Teleray Display Terminals

Pictured above is Teleray's Model 7 display terminal. This unit features a detached, low-profile keyboard and is optionally available in a variety of enclosure styles. The "N-style" enclosure molding is shown here.

Teleray offers a family of ASCII-type display terminals with a variety of emulator versions available. Model 100 features DEC VT100 compatibility.

MODELS: 7, 7/DEC, 7/DDG, 16, 16/APL, 16/GRF, 16/HON, 100, and 100/HAZ.
DISPLAY: A 12-inch (diagonal) display screen is standard; 9- and 14-inch displays are optional.
KEYBOARD: A detached, low profile keyboard is standard on all models.
COMPETITION: Includes Ann Arbor, Esprit Systems, and DEC.
PRICE: $1,295 to $2,740, with quantity discounts available.

MANAGEMENT SUMMARY

The Teleray Division of Research Incorporated currently offers three microprocessor-based display terminal models: Model 7, Model 16, and Model 100. These units provide a 12-inch display screen, white character phosphors, and a variety of editing and ergonomic features.

Model 7 is available with either DEC emulation ability or combined DEC and Data General emulation.

Model 16 is available with either APL, Graphics, or Honeywell emulation capabilities.

Model 100 is available with Honeywell emulation abilities.

A distinctive feature of the Teleray terminals is the wide variety of enclosure styles available for them. Teleray now features six different enclosure styles, including metal, molded plastic, and rack-mount designs.

- Style E—a molded plastic case with a 12-inch tilt-screen and a detached keyboard; includes numeric pad. Available on Model 100 only.

- Style M—a metal case with a 12-inch screen and detached keyboard; includes numeric pad. Available on all models.

- Style N—an injection molded plastic case with a 12-inch screen and detached keyboard; includes numeric pad. Available on all models.

- Style NN—same as Style N, but includes 15-inch display. Available on all models. ▷

CHARACTERISTICS

VENDOR: Teleray Division of Research, Inc., Box 24064, Minneapolis, Minnesota 56424. Telephone (612) 941-3300.

DATE OF ANNOUNCEMENT: Model 7—November 1982; Model 7/DEC—August 1983; Model 7/DDG—September 1983; Models 16 & 16/APL—March 1982; Model 16/GRF—March 1983; Model 16/HON—May 1983; Model 100—November 1980; Model 100/HAZ—October 1983.

DATE OF FIRST DELIVERY: Model 7—January 1983; Models 7/DEC & 7/DDG—October 1983; Models 16 & 16/APL—April 1982; Model 16/GRF—April 1983; Model 16/HON—July 1983; Model 100—December 1980; Model 100/HAZ—October 1983.

NUMBER DELIVERED TO DATE: Information not available.

CONFIGURATION

All Teleray terminals are ASCII-type, microprocessor-based, stand-alone display units which feature ANSI X3.64 compatibility. The current family consists of three basic models, with a variety of emulation options available.

Model 7—Three versions of this unit are offered:

- Model 7: Offers IBM 3101 compatibility, 32 programmable function keys, and two pages of display memory as standard.

- Model 7/DEC: Features DEC VT100 emulation.

- Model 7/DDG: Offers DEC VT100 and Data General D200 compatibility.

Model 16—This unit is available in four versions:

- Model 16: Features a variable line length function, which allows the user to define the input line length as 20 to 255 characters. Horizontal scrolling, 32 programmable function keys, and four pages of display memory are offered as standard. ▶

Teleray Display Terminals

▷ • Style R—a rack-mount configuration with a 12-inch screen and detached keyboard; includes numeric pad. Available on Model 100 only.

• Style T—same as Style E, but an attached keyboard is offered as standard.

All models can be optionally equipped with 9- or 15-inch CRTs, and with characters displayed in green or amber.

COMPETITIVE POSITION

In the Teletype-compatible display terminal marketplace, Teleray has demonstrated an unparalleled amount of flexibility in the design of its products. Various Teleray terminals provide emulation ability of DEC, Data General, Hazeltine, and Honeywell units; others provide for APL and Graphics applications. Teleray's major competitors in the ASCII-compatible sub-market are Ann Arbor, Esprit Systems, Lear Siegler, TeleVideo, and DEC.

ADVANTAGES AND RESTRICTIONS

Among the advantages offered in Teleray products, emulation capability and variety of enclosure styles rank as the most significant. Model 100 provides a display format of 24 lines by 132 characters in DEC VT100 compatible mode.

USER REACTION

In November 1983, Datapro conducted a telephone survey with six vendor-supplied display terminal users who represented a total installed base of 345 Teleray units. These users reported on their experiences with Model 7, Model 16, and Model 100 units. The table below summarizes these results.

	Excellent	Good	Fair	Poor	WA*
Overall performance	3	2	1	0	3.3
Ease of operation	2	3	1	0	2.8
Display clarity	4	2	0	0	3.7
Keyboard feel and usability	4	1	1	0	3.5
Ergonomics	2	4	0	0	3.3
Hardware reliability	2	4	0	0	3.3
Manufacturer's maintenance service/ technical support	4	2	0	0	3.7

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

▶ • **Model 16/APL:** Provides 96 displayable APL characters plus other applications-related features.

• **Model 16/GRF:** Offers Tektronics 4010/4014 and Plot 10 graphics ability.

• **Model 16/HON:** Features Honeywell VIP 7801 compatibility.

Model 100—This unit is available in two versions:

• **Model 100:** Offers selectable 24-lines-by-80-character and 24-lines-by-132-character display formats. Other features include: 20 programmable function keys, 32 graphics keys, selectable scrolling speeds, and one page of display memory.

• **Model 100/HAZ:** Features Hazeltine 1500 Series compatibility.

TRANSMISSION SPECIFICATIONS

Transmission is asynchronous in the half- or full-duplex mode at selectable data rates to 19,200 bps on all models. The data rate is switch-selected, but can be changed by a keyed escape sequence; the rate reverts back to the switch-selected speed at power-up or when terminal functions are reset or initialized. The 10- or 11-unit, 8-level ASCII code is used. Available parities include even, odd, mark, space, or none. All units are equipped with an RS-232-C interface as standard, with RS422 and 20mA current loop interfaces optionally available.

DEVICE CONTROL

Basic terminal functions include full cursor control (up, down, left, right, return, and home), cursor sensing and addressing, new line, right margin wraparound, keyboard lock, and end-of-line bell.

Data can be transmitted character-by-character as it is keyed or in Block mode. Block mode can be selected for a line, partial line, message, page, or partial page. A portion of text can be transmitted as a message.

Data can be displayed in Scroll or Page mode. In Scroll mode, all displayed data is moved up by one line when attempts are made to move the cursor below the bottom line. In Page mode the cursor wraps from the bottom line to the top line, which is overwritten. A horizontal scroll feature is standard for Model 16 units only. Split screen and selectable windowing functions are available on all models.

Data can be designated as protected, and highlighted by any combination of dimming, blinking, underlining, or reverse video field attributes. It can also be blanked for security (in lieu of blinking).

Editing functions include character insertion and deletion and line insertion and deletion. Tabulation functions on all models permit up to 16 tab stops to be set. All or any individual tab stop can be cleared. Tabulation can be performed forward or backward from the keyboard.

Clear functions include clear page, clear-to-end-of-line, clear-to-end-of-page, clear memory, and clear-to-end-of-memory.

