

## Product Description

Program Numbers A2-3D1 and A2-3D2



# Apple II\* Graphics Packages

(3D Graphics,  
Assembly Language Versions)

### A2-3D1

**Hardware Requirements**

Apple II microcomputer and video monitor.

**Memory Requirements**

32K minimum.

**Product Format**

DOS 3.2 standard (muffinable).

**Documentation**

32 page user's manual, 84 page technical manual, in a handsome three-ring binder.

### A2-3D2

**Hardware requirements**

Apple II microcomputer and video monitor.

**Memory Requirements**

48K.

**Software Requirements**

A2-3D1.

**Product Format**

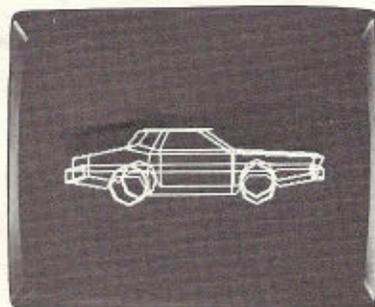
DOS 3.3 standard.

**Documentation**

62 page technical manual.



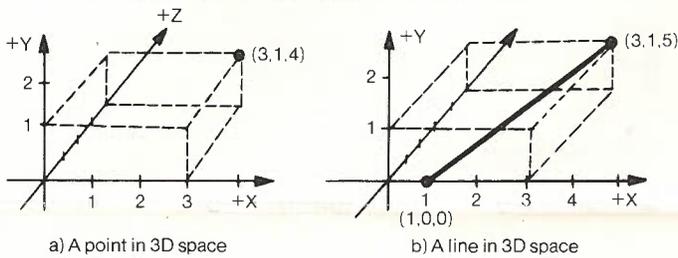
Shown are examples of the kinds of graphics possible with the A2-3D1 and A2-3D2 programs.



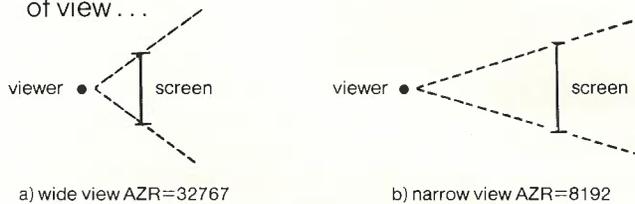
## Description

The A2-3D1 and A2-3D2 graphics packages contain sophisticated yet easy-to-use programs for 3D and 2D animation on the Apple II microcomputer. They are designed to accommodate the graphics needs of both new and experienced programmers. With either package you can:

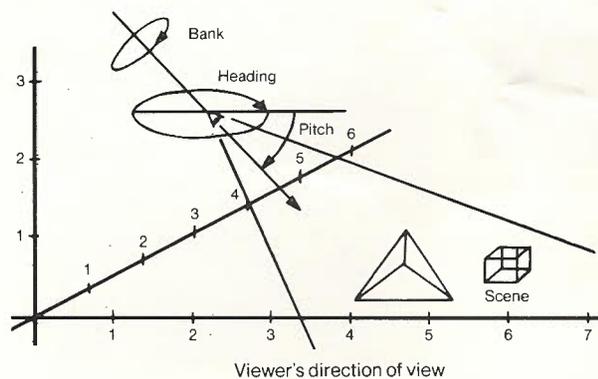
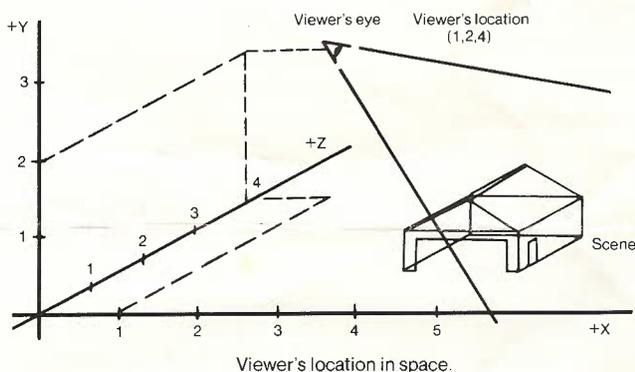
- a) View two- or three-dimensional scenes created in the standard XYZ coordinate system . . .



- b) "Zoom" between wide-angle and telephoto fields of view . . .



- c) Select a location in space and a direction of view.



## Standard Features of the A2-3D1

The A2-3D1 program rates "high" in a number of respects: high projection rate, high versatility, high control. And the extensive documentation makes it highly easy to use.

