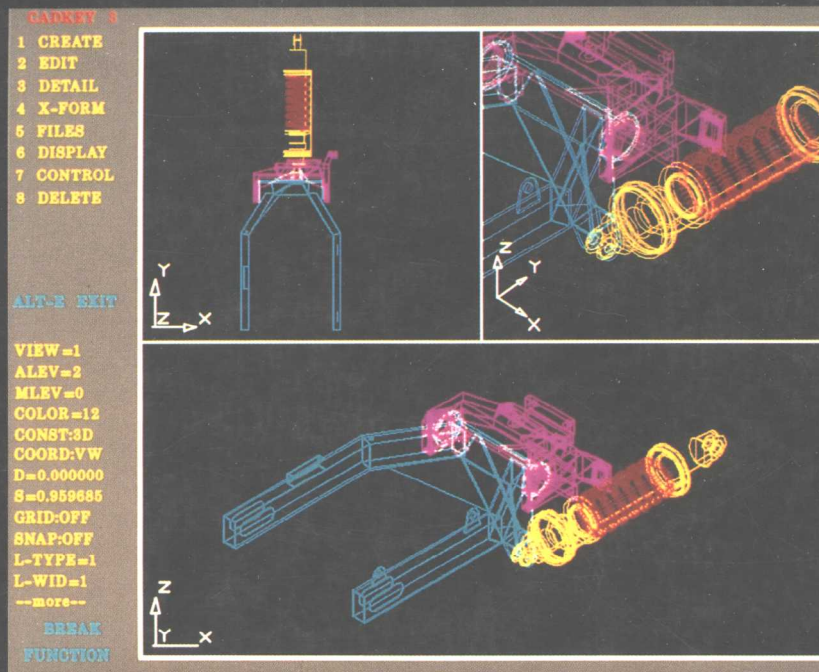
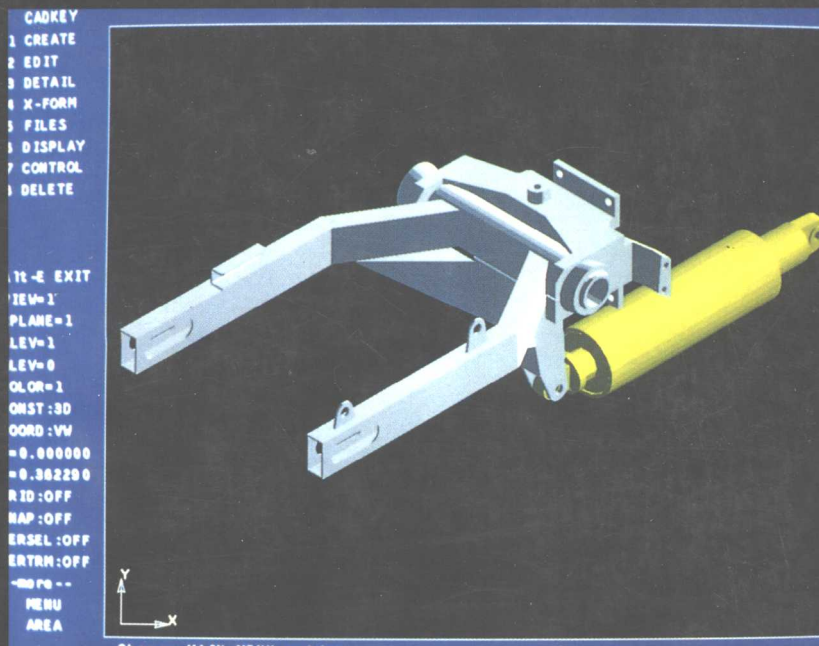


LEARNING CADKEY



Written for
CADKEY 4 and
CADKEY-LIGHT



Richard G. McGinnis and Richard G. McGinnis, Jr.