The Monitor mode permits display of the 32 ASCII control codes as data. In this mode, the display can be used as a line monitor and also allows entry of control characters into the display memory for subsequent block transmission. ▶

Teleray Display Terminals

➤ COMPONENTS

CRT DISPLAY UNIT: A 12-inch (diagonally measured) display screen is standard for all units; 9- and 15-inch display sizes are optionally available. The cursor is displayed as a blinking block, in a standard display format of white characters on a dark background. Green and amber character phosphors are optional.

Models 7 and 16 feature a standard display format of 24 lines by 80 characters, with character formation via an 8-by-10 dot matrix. Model 100 offers selectable 24-line-by-80-character and 24-line-by-132-character display formats as standard, with character formation via a 7-by-9 dot matrix. Double-height and double-width characters are available on Model 7 and Model 100 units.

KEYBOARD: A 75-key, typewriter-style keyboard with an 18-key numeric keypad is standard for all models. The main keygroup includes individual cursor control keys, programmable function keys (32 for Models 7 and 16; 20 on Model 100), and 22 edit/control/mode keys. A separate cluster to the right of the main keygroup includes the numeric keypad and six additional control/mode keys. The keyboard can generate any of 128 ASCII character codes. A caps lock key is provided on all models for Teletype compatability; N-key rollover and auto repeat are provided for all keys. A key-

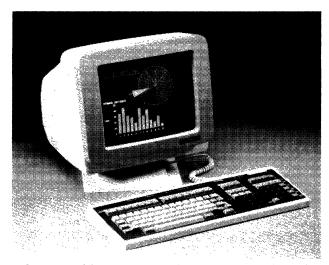board palmrest is optionally available for Model 7 and Model 16 units.

PRICING

Teleray display terminals are available for purchase only. Quantity discounts are available for OEM and end-user purchases.

The Teleray terminals are designed to facilitate easy and rapid self-servicing via snap-out components replaceable by spares. A 90-day warranty that includes priority factory exchange of all defective parts or units is provided. Warranty extensions are also available; contact Teleray for pricing.

	Purchase Price
Model 7	$1,295
Model 7/DEC	1,370
Model 7/DDG	1,525
Model 16	1,545
Model 16/APL	1,695
Model 16/GRF	2,740
Model 16/HON	1,795
Model 100	1,395
Model 100/HAZ	1,745 ■

Teleray Display Terminals

Teleray's Model 7-7305 is a multiprotocol terminal that features complete software- and keyboard-compatibility with the Honeywell VIP7305, as well as a keyboard-selectable DEC VT102 mode. The Model 7-7305 incorporates Teleray's new Triumph enclosure design, and features a keyboard with a layout identical to that found on the Honeywell keyboard.

Teleray manufactures a family of multiprotocol ASCII display terminals. The terminals provide emulation of popular display models from DEC, Data General, Hewlett-Packard, Honeywell, and IBM. Also offered are ANSI X3.64 command code compatibility and Tektronix 4010/4014 graphics capabilities. The terminals are equipped with Teleray's new Triumph enclosure design.

MODELS: Model 7-DHP, Model 7-7305, Model 7-DBM, and Model 20-DDG.
DISPLAY: The Triumph enclosure design incorporates a 14-inch (diagonal) display with green or amber characters. The display tilts and swivels. All models are also available with optional 9-inch and 12-inch rack-mount displays.
KEYBOARD: A variety of keyboard styles are available, depending on the model selected.
COMPETITION: DEC, Data General, Hewlett-Packard, Honeywell, and IBM; Teleray also competes with general-purpose ASCII display terminal vendors, including ADDS, Wyse Technology, TeleVideo Systems, Lear Siegler, Qume, Esprit Systems, Ampex, and several others.
PRICE: $1,395 to $1,695, with quantity discounts available.

MANAGEMENT SUMMARY

UPDATE: *This report contains information on Teleray's new line of multiprotocol display terminals. The terminals are available with the company's new Triumph enclosure design, which includes a smaller footprint (10 by 10 inches), a 14-inch tilt/swivel display, and a choice of green or amber phosphor characters.*

Teleray, a longtime supplier of ASCII display terminals, has recently introduced a new family of multiprotocol displays. In conjunction with the new models, the company has unveiled a new enclosure design, dubbed Triumph. The Triumph enclosure design incorporates a reduced footprint size (10 by 10 inches), a 14-inch tilt/swivel display, and high-resolution green or amber phosphor characters. Teleray has always been known for the variety of display enclosures that it offers; the new models can also be ordered with a 9-inch display or a 12-inch rack-mount display.

Model 7-DHP is compatible with both the Hewlett-Packard 2622/2624 terminals and the DEC VT102. In HP resident mode, the Model 7-DHP offers two pages of display memory, and is both software- and function-compatible with Hewlett-Packard's 2622 and 2624A display terminals. The Teleray terminal adds 256 addressable columns (in place of HP's 80), and 64 programmable keys (instead of HP's 8). In DEC mode, the Model 7-DHP features an extended ANSI code set, and performs all of the operating functions of the DEC VT102, plus extensive text editing, programmable functions, and block transmission. Tektronix 4010/4014 graphics capability is available as an option.

CHARACTERISTICS

VENDOR: Teleray Division of Research, Inc., Box 24064, Minneapolis, Minnesota 56424. Telephone (612) 941-3300.

DATE OF ANNOUNCEMENT: November 1984.

DATE OF FIRST DELIVERY: December 1984.

NUMBER DELIVERED TO DATE: Over 50,000 terminals (mostly older models).

SERVICED BY: Teleray.

MODELS

Four models comprise Teleray's new family of multiprotocol display terminals. These are:

• **Model 7-DHP**—provides emulation of the Hewlett-Packard 2622/2624 and the DEC VT102;

• **Model 7-7305**—provides emulation of the Honeywell VIP7305 and the DEC VT102;

• **Model 7-DBM**—provides emulation of the IBM 3101 and the DEC VT102; and

• **Model 20-DDG**—provides emulation of the DEC VT220 and the Data General Dasher D210.

Teleray Display Terminals

▷ Model 7-7305 is a dual-mode alternative to the Honeywell VIP7305. In its primary resident mode, the terminal is software-compatible with the VIP7305; in its alternate mode, the Model 7-7305 emulates the DEC VT102. The Model 7-7305 is equipped with a 113-key, low-profile keyboard that has a layout identical to that found on the Honeywell keyboard; it accepts special overlays for MF, OAS, and DEF applications, and the entire keyboard is recodable. A nonvolatile screen setup is standard, and 32 nonvolatile, user-programmable functions are available in addition to Honeywell's fixed-function keys. The 7-7305's four displayable character sets include Honeywell graphics and 64 mosaics. Options for the Model 7-7305 include Tektronix 4010/4014 graphics and three pages of display memory.

IBM 3101 and DEC VT102 emulation are available on the Model 7-DBM. In IBM resident mode, the Model 7-DBM provides all of the features and performance of the IBM 3101, plus a keyboard with an identical key layout. The Teleray model also contains user-programmable functions, and can be optionally configured with two additional pages of display memory. In DEC mode, the Model 7-DBM, like the 7-DHP and 7-7305, is software- and function-compatible with the DEC VT102, while adding text editing, programmable functions, and block transmission. Also, like the other members of the family, the Model 7-DBM can be optionally configured with Tektronix 4010/4014 graphics capability.

