

AUTOCAD®

THE
DRAWING
TOOL



CHARLES F.
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AutoCAD[®]

THE DRAWING TOOL

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Preface

This book was written to answer the needs of the student about to enter into the area of computers and the application of the AutoCAD program. The majority of the manuals dealing with AutoCAD assumes that the individual, sitting down at the workstation, has some knowledge of DOS and AutoCAD. For the majority of students this is not the case.

This text assumes that the student has not been exposed to a computer. Therefore, an overview of the computer workstation, the Disk Operating System (DOS), and how to bring the AutoCAD Main Menu to the screen must be discussed prior to any of AutoCAD's commands. These topics are detailed in Chapters 1 and 2. How to use AutoCAD's command structure and procedures are discussed in Chapters 3 to 21.

When AutoCAD's Main Menu appears on the screen (refer to Chapter 2) the instructor and the textbook must be able to provide answers to the three challenges the student will face:

1. What command do I use?
2. Where is the command located?
3. How do I implement the command?

The command application is detailed starting in Chapter 3 for Line, Arc, Circle, Erase, and Save to Dimensioning, Attributes, Hatching and the use of the Template (Chapter 21). The Instructional Objectives (listed at the start of each chapter) provide a listing of the commands discussed in that chapter. Although the text has been designed to start with the basic commands and then the more difficult commands, the instructor has the option to select the sequence of commands best suited for a given curriculum.

Perhaps the most difficult task that the student must learn is the location of each command. The Root Screen Menu (the menu shown on the screen after a drawing has been named) has 19 listings, and within these listings there are 8 to 35 separate commands. The Menu Map technique is used to show the student the location of each command. Each command location is illustrated starting from the Root Screen Menu (the first menu item after the stars [****] is BLOCKS), through the various submenus, to the specified command. In some cases, the command will have one or more options. These options are also illustrated. The Menu Map starts with the Root Screen Menu and illustrates, with the use of arrows, how to find the command. Using this technique, the student's learning period is significantly reduced.

The third challenge (How to implement the command?) is answered by listing a typical Command Sequence for a given command. Where applicable, one or more examples are used to show the student how to apply the command. If there are several options in the implementation of the command, the long way is first described and then the short cuts, if available, are described, along with any restriction that may apply.

In some institutions, the curriculum calls for the use of a special Template (designed by Autodesk) to be used with the Tablet and Tablet Command. (Refer to Chapter 21.) The Template is an overlay, displaying the majority of AutoCAD's commands. The Tablet (sometimes called

a Digitizer) is implemented by using the Tablet command. The locations of the Template commands are crosshatched and appear at the end of each chapter. The use of the Template and the location of each command is unique to this text. In addition to the Template, this text illustrates the chapter commands that are listed in the Pull Down Menus. The commands are highlighted by an arrow.

Where possible, one or more examples are used to illustrate a specific command. These examples use prior commands as well as the current commands, thereby enhancing the educational process. The sequence of commands are based on the successful course given at Cuyahoga Community College, Cleveland, Ohio, called Introduction to CAD (ENGR 130A). At the time of this writing, approximately 1100 students have successfully completed this course. *AutoCAD: the Drawing Tool, Command EXERCISE Workbook* was developed to provide additional problems to further enhance the book examples and problems at the end of each chapter. This workbook may be purchased from Delmar Publishers Inc., Albany, N.Y.

I would like to express my appreciation to Dr. Curtis Gooden, Dean of Instruction at Cuyahoga Community College, who offered me the opportunity to develop this and other advanced courses using AutoCAD. I would like to thank the students of my 1987 winter class who used and critiqued this text.

The illustrations (approximately 400) were plotted using the Houston Instruments Plotter DMP61. To the individuals at Houston Instruments, Ms. Lynn M. Johnson and Mr. K. Pflaum, you are absolutely correct, the Plotter performance meets and beats the specifications. A salute to the staff at Autodesk, and to Patricia Peper, Arul Arangan, and Gloria A. Bastidas for their help and assistance in the writing of this text.

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*This book is dedicated to my grandchildren:
Brian Gary, Alan David, and Rebecca Leigh Rubenstein*

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1

Workstation of the Future

1.1 Introduction

The drafting workstation of the 1980s consisted of a large drafting table, movable parallel rule, reference table, chair, pencils, pencil sharpener, and the electric eraser machine. The drafting workstation of the future will be completely different. (In fact, the drafting workstation of the future is in use today.) The computer is the key element of the Computer Aided Design and Drafting (CADD) workstation. The drafting workstation (called workstation) will consist of a Control Processor Unit (CPU), one or more input devices, special software designed for drafting application, one or more output devices, and an individual who is skilled in applying the fundamentals of drafting combined with the ability to use one or more drafting software packages.

At a minimum, the new workstation will include a CPU with special features (enhanced graphics capability and math co-processor) and associated peripherals. Peripherals are those devices that will provide either input data or output data to/from the computer and are compatible with the software package used for the drafting applications. The Mouse, Pointer, and/or Digitizer are considered input peripherals. The keyboard, which is part of the CPU, also provides input data. The output peripherals will provide either a visual picture on a video Monitor or a print copy (sometimes called a hard copy) from either a Plotter or dot matrix Printer.

