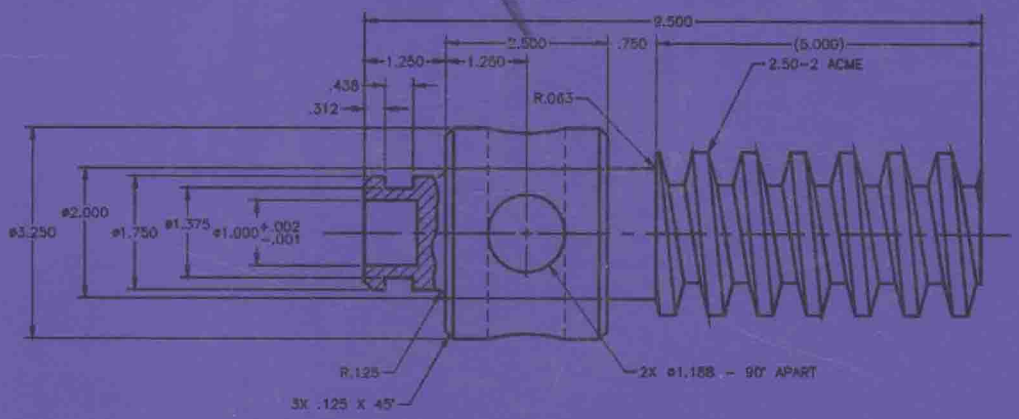
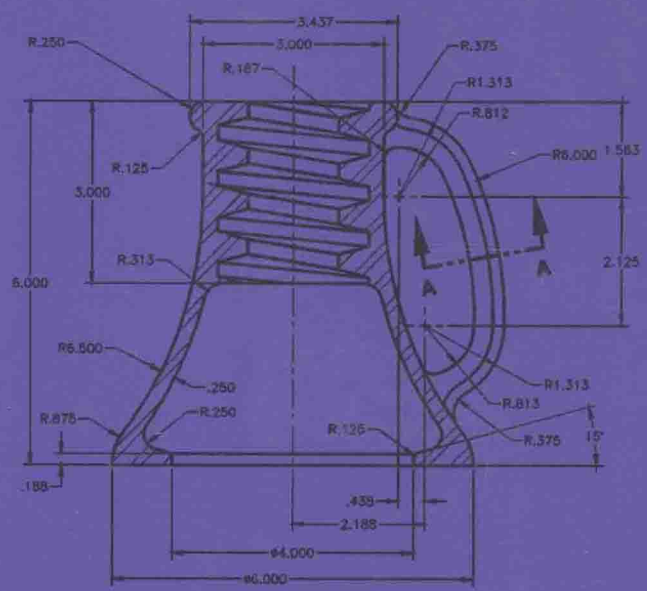
CD-ROM Included

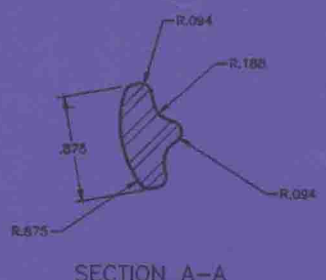
AutoCAD LT
Fundamentals and Applications

Ted Saufley

Autodesk
Certified Instructor







SECTION A–A
SCALE 2:1

Autodesk
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AutoCAD LT

AutoCAD LT
Fundamentals and Applications

by

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Registered Author/Publisher

Windows 3.1
(formerly Release 2)

Publisher
The Goodheart-Willcox Company, Inc.
Tinley Park, Illinois

AUTOCAD

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Library of Congress Catalog Card Number 96-14940
International Standard Book Number 1-56637-322-0

2 3 4 5 6 7 8 9 10 97 00 99 98 97

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Library of Congress Cataloging-in-Publication Data
Saufley, Ted
AutoCAD LT : fundamentals and applications : release 2 for Windows / by Ted Saufley.
p. cm.
ISBN 1-56637-322-0
1. Computer graphics. 2. AutoCAD LT for Windows.
I. Title.
T385.S27 1996
604.2'0285'5369--dc20 96-14940
CIP