The Model 20-DDG provides both DEC VT220 and Data General Dasher D210 emulation. The Model 20-DDG's resident operating mode can be selected from either the keyboard or the DEC/Data General host. The operating features of the Data General D210 and DEC VT220 are included, with Tektronix 4010/4014 graphics optionally available.

COMPETITIVE POSITION

The various models in Teleray's new terminal line can replace the DEC VT102, DEC VT220, Data General Dasher D210, Hewlett-Packard 2622, Hewlett-Packard 2624A, Honeywell VIP7305, and IBM 3101. The terminals' multiprotocol capability makes them an attractive choice for users with multivendor hosts, for instance, a user with both DEC and Data General minicomputers installed. That user would be able to access both hosts through the same terminal. In addition to Teleray, Ampex also manufactures multiprotocol terminals.

In the general-purpose ASCII market, Teleray competes with all of the traditional leaders (as well as some successful newcomers), including ADDS, Lear Siegler, Esprit Systems, TeleVideo Systems, Wyse Technology, Qume, and several others. In particular, virtually all of these vendors have at least one model with DEC VT220 emulation, a market which has sprung up quickly since the introduction of DEC's newest generation of displays in November 1983. ▷

▶ TRANSMISSION SPECIFICATIONS

Transmission is asynchronous in the half- or full-duplex mode at selectable data rates up to 19,200 bps on all models. The data rate is switch-selected, but can be changed by a keyed escape sequence; the rate reverts back to the switch-selected speed at power-up or when terminal functions are reset or initialized. The 10- or 11-unit, 8-level ASCII code is used. Available parities include even, odd, mark, space, or none. All units are equipped with two buffered, bidirectional RS-232-C interfaces, the second of which can be used for either a second host or a printer.

DEVICE CONTROL

All models conform to the ANSI X3.64 standard for command codes when in DEC operating mode. All models feature single-page display memory. Two pages of display memory are available with the Model 7-DHP in HP resident mode. Two additional pages of display memory are optionally available for the Model 7-7305 and Model 7-DBM. Tektronix 4010/4014 graphics capabilities are optionally available for all models.

Data can be transmitted character-by-character as it is keyed, or in block mode. Block mode can be selected for a line, partial line, message, page, or partial page. A portion of text can be transmitted as a message.

Data can be displayed in Scroll or Page mode. In Scroll mode, all displayed data is moved up by one line when attempts are made to move the cursor below the bottom line. In Page mode the cursor wraps from the bottom line to the top line, which is overwritten. Split screen and selectable windowing functions are available on all models.

Editing functions include character insertion and deletion and line insertion and deletion. Tabulation functions on all models permit up to 16 tab stops to be set. All or any individual tab stop can be cleared. Tabulation can be performed forward or backward from the keyboard. Clear functions include clear page, clear-to-end-of-line, clear-to-end-of-page, clear memory, and clear-to-end-of-memory.

Emulation modes on each terminal are menu-selectable. The user configuration menu of the Model 7-DHP allows for the selection of start and end transmit codes, screen brightness level, cursor character, and other user-preference characteristics. Data can be continuously moved, either transparent or displayed, from one bidirectional serial port to the other. Forms may be created in one mode (HP or ANSI/DEC) and used in the other.

The Model 7-7305 has the ability to display an unlimited number (up to 80) of attributes and field qualifiers (all of which are Honeywell VIP7200-, VIP7300-, and VIP7800-compatible) on each display line. For spreadsheet applications, the 7-7305's display memory can be user- or host-programmed to accept line lengths up to 255 columns.

On the Model 20-DDG, each mode (D210 or VT220) contains its own operating settings plus an alternate set of "saved" parameters, which can be recalled at any time. Horizontal smooth scrolling is available so that columns beyond the displayed 80 or 132 can be panned into view. Displayable attributes include underscore, blink, blank, reverse video, and either dim (D210) or bold (VT220). Area qualifiers include protect, alpha only, and numeric only.

Tektronix 4010/4014-compatible graphics capabilities are optional for all models.

Monitor mode permits display of the 32 ASCII control codes as data. In this mode, the display can be used as a line ▶

Teleray Display Terminals

▷ **ADVANTAGES AND RESTRICTIONS**

The multiprotocol capabilities outlined earlier in this report stand as the Teleray terminals' most attractive feature. The terminals can communicate with many of the most popular minicomputer systems from DEC, Data General, Honeywell, and Hewlett-Packard, giving them a broad base of host systems to access. The dual-mode capabilities of the terminal are a plus, as are the enhanced features provided on the Teleray terminals. And the company has made its products even more attractive with the new Triumph enclosure design. For those users who prefer Teleray's older enclosure designs, the company still offers the 9-inch Executive enclosure and the 12-inch rack-mount enclosure. The Teleray terminals also carry an attractive price.

Despite its long experience in the display terminal market, Teleray has never ranked as one of the top vendors in units shipped. It has, instead, carved out a healthy niche in the minicomputer terminal emulation market. The new terminals should allow Teleray to continue its successful run in this market. □

▶ monitor and also allows entry of control characters into the display memory for subsequent block transmission.

COMPONENTS

CRT DISPLAY UNIT: The Triumph display enclosure is the standard configuration for all Teleray display terminal models. The display screen measures 14 inches (diagonally) and has both tilt and swivel capabilities. Green or amber phosphor characters can be chosen at the time of purchase. The Triumph enclosure occupies 10 by 10 inches of desk space.

Models 7-DHP, 7-7305, and 7-DBM display 24 lines of 80 characters each. Model 20-DDG can display 24 lines of 80 or 132 characters each. The Model 7-DHP's character sets contain both HP 2624 and DEC VT102 line drawing graphics. Modle 7-7305 contains four displayable character sets for a total of 255 characters (including standard Honeywell graphics and 64 mosaics). The Model 7-DBM displays the standard ASCII character set. Model 20-DDG contains a set of 382 characters, including 96 multinational, 64 monitor mode, and 94 downloadable, all of which can be displayed as normal, double, or quad wide. Columns beyond the 80th or 132nd character can be panned into view.

In addition to the Triumph enclosure style, two additional enclosure styles are optionally available: the 9-inch Executive enclosure, and the 12-inch rack-mount enclosure.

MODEL 7-DHP KEYBOARD: Includes 93 keys, including a separate numeric pad. Up to 64 of the keys (including the numeric pad) may be reprogrammed by the user or host. Thirty-two soft-labeled function keys are available, all of which can be saved in nonvolatile memory. The keyboard is detachable, and features a low-profile design.

MODEL 7-7305 KEYBOARD: Includes 113 keys in a layout identical to that found on the Honeywell VIP7305's keyboard. Keyboard overlays tailor the keyboard to specific OAS (office automation), MF (multifunction), or DEF (data entry) applications. In addition to the standard Honeywell function keys, the 7-7305 accepts up to 32 nonvolatile, programmed function sequences or control strings from the keyboard (or either of its RS-232-C interfaces). Set-up parameters are entered directly from the keyboard. The keyboard is detachable, and includes a low-profile design.

MODEL 7-DBM KEYBOARD: Includes 87 keys in a layout identical to that found on the IBM 3101. A separate numeric pad and cursor control pad are featured. Nonvolatile, user-programmable functions are available. The keyboard is detachable, and includes a low-profile design.

