

# TeleVideo Display Terminals

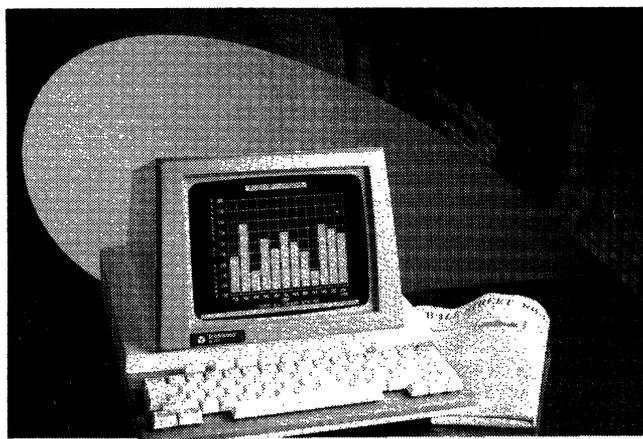
## MANAGEMENT SUMMARY

**UPDATE:** *Since our last report, TeleVideo has discontinued the sale of several of their older terminal models. Included in this report are specifications and pricing information on the models currently being offered.*

TeleVideo Systems began commercial shipping of video display terminals in March 1979. For the following five years they managed to surpass the top market competitors (Applied Digital Data Systems, Lear Siegler, and Esprit Systems) to place number one as an independent terminal supplier. Their success in the terminal market has been attributed to a variety of factors, including off-shore manufacturing of subassemblies, modular components, strict quality control, and aggressive marketing and distribution. Fueled by its success in the terminal business, TeleVideo quickly expanded its operations into the microcomputer market, first with single- and multiuser CP/M units, then with its diskless Personal Mini, and finally with a family of IBM PC-compatible machines.

After some initial success in the microcomputer market, TeleVideo has fallen on hard times. From the fourth quarter of 1984 into the third quarter of 1985, the company announced quarterly losses. TeleVideo has responded to this loss by cutting back staff and consolidating operations into its headquarters, and closing some existing facilities. While much of the blame for these setbacks has been attributed to TeleVideo's problems competing in the PC-compatible market, the company has also cited price and product performance pressure from its competitors in the terminal market.

To counteract these difficulties, TeleVideo Systems signed a 5-year joint marketing accord with Ambi Corporation in September 1985. Ambi is a manufacture of intergrated ▶



*TeleVideo's new Model pT100 is a Digital VT100 emulator that sells for \$499 (list price). The pT100 features a 9-inch display screen with a 24-line by 80-character format and attached keyboard. This model also features 14 programmable function keys, 18 Digital-compatible application keys (9 shifted), and 32 Digital-compatible graphics characters.*

Founded in 1975, TeleVideo Systems, Inc., initially manufactured monitors for video games. In 1979 they began designing, manufacturing, and marketing a line of communications products which now includes video display terminals, high performance, single-user, and multi-user computer systems, file servers, and daisywheel printers. The company's display terminal product line features compatibility with both the general purpose ASCII and the ANSI/Digital Equipment Corporation markets. The most recent addition to the TeleVideo product line is the Model pT100, a Digital VT100 compatible terminal.

**MODELS:** 905, 955, 9220, pT100.

**DISPLAY:** Models 905, 955, and 9220 feature 14-inch screens; Model pT100 features a 9-inch screen. All models feature a 1,920-character display capacity; Models 955 and 9220 also have 132-column display capability. All models except the pT100 offer a tilt/swivel display.

**KEYBOARD:** Model pT100 includes an attached keyboard; all other models feature detachable keyboards. All keyboards have a typewriter-style layout with a low-profile design.

**COMPETITION:** Applied Digital Data Systems (ADDS), Esprit Systems, Visual Technology, Wyse Technology, Liberty Electronics, ITT Qume, and several others. TeleVideo also competes in the Digital Equipment Corporation-compatible market with Models 9220 and pT100.

**PRICE:** Prices range from \$409 to \$1,129; the pT100 is currently priced at \$499.

## CHARACTERISTICS

**VENDOR:** TeleVideo Systems, Inc., 550 East Brokaw Road, P.O. Box 6602, San Jose, CA 95150-6602. Telephone (408) 971-0255.

**DATE OF ANNOUNCEMENT:** Model 955—April 1985; Model 905—July 1985; Model 9220—1985; Model pT100—April 1986.

**DATE OF FIRST DELIVERY:** Model 955—1985; Model 905—1985; Model 9220—1985; Model pT100—1986.

**NUMBER DELIVERED TO DATE:** Over 750,000 (all models). ▶

## TeleVideo Display Terminals

▷ voice/data terminals. Under this agreement TeleVideo will manufacture and sell the AmbiSet IVDT and future Ambi products, and Ambi will buy its hardware from TeleVideo, as well as resell TeleVideo products. This venture opens a new channel of revenue for TeleVideo and is said to be only the beginning of a series of strategic moves being made by the company.

TeleVideo's display terminal product line now consists of four models, which provide the user with a variety of functions and capabilities. Two models are designed for the general-purpose ASCII market; in addition, TeleVideo has introduced two models that offer compliance with the ANSI X3.64 standard for communications, the Digital Equipment Corporation VT220-compatible Model 9220, and the newest TeleVideo terminal, the Digital VT100-compatible Model pT100.

All four models represented here are considered to be in the low-end category. The 955, 905, and 9220 feature improved ergonomics, a 14-inch, tilt/swivel display, and detached keyboard. The 905 and 9220 incorporate block mode transmission and all three units include editing capabilities. Graphics characters are also included on each model.

The pT100 features a compact, space-saving design; it includes a 9-inch display and attached keyboard. Also included are a full range of visual attributes and Digital-compatible graphics characters.

The pT100 is targeted for the executive's desk, and is designed for information retrieval from an organization's internal computer or from a commercial data base. The unit is portable, measuring 9½ inches high by 12½ inches wide by 15 inches deep and weighing approximately 14 pounds. A soft carrying case is optionally available.

Graphics models of the 955 and 9220 are available. These units feature Tektronix 4010/4014 graphics capabilities plus native graphics mode. A green CRT is available on the 955 and amber on the 9220.

### COMPETITIVE POSITION

TeleVideo Systems was founded in 1975, and began commercial deliveries of its first display terminal models (Models 912/920) in 1979. Within a year's time, TeleVideo ranked first in commercial deliveries among all independent display terminal vendors, having overtaken the traditional leaders in that market: Applied Digital Data Systems (ADDS), Lear Siegler, and Esprit Systems (formerly Hazeltine's terminal division). This status was enjoyed for the following five years. Key factors in TeleVideo's rapid rise to the top of the industry include the company's large distributor network and mass production techniques that combine offshore manufacturing of subassemblies with domestic manufacturing of printed circuit boards prior to final assembly in Sunnyvale, CA. and Puerto Rico.

However, recently TeleVideo has found its competitive position in the display terminal market slipping. As we mentioned previously, the company reported substantial

▷ **SERVICED BY:** General Electric Co., Instrumentation and Communication Equipment Service shops.

### MODELS

TeleVideo's display terminals are microprocessor-controlled, standalone units. Four models are currently available:

- **Model 955**—a smart ASCII terminal with 14-inch green or amber CRT; 80 or 132 columns; two sets of 32 (64) programmable function keys; up to four pages of memory (at 132 columns); communications options. The 955 is also available as a graphics terminal with Tektronix 4010/4014 compatibility plus native graphics mode; green CRT.
- **Model 905**—a smart ASCII terminal with 14-inch green CRT; high resolution 80-column display; 16 programmable, nonvolatile function keys; WordStar mode. Compatible with TeleVideo 925 and 910, Lear Siegler 3A/5A, Hazeltine 1410/1500, ADDS A2, and QVT 101. Ten-key accounting-style keypad; standard buffered printer port.
- **Model 9220**—a smart ANSI/Digital-compatible terminal with 14-inch tilt/swivel screen and detached keyboard featuring 30 programmable function keys. Code compatible with the Digital VT220, VT100, and VT52. The 9220 is also available as a graphics terminal with Tektronix 4010/4014 compatibility plus native graphics mode; amber CRT.
- **Model pT100**—a compact, smart ANSI terminal with 9-inch screen and attached keyboard; 14 programmable function keys with status line labels; password-protected user access; full range of visual attributes. Compatible with the Digital VT100 and VT52.

### TRANSMISSION SPECIFICATIONS

Transmission is asynchronous, in half- or full-duplex at switch-selectable rates up to 19,200 bps (up to 38.4 on the 955); 7- or 8-bit data word structure is used, and odd, even, mark, space, or no parity can be selected. An RS-232-C port is standard on all models; a 20 ma current loop interface is also available for the 9220 and is optionally available along with an RS-422 port for the 955. An auxiliary RS-232-C printer port is standard on all models. TeleVideo terminals conform to the X-on/X-off and DTR communications protocols. Models 9220 and pT100 also conform to the ANSI X3.64 standard for control codes.

### DEVICE CONTROL

Cursor functions include up, down, left, right, and home. The cursor appears as block or underline, blinking or steady; the cursor is also addressable, for use with the optional additional page (or pages) of memory.

Editing functions include clear screen, character typeover, clear unprotected positions, character insert and character delete, line insert and line delete, erase and erase to end of page. Line/character insert/delete is available on all models except the Model pT100.

A protect mode is available on the 905 for designating protected fields. In protect mode, those character positions designated as protected (lower intensity) cannot be modified. The cursor cannot enter a protected field, and will be advanced through that field to the next unprotected position.

Forward and back tabs are set using columns of protected characters in protect mode. Typewriter-style tabs are offered when not in protect mode. Up to 80 tab positions may be set without loss of character location.

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▶ losses in the fourth quarter of 1984 and a 39 percent decrease in net sales by its fiscal third quarter of 1985. During TeleVideo's period of declining sales, its competitors have all been active in their attempts to increase their market shares. Add to them a number of newer entrants that have enjoyed success, like Wyse Technology, ITT Qume, Liberty Electronics, and Visual Technology, and one can see that the competition in this market is intense. The trend continues toward more functionality and features for less money, with no end in sight. The low-end price for smart terminals has reached the \$200 level, putting more pressure on margins. The signing of a 5-year joint marketing accord with Ambi Corporation, and purchase of slightly less than 10 percent of Ambi stock lead us to believe that TeleVideo has no plans to be eliminated as a viable contender in the display terminal market.

### ADVANTAGES AND RESTRICTIONS

TeleVideo currently offers a product line of low-end, general-purpose ASCII terminals and ANSI/Digital-compatible terminals. It has consistently attempted to improve upon its offerings, particularly in the area of ergonomics. The agreement with Ambi could prove to be a lucrative one should the market for voice/data terminals blossom as anticipated. Hence, these products would be made available by TeleVideo, a company known for its product integrity. Although TeleVideo offers graphics capabilities on their 955 and 9220, a color display has yet to be introduced.

### USER REACTION

In Datapro's 1986 Terminal Users Survey, conducted in conjunction with *Data Communications* magazine, a total of 30 users of TeleVideo display terminals responded. These users represent an installed base of 2,461 units. The users were asked to rate their terminals with respect to seven specific categories. Their responses are summarized in the following table.

