DECgraphic-11

GT46 Stand-Alone Graphics System

- Self Contained System
- Full PDP-11 Family Features
- Choice of Operating Systems
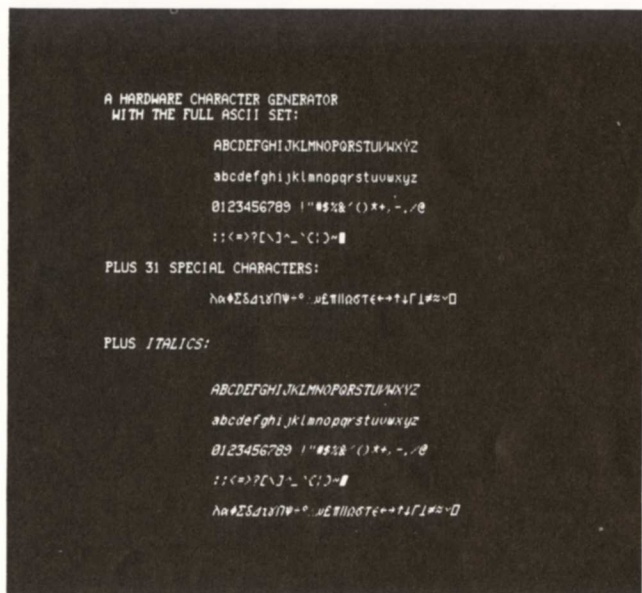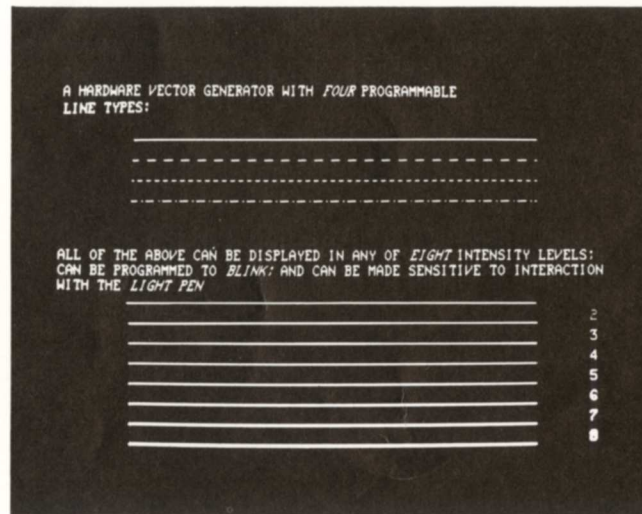- A DECgraphic-11 Family Member
- Refresh Display with Light Pen
- Wide Range of Peripherals
- Graphics Support Routines
- Single Source, World Wide Support

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THE DECGRAPHIC-11 GT46

The GT46 is a self-contained member of the DECgraphic-11 family of interactive graphics display systems.

The GT46 provides the user with rapid generation and dynamic changes of graphical information through the autonomous refresh capabilities of its display processor. On-line interaction with the user's application is readily achieved by a convenient hand-held light pen or optional 16-button function key pad.

The economical GT46 combines the power and versatility of the PDP-11T34 disk-based computer system with the graphical facilities of the VT11 display subsystem. It is thus ideally suited for a broad range of applications, from real-time data acquisition and display to simulation studies and computer aided design. It is fully supported by a comprehensive set of FORTRAN callable subroutines in RT-11 and RSX-11M environments.

FEATURES

- **Self-Contained System**
  A complete disk-based computer system with full hardware and software graphics support. Suitable for many applications in the basic configuration.

- **PDP-11 Family Features**
  PDP-11/34 includes an integral Memory Management Unit, Extended Instruction Set, and is expandable to 124K words of memory.

- **Choice of Operating Systems**
  RT-11 for real-time fast response. RSX-11M for multi-task operation.

- **A DECgraphic-11 Family Member**
  Being a member of the DECgraphic-11 series of interactive graphics systems means that application software written for the GT46 can be easily transferred to run on other DECgraphic-11 configurations. The integrated family approach brings the benefits of commonality in training, operating, programming, and documentation. Other DECgraphic-11 family members include graphics terminal systems, as well as high performance graphic systems using the upward compatible VS60 display subsystem.

- **Refresh Display with Light Pen**
  The GT46 incorporates the VT11 display subsystem. Since this is a refresh display subsystem, the GT46 graphics user derives the following benefits:
  —Good picture contrast.
  —Rapid picture generation and modification.
  —Direct memory access without CPU overhead.