MODEL 20-DDG KEYBOARD: Includes 106 keys in a layout similar to that found on the DEC VT220. A separate numeric pad and cursor control pad are featured. Compatibility with the Data General Dasher D210 is achieved through the addition of a dedicated Home key, function key overlays, and color-coded key legends. Each emulation mode contains its own nonvolatile function memory, which will accommodate up to 20 programmable functions. In each emulation mode the entire keyboard may be redefined, by the user or host, for special applications.
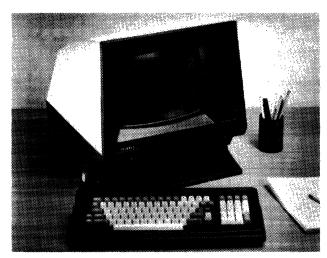
PRICING

Teleray display terminals are available for purchase only. Quantity discounts are available for OEM and end-user purchases.

The Teleray terminals are designed to facilitate easy and rapid self-servicing via snap-out components replaceable by spares. A 90-day warranty that includes priority factory exchange of all defective parts or units is provided. Warranty extensions are also available; contact Teleray for pricing.

Model	Purchase Price ($)
Model 7-DHP	1,595
Model 7-7305	1,695
Model 7-DBM	1,495
Model 20-DDG	1,395 ■

Teleray Series 10 and Model 100 Display Terminals

The Teleray Model 100 is a DEC VT100 emulator. The Model 100 is shown here with a 12-inch display screen and the N-style enclosure. All Teleray terminals can be configured with a 15-inch screen as well as the 12-inch size; in addition, six other enclosure styles are currently available.

MANAGEMENT SUMMARY

The Teleray Division of Research Incorporated currently offers four microprocessor-based display terminal models, ranging from a single-page editor to a DEC VT100-compatible unit. A distinctive feature of the Teleray terminals is the wide variety of enclosure styles available for them. Teleray now features eight different enclosure styles, including metal, molded plastic, and rack-mount designs, with attached or detached keyboards. The user can choose between a 12- or 15-inch display screen, and white, green, or amber characters.

Teleray's top-of-the-line (and newest) terminal is the Model 100, a DEC VT100 emulator. Display formats for the Model 100 include 24 lines of 80 or 132 characters, as well as 24 lines of 40 or 66 extra-wide characters. Other display attributes available include double high characters, bold, blink, underline, overline, reverse, and blank. Also standard on the Model 100 are: character or block mode transmission; an independent protect attribute; screen editing; four smooth scroll rates; an 880-character non-volatile function memory (20 functions); a bidirectional peripheral port; and a 32-character special graphics set.

Teleray's Series 10 consists of three models: Models 10, 11, and 12. The Model 10 is a single-page editing terminal with a function memory of 527 characters (32 functions). Model 11 is an APL/ASCII terminal, featuring true APL overstrike. Model 11 features a programmable function memory of just over 500 characters (32 functions). The Model 12 features a 7500-character programmable function memory with 32 functions. A 48-line display memory is included, with a 24-line rolling display window. In addition, if more than 48 lines of memory are needed for ▷

A family of stand-alone editing/formatting terminals, available in a variety of enclosure styles and with a choice of 12- or 15-inch display screens.

A significant feature provided by these units is a function storage buffer, which can be used to store up to 32 multiple-character, user-defined functions such as text, forms, and control sequences. The buffer capacity is 7500 characters on Model 12, 880 characters on Model 100, and 527 characters on Models 10 and 11.

Single-quantity prices range from $1,150 for the Model 10 to $1,945 for the Model 100. Quantity discounts and leasing plans are available.

CHARACTERISTICS

VENDOR: Teleray Division of Research Inc., Box 24064, Minneapolis, Minnesota 56424. Telephone (612) 941-3300.

DATE OF ANNOUNCEMENT: Model 10—August 1978; Model 11—April 1979; Model 12—July 1979; Model 100—October 1980.

DATE OF FIRST DELIVERY: Model 10—September 1978; Model 11—July 1979; Model 12—September 1979; Model 100—December 1980.

NUMBER DELIVERED TO DATE: Over 10,000.

CONFIGURATION

All Teleray terminals are microprocessor-based stand-alone display terminals. Four models are currently available:

● **Model 10**—a Teletype-compatible editing/formatting terminal with a single-page display memory, plus a 527-character function storage buffer that can be used to store up to 32 multiple-character user-defined functions, such as text, forms, and control sequences.

● **Model 11**—an APL/ASCII (keyboard-switchable) version of the Model 10.

● **Model 12**—an enhanced version of the Model 10 that features a two-page display memory and an expanded 7500-character function storage buffer.

● **Model 100**—a 132-column terminal offering DEC VT100, VT132, and VT52 compatibility. An 880-character function storage buffer is included.

All models can be equipped with 12- or 15-inch CRTs, with characters displayed in white, green, or amber. Teleray also offers the following enclosure styles:

● **Style E**—a molded plastic case with a 12-inch tilt-screen and a detached keyboard; includes numeric pad. Available on Models 10 and 100 only. ▶

▷ editing purposes, a feature called "parking memory" is available. Using this feature, the operator can "park" excess memory (over 90 lines) in function memory for processing at a later time.

All Series 10 terminals can be equipped with the 12- or 15-inch screens, with display capacities of 24 lines by 80 (standard) or 40 (double-wide) characters. Other standard features for the Series 10 units include: character or block mode transmission; monitor mode; insert/delete character/line; video attributes, including protect, dim, blink, underline, and reverse video (in any combination); and independent I/O and peripheral speeds. Data General Dasher, Microdata Prism, or DEC VT52 emulation is optional for Model 10.

Teleray terminals include snap-in/snap-out modules for ease of service. A toll-free service line is available for help in isolating the causes of terminal failures. Replacement modules can then shipped to replace the faulty part.

USER REACTION

Datapro's 1981 survey of alphanumeric display terminal users yielded no responses on the Teleray display terminals. However, in the previous year's survey, a total of five users reported on their experiences with an installed base of some 45 Model 10 terminals. Since these models are still active products, we present their ratings in the following table:

	Excellent	Good	Fair	Poor	WA*
Overall performance	3	2	0	0	3.6
Ease of operation	1	4	0	0	3.2
Display clarity	2	2	0	1	3.0
Keyboard feel & usability	2	2	1	0	3.2
Hardware reliability	3	2	0	0	3.6
Maintenance service	2	2	0	0	3.5
Technical support	1	2	0	0	3.3

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

One user did not rate maintenance, and two users declined to give a rating for technical support. Three of the five users represented academic institutions. Data entry (3 users), text editing (4 users), and program development (4 users) were mentioned as the primary applications for the Teleray units.□

▶ • Style L—a smaller version of the E case; a wall-mount bracket is optional. Available on Models 10 and 100 only.

• Style M—a metal case with a 12-inch screen and detached keyboard; includes numeric pad. Available on all models.

• Style N—an injection molded plastic case with a 12-inch screen and detached keyboard; includes numeric pad. Available on all models.

• Style NN—same as Style N, but includes 15-inch display. Available on all models.

• Style R—a rack-mount configuration with a 12-inch screen and detached keyboard; includes numeric pad. Available on Models 10, 12, and 100 only.

• Style S—a molded plastic case with a 12-inch tilt-screen and an attached keyboard. Available on Model 10 only.

• Style T—a molded plastic case with a 12-inch tilt-screen and an attached keyboard; includes numeric pad. Available on all models.

