that can be displayed or keyed.
- A complete editing capability, including character and line insertion and deletion.
- A formatting option that features protected fields for format descriptors.
- A paging option that increases the size of display memory to 48 or 72 80-character lines (2 or 3 pages) and, through scrolling, displays any consecutive 24 lines or complete 24-line memory segments.
- A horizontal tab option that permits any number of tab positions to be established.
- A highlighting option that flashes selected segments of data between half and full intensity.
- A high-speed impact page printer that prints up to 314 80-character lines per minute on ordinary teleprinter on a message block basis transmits the entire contents or a selected part of the display memory upon operator command (and after receipt of a polling message in the case of Model 40/4). Messages are composed and edited prior to transmission.

  Manual cursor controls position the cursor up, down, left, right, to the initial position of the next line (return), to the initial position of the first line (home), or spaced forward or backward. Repetitive operation is provided for these cursor functions. The cursor can also be moved to any character position by received series of two-character cursor command sequences that correspond to the cursor functions provided by the manual controls.

  On models 40/1, 40/2, and 40/3, cursor movement in any one direction is inhibited when the cursor reaches the edge of the screen. Model 40/4, however, provides cursor wraparound. If the cursor is moved off the screen to the right or left, it reappears on the left or right, one line lower or higher, respectively.

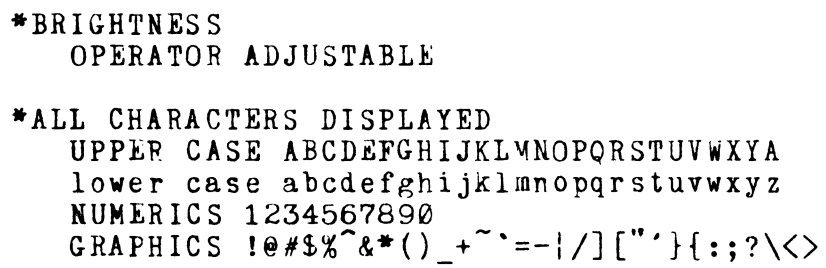
  Models 40/1, 40/2, and 40/3 differ functionally from Model 40/4. The 40/4 is designed for on-line data entry applications as a directly compatible replacement for the IBM 3270 Information Display System (BSC version only) and provides protected format, tabbing, highlighting (programmable brightness levels), and numeric field delineation as standard features. The other models are intended for inquiry-response interactive applications, but can be equipped for data entry applications. These models offer the above features as options.

  The protected format feature permits the use of fixed formats for data entry applications that require the operator to key pertinent data into blank spaces within a displayed format. The feature restricts key entry to unprotected or variable fields within the fixed format. Format descriptors are protected from inadvertent data entry and remain displayed until erased by computer message or by the operator. Only unprotected fields are transmitted or erased, while the format remains displayed. Fields can be high-lighted, blanked (40/4), or restricted to numeric entry only (40/4). Models 40/1, 40/2, and 40/3 display protected fields at half the normal intensity. The operator moves from one unprotected field to another (forward or backward) via the tab function, which permits the operator to move to the next unprotected field (tab) or, on the 40/4, to the previous unprotected field (backtab). Formats are received only via computer message on the 40/4, but they can also be received from magnetic tape (via the Teletype 4210) or keyed by the operator on the other models.

  Highlighting is used to direct the operator's attention to significant information. On the 40/4, fields can be made to blink, displayed at higher than normal brightness, or a combination of both functions. Specified fields can also be blanked (non-displayed) for security reasons. On all other models, highlighting is restricted to blinking a character or field between full and half intensity once every second.

  Tabulation is a computer-controlled function on the 40/4, but it can also be controlled from the keyboard on all other models. Tab controls on the 40/4 permit the operator to tab (move the cursor) to the beginning of the next unprotected field, to the beginning of the next unprotected field with erasure of all unprotected data between the existing and new cursor positions, and to the beginning of the present or previous unprotected field. On the other models, tab stops can be set and cleared from the keyboard. Tab stops, each displayed as a dot, are line-independent; i.e., individual tab stops can be located at different positions on each line. When setting tab stops, all stops are simultaneously set in a column, at and immediately below

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals



This sample output from the Model 40 printer (left) illustrates its ability to produce high-quality printing in both upper and lower case.

roll paper or sprocket-fed, multi-part forms. Upper-case-only or upper-and-lower-case alphabetics can be specified.

- A transmission speed of 1050 or 1200 bits per second in Models 40/1 and 40/3, and of 110 to 4800 bits per second in Model 40/2.

- The capability to interface with a Teletype Model 4210 Magnetic Tape Data Terminal.

The Model 40's page printer sharply contrasts with conventional teleprinter design and construction. In contrast to the single print actuator technique used by Teletype's family of teleprinters, the Model 40 printer employs 80 print actuators, one for each print position. It produces printed copy by means of a continuous moving belt that contains imbedded metal type pallets, and a commercially available ribbon. The printer is designed to average 2500 hours of operation between failures.

Teletype is by no means a neophyte in the CRT terminal industry. Though long dedicated to the production of teleprinters and punched tape equipment, Teletype gained experience with CRT terminals in the late 1960's, when development began on communication display terminals which were produced and used within the AT&T organization for in-house applications such as order entry.

USER REACTION

In June 1976, Datapro talked with 10 users of Teletype Model 40's (representing 429 terminals) about their experience with this equipment. Their ratings are summarized in the following table.

	Excellent	Good	Fair	Poor	WA*
Overall performance	7	3	0	0	3.7
Ease of operation	6	3	1	0	3.7
Display clarity	6	4	0	0	3.6
Keyboard feel and usability	5	4	1	0	3.4
Hardware reliability	5	3	2	0	3.3
Maintenance service	6	3	1	0	3.7
Software & technical support	6	3	1	0	3.7

*Weighted Average on a scale of 4.0 for Excellent.

the cursor, in a manner analogous to setting tabs on a typewriter. When clearing, all tab stops immediately below and to the right of the cursor are cleared. The operator can tab to the first tab stop to the right, to the beginning of the next line, or to the beginning of the next unprotected field, whichever comes first.

On Models 40/1, 40/2, and 40/3, protected format (the Protected Data feature), tabulation (Tab Control), and Highlighting are features of the optional Display Option Group.

All models include an extensive editing capability as a standard feature. Edit functions include both character and line insertion and deletion. Character insertion and deletion, both repeatable functions, affect all data to the right of the cursor up to the end of the line or the beginning of a protected field. The displayed text expands (to the right) for each character entered and contracts for each character deleted. Character insertion is inhibited if no blank spaces are present to the right of the cursor. Line insertion and deletion affect all lines of text from the cursor to the end of display memory or (Models 40/1, 40/2, and 40/3 only) a line occupied by a protected field. On Models 40/1, 40/2, and 40/3, an attempted line insertion is inhibited when display memory has been filled with partial or complete lines of data, or when the insertion is attempted into a segment preceding a protected field where all lines are occupied; i.e., the line containing the protected field will not move downward. On Model 40/4, line insertion or deletion is inhibited if any formatted fields exist on the screen.

Erasure is restricted to screen erasure only on Models 40/1, 40/2, and 40/3. The entire contents of display memory (excluding protected fields when the protected format feature is activated) are erased, beginning at the first character position to the right of the cursor. On Model 40/4, the operator can erase the unprotected fields only or the entire screen. If the entire screen is erased, the cursor is automatically positioned at Home and the format is transmitted when the terminal is polled.

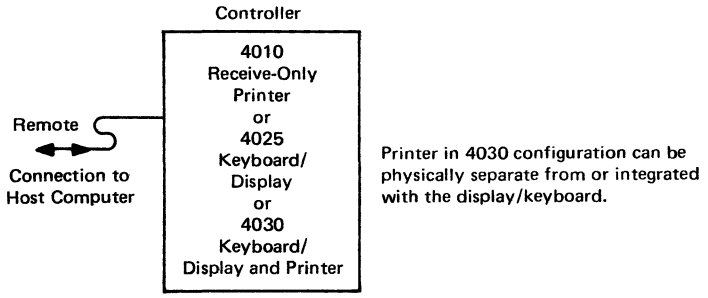
Model 40/4 operates under the control of the program stored at the host computer and provides complete compatibility with the addressing sequence, command code structure, and line discipline employed by the IBM 3270 Information Display System. The 40/4 responds to and executes the full repertoire of IBM 3270 commands, including Read Buffer, Read Modified, Write, Erase-Write, Copy, Erase All Unprotected, Start Field, Set Buffer Address, Insert Cursor, Program Tab, Repeat to Address, and Erase Unprotected to Address. Attribute characters can define fields as protected, highlighted, numeric, and non-displayed.

Scrolling Memory, an optional feature for Models 40/1, 40/2, and 40/3, adds one or two additional 1920-character (24-line) segments to the basic 1920-character display

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

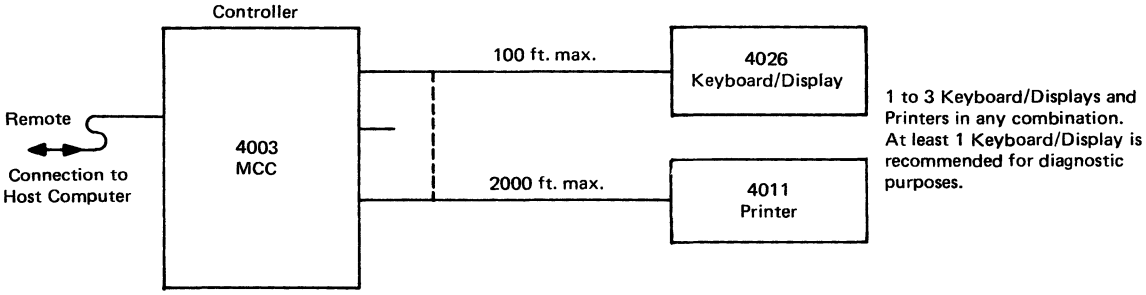
TELETYPE MODEL 40 CONFIGURATION

Model 40/1, 40/2, 40/3



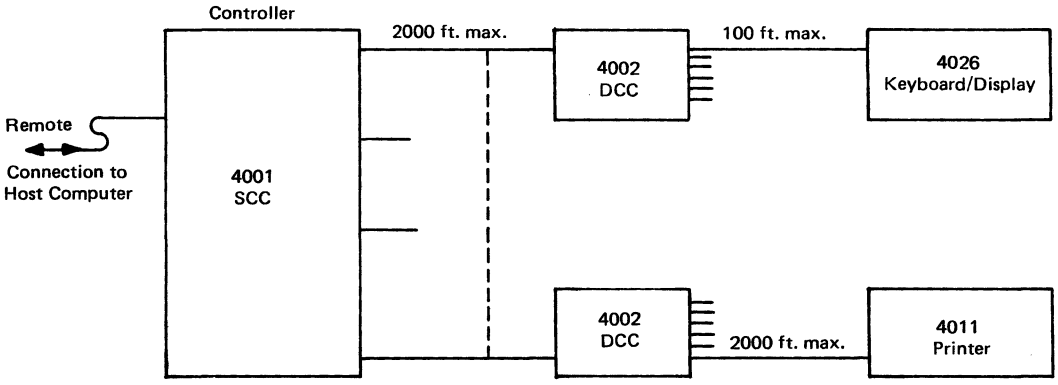
Printer in 4030 configuration can be physically separate from or integrated with the display/keyboard.

Model 40/4 Mini-cluster



1 to 3 Keyboard/Displays and Printers in any combination. At least 1 Keyboard/Display is recommended for diagnostic purposes.

Model 40/4 Maxi-Cluster



Basic Controller can accommodate 1-24 Keyboard/Displays and 0-12 Printers.

Each Device Controller handles up to 4 Keyboard/Displays and 2 Printers.

Maximum of 4 Device Controllers per basic controller.

At least 1 Keyboard/Display is recommended for diagnostic purposes.

MCC – Mini-Cluster Controller
SCC – Station Cluster Controller
DCC – Device Cluster Controller

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

As can be seen from the Weighted Averages, users were very pleased with the Teletype Model 40. They were particularly satisfied with the overall performance and general appearance of the terminal. Other advantages cited included sharpness of screen, fast printer speeds, convenience of the integral arrangement of components, flexibility and reliability.

There were no significant disadvantages cited except for a few isolated complaints of maintenance service or technical support. However, these cases represented problems with a particular leasing company (e.g. a time-sharing service) rather then with Teletype. □

memory to provide storage for a total of 48 or 72 lines of data. Data storage is divided into two or three consecutive but continuous 24-line segments. By means of the Scroll Up and Scroll Down key functions, any consecutive 24 lines of memory can be displayed at one time; data is moved continuously on one line from each key depression. The Display Advance key function displays each consecutive 24-line segment of the display memory through successive key depressions.

The printer operates in either on- or off-line mode when used in the KDP configuration. When operating on-line, all received messages are printed; since printing is performed from the display memory, the received messages are also displayed. When operating off-line, the printer is under operator control as a local-copy printer. Displayed messages are printed only when the Print Local key is depressed.

SOFTWARE SUPPORT: Model 40/4 is supported under existing IBM software support for the IBM 3270, which includes the following IBM access methods: BTAM under DOS, DOS/VS, OS, or OS/VS2; TCAM under OS; and VTAM under DOS/VS, OS/VS1, or OS/VS2. Model 40/4 is also supported for use with the following IBM Program Products: VIDEO/370, DATA/360, IMS, IQF, CICS, and TSO.

ERROR CONTROL: Character parity is generated for each keyed character and accompanies the transmitted characters. Parity checking is performed on received data. A character found to be in error is replaced with a special symbol, which is printed and/or displayed on the screen in place of the incorrect character.

COMPONENTS

CRT DISPLAY: Via a 13-inch (diagonal measurement) CRT with a viewing area 11.25 inches wide by 5.25 inches high. The screen is arranged in 24 lines of 80 characters each, totaling 1920 character positions. Models 40/1, 40/2, and 40/3 provide a character set of 127 ASCII characters, including upper and lower case alphabetics, numerics, and special symbols. Model 40/4 has a character set of 64 or 96 (optional) characters, including upper case alphabetics, numerics, and symbols; lower case letters are included in the optional 96-character set. All models display data in white against a dark background. Characters are formed by a 7-by-9 dot matrix. The viewing screen can be vertically tilted through 20 degrees of rotation (±10 degrees from the horizontal) to compensate for glare and ease operator viewing.

KEYBOARD: The typewriter-style keyboard can generate any of 127 ASCII characters, including upper and lower case alphabetics, numerics, specials, and control codes. Control codes are printed on their respective keytops. A character repeat function can be user-implemented to permit repetitive entry of data or control functions.

Program Function and Program Attention keys, a standard feature of the IBM 3270, are also standard on Model 40/4. Each of these keys generates a unique code that is recognized by the controlling software as a specific program request or data identifier. Program Function codes accompany the display data as it is transmitted to the computer, while Program Attention codes are transmitted separately.

PRINTER: The impact page printer prints up to 80 char/line, spaced at 10 char/inch with a vertical spacing of 6 lines/inch. The printer operates at speeds up to 314 lines/minute using a 64-character subset of ASCII symbols (upper case alphabetics only) and at speeds up to 220 lines/minute using a full complement (127 characters) of ASCII symbols, including upper and lower case alphabetics.

Printing is performed by means of a row of 80 print actuators, one per print position, and a continuous arrangement of type pallets which are imbedded into a moving belt. When energized, each actuator strikes its respective pallet, which impacts the paper through a ribbon. The 64-character set is repeated three times around the belt; the full ASCII set is repeated two times.

Two versions of the printer are available. One uses standard teleprinter roll paper that is contained within the printer cabinet. The second includes an adjustable-width tractor mechanism for up to 6-part fanfold forms. Both versions use standard ribbons.