AutoCAD LT—Fundamentals and Applications is a text and workbook combination that provides complete instruction in mastering AutoCAD LT™ commands and drawing techniques. Typical applications of AutoCAD LT are presented with basic and advanced concepts. The topics are covered in an easy-to-understand sequence, and progress in a way that allows you to become comfortable with the commands as your knowledge builds from one chapter to the next. In addition, *AutoCAD LT—Fundamentals and Applications,* offers the following features:

- Step-by-step use of AutoCAD LT commands.
- Easily understandable explanations of how and why the commands function as they do.
- Numerous illustrations to reinforce concepts.
- Professional tips explaining how to use AutoCAD LT effectively and efficiently.
- Exercises and tutorials involving tasks to reinforce chapter section topics.
- Chapter tests for reviewing commands and key AutoCAD LT concepts.
- Chapter problems to supplement each chapter.

Objectives

It is the goal of *AutoCAD LT—Fundamentals and Applications* to provide a step-by-step approach in mastering AutoCAD LT commands. Each topic is presented in a logical sequence that permits the user to progress from the most basic drawing commands to the more advanced editing and dimensioning functions. Additionally, the reader also becomes acquainted with:

- Quick and efficient drawing construction techniques.
- Dimensioning applications and practices, as interpreted through accepted standards.
- Drawing sectional views and creating custom hatch patterns.
- Creating special shapes and symbols for multiple use.
- Isometric drawing and dimensioning practices.
- Plotting and printing drawings.
- Using the Windows File Manager for drawing file management.
- Customizing the AutoCAD LT graphical user environment and menu system.
- Using clipboard graphics and Object Linking and Embedding (OLE).

Fonts used in this text

Different type faces are used throughout the chapters to define terms and identify AutoCAD LT commands. Important terms always appear in ***bold-italic face, serif*** type. AutoCAD LT menus, commands, variables, dialog box names, and button names are printed in **bold-face, sans serif** type. Filenames, directory names, paths, and keyboard-entry items appear in the text in Roman, sans serif type. Keyboard keys are shown inside brackets [ ] and appear in Roman, sans serif type. For example, [Enter] means to press the Enter (Return) key.

Prompt sequences are set apart from the body text with space above and below, and appear in Roman, sans serif type. Keyboard entry items in prompts appear in **bold-face, sans serif** type. In prompts, the [Enter] key is represented by the enter symbol (↵).

Checking the AutoCAD LT User's Guide

No other AutoCAD LT reference should be needed when using this worktext. However, the author has referenced the major topic areas to the corresponding *AutoCAD LT User's Guide* chapters for your convenience. You will find the following abbreviation to the right of most major headings in this text:

ALTUG 8

The number to the right of each abbreviation identifies the related chapter in the *AutoCAD LT User's Guide*. For example, a reference such as ALTUG 8 refers to Chapter 8 of the *AutoCAD LT User's Guide*.

Introducing the AutoCAD LT commands

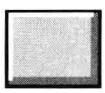
There are several ways to select AutoCAD LT drawing and editing commands. The format is slightly different when typing commands from the keyboard when compared to selecting commands from the toolbar, toolbox, or pull-down menus. For this reason, all AutoCAD LT commands and related options in this text are presented as if they were typed at the keyboard (unless otherwise specified). This allows you to see the full command name and the prompts that appear on screen. Since you are encouraged to enter commands in the most convenient manner, shortened command aliases are also presented.

Commands, options, and values you must enter are given in bold text as shown in the following example. Pressing the [Enter] key is indicated with the enter symbol (↵). (Also, refer to the earlier section *Fonts used in this text*.)

Command: *(type* LINE *or* L *and press* [Enter]*)*
From point: **2,2** ↵
To point: **4,2** ↵
To point: ↵

General input tasks such as picking a point or selecting an object are presented in italics.

Command: *(type* LINE *or* L *and press* [Enter]*)*
From point: *(pick a point)*
To point: *(pick another point)*
To point: ↵



Selecting commands from the pull-down menus is discussed and illustrated throughout the text. Where applicable, toolbar and toolbox button alternatives are also covered. These buttons are illustrated in the margin next to the text reference. The text will indicate where the button is located. As shown here, a grayscale button is used to represent an AutoCAD LT-related button.