TRANSMISSION SPECIFICATIONS

Transmission is asynchronous in the half- or full-duplex mode at any of 15 selectable data rates from 50 to 9600 bps on Models 10, 11, and 12, and 50 to 19,200 bps on Model 100. The data rate is switch-selected, but can be changed by an keyed escape sequence; the rate reverts back to the switch-selected speed at power-up or when terminal functions are reset of initialized. The 10- or 11-unit, 8-level ASCII code is used. Odd or even parity generation and checking can be enabled or disabled. When disabled, 7- or 8-level ASCII is selectable; the 8-level code includes a mark ("1") bit in the 8th bit position. The terminal is equipped with an RS-232-C interface. A 20mA dc current loop interface is optional.

DEVICE CONTROL

Basic terminal functions include full cursor control (up, down, left, right, return, and home), cursor sensing and addressing, new line, right margin wraparound, keyboard lock, and end-of-line bell.

Data can be transmitted character-by-character as it is keyed or in Block mode. Block mode can be selected for a line, partial line, message, page, or partial page. A portion of text can be transmitted as a message.

Data can be displayed in Scroll or Page mode. In Scroll mode, all displayed data is moved up by one line when attempts are made to move the cursor below the bottom line. In Page mode the cursor wraps from the bottom line to the top line, which is overwritten.

Data can be designated as protected, and highlighted by any combination of dimming, blinking, underlining, or reverse video field attributes. It can also be blanked for security (in lieu of blinking).

Editing functions include character insertion and deletion and line insertion and deletion.

Tabulation functions on all models except Model 12 permit up to 16 tab stops to be set. On Model 12, tab stops are automatically preset at every eighth column on power-up; alternatively any number of tab stops may be set manually from the keyboard for any column positions (operator-set tabs clear and the present tabs reset automatically upon power-off). All or any individual tab stop can be cleared. Tabulation can be performed forward or backward from the keyboard.

Clear functions include clear page, clear-to-end-of-line, and clear-to-end-of-page. Model 12 also provides clear memory and clear-to-end-of-memory functions.

The terminal operates in two display modes, Normal and Wide. In Wide mode, the initial 40 characters (66 characters on the Model 100 in 132-column format) of each line are displayed at double their normal width. However, the display memory still contains 80 characters (or 132 character on the Model 100) per line and all wrap and cursor positioning functions are performed accordingly.

The Monitor permits display of the 32 ASCII control codes as data. In this mode, the display can be used as a line monitor and also allows entry of control characters into the display memory for subsequent block transmission. ▶

Teleray Series 10 and
Model 100 Display Terminals

▶ A function storage buffer with a total memory capacity of 7500 characters (Model 12), 880 characters (Model 100), or 527 characters (all other models) is provided for storage of up to 32 variable-length multiple-character user-defined function sequences. The functions can be used to store text, forms, control sequences, escape sequences, answerback messages, etc., and may even be used to call other function sequences.

The peripheral port is controlled by keyed or received control codes; data can also be transferred as a block by the Print function key.

COMPONENTS

CRT DISPLAY UNIT: All Teleray Models can be equipped with a 12-inch or 15-inch (diagonally measured) CRT display. Two display formats are available on the Series 10 Models: 24 lines of 80 characters (standard size characters), and 24 lines of 40 characters (double wide characters). The Model 100 features display formats of 24 lines by 80 or 132 normal size characters, and 24 lines of 40 or 66 double size characters. The character set consists of 128 displayable ASCII symbols, including upper and lower case alphabetics, numerics, specials, and control codes (double-alpha symbols). Model 11 also displays the 95-character APL Set including true APL overstrikes, and supports "instant replay" of the composite character's components. Each character is formed via a 7-by-9 dot matrix plus true lower case descenders (8-by-11 dot matrix for APL characters) within a 10-by-12 dot character cell. The cursor is displayed as a blinking block character. Characters are displayed in white; green or amber characters are optional.

KEYBOARD: A 97-key, typewriter-paired, detached keyboard. The main keygroup includes individual cursor control keys, four program function keys (shiftable for control of a total of eight functions), and 22 edit/control/mode keys. A separate cluster to the right of the main keygroup includes a 12-key numeric pad and six additional control/mode keys. The keyboard can generate any of 128 ASCII character codes. The Model 11 keyboard provides for keyboard selection of the 95 APL character codes, including true APL overstrikes, as an alternate to the ASCII character set. A caps lock key is provided on all models for Teletype compatibility. N-key rollover and auto repeat are provided for all keys. Other character sets and key arrangements are

available, including two attached keyboards (with and without the numeric pad).
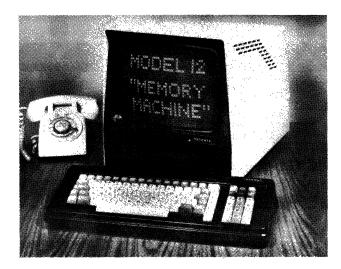
PRICING

Teleray display terminals are available for purchase only. Quantity discounts are available for OEM and end-user purchases.

The Teleray terminals are designed to facilitate easy and rapid self-servicing via snap-out components replaceable by spares. A 90-day warranty that includes priority factory exchange of all defective parts or units is provided. Warranty extensions are also available; contact Teleray for pricing.

	Purchase Price
Model 10:	
10 L	$1,150
10 N, M, E, S, T	1,195
10 NN	1,395
10 R	1,470
Model 11:	
11 N, M, T	1,595
11 NN	1,795
Model 12:	
12 N, M, T	1,695
12 NN	1,895
12 R	1,970
Model 100:	
100 L	1,695
100 N, M, E, T	1,745
100 NN	1,945
100 R	1,945
Options:	
Data General Dasher emulation (Model 10 only)	110
Microdata Prism emulation (Model 10 only)	110
DEC VT52 emulation (Model 10 only)	140
20mA Current Loop interface	60
Green screen CRT (12-inch)	10
Amber screen CRT (12-inch)	10
Amber screen CRT (15-inch, NN-style only)	15
Composite Video (Model 100 only)	30
N-style Tilt Mounting Base	49
L-style Wall-Mount Bracket	40■

Teleray Series 10 Display Terminals

The high-end of the Series 10, Model 12, provides a special "parking memory" for storage of up to 7500 characters of display data (in addition to its 3840-character display memory). The parking memory can also be used to store up to 32 user-defined functions, such as text, forms, and control sequences.

A family of stand-alone editing/formatting terminals. Various models provide a choice of standard, "front office", or rack-mounted casing; ASCII or APL/ASCII character sets; single- or multiple-page display memory; and DEC VT52, Data General Dasher, or Microdata Prism emulation.

An unusual and potentially powerful feature provided by these units is a function storage buffer, which can be used to store up to 32 multiple-character, user-defined functions such as text, forms, and control sequences. The buffer capacity is 7500 characters on Model 12 and 527 characters on all other models.

Single-quantity prices range from $1,190 for the Model 10 to $1,690 for the Model 12. Quantity discounts and leasing plans are available.