PRICING

The Model 40 can be obtained from Teletype on a purchase basis only. Teletype now provides functional discounts only; quantity discounts have been discontinued. Functional discounts of 10 percent are available to nonprofit educational institutions (public and private) and to state, county, and municipal governments and their Canadian equivalents. Functional discounts of 20 percent are available to resellers (OEM's), lessors, and common carriers (communications and transportation), and to United States and Canadian Federal Governments and their prime contractors (including subcontractors).

List prices are presented below. The price ranges for Models 40/1, 40/2, and 40/3 reflect the difference between a basic model and a model with all options, including buffering and a full ASCII character set for the Model 4010 Receive-Only Printer; display memory capacity and the inclusion of the Display Option Group for the Model 4025 Keyboard Display (KD); and a combination of the printer and display options for the Model 4030 Keyboard Display Printer (KDP).

Stand-Alone Configuration	Model 40/1	Model 40/2	Model 40/3*
Model 4010 Receive-Only Printer	$2,974-3,541	$2,974-3,541	$2,974-3,541
Model 4025 Keyboard Display	3,078-4,374	3,525-4,439	3,613-4,344
Model 4030 Keyboard Display Printer	5,010-6,543	5,501-6,435	5,464-6,513

* Requires Station Controller priced at $1,016 to $1,096, which is not subject to discounts.

The price range for the 4210 Magnetic Tape Data Terminal is $3,148 to $3,247.

Teletype Model 40 (AT&T Dataspeed 40) Data Terminals

40/4 Cluster Configuration

Configuration	List Price
Model 4026 Keyboard Display	$ 933-$ 969
Model 4011 Printer	1,633-1,995
Model 4001 Station Cluster Controller (SCC)	3,956-4,250
Model 4002 Device Cluster Controller (DCC)	3,909-5,859
Model 4003 Mini-Cluster Controller (MCC)	4,656-5,574
Model 4000 Pedestal	184- 185

In the 40/4 cluster configurations, the price range for the 4026 Keyboard Display reflects base or cabinet mounting (more expensive); the price range for the printer reflects friction (basic) or tractor feed; the price range for the Station Cluster Controller reflects the number of Device Cluster Controllers that can be accommodated (4 or 6) and the type of pedestal used (plain or slotted top); the price range for the Device Cluster Controller reflects the number of Keyboard Displays and Printers that can be accommodated and the type of pedestal; the price range for the Mini-Cluster Controller also reflects the number of Keyboard Displays and Printers that can be used and the type of pedestal employed.

Dataspeed 40 Service, offered by AT&T through its individual Bell System operating companies, is priced below. The price ranges reflect the differentials among the tariffs written by the various operating companies. The approximate range of lease prices, excluding all options, is as follows:

	Model 40/1	Model 40/2*	Model 40/3*
ROP	$105 to 125/mo.	–	$160 to 180/mo.
KD	110 to 135/mo.	$135 to 160/mo.	180 to 205/mo.
KDP	175 to 205/mo.	200 to 230/mo.	245 to 275/mo.

* Requires the Display Option Group, which includes protected format, horizontal tab, and highlighting.

The prices do not include the cost of a modem or communications facility.

Each additional 24 lines (or page) of display memory is priced at $8/month. Options including protected format, horizontal tab, and highlighting total $15/month. The Send/Receive option is priced at $5/month. A 1000-character buffer for the RO version is priced at $10/month.

The 420 Magnetic Tape Data Terminal for use with the Dataspeed 40 Service is available for $100 to $125/month.■

Teletype 4540 Synchronous Data Terminals

The Teletype 4540 can operate in either cluster or standalone configurations. A 4540 cluster configuration supports up to 32 devices (keyboard/displays and printers), and can operate in either channel-attached or remote point-to-point or multipoint set-ups.

A data communication terminal system which offers support for up to 32 displays and/or printers. Both remote and channel attached configurations are available.

The 4540 Series Cluster Configuration includes keyboard, display, line printer, and controller components. The 4540 terminals are designed for IBM 3270 BSC or SDLC compatibility.

A small cluster configuration, including a 4505 controller, six 4503 displays with 4501 keyboards, and two 4504 line printers costs approximately $31,402.

A maximum configuration, including a controller, 24 displays with keyboards, and eight line printers costs approximately $114,396.

MANAGEMENT SUMMARY

Introduced in June 1978, the 4540 Synchronous Data Terminal Series represents the first offerings in Teletype's 4500 microprocessor-based terminals.

Designed to compete in the same market as the second generation components of the IBM 3270 Information Display System, the 4540 System includes display/keyboard and printer components in clustered (local and remote) and single display configurations for private line operation; the single display is offered only in an SDLC version. BSC users can obtain single display terminals in the Teletype Model 40/4 Series (Report #C25-830-101). The 4540 cluster controllers are designed so that components can be added, removed, or substituted without major hardware adjustments to existing members.

From a historical point of view, the 4540 Series continues Teletype's expansion into display terminals that began with its Model 40 Series. The 4540 Series represents an upward migration from the Model 40 family. The primary difference is that the 4540's technology results in a more compact, lower cost unit. As this report was going to press, Teletype unveiled a new generation of display terminals, the 5000 Series, that provides further technological advancements to both Teletype's synchronous and asynchronous product lines.

The 4540 is designed for inquiry/response, data entry, and data retrieval applications using IBM 3270-compatible software with BSC or SDLC protocol, including command code structure and addressing sequence.

CHARACTERISTICS

VENDOR: Teletype Corporation, 5555 Touhy Avenue, Skokie, Illinois 66076. Telephone (312) 982-2000.

DATE OF ANNOUNCEMENT: June 1978.

DATE OF FIRST DELIVERY: January 1979.

NUMBER DELIVERED TO DATE: Approximately 200,000 (all models, including 40 and 4400 Series).

SERVICED BY: Teletype Corporation.

CONFIGURATION

The 4540 System currently has channel-attached and remote BSC and SDLC clustered configurations, and an SDLC standalone configuration. The clustered configuration consists of CRT keyboard/display stations and printers. Keyboards may be detached, for use on customer-provided furniture, or attached to Teletype-provided furniture. The cluster controller accommodates eight, 16, or 32 workstations. At least one display/keyboard is required for diagnostic purposes, and no more than eight printers can be accommodated. Display/keyboards can be located up to 5000 feet from the controller and printers up to 2000 feet. The standalone station consists of a CRT display with keyboard. Printer and furniture are optional. The microprocessor-driven controller is housed in the display's 14-inch circular base.

TRANSMISSION SPECIFICATIONS

The 4540 Series controllers support communications with a host computer as an IBM 3270 using BSC or SDLC protocol in half-duplex mode. The BSC protocol conforms to ANSI X3.28-1971/2.4B2 and sub RV1 and WACK; the SDLC protocol conforms to ANSI X3.66 module 8. The 4540 can

Teletype 4540 Synchronous Data Terminals

The 4540 clustered configurations support up to 32 keyboard/display units and line printers. At least one keyboard/display is required, and up to eight printers can be included in the cluster.

A cluster configuration can operate in either channel attached or remote point-to-point or multipoint set-ups in non-switched networks. Remote communications with the host computer take place in half-duplex synchronous mode at speeds of 2400, 4800, or 9600 bps, depending on the modem selected. All controllers are equipped with an RS–232–C interface. Local clustered configurations connect directly to the host computer via the byte multiplexer, selector, or block multiplexer channel. The local controller functions as an IBM 3272-2, 3274-1B, or 3274-21B controller.

Displays can be located up to 5000 feet from the controller and printers up to 2000 feet when connected using two-pair twisted cable. Connection to the controller may also be made via coaxial cable and an optional coax adapter; in this case the maximum distance from the controller is 2000 feet for both displays and printers. Two-twisted-pair and coax connections can be intermixed on the same controller. In addition, the 4540 also supports connections via under-the-carpet ribbon cable. By offering a variety of cabling options, the 4540 thus has the potential to reduce installation costs, provide increased flexibility in configuring the cluster or relocating displays, and to maximize the use of existing cabling.

The 4540 cluster includes a single cluster control unit, which contains a microprocessor-based operating system; in addition, certain display unit controls are stored in a microprocessor located on the display unit base. Most function logic is stored in the cluster control unit's 64K bytes of memory. A set of circuit cards provide the central processing area, device feature storage, and device interface logic. At time of installation (and as required thereafter), system options and device control options are keyed into a table stored in the memory. Additional control functions are performed by a 16K-byte microprocessor-based controller integrated into each display. Upon power-up, applicable tables stored in the cluster controller are loaded into the display memory to provide all display control functions.

The standalone configuration consists of a single display with an integrated controller. The unit operates at up to 9600 bits per second with SDLC protocol.

Other key features of the 4540 include:

- Display capacity—Provides a 1920-character screen, plus a 25th status line that indicate the operational status to the operator.

- Key entry—A selection of five keyboards provides ASCII or EBCDIC typewriter-style layouts with or without an internal numeric cluster, an external numeric cluster, or magnetic stripe reader, including a new typewriter-style

be channel attached, or operate in remote point-to-point or multipoint set-ups via leased or private lines or AT&T's Digital Dataphone Service at transmission speeds of up to 9600 bps. The channel attached units can connect to the host via the selector, byte, or block multiplexer channel. The remote units have a single communications port which provides an EIA RS-232-C interface for connection to a Bell System 201 (2400 bps), 208 (4800 bps), 209 (9600 bps), or equivalent modem. The modem can be located up to 50 feet from the controller. An 8-level ASCII (odd-parity) or EBCDIC code can be transmitted. Automatic error control procedures check for vertical and longitudinal parity or cyclic redundancy and alternative odd/even block count; data is automatically retransmitted if errors are detected.

Each device in the 4540 is equipped either with its own 1920-character addressable buffer or a buffer addressing scheme. This permits data to be prepared on the display, that data to be sent to the host computer for processing, and the results to be returned to a designated printer without interrupting operator preparation of a subsequent page of data. Also, each printer is available for local printing of displayed data or remote printing of host computer data without interrupting display operations. When not communicating with the computer, display/keyboards may transfer keyed data to an associated printer in an off-line mode.

DEVICE CONTROL

The 4540 consists of interactive terminals designed for inquiry-response, data entry, and data retrieval. Data is transmitted and received in message blocks. Messages are composed and edited before transmission; the entire contents or a selected part of the display memory is transmitted upon operator command (and after receipt of a polling message).

In addition to local cursor functions, the computer can also position the cursor by sending a series of two-character command sequences that correspond to the manual cursor control functions. In this way the cursor can act as a prompt for keying of data in a fixed format. Visually, the cursor is a character-sized white rectangle.

Edit functions include character and line insertion and deletion. Character insertion and deletion, both repeatable functions, affect all data to the right of the cursor up to the end of the line or the beginning of a protected field. The displayed text expands (to the right) for each character entered and contracts for each character deleted. Character insertion is inhibited if no blank spaces are present to the right of the cursor. Line insertion and deletion affects all lines of text from the cursor to the end of display memory; line insertion or deletion is inhibited if any formatted fields exist on the screen.

Erasure functions permit the operator to erase the unprotected fields only or the entire screen. If the entire screen is erased, the cursor is automatically positioned at Home and the computer is informed of the screen-clear operation.

The 4540 terminals operate under the control of the program stored at the host computer and provide complete compatibility with the addressing sequence, command code structure, and line discipline employed by the IBM 3270 Information Display System. They respond to and execute the full repertoire of IBM 3270 commands. Attribute characters can define fields as protected, modified, highlighted, numeric, and non-displayed.

The protected format feature permits the use of fixed formats for data entry applications that require the operator to key pertinent data into blank spaces within a displayed

Teletype 4540 Synchronous Data Terminals

unitized keyboard. The external numeric cluster keyboards contain transparent character generation, so that keytops can be defined according to user requirements. In addition, any current 40/4 keyboard can be supported by a 4540.

- Editing features—Provides character insertion and deletion and line insertion and deletion. The terminal's standard Character Insert editing function operates as a character-at-a-time insert function; operation in IBM-compatible Character Insert mode is optionally provided. Also, any terminal can optionally be equipped to include the IBM-compatible Erase to End of Field mode. The cursor Select feature allows the operator to pick out one or more fields on the screen and have them transmitted upon the depression of a single key—a useful feature, for example, when an operator is choosing selected items from a menu of choices.

- PF keys—Provides up to 24 Program Function keys on all keyboards. Special keytops can be used to identify each function. On keyboards with external numeric clusters, PF 13 through 24 can be accessed as a primary keystroke. On the typewriter-style keyboards, they are accessed as a Alt. or Control function.

- Device interface interference—To reduce noise interference on the device interface line, improved signalling techniques were developed for the 4540. These include an error checking and automatic transmission scheme and a higher transmission voltage between the cluster controller and peripheral devices than the 40/4, the terminals are less sensitive to noise on the device interface line than the 40/4. An electrical-noise measurement specification has been developed for use with the 4540 so that users can evaluate whether noise-shield cable is needed for system installation.

- Printed output—Printers supported by the 4540 system include the Model 4504, a 132-column full-character line printer that operates at speeds up to 220 lines per minute using either a 64-character monocase or a 96-character set including upper and lower case alphabetics. The 4504 is totally enclosed in a noise-reducing cabinet, and carries a re-inker and a paper jam alarm as standard features. In addition, any of the current 40/4 line printers, including an 80-column friction or tractor feed printer, or the Forms Access printer, can be supported by a 4540. Using a 64-character set, these 80-column versions operate at speeds of up to 300 lines per minute. Teletype also offers 30 and 340 character per second auxiliary matrix character printers for use on the 4540 system. As with any shared logic system, actual output will vary depending upon system traffic, message content, and other considerations.

The 4540 is designed to support a self-diagnostic capability that serves as an aid to the user for quickly locating a faulty component. Component failures are identified by lighted indicators on the component cabinet or by printed or displayed messages and patterns activated by keyed diagnostics sequences. These keyed diagnostics can test each

format. The feature restricts key entry to unprotected or variable fields within the fixed format. Format data is protected from inadvertent data entry and remain displayed until erased by computer message or by the operator. Only unprotected fields are transmitted or erased, while the format remains displayed. The operator moves from one unprotected field to another (forward or backward) via the tab and backtab functions.

Highlighting is used to direct the operator's attention to significant information. Fields can be made to blink or to be displayed at higher than normal brightness, or a combination of both functions can be used. Blinking alternates the display of a character or field between full and half intensity once every second. Specified fields can also be blanked (not-displayed) for security reasons.

Manual tab controls permit the operator to tab (move the cursor) to the beginning of the next unprotected field with erasure of all unprotected data between the existing and new cursor positions, and to the beginning of the present or previous unprotected field. Since tabulation control is strictly a computer-controlled function, tab stops cannot be set and cleared from the keyboard. The operator tabs to the beginning of the next line or to the beginning of the next unprotected field, whichever comes first.

SOFTWARE SUPPORT: The 4540 Series is supported under all existing IBM software support for the IBM 3270.

ERROR CONTROL AND MALFUNCTION ISOLATION: Character parity is generated for each keyed character and accompanies the transmitted characters. When the ASCII code is used, each character is checked for odd vertical parity, and horizontal redundancy checking is performed on each message block, producing a block check character. When EBCDIC code is used, cyclical redundancy checking is performed on each message producing two block check characters (16 bits). Alternating odd/even block check counting is also performed. Parity checking is also performed on all received data. The message block is automatically retransmitted if an error is detected in either incoming or outgoing data.

A series of operator-initiated diagnostic tests can be performed to isolate component and system malfunctions. When a problem is detected, a test-fail message and a specific description of the problem are generated. In addition, indicator lights are visible on all components to alert the operator to component malfunctions.