	Excellent	Good	Fair	Poor	WA*
Overall performance	7	15	7	0	3.0
Ease of operation	13	14	2	1	3.3
Display clarity	7	18	4	1	3.0
Keyboard feel & usability	5	18	3	4	2.8
Ergonomics	5	15	5	5	2.7
Hardware reliability	12	7	5	2	3.0
Maintenance service/ technical support	9	8	7	5	2.7

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

When asked whether or not they would recommend TeleVideo display terminals to other users, 19 users responded that they would, while only 6 stated that they would not. The remaining users were undecided. The users were also asked which of the following factors *most* influenced their decision to purchase TeleVideo displays: features/functionality, vendor recognition/loyalty, price, or other factors. The users were split almost evenly between price (48 percent) and features/functionality (44 percent). □

▶ Both blinking and blank fields can be designated over areas of the display. In areas that are blanked, characters are still entered into display memory. Visual attributes, selectable on a character-by-character basis, include blink, blank, underline, half-intensity, and reverse video. The pT100 also provides bold and double-high/double-wide characters; the 905 and 955 offer line/page, and the 955 also offers embedded and nonembedded fields.

Character mode transmission can be accomplished in half- or full-duplex. In half-duplex, the terminals send and receive data in only one direction at a time. Characters are displayed on the screen and transmitted to the computer at the same time that they are typed from the keyboard. In full-duplex, the terminal sends and receives data simultaneously. Typed characters are echoed from the computer back to the terminal.

Data can also be sent and received in complete blocks using the 905 and 9220. Data up to a full screen can be entered by the operator. In block mode, characters are stored and displayed, but not transmitted until a special code sequence is received by the terminal. The edited data can be transmitted partially or completely.

Native graphics capability with Tektronix 4010/4014 compatibility is available on the 955 and 9220.

### COMPONENTS

**CRT DISPLAY UNIT:** The 955, 905, and 9220 all feature 14-inch diagonally measured, non-glare display screens. Touch-tilt and swivel capability is offered on these three models. The display capacity is 1,920 characters arranged in 24 lines by 80 columns each; 32 columns are available on the 955 and 9220. A 25th status line is offered on each model and 26th label line on the 955. The 905 and 955 also offer a screensaver feature. The screen switches off after 15 minutes of inactivity on the 905 and after 5, 10, or 15 minutes of inactivity on the 955. The pT100 features a 9-inch, nonglare, yellow-green phosphor with timeout screensaver. Characters are displayed in a 24-line by 80-column format with a 25th status line. Characters are formed in a 5-by-7 dot matrix with descenders in a 7-by-10 cell on the pT100 and a 7-by-9 dot matrix on the 905, 955, and 9220.

The 128-character ASCII set is displayable on the 905, 955, and 9220; a 96 character ASCII set is displayable on the pT100; 32 Digital-compatible special graphics characters are also available on the pT100; 128 graphics characters on the 955, and 16 thinline graphics characters on the 905. Digital-compatible graphics characters are also available on the 9220. The 9220 offers 15 set-up-selectable international sets; program-selectable ASCII, Digital supplemental, U.K., graphics and soft font sets, plus individual keyboard character composition.

All models except the pT100 feature a detached, typewriter-style keyboard with an accounting-style numeric keypad. In addition, the 905 features 16 nonvolatile programmable function keys; the 955 features two sets of 32 nonvolatile programmable function keys; and the 9220 features 30 nonvolatile programmable function keys (15 shifted), as well as N-key rollover with ghost-key lockout. The pT100 has no numeric pad; however, it features 74 full-sized keys, 14 nonvolatile programmable function keys, 2-key rollover, 3-key lockout, and 18 Digital-compatible application keys. ▶

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### ► PRICING

The TeleVideo terminals are available for purchase only, through authorized TeleVideo distributors. Quantity and OEM discounts are available.

Service is available nationwide through the General Electric Instrumentation and Computer Centers. TeleVideo also provides its own Technical Support Staff to answer customer questions.

### EQUIPMENT PRICES

955		629
905		409
9220		619
pT100		499
955	Graphics Terminal	1,129
9220	Graphics Terminal	1,129
955	Memory expansion (3/4 pages)	80
955	Memory expansion (2,3,4 pages)	120
955	RS-422 interface	100
955/905	Current loop interface	50
pT100	Carrying case	69 ■

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## MANAGEMENT SUMMARY

Having begun commercial deliveries of their first display terminal models in March 1979, TeleVideo Systems rapidly became the number one independent supplier of video display terminals, passing established terminal vendors such as Lear Siegler, Applied Digital Data Systems (ADDS), and Esprit Systems (then Hazeltine). The company has averaged shipments in the 125,000-unit vicinity each year. TeleVideo's success in the terminal market has been attributed to a variety of factors, including off-shore manufacturing of subassemblies, modular components, strict quality control, and aggressive marketing and distribution. Fueled by its success in the terminal business, TeleVideo quickly expanded its operations into the microcomputer market, first with single- and multiuser CP/M units, then with its diskless Personal Mini, and finally with a family of IBM PC-compatible machines.

After some initial success in the microcomputer market, TeleVideo has fallen on hard times. Recently, the company announced a \$7.9 million loss in the fourth quarter of 1984, its first quarterly loss ever. TeleVideo has responded to this loss by cutting back staff and consolidating operations into its headquarters, closing some existing facilities. While much of the blame for these setbacks has been attributed to TeleVideo's problems competing in the PC-compatible market, the company has also cited price and product performance pressure from its competitors in the terminal market.

TeleVideo's display terminal product line now consists of eleven models, which provide the user with a variety of functions, capabilities, and housing designs. All models are designed for the general-purpose ASCII market; in addition, TeleVideo has introduced two models that offer compliance with the ANSI X3.64 standard for communications, the DEC VT100-compatible Model 970, and the



*TeleVideo's new Model 922 is a DEC VT220 emulator that sells for \$995 (list price). The 922 features a 12-inch display screen with 80-/132-column display capability. The keyboard is detachable, has a low-profile design, and boasts some key layout improvements over the DEC VT220 keyboard.*

Since its first shipments of terminals began in 1979, TeleVideo has become the number one independent supplier of video display terminals, with an average of over 125,000 units shipped per year. The company's display terminal product line features models with a wide variety of functions, capabilities, and enclosure styles, all at some of the industry's lowest prices. The most recent addition to the TeleVideo product line is the Model 922, a DEC VT220 emulator.

**MODELS:** 910, 910 Plus, 914, 921, 922, 924, 925, 925E, 950, 970, and the Personal Terminal (PT).

**DISPLAY:** Models 910, 910 Plus, 914, 924, 925, and 950 feature 12-inch screens; Model 970 features a 14-inch screen; the Personal Terminal has a 9-inch screen. All models feature a 1,920-character display capacity; Models 922 and 970 also have 132-column display capability. Models 914, 921, 922, 924, 925, 925E, and 950 have tilt/swivel screens; Model 970 features a "natural balance" tilt mechanism.

**KEYBOARD:** Models 910 and 910 Plus include attached keyboards; all other models feature detachable keyboards. All keyboards have a typewriter-style layout with a low-profile design.

**COMPETITION:** Applied Digital Data Systems (ADDS), Lear Siegler, Esprit Systems, Visual Technology, Wyse Technology, Liberty Electronics, Qume, and several others. TeleVideo also competes in the DEC-compatible market with the Models 922 and 970.

**PRICE:** Prices range from \$649 to \$1,495 for the 900 Series terminals. The Personal Terminal ranges in price from \$499 to \$1,127, depending on its configuration.

## CHARACTERISTICS

**VENDOR:** TeleVideo Systems, Inc., 1170 Morse Avenue, Sunnyvale, CA 94086. Telephone (408) 745-7760.

**DATE OF ANNOUNCEMENT:** Model 950—December 1980; Model 910—May 1981; Model 925—November 1981; Model 910 Plus—February 1982; Model 970—June 1982; Model 924—April 1983; Model 914—August 1983; Personal Terminal—November 1983; Models 921, 922, and 925E—May 1984.

**DATE OF FIRST DELIVERY:** Model 950—January 1981; Model 910—May 1981; Model 925—November 1981; Model 910 Plus—February 1982; Model 970—January 1983; Model 924—August 1983; Model 914—October 1983; Personal Terminal—November 1983; Models 921 and 925E—September 1984; Model 922—November 1984.

## TeleVideo Display Terminals

➤ newest TeleVideo terminal, the DEC VT220-compatible Model 922. TeleVideo has also entered the voice/data workstation market with the recent introduction of the company's Personal Terminal.

The low-end models in TeleVideo's product line are Models 910 and 910 Plus. The 910 is a basic conversational model; the 910 Plus is an enhanced version of the 910, incorporating block mode transmission and editing capabilities. Both models feature a 12-inch display and attached keyboard.

The Models 925 and 950 are mid-range smart terminals. The 925 is an enhanced version of the Model 920, one of TeleVideo's initial models. The 925 contains editing features, block mode transmission, and improved ergonomic features, including a 12-inch tilt/swivel display and a detachable keyboard. Model 950 contains all the features found on the 925, plus advanced editing, split screen, smooth scrolling, 15 graphics characters, and up to three additional pages of display memory.

Models 914, 921, 924, and 925E are recent additions to the TeleVideo product line, and contain the company's new smaller footprint housing design and low-profile keyboard. The 914 is a low-end editing terminal with most of the features found on the 910 Plus, plus ADDS Viewpoint emulation. The 921 is also a low-end model, coupling smart terminal features with embedded/nonembedded video attributes. The 924 is a mid-range model with features that include split screen, graphics, and four pages of display memory. The 925E is an enhanced version of the 925.

Model 970 is the company's first ANSI X3.64-compliant unit. The 970 features DEC VT100 compatibility, and a unique enclosure design that includes vertical mounting of the terminal's logic boards and power supply and a 14-inch display that tilts at the touch of a finger.

In order to gain a share of the blossoming DEC VT220-compatible market, TeleVideo has unveiled the Model 922. Fully VT220-compatible, the 922 boasts some improvements to the DEC key layout, contains TeleVideo's new enclosure design, and sells for a price (\$995) considerably below that of the VT220. The 922 also conforms to the ANSI X3.64 standard.

The Personal Terminal is targeted for the executive's desk, a new market for TeleVideo. The unit features a 9-inch display, integral keyboard, and an optional telephone handset. The PT is designed for information retrieval from an organization's internal computer or from a commercial data base. The unit is portable, measuring 9½ inches high by 12½ inches wide by 15 inches deep and weighing approximately 14 pounds. Integral 300 bps and 300/1200 bps modems are also optional.

TeleVideo has recently introduced optional Tektronix 4010/4014 graphics capabilities for Models 914, 921, 922, and 970. The graphics board, which plugs into the TeleVideo terminal, allows the user to run Tektronix Plot 10 graphics programs. A graphics mouse pointing device is also optionally available.

➤ **NUMBER DELIVERED TO DATE:** Over 400,000 (all models).