  Closely coupled graphical interaction is then easily achieved with:
  —Solid state light pen (standard)
  —16 push-button unit (optional)

- **Wide Range of Peripherals**
  The GT46 can be used with any UNIBUS peripheral. Particularly useful in graphics environments are:
  —Graphic Plotters, Electrostatic Printer/Plotter
  —Real-Time A/D Interface

- **Graphics Support Routines**
  For application programs written in FORTRAN, the GT46 user can use DECgraphic-11 FORTRAN Support routines:
  Compatible with other DECgraphic-11 systems. Available under RT-11 or RSX-11M.
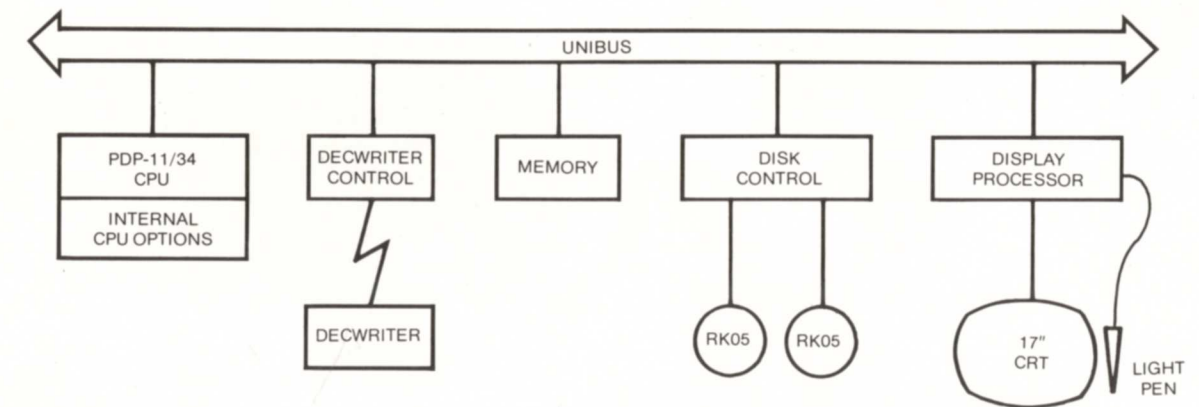 FORTRAN callable subroutines:
  —Picture Generation
  —Picture Modification
  —Interaction & Light Pen Tracking
  —Utility Routines

- **Single Source, World-Wide Support**
  The GT46 is the only interactive graphics system in its price range where the user can call upon a single supplier for his requirements—computer and graphics hardware; computer and graphics software; installation, training, and maintenance. No need to involve more than one supplier to meet a graphics requirement —and when that supplier is DIGITAL, it means ongoing dependable support from specialists in our 250 offices throughout the world.

GT46 SYSTEM CONFIGURATION

The GT46 Consists Of:
- PDP-11/34 Central Processor incorporating
  —Integer multiply/divide (EIS—Extended Instruction Set)
  —Memory Management Unit
  —Hardware Bootstrap Loader (M9301-YB)
- Programmer's console (KY11-LB)
- Graphics Display Processor with 17" (43cm) CRT Monitor and Light Pen (VT11-A)
- Console DECwriter (LA36)
- Serial Line Interface for LA36/Real-Time Clock (DL11-WA)
- 32K words (64K bytes) MOS or Core memory
- Two 1.2M word cartridge disk drives (RK05) and control (RK11)
- Table for CRT (H970-FA)
- Tall cabinet (72", 183cm) (H960-DH)

SOFTWARE
The successful implementation of any graphics application hinges on the effectiveness of the applications program in its working environment. A major stepping stone to success is the provision of a comprehensive package of graphics functional routines. Such a package allows the user to carry out complex real-time graphical manipulation and interaction in a simple and straightforward manner. The software optionally available with the GT46 provides these facilities.

At the operating system level, the user has a choice of two highly versatile PDP-11 operating systems: RT-11, a foreground/background monitor for dedicated applications needing fast response, or RSX-11M where graphics use can be carried out simultaneously with other tasks. Both of these operating systems provide a wide range of program utilities—editors, file management, debugging aids—for efficient program development and operation.

For the graphics facilities, a comprehensive set of software functions is provided under FOCAL/RT-11 and BASIC/RT. Even more extensive facilities are provided for FORTRAN users under both RT-11 and RSX-11M. These FORTRAN callable subroutines—DECgraphic-11 FORTRAN Support—are also applicable to extended versions of the GT46, which could include remotely coupled GT43 or GT62 display terminals.

