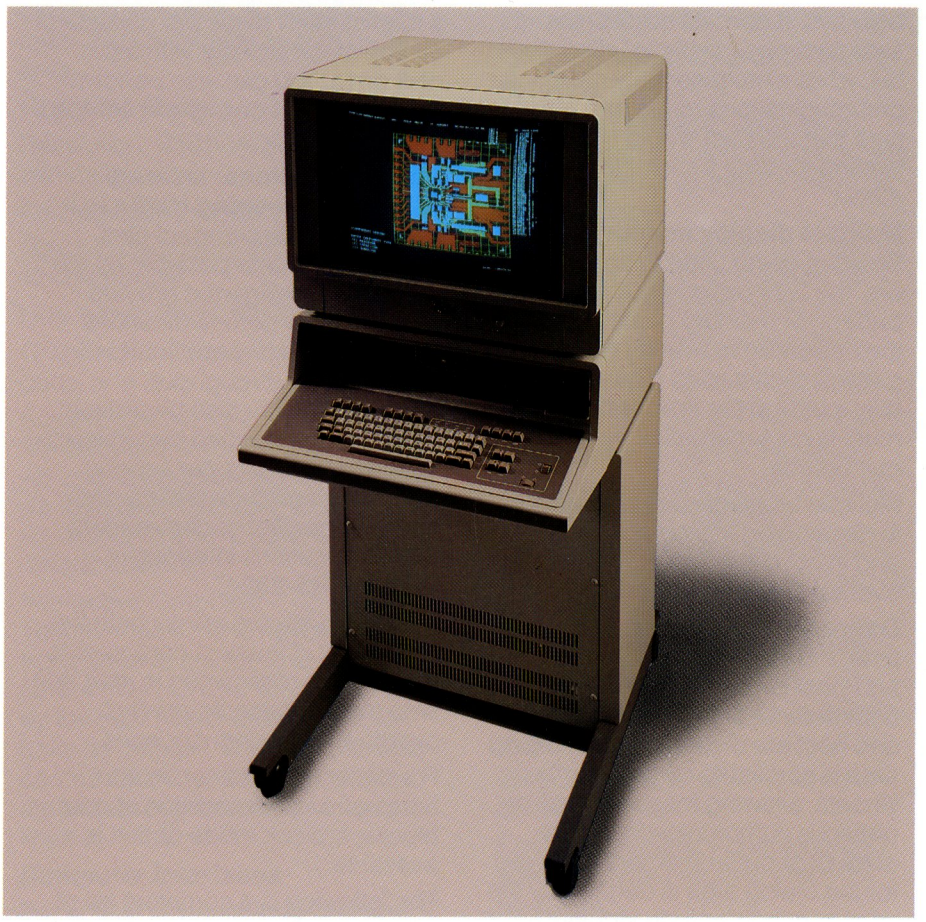
Raster scan color display with local picture segments, 2-D transforms, true zoom and pan, and up to four display memory planes. Compatible with Tektronix 4010 Series and other members of the 4110 Series.

COMPUTER DISPLAY TERMINAL



New capabilities of color combined with local intelligence. The 4113 Computer Display Terminal continues the evolution of the 4110 Series of intelligent display terminals by adding color raster features while maintaining compatibility with the monochrome raster 4112 and the high resolution storage tube 4114.

The 4113 has all the unique features of the 4112 such as local true zoom and pan and multiple viewports. In addition, three bit planes are standard and provide the capability of displaying any 8 colors at one time out of a palette of 4,096 colors. An optional bit plane is available to expand the number of colors displayed to 16. These colors are easily selectable and identifiable by using the hue, lightness, and saturation method pictured in the Tektronix Color Standard.

The display of the 4113 is a 483mm (19 inch), 640x480 delta gun, shadow mask color raster display that refreshes at a 60 Hz non-interlaced rate. This refresh rate eliminates the flicker characteristic of 30 Hz interlaced displays. The elimination of flicker and the quality of the display are extremely important considering the human factors of the terminal and the necessity to provide for viewer comfort.

The 4113 incorporates the valuable local features of the other 4110 Series products that enhance user interactivity and graphics capability while radically reducing the load on the host and the volume of communications traffic. These features include:

Local picture segments. A local picture segment is a group of graphic primitives that describes a portion or segment of a picture. These primitives are retained in the terminal's memory to be redrawn and manipulated at any time by using the 4113's local "segments" capability. Eight programmable function keys are provided for user-definable functions that may be used locally.

