MEGATEK SPECIFICATION

7000 SPEC SHEET

1 JUNE 1978

The MEGRAPHIC 7000 is a microprocessor-based, self-refreshing vector graphic system. It features high performance interactive computer graphics in a powerful, modular, yet economical package. The MEGRAPHIC 7000 brings state of the art technology to computer graphics.

As with all MEGRAPHIC Series display systems, the 7000 is a total refresh system. The design provides for a highly interactive, user oriented graphics station with a full range of sophisticated display capabilities. Selective erase of any screen information can be accomplished without affecting the remainder of the image.

The Graphic Display Unit (GDU) of the MEGRAPHIC 7000 comprises a number of independent modules connected to one another by an asynchronous tri-state bus structure. Each module plugs directly into a motherboard backplane which resides in a chassis, rack-mountable or table-top, containing its own power supplies. This advanced architecture not only allows for future expansion or the addition of options, but also facilitates field service.

The 7000 may be used in conjunction with most current minicomputers. Display commands are transferred between the 7000 and the host computer in either programmed I/O or DMA modes. Standard host computer interface modules are available for the most popular minicomputers and a Universal Interface Module (UIM) simplifies connection to others. Because the 7000 contains its own RAM refresh memory and a microcontroller for hardware-implemented graphics features, memory requirements and loading of the host computer are minimized.

MEGATEK's sophisticated Graphic Processor is built around a proprietary microcontroller utilizing bipolar slice architecture for exceptional speed and versatility. This 32-bit-wide microcontroller controls access to the graphics display list stored in the memory module. The micro interprets the display data, controls microcode-implemented graphics functions and prepares X-Y coordinate pairs for input to a FIFO memory.

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A FIFO buffer between the graphics processor and vector generator optimizes maximum average throughput and permits the digital portion of the system to keep up with the very fast analog circuitry. High speed normalize circuits insure constant vector intensity regardless of vector length.

The Vector Generator incorporates a proprietary MEGATEK design that provides an exceptionally sharp, constant intensity vector. End point matching is precise; vector quality is unsurpassed.

Each vector generator can control two monitors, with either identical or different images. Two vector generator modules can be plugged into each 7000 chassis. Thus, a total of four individual displays can be driven by one MEGRAPHIC 7000 system, greatly reducing the cost of each workstation in a cluster.

The 7000 display processor offers a full range of sophisticated graphics display capabilities such as scaling, rotation, translation, and clipping. In addition to the standard 96-character ASCII subset, the hardware character generator will accommodate special user-defined symbol sets.

Twelve-bit resolution is standard on the 7000, as are hardware translation, dashed lines, and blinking. Hardware rotation, scaling, and clipping are options which may be added at any time. Sixteen levels of vector intensity allow precise control of shading and figure differentiation.

An advanced 21" (diagonal) electromagnetic deflection monitor provides sharp, bright pictures, even in a high brightness environment. Available with any of a wide range of phosphors, the monitor has excellent line quality. Spot size is 15 mil standard; 10 mil is available as an option. The monitor has an attractive table-top housing which, if desired, can be removed for rack mounting.

The screen is organized with the origin (0,0) at the center and a range of -2048 through +2047 for each axis. The X and Y coordinate axes may be redefined in user units and the origin may be translated under program control by the user.

For maximum flexibility, speed, and resolution, the 7000 operates with a 32-bit display word. The memory modules use extremely fast 4K RAMS for display refresh. Each module

can accept up to 4K words (32-bit) RAM and 2K words (32-bit) PROM. Refresh memory may be expanded up to 32K 32-bit words. An additional 32K is reserved for character and symbol sets as well as device addresses used in the 7000.

The MEGRAPHIC 7000 is based upon a dual tri-state bus structure: the graphics processor, vector generator, and memory modules reside on the Graphics Bus while graphics peripherals (e.g. keyboard, joystick, data tablet, plotter, etc.) are interfaced through the Peripherals Bus. An Input Peripheral Control Unit (IPCU) interfaces up to three peripherals (one keyboard, one joystick, and one data tablet) to the Peripherals Bus. The IPCU is an intelligent device which handles routine interrupt servicing of these peripherals, further reducing loading of the host CPU. Characters may be entered from the keyboard into a user-defined scrolling text area of the screen and the joystick or digitizer cursor may be tracked locally.

MEGATEK's Graphic Software package (MGS) is a set of powerful, user-oriented routines designed to speed applications software development. Callable from FORTRAN, these routines allow the user to create and modify display lists, change the flow of command execution, and manipulate images. Standard functions include:

1) Picture Definition. Up to 32 sub-pictures, each of any complexity, may be individually displayed, manipulated, or modified. The screen origin and range for each picture may be defined in user units.

2) Absolute, Relative and Incremental Vector Types. Relative vectors may be either large deflection long form or memory-saving short form. Incremental types, half absolute and half relative, simplify special operations.