COMPONENTS

4505 CLUSTER CONTROL UNIT: A microprocessor-based controller containing 64K bytes of addressable memory made up of LSI integrated circuits, CMOS RAM chips, and three direct memory access circuits programmed to support the operating characteristics of the cluster. At the time of installation all variables, such as code choice (ASCII or EBCDIC), station and cluster addresses, and specification of component features requiring systems support, are keyed into a set of tables in the memory. Since the set of tables is volatile during power-loss situations, a back-up battery is provided to protect the system.

The 4505 is available in six versions, which differ only in the type of host connection (local or remote) each provides and in the number of workstations each can support: 4BAO and 4LAO can accommodate up to eight workstations; 4BBO and 4LBO, up to 16 workstations; and 4BCO and 4LCO, up to 32 workstations. The 4BXO units support remote connection, the 4LXO units, local channel-attachment. Any combination of 4503 display stations with keyboards and 4540-

Teletype 4540 Synchronous Data Terminals

component individually and the entire system; with proper modems, testing is extended to the communications line and remote-end modem.

COMPETITIVE POSITION

Teletype is one of the leaders in the alphanumeric display terminal market, both in the asynchronous segment and in the IBM 3270-compatible segment. The 4540 Series, Teletype's most popular, competes against the second generation IBM 3270 components. Teletype, formed in 1907, has been part of the AT&T family as a wholly-owned subsidiary of Western Electric. Deregulation will affect Teletype in that it no longer will need to obtain tariffed pricing on its products, as it has in the past. However, as part of Computer Inquiry II, Teletype will not be permitted to sell new customer-premise equipment to commercial end-users starting in 1983. Teletype products will now be sold to end-users through American Bell Incorporated's Advanced Information Systems division and through other third-party resellers and lessors. Teletype has also recently announced a new generation of display terminal products, the 5000 Series, which includes both asynchronous and synchronous models.

ADVANTAGES AND RESTRICTIONS

Teletype provides a wide range of alternatives to the 3270 Information Display System with the 4540 family. Teletype's products have a well-deserved reputation for quality and reliability, as is mirrored in the User Reaction section below. It is still somewhat unclear, however, how the deregulation of AT&T will affect Teletype in the long run. The company's new display terminal product introductions would seem to indicate that it will not have a negative affect, and may very well be advantageous to the company.

USER REACTION

During June, July, and August of 1982, Datapro conducted an extensive Terminal Users' Survey in conjunction with *Data Communications* magazine. A questionnaire was designed and produced by Datapro and mailed to approximately 10,000 addresses selected at random from a cross-section of *Data Communications'* U.S. end-user subscriber base. The users were asked to rate all types of terminal equipment, including clustered and standalone displays, intelligent, smart, and dumb displays, and teleprinters. Responses were received from 10 users of the Teletype 4540 Series, representing a total installed base of 13,638 terminals. (These responses include Dataspeed 4540 users). The ratings given to the Teletype terminals by those users are summarized in the following table:

	Excellent	Good	Fair	Poor	WA*
Overall performance	7	3	0	0	3.7
Ease of operation	5	4	1	0	3.4
Display clarity	6	3	1	0	3.5
Keyboard feel & usability	3	6	1	0	3.2
Hardware reliability	6	3	1	0	3.5
Maintenance service/ technical support	3	4	3	0	3.0

*Weighted Average based on a scale of 4.0 for Excellent.

supported printers is acceptable as long as at least one display/keyboard workstation is provided to support controller diagnostic procedures, and no more than eight printers are included in the cluster. Connection of workstations to the controller is accomplished by two-twisted-pair cabling using Standard Serial Interface (SSI) signalling, coax cable with adapters, or under-the-carpet ribbon cable. An EIA RS-232-C communications line interface is provided for connection to a host computer for remote applications, and a standard I/O channel interface is provided for local operation.

4503 DISPLAY: The display screen measures 13 inches diagonally with a viewing area 11.25 inches wide by 5.25 inches high. The screen is arranged in 24 lines of 80 characters each, totalling 1920 character positions, plus a 25th status line. A choice of 64-, 96-, or 128-character sets in EBCDIC or ASCII are available. All models display data in white against a dark background. Characters are formed by a 7-by-9 dot matrix. The viewing screen can be vertically tilted through 20 degrees of rotation (± 10 degrees from the horizontal) and brightness levels adjusted. An audible alarm is provided to alert the operator to certain error conditions. The display rests on a disk-shaped controller which contains a 16K-byte microprocessor memory (made up of MOS chips) and a power supply.

4543 SINGLE DISPLAY/CONTROL UNIT: An interactive terminal featuring an integrated controller for standalone operation. The display screen measures 13 inches diagonally with a viewing area 11.25 inches wide by 5.25 inches high. The screen is arranged in 24 lines of 80 characters each, totalling 1920 character positions, plus a 25th status line. A character set displaying 68 EBCDIC monocase symbols is formed utilizing a 7-by-9 dot matrix. The non-glare screen displays characters in white on a dark background. The console is tiltable. Any of the 4501 keyboards is available for use with the 4543. The 4543 also supports any of the 4540-compatible printers.

4501 KEYBOARD: Five keyboards are available: typewriter-style with an internal numeric cluster (INC); typewriter-style with an external numeric cluster (ENC); and typewriter-style with external numeric cluster and magnetic stripe reader (ENC/MSR). Each of the keyboards can generate a 128-character ASCII or EBCDIC set. Character generation on all typewriter-style and INC keyboards is fixed; a specified key directly generates a specific character. Character generation on the ENC and ENC/MSR keyboards is "transparent;" depression of a key initiates a table look-up. This permits the key tops to be customized to specific user requirements.

Character repetition on the typewriter-style keyboard is restricted to a few specific characters and repeatability is built into the key's function. Character repetition on the INC, ENC, and ENC/MSR keyboards is controlled by a repeat-key; depressing this key with any other key automatically causes repetition. In addition, keys for certain characters have built-in repeatability. Program Function and Program Attention Keys, a standard feature on the IBM 3270, are also standard on the 4501 keyboards.

All keyboard models are available in table-top or detached versions. An optional keylock is available on Cluster Configuration ENC and ENC/MSR models.

4504 LINE PRINTER: This printer offers a choice of 64- or 96-character sets in ASCII or EBCDIC code. It can operate at a speed of 220 lines per minute using the 64-character set or the 96-character set. Printing is performed by means of a row of 132 print actuators and a continuous arrangement of type pallets which are embedded into a moving belt. The 4504 provides a variable-width tractor feed and 132

Teletype 4540 Synchronous Data Terminals

When asked whether or not they would recommend the Teletype 4540 terminals to other users with similar applications, all 10 of the users responded that they would. As has been the case in previous surveys conducted by Datapro, the Teletype 4540 terminals once again received superior ratings from their users.□

characters per line and accommodates pin-fed, 6-part continuous forms with widths of 4¼ to 15 inches and lengths of 2½ to 22 inches. Standard features include a ribbon reinker, which increases ribbon print life by about 20 million characters, and a paper jam detector which stops the printer and lights an indicator when the pin-fed paper does not move.

PRICING

The 4540 terminals can be obtained from Teletype on a purchase-only basis. In accordance with Computer Inquiry II, Teletype will not be permitted to sell new customer-premise equipment to commercial end-users, starting in 1983. Teletype products will now be sold to end-users through American Bell Incorporated's Advanced Information Systems division and through other third-party resellers (OEMs) and lessors. The 4540 terminals are offered to resellers and lessors at 40% functional discount from list.

Equipment preparation and installation services are available on a time- and material-basis. The standard hourly rate is $55.00 per hour for services performed Monday through Friday between 8:30 a.m. and 4:30 p.m.

Full Coverage Maintenance includes scheduled preventive factory maintenance and on-site repair service. Prices depend on distance from the service center and the types and number of 4540 devices employed.

	Purchase Price
4505 Remote Cluster Controllers:	
Supports up to 8 devices	$ 4,450
Supports up to 16 devices	5,222
Supports up to 32 devices	6,588
4505 Local Connect Controllers:	
Supports up to 8 devices	8,795
Supports up to 16 devices	9,567
Supports up to 32 devices	10,933
4503 Display:	
1920-character screen	1,952
4543 Single Standalone Display/Control Unit	4,745-5,287
4501 Keyboards:	
Typewriter-style	675
Typewriter-style, unitized	540
Typewriter-style with internal numeric cluster	675
Typewriter-style with external numeric cluster	813
Typewriter-style with external numeric cluster and magnetic stripe reader	970
Keylock (part number 347300)	25.80
4504 Line Printers:	
Tractor feed; 132 columns; ASCII	5,595
Tractor feed; 132 columns; EBCDIC	5,595
Optional Printers:	
4011 Series (Model 40 friction or tractor, 80- or 132-column)	3,973-5,170
AP200 Matrix Printer, 132-column, 340-cps	3,868
45 AP 102 AAA Matrix Printer, 132-column, 30-cps	2,498
45 AP 104 AAA Matrix Printer, 132-column, 30-cps	2,202
4507 Tables:	
36-inch width; for keyboard/display workstation	322
45-inch width; for keyboard/display/controller workstation	347
20-inch width; for controller	252 ■

Teletype 4540 Synchronous Data Terminals

MANAGEMENT SUMMARY

Introduced in June 1978, the 4540 Synchronous Data Terminal Series represents the first offerings in Teletype's 4500 microprocessor-based terminals.

Designed to compete in the same market as the newer components of the IBM 3270 Information Display System, the 4540 System includes display/keyboard and printer components in clustered and single display configurations for private line operation; the single display is offered only in an SDLC version. BSC users can obtain single display terminals in the Teletype Model 40/4 series (report #C25-830-101). The 4540 cluster controllers are designed so that components can be added, removed, or substituted without major hardware adjustments to existing members.

From a historical point of view, the 4540 Series continues Teletype's expansion into display terminals that began with its Model 40 Series. The 4540 Series represents a "migration" from the Model 40 family. The primary difference is that the newer technology of the 4540 results in a more compact, lower cost unit.

The 4540 consists of clustered and stand-alone configurations. Clustered configurations support up to 32 keyboard/display units and line printers. At least one keyboard/display is required, and up to 8 printers can be included in the cluster. The 4540 is designed for inquiry/response, data entry, and data retrieval applications using IBM 3270-compatible software with BSC or SDLC protocol, including command code structure and addressing sequence.

A data communication terminal system which offers support for up to 32 displays and/or printers.

The 4540 Series Cluster Configuration includes keyboard, display, line printer, and controller components. The 4540 terminals are designed for IBM 3270 BSC or SDLC compatibility.

A small cluster configuration, including a 4505 controller, six 4503 displays with 4501 keyboards, and two 4504 line printers costs approximately $30,470.

A maximum configuration, including a controller, twenty-four displays with keyboards, and eight line printers costs approximately $118,695.

Components are available on a purchase only basis.

CHARACTERISTICS

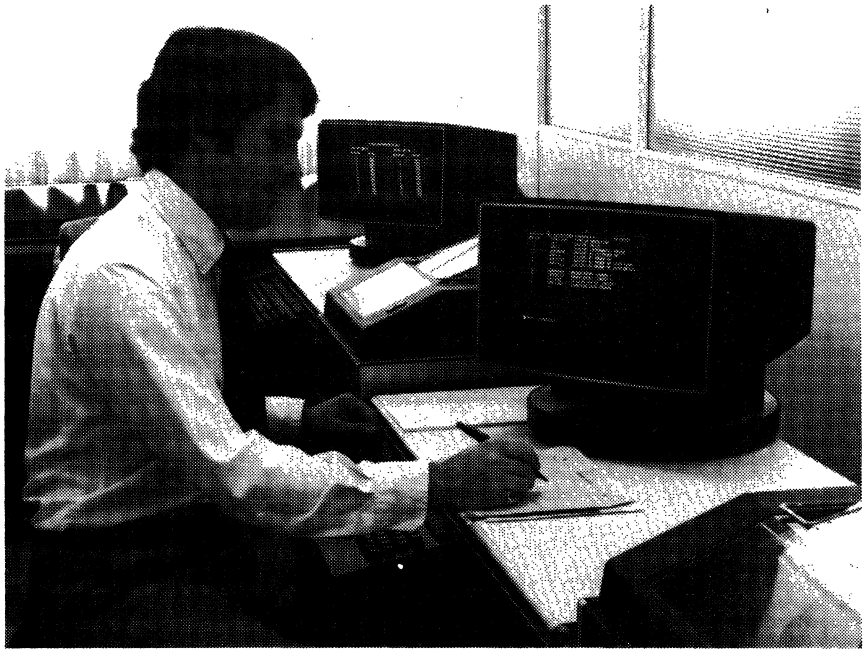
VENDOR: Teletype Corporation, 5555 Touhy Avenue, Skokie, Illinois 60076. Telephone (312) 982-2000.

DATE OF ANNOUNCEMENT: June 1978.

DATE OF FIRST DELIVERY: January 1979.

NUMBER DELIVERED TO DATE: Approximately 100,000 (includes both 40/4 and 4540).

SERVICED BY: Teletype Corporation.



The Teletype 4540 Synchronous Data Terminal System is compatible with IBM 3270-type host software. In the cluster configuration, the system's cluster controller can support up to 32 devices. Ergonomic features include a non-glare display screen, and a tiltable console.

Teletype 4540 Synchronous Data Terminals

A cluster configuration can operate in either point-to-point or multipoint setups in non-switched networks. Communications with the host computer takes place in half-duplex synchronous mode at speeds of 2400, 4800, or 9600 bps, depending on the modem selected. All controllers are equipped with an RS-232 interface.

Most function logic is stored in the cluster control unit's 64K bytes of memory. A set of circuit cards provide the central processing area, device feature storage, and device interface logic. At time of installation (and as required thereafter), system options and device control options are keyed into a table stored in the memory. Additional control functions are performed by a 16K-byte microprocessor-based controller integrated into each display. Upon power-up, applicable tables stored in the cluster controller are loaded into the display memory to provide all display control functions.

The stand-alone configuration consists of a single display with an integrated controller. The unit operates at up to 9600 bits per second with a bit-oriented link control protocol.

Other key features of the 4540 include:

- Display capacity—Available in a 1920-character screen.
- Key entry—Available with either ASCII or EBCDIC typewriter-style keyboard, with or without an internal numeric cluster, an external numeric cluster, or magnetic stripe reader.
- Editing—Provides character insertion and deletion and line insertion and deletion.
- Printed output—Printers supported by the 4540 system include a 132-column full-character line printer operating at speeds up to 220 lines per minute using either a 64-character monocase or a 96-character set including upper and lower case alphabetics. In addition, any of the current 40/4 line printers, including an 80-column friction or tractor feed printer, or Forms Access printer, can be supported by a 4540. Using a 64-character set, these 80-column versions operate at speeds of up to 300 lines per minute. Teletype also offers 30 and 340 character per second auxiliary matrix character printers for use on the 4540 system. As with any shared logic system, actual output will vary depending upon system traffic, message content, and other considerations.

The 4540 is designed to support a self-diagnostic capability that serves as an aid to the user for quickly locating a faulty component. Component failures are identified by lighted indicators on the component cabinet or by printed or displayed messages and patterns activated by keyed diagnostics sequences. These keyed diagnostics can test each component individually and the entire system; with proper modems, testing is extended to the communications line and remote-end modem.

CONFIGURATION

The 4540 System currently has BISYNC or SDLC clustered configurations, and an SDLC stand-alone configuration. The company has recently announced that an SNA/SDLC version will be available 2nd quarter, 1982. The clustered configuration consists of CRT display stations with keyboards and printers. Keyboards may be detached, for use on customer-provided furniture, or attached to Teletype-provided furniture. The cluster controller accommodates 8, 16, or 32 workstations. At least one display/keyboard is required for diagnostic purposes, and no more than 8 printers can be accommodated. Display/keyboards can be located up to 5000 feet from the controller and printers up to 2000 feet. The stand-alone station consists of a CRT display with keyboard. Printer and furniture are optional. The microprocessor-driven controller is housed in the display's 14″ circular base.