MANAGEMENT SUMMARY

The Teleray Series 10 is a family of three low-cost, microprocessor-based modular display terminals designed especially for ease of user maintainability. The Series' predecessors are Teleray's Models 1061 and 4041, two Teletype-compatible terminals packed with features that include support for formatted data entry applications. Modular construction, a key feature of the Teleray terminals, facilitates quick access and easy replacement of each of the terminal's four major components (keyboard, display, logic board, and power supply) without the use of tools. It also allows the customer to mix-and-match the basic terminal with various cabinet styles and keyboard options. Each Series 10 terminal is equipped with a serial I/O interface; Teleray offers a Teletype unbuffered Model 43 RO printer or its own Teledisk minidiskette drive as peripherals for use with the Series 10. Teleray also offers a 300-bps acoustic coupler (a Multi-Tech FM 30).

One outstanding feature available on Models 10 and 12 that provides significant operating flexibility is the function storage buffer, which Teleray calls its "parking memory". This buffer, which will accept and store up to 32 multiple-character variable-length user-defined function sequences, can be used to hold "excess" display data for editing. Total buffer capacity is 527 characters on Model 10 and 7500 characters on Model 12. This effectively increases the Model 12's data capacity from two to more than five pages. The buffer can also be used to store forms, text, messages, control sequences, and other user-defined functions. $\triangleright$

CHARACTERISTICS

DATE OF ANNOUNCEMENT: Model 10—August 1978; Model 11—April 1979; Model 12—July 1979.

DATE OF FIRST DELIVERY: Model 10—September 1978; Model 11—July 1979; Model 12—September 1979.

NUMBER DELIVERED TO DATE: 10,000 (Model 10).

CONFIGURATION

The Series 10 currently consists of three microprocessor-controlled (MOS 6502) stand-alone display terminals that share identical monitor, keyboard, and power supply components but differ in control logic and, in some cases, keytops:

● Model 10—a Teletype-compatible editing/formatting terminal with a single-page display memory, plus a 527-character function storage buffer that can be used to store up to 32 multiple-character user-defined functions, such as text, forms, and control sequences.

● Model 11—An APL/ASCII (keyboard-switchable) version of the Model 10.

● Model 12—an enhanced version of the Model 10 that features a two-page display memory and an expanded 7500-character function storage buffer.

The Model 10's and 12's more sophisticated buffer control logic permits the contents of their buffers to be edited, effectively expanding the editing workspace of the Model 10 to 36 lines and of the Model 12 to 141 lines (a total of more than five pages). Although the Model 11 is also equipped with a 527-character buffer, it lacks the enhanced buffer control $\blacktriangleright$

Teleray Series 10 Display Terminals
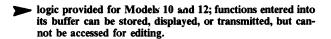
▷ **USER REACTION**

In October 1979, Datapro conducted telephone interviews with six users of the Teleray Model 1061 and Model 10 display terminals (the two models differ only in external packaging). The users, whose names were supplied by Teleray, reported on their experiences with a total of 108 Model 1061's and 9 Model 10's. Their ratings follow.

	Excellent	Good	Fair	Poor	WA*
Overall performance	4	2	0	0	3.7
Ease of operation	6	0	0	0	4.0
Display clarity	4	2	0	0	3.7
Keyboard feel & usability	3	2	1	0	3.3
Hardware reliability	4	2	0	0	3.7
Maintenance service	3	1	0	0	3.8
Technical support	6	0	0	0	4.0

*Weighted Average on a scale of 4.0 for Excellent.

These ratings indicate an exceptionally high degree of user satisfaction with the Teleray terminals. Five of those polled cited the low cost for the available features as a major advantage. Four others mentioned that ease of maintenance is a strength. As one user put it, the take-apart feature of the terminal makes maintenance so easy, "even a layman such as myself" can maintain it.

Only minor disadvantages were mentioned. One user stated that the keyboard keys stick on occasion. Another stated that the operator's manual was not as complete as it could be.□

▶ logic provided for Models 10 and 12; functions entered into its buffer can be stored, displayed, or transmitted, but cannot be accessed for editing.

Model 10 can also be equipped with an optional logic package that provides emulation of Digital Equipment's Model VT-52, Data General's Dasher, or Microdata's Prism terminals. Teleray's emulation of the VT-52 includes all features offered by DEC except the graphics option and split baud capability. Their emulation of the Dasher provides all features offered by Data General except the composite video option. Their emulation the Prism offers all features provided by Microdata. Other emulation packages are available from Teleray upon special order.

Each of the three models is available in any of five cabinet styles: Teleray's standard metal cabinet with detached keyboard; a decorator-styled plastic cabinet, with pedestal-mounted tiltable monitor and detached keyboard, that is lighter in weight, more compact, and available in five colors to match "front office" decors; a rack-mounted version; a style that includes a pedestal-mounted tiltable monitor and attached keyboard without the numeric pad; and a version with a pedestal-mounted tiltable monitor and attached keyboard with numeric pad.

An RS-232C serial asynchronous peripheral interface is standard. The data rate is normally the same as the transmission rate, but can be selected independently by keyed or received Escape sequences. Teleray provides Teletype 43 (unbuffered) RO printer or a Teleray Teledisk minidiskette drive for attachment to these terminals.

TRANSMISSION SPECIFICATIONS

Transmission is asynchronous in the half- or full-duplex mode at any of 15 selectable data rates from 50 to 9600 bits/second. The data rate is switch-selected, but can be changed by an keyed escape sequence; the rate reverts back to the switch-selected speed at power-up or when terminal functions are reset or initialized. The 10- or 11-unit, 8-level ASCII code is used. Odd or even parity generation and checking can be enabled or disabled. When disabled, 7- or 8-level ASCII is selectable; the 8-level code includes a mark ("1") bit in the 8th bit position. The terminal is equipped with an RS-232C interface. A 20 ma dc current loop interface and a separate 300-bps originate-only acoustic coupler (a Multi-Tech FM-30) are optional.

DEVICE CONTROL

Basic terminal functions include full cursor control (up, down, left, right, return, and home), cursor sensing and addressing, new line, right margin wraparound, keyboard lock, and end-of-line bell.

Data can be transmitted character-by-character as it is keyed or in Block mode. Block mode can be selected for a line, partial line, message, page, or partial page. A portion of text can be transmitted as a message.

Data can be displayed in Scroll or Page mode. In Scroll mode, all displayed data is moved up by one line when attempts are made to move the cursor below the bottom line. In Page mode the cursor wraps from the bottom line to the top line, which is overwritten.

Data can be designated as protected, and highlighted by any combination of dimming, blinking, underlining, or reverse video field attributes. It can also be blanked for security (in lieu of blinking).

Editing functions include character insertion and deletion and line insertion and deletion.

Tabulation functions on all models except Model 12 permit up to 16 tab stops to be set. On Model 12, tab stops are automatically preset at every eighth column on power-up; alternatively any number of tab stops may be set manually from the keyboard for any column positions (operator-set tabs clear and the preset tabs reset automatically upon power-off). All or any individual tab stop can be cleared. Tabulation can be performed forward or backward from the keyboard.

Clear functions include clear page, clear-to-end-of-line, and clear-to-end-of-page. Model 12 also provides clear memory and clear-to-end-of-memory functions.

The terminal operates in two display modes, Normal and Wide. In Wide mode, the initial 40 characters of each line are displayed at double their normal width. However, the display memory still contains 80 characters per line and all wrap and cursor positioning functions are performed accordingly.

The Monitor permits display of the 32 ASCII control codes as data. In this mode, the display can be used as a line monitor and also allows entry of control characters into the display memory for subsequent block transmission.