3) Alphanumeric Text and Special Symbols. Drawn from our standard hardware character set or a user-defined symbol set in firmware, characters may be drawn in any of seven displayable sizes and at any of four rotation angles. Strings of any length may be created or symbols may be overlaid.

4) Display List Addressing. Memory used for the display list refresh buffer may be addressed in absolute terms or a label assigned to any point in the list. Graphics commands may be appended, inserted, or deleted without affecting the labelled position.

5) Branch Instructions. Absolute or vectored display list jumps may be made to display addresses or labels. Four levels of graphics subroutine capability save refresh memory and programming effort.

6) Picture Manipulation. Picture information may be rotated, scaled, and clipped with the execution of a single display command.

7) Peripheral Control. Graphics peripherals, input and output, are fully supported by MGS. The operator may easily interact with the system to modify the presentation in real time.

8) Special Graphics Processor Functions. The user can control multiple displays, change refresh rate, and regulate graphics command execution.

The MEGRAPHIC 7000 is an advanced graphic display system utilizing state of the art technology. The combination of powerful standard modules, plus optional features which can be configured to meet almost any application requirement, make the MEGRAPHIC 7000 the most versatile low cost, high resolution, quality vector graphic system available.

HARDWARE

Graphic Display Unit	Self-contained, 12 slot chassis, rack mountable, or table top (option). Dual bus architecture: Peripheral and Graphics
Graphics Processor	High speed 32-bit bipolar slice architecture
Vector Generator	FIFO buffered for optimum throughput
	Analog Stroke Output (X, Y, Z) 5± volt plus TTL Unblank
	Multiple Monitor Option
Memory Module	Up to 4K words RAM (32-bit) plus 2K words PROM (32-bit) per module
	8 Memory Modules, maximum
	Cycle time: 500 ns standard, 200 ns optional
Computer Interface	Interfaces host processor to tri-state Graphics Bus via programmed I/O or Direct Memory Access (DMA)
Input Peripheral Control Unit	Interfaces input peripherals to host CPU through 7000 Peripherals Bus. Handles routine interrupt servicing
Resolution	12 bits, 4096 x 4096, standard
Intensity Levels	16, standard
Refresh Rate	60 HZ and Free Run, standard Programmable Refresh, optional
Hardware Blink	Standard
Dashed Lines	Standard
Absolute Jump	Standard
Relative Jump	Standard
Jump Subroutine	4 levels, standard

Vectors:	
Absolute	12 bits X and Y
Relative (short)	7 bits ΔX and ΔY with multiplication
Relative (long)	12 bits ΔX and ΔY
Incremental X, abs Y	12 bits X and Y
Incremental Y, abs X	12 bits X and Y
Characters	4 per word
Hardware Translation	Standard
Hardware Rotation	Optional
Hardware Scaling, Zoom	Optional
Multiple Monitors	Optional (4 maximum)
Keyboard Interface	Optional
Joystick Interface	Optional
Data Tablet Interface	Optional
Hardware Character Generator:	Optional
8 Character Sizes	Standard
4 Rotations (0,90,180,270 degrees)	Standard
Upper/Lower Case ASCII	Standard
User-Defineable Characters	Optional

Vector Capability (@ 30 fps refresh)		
½" long vectors (relative)	14,000	
1" long vectors (absolute)	12,500	
5" long vectors (absolute)	5,300	
10" long vectors (absolute)	2,500	
Maximum inches	35,000	vector inches
Characters (Hwd)	3,000	(typical)
End Matching	Better than .010 inch, .005" typical	
End Closure	Better than .010 inch, .005" typical	

Monitor

21" (Diagonal) Electromagnetic Deflection with 13" x 14" viewable area, Table-top enclosure	Standard
Controls:	
Front	Intensity, Focus
Rear	X,Y Gain X,Y Position Power, On/Off
Spot Size	
15 Mil	Standard
10 Mil	Optional
Cable Length	8 ft., Standard

Keyboard

Upper/Lower Case ASCII	Standard
Parallel (8 bit)	Standard
20 Function Keys	Standard
Joystick	Optional

Package

Graphic Display Unit	
8 3/4" High, 19" Rack Mountable (w/slides)	Standard
Table Top	Optional
12 Slots	Standard
Circuit Board Size	7¼" x 10"
Power Supply	±15V .9 amps +5V 19 amps
Controls	Power On/Off
Data Table (for CRT & User Space)	48" wide x 30" deep
Equipment Bay	18 3/4" Panel Space, 30" Depth

Peripherals

Joystick (with or without push button interrupt)	Optional
Data Tablet (11" x 11")	Optional
Digitizer up to (42" x 60")	Optional
Pen Plotter	Optional
Electrostatic Printer/ Plotter	Optional