**Resolution.** You'll have 140 x 192 pixel resolution on the Apple II as your scenes appear on its screen.

**Speed.** Projection rates of 150 lines per second in the unclipped mode and 100 lines per second in the clipped mode are possible. A 42 millisecond screen erase subroutine is included in the package. A 20-line drawing will be presented at about 5 frames per second in the unclipped mode. If you are doing complex calculations of location and viewing angle, then the program speed will be reduced accordingly.

**Versatility.** You may specify your own scenes consisting of points and lines by giving XYZ coordinates of points and line end points. Coordinate values within a  $\pm 32767$  unit range may be entered and stored. Viewing location (XYZ) may be specified within a  $\pm 32767$  range, and you have full-circle viewing freedom of pitch, bank, and heading.

**Control.** A set of control programs is provided to give you unlimited utility in your educational, scientific, and game applications. These programs help you to create scenes and allow you to move dynamically through 3D space as follows:

You receive five sample data bases to view during familiarization. After familiarization, you may enter your own data bases as the "data base development program" requests. You may view your creations from different angles at any time during the development, and a "view finder program" helps find scenes as you move freely in 3D space. Scenes can be saved on cassette or disk. Data base relocation instructions let you move data bases in memory and thereby eliminate scene re-entry because of system or program change.

The movement program examples included allow you to change your location and viewing direction dynamically. Your scene will be viewed as you move through 3D space. A special subroutine is included that allows you to orbit your scene.

**Utility.** Two manuals which are written at different technical levels give all Apple users a quick understanding of access and uses from both assembly language and BASIC language levels.

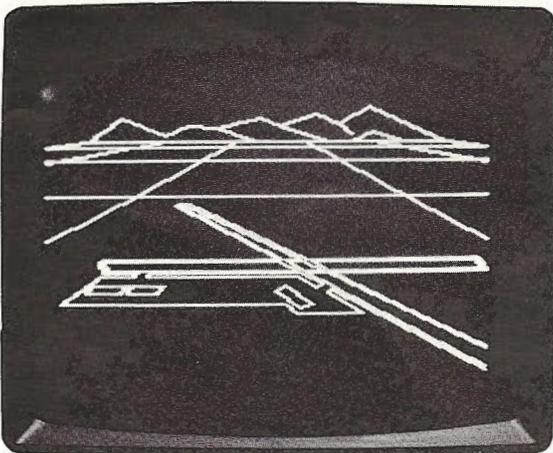
The **Load and Go Manual** guides you through an orientation session with the A2-3D1 program. Load the 3D-2D transformer, load the DEVELOP program, and view the scenes waiting for you. The manual will show you how to change location and direction of view one step at a time.

The load and go manual will also guide you through data base development by discussing how to create and enter your own data bases.

The **Technical Manual**, for advanced applications, describes the 3D-2D transformer algorithm in depth. Patchpoints and methods for hardware multiply, data input, and data output are described also, as well as special features of the package.

### Special Features of the A2-3D1

- An array generating feature lets you generate an output array of line start and end points instead of plotting on the Apple screen. This array will let you use the program with future graphic output devices.
- A "zero page restore" feature leaves all of your zero page variables intact after subroutine exit.
- The page control feature allows selective page erase, display, and draw for ping-ponging between screens. This permits smooth animation.
- The selective erase feature allows movement of objects without erasing the full screen.
- A variable field of view feature lets you adjust your field of view and "zoom in" on objects in a camera-like fashion.



A special demonstration program is included in the A2-3D1 package.

### Features of the A2-3D2

You must own and be familiar with the A2-3D1 package in order to use the A2-3D2 enhanced graphics package. The concepts of 3D data bases, viewer location and rotation, and display file creation and interpretation are all described in the A2-3D1 technical manual.

The A2-3D2 graphics package contains all of the features found in the A2-3D1 (listed above). It also has a number of new features not available in the A2-3D1 package. These include:

- Color lines and high-resolution (280 x 192) line generation that is nearly as fast as the generation of white low-res lines.
- Slightly faster 2D line drawing and erasing.
- Range handling. Data bases can go right to the edge of the world and lines can start at any point in space and run to any other point (no line length restrictions).
- Trig, multiply, divide, erase, point plot, line draw, and other routines to aid in overall simulation speed.
- Independent object manipulation that allows you to "instance" an object definition anywhere in space. Instance nesting is supported so the user can define objects that remain in other objects' reference and even move around in them.
- Commands to aid in debugging and display control are provided. Skip (to skip over no-longer-used elements) and pause (to put a wait in the display file) are provided.