TRANSMISSION SPECIFICATIONS

The 4540 Series controllers support communications with a host computer as an IBM 3270 using BSC protocol in half-duplex mode. The BISYNC protocol conforms to ANSI X3.28-1971/2.4B2 and sub RV1 and WACK; the SDLC protocol conforms to ANSI X3.66 module 8. The 4540 can operate in point-to-point or multipoint set-ups via leased or private lines or AT&T's Digital Dataphone Service at transmission speeds of up to 9600 bps. The controller has a single communications port which provides an EIA RS232 interface for connection to a Bell System 201 (2400 bps), 208 (4800 bps), 209 (9600 bps), or equivalent modem. The modem can be located up to 50 feet from the controller. An 8-level ASCII (odd-parity) or EBCDIC code can be transmitted. Automatic error control procedures check for vertical and logitudinal parity or cyclic redundancy and alternative odd/even block count; data is automatically retransmitted if errors are detected.

Each device in the 4540 is equipped either with its own 1920-character addressable buffer or a buffer addressing scheme. This permits data to be prepared on the display, that data to be sent to the host computer for processing, and the results to be returned to a designated printer without interrupting operator preparation of a subsequent page of data. Also, each printer is available for local printing of displayed data or remote printing of host computer data without interrupting display operations. When not communicating with the computer, display/keyboards may transfer keyed data to an associated printer in an off-line mode.

DEVICE CONTROL

The 4540 consists of interactive terminals designed for inquiry-response, data entry, and data retrieval. Data is transmitted and received in message blocks. Messages are composed and edited before transmission; the entire contents or a selected part of the display memory is transmitted upon operator command (and after receipt of a polling message).

Manual cursor controls position the cursor up, down, left, right, to the initial position of the next line (return), to the initial position of the first line (home), forward, or backward. Repetitive operation and cursor wraparound are provided for these cursor functions.

The computer can also position the cursor by sending a series of two-character command sequences that correspond to the manual cursor control functions. In this way the cursor can act as a prompt for keying of data in a fixed format. Visually, the cursor is a character-sized white rectangle.

Teletype 4540 Synchronous Data Terminals

Characteristics of the 4540 are in many ways similar to those of the 40/4. However, several major improvements have been implemented in the new 4540 cluster components and these are described below:

- Processing system—The 4540 cluster includes a single cluster control unit, which contains a microprocessor-based operating system; in addition, certain display unit controls are stored in a microprocessor located on the display unit base. The 40/4 requires two types of control units; a station cluster control and up to six device cluster controls.

- Cluster configuration—The 4540 cluster can contain up to 32 devices in any combination, as long as at least one device is a display/keyboard unit and no more than 8 devices are printers. All 32 devices can be display/keyboards, if desired. The 40/4 cluster can handle 36 devices, of which at least one and no more than 24 can be display/keyboards, and no more than 30 can be printers.

- Cabling—All attachments to the 4540 control unit are connected using simple two-twisted-pair cabling or existing coaxial cable. The 4540's Standard Serial Interface (SSI) signalling permits keyboard/displays to be located up to a mile and printers up to 2000 feet from the controller. Using existing coaxial cable, the range is more limited. In a 40/4 cluster, connections between the station cluster controller and the modem or the device cluster controller utilize SSI cables (a simple two-twisted-pair cabling), but connections between the device cluster controller and the keyboard/displays require specialty cable.

- Error checking—More elaborate error control is provided in the 4540, which automatically handles some situations that required operator intervention in the 40/4.

- Device interface interference—Because the 4540 uses an improved signalling technique, including an error checking and automatic transmission scheme and a higher transmission voltage, between the cluster controller and peripheral devices, the terminals are less sensitive to noise on the device interface line than the 40/4. An electrical-noise measurement specification has been developed for use with the 4540 so that users can evaluate whether noise-shield cable is needed for system installation.

- Keyboard functions—In addition to the present 40/4 keyboards, two new keyboards are available with the 4540: a typewriter-style with external numeric cluster, and a typewriter-style with external numeric cluster and magnetic stripe reader. These new keyboards contain transparent character generation, so that keytops can be defined according to user requirements.

- Printer design—The 4504 printer is totally enclosed in a noise-reducing cabinet. It carries a re-inker and a

Edit functions include character and line insertion and deletion. Character insertion and deletion, both repeatable functions, affect all data to the right of the cursor up to the end of the line or the beginning of a protected field. The displayed text expands (to the right) for each character entered and contracts for each character deleted. Character insertion is inhibited if no blank spaces are present to the right of the cursor. Line insertion and deletion affects all lines of text from the cursor to the end of display memory; line insertion or deletion is inhibited if any formatted fields exist on the screen.

Erasure functions permit the operator to erase the unprotected fields only or the entire screen. If the entire screen is erased, the cursor is automatically positioned at Home and the computer is informed of the screen-clear operation.

The 4540 terminals operate under the control of the program stored at the host computer and provide complete compatibility with the addressing sequence, command code structure, and line discipline employed by the IBM 3270 Information Display System. They respond to and execute the full repertoire of IBM 3270 commands. Attribute characters can define fields as protected, modified, highlighted, numeric, and non-displayed.

The protected format feature permits the use of fixed formats for data entry applications that require the operator to key pertinent data into blank spaces within a displayed format. The feature restricts key entry to unprotected or variable fields within the fixed format. Format data is protected from inadvertent data entry and remain displayed until erased by computer message or by the operator. Only unprotected fields are transmitted or erased, while the format remains displayed. The operator moves from one unprotected field to another (forward or backward) via the tab and backtab functions.

Highlighting is used to direct the operator's attention to significant information. Fields can be made to blink or to be displayed at higher than normal brightness, or a combination of both functions can be used. Blinking alternates the display of a character or field between full and half intensity once every second. Specified fields can also be blanked (not-displayed) for security reasons.

Manual tab controls permit the operator to tab (move the cursor) to the beginning of the next unprotected field with erasure of all unprotected data between the existing and new cursor positions, and to the beginning of the present or previous unprotected field. Since tabulation control is strictly a computer-controlled function, tab stops cannot be set and cleared from the keyboard. The operator tabs to the beginning of the next line or to the beginning of the next unprotected field, whichever comes first.

SOFTWARE SUPPORT: The 4540 Series is supported under all existing bisynchronous IBM software support for the IBM 3270.

ERROR CONTROL AND MALFUNCTION ISOLATION: Character parity is generated for each keyed character and accompanies the transmitted characters. When the ASCII code is used, each character is checked for odd vertical parity, and horizontal redundancy checking is performed on each message block, producing a block check character. When EBCDIC code is used, cyclical redundancy checking is performed on each message producing two block check characters (16 bits). Alternating odd/even block check counting is also performed. Parity checking is also performed on all received data. The message block is automatically retransmitted if an error is detected in either incoming or outgoing data.

Teletype 4540 Synchronous Data Terminals

paper jam alarm as standard features; these are optional on the 40/4 printers.

USER REACTION

Datapro conducted telephone interviews with five users of the Teletype 4540 Data Terminal in July, 1981. Those contacted reported on a total of 559 units and 5.5 years of user experience, for an average of 112 units and 13 months, respectively. One large end user (an express company) had an installed base of 475 terminals, which when subtracted from the total reduced the average to 17 units per user contacted.

The ratings are as follows:

	Excellent	Good	Fair	Poor	WA*
Overall Performance	4	1	0	0	3.8
Ease of Operation	2	3	0	0	3.4
Display Clarity	2	3	0	0	3.4
Keyboard Feel & Usability	1	3	1	0	3.0
Hardware Reliability	4	1	0	0	3.8
Maintenance Service	3	2	0	0	3.6
Technical Support	3	2	0	0	3.6

*Weighted Average on a scale of 4.0 for Excellent.

The user ratings reflect a high level of satisfaction. Price, flexibility, and product design are key attributes of the Teletype 4540, according to those contacted. Most were attracted to its low cost, with one user noting the 4540's ability to provide cheaper compatibility than certain IBM products. The Teletype 4540's responsiveness to special applications and the ability to connect multiple devices to a single printer were given as examples of its flexibility.

Another noted strength of the product concerned its ergonomic features. Users expressed satisfaction with the tiltable screen, the ability to move the detachable keyboard an extended distance from the tube, and the terminal's compact size and good appearance. When asked to give his opinion of the Teletype 4540, one user stated he was "very, very satisfied with them; the price was right and the performance is good."

Those contacted found few faults with the product. The lack of SNA compatibility and the fact that a local controller was needed for each cluster of workstations were mentioned as the only disadvantages of the product itself. One user felt that since Teletype's maintenance centers were located in major cities, it was difficult for a user located in a remote area to have the terminals serviced. However, he indicated this was largely offset by the 4540's ability to withstand hard use.□

A series of operator-initiated diagnostic tests can be performed to isolate component and system malfunctions. When a problem is detected, a test-fail message and a specific description of the problem are generated. In addition, indicator lights are visible on all components to alert the operator to component malfunctions.

COMPONENTS

4505 CLUSTER CONTROL UNIT: A microprocessor-based controller containing 64K bytes of addressable memory made up of LSI integrated circuits, CMOS RAM chips, and three direct memory access circuits programmed to support the operating characteristics of the cluster. At the time of installation all variables, such as code choice (ASCII or EBCDIC), station and cluster addresses, and specification of component features requiring systems suport, are keyed into a set of tables in the memory. Since the set of tables is volatile during power-loss situations, a back-up battery is provided to protect the system.

The 4505 is available in three versions, which differ only in the number of workstations each can support: 4BAO can accommodate up to 8 workstations; 4BBO, up to 16 workstations; and 4BCO, up to 32 workstations. Any combination of 4503 display stations with keyboards and 4504 printers is acceptable as long as at least one display/keyboard workstation is provided to support controller diagnostic procedures, and no more than eight printers are included in the cluster. Connection of workstations to the controller is accomplished by two-twisted-pair cabling using Standard Serial Interface (SSI) signalling. An EIA RS232 communications line interface is provided for connection to a host computer.

4503 DISPLAY: The display screen measures 13 inches diagonally with a viewing area 11.25 inches wide by 5.25 inches high. The screen is arranged in 24 lines of 80 characters each, totalling 1920 character positions. A choice of 64-, 96-, or 128-character sets in EBCDIC or ASCII are available. All models display data in white against a dark background. Characters are formed by a 7 x 9 dot matrix. The viewing screen can be vertically tilted through 20 degrees of rotation (± 10 degrees from the horizontal) and brightness levels adjusted. An audible alarm is provided to alert the operator to certain error conditions. The display rests on a disk-shaped controller which contains a 16K-byte microprocessor memory (made up of MOS chips) and a power supply.

4501 KEYBOARD: Four keyboard formats are available: typewriter-style, typewriter-style with an internal numeric cluster (INC), typewriter-style with an external numeric cluster (ENC), and typewriter-style with external numeric cluster and magnetic stripe reader (ENC/MSR). Each of the keyboards can generate a 128-character ASCII or EBCDIC set. Character generation on all typewriter-style and INC keyboards is fixed; a specified key directly generates a specific character. Character generation on the ENC and ENC/MSR keyboards is "transparent;" depression of a key initiates a table look-up. This permits the key tops to be customized to specific user requirements.

Character repetition on the typewriter-style keyboard is restricted to a few specific characters and repeatability is built into the key's function. Character repetition on the INC, ENC, and ENC/MSR keyboards is controlled by a repeat-key; depressing this key with any other key automatically causes repetition. In addition, keys for certain characters have built-in repeatability.

Program Function and Program Attention Keys, a standard feature on the IBM 3270, are also standard on the 4501 keyboards.

All keyboard models are available in table-top or detached versions. An optional keylock is available on Cluster Configuration ENC and ENC/MSR models.

4543 SINGLE DISPLAY: An interactive terminal featuring an integrated controller for stand-alone operation. The display screen measures 13 inches diagonally with a viewing

Teletype 4540 Synchronous Data Terminals

area 11.25 inches wide by 5.25 inches high. The screen is arranged in 24 lines of 80 characters each, totalling 1920 character positions. A character set displaying 68 EBCDIC monocase symbols is formed utilizing a 7 x 9 dot matrix. The non-glare screen displays characters in white on a dark background. The console is tiltable. A choice of five detachable keyboards are available for use with the 4543, two of which contain 24 function keys. The 4543 also supports a variety of optional printers.

4504 LINE PRINTER: This printer offers a choice of 64- or 96-character sets in ASCII or EBCDIC code. It can operate at a speed of 220 lines per minute using the 64-character set or the 96-character set. It features a variable-width tractor fed and 132 characters per line and accommodates pin-fed, 6-part continuous forms with widths of 4¼ to 15 inches and lengths of 2½ to 22 inches.

Printing is performed by means of a row of 132 print actuators, and a continuous arrangement of type pallets which are embedded into a moving belt.

Standard features on the 4504 printer include a ribbon re-inker, which increases ribbon print life by about 20 million characters, and a paper jam detector which stops the printer and lights an indicator when the pin-fed paper does not move.

The 4540 terminals can be obtained from Teletype on a purchase only basis. Functional discounts of 10 percent are available to nonprofit educational institutions (public and private) and to state, county, and municipal governments and their Canadian equivalents. Functional discounts of 40 percent are available to resellers (OEM's), lessors, and common carriers (communications and transportation), and to United States and Canadian Federal Governments and their prime contractors and subcontractors.

Equipment preparation and installation services are available on a time-and-material basis. The standard hourly rate is $45.00 per hour for services performed Monday through Friday between 8:30 AM and 4:30 PM.

Full Coverage Maintenance includes scheduled preventive factory maintenance and on-site repair service. Prices depend on distance from the service center and the types and number of 4540 devices employed. Typical minimum annual costs are $312 per year for a controller, $216 per year for a keyboard/display, and $348 per year for a line printer.

	Purchase Price
4505 Cluster Controllers:	
Supports up to 8 devices	$4,238
Supports up to 16 devices	5,008
Suports up to 32 devices	6,375
4503 Display:	
1920-character screen	1,845
4543 Single Stand-alone Display w/controller	4,732-5,422
4501 Keyboards:	
Typewriter-style	662
Typewriter-style with internal numeric cluster	662
Typewriter-style with external numeric cluster	835
Typewriter-style with external numeric cluster and magnetic stripe reader	970
Keylock (part number 347300)	25.80
4504 Line Printers:	
Tractor feed; 132 columns; ASCII	5,595
Tractor feed; 132 columns, EBCDIC	5,595
Optional Printers:	
4011 Series (Model 40 friction or tractor, 80- or 132- column)	3,820-5,170
AP200 Matrix Printer, 132-column, 340 cps	3,868
45 AP 102 AAA Matrix Printer, 132-column, 30-cps	2,498
45 AP 104 AAA Matrix Printer, 132-column, 30 cps	2,202
4507 Tables:	
36-inch width; for keyboard/display workstation	322
45-inch width; for keyboard/display/controller workstation	347
20-inch width; for controller	252 ■

Teletype 4540 Synchronous Data Terminals

The 4540 workstation shown above includes a Model 4503 1920-character CRT display, a Model 4501 typewriter-style keyboard with an external numeric pad and a magnetic stripe reader, and a Model 4505 cluster control unit. Although each component is separately housed, a custom-designed 45-inch table top provides an integrated office-furniture look.

The first members of the new 4500 System display family.

The 4540 Series Cluster Configuration includes keyboard, display, line printer, and controller components. Up to 32 devices can be accommodated in the cluster. The 4540 terminals are designed for IBM 3270 BSC compatibility.