**SERVICED BY:** General Electric Co., Instrumentation and Communication Equipment Service shops.

### MODELS

TeleVideo's display terminals are microprocessor-controlled, standalone units. Eleven models are currently available:

- **Model 910**—a basic conversational terminal. The 910 features a 12-inch CRT display and an attached typewriter-style keyboard, plus switch-selectable emulation of the ADDS Regent 25, Hazeltine 1410, and Lear Siegler ADM 3A/5.
- **Model 910 Plus**—contains all of the features of Model 910, plus editing capabilities, block mode transmission, and protected fields.
- **Model 914**—contains the features found on Model 910 Plus, while incorporating a new ergonomic housing design that features a smaller footprint, tilt/swivel monitor, and low-profile detachable keyboard. The 914 features emulation of the ADDS Viewpoint.
- **Model 921**—a smart editing terminal with embedded/nonembedded video attributes.
- **Model 922**—a DEC VT220-compatible terminal. The 922 is also DEC VT100, VT52, and ANSI X3.64-compatible.
- **Model 924**—a smart terminal that combines the ergonomic improvements of Model 914 with additional functions. Enhanced features include 16 function keys, programmable delimiters, eight resident national character sets, and up to four pages of display memory (optional).
- **Model 925**—a smart terminal that features emulation of the company's older Models 912/920.
- **Model 925E**—combines the features of the 925 (plus some enhancements) with TeleVideo's new ergonomic housing.
- **Model 950**—contains all of the features of Model 925, plus advanced editing with wraparound, smooth scrolling, split screen with line lock, and 15 special graphics characters.
- **Model 970**—a DEC VT100-compatible terminal featuring 80-/132-column displays and compliance with the ANSI X3.64 standard for data communications. Advanced features include 24-line by 132-column display capability (compared with 16-by-132 found on Model 960), three pages of display memory, and a 14-inch display.
- **Personal Terminal**—a compact, executive workstation. Features include a 9-inch display, video attributes, and limited editing. Optional features include a telephone handset, 300 bps modem, and 300/1200 bps modem. The PT also features an integral keyboard.

### TRANSMISSION SPECIFICATIONS

Transmission is asynchronous, in half- or full-duplex at switch-selectable rates up to 19,200 bps; 10- or 11-bit ASCII code is used, and odd, even, mark, or space parity can be selected. An RS-232-C port is standard on all models; a 20 ma current loop interface is also available for most models, while an RS-422 main port is available for the Model 921. An auxiliary RS-232-C printer port is standard on Models 914, 921, 922, 924, 925, and 925E. A gated printer port is

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### ► COMPETITIVE POSITION

TeleVideo Systems was founded in 1975, and began commercial deliveries of its first display terminal models (Models 912/920) in 1979. Today, TeleVideo ranks first in commercial deliveries among all independent display terminal vendors, having overtaken the traditional leaders in that market: Applied Digital Data Systems (ADDS), Lear Siegler, and Esprit Systems (formerly Hazeltine's terminal division). Key factors in TeleVideo's rapid rise to the top of the industry include the company's large distributor network and mass production techniques that combine off-shore manufacturing of subassemblies with domestic manufacturing of printed circuit boards prior to final assembly in Sunnyvale and Puerto Rico. TeleVideo has moved actively to protect its leading position, introducing new models that combine improved price/performance with enhanced ergonomic housing. TeleVideo has also embraced the ANSI X3.64 standard for communications, and has mounted an advertising campaign aimed at educating the terminal-buying public in the advantages of compliance with that standard.

TeleVideo now finds its leadership position in this market threatened, however. As we mentioned previously, the company reported a substantial loss in the fourth quarter of 1984, due partially to its problems in the microcomputer market, and partially to increased competition in the display terminal field. The traditional leaders in the display terminal market, ADDS, Lear Siegler, and Esprit, have all been active in their attempts to increase their market shares. Add to them a number of newer entrants that have enjoyed success, like Wyse Technology, Qume, Liberty Electronics, and Visual Technology, and one can see that the competition in this market is intense. The trend continues toward more functionality and features for less money, with no end in sight. The low-end price for smart terminals has reached the \$600 level, and could conceivably fall even farther, putting more pressure on margins. TeleVideo, it would seem, faces a fight for the top spot in the terminal arena.

One question arises: does TeleVideo's recent problems make them a candidate for acquisition? ADDS was acquired by NCR Corporation in 1981, and this past year saw the attempted acquisition of Visual Technology by Lee Data Corporation. Following the release of TeleVideo's fourth quarter financial results, TeleVideo's stock dropped to \$3 a share, possibly making it a target for takeover.

### ADVANTAGES AND RESTRICTIONS

TeleVideo offers a broad product line of low-priced general-purpose ASCII terminals. It has consistently attempted to improve upon its offerings, particularly in the area of ergonomics. The company's leadership position in the terminal market indicates that it has succeeded. The new Personal Terminal, with its voice option, positions the company in a new market (voice/data workstations) that is beginning to blossom. The Model 922 should be able to carve out a share of the potentially lucrative DEC VT220 ►

► standard on Model 910, and a buffered auxiliary port is standard on Models 950 and 970. TeleVideo terminals conform to the X-on/X-off and DTR communications protocols. Models 922 and 970 also conform to the ANSI X3.64 standard for control codes.

Two RJ-11C telephone interfaces are available for the Personal Terminal when configured with optional telephone handset. A 300 or 300/1200 bps integral modem is also optional for the Personal Terminal.

### DEVICE CONTROL

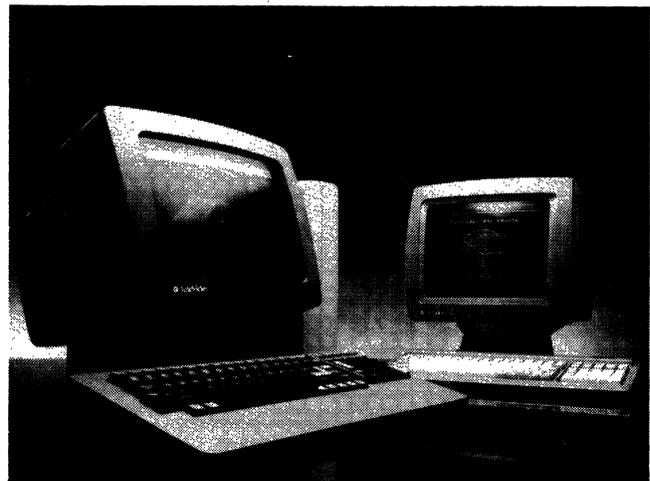
Cursor functions include up, down, left, right, and home. Any desired cursor position can be obtained using an absolute cursor address of Y (line) and X (column) combination. The cursor appears as a reverse video block, either solid or blinking; the cursor is also addressable, for use with the optional additional page (or pages) of memory.

Editing functions include clear screen, character typeover, clear unprotected positions, character insert and character delete, line insert and line delete, erase to end of line or field, and erase to end of page. Line/character insert/delete is available on all models except the Model 910.

A protect mode is available for designating protected fields (except on Model 910). In protect mode, those character positions designated as protected (lower intensity) cannot be modified. The cursor cannot enter a protected field, and will be advanced through that field to the next unprotected position. A split screen capability is available on the Model 970. Up to 3 independent windows can be designated.

Forward and back tabs are set using columns of protected characters in protect mode. Typewriter-style tabs are offered when not in protect mode. Up to 80 tab positions may be set without loss of character location.

Both blinking and blank fields can be designated over areas of the display. In areas that are blanked, characters are still entered into display memory. Visual attributes, selectable on a character-by-character basis, include blink, blank, underline, half-intensity, and reverse video. The Personal Terminal also provides double-high and double-wide characters. Two different visual attributes may be used per line on the ►



TeleVideo is now offering an optional graphics board that provides the Models 970 (left), 914, 921, and 922 with Tektronix 4010/4014 compatibility. A graphics mouse pointing device is also optionally available for use with these models equipped with the graphics board.

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market. Additionally, the company has added a graphics option to selected terminal models, broadening the functionality of its terminal line even more. Like Lear Siegler, however, the TeleVideo product line still lacks a color model; ADDS and Esprit do offer low-priced color terminals.

### USER REACTION

During the months of November and December 1984, Datapro, in conjunction with *Data Communications* magazine, conducted a mail survey of display terminal, voice/data workstation, and cluster controller users. The 1985 Terminal Users Survey was the result. Responding to this survey were a total of 62 TeleVideo display terminal users. These users responded on a wide variety of TeleVideo models, the most frequently mentioned of which were the Model 950 (18 users), Model 925 (16 users), and Model 970 (10 users). Individually, the Model 970 received the best overall performance rating of 3.8. The Model 914 received a perfect 4.0 for overall performance; however, this rating was based on only three user responses. The users reported on an installed base of approximately 4,513 units. Each user was asked to rate their terminals in seven specific categories; their ratings are summarized in the following table.

	Excellent	Good	Fair	Poor	WA*
Overall performance	25	30	7	0	3.3
Ease of operation	20	33	6	3	3.1
Display clarity	19	33	9	0	3.2
Keyboard feel & usability	13	32	14	3	2.9
Ergonomics	9	19	24	7	2.5
Hardware reliability	19	30	12	1	3.1
Maintenance service/ technical support	5	30	17	2	2.7

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

When asked whether or not they would recommend TeleVideo display terminals to other users, 44 users responded that they would, while only 6 stated that they would not. The remaining users were either undecided or did not answer the question. The users were also asked which of the following factors *most* influenced their decision to purchase TeleVideo displays: features/functionality, vendor recognition/loyalty, price, or other factors. The users were split almost evenly between price (48 percent) and features/functionality (44 percent). □

► **Personal Terminal.** Nonembedded video attributes are available on the Models 914, 921, 922, 924, 970, and Personal Terminal.

Character mode transmission can be accomplished in half- or full-duplex. In half-duplex, the terminals send and receive data in only one direction at a time. Characters are displayed on the screen and transmitted to the computer at the same time that they are typed from the keyboard. In full-duplex, the terminal sends and receives data simultaneously. Typed characters are echoed from the computer back to the terminal.

Data can also be sent and received in complete blocks (except on Model 910). Data up to a full screen can be entered by the operator. In block mode, characters are stored and displayed, but not transmitted until a special code sequence is received by the terminal. The edited data can be transmitted partially or completely.

The self test mode is used to verify the proper operation of the video display circuitry, the serial interfaces, and the control processor. The test consists of the transmission of the complete displayable character set, with all attributes (reverse video, underline, protected fields) exercised.

Block graphics capabilities are available on the Models 924 and 970. A board for Tektronix 4010/4014-compatible graphics capabilities is optional for Models 914, 921, 922, and 970. A graphics mouse pointing device is also available for these models.

In addition to its availability as a personal information workstation, the Personal Terminal can be configured as a voice/data workstation with any of the options offered for it, including a telephone handset, 300 bps modem, and 300/1200 bps modem. With the optional modems, the Personal Terminal can access outside databases using function keys to do the dialing. Autodial is available from a directory of 28 entries of 15 digits each. Two RJ-11C telephone jacks are standard to enable voice/data communications with the optional telephone handset. For more information on the voice/data workstation market, see Report C25-010-501.

### COMPONENTS

**CRT DISPLAY UNIT:** Five enclosure styles are available for TeleVideo's display terminal line. Models 910 and 910 Plus feature a one-piece "clam shell" design made popular by Lear Siegler's original dumb terminal line. These models feature a stationary, 12-inch (diagonal) display with a 1,920-character capacity arranged in 24 lines by 80 characters each. Models 925 and 950 feature a display design similar to that of the DEC VT100; they include a 12-inch display that can be tilted or swiveled, and a 1,920-character capacity (24-line by 80-character format, plus a 25th status line). Model 970 features a unique design that includes a 14-inch display that can be tilted by the touch of a finger, and vertical mounting of the logic boards and power supply. Display formats are selectable at 24 lines by 80 or 132 characters. Models 914, 921, 922, 924, and 925E incorporate TeleVideo's new small footprint "pedestal-style" enclosure, which includes a 12-inch tilt/swivel display. Models 914, 921, 924, and 925E feature display formats of 24 lines by 80 characters, plus a 25th status line. Model 922 features a selectable display format of 24 lines by 80 or 132 characters, plus a 25th status line. The Personal Terminal includes a compact housing design intended to fit easily on an executive's desk. A 9-inch display with selectable formats of 24 lines by 40 or 80 characters is standard. Characters are formed in a 5-by-7 dot matrix on the Personal Terminal; a 6-by-7 dot matrix on the 910 and 910 Plus; a 6-by-8 dot matrix on the 922 and 925; a 7-by-8 dot matrix on the 914, 921, 924, 925E, and 970; and a 10-by-7 dot matrix on the 950. The Personal Terminal displays characters in yellow-green (P9 phosphor); all other models feature green (P31 phosphor) characters as standard. Amber phosphor characters are available, as a no-charge option, for Model 921.