Minicomputer

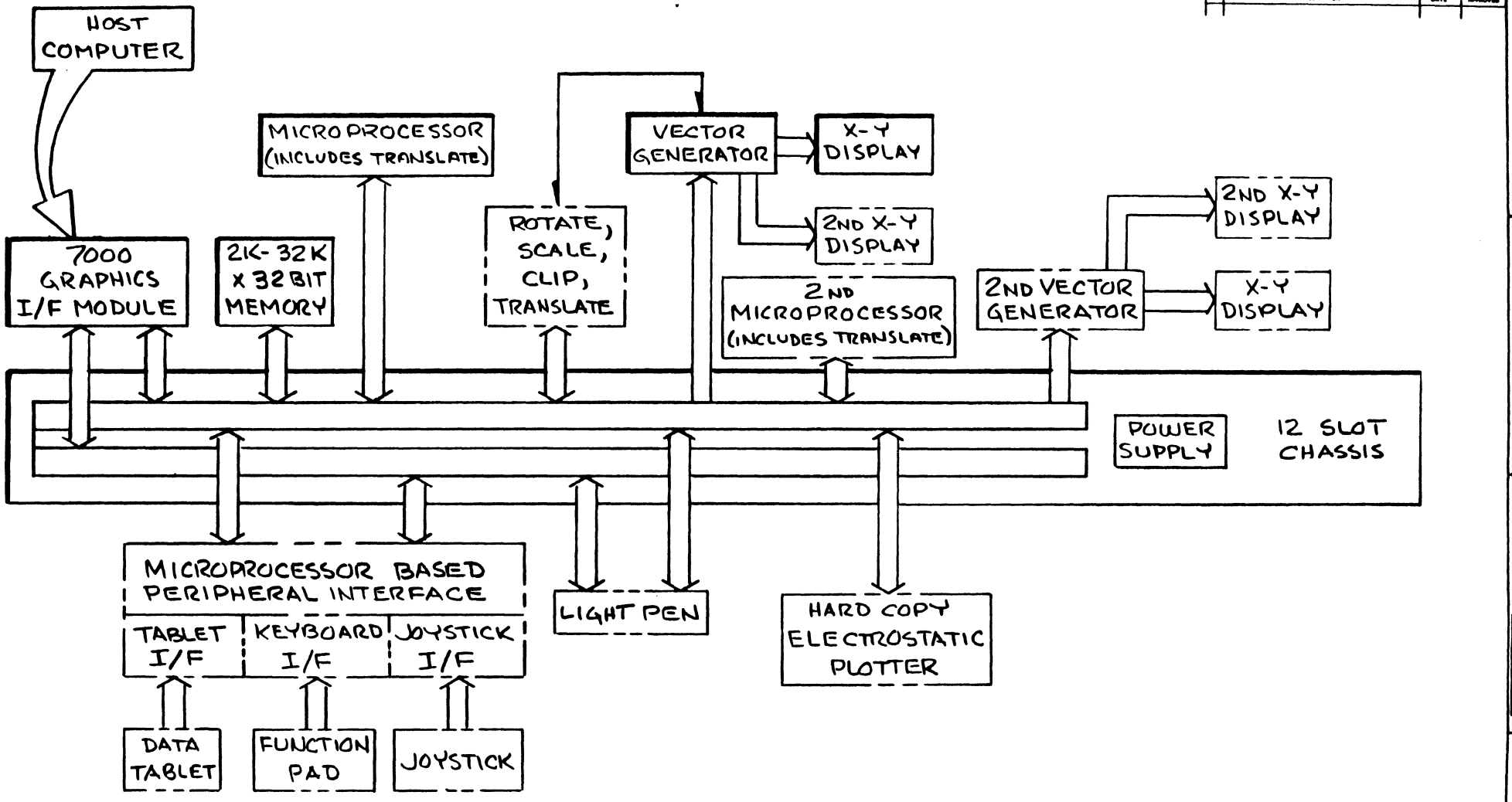
Interface (DMA)	
PDP-11	Standard
NOVA 3 or ECLIPSE	Standard
Universal I/F	Standard
NOVA 3	Optional
PDP-11/04 or PDP-11/34	Optional

Electrical

115/230 VAC, 3 wire, 50/60 Hz single phase, 1500 V.A.	Standard

SOFTWARE

FORTRAN-Callable Graphics Package (includes translate, scale, zoom, rotate, clip) for:	
Data General DOS, RDOS, RTOS	Standard
Digital Equipment Corp,	
RSX11M	Standard
RT11	Optional
Software Character Generator	Standard
Diagnostics	Standard



REVISIONS

LTR	DESCRIPTION	DATE	APPROVED

CONTRACT NO	MEGATEK CORPORATION
PREPARED	MG7000 CONFIGURATION WITH OPTIONS
CHECKED	
APPROVED	
SIZE B	CODE IDENT NO. / NUMBER
SCALE	SHEET