A small cluster configuration, including a 4505 controller, six 4503 displays with 4501 keyboards, and two 4504 line printers costs about $25,779.

A maximum configuration, including a controller, twenty-four displays with keyboards, and eight line printers costs about $93,480.

Components are available on a purchase-only basis.

MANAGEMENT SUMMARY

Introduced in June 1978, the 4540 Synchronous Data Terminal Series represents the first offerings in Teletype's new 4500 System family of microprocessor-based terminals.

Designed to compete in the same market as the newer components of the IBM 3270 Information Display System, the 4540 Series includes display/keyboard and line printer components. A new serial matrix printer has been scheduled for delivery starting in early 1980. The 4540 will eventually include single display configurations for multipoint private line and point-to-point switched network operations; until they become available, Teletype is offering the 40/4 single display terminal as an alternative. The 4540 controllers are designed so that new components can be added to the family without major hardware adjustments to existing members.

The 4500 System is expected to expand over the new few years to cover a broad base of terminal requirements. A second series, the 4520, was announced at the NCC show in June 1979; this keyboard/printer-based terminal provides IBM 2740-2 compatibility. Future offerings will include a remote batch terminal and additional peripherals such as a card unit and a diskette drive. ⊳

CHARACTERISTICS

VENDOR: Teletype Corporation, 5555 Touhy Avenue, Skokie, Illinois 60076. Telephone (312) 982-2000.

DATE OF ANNOUNCEMENT: June 1978.

DATE OF FIRST DELIVERY: January 1979.

NUMBER DELIVERED TO DATE: —

SERVICED BY: Teletype Corporation.

CONFIGURATION

The 4540 Series currently has only one model, a Clustered Configuration. The configuration consists of 4503 CRT display stations with 4501 keyboards, 4504 line printers, and a 4505 cluster controller. The 4505 controller is offered in three versions: Model 4505-4ABAO accommodates up to 8 workstations; Model 4505-4BBO, up to 16; and Model 4505-4BCO, up to 32. At least one display/keyboard workstation is required in a 4541 configuration for diagnostic purposes, and no more than 8 printers can be accommodated. Display/keyboards can be located up to 5000 feet from the controller and printers up to 2000 feet.

Since all cluster components are separate units, Teletype has available specially-designed tables to accommodate various component combinations (controller only, controller/keyboard/display, and keyboard/display) for the office environment.

TRANSMISSION SPECIFICATIONS

The 4540 Series controllers support communications with a host computer as an IBM 3270 using BSC protocol in half-duplex mode. The BSC protocol conforms to the standard ANSI X3.28-1971/2.4B2. The 4540 can operate in point-to-

Teletype 4540 Synchronous Data Terminals

From a historical point of view, the 4540 Series continues Teletype's expansion into display terminals that began with its Model 40 Series. The 4540 Series represents a "migration" from the Model 40 family. The primary difference is that the newer technology of the 4540 results in a more compact, lower cost unit. Although the 40/4 terminals will continue to be supported for maintenance and additions to existing systems, Teletype plans to taper off its marketing efforts for Model 40/4's as it increases its emphasis on the 4500 System.

The 4540 Series currently consists of one model, a Clustered Configuration, which supports up to 32 keyboard/display units and line printers. At least one keyboard/display is required, and no more than 8 printers can be included in the cluster. The 4540 Series is designed for inquiry/response, data entry, and data retrieval applications using IBM 3270-compatible software with BSC protocol, including command code structure and addressing sequence.

The Cluster Configuration can operate in either point-to-point or multipoint setups in non-switched networks. Communications with the host computer takes place in half-duplex synchronous mode at speeds of 2400, 4800, or 9600 bps, depending on the modem selected. All controllers are equipped with an RS232 interface.

Most function logic is stored in the cluster control unit's 64K bytes of memory. A set of circuit cards provide the central processing area, device feature storage, and device interface logic. At time of installation (and as required thereafter), system options and device control options are keyed into a table stored in the memory. Additional control functions are performed by a 16K-byte microprocessor-based controller integrated into each display. Upon power-up, applicable tables stored in the cluster controller are loaded into the display memory to provide all display control functions.

Other key features of the 4540 Series components include:

- Display capacity—Available in a 1920-character screen only.
- Key entry—Available with either ASCII or EBCDIC typewriter-style keyboard, with or without an internal numeric cluster, an external numeric cluster, or magnetic stripe reader.
- Editing—Provides character insertion and deletion and line insertion and deletion.
- Printed output—Provides 132-column full-character printing at speeds up to 300 lines per minute using a 64-character monocase set or 220 lines per minute using a 96-character set including upper and lower case alphabetics. In addition, any of the current 40/4 printers, including an 80-column friction or tractor feed printer or a forms access printer, can be supported by a 4540.

The 4540 Series is designed to support a self-diagnostic capability that serves as an aid to the user for quickly

point or multipoint set-ups via leased or private lines or AT&T's Digital Dataphone Service at transmission speeds of up to 9600 bps. The controller has a single communications port which provides an EIA RS232 interface for connection to a Bell System 201 (2400 bps), 208 (4800 bps), 209 (9600 bps), or equivalent modem. The modem can be located up to 50 feet from the controller. An 8-level ASCII (odd-parity) or EBCDIC code can be transmitted. Automatic error control procedures check for vertical and longitudinal parity or cyclic redundancy and alternative odd/even block count; data is automatically retransmitted if errors are detected.

Each device in the 4540 Series is equipped either with its own 1920-character addressable buffer or a buffer addressing scheme. This permits data to be prepared on the display, that data to be sent to the host computer for processing, and the results to be returned to a designated printer without interrupting operator preparation of a subsequent page of data. Also, each printer is available for local printing of displayed data or remote printing of host computer data without interrupting display operations. When not communicating with the computer, display/keyboards may transfer keyed data to an associated printer in an off-line mode.

DEVICE CONTROL

The 4540 Series consists of interactive terminals designed for inquiry-response, data entry, and data retrieval. Data is transmitted and received in message blocks. Messages are composed and edited before transmission; the entire contents or a selected part of the display memory is transmitted upon operator command (and after receipt of a polling message).

Manual cursor controls position the cursor up, down, left, right, to the initial position of the next line (return), to the initial position of the first line (home), forward, or backward. Repetitive operation and cursor wraparound are provided for these cursor functions.

The computer can also position the cursor by sending a series of two-character command sequences that correspond to the manual cursor control functions. In this way the cursor can act as a prompt for keying of data in a fixed format. Visually, the cursor is a character-sized white rectangle.

Edit functions include character and line insertion and deletion. Character insertion and deletion, both repeatable functions, affect all data to the right of the cursor up to the end of the line or the beginning of a protected field. The displayed text expands (to the right) for each character entered and contracts for each character deleted. Character insertion is inhibited if no blank spaces are present to the right of the cursor. Line insertion and deletion affects all lines of text from the cursor to the end of display memory; line insertion or deletion is inhibited if any formatted fields exist on the screen.

Erasure functions permit the operator to erase the unprotected fields only or the entire screen. If the entire screen is erased, the cursor is automatically positioned at Home and the computer is informed of the screen-clear operation.

The 4540 terminals operate under the control of the program stored at the host computer and provide complete compatibility with the addressing sequence, command code structure, and line discipline employed by the IBM 3270 Information Display System. They respond to and execute the full repertoire of IBM 3270 commands. Attribute characters can define fields as protected, modified, highlighted, numeric, and non-displayed.

Teletype 4540 Synchronous Data Terminals

locating a faulty component. Component failures are identified by lighted indicators on the component cabinet or by printed or displayed messages and patterns activated by keyed diagnostics sequences. These keyed diagnostics can test each component individually and the entire system; with proper modems, testing is extended to the communications line and remote-end modem.

Characteristics of the 4540 Series are in many ways similar to those of the 40/4. However, several major improvements have been implemented in the new 4540 cluster components and these are described below:

- Price "reductions"—Major price increases were announced for the 40/4 terminals in December 1978. As a result, list prices for 4540 configurations are at least 30 percent lower than comparable 40/4 configurations.

- Processing system—The 4540 cluster includes a single cluster control unit, which contains a microprocessor-based operating system; in addition, certain display unit controls are stored in a microprocessor located on the display unit base. The 40/4 requires two types of control units; a station cluster control and up to six device cluster controls.

- Cluster configuration—The 4540 cluster can contain up to 32 devices in any combination, as long as at least one device is a display/keyboard unit and no more than 8 devices are printers. All 32 devices can be display/keyboards, if desired. The 40/4 cluster can handle 36 devices, of which at least one and no more than 24 can be display/keyboards, and no more than 30 can be printers.

- Cabling—All attachments to the 4540 control unit are connected using simple two-twisted pair cabling. The 4540's Standard Serial Interface (SSI) signalling permits keyboard/displays to be located up to 5000 feet and printers up to 2000 feet from the controller. In a 40/4 cluster, connections between the station cluster controller and the modem or the device cluster controller utilize SSI cables (a simple two-twisted-pair cabling), but connections between the device cluster controller and the keyboard/displays require specialty cable.

- Error checking—More elaborate error control is provided in the 4540 Series, which automatically handles some situations that required operator intervention in the 40/4.

- Device interface interference—Because the 4540 uses an improved signalling technique, including an error checking and automatic retransmission scheme and a higher transmission voltage, between the cluster controller and peripheral devices, the terminals are less sensitive to noise on the device interface line than the 40/4. An electrical-noise measurement specification has been developed for use with the 4540 so that users can evaluate whether noise-shielded cable is needed for system installation.

The protected format feature permits the use of fixed formats for data entry applications that require the operator to key pertinent data into blank spaces within a displayed format. The feature restricts key entry to unprotected or variable fields within the fixed format. Format data is protected from inadvertent data entry and remain displayed until erased by computer message or by the operator. Only unprotected fields are transmitted or erased, while the format remains displayed. The operator moves from one unprotected field to another (forward or backward) via the tab and backtab functions.

Highlighting is used to direct the operator's attention to significant information. Fields can be made to blink or to be displayed at higher than normal brightness, or a combination of both functions can be used. Blinking alternates the display of a character or field between full and half intensity once every second. Specified fields can also be blanked (not-displayed) for security reasons.

Manual tab controls permit the operator to tab (move the cursor) to the beginning of the next unprotected field with erasure of all unprotected data between the existing and new cursor positions, and to the beginning of the present or previous unprotected field. Since tabulation control is strictly a computer-controlled function, tab stops cannot be set and cleared from the keyboard. The operator tabs to the beginning of the next line or to the beginning of the next unprotected field, whichever comes first.

SOFTWARE SUPPORT: The 4540 Series is supported under all existing bisynchronous IBM software support for the IBM 3270.

ERROR CONTROL AND MALFUNCTION ISOLATION: Character parity is generated for each keyed character and accompanies the transmitted characters. When the ASCII code is used, each character is checked for odd vertical parity, and horizontal redundancy checking is performed on each message block, producing a block check character. When EBCDIC code is used, cyclical redundancy checking is performed on each message producing two block check characters (16 bits). Alternating odd/even block check counting is also performed. Parity checking is also performed on all received data. The message block is automatically retransmitted if an error is detected in either incoming or outgoing data.

A series of operator-initiated diagnostic tests can be performed to isolate component and system malfunctions. When a problem is detected, a test-fail message and a specific description of the problem are generated. In addition, indicator lights are visible on all components to alert the operator to component malfunctions.

COMPONENTS

4505 CLUSTER CONTROL UNIT: A microprocessor-based controller containing 64K bytes of addressable memory made up of LSI integrated circuits, CMOS RAM chips, and three direct memory access circuits programmed to support the operating characteristics of the cluster. At the time of installation all variables, such as code choice (ASCII or EBCDIC), station and cluster addresses, and specification of component features requiring systems support, are keyed into a set of tables in the memory. Since the set of tables is volatile during power-loss situations, a back-up battery is provided to protect the system.

The 4505 is available in three versions, which differ only in the number of workstations each can support: 4BAO can accommodate up to 8 workstations; 4BBO, up to 16 workstations; and 4BCO, up to 32 workstations. Any combination of 4503 display stations with keyboards and 4504 printers is acceptable as long as at least one

Teletype 4540 Synchronous Data Terminals

- Keyboard functions—In addition to the present 40/4 keyboards, two new keyboards are available with the 4540 Series: a typewriter-style with external numeric cluster, and a typewriter-style with external numeric cluster and magnetic stripe reader. These new keyboards contain transparent character generation, so that keytops can be defined according to user requirements.

- Printer design—The 4504 printer is totally enclosed in a newly-designed noise-reducing cabinet. It carries a re-inker and a paper jam alarm as standard features; these are optional on the 40/4 printers. □

display/keyboard workstation is provided to support controller diagnostic procedures, and no more than eight printers are included in the cluster. Connection of workstations to the controller is accomplished by two-twisted-pair cabling using Standard Serial Interface (SSI) signalling. An EIA RS232 communications line interface is provided for connection to a host computer.

4503 DISPLAY: The display screen measures 13 inches diagonally with a viewing area of 11.25 inches wide by 5.25 inches high. The screen is arranged in 24 lines of 80 characters each, totaling 1920 character positions. a choice of 64-, 96-, or 128-character sets in EBCDIC or ASCII are available. All models display data in white against a dark background. Characters are formed by a 7 x 9 dot matrix. The viewing screen can be vertically tilted through 20 degrees of rotation (± 10 degrees from the horizontal) and brightness levels adjusted. An audible alarm is provided to alert the operator to certain error conditions. The display rests on a disk-shaped controller which contains a 16K-byte microprocessor memory (made up of MOS chips) and a power supply.

4501 KEYBOARD: Four keyboard formats are available: typewriter-style, typewriter-style with an internal numeric cluster (INC), typewriter-tyle with an external numeric cluster (ENC), and typewriter-style with external numeric cluster and magnetic stripe reader (ENC/MSR). Each of the keyboards can generate a 128-character ASCII or EBCDIC set. Character generation on all typewriter-style and INC keyboards is fixed; a specified key directly generates a specific character. Character generation on the ENC and ENC/MSR keyboards is "transparent;" depression of a key initiates a table look-up. This permits the key tops to be customized to specific user requirements.

Character repetition on the typewriter-style keyboard is restricted to a few specific characters and repeatability is built into the key's function. Character repetition on the INC, ENC, and ENC/MSR keyboards is controlled by a repeat-key; depressing this key with any other key automatically causes repetition. In addition, keys for certain characters have built-in repeatability.

Program Function and Program Attention Keys, a standard feature on the IBM 3270, are also standard on the 4501 keyboards.

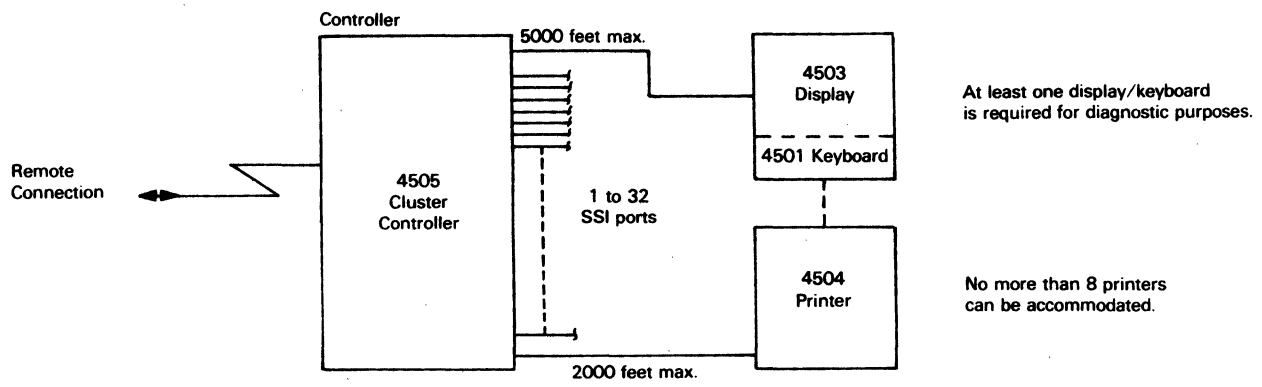
All keyboard models are available in table-top or detached versions. An optional keylock is available on Cluster Configuration ENC and ENC/MSR models.