The 128-character ASCII set is displayable on all models. A set of 15 special graphics characters is available on the 921 and 950; 32 special graphics characters are available on the 922 and 970; 64 special graphics characters are available on the 914 and 924; 128 graphics characters can be used on the Personal Terminal. Four strappable national character sets are standard on the 925: English, French, German, and Spanish. The 924 features eight resident national character

## TeleVideo Display Terminals

► sets: U.S. ASCII, United Kingdom, French, German, Spanish, Portuguese, Norwegian/Danish, and Swedish/Finnish. A snap-on telephone handset is optional for the Personal Terminal.

**KEYBOARDS:** All models except the Personal Terminal feature a typewriter-style keyboard with a numeric pad. The Personal Terminal has no numeric pad. Models 910 and 910 Plus include 82 keys. Models 925, 925E, and 950 include 101 keys, with 11 special function keys on the 925 and 950 (shiftable to 22 functions), and 16 function keys on the 925E (shiftable to 32), six editing keys, and two transmission keys. Model 970 includes 112 keys, with 16 special function keys (32 shifted), six editing keys, and four transmission keys. Model 914 includes 90 keys, with three function keys (shiftable to six). Models 921 and 924 includes 110 keys, with 16 function keys (32 shifted) and dedicated editing keys. The Model 922 features 112 keys, including 15 programmable function keys (30 shifted) and a true 10-key accounting style keypad. The 922 keyboard conforms to the DEC VT220 keyboard, except for the location of the Return, Escape, and Shift keys. The Personal Terminal features 74 keys, including seven function keys. Model 910 and the Personal Terminal feature attached keyboards; the keyboards on Models 914, 921, 922, 924, 925, 925E, 950, and 970 are detachable, connected to the monitor through a coiled (telephone-style) cord. The keyboards on Models 914, 921, 922, 924, 925E, and 970 feature a low-profile design.

### PRICING

The TeleVideo terminals are available for purchase only, through authorized TeleVideo distributors. Quantity and OEM discounts are available.

Service is available nationwide through the General Electric Instrumentation and Computer Centers. TeleVideo also provides its own Technical Support Staff to answer customer questions.

Models	Purchase Price (\$)
Model 910	649
Model 910 Plus	699
Model 914	699
Model 921	695
Model 922	995
Model 924	899
Model 925	995
Model 925E	795
Model 950	1,195
Model 970	1,495
Personal Terminal (basic)	499
Personal Terminal (w/300 bps modem)	648
Personal Terminal (w/300 bps modem & telephone)	727
Personal Terminal (w/300/1200 bps modem)	1,048
Personal Terminal (w/300/1200 bps modem & telephone)	1,127
Options	
Graphics board (914, 921, 922)	525
Graphics board (970)	625
Graphics mouse	149
924 Memory expansion (4 pages)	160
925/950 Memory expansion (2 pages)	40
950 Memory expansion (4 pages)	120



# TeleVideo Display Terminals



*TeleVideo's Model 914 is an entry level smart terminal with ergonomic features that include a 12-inch tilt/swivel display, small footprint for more efficient use of office space, and a low profile, detachable keyboard.*

## MANAGEMENT SUMMARY

Having begun commercial deliveries of their first display terminal models in 1979, TeleVideo Systems has grown to become the number one independent supplier of video display terminals. The company shipped over 120,000 units in 1983 alone. Fueled by this success, TeleVideo has expanded its operations into the microcomputer market, where the company has become a strong contender.

TeleVideo's display terminal product line consists of eight models, which provide the user with a variety of functions, capabilities, and housing designs. All models are designed for the general purpose ASCII market; in addition, TeleVideo has introduced two models that offer compliance with the ANSI X3.64 standard for communications. TeleVideo has also entered the personal workstation market with the recent introduction of the company's Personal Terminal.

The low-end models in TeleVideo's product line are Models 910 and 910 Plus. The 910 is a basic conversational model; the 910 Plus is an enhanced version of the 910, incorporating block mode transmission and editing capabilities. Both models feature a 12-inch display and attached keyboard.

The Models 925 and 950 are mid-range smart terminals. The 925 is an enhanced version of the Model 920, one of TeleVideo's initial models. The 925 contains editing features, block mode transmission, and improved ergonomic

TeleVideo has become the number one independent supplier of video display terminals, with over 120,000 units shipped in 1983. The company's display terminal product line features models with a wide variety of functions, capabilities, and enclosure styles, all at some of the industry's lowest prices.

**MODELS:** 910, 910 Plus, 914, 924, 925, 950, 970, and the Personal Terminal.

**DISPLAY:** Models 910, 910 Plus, 914, 924, 925, and 950 feature 12-inch screens; Model 970 features a 14-inch screen; the Personal Terminal has a 9-inch screen. All models feature a 1920-character display capacity; Model 970 also has 132-column capability. Models 914, 924, 925, and 950 have tilt/swivel screens; Model 970 features a "natural balance" tilt mechanism.

**KEYBOARD:** Models 910 and 910 Plus include attached keyboards; all other models feature detachable keyboards. All keyboards have a typewriter-style layout.

**COMPETITION:** Applied Digital Data Systems (ADDS), Lear Siegler, Esprit Systems, Visual Technology, and several others.

**PRICE:** Prices range from \$649 to \$1,495.

## CHARACTERISTICS

**VENDOR:** TeleVideo Systems, Inc., 1170 Morse Avenue, Sunnyvale, CA 94086. Telephone (408) 745-7760.

**DATE OF ANNOUNCEMENT:** Model 950—December 1980; Model 910—May 1981; Model 925—November 1981; Model 910 Plus—February 1982; Model 970—June 1982; Model 924—April 1983; Model 914—August 1983; Personal Terminal—November 1983.

**DATE OF FIRST DELIVERY:** Model 950—January 1981; Model 910—May 1981; Model 925—November 1981; Model 910 Plus—February 1982; Model 970—January 1983; Model 924—August 1983; Model 914—October 1983; Personal Terminal—November 1983.

**NUMBER DELIVERED TO DATE:** Over 330,000 (all models).

**SERVICED BY:** General Electric Co., Instrumentation and Communication Equipment Service shops.

## MODELS

TeleVideo's display terminals are microprocessor-controlled, standalone units. Eight models are currently available:

- Model 910—a basic conversational terminal. The 910 features a 12-inch CRT display and an attached typewriter-style keyboard, plus switch-selectable emulation of the ADDS Regent 25, Hazeltine 1410, and Lear Siegler ADM 3A/5.

## TeleVideo Display Terminals

➤ features, including a 12-inch tilt/swivel display and a detachable keyboard. Model 950 contains all the features found on the 925, plus advanced editing, split screen, smooth scrolling, 15 graphics characters, and up to three additional pages of display memory.

Models 914 and 924 are recent additions to the TeleVideo product line, and contain the company's new smaller footprint housing design and low profile keyboard. The 914 is a low end editing terminal with most of the features found on the 910 Plus. The 924 is a mid-range model with features that include split screen, graphics, and four pages of display memory.

Model 970 is the company's first ANSI X3.64-compliant unit. The 970 features DEC VT100 compatibility, and a unique enclosure design that includes vertical mounting of the terminal's logic boards and power supply and a 14-inch display that tilts at the touch of a finger.

The Personal Terminal is targeted for the executive's desk, a new market for TeleVideo. The unit features a 9-inch display, integral keyboard, and an optional telephone handset. The PT is designed for information retrieval from an organization's internal computer or from a commercial data base. The unit is portable, measuring 9½ inches high by 12½ inches wide by 15 inches deep and weighing approximately 14 pounds. Integral 300 bps and 1200 bps modems are also optional.

Nationwide field service for TeleVideo terminals is available through General Electric's Instrumentation and Communication Equipment Service locations.

### COMPETITIVE POSITION

TeleVideo Systems was founded in 1975, and began commercial deliveries of its first display terminal models (Models 912/920) in 1979. Today, TeleVideo ranks first in commercial deliveries among all independent display terminal vendors, overtaking the traditional leaders in that market: Applied Digital Data Systems (ADDS), Lear Siegler, and Esprit Systems (formerly Hazeltine's terminal division). Key factors in TeleVideo's rapid rise to the top of the industry include the company's large distributor network and mass production techniques that combine offshore manufacturing of subassemblies with domestic manufacturing of printed circuit boards prior to final assembly in Sunnyvale and Puerto Rico. TeleVideo has moved actively to protect its leading position, introducing new models that combine improved price/performance with enhanced ergonomic housing. TeleVideo has also embraced the ANSI X3.64 standard for communications, and has mounted an advertising campaign aimed at educating the terminal-buying public in the advantages of compliance with that standard.

TeleVideo has also expanded into the microcomputer market, and now offers several systems, including portable and IBM PC-compatible products. Participation in a "glamorous" market like microcomputers lends prestige to the ➤

- • **Model 910 Plus**—contains all of the features of Model 910, plus editing capabilities, block mode transmission, and protected fields.
- **Model 914**—contains the features found on Model 910 Plus, while incorporating a new ergonomic housing design that features a smaller footprint, tilt/swivel monitor, and low profile detachable keyboard.
- **Model 924**—a smart terminal that combines the ergonomic improvements of Model 914 with additional functions. Enhanced features include 16 function keys, programmable delimiters, eight resident national character sets, and up to four pages of display memory (optional).
- **Model 925**—a smart terminal that features emulation of the company's older Model 920.
- **Model 950**—contains all of the features of Model 925, plus advanced editing with wraparound, smooth scrolling, split screen with line lock, and 15 special graphics characters.
- **Model 970**—a DEC VT100-compatible terminal featuring 80/132-column displays and compliance with the ANSI X3.64 standard for data communications. Advanced features include 24-line by 132-column display capability (compared with 16-by-132 found on Model 960), three pages of display memory, and a 14-inch display.
- **Personal Terminal**—a compact, executive workstation. Features include a 9-inch display, video attributes, limited editing, and an optional telephone handset. The PT also features an integral keyboard.

### TRANSMISSION SPECIFICATIONS

Transmission is asynchronous, in half- or full-duplex at switch-selectable rates up to 19,200 bps; 10- or 11-bit ASCII code is used, and odd, even, mark, or space parity can be selected. An RS-232-C port is standard on all models; a 20mA current loop interface is also available for most models. An auxiliary RS-232-C printer port is standard on Models 914, 924, and 925. A gated printer port is standard on Model 910, and a buffered auxiliary port is standard on Models 950 and 970.

A 300 or 1200 bps integral modem is optional for the Personal Terminal.

### DEVICE CONTROL

Cursor functions include up, down, left, right, and home. Any desired cursor position can be obtained using an absolute cursor address of Y (line) and X (column) combination. The cursor appears as a reverse video block, either solid or blinking; the cursor is also addressable, for use with the optional additional page (or pages) of memory.