Prerequisites

AutoCAD LT—Fundamentals and Applications has been developed for the user or student with experience using MS-DOS based personal computers. While prior exposure to Microsoft Windows is certainly helpful, it is by no means required. The text takes you through the entire AutoCAD LT command structure and applies AutoCAD LT functions to basic drafting concepts. Thus, readers should already possess a good working knowledge of drafting principles, such as orthographic projection, line and lettering standards, and industrial dimensioning practices.

Flexibility in design

Flexibility is the key word when using ***AutoCAD LT—Fundamentals and Applications***. This worktext is an excellent training aid for individual, as well as classroom instruction. ***AutoCAD LT—Fundamentals and Applications*** teaches you AutoCAD LT and its applications to common drafting tasks. It is also a useful resource for professionals using AutoCAD LT in the work environment.

There are a variety of notices you will see throughout the text. These notices consist of technical information, hints, and cautions that will help you develop your AutoCAD LT skills. The notices that appear in the text are identified by icons and rules around the text. The notices are as follows:

PROFESSIONAL TIPS

These are ideas and suggestions aimed at increasing your productivity and enhancing your use of AutoCAD LT commands and techniques.

NOTES

A note alerts you to important aspects of the command or activity that is being discussed.

CAUTIONS

A caution alerts you to potential problems if instructions or commands are used incorrectly, or if an action could corrupt or alter files, directories, or disks. If you are in doubt after reading a caution, always consult your instructor or supervisor.

The chapter exercises, tests, and drawing problems are set up to allow an instructor to select individual or group learning goals. Thus, the structure of ***AutoCAD LT—Fundamentals and Applications*** lends itself to the development of a course devoted entirely to AutoCAD LT training. To that end, several optional course syllabi are provided in the ***Solution Manual*** for you to use or revise to suit individual classroom needs.

AutoCAD LT—Fundamentals and Applications offers several ways for you to evaluate your performance. Included are:

- **Tutorials.** Several of the chapters include mini-tutorials that offer step-by-step instructions for producing AutoCAD LT drawings. The tutorials also serve to help reinforce key chapter concepts.
- **Exercises.** Each chapter is divided into short sections covering various aspects of AutoCAD LT. An exercise composed of several instructions is found at the end of most sections. These exercises help you become acquainted with the commands just introduced at your own pace.
- **Chapter Tests.** Each chapter also includes a written test. Questions may require you to provide the proper command, option, or response to perform a certain task.
- **Drawing Problems.** A variety of drawing problems follow each chapter. These problems are presented as "real-world" CAD drawings and, like some real-world applications, may contain mistakes, inaccuracies, or omissions. Always be sure to modify the drawings as needed and apply accurate dimensions to the completed drawings where required. The problems are designed to make you think, solve problems, research proper drafting standards, and correct possible errors in the drawings. Each drawing problem deals with one of five technical disciplines. Although doing all of the problems will enhance AutoCAD LT skills, you may have a particular discipline upon which you wish to focus. The discipline that a problem addresses is indicated by a text graphic in the margin next to the problem number. Each graphic and its description is as follows:

Mechanical Drafting These problems address mechanical drafting and design applications, such as manufactured part design.

Architecture These problems address architectural drafting and design applications, such as floor plans and presentation drawings.

Electronics Drafting These problems address electronics drafting and design applications, such as electronic schematics, logic diagrams, and electrical part design.

Graphic Design These problems address graphic design applications, such as text creation, title blocks, and page layout.

General These problems address a variety of general drafting and design applications, and should be attempted by everyone learning AutoCAD LT for the first time.

ENHANCING THE TEXT WITH CD-ROM

To aid you in the AutoCAD LT endeavors, a CD-ROM is packaged with this text. This CD-ROM contains a variety of "tools" that can be used to enhance your productivity efforts. In addition, demos of several programs that can enhance your productivity and maximize your efforts are included on the disc.