4504 LINE PRINTER: This printer offers a choice of 64- or 96-character sets in ASCII or EBCDIC code. It can operate at a speed of 300 lines per minute using 64-character set, or 220 lines per minute using the 96-character set. It features a variable-width tractor feed and 132 characters per line and accommodates pin-fed, 6-part continuous forms with widths of 4¼ to 15 inches and lengths of 2½ to 22 inches.

Printing is performed by means of a row of 132 print actuators, and a continuous arrangement of type pallets which are embedded into a moving belt. The 64-character set is repeated three times around the belt; the 96-character set is repeated twice.

Standard features on the 4504 printer include a ribbon re-inker, which increases ribbon print life by about 20 million characters, and a paper jam detector which stops the printer and lights an indicator when the pin-fed paper does not move.

CONFIGURATION



Teletype 4540 Synchronous Data Terminals

PRICING

The 4540 Series terminals can be obtained from Teletype on a purchase only basis. Functional discounts of 10 percent are available to nonprofit educational institutions (public and private) and to state, county, and municipal governments and their Canadian equivalents. Functional discounts of 40 percent are available to resellers (OEM's), lessors, and common carriers (communications and transportation), and to United States and Canadian Federal Governments and their prime contractors and subcontractors.

Equipment preparation and installation services are available on a time-and-material basis. The standard hourly rate is $26.00 per hour for services performed Monday through Friday between 8:30 AM and 4:30 PM.

Full Coverage Maintenance includes scheduled preventive factory maintenance and on-site repair service. Prices depend on distance from the service center and the types and number of 4540 devices employed. Typical minimum annual costs are $360 per year for a controller, $264 per year for a display, $276 per year for a line printer, and $60 per year for a keyboard.

		Purchase Price
	4504 Cluster Controllers:	
-4BAO	Supports up to 8 devices	$3,775
-4BBO	Supports up to 16 devices	4,304
-4BCO	Supports up to 32 devices	5,464
	4503 Display:	
-1OAO	1920-character screen	1,700
	4504 Line Printers:	
-1CAF	Tractor feed; 132 columns; ASCII	4,265
-1CEF	Tractor feed; 132 columns, EBCDIC	4,265
	4507 Tables:	
-2AAO	36-inch width; for keyboard/display workstation	280
-2ABO	45-inch width; for keyboard/display/controller workstation	308
-2BOO	20-inch width; for controller	198

		Table-top	Detached
	4501 Keyboards:		
-1AOO/1DOO	Typewriter-style	$520	$555
-2AOO/2DOO	Typewriter-style with internal numeric cluster	520	555
-3AOO/3DOO	Typewriter-style with external numeric cluster	670	733
-4AOO/4DOO	Typewriter-style with external numeric cluster and magnetic stripe reader	787	850
	Keylock (part number 347300)	22.90	22.90■

Teletype 4540 Synchronous Data Terminals

The 4540 workstation shown above includes a Model 4503 1920-character CRT display, a Model 4501 typewriter-style keyboard with an external numeric pad and a magnetic stripe reader, and a Model 4505 cluster control unit. Although each component is separately housed, a custom-designed 45-inch table top provides an integrated office-furniture look.

The first generation of the new 4500 System display family.

The 4540 Series includes keyboard, display, line printer, and controller components. Stand-alone and cluster configurations, accommodating up to 32 devices, are available. All models are designed for IBM 3270 BSC compatibility.

A small cluster configuration, including a 4505 controller, six 4503 displays with 4501 keyboards, and two 4504 line printers costs about $25,779.

A maximum configuration, including a controller, twenty-four displays with keyboards, and eight line printers costs about $93,480.

Components are available on a purchase-only basis.

MANAGEMENT SUMMARY

Introduced in June 1978, the 4540 Synchronous Data Terminals represent the first generation in Teletype's new family of microprocessor-based display terminals. Designed to compete in the same market as the newer components of the IBM 3270 Information Display System, the 4500 family is expected to expand over the next few years to cover a broad base of terminal requirements.

The 4540 Series includes display/keyboard and line printer components and is specifically designed for inquiry/response applications. A new serial matrix printer has been scheduled for delivery starting in late 1979. Future generations will include a remote batch terminal, an interactive keyboard/printer, and additional peripherals such as a card unit and a diskette drive. The controllers in the 4540 Series are designed so that changes in function represented by new generations can be implemented without major hardware adjustments.

From a historical point of view, the 4500 System represents a continuation of Teletype's expansion into display terminals that began with its Model 40 Series. The 4540 Series represents a "migration" from the Model 40 family; some components in the older family are used in the new ➢

CHARACTERISTICS

VENDOR: Teletype Corporation, 5555 Touhy Avenue, Skokie, Illinois 60076. Telephone (312) 982-2000.

DATE OF ANNOUNCEMENT: June 1978.

DATE OF FIRST DELIVERY: January 1979.

NUMBER DELIVERED TO DATE: —

SERVICED BY: Teletype Corporation.

MODELS

The 4540 series consists of three configurations:

- **4541 Clustered Configuration—For point-to-point or multipoint operations.**
- **4542 Single-Display Configuration—For multipoint private line operations.**
- **4545 Stand-Alone Configuration—For point-to-point switched network operations.**

CONFIGURATION

The Model 4541 configuration consists of 4503 CRT display stations with 4501 keyboards, 4504 line printers, and a 4505 cluster controller. The 4505 controller is offered in three versions: Model 4505-4BAO accommodates up to 8 workstations; Model 4505-4BBO, up to 16; and Model 4505-4BCO, up to 32. At least one display/keyboard workstation is required in a 4541 configuration for diagnostic purposes, and no more than 8 printers can be accommodated. Display/keyboards can be located up to 5000 feet from the controller and printers up to 2000 feet.

Since all cluster components are separate units, Teletype has available specially-designed tables to accommodate var- ➢

Teletype 4540 Synchronous Data Terminals

one. Although the 40/4 terminals will continue to be supported for maintenance and additions to existing systems, Teletype plans to taper off its marketing efforts for Model 40/4's as it increases its emphasis on the 4500 System.

Three models are available in the 4540 Series:

- 4541 Clustered Configuration—Supports attachment of up to 32 devices.
- 4542 Single-Display Configuration—For multipoint operations on leased or private lines.
- 4545 Stand-Alone Configuration—For point-to-point dial-up operations.

All terminals in the series are designed for inquiry/response, data entry, and data retrieval applications using IBM 3270-compatible software with BSC protocol. The 4500 Series is compatible with the 3270, including command code structure and addressing sequence.

Communications with the host computer takes place in half-duplex synchronous mode. Transmission speeds supported by the Cluster Configuration are 2400, 4800, or 9600 bps, depending on the modem selected; the Stand-Alone and Single-Display terminals can transmit at 2400 or 4800 bps. The Cluster Configuration can operate in either point-to-point or multipoint setups in non-switched networks. The Stand-Alone terminal supports only point-to-point switched communications; the Single-Display, only multipoint non-switched. All controllers are equipped with an RS232 interface.

In the Cluster Configuration, the controller is microprocessor-based. Most function logic is stored in the cluster control unit's 64K bytes of memory. A set of circuit cards provide the central processing area, device feature storage, and device interface logic. At time of installation (and as required thereafter), processing and device control options are keyed into a table stored in the memory. Additional control functions are performed by a 16K-byte microprocessor-based controller integrated into each display. Upon power-up, applicable tables stored in the cluster controller are loaded into the display memory to provide all display control functions.

Stand-Alone and Single-Display terminals utilize Model 40/4 control units, which are hardwired to support processing and device control functions.

Other key features of the 4540 Series components include:

- Cluster Configuration—Accommodates up to 32 display/keyboard units and line printers. At least one display/keyboard is required, and no more than 8 printers can be included in the cluster.
- Stand-Alone and Single-Display Configurations—Accommodate one display/keyboard unit (required) and one line printer (optional).

ious component combinations (controller only, controller/keyboard/display, and keyboard/display) for the office environment.

The Model 4542 and 4545 configurations consist of a controller, a keyboard and a display and can be set up with either integrated or detached components. The Model 4025 controller has its own CRT display and keyboard in an integrated table-top workstation. The Model 4004/5 controller is pedestal-mounted and utilizes variations of the Model 4026 detached display/keyboard. An optional Model 4011 line printer can be added to either configuration.

TRANSMISSION SPECIFICATIONS

The 4540 Series controllers support communications with a host computer as an IBM 3270 using BSC protocol in half-duplex mode. The BSC protocol conforms to the standard ANSI X3.28-1971/2.4B2. The Clustered Configuration can operate in point-to-point or multipoint set-ups via leased or private lines or AT&T's Digital Dataphone Service at transmission speeds of up to 9600 bps. The Stand-Alone Configuration can operate only in a point-to-point arrangement, using a dial-up connection at speeds up to 4800 bps. The Single-Display Configuration can operate only in a multipoint set-up, using leased or private lines, at speeds up to 4800 bps. Each controller has a single communications port which provides an EIA RS232 interface for connection to a Bell System 201 (2400 bps), 208 (4800 bps), 209 (9600 bps), or equivalent modem. The modem can be located up to 50 feet from the controller. An 8-level ASCII (odd-parity) or EBCDIC code can be transmitted. Automatic error control procedures check for vertical and longitudinal parity or cyclic redundancy and alternative odd/even block count; data is automatically retransmitted if errors are detected.

Each device in the 4540 Series is equipped either with its own 1920-character addressable buffer or a buffer addressing scheme. This permits data to be prepared on the display, that data to be sent to the host computer for processing, and the results to be returned to a designated printer without interrupting operator preparation of a subsequent page of data. Also, each printer is available for local printing of displayed data or remote printing of host computer data without interrupting display operations. When not communicating with the computer, display/keyboards may transfer keyed data to an associated printer in an off-line mode.

DEVICE CONTROL

The 4540 Series consists of interactive terminals designed for inquiry-response, data entry, and data retrieval. Data is transmitted and received in message blocks. Messages are composed and edited before transmission; the entire contents or a selected part of the display memory is transmitted upon operator command (and after receipt of a polling message).

Manual cursor controls position the cursor up, down, left, right, to the initial position of the next line (return), to the initial position of the first line (home), forward, or backward. Repetitive operation and cursor wraparound are provided for these cursor functions.

The computer can also position the cursor by sending a series of two-character command sequences that correspond to the manual cursor control functions. In this way the cursor can act as a prompt for keying of data in a fixed format. Visually, the cursor is a character-sized white rectangle.

Edit functions include character and line insertion and deletion. Character insertion and deletion, both repeatable functions, affect all data to the right of the cursor up to

Teletype 4540 Synchronous Data Terminals

- Display capacity—Available in a 1920-character screen only.

- Key entry—Available with either ASCII or EBCDIC typewriter-style keyboard, with or without an internal numeric cluster, an external numeric cluster, or magnetic stripe reader.

- Editing—Provides character insertion and deletion and line insertion and deletion.

- Printed output—Provides full-character printing at speeds up to 300 lines per minute using a 64-character monocase set or 220 lines per minute using a 96-character set including upper and lower case alphabetics. All configurations can support either an 80-column friction feed or 80- or 132-column tractor-feed printers.

All members of the 4500 family are designed to support a self-diagnostic capability that serves as an aid to the user for quickly locating a faulty component. Component failures are identified by lighted indicators on the component cabinet or by printed or displayed messages and patterns activated by keyed diagnostic sequences. These keyed diagnostics can test each component individually and the entire system; with proper modems, testing is extended to the communications line and remote-end modem.

Characteristics of the 4540 Series are in many ways similar to those of the 40/4. In fact the Stand-Alone and Single Display terminals utilize nothing but 40/4 components. However, several major improvements have been implemented in the new 4540 cluster components and these are described below:

- Price "reductions"—Major price increases were announced for the 40/4 terminals in December 1978. As a result, list prices for 4540 configurations are at least 30 percent lower than comparable 40/4 configurations.

- Processing system—The 4540 cluster includes a single cluster control unit, which contains a microprocessor-based operating system; in addition, certain display unit controls are stored in a microprocessor located on the display unit base. The 40/4 requires two types of control units: a station cluster control and up to six device cluster controls. All 40/4 control functions are hardwired.

- Cluster configuration—The 4540 cluster can contain up to 32 devices in any combination, as long as at least one device is a display/keyboard unit and no more than 8 devices are printers. All 32 devices can be display/keyboards, if desired. The 40/4 cluster can handle 36 devices, of which at least one and no more than 24 can be display/keyboards, and no more than 30 can be printers.

the end of the line or the beginning of a protected field. The displayed text expands (to the right) for each character entered and contracts for each character deleted. Character insertion is inhibited if no blank spaces are present to the right of the cursor. Line insertion and deletion affects all lines of text from the cursor to the end of display memory; line insertion or deletion is inhibited if any formatted fields exist on the screen.

Erasure functions permit the operator to erase the unprotected fields only or the entire screen. If the entire screen is erased, the cursor is automatically positioned at Home and the computer is informed of the screen-clear operation.

The 4540 terminals operate under the control of the program stored at the host computer and provide complete compatibility with the addressing sequence, command code structure, and line discipline employed by the IBM 3270 Information Display System. They respond to and execute the full repertoire of IBM 3270 commands. Attribute characters can define fields as protected, modified, highlighted, numeric, and non-displayed.

The protected format feature permits the use of fixed formats for data entry applications that require the operator to key pertinent data into blank spaces within a displayed format. The feature restricts key entry to unprotected or variable fields within the fixed format. Format data is protected from inadvertent data entry and remain displayed until erased by computer message or by the operator. Only unprotected fields are transmitted or erased, while the format remains displayed. The operator moves from one unprotected field to another (forward or backward) via the tab and backtab functions.

Highlighting is used to direct the operator's attention to significant information. Fields can be made to blink or to be displayed at higher than normal brightness, or a combination of both functions can be used. Blinking alternates the display of a character or field between full and half intensity once every second. Specified fields can also be blanked (not-displayed) for security reasons.

Manual tab controls permit the operator to tab (move the cursor) to the beginning of the next unprotected field with erasure of all unprotected data between the existing and new cursor positions, and to the beginning of the present or previous unprotected field. Since tabulation control is strictly a computer-controlled function; tab stops cannot be set and cleared from the keyboard. The operator tabs to the beginning of the next line or to the beginning of the next unprotected field, whichever comes first.

SOFTWARE SUPPORT: The 4540 Series is supported under all existing bisynchronous IBM software support for the IBM 3270.

ERROR CONTROL AND MALFUNCTION ISOLATION: Character parity is generated for each keyed character and accompanies the transmitted characters. When the ASCII code is used, each character is checked for odd vertical parity, and horizontal redundancy checking is performed on each message block, producing a block check character. When EBCDIC code is used, cyclical redundancy checking is performed on each message producing two block check characters (16 bits). Alternating odd/even block check counting is also performed. Parity checking is also performed on all received data. The message block is automatically retransmitted if an error is detected in either incoming or outgoing data.

A series of operator-initiated diagnostic tests can be performed to isolate component and system malfunctions. When a problem is detected, a test-fail message and a specific

Teletype 4540 Synchronous Data Terminals

- Cabling—All attachments to the 4540 control unit are connected using Standard Series Interface (SSI) cables. In a 40/4 cluster, connections between the station cluster controller and the modem or the device cluster controller utilize SSI cables (a simple two-twisted-pair cabling), but connections between the device cluster controller and the keyboard/displays require specialty cable.