A function storage buffer with a total memory capacity of 7500 characters (Model 12) or 527 characters (all other models) is provided for storage of up to 32 variable-length multiple-character user-defined function sequences. The functions can be used to store text, forms, control sequences, escape sequences, answerback messages, etc. and may even be used to call other function sequences. ▶

Teleray Series 10 Display Terminals

On Model 10 and 12 only, contents of the buffer can be edited on the display, effectively expanding the Model 10's editing workspace from 24 to 31 lines, and the Model 12's workspace from 48 to 141 lines. Of the 32 function sequences, the first eight can be accessed through four shiftable dedicated program function keys; all 32 sequences can be accessed through escape sequences.

The peripheral port is controlled by keyed or received control codes; data can also be transferred as a block by the Print function key.

COMPONENTS

DISPLAY UNIT: A 12-inch CRT (diagonal measurement) with a viewing area 6.5 inches high by 8.5 inches wide. Data is displayed in white on a black background. The display arrangement is selectable at 24 lines of 80 characters each or 24 lines of 40 characters (double width characters) for a total display capacity of 960 or 1920 characters, respectively. The character set consists of 128 displayable ASCII symbols, including upper and lower case alphabetics, numerics, specials, and control codes (double-alpha symbols). Model 11 also displays the 95-character APL Set including true APL overstrikes, and supports "instant replay" of the composite character's components. Each character is formed via a 7-by-9 dot matrix plus true lower case descenders (8-by-11 dot matrix for APL characters) within a 10-by-12 dot character cell. Highlighting field modifiers include dual intensity, reverse video, blinking (or blanking), and underline. The cursor is displayed as a blinking block character.

KEYBOARD: A 97-key, typewriter-paired, detached keyboard. The main keygroup includes individual cursor control keys, four program function keys (shiftable for control of a total of eight functions), and 22 edit/control/mode keys. A separate cluster to the right of the main keygroup includes a 12-key numeric pad and six additional control/mode keys. The keyboard can generate any of the 128 ASCII character codes. The Model 11 keyboard provides for keyboard selection of the 95 APL character codes, including true APL overstrikes, as an alternate to the ASCII character set. A caps lock key is provided on all models for Teletype compatibility. N-key rollover and auto repeat are provided for all keys. Other character sets and key arrangements are available, including two attached keyboards (with and without the numeric pad).

PRICING

Teleray display terminals are available for purchase or on a 1-, 2-, or 3-year lease. Quantity discounts are available for OEM and end-user purchases. As of October 1, 1979, Teleray is selling to end-users exclusively through distributors, and prices shown below are therefore "manufacturer's suggested prices."

The Teleray terminals are designed to facilitate easy and rapid self-servicing via snap-out components replaceable by spares. A 90-day warranty that includes priority factory exchange of all defective parts or units is provided and can be extended to a full year for $80 (Model 10), $85 (Model 11), or $90 (Model 12). Second year warranty extensions are also available; contact Teleray for pricing. Two post-warranty "Super Service" plans are also provided: for $90 per occurrence, Plan I provides same-day shipment of a replacement for defective part upon receipt of a phone call from the customer, who returns the defective part when the replacement is received; for $70 per occurrence, Plan II provides for repair (or replacement) and reshipment of a defective part sent by the customer to the factory. Spare assemblies for all components are available from Teleray.

On-site, prime-shift maintenance service is available as an alternative to "Super Service" at customer sites up to 50 miles from Teleray service center. Maintenance for leased or purchased equipment located up to 25 miles from a Teleray service center is available for $20/month or $240/year for Model 10 and $30/month or $360/year for Models 11 and 12, respectively. Maintenance for leased or purchased equipment located up to 50 miles from a Teleray service center is available for $25/month or $300/year for Model 10 and $35/month or $420/year for Models 11 and 12, respectively.
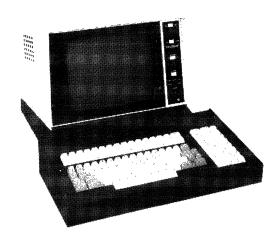
Monthly Charges*

	1-Year Lease	2-Year Lease	3-Year Lease	Purchase
Basic Terminal, including metal cabinet, detached keyboard, and I/O cable				
Model 10	$64	$56	$48	$1,190
Model 11	86	74	64	1,590
Model 12	95	84	72	1,690
Options				
Alternative Terminal Housing				
Molded plastic cabinet; detached keyboard; available on Model 10 only	5	4	4	100
Rack-mount housing; detached keyboard	—	—	—	280
Molded plastic cabinet; integral keyboard; available on Model 10 and 12 only	4	4	3	80
Molded plastic cabinet; integral keyboard with numeric pad	5	5	4	100
VT52 Adapter; for Model 10 only	8	6	4	95
Dasher Adapter; for Model 10 only	8	6	4	95
Prism Adapter; for Model 10 only	8	6	4	95
Current Loop	3	3	2	60
Printer Interface	22	18	15	375
Printer; Teletype 43 RO	80	65	55	1,235
Acoustic Coupler	15	13	11	230
Desk Stand; for metal cabinet	—	—	—	55

*Includes factory module exchange warranty only. On-site maintenance is available at a price of $20 to $35 per month, depending on model and distance from customer site to a Teleray service center.■

Teleray Model 4041 Display Terminal

A stand-alone, Teletype-compatible keyboard/display terminal loaded with features for point-to-point or multipoint operation.

Standard features include microprocessor control, two pages of display memory, paging, character or block transmission, 16 switch-selectable rates from 50 to 19,200 bps, upper and lower case alphabetics, addressable cursor, programmable tabulation, transparent mode, diagnostics, etc. Options include 4 or 8 pages of display memory, multipoint operation, a peripheral interface, full cursor control, full editing, format protection, 15 program function keys, etc.

The basic terminal sells for $1,750 or leases for $73 per month under a one-year lease (maintenance not included). Quantity discounts and extended lease terms are available.

MANAGEMENT SUMMARY

The Teleray Model 4041 is the first microprocessor-based display terminal to be produced by Teleray, which is well known for its family of Teletype-compatible display terminals that now includes five models. Model 4041 is equipped with an MOS Technology 6502 microprocessor, a virtual copy of the Motorola 6800 with a few basic enhancements. The terminal is available in a basic version with an attached keyboard or in an expanded version with a detachable keyboard. The expanded version is loaded with features that greatly extend the 4041's operating flexibility. These features support data entry via format protection and text editing.

The standard terminal (either version) is equipped with a two-page memory and provides paging. As an option, the user can specify a four-page or an eight-page memory; however, only one page is displayed at a time.

The basic version is equipped with a 61-key typewriter-style keyboard; a separate numeric keypad is optional. The expanded version adds a numeric keypad, full cursor controls, page controls, and full edit functions. No-cost options for the expanded version include a set of 15 program function keys and/or a set of 8 additional function keys required to create protected formats for data entry.

Designed as an asynchronous ASCII terminal for point-to-point operation, the 4041 is available with a polling option for multipoint operation. And, although emulation firmware is not provided, Teleray will customize its firmware to user specifications.

Salient features of the expanded version include:

● 16 switch-selectable data rates from 50 to 19,200 bps. ▷

CHARACTERISTICS

VENDOR: Teleray (a division of Research, Inc.) Box 24064, Minneapolis, Minnesota 55424. Telephone (612) 941-3300.

DATE OF ANNOUNCEMENT: April 1977.

DATE OF FIRST DELIVERY: June 1977.