Editing functions include clear screen, character typeover, clear unprotected positions, character insert and character delete, line insert and line delete, erase to end of line or field, and erase to end of page. Line/character insert/delete is available on models 924, 950, and 970. Line-on-page edit is available on Models 950 and 970; Model 910 has no editing capabilities.

A protect mode is available for designating protected fields (except on Model 910). In protect mode, those character positions designated as protected (lower intensity) cannot be modified. The cursor cannot enter a protected field, and will be advanced through that field to the next unprotected position. A split screen capability is available on the Model 970. Up to 3 independent windows can be designated. ➤

## TeleVideo Display Terminals

▷ company, and should strengthen their position even further in the terminal market.

### ADVANTAGES AND RESTRICTIONS

TeleVideo offers a broad product line of low-priced general purpose ASCII terminals. It has consistently attempted to improve upon its offerings, particularly in the area of ergonomics. The company's current position in the market indicates that it has succeeded. The new Personal Terminal, with its voice option, positions the company in a new market (voice/data workstations) that is beginning to blossom. As of this writing, TeleVideo's terminal line lacks only a color model and more extensive graphics features; look for one or both of these additions in the future.

### USER REACTION

In Datapro's 1983 Terminal Users Survey, conducted in conjunction with *Data Communications* magazine, a total of 43 responses were received from users of TeleVideo display terminals. Broken down by model, there were 19 responses from users of Model 950; 10 responses from users of Model 925; five responses on Model 920 (no longer available); four responses on Models 910 and 910 Plus; and the remaining five responses on a variety of other models. Altogether, the 42 responses represented an installed base of 708 terminals. The users were asked to rate their terminals in seven specific categories. Their ratings are summarized in the following table.

	Excellent	Good	Fair	Poor	WA*
Overall performance	26	12	1	0	3.6
Ease of operation	16	25	2	0	3.3
Display clarity	15	22	3	2	3.2
Keyboard feel & usability	17	22	3	0	3.3
Ergonomics	10	19	12	2	2.9
Hardware reliability	9	17	15	1	2.8
Maintenance service/ technical support	14	20	9	0	3.1

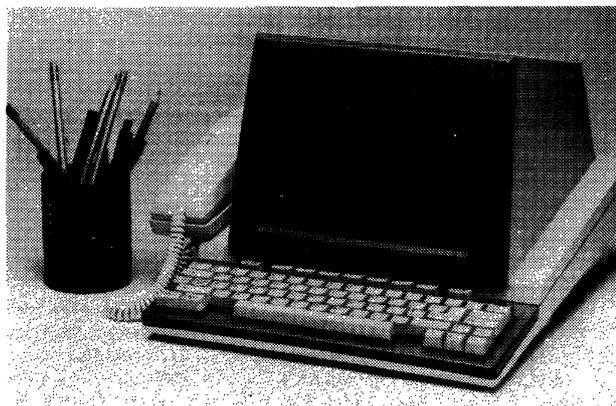
\*Weighted Average based on a scale of 4.0 for Excellent.

When asked whether they would recommend TeleVideo display terminals to other users, 37 would recommend them, and only one would not; the remainder were undecided, or did not answer the question. □

▶ Forward and back tabs are set using columns of protected characters in protect mode. Typewriter-style tabs are offered when not in protect mode. Up to 80 tab positions may be set without loss of character location.

Both blinking and blank fields can be designated over areas of the display. In areas that are blanked, characters are still entered into display memory. Visual attributes, selectable on a character-by-character basis, include blink, blank, underline, half intensity, and reverse video. The Personal Terminal also provides double high and double wide characters. Two different visual attributes may be used per line on the Personal Terminal.

Character mode transmission can be accomplished in half- or full-duplex. In half-duplex, the terminals send and receive data in only one direction at a time. Characters are displayed on the screen and transmitted to the computer at



*Introduced in November 1983, TeleVideo's Personal Terminal is aimed at executives. The PT includes a 9-inch display, integral keyboard, and an optional telephone handset for voice applications. The Personal Terminal carries a price tag of just \$469.*

the same time that they are typed from the keyboard. In full-duplex, the terminal sends and receives data simultaneously. Typed characters are echoed from the computer back to the terminal.

Data can also be sent and received in complete blocks (except on Model 910). Data up to a full screen can be entered by the operator. In block mode, characters are stored and displayed, but not transmitted until a special code sequence is received by the terminal. The edited data can be transmitted partially or completely.

The self test mode is used to verify the proper operation of the video display circuitry, the serial interfaces, and the control processor. The test consists of the transmission of the complete displayable character set, with all attributes (reverse video, underline, protected fields) exercised.

### COMPONENTS

**CRT DISPLAY UNIT:** Five enclosure styles are available from TeleVideo. Models 910 and 910 Plus feature a one-piece "clam shell" design made popular by Lear Siegler's original dumb terminal line. These models feature a stationary, 12-inch (diagonal) display with a 1920-character capacity arranged in 24 lines by 80 characters each. Models 925 and 950 feature a display design similar to that of the DEC VT100; they include a 12-inch display that can be tilted or swiveled, and a 1920-character capacity (24-line by 80-character format, plus a 25th status line). Model 970 features a unique design that includes a 14-inch display that can be tilted by the touch of a finger, and vertical mounting of the logic boards and power supply. Display formats are selectable at 24 lines by 80 or 132 characters. Models 914 and 924 incorporate TeleVideo's new small footprint enclosure, which includes a 12-inch tilt/swivel display. Models 914 and 924 feature display formats of 24 lines by 80 characters. The Personal Terminal includes a compact housing design intended to fit easily on an executive's desk. A 9-inch display with selectable formats of 24 lines by 40 or 80 characters is standard. Characters are displayed in green phosphor on all models. Characters are formed in a 5-by-7 dot matrix on the Personal Terminal; a 6-by-7 dot matrix on the 910 and 910 Plus; a 6-by-8 dot matrix on the 925; a 7-by-8 dot matrix on the 914, 924, and 970; and a 10-by-7 dot matrix on the 950.

The 128-character ASCII set is displayable on all models. A set of 15 special graphics characters is available on the 950; 64 special graphics characters are available on the 914 and

## TeleVideo Display Terminals

► 924; 128 graphics characters can be used on the Personal Terminal. Four strappable national character sets are standard on the 925: English, French, German, and Spanish. The 924 features eight resident national character sets: US ASCII, United Kingdom, French, German, Spanish, Portuguese, Norwegian/Danish, and Swedish/Finnish. A snap-on telephone handset is optional for the Personal Terminal.

**KEYBOARDS:** All models except the Personal Terminal feature a typewriter-style keyboard with a numeric pad. The Personal Terminal has no numeric pad. Models 910 and 910 Plus include 82 keys. Models 925 and 950 include 101 keys, with 11 special function keys, six editing keys, and two transmission keys. Model 970 includes 112 keys, with 16 special function keys, six editing keys, and four transmission keys. Model 914 includes 90 keys, with three function keys. Model 924 includes 110 keys, with 16 function keys and dedicated editing keys. The Personal Terminal features 74 keys, including seven function keys. Model 910 includes 10 preprogrammed function codes; all other models feature 22 function codes. Model 910 and the Personal Terminal feature attached keyboards; the keyboards on Models 914,

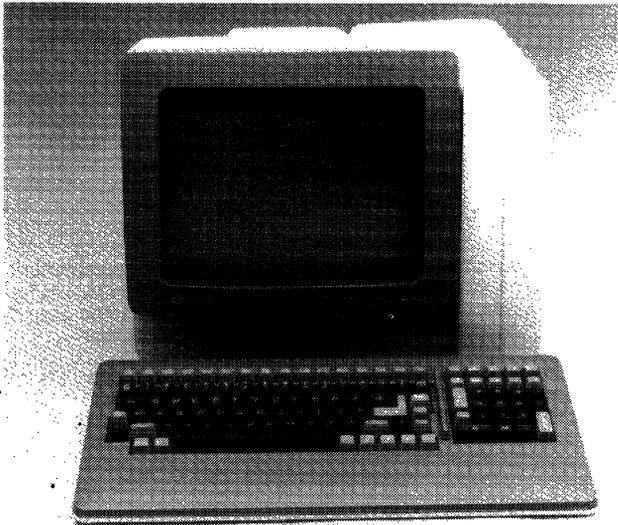
924, 925, 950, and 970 are detachable, connected to the monitor through a coiled (telephone-style) cord. The keyboards on Models 914, 924, and 970 feature a low profile design.

### PRICING

The TeleVideo terminals are available for purchase only. Quantity and OEM discounts are available:

	<u>Purchase Price</u>
Model 910	\$ 649
Model 910 Plus	649
Model 914	699
Model 924	895
Model 925	995
Model 950	1,195
Model 970	1,495
Personal Terminal	469 ■

# TeleVideo 900 Series Display Terminals



*The Model 970 is TeleVideo's newest display terminal. The 970 features a special ergonomic design in which the logic boards and power supply are mounted vertically on the side of the CRT, providing true convection cooling. The screen is also balanced so that it can be tilted with the touch of a finger. The 970 is a DEC VT100 compatible terminal and features 80/132-column display capability.*

## MANAGEMENT SUMMARY

TeleVideo Systems is a major success story in the high-volume, general purpose display terminal market. The company was founded in 1975, and began commercial deliveries in 1979. Since then, TeleVideo has shipped over 100,000 units, putting it on a par with the established leaders in the market, ADDS, Lear Siegler, and Hazeltine. A key to TeleVideo's success is the company's mass production techniques. Sub-assemblies are manufactured offshore and assembled at TeleVideo's Sunnyvale, California facilities; this method allows the company to ship terminals faster, while keeping prices low. Other independent manufacturers have followed suit, hoping to emulate TeleVideo's success. Meanwhile, TeleVideo has rapidly expanded their terminal product line, and has also entered the microcomputer/small business computer market.

TeleVideo's terminal line currently consists of seven models—the 910, 910 Plus, 912, 920, 925, 950, and 970. Features common to all models except the 970 include: a 12-inch (diagonal) CRT display; a 24-line by 80-character display format; visual attributes (reverse video, half intensity, blink, blank, and underline); and a typewriter-style keyboard. The new Model 970 features a new, ergonomically-improved enclosure design, and a 14-inch display.

Model 910 is a low-priced conversational terminal. The 910 features switch-selectable emulation of the ADDS Regent 25, Hazeltine 1410, and Lear Siegler ADM 3A. In addition, four strappable languages (English, French, German, and Spanish) can be accessed. The 910's keyboard is ▶

A popular family of low-priced, general purpose video display terminals.

Seven models are currently available, which provide a variety of features and capabilities ranging from a basic conversational terminal to an ergonomically-designed, fully-featured smart terminal. A 12-inch CRT with a 24-line by 80-character format is standard on all models except the Model 970, which features a 14-inch CRT with 80/132-column display capability. A typewriter-style keyboard is standard, and is either attached or detached depending on the model selected. An integral modem is optionally available on all models.

Purchase prices for the TeleVideo terminals range from \$699 to \$1,495.

## CHARACTERISTICS

**VENDOR:** TeleVideo Systems, Inc., 1170 Morse Avenue, Sunnyvale, CA 94086. Telephone (408) 745-7760.

**DATE OF ANNOUNCEMENT:** Models 912/920—November 1978; Model 950—December 1980; Model 910—May 1981; Model 925—November 1981; Model 910 Plus—February 1982; Model 970—June 1982.