- Error checking—More elaborate error control is provided in the 4540 Series, which automatically handles some situations that required operator intervention in the 40/4.

- Communications noise interference—Because the 4540 uses an improved signalling technique, including a higher transmission voltage, between the cluster controller and peripheral devices, the terminals are less sensitive to noise on the communications line than the 40/4. An electrical-noise measurement specification has been developed for use with the 4540 so that users can evaluate whether noise-shielded cable is needed for system installation.

- Keyboard functions—Two new keyboards are available with the 4540 Series: a typewriter-style with external numeric cluster, and a typewriter-style with external numeric cluster and magnetic stripe reader. These new keyboards contain transparent character generation, so that keytops can be defined according to user requirements.

- Printer design—The 4504 printer is totally enclosed in a newly-designed noise-reducing cabinet. It carries a re-inker and paper jam alarm as standard features; these are optional on the 40/4 printers.

Just before going to press, Datapro received information from Teletype that some modification to System 4500 offerings would be released shortly. The modifications are expected to redefine the ordering information and catalog codes to include the Single-Display and Stand-Alone Configurations in the 40/4 Series instead of the System 4500 family.□

description of the problem are generated. In addition, indicator lights are visible on all components to alert the operator to component malfunctions.

COMPONENTS

4505 CLUSTER CONTROL UNIT: A microprocessor-based controller containing 64K bytes of addressable memory made up of LSI integrated circuits, CMOS RAM chips, and three direct memory access circuits programmed to support the operating characteristics of the cluster. At the time of installation all variables, such as code choice (ASCII or EBCDIC), station and cluster addresses, and specification of component features requiring systems support, are keyed into a set of tables in the memory. Since the set of tables is volatile during power-loss situations, a back-up battery is provided to protect the system.

The 4505 is available in three versions, which differ only in the number of workstations each can support: 4BAO can accommodate up to 8 workstations; 4BBO, up to 16 workstations; and 4BCO, up to 32 workstations. Any combination of 4503 display stations with keyboards and 4504 or 4011 printers is acceptable as long as at least one display/keyboard workstation is provided to support controller diagnostic procedures, and no more than eight printers are included in the cluster. Connection of workstations to the controller is accomplished via Standard Serial Interface (SSI) connectors. An EIA RS232 communications line interface is provided for connection to a host computer.

STAND-ALONE/SINGLE-DISPLAY CONTROL UNITS: Two types of control units for stand-alone and single-display configurations are included in the 4540 Series: the Model 4025 controller with its own display and keyboard is integrated into a table-top workstation; the Model 4004 (Stand-Alone) and 4005 (Single-Display) pedestal-mounted controllers utilize the 4026 detached display/keyboard.

The 4025 controller is available in twelve models: six Stand-Alone (last four digits of model number end in Z) and six Single-Display (last four digits of model number end in O). The 4026 display/keyboards also available in six models. Each set of six models consists of three keyboard variations (typewriter-style, INC, and ENC) for 60 Hertz or 50/60 Hertz power. See the description of the 4501 keyboard below for details on keyboard variations.

The 4004 and 4005 controllers are each available in two models: one with a 29-inch table-top, which can support a display and keyboard, and one with a 27-inch table-top and a paper-feed slot, which can support a printer.

Display and keyboard characteristics for the 4025 and 4026 display and keyboards are identical to those described below for the 4503 Display and 4501 keyboard. The magnetic stripe reader is not available for stand-alone and single-display configurations. An EIA RS232 communications line interface is provided on each controller for connection to a host computer. One optional 4011 line printer may be attached to any of these controllers via an SSI connector.

4503 DISPLAY: The display screen measures 13 inches diagonally with a viewing area of 11.25 inches wide by 5.25 inches high. The screen is arranged in 24 lines of 80 characters each, totaling 1920 character positions. A choice of 64-, 96-, or 128-character sets in EBCDIC or ASCII are available. All models display data in white against a dark background. Characters are formed by a 7 x 9 dot matrix. The viewing screen can be vertically tilted through 20 degrees of rotation (± 10 degrees from the horizontal) and brightness levels adjusted. An audible alarm is provided to alert the operator to certain error conditions.

In Cluster Configurations the display rests on a disk-shaped controller which contains a 16K-byte microprocessor memory (made up of MOS chips) and a power supply. In Stand-Alone and Single-Display Configurations the display control functions are integrated into the control unit.

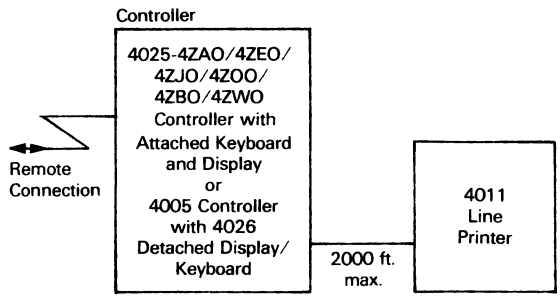
4501 KEYBOARD: Four keyboard formats are available: typewriter-style, typewriter-style with an internal numeric cluster (INC), typewriter-style with an external numeric cluster (ENC), and typewriter-style with external numeric cluster and magnetic stripe reader (ENC/MSR). Each of the keyboards can generate a 128-character ASCII or EBCDIC set. Character generation on all typewriter-style and INC keyboards and on Stand-Alone and Single-Display ENC keyboards is fixed; a specified key directly generates a specific character. Character generation on the Cluster Configuration ENC and ENC/MSR keyboards is "transparent;" depression of a key initiates a table look-up. This permits the key tops to be customized to specific user requirements.

Character repetition on the typewriter-style keyboard is restricted to a few specific characters and repeatability is built into the key's function.

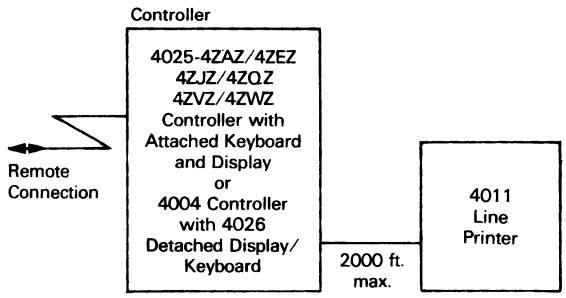
Teletype 4540 Synchronous Data Terminals

CONFIGURATIONS

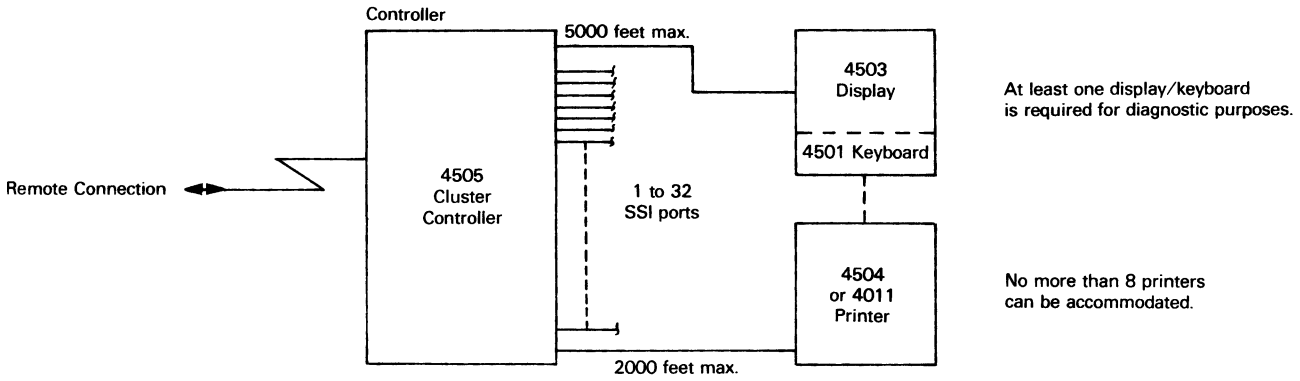
4542 Single Display Configuration



4545 Stand-Alone Configuration



4541 Clustered Configuration



Character repetition on the INC, ENC, and ENC/MSR keyboards is controlled by a repeat-key; depressing this key with any other key automatically causes repetition. In addition, keys for certain characters have built-in repeatability.

Program Function and Program Attention Keys, a standard feature on the IBM 3270, are also standard on the 4501 keyboards.

Typewriter-style, INC, and ENC keyboards are available in all configurations; ENC/MSR keyboards are available in Cluster Configurations only. All keyboard models are available in table-top or detached versions. An optional keylock is available on Cluster Configuration ENC and ENC/MSR models.

LINE PRINTER: Two line printers are included in the 4540 Series: the Model 4504 (for Cluster Configurations only) and the Model 4011. Each offers a choice of 64- or 96-character set in ASCII or EBCDIC code. Each printer can operate at a speed of 300 lines per minute using the 64-character set, or 220 lines per minute using the 96-character set. The 4504 printer is available with a variable-width tractor feed and 132 characters per line only; the 4011 comes in either friction feed (80 characters per line) or variable width tractor feed (80 or 132 characters per line). The friction feed model accommodates standard paper width of 8½ inches. Tractor feed models accommodate pin-fed, 6-part continuous forms with widths of from 4¼ to 9½ inches for the 80-column unit or 4¼ to 15 inches for the 132-column units and lengths of 2½ to 22 inches.

Printing is performed by means of a row of 80 or 132 print actuators, and a continuous arrangement of type pallets which are imbedded into a moving belt. The 64-character set is repeated three times around the belt; the 96-character set is repeated twice.

Standard features on the 4504 printer include a ribbon reinker, which increases ribbon print life by about 20 million characters, and a paper jam detector which stops the printer and lights an indicator when the pin-fed paper does not move.

PRICING

The 4540 Series terminals can be obtained from Teletype on a purchase basis only. Functional discounts of 10 percent are available to nonprofit educational institutions (public and private) and to state, county, and municipal governments and their Canadian equivalents. Functional discounts of 40 percent for 4541 configurations and 20 percent for 4542 and 4545 configurations are available to resellers (OEM's), lessors, and common carriers (communications and transportation), and to United States and Canadian Federal Governments and their prime contractors and subcontractors.

Equipment preparation and installation services are available on a time-and-material basis. The standard hourly rate is $26.00 per hour for services performed Monday through Friday between 8:30 AM and 4:30 PM.

Full Coverage Maintenance includes scheduled preventive factory maintenance and on-site repair service. Prices depend on distance from the service center and the types and number of 4540 devices employed. Typical minimum annual costs are $360 per year for a controller, $264 per year for a display, $276 per year for a line printer, and $60 per year for a keyboard.

Teletype 4540 Synchronous Data Terminals

Model 4541 Cluster Configurations

		Purchase Price
	4504 Cluster Controllers:	
-4BAO	Supports up to 8 devices	$3,775
-4BBO	Supports up to 16 devices	4,304
-4BCO	Supports up to 32 devices	5,464
	4503 Display:	
-1OAO	1920-character screen	1,700
	4504 Line Printers:	
-1CAF	Tractor feed; 132 columns; ASCII	4,237
-1CEF	Tractor feed; 132 columns, EBCDIC	4,237
	4507 Tables:	
-2AAO	36-inch width; for keyboard/display workstation	280
-2ABO	45-inch width; for keyboard/display/controller workstation	308
-2BOO	20-inch width; for controller	198

		Table-top	Detached
	4501 Keyboards:		
-1AOO/1DOO	Typewriter-style	$520	$555
-2AOO/2DOO	Typewriter-style with internal numeric cluster	520	555
-3AOO/3DOO	Typewriter-style with external numeric cluster	670	733
-4AOO/4DOO	Typewriter-style with external numeric cluster and magnetic stripe reader	787	850
	Keylock (part number 347300)	22.90	22.90

Model 4542 Single-Display and Model 4545 Stand-Alone Configurations

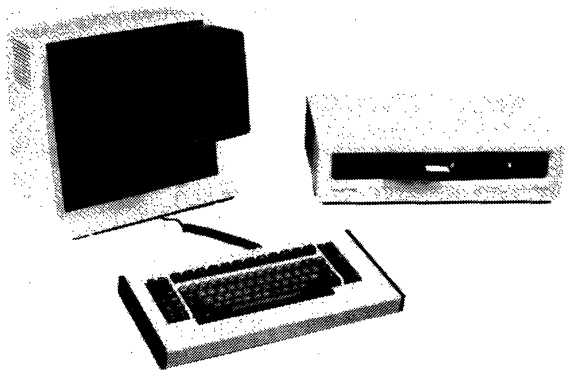
		Stand-Alone	Single-Display
	4025 Controllers with Attached Keyboard and Display:		
-4ZAZ/4ZAO	Typewriter-style keyboard; 60 Hertz	$3,350	$3,350
-4ZEZ/4ZEO	Typewriter-style keyboard with internal cluster; 60 Hertz	3,350	3,350
-4ZJZ/4ZJO	Typewriter-style keyboard with external numeric cluster; 60 Hertz	3,494	3,494
-4ZQZ/4ZQO	Typewriter-style keyboard; 50/60 Hertz	3,533	3,533
-4ZVZ/4ZVO	Typewriter-style keyboard with internal numeric cluster; 50/60 Hertz	3,533	3,533
-4ZWZ/4ZWO	Typewriter style keyboard with external numeric cluster; 50/60 Hertz	3,676	3,676

	4004 Single-Display Controllers for Detached Keyboard and Display:	
-4EAA	Control unit with 29-inch table top	2,526
-4EAL	Control unit with 27-inch table top	2,528
	4005 Stand-Alone Controllers for Detached Keyboard and Display:	
-4EAA	Control unit with 29-inch table top	2,619
-4EAL	Control unit with 27-inch table top	2,620
	4026 Detached Keyboards and Displays:	
-4ZAR	Typewriter-style keyboard; 60 Hertz	960
-4ZER	Typewriter-style keyboard with internal numeric cluster; 60 Hertz	960
-4ZJR	Typewriter-style keyboard with external numeric cluster; 60 Hertz	1,085
-4ZQR	Typewriter-style keyboard; 50/60 Hertz	1,143
-4ZVR	Typewriter-style keyboard with internal numeric cluster; 50/60 Hertz	1,143
-4ZWR	Typewriter-style keyboard with external numeric cluster; 50/60 Hertz	1,268
	4000 Pedestals:	
-400D	24-inch wide pedestal; 24-inch top; no paper slot	151
-400E	24-inch wide pedestal; 24-inch top; 11-inch paper slot	153
-400F	20-inch wide pedestal; 20-inch top; 11-inch paper slot	110
-400J	27-inch wide pedestal; 27-inch top; 17-inch paper slot	114
-400L	24-inch wide pedestal; 27-inch top; 17-inch paper slot	153

4011 Line Printers:

-3BOO	Friction feed; 80 columns; ASCII	1,935
-3BZO	Friction feed; 80 columns; EBCDIC	1,935
-4GOO	Tractor feed; 80 columns; ASCII	2,105
-4GZO	Tractor feed; 80 columns; EBCDIC	2,105
-4LOO	Tractor feed; 132 columns; ASCII	2,850
-4LZO	Tractor feed; 132 columns; EBCDIC	2,850■

Teletype 5000 Series Display Terminals



Teletype's new 5540 is a family of IBM 3270-compatible displays and controllers. Displays are available in 12- and 13-inch screen sizes, with 1920- and 3564-character display formats, and a variety of keyboard styles. Controllers are available in table-top or floor-standing units, with up to 32 ports available for device attachment.

Teletype's new family of display terminals, which includes two asynchronous models and a new IBM 3270-compatible product family.