LEARNING CADKEY

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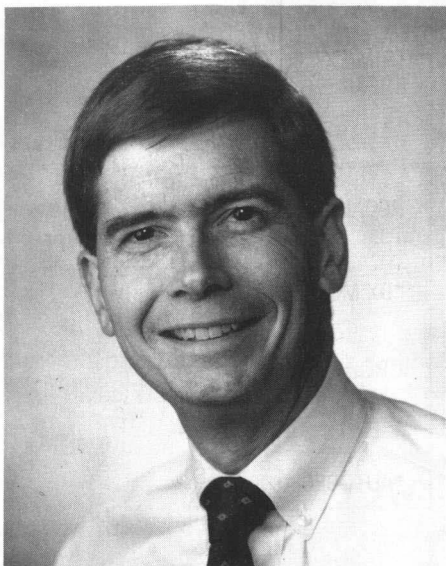
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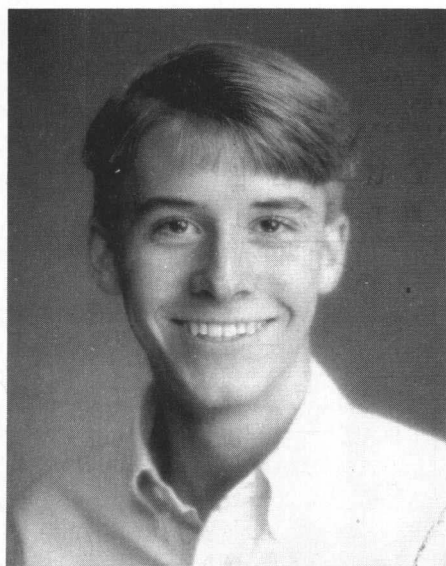
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Richard G. McGinnis, Jr.

Richard G. McGinnis is an associate professor of civil engineering at Bucknell University. He was director of the Bucknell University Center for Computer-Aided Engineering and Design from the time of its establishment until 1986. He has written numerous papers on the subjects of computer-aided engineering and design (CAED) and computer-aided drafting (CADD) and made presentations on these topics in Asia, Europe, and North America. Dr. McGinnis has been a CAED consultant to private industry, educational institutions, and government. Major consulting projects include working with the Singapore Polytechnic Institute with their CAED programs and providing the plan for the integration of computer-aided engineering and design into the Pennsylvania Department of Transportation.

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LEARNING CADKEY

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234567890 MAL MAL 9098765432

ISBN 0-07-044791-8

The editor was B. J. Clark;
the production supervisor was Denise L. Puryear.
Malloy Lithographing, Inc. was printer and binder.

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Preface

Learning CADKEY has been written for users of CADKEY 4, CADKEY 3.5, CADKEY 386, and CADKEY LIGHT. Users of any of these CADKEY systems will find it easy to determine which sections of the material in the book are relevant to their particular version of the software. CADKEY 4 and CADKEY 386 (Version 4) users should read the entire book since all the capabilities explained in the book are available to them. Users of CADKEY 3.5 and CADKEY 386 (Version 3.5) should read all sections except those indicated with a + which designates commands available only in the CADKEY 4 versions. Users of the student version, CADKEY LIGHT, can skip those sections marked with a * or a + since these commands and options are not currently available in CADKEY LIGHT.

The book has been designed to be used by a variety of CADKEY users. A major group of intended users are those who are new learners of CADKEY. These new users may be students in drafting, engineering, architectural or other drawing-related courses or individuals whose vocations or advocations call for the use of computer-aided drafting (CADD). For those beginning the journey along the CADKEY learning curve, the trip should be made faster and more pleasant by using the *Learning CADKEY* book as a guide.

Current users of CADKEY may also find the book useful. Because of the structure of book, it is simple to identify the commands and options that have been added to CADKEY in version 4. Thus, current users of CADKEY 3.5 who have upgraded to CADKEY 4 can use the book to learn the new capabilities of their upgraded software. CADKEY users of all versions who classify themselves as "occasional" users will find the book extremely helpful as a reference guide to refresh their knowledge of commands and procedures that have moved temporarily to inaccessible parts of their minds. The extensive table of contents and index provide a quick way to find a command, option, or menu item. Also, a table in the appendix has page references to the CADKEY Reference Guides for each CADKEY command.