**DATE OF FIRST DELIVERY:** Models 912/920—March 1979; Model 950—January 1981; Model 910—May 1981; Model 925—November 1981; Model 910 Plus—February 1982; Model 970—January 1983.

**NUMBER DELIVERED TO DATE:** Over 100,000 (all models).

**SERVICED BY:** General Electric Co., Instrumentation and Communication Equipment Service shops.

## MODELS

TeleVideo's 900 Series terminals are microprocessor-controlled, standalone units. Seven models are currently available:

- **Model 910**—a basic conversational terminal. The 910 features a 12-inch CRT display and an attached typewriter-style keyboard, plus switch-selectable emulation of the ADDS Regent 25, Hazeltine 1410, and Lear Siegler ADM 3A/5.
- **Model 910 Plus**—contains all of the features of the 910, plus editing capabilities, block mode transmission, and protected fields.
- **Model 912** contains all of the features of the 910 Plus, except that it includes two pages of display memory instead of one. ▶

## TeleVideo 900 Series Display Terminals

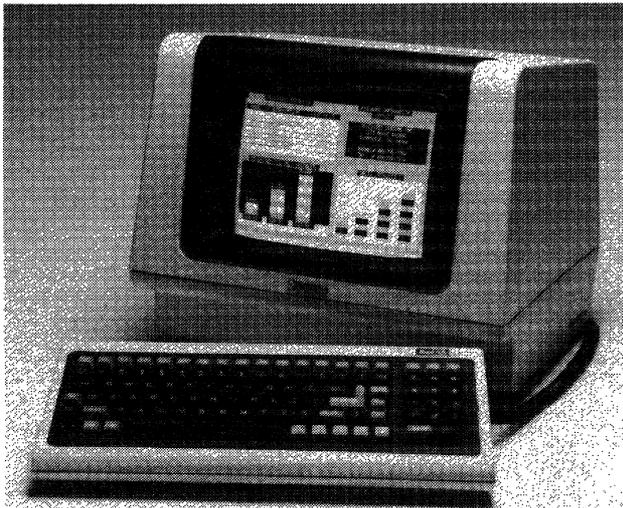
▷ attached and includes a numeric pad and 10 preprogrammed function codes. An enhanced version of the 910, called the 910 Plus, has been added to the product line. The 910 Plus contains all of the features of the 910, plus some additional capabilities including block mode transmission, full editing capabilities, and protected fields. The 910 Plus carries the same price tag as the 910, making it a very attractive alternative to its predecessor.

The oldest members of the TeleVideo line are Models 912 and 920. Both models offer block mode transmission as well as conversational operation. Protected fields can be selected on a character-by-character basis. Both models feature an attached keyboard—Model 920 differs from the Model 912 in that it includes an extra row of keys at the top of the main array, including 11 special function keys, six editing keys, and two transmission keys. A total of 22 programmable functions are available. Full editing features are included. An auxiliary port and a self test feature are also standard, and a second page of display memory can be added optionally.

Model 925 is an intermediate terminal. The 925 has the same basic features as the 920, while adding the 910's broader range of transmission rates (50 to 19,200 bps) and strappable character sets. In addition, the 925 adds ergonomic features such as a tilt/swivel display, green phosphor characters, and a detachable keyboard.

The 950 contains the same ergonomic features found on the Model 925, plus the following enhanced features: advanced editing (line and character insert/delete, line-on-page edit); wraparound; smooth scrolling; split screen with line lock; buffered auxiliary port; and 15 special graphics characters. Up to three additional pages of display memory can be added to the 950 as an option.

The Model 970 is TeleVideo's newest and most unique video display terminal. The 970 features ANSI X3.64/DEC VT100 compatibility, with an 80/132-column display capability, in addition to possessing all of the advanced operat- ▷



*The Model 925 is a mid-range smart terminal. The terminal, introduced in November 1981, contains a full complement of visual attributes and editing features.*

- ▶ **Model 920**—contains all features of the 912, plus 11 special function keys, six editing keys, and two transmission keys.
- **Model 925**—features Model 920 emulation, as well as a higher maximum transmission rate (19,200 bps as opposed to the 920's 9600 bps maximum). Enhanced ergonomic features include a tilt/swivel display and a detachable keyboard.
- **Model 950**—contains all of the features of the 925, plus advanced editing with wraparound, smooth scrolling, split screen with line lock, and 15 special graphics characters.
- **Model 970**—a DEC VT100-compatible terminal featuring 80/132-column display capability. The 950 contains all of the operational features of the 950, plus a new ergonomic enclosure design, and provides three pages of memory as a standard feature.

### TRANSMISSION SPECIFICATIONS

Transmission is asynchronous in half- or full-duplex at nine switch-selectable rates from 75 to 9600 bps on Models 912/920, and at 15 selectable rates from 50 to 19,200 bps on all other models. 10- or 11-bit ASCII code is used, and odd, even, mark, or space parity can be selected. RS-232-C and 20mA current loop interfaces are standard (current loop is optional on Models 910 and 925). An auxiliary RS-232-C printer port is standard on Models 912, 920 and 925. A gated printer port is standard on Model 910, and a buffered auxiliary port is standard on Models 950 and 970.

Also optionally available is the Model 9103 Integral Terminal modem. It is an originate-only, FCC-approved modem designed for use inside all TeleVideo 900 Series terminals.

### DEVICE CONTROL

Cursor functions include up, down, left, right, and home. Any desired cursor position can be obtained using an absolute cursor address of Y (line) and X (column) combination. The cursor appears as a reverse video block, either solid or blinking; the cursor is also addressable, for use with the optional additional page (or pages) of memory.

Editing functions include clear screen, character typeover, clear unprotected positions, character insert and character delete, line insert and line delete, erase to end of line or field, and erase to end of page. Line on page edit is available on Models 950 and 970; Model 910 contains no editing capabilities.

A protected mode is available for designating protected fields (except on Model 910). In protect mode, those character positions designated as protected (lower intensity) cannot be modified. The cursor cannot enter a protected field, and will be advanced through that field to the next unprotected position. A split screen capability is available on the Model 970. Up to 3 independent windows can be designated.

Forward and back tabs are set using columns of protected characters in protect mode. Typewriter-style tabs are offered when not in protect mode. Up to 80 tab positions may be set without loss of character location.

Both blinking and blank fields can be designated over areas of the display. In areas that are blanked, characters are still entered into display memory.

Character mode transmission can be accomplished in half- or full-duplex. In half-duplex, the terminals send and receive data in only one direction at a time. Characters are ▶

## TeleVideo 900 Series Display Terminals

ing features of the 950. The standard 970 comes with three pages of display memory.

The 970 also features a new design. The terminal's logic boards and power supply are mounted vertically on the left side of the CRT. The vertical placement of the printed circuit boards allows for convection cooling, which provides the unit's electronics with an estimated 60-percent longer life. This style also balances the monitor so that it can be tilted easily with the touch of a finger. The display screen measures 14 inches diagonally, and the 970's keyboard is detached.

All models can be optionally configured with TeleVideo's Model 9103 Integral Terminal Modem. This is an originate-only, FCC-approved modem specially designed for use in TeleVideo's terminals. The modem features an automatic re-dial capability, and uses the terminal's numeric pad as the touch-tone dialer. The 9103 requires only the available telephone line and not the telephone itself.

Nationwide field service for TeleVideo terminals is available through General Electric Company's Instrumentation and Communication Equipment Service shops.

### USER REACTION

Datapro, in conjunction with *Data Communications* magazine, conducted the first edition of our Terminal Users Survey during June, July, and August 1982. Detailed questionnaires, designed by Datapro, were sent to a cross-section of *Data Communications*' U.S. end-user subscriber base.

By editorial cut-off date, a total of 16 responses were received from users of the TeleVideo 900 Series display terminals. Breaking the responses down by model yielded the following results: five users responded on the Model 920, reporting on an installed base of 163 terminals; three users responded on the Model 925, representing 165 terminals; three users responded on the Model 950, covering a total of 16 terminals; and the remaining five users reported on the 910 and 912, with a total of 177 terminals installed.

The ratings given to the TeleVideo terminals by these users are presented in the following chart. For the purposes of this report, the ratings for all of the models have been combined.

	Excellent	Good	Fair	Poor	WA*
Overall performance	8	7	0	1	3.4
Ease of operation	5	8	2	1	3.1
Display clarity	7	8	0	1	3.3
Keyboard feel & usability	3	9	3	1	2.9
Hardware reliability	7	6	2	1	3.2
Maintenance service/ technical support	4	10	0	2	3.0

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

The users were also asked whether or not they would recommend their TeleVideo terminals to other users with similar applications. Thirteen of the users stated that they would, while only one replied negatively. Two users did not respond to this question. □

▶ displayed on the screen and transmitted to the computer at the same time that they are typed from the keyboard. In full-duplex, the terminal sends and receives data in both directions simultaneously. Typed characters are echoed from the computer back to the terminal.

Data can also be sent and received in complete blocks (except on Model 910). Data up to a full screen can be entered by the operator. In block mode, characters are stored and displayed, but not transmitted until a special code sequence is received by the terminal, or by the depression of a send key on the 920. The edited data can be transmitted partially or completely.

The self test mode is used to verify the proper operation of the video display circuitry, the serial interfaces, and the control processor. The test consists of the transmission of the complete displayable character set, with all attributes (reverse video, underline, protected fields) exercised.

### COMPONENTS

**CRT DISPLAY UNIT:** All models except the 970 contain a 12-inch (diagonally measured) display screen with a 1920-character capacity, arranged in 24 lines of 80 characters each (plus a 25th status line on the 925 and 950). The 970 contains a 14-inch display screen with selectable screen arrangements of 24 lines by 80 characters and 24 lines by 132 characters. Characters are displayed in green (P31 phosphor) on all models. Characters are formed via a 6-by-7 dot matrix on Models 910, 910 Plus, 912, and 920, via a 6-by-8 dot matrix on Model 925, via a 10-by-7 dot matrix on Model 950, and via a 7-by-8 dot matrix on Model 970. The 128 ASCII character set is displayable on all models except the 912 and 920, which display a 96 ASCII set. A set of 15 special graphics characters are available on Model 950. Models 910 and 925 feature four strappable character sets: English, French, German, and Spanish. Models 912 and 920 feature English and German, while Model 950 features English only. Models 925, 950, and 970 feature a tiltable display.

**KEYBOARDS:** All models feature a typewriter-style keyboard with a numeric pad. Models 910 and 912 include 82 keys. Models 920, 925, and 950 include 101 keys, including 11 special function keys, six editing keys, and two transmission keys. Model 970 includes 112 keys, including 16 special function keys, six editing keys, and four transmission keys. Model 910 includes 10 preprogrammed function codes; all other models feature 22 function codes. Models 910, 912, and 920 feature attached keyboards; the keyboards on Models 925, 950, and 970 are detachable, connected to the monitor via a coiled (telephone-style) cord.

**MODEL 9103 INTEGRAL MODEM:** An FCC-approved, originate-only modem which is optionally available on all TeleVideo 900 Series terminals. The 9103 uses a Standard telephone cable with a six-pin modular plug to connect to the telephone line. Operating speed is 300 bps in full-duplex mode. The 9103 is Bell 103/113-compatible.