Schematic components, symbols, titles, and text can be defined as segments, for example, then stored in local memory and redrawn in their specified color when needed, with minimal computer time and communications traffic required.

2-D Transforms. Local segments may also be rotated, scaled, or translated (moved around the screen), by a simple short command from the host processor.

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Zoom and pan. An addressable display space of 4096x4096 points is accessible locally by simple, key-actuated zoom and pan or via the host. The thumbwheel controls are used to pan the display with a rectangular cursor and to set the viewport dimensions of the magnified image.

With this magnification capability, the user can view and work with plots of the same complexity as those developed on the highest resolution Tektronix storage tube displays. It permits addition or examination of extremely fine detail, while simultaneously reducing communications traffic and the time that the user would spend waiting for data transmitted from a host.

Multiple display memory planes. Besides being used to specify colors, the 3, or optionally 4, bit map buffers, or memory planes, provide the capability to overlay text and/or graphic information. This is particularly useful in the preparation of multi-layer schematics such as circuit boards.

Multiple bit planes are also useful in developing limited animation and in double buffering to reduce overlap viewing and redraw time.

Definable dialog area. At any time, the user can specify the size and position of the region where communications between terminal and host are displayed. This dialog area is scrollable by the thumbwheels, allowing for easy recall of previous communications. The amount of buffer memory reserved for the dialog area is defined by the user and may include virtually all of the terminal's memory, if desired.

Memory. The standard 4113 memory consists of 32K bytes of RAM and 88K bytes of ROM. It is expandable incrementally up to a total of 800K bytes of RAM, so capacity can continually expand with the application need. Extensive use of segments capability will require RAM expansion.

For convenient, local storage of fonts, macros, and other elements, one or two optional, integral flexible disk drives can be specified to add a total of 494K bytes per diskette of off-line mass storage with each disk drive. You can also perform background spooling and off-line plotting functions.

Communications: an array of tools for keeping traffic to a minimum. The compact host commands made possible by the 4113 local intelligence provide dramatic new communications efficiencies in any application. Several other throughput advantages may also be utilized, including a sustained transmission speed of 9600 bits per second. Receiving and transmitting rates may be specified independently. Communications interface is standard RS-232-C.

A flagging feature allows both the terminal and the host computer to signal each other when to start and stop transmission, to prevent overflowing the input queues.

For better error detection and automatic retransmission of data blocks, a block mode option is available.

The following is a complete list of 4113 options currently available. All (except Option 21) are field installable, enabling an easy upgrading of capabilities to meet evolving applications.

Option 1. Extended Communications. Includes half-duplex and block mode.

Option 2. Current-Loop Interface. Converts RS-232 signal levels to 20-milliampere current-loop signals.

Option 4. Special Keyboards. These provide the keyboard and firmware for specific language requirements, including United Kingdom (Option 4A), Swedish (Option 4C), APL (Option 4E), and Danish-Norwegian (Option 4F).

Option 10. Three-Port Peripheral Interface. A single interface with three RS-232 connectors and associated firmware that permit the terminal to be used with a plotter printer or other RS-232-C device, without that device being placed between the terminal and the host computer. Enables background spooling from host to port or port to port.

Option 12. External Video Output. Converts 60 Hz, non-interlaced RGB video to 30 Hz interlaced RGB video (or with the 50 Hz version, converts 50 Hz non-interlaced RGB video to 25 Hz interlaced RGB video). Also allows the 4113 to be synchronized with an external source. May be required for use with some hard copy units or with some external monitors.

Option 13. 11″ x 11″ Graphic Tablet with pen.

Option 14. 30″ x 40″ Graphic Tablet with pen.

Both include controller, tablet, and interface. They allow easy, accurate digitizing of virtually any graph or drawing with pen point, one-button or four-button cursor. These tablets represent two-fold increase in accuracy over previous tablets. Note that these tablet options are compatible with 4110 Series terminals only, adding greater accuracy and increased resolution up to 200 points/inch. Other graphic tablets are not compatible with the 4110 terminals.

Option 21. Display Memory Plane. An additional 640x480 bit map buffer that expands the number of simultaneously displayable colors from 8 to 16 as well as increasing the capabilities for overlays, double buffering, and limited animation effects.

Option 24. Additional 32K bytes of RAM.

Option 25. Additional 64K bytes of RAM.