The primary purpose of this book is to teach the use of the CADKEY software, and it is not intended to teach drafting techniques. A companion book published by McGraw-Hill, *Graphical Communication Principles: A Prelude to CAD* by Foster, Rogers, and Devon, provides instruction in the graphical concepts and relationships necessary for users of CADD systems. The combination of the *Learning CADKEY* and the Foster book provides an excellent basis for an introductory CADD or drafting course. In addition, there is a workbook written by Rogers to accompany the Foster, Rogers, and Devon book.

One objective of the *Learning CADKEY* book is to present material in a concise, yet readable manner. Commands are displayed in boxed menus next to short descriptions of each command. These easy-to-read summaries are followed by more in-depth step-by-step instructions for using the commands. Figures are included with most commands to show the user how to use each of the options associated with the commands. Two extensive tutorials lead the new user through the creation of 2D and 3D drawings.

The book is organized into eleven chapters and three appendices. The first chapter gives a short introduction to CADD systems and describes the hardware components of a typical CADD system. The CADKEY software versions covered by the book are described briefly. Chapter 2, Learning the Basics, covers the CADKEY screen components, menu structure, system parameters, and input/output options. Chapter 3 explains the nine methods available for indicating positions. Understanding how to indicate positions precisely is very important since positioning is needed with almost all CADKEY commands.

Chapter 4 is the longest of the chapters because it covers the commands that are used to create the entities that constitute the drawing. Over seventy figures are included in this chapter to help the user understand the workings of the CREATE commands. (Note: Throughout the book, command names are shown in uppercase letters, e.g., CREATE.) A detailed tutorial steps the user through the creation of a 2D locomotive. After completing chapter 4, the student is ready to learn the drawing aids available in CADKEY that make the drawing process easier. Chapter 5 covers deleting, selecting, and masking; chapter 6, the commands controlling the display of the part (zooming, panning, grids, viewports, etc.); and chapter 7, editing.

Chapter 8 explains the commands that provide the power to a CADD system. The transformation commands that give the user the ability to copy, move, translate, rotate, scale, mirror, and project drawings are described. Chapter 9 discusses the commands used to add documentation to drawings such as dimensions, notes, labels, and crosshatching. Advanced features not used by most beginning users are explained in Chapter 10. These features include splines, conics, and meshes; verification and analysis capabilities; and topics related to 3D drawings. The final chapter covers printing and plotting of CADKEY drawings.

Appendix A contains a glossary of technical terms. Appendix B is a table of all CADKEY commands with brief descriptions and page references to the *Learning CADKEY* book and to the CADKEY User Reference Guides for CADKEY 4, CADKEY 3.5, and CADKEY LIGHT. Appendix C provides instructions for installing CADKEY and configuring the CADKEY system. The inside covers of the book display the complete CADKEY menu structure.

The writing of this book has been a rewarding experience for the two authors resulting in a professional relationship not usually experienced between a father and a teenage son. We now have a mutual respect for the ideas and contributions of each other.

Many individuals have provided the encouragement and support necessary to complete a project of this magnitude. Bucknell University colleagues Maurice F. Aburdene, Robert J. Brungraber, David J. Cartwright, Jai B. Kim, and Thomas P. Rich have provided on-going support to us throughout the two-year project. Bucknell students in the EG 100 Exploring Engineering classes and in the CADKEY Jan Plan have used drafts of the book and provided helpful suggestions and criticisms. Beverly Spatzer, Diane Goodling, and Brian Hoyt have assisted with many of the logistical aspects of producing the manuscript.

At McGraw-Hill, B.J. Clark and Jack Maisel have been the two people who have made the publishing of the book a possibility and an enjoyable experience. Bruce Marcus, also from McGraw-Hill, learned CADKEY so he could review the tutorials.

Robert Foster and Hugh Rogers from Penn State have helped by allowing us to include several of the exercises from their companion books. Also, Robert Foster assisted by reviewing the book as did Jayne Scott from Worcester Polytechnic Institute.

