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
THE DECGRAPHIC-11 GT46
The GT46 is a self-contained member of the DECgraphical-11 family of interactive graphics display systems. The GT46 provides the user with rapid generation and dynamic change 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-11/34 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 DECgraphical-11 Family Member**
  Being a member of the DECgraphical-11 series of interactive graphics systems means that application software written for the GT46 can be easily transferred to run on other DECgraphical-11 configurations. The integrated family approach brings the benefits of commonality in training, operating, programming, and documentation. Other DECgraphical-11 family members include graphics terminal systems, as well as high performance graphics hardware software systems using the upward compatible V660 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:
  - Very high picture contrast
  - Rapid picture generation and modification
  - Direct memory access without CPU overhead
  Closely coupled graphical interaction is then easily achieved:
  - Solid state light pen (standard)
  - 16 push-button unit (optional)
- **Wide Range of Peripherals**
  The GT46 can be used with any UNIBUS peripheral. Useful peripheral in graphics environments are:
  - Graphics 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 walk upon a single supplier for its 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.

The GT46 Consists Of:
- PDP-11/34 Central Processor incorporating Integrate multiply/divide (EIS—Extended Instruction Set)
  - Memory Management Unit
  - Hardware Graphic Bootstrap Loader (M9301-YB)
- Programmer's console (KY11-LB)
  - Graphics Display Processor with 12" (34cm) CRT Monitor and Light Pen (VT11-A)
  - Console DECWRITER (LA38)
  - 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)
  - Table for CRT (H980-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.

**GT46 SYSTEM CONFIGURATION**

**EXPANSION SPACE**
- **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-BC)
  - 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: QJ903-AE with either FOCAL (QJ902-AE), BASIC (QJ990-AE) or FORTRAN (QJ980-AE)

**SYSTEM SPECIFICATIONS**
- **CRT Monitor**
  - Screen Size: 17" (43cm) diagonal
  - Image Area: 5.5 x 3.5 (23.5cm x 23.5cm)
  - Phosphor Type (standard): P99 with IR doping
  - Deflection Type: Beam Spot Size: Less than 0.25" (.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) Set Graphic Modes Load Status Registers
Instructions: No-Op
Main Viewing Area: Jump
Image Definition Area: 1024 X 1024 rasters
Hardware Parameter: 8192 X 8192 rasters
Refresh Rate: Blink
Scissoring: Line Frequency or Unsyncronized (programmable)
Interrupts: Hardware
Physical: Light Pen
Display STOP Interrupt
1 System Unit
20' (6.1m) Cable
1 Bus Load
Vector Generator
Line Types: Solid, long dash, short dash, dot dash
Modes: Relative
Technique: Relative Short (±32)
Drawing Speeds: Incremental Stroke
Character
Vectors
26μsec
18μsec for ½” vector
200μsec full screen vector
20μsec
18μsec for ¼” increment
Absolute Point
Relative Point
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: 25μsec/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, MM11-0P, 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 μsec/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" (54.6cm) 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)