The most obvious new feature of the A2-3D2 is the color and high-res line generation. White-lined objects take on a new look of precision when drawn in 280 x 192 high resolution. Colors available in lower resolution include white, green, violet, blue, and orange/red.

Independent object manipulation can be used to manipulate objects on an individual basis. It also allows you to create a large number of occurrences of a single object (such as putting 25 houses on a street by calling for the same house definition), and lets you give an object moving parts (such as propellers on airplanes, wheels on cars, etc.); in addition, this feature allows elements of an overall design to be grouped together.

The independent object feature even allows you to design a number of items (such as walls of a house) in two dimensions (where designing is easy), and finally assemble the flat surfaces into a composite 3D design by simply rotating the design planes into their proper positions. Independent object files can be used to build libraries of symbols, fonts, and shading patterns.

## FUNCTION

## A2-3D1

## A2-3D2

### **Interpretative Functions**

Pure Point (140 x 192)	0,x,y,z	0,x,y,z
Start Point (140 x 192)	1,x,y,z	1,x,y,z
Continue Point (140 x 192)	2,x,y,z	2,x,y,z
Ray Point (140 x 192)	3,x,y,z	3,x,y,z
Clipper Control	4,on/off	4,on/off
Viewer Position D.P., Pseudodegrees	5,x,y,z,p,b,h	5,x,y,z,p,b,h
Draw 2D Line on Screen	6,x,y,x',y'	6,x,y,x',y'
Display Screen Select	7,code	7,code
Erase Screen / Fill Screen	8,code	8,code
Write Screen Select	9,code	9,code
Plot a 2D White Point	10,x,y	10,x,y
Interpretive Jump	11,adrlsb,adrmsb	11,adrlsb,adrmsb
Set Line Drawing Mode	12,mode	12,mode
Turn on Output Array	13,adrlsb,adrmsb	13,adrlsb,adrmsb
Screen Size Select	14,w,h,cx,cy	14,w,h,cx,cy
Field of View Select	15,axr,ayr,azr	15,axr,ayr,azr
Easy Initialize	16	16
No Operation	17	17
Set Color Mode	—	18,col
Independent Object Call	—	19,stat,loc,addr
Set Resolution	—	20,res
Hi-Res (280 x 192) Line 2D	—	21,xl,xh,y,xl,xh,y
Set Hi-Res Bias	—	22,xl,xh,y
Hi-Res (x=256 Limited) Line 2D	—	23,x,y,x',y'
Hi-Res (280 x 192) Point Plot 2D	—	24,xl,xh,y
Hi-Res (x=256 Limited) Point Plot 2D	—	25,x,y
Skip Segment	—	26,size,status
Pause for n/5ths of a Second	—	27,time
Set 3D to 3D Array Gen Address	—	28,adrlsb,adrmsb
Set 3D to 3D Array Gen. Status	—	29,status
End of File	undefined	121 (79 hex)

### **Callable Functions**

Sine/Cosine Calls	yes	yes
Multiply (SP and DP)	—	yes
Divide (DP)	—	yes
Erase (hi/low page)	—	yes
Hi-Res Point Plot	—	yes
Color Point Plot	—	yes
Hi-Res Line Draw	—	yes
Color Line Draw	—	yes
Set Display Resolution	—	yes

### **General Features**

Initialize Input Buffer Ptr.	—	yes
Line Length Limit	32767 max.	113508 max.*
World Movement	limited by overflow	unlimited**
Program Location(s)	2048+24576	24576
Program Length	4864 bytes	8443 bytes

\*Distance from -32767, -32767, -32767 to 32767, 32767, 32767.

\*\*As long as the value of -32768 is avoided in data bases and eye position.

## **Ordering Information**

**See your dealer** or order directly from SubLOGIC. The A2-3D1 with A2-3D2 Enhancement is \$84.90 on disk. You may update to A2-3D2 at any time. Contact SubLOGIC for details. The whole Graphics Family including A2-GE1 Graphics Editor (see separate brochure) is \$119.85.

Shipping weight of the packages is approximately five pounds.

Shipping charges: US and Canada add \$6.50 for first class mail, \$3.00 for UPS, \$4.50 for UPS-COD orders. Foreign add \$20.00 (\$27 Australia) for airmail. Illinois residents add 5% sales tax. Visa and MasterCard accepted.

# subLOGIC

**Communications Corp.**  
713 Edgebrook Drive  
Champaign, IL 61820  
(217) 359-8482  
Telex: 206995

*The engineering and graphics  
experts, opening a new era  
in computer simulation.*