Most helpful have been the wonderful people at CADKEY, Inc. who have worked closely with us during the entire project. Lilian Johnson has been the one individual without whom this book would not have been possible. We are indeed grateful for her endless help in getting answers to our many questions and needs. Peter Smith, through his generous support of his alma mater, Bucknell, was the one who convinced us to make the switch from AutoCAD to CADKEY, a decision we and our students are very happy we made. Others at CADKEY who have contributed include Paul Mailhot, Debra Ritchie, Sandra Rimetz, and Mary Beth Staron.

The writing of this book has been truly a family affair. The encouragement, love, and understanding given to us by Miranda White McGinnis (wife, mother, and critic) is greatly appreciated as is the tolerance shown by Heather, Charlie, and Ariel (children and siblings). Sadly, the person to whom we are dedicating this book, died before the completion of the manuscript. We dedicate this book to Charles F. White, father-in-law and grandfather, whose love of life and family gave us the inspiration for the book.

Richard G. McGinnis
Richard G. McGinnis, Jr.

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Introduction

CADKEY

CADKEY¹ is a three-dimensional (3D) computer-aided drafting and design (CADD) package used primarily to produce 2D and 3D drawings and designs for engineers and architects. The range of applications for CADKEY is limited only by the user's imagination. For example, CADKEY is used by electrical engineers to draw circuit board designs, by mechanical engineers to create 3D drawings of automobiles, by chemical engineering to draw flow charts for oil refineries, by civil engineers to draw construction plans for bridges, and by architects to draw floor plans for buildings (Figure 1-1).

CADKEY can also be used as an integral component of the engineering design process. For example, in the computer-aided design/computer-aided manufacturing (CAD/CAM) process, CADKEY is used as a front-end processor to produce a 3D computer model of a part that can be used as input to a finite elements analysis (FEA) computer program to do stress analysis. The output from the stress analysis, perhaps with some editing using CADKEY, may in turn be sent to a post-processor where the instructions are generated for the computerized numerical controlled (CNC) machine that manufactures the part.

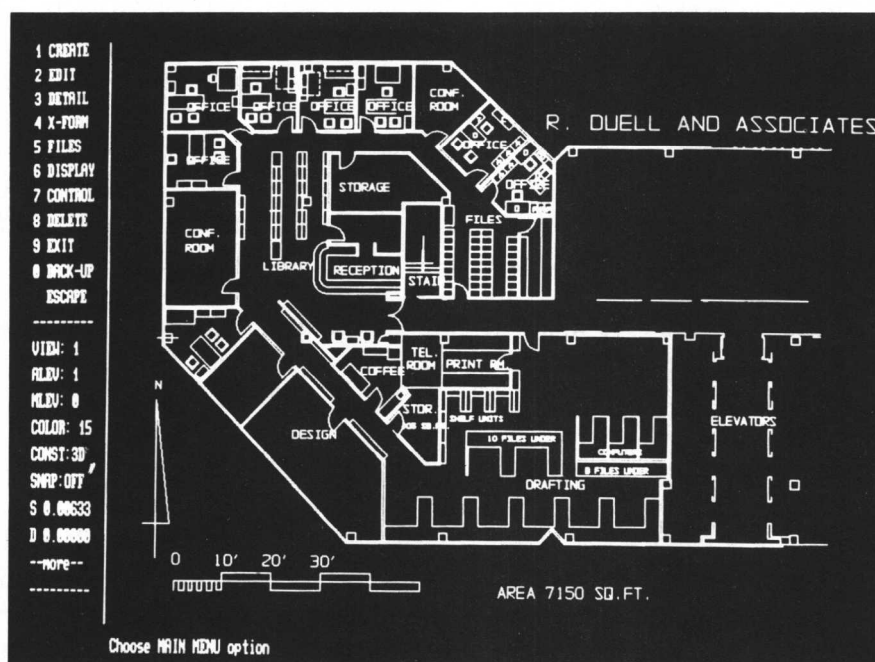


Figure 1-1 CADKEY Screen with Architectural Floor Plan

¹ CADKEY is a trademark of CADKEY, Inc.