The computer requires at least two software packages. One of these packages programs the computer and provides some of the operational functions (eg, turning on or booting up the computer, making copies of the files, renaming files, deleting files, etc). This operational program is called the Disk Operating System (DOS).

The second software package is AutoCAD. The AutoCAD software program is a unique drafting system designed by AutoDesk to assist the individual in his or her design or drafting activities. In a sense, the drafting pencil has been replaced by the computer workstation.

1.2 Peripheral Equipment

Input devices may include one or more of the following items:

Alpha-Numeric keyboard

Stylus

Mouse

Menu Tablet

Digitizer

The output devices may include one or more of the following items:

Video Monitor

Dot Matrix Printer

Single or multi-pen Plotter

A typical flow diagram of the proposed workstation is shown in Figure 1-1.

AutoCAD software is designed to work with a large number of peripherals. The specific make and model numbers of the individual devices are listed in the AutoCAD supplementary manual entitled *Installation and Performance Guide for the AutoCAD Drafting Package*. Typical input devices are:

CALcomp Series 2500 and 9100 series

Hitachi HICOMSCAN HDG series

IBM PS/2 Mouse

Summagraphics SummaSketch MM series tablet

Typical output devices that will produce hard copy are:

Plotters

Houston Instruments

Hewlett Packard

IBM

Printers

Panasonic

Epson

Okidata

The video Monitors provide a visual presentation. Many companies make

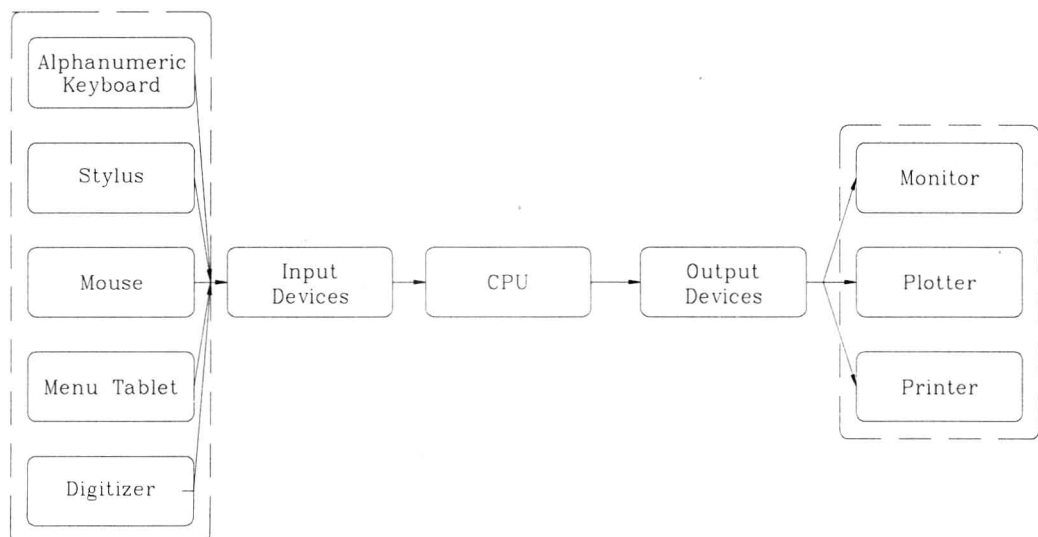


Figure 1-1 Typical Flow Diagram

these units. A sample list taken from the AutoCAD manual is shown below:

MONITORS	
IBM	WYSE
HP	HITACHI
SIGMA DESIGN	SONY
VERTICOM	

A number of Plotters, Printers and Monitors are available. The prime Printer's considerations are (1) the size of the hard copy (usually limited to 8.5" × 11") and (2) the number of dots per inch (dpi). For the Plotters, in addition to the size of the hard copy (from A size, 8.5" × 11" to D size, 24" × 36") the need for a multi-pen and/or color capability will depend upon the individual's requirements. The Monitor specification will call out the display size, video card adapter, color, and resolution. Listings of the specific Monitor, Printer or Plotter are growing daily. The equipment manufacturer will provide sufficient data to make its equipment work with the AutoCAD drafting package.

1.3 Computer Interface

It is imperative that the CAD operator have some working knowledge of the Computer ON/OFF switches, drives, and cable locations. For those who will be using the computer for the first time, a few definitions are in order:

Standard Floppy Disk is a magnetic film disk housed in a nonmagnetic cover and used to store computer information. The disk (sometimes called a "floppy") must be formatted to accept information from the computer. Currently the floppy disks come in two sizes: 5 1/4" and the 3 1/2". AutoCAD's Release 11 is available in either size. These floppies come in two options and are shown in Table 1-1.

Table 1-1

Disk Size	5 1/4"	3 1/2"
Low Density	360 kB	720 kB
High Density	1.20MB	1.44 MB

NOTE: k represents 1000, B represents Bytes or a unit of magnetic disk storage, and M represents 1,000,000.

Care must be taken to choose the correct floppy for your CPU. The 286 and 386 computers will usually work with either floppy size or density. The older XT computers, unless modified, were designed to use the low density 5 1/4" floppy. The setting of the magnetic disk structure or formatting of the disk is based on the DOS software and is discussed in Chapter 2. It is possible to have two floppy disk drives installed in the same computer. The top drive is usually designated as drive A and the lower drive is called drive B.