The 5410 is an asynchronous conversational display; the 5420 is an asynchronous buffered display. Both terminals feature a 12-inch display with a seven-position tilt capability, and detached, low-profile keyboards. Features on the new asynchronous terminals include ANSI 3.64 compatibility, 80/132-column display capability, editing capabilities, horizontal split screen, and display attributes. The 5420 provides up to 72 lines of display memory.

The 5540 family is Teletype's new line of IBM 3270-compatible equipment, featuring controllers and displays that also offer compatibility with Teletype's established 4540 line. Family members include the 5544 and 5546 Controllers, and the 5548-12, 5548-22 and 5548-25 Displays. The 5540 family offers both BSC and SNA/SDLC protocol-compatibility. Controllers are available in from 6- to 32-port versions, while displays are available with 12- or 13-inch screens, with 1920- to 3564- character display capacities, and a choice of detached keyboard styles.

The 5410 is priced at $995, while the 5420 sells for $1,495. The 5540 controllers range in price from $4,500 to $11,500, and the 5540 displays carry a price range from $1,633 to $3,000.

MANAGEMENT SUMMARY

The 5000 Series products represent Teletype's first new offering following the AT&T divestiture. These new products cover a broad field, with new terminals for four different application areas: asynchronous conversational, asynchronous buffered, IBM 3270-compatible, and intelligent dot-mapped graphics. This report will cover Teletype's new products in the first three application areas only.

The 5410 Display is a low-priced, character mode asynchronous terminal. The 5410 is based on the ANSI 3.64 standard, and contains several features not normally associated with conversational terminals. These include: 80/132-column display capability; horizontal split screen; eight programmable function keys with associated screen labels; full editing features and visual attributes; and graphics capabilities. The 5410 also has Teletype's new display design, which includes a 12-inch, 7-position tilt display, and a low-profile, detached keyboard.

The 5420 is a buffered version of the 5410. The 5420 provides up to 72 lines of display memory in 80-column mode (48 lines in 132-column mode). In addition to the horizontal split screen capability, a scroll mode, page mode, and windowing capability are provided in order to access and manipulate the 5420's memory. The 5420 also provides all of the operational and design features of the 5410.

The 5540 is a family of IBM 3270-compatible products; the new products are also compatible with Teletype's existing 4540 series of 3270- compatible controllers and displays. The 5540 family consists of two controllers (5544 and 5546) and three displays (5548-12, 5548-22, and 5548-25), as well as a line of printers.

CHARACTERISTICS

VENDOR: Teletype Corporation, 5555 Touhy Avenue, Skokie, Illinois 60076. Telephone (312) 982-2000.

DATE OF ANNOUNCEMENT: April 1983.

DATE OF FIRST DELIVERY: Third quarter 1983.

NUMBER DELIVERED TO DATE: New product.

SERVICED BY: Teletype Corporation.

MODELS

The 5000 Series consists of three models: the 5410, 5420, and 5540. A fourth member of this series, the 5620, is an intelligent graphics terminal and thus beyond the scope of this report. The following paragraphs summarize the difference between the three models covered in this report.

Teletype 5000 Series Display Terminals

The 5544 is an IBM 3274-compatible control unit. Available in 16-port and 32-port versions, the 5544 is a floor-standing unit. The 5546 is an IBM 3276-compatible, table-top control unit available in 6-port and 12-port versions. Both controllers provide 5¼-inch dual floppy disks for software storage. Users can switch from BSC to SNA/SDLC line protocol by changing disks.

The 5540 display terminals contain the basic design features of the new asynchronous displays. The 5548-22 is an IBM 3278 Model 2 compatible unit containing a 13-inch display and a 1920-character display capacity. The 5548-25 is compatible with the IBM 3278 Model 5; it also contains a 13-inch screen, while providing selectable display capacities of 1920 and 3564 (27 lines by 132 columns) characters. The 5548-12 is Teletype's version of the IBM 3178, with a smaller (12-inch) display screen and a 1920-character display capacity. All of the 5540 displays can be configured with a choice of available keyboards, including typewriter-style, typewriter with external numeric pad, and data entry styles, in either low- or high-profile designs.

COMPETITIVE POSITION

Teletype's 5000 Series covers three distinct market areas. The 5410 and 5420 are targeted at the low-priced ASCII terminal market, a segment in which Teletype has not traditionally been a major force. The 5410 contains a high degree of functionality for a conversational terminal, while maintaining a sub-$1,000 price tag. The 5420 is also priced competitively as a buffered terminal.

The 5540 family is Teletype's new generation of IBM 3270 replacement products. The new components are also compatible with the existing Teletype 4540 products, a line which boasts a very large installed base and a high degree of user acceptance in the competitive 3270 replacement market.

The new 5620 is an intelligent, dot-mapped graphics terminal which places Teletype in the intelligent terminal market for the first time.

ADVANTAGES AND RESTRICTIONS

Teletype has a well-deserved reputation among users for reliability and quality in their products. This reputation should aid the 5410, 5420, and 5620 in capturing a share of their respective markets. The acceptance of the new 5540 products is probably a foregone conclusion, considering the popularity of the 4540 products and the fact that a user can mix and match the new products with the 4540 products. □

- **5410—an asynchronous, conversational terminal. The 5410 conforms to the ANSI X 3.64 standard. It provides 80-or 132-column display capability, horizontal split screen, editing capabilities, and five display attributes.**

- **5420—an asynchronous, buffered terminal. The 5420 provides all of the features of the 5410, plus 72 lines of display memory, scroll mode, page mode, and windowing.**

- **5540—a family of IBM 3270-compatible display terminals and controllers. As with the older 4540 family, the 5540 products operate under both BSC and SDLC line protocols. Members of the 5540 line include: the 5544 control unit, which is compatible with the IBM 3274 and is available in 16- and 32-port configurations; the 5546 control unit, which is IBM 3276-compatible and is available in 6- and 12-port versions; the 5548 Model 12 display, which is IBM 3178-compatible; the 5548 Model 22, which is IBM 3278 Model 2-compatible; and the 5548 Model 25, which is IBM 3278 Model 5-compatible. All displays are available with data entry or typewriter-style keyboards. Teletype also provides a variety of printers for use with the 5540 family.**

TRANSMISSION SPECIFICATIONS

For the 5410 and 5420, transmission is asynchronous, in half- or full-duplex, at speeds up to 19,200 bits per second. Model 5420 also provides for isochronous transmission with flow control. Both models provide an EIA RS-232-C interface, as well as an auxiliary EIA printer interface. A self-test capability is standard.

For the 5540 family, transmission is synchronous, in half- or full-duplex, at speeds up to 9600 bits per second. Both BSC and SNA/SDLC protocols are supported. The 5544 is compatible with the IBM 3274 "C" models, while the 5546 is compatible with the IBM 3276 remote controllers. The following SNA descriptors are supported: Physical Unit (PU) Type 2, Logical Units (LU) Types 1, 2, and 3, and Format Identification (FID) Type 2. Displays connect to the control unit via twisted pair or coaxial cable, at distances up to 5,000 feet. Over non-switched transmission facilities, half-duplex terminal operation is supported. Two EIA RS-232-C interfaces are standard.

DEVICE CONTROL

The 5410 conversational display transmits data a character-at-a-time as it is keyed. The option menu is displayed on the screen in a "plain English" manner. Eight user-or host-programmable function keys are included, each of which has up to a 50-character per key capacity in non-volatile memory. Each function key has a corresponding screen label, with up to 16 characters displayable on each label.

Visual display attributes available on the 5410 include normal, blank, half-intensity, blink, underline, and reverse video. The display screen may be split horizontally into up to two static regions and one scrolling region. Editing capabilities include character and line insert/delete, as well as clear functions. Line drawing and special symbol graphics are available. The 5410 conforms to the ANSI 3.64 standard.

The 5420 buffered display can transmit data a character-at-a time from the keyboard, or by line/page/block from the display. Up to 72 lines of display memory are available when using the 80-column display format, and up to 48 lines of memory are available when using the 132-column display format. The 5420 contains all of the basic operating features of the 5410, plus some additional features not found on the 5410, including single or multiple character or line insert/delete.

The 5420 provides four separate methods to access and manipulate the display memory; scroll mode, page mode, horizontal split screen, and windowing. Scroll mode allows the operator to scroll through display memory. In page mode, the display memory is divided into three separate pages of 24 lines by 80 or 132 columns, each with its own set of screen labels for the system-defined function keys. The horizontal split screen feature is the same as the 5410's, except that on the 5420 it can be used while in either scroll or

Teletype 5000 Series Display Terminals

page mode. With windowing, the 5420's memory can be divided into up to four rectangles of varying lengths and widths, called workspaces. A window or viewport into each workspace can be created, and its position defined and located on the screen. One viewport can be overlapped or eclipsed with another.

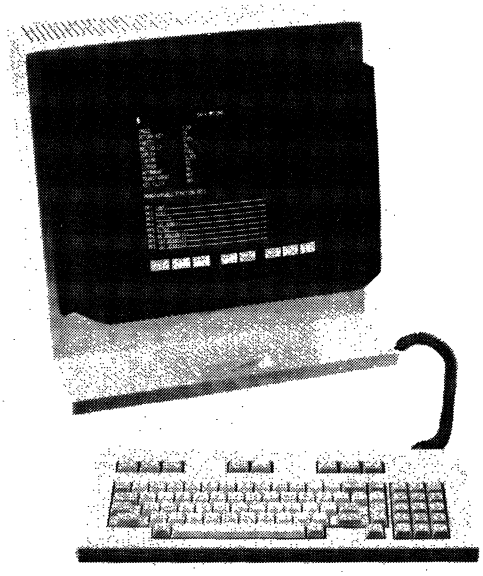
The 5540 family of components are compatible with the corresponding members of the IBM 3270 Information Display System. The 5540 is also compatible with the Teletype 4540 family, the company's current line of IBM 3270-compatible equipment.

The 5540 terminals feature a separate user information/status line, block or underline cursor with selectable blink, and self-test diagnostics. A selector light pen is optional. The displays connect to a cluster controller via twisted pair or coaxial cable at distances up to 5,000 feet.

All software for the 5540 controllers is stored on dual 5¼-inch floppy disks; a user can switch from BSC to SDLC protocol by switching disks. The first port on the controller is reserved for the controller console, for communicating with the host and for setting options such as station addresses, configurations, and printer authorization matrix.

COMPONENTS

5410 DISPLAY UNITS: Include a 12-inch (diagonal) display screen, capable of displaying 24 lines of 80 or 132 characters. One status line is available, plus two lines for eight screen labels. Characters are formed utilizing a 7-by-9 dot matrix with descenders in a 9-by-13 field (80-column format), or using a 5-by-7 dot matrix with descenders in a 7-by-13 field (132-column format). Characters are displayed in white on a dark background. Two character sets are selectable: 128 ASCII alphanumeric plus control characters, or 96 line drawing and special graphic characters. The screen features seven tilt positions, a non-glare finish, and brightness control.



The 5410 is an asynchronous, conversational mode terminal. The 5410 contains a 12-inch, 7-position tilt display, and a low-profile detached keyboard. With a quantity-one end-user price of $995, the 5410 contains some advanced features such as horizontal split screen, editing capabilities, and graphics.

5410/5420 KEYBOARD: Feature a typewriter-style layout with a separate numeric cluster and eight programmable function keys. The keyboards are detached and feature a low-profile design that meets the 30mm DIN height standard. All alphanumeric keys repeat, and audible key click is selectable. When not in use, the keyboard stores on a shelf underneath the display.

5544 CONTROLLER: A floor-standing control unit that is compatible with the IBM 3274 Control Unit. The 5544 is based on a 16-bit microprocessor; software is stored on 5¼-inch dual floppy disks. The 5544 is available in two models, featuring 16 and 32 device attachment ports. Both models support BSC and SNA/SDLC line protocols by changing diskettes. Built-in local and remote test features are included.

5546 CONTROLLER: A table-top control unit that is compatible with the IBM 3276 Control Unit (it does not include an integral display like the 3276). The 5546 is based on a 16-bit microprocessor; software is stored on 5¼-inch dual floppy disks. The 5546 is available in two models, featuring 6 and 12 device attachment ports. Both models support BSC and SNA/SDLC line protocols by changing diskettes. Built-in local and remote test features are included.

5548-12 DISPLAY TERMINAL: Includes a 12-inch (diagonal) display screen with a 1920-character capacity arranged in a 24-line by 80-column format. The 5548 Model 12 is designed to replace the IBM 3178 Display Station. Characters are formed utilizing a 9-by-14 dot matrix, and are displayed in white on a dark background. The EBCDIC character set is displayable. The screen features a non-glare finish, brightness control, and is tiltable.

5548-22 DISPLAY TERMINAL: Includes a 13-inch (diagonal) screen with a display capacity of 1920 characters, arranged in 24 lines of 80 characters each. The 5548 Model 22 is compatible with the IBM 3278 Model 2 Display Station. Characters are formed via a 9-by-14 dot matrix, and are displayed in white on a dark background. The EBCDIC character set is displayable. The display screen features a non-glare finish, brightness control, and is tiltable.

5548-25 DISPLAY TERMINAL: Includes a 13-inch (diagonal) screen with selectable display capacities of 1920 (24 lines by 80 columns) or 3564 (27 lines by 132 columns) characters. The 5548 Model 25 is compatible with the IBM 3278 Model 5 Display Station. Display formats are operator- or program-selectable. Characters are formed utilizing a 9-by-14 dot matrix, and are displayed in white on a dark background. The EBCDIC character set is displayable. The screen features a non-glare finish, brightness control, and is tiltable.

5540 KEYBOARDS: Keyboards are available with the following layouts: typewriter-style, typewriter-style with external numeric pad, and data entry. All keyboards are detached, plug-compatible with each other, and feature a 3270-like layout. The typewriter-style keyboard is available in high-profile (70mm) and low-profile (30mm) versions. The data entry and typewriter-style with external numeric pad keyboards are currently available in only the low-profile version. The high-profile keyboard features a 12-degree stepped keyrow and tactile feedback. The low-profile design conforms to the DIN height standard; it does not feature tactile feedback.

All keyboard styles feature 24 programmable function keys; up to 12 of the keys (PF1 through PF12) can be executed via a single keystroke. N-key rollover and audible alarm are also included.

Teletype 5000 Series Display Terminals

5540 PRINTERS: A variety of printers are available for use with the 5540 controllers. Two matrix character printers are offered, with speeds of 30 cps and 340 cps. Both printers provide 132- column print capability. Two line printers are offered, in either table-top or floor-standing versions. Both line printers operate at 300 lpm and are available in an 80-column friction feed version, or in an 80/132-column tractor feed version. Also offered is an 80-column forms access printer.

PRICING

The Teletype 5000 Series components are available for purchase only. In accordance with Computer Inquiry II, Teletype will not be permitted to sell new customer-premise equipment to end-users, starting in 1983. Teletype products will now be sold to end-users through American Bell Incorporated's Advanced Information Systems division and through other third-party resellers (OEMs) and lessors.

	Purchase Price
Asynchronous Displays	
5410 Conversational Display	$ 995
5420 Buffered Display	1,495
5540 Family	
5544 Controller (16-port)	7,150
5544 Controller (32-port)	11,500
5546 Controller (6-port)	4,500
5546 Controller (12-port)	4,742
5548-12 Display with—	
Data Entry Keyboard (30mm)	1,633
Typewriter-Style Keyboard (70mm)	1,816
5548-22 Display with—	
Data Entry Keyboard (30mm)	2,067
Typewriter-style Keyboard (70mm)	2,250
5548-25 Display with—	
Data Entry Keyboard (30mm)	2,817
Typewriter-Style Keyboard (70mm)	3,000
Selector Light Pen	417■