### PRICING

The TeleVideo terminals are available for purchase only. Quantity and OEM discounts are available:

	Purchase Price
Model 910/910 Plus	\$ 659
Model 912	925
Model 920	995
Model 925	995
Model 950	1,195
Model 970	1,495
Second page of memory for 912/920	80
Extra page of memory for 950	95
Extra three pages of memory for 950	285
Integral Modem	349
20mA Current Loop (910/925)	50■



## TeleVideo 900 Series Display Terminals Product Enhancement

TeleVideo has unveiled a new ergonomic display design with the announcement of two new display terminals, the 914 and 924. In addition, a third new model, the 960, has also been introduced, containing the same styling. These new models are more compact than and do not follow the same design principles as the company's unique Model 970 (introduced in June 1982). Features include a 12-inch tilt/swivel display, low-profile detached keyboard, and a reduced footprint size.

The 914 is a block-mode editing terminal that will probably replace the company's low-end 910 Plus. (The 914 replaces the previously announced 915, which was withdrawn from production by TeleVideo prior to delivery.) Significant features of the 914 include pre-programmed function keys, a keyboard-accessible English language set-up menu, foreign language character sets, and two RS-232-C ports. The 914 is priced at \$699 in single quantities.

The 924 contains all of the features of the 914, while adding significant features such as split screen capability, graphics, and four pages of display memory. Single quantity price for the 924 has been set at \$895.

The new 960 is a DEC VT100 emulator that conforms to the ANSI X3.64 standard. Screen formats include 24 lines by 80 characters and 16 lines by 132 characters. Editing features and programmable function keys are also included. The 960 is scheduled for availability following Comdex; pricing has not yet been announced.

TeleVideo is generally acknowledged as the current leader in terminal shipments among the ASCII terminal vendors. □



*TeleVideo has introduced a new display terminal enclosure design which features a tilt/swivel screen, reduced footprint size, and a low-profile detached keyboard. This design is implemented on three new models, the 914, 924, and the soon-to-be-available 960.*



## TeleVideo 900 Series Display Terminals

### Product Enhancement

In April, 1983, TeleVideo unveiled a new ergonomic display design with the announcement of two new display terminals, the 915 and 924. Shortly thereafter, a third new model, the 960, was introduced, containing the same styling. These new models are more compact than and do not follow the same design principles as the company's unique Model 970 (introduced in June 1982). Features include a 12-inch tilt/swivel display, low-profile detached keyboard, and a reduced footprint size.

The 915 is a block-mode editing terminal that will probably replace the company's low-end 910 Plus. Significant features of the 915 include 32 pre-programmed function keys, a keyboard-accessible English language set-up menu, eight foreign language character sets, and two RS-232-C ports. The 915 is priced at \$699 in single quantities.

The 924 contains all of the features of the 915, while adding significant features such as split screen capability, graphics, and four pages of display memory. Single quantity price for the 924 has been set at \$895.

The new 960 is a DEC VT100 emulator that conforms to the ANSI X3.64 standard. Screen formats include 24 lines by 80 characters and 16 lines by 132 characters. Editing features and programmable function keys are also included. Pricing for the 960 has not yet been announced.

TeleVideo is generally acknowledged as the current leader in terminal shipments among the ASCII terminal vendors. □



# TeleVideo 900 Series Display Terminals



*Model 950 is TeleVideo's top-of-the-line terminal. Standard features include full editing with wraparound, smooth scrolling, protected fields, split screen with line lock, 22 programmable functions, and 15 special graphics characters. Ergonomic features include a tilt/swivel CRT display and a detachable keyboard.*

## MANAGEMENT SUMMARY

TeleVideo Systems was founded in 1975, and began commercial deliveries of its first ASCII terminals in 1979. Since then, the company has risen at a rapid rate to the top of the ASCII terminal industry, competing head-to-head with such established giants as ADDS, Hazeltine, and Lear Siegler. TeleVideo now hopes to duplicate this type of success in the small business computer market.

TeleVideo's terminal line currently consists of five models—the 910, 912, 920, 925, and 950. The terminals' four-part modular construction allows for both low-cost mass production and ease of servicing. Features common to all five models include: a 12-inch (diagonal) CRT display; a 24-line by 80-character display format; visual attributes (reverse video, half intensity, blink, blank, and underline); and a typewriter-style keyboard.

Model 910 is a low-priced conversational terminal. The 910 features switch-selectable emulation of the ADDS Regent 25, Hazeltine 1410, and Lear Siegler ADM 3A. In addition, four strappable languages (English, French, German, and Spanish) can be accessed. The 910's keyboard is attached and includes a numeric pad and 10 preprogrammed function codes. Other features include a gated printer port, self test, and 15 selectable transmission rates from 50 to 19,200 bits per second.

The senior members of the TeleVideo line are Models 912 and 920. Both models offer block mode transmission as well as conversational operation. Protected fields can be selected on a character-by-character basis. Both models feature an attached keyboard—Model 920 differs from the Model 912 in that it includes an extra row of keys at the top

A family of microprocessor-controlled, modularly constructed ASCII display terminals.

Five models are currently available, with a variety of features and capabilities ranging from a basic conversational terminal to a fully-featured smart terminal. All models feature a 12-inch CRT display with a 24-line by 80-character format, and five visual attributes (reverse video, half intensity, blink, blank, underline). All models feature a typewriter-style keyboard with a numeric pad, in either an attached (Models 910, 912, and 920) or detachable (Models 925 and 950) configuration. An integral modem is optionally available on all models.

Purchase prices for the TeleVideo terminals range from \$699 to \$1,195.

## CHARACTERISTICS

**VENDOR:** TeleVideo Systems, Inc., 1170 Morse Avenue, Sunnyvale, CA 94086. Telephone (408) 745-7760.

**DATE OF ANNOUNCEMENT:** Models 912/920—November 1978; Model 950—December 1980; Model 910—May 1981; Model 925—November 1981.

**DATE OF FIRST DELIVERY:** Models 912/920—March 1979; Model 950—January 1981; Model 910—May 1981; Model 925—November 1981.

**NUMBER DELIVERED TO DATE:** Over 90,000 (all models).

**SERVICED BY:** General Electric Co., Instrumentation and Communication Equipment Service shops.

## MODELS

TeleVideo's 900 Series terminals are microprocessor-controlled, standalone units. Five models are currently available:

- **Model 910**—a basic conversational terminal. The 910 features a 12-inch CRT display and an attached typewriter-style keyboard.
- **Models 912/920**—block mode, editing versions of the 910. Model 920 differs from the 912 in that it includes 11 special function keys, six editing keys, and two transmission keys.
- **Model 925**—features Model 920 emulation, as well as a higher maximum transmission rate (19,200 bps as opposed to the 920's 9600 bps maximum). Enhanced ergonomic features include a tilt/swivel display and a detachable keyboard.
- **Model 950**—contains all of the features of the 925, plus the following: advanced editing with wraparound; smooth scrolling; split screen with line lock; and 15 special graphics characters.

## TeleVideo 900 Series Display Terminals

▷ of the main array, including 11 special function keys, six editing keys, and two transmission keys. A total of 22 programmable functions are available. Editing features include character and line insert/delete. Transmission rates range from 75 to 9600 bps. An auxiliary port and a self test feature are also standard. A second page of display memory can be added optionally.

The newest offering from TeleVideo is the Model 925. The new model is designed to bridge the gap between the low-end 910 and the high-end 950. The 925 has the same basic features as the 920, while adding the 910's broader range of transmission rates (50 to 19,200 bps) and strappable character sets. In addition, the 925 adds ergonomic features such as a tilt/swivel display, green phosphor characters, and a detachable keyboard.

The 950 is TeleVideo's most sophisticated model. The unit contains the same ergonomic features found on the Model 925, plus the following enhanced features: advanced editing (line and character insert/delete, line-on-page edit); wraparound; smooth scrolling; split screen with line lock; buffered auxiliary port; and 15 special graphics characters. Up to three additional pages of display memory can be added to the 950 as an option.

All models can be optionally configured with TeleVideo's Model 9103 Integral Terminal Modem. This is an originate-only, FCC-approved modem specially designed for use in TeleVideo's terminals. The modem features an automatic re-dial capability, and uses the terminal's numeric pad as the touch-tone dialer. The 9103 requires only the available telephone line and not the telephone itself.

Nationwide field service for TeleVideo terminals is available through General Electric Company's Instrumentation and Communication Equipment Service shops. ▷



*Model 910 is a basic conversational terminal. Priced at \$699, the 910 competes with other low-priced units as the Hazeltine Esprit, the ADDS Viewpoint, and Lear Siegler's new ADM 21.*

### ▷ TRANSMISSION SPECIFICATIONS

Transmission is asynchronous in half- or full-duplex at nine switch-selectable rates from 75 to 9600 bps on Models 912/920, and at 15 selectable rates from 50 to 19,200 bps on all other models. 10- or 11-bit ASCII code is used, and odd, even, mark, or space parity can be selected. RS-232-C and 20mA current loop interfaces are standard (current loop is optional on Models 910 and 925). An auxiliary RS-232-C printer port is standard on Models 912, 920 and 925. A gated printer port is standard on Model 910, and a buffered auxiliary port is standard on Model 950.

Also optionally available is the Model 9103 Integral Terminal modem. It is an originate-only, FCC-approved modem designed for use inside all TeleVideo 900 Series terminals.

### DEVICE CONTROL

Cursor functions include up, down, left, right, and home. Any desired cursor position can be obtained using an absolute cursor address of Y (line) and X (column) combination. The cursor appears as a reverse video block, either solid or blinking; the cursor is also addressable, for use with the optional additional page (or pages) of memory.

Editing functions include clear screen, character typeover, clear unprotected positions, character insert and character delete, line insert and line delete, erase to end of line or field, and erase to end of page. Line on page edit is available on Model 950, Model 910 contains no editing capabilities.

A protect mode is available for designating protected fields (except on Model 910). In protect mode, those character positions designated as protected (lower intensity) cannot be modified. The cursor cannot enter a protected field, and will be advanced through that field to the next unprotected position.

Forward and back tabs are set using columns of protected characters in protect mode. Typewriter-style tabs are offered when not in protect mode. Up to 80 tab positions may be set without loss of character location.

Both blinking and blank fields can be designated over areas of the display. In areas that are blanked, characters are still entered into display memory.

▷ Character mode transmission can be accomplished in half- or full-duplex. In half-duplex, the terminals send and receive data in only one direction at a time. Characters are displayed on the screen and transmitted to the computer at the same time that they are typed from the keyboard. In full-duplex, the terminal sends and receives data in both directions simultaneously. Typed characters are echoed from the computer back to the terminal.

Data can also be sent and received in complete blocks (except on Model 910). Data up to a full screen can be entered by the operator. In block mode, characters are stored and displayed, but not transmitted until a special code sequence is received by the terminal, or by the depression of a send key on the 920. The edited data can be transmitted partially or completely.

The self test mode is used to verify the proper operation of the video display circuitry, the serial interfaces, and the control processor. The test consists of the transmission of the complete displayable character set, with all attributes (reverse video, underline, protected fields) exercised.

### COMPONENTS

**CRT DISPLAY UNIT:** A 12-inch (diagonally measured) CRT display with a capacity of 1920 characters arranged in 24 lines of 80 characters each. A 25th line for the display of status ▷

## TeleVideo 900 Series Display Terminals

### ➤ USER REACTION

During December 1981, Datapro conducted telephone interviews with four TeleVideo display terminal users. These users all have multiple units installed, with the largest user having approximately 1,500 terminals and the smallest, 15 terminals. All had been using TeleVideo displays for over a year. The users were asked to rate the terminals on a variety of characteristics, and their ratings are presented in the following table:

	Excellent	Good	Fair	Poor	WA*
Overall performance	4	0	0	0	4.0
Display clarity	4	0	0	0	4.0
Ease of operation	4	0	0	0	4.0
Keyboard feel & usability	3	1	0	0	3.8
Hardware reliability	3	1	0	0	3.8
Maintenance service	2	1	0	0	3.7
Technical support	2	1	0	1	3.0

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

The first user contacted was a large communications company with approximately 1,500 Model 920s installed. This user characterized the terminals, particularly the keyboard, as "almost indestructible." He reported that in the past year the company had experienced only about three failures among their large base of terminals. He added that this failure rate was "superb compared to others we've used."