The CD-ROM is organized into separate directories, each containing a README.TXT file that describes the installation and use of the program(s) in that particular directory. (You can access the README.TXT files from Windows 3.x Notepad.) The following list indicates the names of the directories and provides a brief description of the contents of each:

Directory	Description
ARCHNOTE	Contains typical architectural notes and symbols, which can be incorporated in drawings. Also includes an architectural font.
BONUS	Includes a variety of sample drawings that were created with AutoCAD and AutoCAD LT.
CADSYM	Contains a demonstration program, which includes electrical and fluid power symbols.
CREATCAD	Provides several different fonts.
MNU&BUTT	Includes a compilation of buttons, toolbars, and menus found in AutoCAD LT.
MNU_UTIL	Includes several subdirectories, which contain a variety of AutoCAD LT menu enhancements.
PROTOTYP	Provides several prototype drawing files, which can be used to expedite drawing set up for A-size through E-size drawings.
TITLBLOC	Contains a variety of title blocks and borders for A-size through E-size drawings.
RXHIGHLI	Includes a working version of a "redlining" program and several sample drawings from manufacturers.
VIACAD1	Contains over 70 electrical symbols, which can be used in the development of electrical/electronic schematics.
VIACAD2	Includes a self-paced demo of a program used to create printed circuit board (PCB) artwork.
VIADEV	Contains a self-running demo, which shows how the process of electrical controls design can be automated.

ABOUT THE AUTHOR

Ted Saufley is an AutoCAD certified instructor for the Premier Authorized Autodesk Training Center at Clackamas Community College, Oregon City, Oregon. In addition to community college experience, Ted was also an AutoCAD instructor at the University of Oregon Continuation Center in Portland, Oregon. In 1992, he was twice recognized by Autodesk as one of the top rated AutoCAD instructors in the Autodesk Training Center network. Ted has extensive industrial experience in both mechanical and software engineering, and has been involved with CAD/CAM for over a decade as a user, software developer, and consultant. He is the author of Goodheart-Willcox's ***AutoCAD AME—Solid Modeling for Mechanical Design,*** and the co-author of ***AutoCAD and its Applications—Release 12 for Windows.***

NOTICE TO THE USER

This worktext is designed as a complete entry-level AutoCAD LT teaching tool. The author presents a typical point of view. Users are encouraged to explore alternative techniques for using and mastering AutoCAD LT. The author and publisher accept no responsibility for any loss or damage resulting from the contents of information presented in this text. This text contains the most complete and accurate information that could be obtained from various authoritative sources at the time of production. The publisher cannot assume responsibility for any changes, errors, or omissions.

ACKNOWLEDGMENTS

Lisa Senauke, Autodesk, Inc.

Contribution of materials

Melissa Martin, Geo Engineers, Portland, OR
Doug Millican, Pesznecker Bros., Clackamas, OR

CD-ROM software contributions

Autodesk, Inc.
CADSYM
Creative CAD
Dean Saadallah
Expert Graphics, Inc.
VIACAD, Inc.
Via Development Corporation

Dedicated to...

Elizabeth and Matthew Saufley

Table of Contents

Chapter 1
Getting Started with AutoCAD LT

Learning objectives

After you have completed this chapter, you will be able to:

- Start Microsoft Windows and load AutoCAD LT from Program Manager.
- Describe the AutoCAD LT graphics window and user interface.
- Understand the function and components of dialog boxes.
- Select and use the various keyboard and function keys and identify their command equivalents.
- Use the **HELP** command and other on-line services for assistance.

INTRODUCTION TO AUTOCAD LT

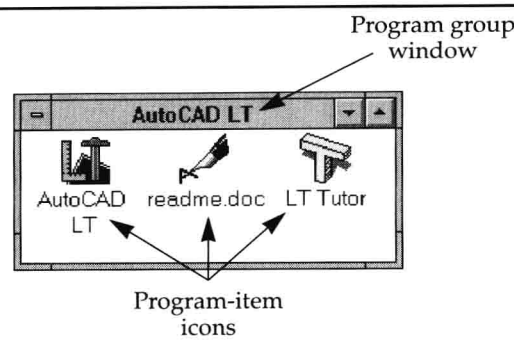
In December of 1982, a small company in Sausalito, California, introduced a new PC-based computer-aided drafting (CAD) software package. The small company was called Autodesk and they named their bold new product AutoCAD. Within five years, AutoCAD rapidly became the market leader and standard bearer for the CAD industry worldwide.