NUMBER DELIVERED TO DATE: Over 100 units.

SERVICED BY: Western Union.

CONFIGURATION

A stand-alone, desktop keyboard/display terminal with or without a detachable keyboard. A peripheral interface is optional. The terminal can be daisy-chained via the optional composite video output.

TRANSMISSION SPECIFICATIONS

Transmission is asynchronous in the half- or full-duplex mode at the following operator-selectable speeds: 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, and 19,200 bits/second. The 8-level, 10- or 11-unit ASCII code is used. Odd or even parity, marking, or spacing is switch-selectable. Character parity is checked and transmitted when enabled, and an error symbol is displayed for a detected parity error. The terminal is equipped with an RS-232C interface; a 20 ma dc current loop interface is optional. Multipoint operation is optional; the Polling option provides 128 discrete addresses.

DEVICE CONTROL

Terminal control is performed by a microprocessor (MOS Technology 6502) under the direction of firmware that resides in 3K or 6K (optional) bytes of ROM or PROM. The standard terminal contains a 4K-byte RAM display memory ▶

Teleray Model 4041 Display Terminal

▷ ● Character, line, or block transmission.

● Cursor addressability.

● Full cursor control.

● Format protection for data entry applications.

● Full edit capability.

● Tabulation between programmable tab settings or unprotected fields.

● Display of control codes (transparency) via representative special symbols.

● Paging, forward or backward.

● Storage for up to 8 full 1920-character pages.

● Display and keyboard operation of upper case-only or upper and lower case ASCII characters via switch selection.

● Repeatable keys.

● A 1920-character screen.

● Dual intensity, blinking and reverse video highlighting features.

● Self-test diagnostics.

● Numeric pad.

● RS-232C or 20 ma dc communications interface.

● RS-232C or 20 ma dc peripheral interface with 16 independently switchable speeds (supports a user-supplied I/O device such as a printer or cassette tape or diskette drive).□

► for storage of two displayable pages (48 lines of 80 characters each); a four-page (96 lines of 80 characters) or eight-page (142 lines of 80 characters) display memory is optional.

Transmission can be performed on a character-by-character basis as each character is keyed or on a block basis where a partial or complete line, partial or complete page, or complete memory contents is transmitted following composition and editing.

The terminal responds to keyed or received control codes including carriage return, line feed, space, backspace, tab, back tab, and device on/off. All other terminal functions respond to received Escape sequence commands.

Operating modes include On/Off-Line and Transparent. In the On-Line mode, the terminal is connected to the communications line; the Off-Line mode is used for data entry/editing and I/O functions. In the Transparent mode, the terminal ignores all control codes and displays their equivalent symbols.

Cursor control with the standard keyboard is limited to space, backspace, return, and line feed functions. The optional edit keyboard features full cursor controls that position the cursor left, right, up, down, or home. Automatic cursor wraparound is provided for the left margin, but is switch-selectable for the right margin. Automatic new line is also switch-selectable. The standard cursor is character-addressable.

The edit keyboard also provides tabulation, edit, print, and transmit functions. Tab functions include tab, back tab, and tab set. Edit functions include character and line insert and delete, and erase functions including clear page, clear to end-of-page, and clear to end-of-line. A local print function transfers display data to an external I/O device. Transmit functions permit one line, or up to the complete memory contents, to be transmitted. STX and ETX keys permit the operator to define the message segment. Blanks are automatically suppressed at the end of each line.

Limited paging is provided with the standard keyboard; the operator can step to the next page and sequence back to the first. The edit keyboard provides both forward and backward page stepping. Paging and/or memory wraparound can be disabled.

An optional set of function keys, available at no extra cost with the edit keyboard, provide additional erase, format protection, and highlighting functions. Erase functions permit memory erasure between the cursor and end of memory, complete memory erasure, and line erasure between the cursor and end of the line. Format protection is provided by three functions—Protect Enter, Protect Leave, and Protect Set. A fixed format can be keyed, edited, and frozen in memory for later use. Automatic tab stops are established for every entry field. Highlighting functions include blink and reverse video.

An optional set (no extra cost with edit keyboard) of 15 Program Function keys transmit application program defined codes when keyed.

An audible alarm sounds when the 72nd character is keyed or a Bell code is received.

A ROM- or PROM-resident diagnostic routine produces a series of test patterns as it checks terminal operation. The operator is alerted to terminal malfunctions via status lights. Also, three programmable status lights are provided.

The keyboard can be locked in the upper-case only mode.

The data transfer rate of the optional peripheral interface is independently switch-selectable. The same 16 speeds provided for the communications interface are also provided for the peripherals interface.

COMPONENTS

CRT DISPLAY UNIT: A 12-inch (diagonal measurement) CRT with a display arrangement of 24 lines of 80 characters each for a total display capacity of 1920 characters. The character set consists of 128 ASCII symbols including upper and lower case alphabetics, numerics, and special symbols, and control codes. Each character is formed via a 7-by-9 dot matrix. Data is displayed in white. Highlighting features include dual intensity, blinking, and reverse video (black on white). Any combination of highlighting can be used.

KEYBOARD: The standard terminal contains an integral typewriter-style keyboard with optional numeric pad. A detachable edit keyboard is optional and includes numeric pad, cursor control pad, and edit keys. Edit keyboard options include a row of 15 program function keys and a set of 8 program control keys. Either keyboard can generate 128 ASCII character codes. Basic key functions include Return, Line Feed, Space, Back Space, Break, Escape, Tab, Caps ►

Teleray Model 4041 Display Terminal

➤ Lock, Delete, Shift, Control Shift, and Shift Lock. All keys are repeatable when held depressed. Additional key functions provided by the edit keyboard include Clear Page, Clear EOP, Clear EOL, Delete Line, Insert Line, Delete Character, Insert Character, STX, ETX, Print, Xmit Line, Xmit Page, Next Page, Previous Page, Tab Set, Back Tab, Tab, and individual cursor controls. The additional set of eight key functions includes Clear EOM, Clear Memory, Clear Line, Enter Protect, Leave Protect, Protect Set, Blink Set, and Inverse Set (reverse video).

PRICING

The Teleray 4041 is available for purchase or lease. Lease terms are available for six months or one, two, or three years. A separate maintenance contract is available for leased or purchased equipment. Quantity discounts are available for purchased equipment.

| | | | | | | Quantity Purchase Prices | | | |
| | Monthly Cost* | | | | 1-9 units | 10-19 units | 20-49 units | 50-99 units | 100-199 units |
	6 Mo.	1-Year	2-Year	3-Year					
Teleray 4041 (basic unit)	102	73	69	62	1,750	1,680	1,610	1,480	1,405
Teleray 4041 (with edit keyboard)	112	80	75	67	1,910	1,840	1,770	1,640	1,565
Polling	6	4	4	2	100	90	85	80	75
Memory; 4 pages	6	4	4	2	100	90	80	70	65
Memory; 8 pages	36	24	18	12	600	580	560	540	525
Current Loop Interface (20 ma dc)	3	2	2	1	50	45	40	35	30
Peripheral Interface (RS-232)	3	2	2	1	50	45	40	35	30
Peripheral Interface (20 ma dc)	6	4	4	2	100	90	80	70	65
Composite Video Output	3	2	2	1	50	45	40	35	30

*Monthly cost does not include maintenance; contact vendor for maintenance cost.■