The second user was a computer hardware manufacturer that uses approximately 75 Model 912, 920, and 950 terminals on an in-house basis. He maintained that the TeleVideo terminals were more reliable than comparable Lear Siegler terminals that he had used. The user also stated that when there was a component failure, the average turnaround time for new parts was about two weeks. While saying that in particular he was pleased with the user's manual, he added that the TeleVideo terminals were "superior compared to other units in that price range."

The third user contacted was also a computer hardware manufacturer with about 120 Model 920 terminals installed, all of which are used in-house. This user said that the terminals require minimal service, and when it was required, the average turnaround time was 10 days.

The final contact was made with a communications hardware vendor who has 15 Model 920 and 950 terminals, in addition to some ADDS and Lear Siegler units comparable in features and price. After some initial

problems with units that were "dead on arrival," this user said that he was currently very satisfied with the TeleVideo terminals. He maintained that they had experienced fewer problems with the TeleVideo units than with the other vendors' terminals, although they had more of the others installed. In closing, he stated that "feature for feature and dollar for dollar, they're (TeleVideo's terminals) very good." □

➤ information is available on Models 925 and 950. Characters are displayed in white (P4 phosphor) on Models 910, 912, and 920, and in green (P31 phosphor) on Models 925 and 950. Characters are formed via an 8 x 10 dot matrix on Models 910 and 925, via a 7 x 10 dot matrix on Models 912 and 920, and via a 14 x 10 dot matrix on Model 950. Upper and lower case characters are generated. Models 912 and 920 feature 96 displayable ASCII characters; Models 910 and 925 feature 128 displayable ASCII characters; and Model 950 features 128 displayable ASCII characters plus 15 special graphics characters. Models 910 and 925 feature four strappable character sets: English, French, German, and Spanish. Models 912 and 920 feature English and German, while Model 950 features English only.

**KEYBOARDS:** All models feature a typewriter-style keyboard with a numeric pad. Models 910 and 912 include 82 keys. Models 920, 925, and 950 include 101 keys, including 11 special function keys, six editing keys, and two transmission keys. Model 910 includes 10 preprogrammed function codes; all other models feature 22 function codes. Models 910, 912, and 920 feature attached keyboards; the keyboards on Models 925 and 950 are detachable, connected to the monitor via a coiled (telephone-style) cord.

**MODEL 9103 INTEGRAL MODEM:** An FCC-approved, originate only modem which is optionally available on all TeleVideo 900 Series terminals. The 9103 uses a standard telephone cable with a six-pin modular plug to connect to the telephone line. Operating speed is 300 bps in full-duplex mode. The 9103 is Bell 103/113-compatible.

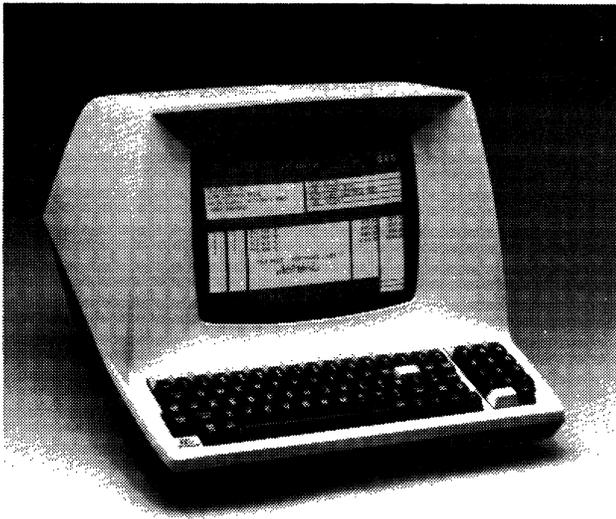
### PRICING

The TeleVideo terminals are available for purchase only. Quantity and OEM discounts are available:

	Purchase Price
Model 910	\$ 699
Model 912	925
Model 920	995
Model 925	995
Model 950	1,195
912/920-second page of memory	80
950-extra page of memory	95
950-3 extra pages of memory	285
Integral Modem	349
20mA Current Loop (910/925)	50■



# TeleVideo Model 912/920 Series Display Terminals



The TVI 920B features a standard teletype-style keyboard, plus 11 special function keys, six editing keys, and two transmission keys, all of which are configured in the top row of the keyboard. The display screen measures 12" diagonally, and has an etched finish to reduce glare. Display capacity is 1920 characters, and an additional 1920 characters may be stored in an optional second page of memory.

## MANAGEMENT SUMMARY

The TeleVideo Model 912/920 Series currently consists of four terminal models: the 912B, 912C, 920B, and 920C. The 912 models have the standard features common to all four models, while the 920 models offer 11 special function keys, six editing keys, and two transmission keys as additional standard features on the keyboard. The "B" models differ from the "C" models in the keyboard style—the "B" models feature teletype-style keyboards, while the "C" models feature typewriter-style keyboards. All keyboards have a dedicated numeric pad.

The TeleVideo terminals are under microprocessor control, and feature the following video attributes: dual intensity, reverse video, blinking fields/blank fields, protected fields, underlining, blinking cursor, and line/character insert/delete. Block or character transmission is accommodated, and a self test capability is standard.

Display screen capacity is 1920 characters in a 24-line by 80-column format. A second page of memory, providing storage for an additional 1920 characters, is optional. The 96-character ASCII set is displayed. Characters are formed utilizing a 7 x 10 character matrix with 12 x 10 resolution. The screen measures 12" diagonally, and has an etched finish to reduce glare.

Models 912C and 920C can be optionally configured with TeleVideo's Model 9103 Integral Terminal Modem. This ►

A family of microprocessor-controlled video display terminals offering a choice between typewriter- and teletype-style keyboards.

The following are standard features for all of the models in the family: dual intensity, blinking fields/blank fields, reverse video, protected fields, underlining, blinking cursor, tabbing, line/character insert/delete, block and character transmission modes, and self test capability. Display capacity is 1920 characters in a 24-line by 80-column format. An optional second page of memory provides storage for an additional 1920 characters.

Purchase prices for the TeleVideo terminals range from \$875 to \$995.

## CHARACTERISTICS

**VENDOR:** TeleVideo, Inc., 2149 Paragon Drive, San Jose, CA 95131. Telephone (408) 946-8500.

**DATE OF ANNOUNCEMENT:** November 1978.

**DATE OF FIRST DELIVERY:** March 1979.

**SERVICED BY:** General Electric Co., Instrumentation and Communication Equipment Service shops.

## MODELS

Four models are currently available: 912B, 912C, 920B, and 920C. "B" models come with teletypestyle (flat) keyboards, while the "C" models are equipped with typewriter-style (tiered) keyboards. The 920 models feature special function keys, edit keys, and transmission keys that are not available on the 912 models.

## TRANSMISSION SPECIFICATIONS

Transmission is asynchronous in half- or full-duplex at switch-selectable rates of 75, 110, 150, 300, 600, 1200, 2400, 4800, and 9600 bits per second. 10- or 11-bit ASCII code is used, and odd, even mark, or space parity can be selected. Block or character mode transmission can be used. RS-232-C and 20mA current loop interfaces are standard, as well as an auxiliary RS-232-C printer port.

Also optionally available is the Model 9103 Integral Terminal modem. It is an originate-only, FCC-approved modem designed for use inside the 912C and 920C terminals.

## DEVICE CONTROL

Cursor functions include up, down, left, right, and home. Any desired cursor position can be obtained using an absolute cursor address of Y (line) and X (column) combination. The cursor appears as a reverse video block, either solid or blinking; the cursor is also addressable, for use with the optional second page of memory. ►

## TeleVideo Model 912/920 Series Display Terminals

➤ **Modem.** This is an originate-only, FCC-approved modem specially designed for use in TeleVideo's "C" model terminals. The modem features an automatic re-dial capability, and uses the terminal's numeric pad as the touch-tone dialer. The 9103 requires only the available telephone line and not the telephone itself.

TeleVideo is a privately-held company that was founded in 1975, and began commercial deliveries in March, 1979. Field service for TeleVideo terminals is available through General Electric Company's Instrumentation and Communication Equipment Service shops. □

➤ **Editing functions** include clear screen, character typeover, clear unprotected positions, character insert and character delete, line insert and line delete, erase to end of line or field, and erase to end of page.

A protect mode is available for designating protected fields. In protect mode, those character positions designated as protected (lower intensity) cannot be modified. The cursor cannot enter a protected field, and will be advanced through that field to the next unprotected position.

Forward and back tabs are set using columns of protected characters in protect mode. Typewriter-style tabs are offered when not in protect mode. Up to 80 tab positions may be set without loss of character location.

Both blinking and blank fields can be designated over areas of the display. In areas that are blanked, characters are still entered into display memory.

Character mode transmission can be accomplished in half- or full-duplex. In half-duplex, the terminals send and receive data in only one direction at a time. Characters are displayed on the screen and transmitted to the computer at the same time that they are typed from the keyboard. In full-duplex, the terminal sends and receives data in both directions simultaneously. Typed characters are echoed from the computer back to the terminal.

Data can also be sent and received in complete blocks. Data up to a full screen can be entered by the operator. In block mode, characters are stored and displayed, but not transmitted until a special code sequence is received by the terminal, or by the depression of a send key on the 920. The edited data can be transmitted partially or completely.

The self test mode is used to verify the proper operation of the video display circuitry, the serial interfaces, and the control

processor. The test consists of the transmission of the complete displayable character set, with all attributes (reverse video, underline, protected fields) exercised.

### COMPONENTS

**DISPLAY UNIT:** The 12" diagonal screen has a display capacity of 1920 characters in a 24-line by 80-column format. Characters are formed utilizing a 7 x 10 dot matrix with 12 x 10 resolution, and are displayed in P4 white phosphor on a dark background (black characters on a white background for reverse video). A 96-character ASCII set with upper and lower case is generated. Dual intensity, blinking fields, blank fields, and underlined fields are featured.

**KEYBOARDS:** "B" models feature a teletype-style keyboard, and "C" models feature a typewriter-style keyboard. These keyboards are modeled after the most popular teletype and typewriter keyboard designs, for ease of operator use.

The 912B has an 84-key teletype-style keyboard consisting of alphanumeric characters, symbols, control keys, and a numeric pad.

The 912C has an 82-key typewriter-style keyboard consisting of alphanumeric characters, symbols, control keys, and a numeric pad.

The 920B has a 103-key teletype-style keyboard consisting of alphanumeric characters, symbols, control keys, a numeric pad, 11 special function keys, six editing keys, and two transmission keys.

The 920C has a 101-key typewriter-style keyboard consisting of alphanumeric characters, symbols, control keys, a numeric pad, 11 special function keys, six editing keys, and two transmission keys.

### PRICING

The TeleVideo terminals are available for purchase only. Quantity and OEM discounts are available:

	<u>Purchase Price</u>
912B	\$875
912C	925
920B	945
920C	995
Second page of memory	80
Model 9103 Integral Modem	349■