EXPANSION SPACE:
Core Version	1 System Unit (SU)
MOS Version	1 SU, 2 Hex SPC Slots, 1 Quad SPC Slot, plus additional panel space in the cabinet

OPTIONS:
LK11:	16 Push Button Box
LV11:	Electrostatic Line Printer/Plotter
Plus,	full range of PDP-11 peripherals

ORDERING INFORMATION
Option designations in brackets are for 230V/50Hz:

32K Core System:	GT46-CA (GT46-CB)
32K MOS System:	GT46-MA (GT46-MB)

NOTE: Core version is slightly faster and the memory is non-volatile. The MOS version has more expansion space.

Software Ordering Information:
RT-11 Software License: QJ003-AE with either FOCAL (QJ922-AE), BASIC (QJ830-AE), or FORTRAN (QJ980-AE).

RSX-11M Software License: QJ620-AE (includes FORTRAN), plus Graphics Extensions (QJ641-AE).

SYSTEM SPECIFICATIONS
CRT Monitor
Screen Size:	17" (43cm) diagonal
Image Area:	9¼" X 9¼" (23.5cm x 23.5cm)
Phosphor Type (standard):	P39 with IR doping
Deflection Type:	Electromagnetic
Beam Spot Size:	Less than .02" (.5mm)
Discrete Intensity Levels:	8
Brightness:	30 foot lamberts (measured using a shrinking raster technique)
Contrast Ratio:	10:1

Display Processor
Type:	Direct Memory Access (NPR)
Instructions:	Set Graphic Modes
	Load Status Registers

Instructions:	No-Op
	Jump
Main Viewing Area:	1024 X 1024 rasters
Image Definition Area:	8192 X 8192 rasters
Hardware Parameter:	Blink
Refresh Rate:	Line Frequency or Unsynchronized (programmable)
Scissoring:	Hardware
Interrupts:	Light Pen
	Time Out
	Display STOP Interrupt
Physical:	1 System Unit
	20' (6.1m) Cable
	1 Bus Load

Vector Generator

Line Types:	Solid, long dash, short dash, dot dash
Modes:	Relative
	Relative Short (±32)
Technique:	Incremental Stroke
Drawing Speeds:	
Character	$26\mu sec$
Vectors	$18\mu sec$ for ½" vector
	$200\mu sec$ full screen vector
Absolute Point	$20\ \mu sec$
Relative Point	$18\ \mu sec$ for ½" increment

Character Generator

Code:	ASCII
Character Set:	Full 96 ASCII Set (upper and lower case) plus 31 special symbols
Modes:	Normal, Italics
Rows/Screen:	31 (42 optional)
Columns/Row:	72 (80 optional)
Drawing Speed:	$25\ \mu sec$/character

Other Modes

Absolute X,Y points
Relative X,Y points
X and Y graph plot modes

Interaction

| Light Pen: | Programmable sensitivity for any graphic element |

| Information Available to Programmer: | DPC location; absolute X,Y coordinates of light pen detect. |

CPU-PDP-11/34

- Single and double operand instructions
- Hardware implemented multiply and divide instructions
- 16-bit word (two 8-bit bytes)
- Parity detection on each 8-bit byte
- Memory addressing to 124K words
- Asynchronous operation
- 8 internal general purpose registers
- Automatic Priority Interrupt
- Vectored interrupts
- Power Fail and Automatic Restart

Memory

MOS

The basic unit of MOS memory, MS11-JP, contains 16K words of parity MOS memory. Each 16K words of MOS requires 1 hex mounting space. Cycle time 0.775 microsecond; access time 0.635 microsecond.

Core

The basic unit of Core memory, MM11-DP, contains 16K words of parity core memory. Each 16K words of core memory requires 2 hex mounting spaces. Cycle time 1.0 microsecond; access time 0.510 microsecond.

Disks

Two 1.2M word cartridge disk drives and control

Storage medium:	Disk cartridge
Capacity/cartridge:	1,228,800 words
Data transfer rate:	$11.1\ \mu sec$/word

Physical Dimensions:

Cabinet:	72" (183cm) H X 21" (53.3cm) W X 30" (76.2cm) D
CRT:	15" (38.1cm) H X 21.5" (54.6 cm) W X 27" (68.6cm) D
Table:	30" (76.2cm) H X 48" (121.9cm) W X 29" (73.7cm) D
Weight of GT46:	940 lbs. (includes cabinet, LA36, table and CRT)

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