Slightly over a decade later, Autodesk set another industry milestone with the release of AutoCAD LT for Windows. With AutoCAD LT, you can prepare engineering drawings for mechanical objects, architectural floor plans for residential and commercial structures, or site plans for subdivided parcels of land. Sharing the same easy-to-use interface and command syntax as its "big brother" AutoCAD, AutoCAD LT has quickly emerged as the new market leader in low-cost desktop CAD solutions.

While many people mistakenly believe that the "LT" in AutoCAD LT means "Lite," it really stands for "Laptop." This is because AutoCAD LT requires less ***random access memory (RAM)*** and hard disk space than big brother AutoCAD. Thus, AutoCAD LT can be installed and run on relatively modest laptop and notebook computers. As you experiment with the exercises, tutorials, and drawing problems found in this text, you will probably come to agree with thousands of other users that there is nothing light about AutoCAD LT.

As with other Microsoft Windows-compatible programs, AutoCAD LT must first be installed on the hard disk drive of your computer. The AutoCAD LT program is contained on several floppy disks and contains a Windows-based installation program called SETUP.EXE. Instructions are given on-screen during the installation process to assist you in proper installation. The setup program automatically transfers files from the release disks to subdirectories it creates on your computer's hard disk, and then creates a ***program group*** in the Program Manager window. A program group contains program items graphically displayed as ***icons***. Icons are small pictures that represent applications, accessories, files, or commands. An icon that starts an application like AutoCAD LT, is called a ***program-item*** icon. The AutoCAD LT program ***group window*** is a separate window within Program Manager and contains the AutoCAD LT program-item icon, a README.DOC icon, and an icon labeled LT Tutor. See Figure 1-1. The AutoCAD LT tutorial program is discussed in more detail later in this chapter.

Figure 1-1.
The AutoCAD LT installation procedure creates a new program group in the Program Manager window. Double-clicking the **AutoCAD LT** program-item icon starts AutoCAD LT.



NOTE

Typically, a README.DOC file is in Windows Write format. It includes useful information about AutoCAD LT and special functions which may not be covered in the printed *AutoCAD LT User's Guide*. Be sure to read this additional documentation after installing AutoCAD LT on your hard disk.

Starting Microsoft Windows

After turning on and booting up your computer, the ***command prompt*** that appears on the display monitor indicates the current disk drive (the drive being addressed by the computer). To run Microsoft Windows, the prompt must display the letter of the hard disk drive. In the unlikely event that the screen prompt appears as A:\⟩ or B:\⟩, you must change to the hard drive. To change drives, type C: and then press the [Enter] key. You are now addressing the hard drive and the prompt should appear as C:\⟩.

If your command prompt does not look like the example, you may need to change to the root directory of the hard drive. To do so, type the following:

**CD ** ↵

If the display prompt was already C:\⟩, you are ready to start Windows and run AutoCAD LT. To load Windows, type in the following at the DOS prompt:

C:\⟩**WIN** ↵

As Windows loads, the Microsoft Windows logo will appear briefly. The display screen will then present you with the Program Manager window. Program Manager is an application that is central to the Windows operating environment, and continues to run as long as you are working with a Windows application, like AutoCAD LT.

Starting AutoCAD LT from Program Manager

The Program Manager window can assume one of several different screen representations, depending on the way Windows has been configured on your computer. In Figure 1-2, Program Manager is shown with the Main group window open inside the Program Manager window. Each of the other group windows have been minimized and are represented by ***group icons*** located at the lower edge of the Program Manager window. The group icons are clearly labeled so that each may be easily distinguished from one another.