Option 26. Additional 96K bytes of RAM.

Option 27. Additional 128K bytes of RAM.

Option 28. Additional 256K bytes of RAM.

Option 29. Additional 512K bytes of RAM.

Option 42. Single Flexible Disk and Disk Controller.

Option 43. Dual Flexible Disk and Disk Controller. Flexible disk units and controller provide the convenience and security of local removable mass storage media with up to 494K bytes of user file storage per diskette. The diskettes may be formatted to optimize the directory size to maintain from 368 to 1872 user files. Each file is referenced by a name which may be from one to nine characters long.

Option 52. Specify Voltage and Hz.

Option A1—220V/16A 50 Hz operation. Universal Euro Plug.

Option A2—240V/13A 50 Hz operation. United Kingdom Plug.

Option A3—240V/10A 50 Hz operation. Australian Plug.

Option A4—240V/15A 60 Hz operation. North American Plug.

All options and displays will be set for 50 Hz operation when these options specify 50 Hz.

Specifications:

Keyboard

Normal Keyboard: 72 typewriter paired upper and lower case, programmable and auto repeating (seven lighted); 8 user-definable programmable function keys, 4 terminal control keys, and 4 special keys for zoom and pan function.

Other controls: Thumbwheels control graphic cursor, zoom-pan function, and scrolling; audible bell alarm.

Alphanumeric Mode

Standard Character Set:
Full ASCII set of 94 displayable characters, or 128 displayable characters in "snoopy mode".

Optional Character Sets: United Kingdom (Option 4A), Swedish (Option 4C), APL (Option 4E), Danish/Norwegian (Option 4F).

Character Format: 80 columns, 34 rows, 7x9 dot matrix in an 8 by 14 area.

Graphics Mode

Resolution: 640 horizontal by 480 vertical pixels.

Addressability: 4096 x 4096 points.

Graphic command syntax: PLOT 10 compatible.

Line Types: Solid, dashed, erase.

Graphic Primitives: Vectors, polygons, and text.

Color: Eight colors are provided on the standard (three bit plane) 4113. An optional additional bit plane expands this to 16 colors. Colors are selected from a palette of 4096 different colors.

Interactive Graphics:
Thumbwheels in the keyboard control a graphic cursor. The graphic cursor may have its shape defined by the user (with hardware crosshairs as default). The user can also control zooming, scolling, and the alpha cursor position by keyboard keys.

Computer Interfaces

Basic data communications interface, EIA RS-232-C compatible, full or half-duplex.

AC Power

90 to 132 Vac, 10A maximum
50 or 60 Hz or 198 to 250 Vac, 5A maximum, 50 or 60 Hz.

Physical Characteristics

Dimensions: Height—1.35 m (53 in); Width—58.4 cm (23 in); Depth—78.7 cm (31 in); Weight—125 kg (175 lbs).

Companion Products

4612 Hard Copy Unit (requires Opt. 12 on 4113) (Bi-level copies only)
4632 Hard Copy Unit
4634 Hard Copy Unit
4662 Interactive Digital Plotter
4663 Interactive Digital Plotter

Software

PLOT 10 Software provides access to proven graphics software. Existing 4010/4012 applications programs that use Terminal Control System (TCS) will run on the 4113 in emulation mode. New application programs that take advantage of the advanced features of the 4113 use PLOT 10 Interactive Graphics Library (IGL).

Graphic Tablet Characteristics
(Options 13 and 14)

Proximity Distance: Data will be stable if pen stylus or cursor is held stable within 3.97 mm (0.156 in) of tablet surface.

Proximity Area: Option 13—280 by 280 mm (11 by 11 in); Option 14—760 by 1020 mm (30 by 40 in).

Resolution: 0.127 mm (0.005 in).

Accuracy: ±0.0254 mm (±0.010 in).

Repeatablity: ±0.127 mm (±0.005 in).

Dimensions of Option 13 Tablet: Active surface is 279 mm wide by 279 mm high (11 by 11 in).

Option 14 Tablet: Active surface is 1.016 mm wide by 762 mm high (30 by 40 in).

Flexible Disk Characteristics
(Options 42 and 43)

8 inch single-sided double-density diskette.

IBM Compatible soft-sectored recording format.

Cyclic redundancy checking and automatic data recovery retry for reliability.

Direct memory access.

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Some of the products, options and services mentioned in this brochure are not available outside the USA. Contact your local Tektronix representative for details.

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