GRAPHICALLY SPEAKING

Enhanced Edition

by Mark Pelczarski

Produced by:
Brian Wiser & Bill Martens

Apple PugetSound Program Library Exchange
ACKNOWLEDGEMENTS

Graphically Speaking was written by Mark Pelczarski, originally published by Softalk Books in 1983, and is copyright © 1983 by Mark Pelczarski. All Rights Reserved. This new Enhanced Edition, produced in coordination with Mark Pelczarski and released with his permission, is copyright by A.P.P.L.E. as the publisher. No claim to copyright over Graphically Speaking is created outside of those portions created by A.P.P.L.E..

The modified Cover Art & Chapter Illustrations were originally created by Kurt A. Wahlner.

The newly-added Penguins were created by Cheryl Pelczarski, Dav Holle, Steve Wedemeyer, Bill Giese, Elaine Cheever, and Rick Incrocci.

The new Cover and Book were designed by Brian Wiser.

PRODUCTION

Brian Wiser → Design, Layout, Editing, Art & Cover Remastering
Bill Martens → OCR Conversion, Disk Updates, Production
Mark Pelczarski → Preface, Scanning, Inspiration

DISCLAIMER

No part of this book may be reproduced, distributed or transmitted in any form or by any means, including photocopying, scanning, or other electronic or mechanical methods, without prior written permission of the publisher, except in the case of brief quotations contained in articles and reviews, and program listings which may be entered, stored and executed in a computer system, but not reproduced for publication.

A Graphically Speaking disk image is available from the publisher: www.callapple.org. No warranty of disk images is made or implied and should be used at your own risk.

Graphically Speaking: Enhanced Edition is an independent publication and has not been authorized, sponsored, or otherwise approved by any institution, public or private. All images are under copyright and the property of A.P.P.L.E., Mark Pelczarski, or as otherwise indicated. Use is prohibited without prior permission.

Apple and all Apple hardware and software brand names are trademarks of Apple Inc., registered in the United States and other countries. All other brand names and trademarks are the property of their respective owners.

Books will not be replaced, so don’t lose this book or let your dog eat it. At no time will A.P.P.L.E. or anyone else who has been involved in the creation, production, or distribution of this book be liable or responsible for any errors or omissions, or for indirect, special, or consequential damages resulting from use of this material, such as, but not limited to: hurricanes, fires, minor head colds, divorce, or beady eyes.
About Mark Pelczarski

After earning degrees in Computers and Education, Mark Pelczarski taught mathematics, computer programming, and computer science at both the high school and university levels. Mark started Penguin Software in 1981, creating *The Complete Graphics System*, *Special Effects*, and *Graphics Magician* for the Apple II, while describing his techniques in Softalk magazine's "Graphically Speaking" column. *Graphics Magician* was used by many other software publishers for adding graphics and animation to their programs. Penguin Software released over 45 popular games, graphics, utilities and educational programs for many platforms, such as: *The Coveted Mirror*, *Expedition Amazon*, *Minit Man*, *Oo-Topos*, *The Quest*, *The Spy's Adventures Around the World series*, *Spy's Demise*, *Sword of Kadash*, and *Transylvania*. Learn more about Penguin Software at: graphicsmagician.com.

In 1987, he retired from Penguin Software/Polarware and published early music software called *MIDI OnStage* under the Magic Tree label. Mark played steel drums in a trio named Stainless Steel with an Apple IIc playing the bass and percussion parts via MIDI. He even set up Jimmy Buffett's Shrimpboat Sound studio in Key West and Dan Fogelberg's studio in Pagosa Springs, interfacing Mac SE computers with the tape systems, and worked on a couple albums with Buffett.

Before the Internet as we know it, Mark published a mapping CD-ROM called *TripGuide* that was a very crude version of some of what Google Maps is today. And in 1999, he launched a commercial website that within months made the front page of The Wall Street Journal.

Mark taught college computer science for another 20+ years. He taught one of the first completely online college courses in 1996, writing much of the software to make it work, which in turn was used by other universities around the world for their early online courses. In more recent years he worked with a National Science Foundation grant to create a curriculum in Computer Security and Forensics.
He spent a year at President Obama's re-election headquarters working with large amounts of data and assisting most of the departments within the campaign. Afterwards, Mark worked with the Presidential Commission on Election Administration, CalTech/MIT Voting Technology Project, and the Center for Tech and Civic Life on data analysis and developing tools to help election administrators address efficiency issues.

Over the years he's performed on stage playing steel drums with Jimmy Buffett several times, and today Mark is still creating and publishing music as "Mango Island Sound."
To Cheryl,

for going along with all the craziness,
and to all the "Penguins"
for contributing to it.

And to all those who share
as they learn and discover.
## Contents

Preface: *by Mark Pelczarski* ................................................................. xv

The Secret Life of Penguins ................................................................. xxvii

I Don’t Think We’re in Kansas Anymore: *by Mark Pelczarski* ........ xxix

### 1 – An Introduction

Overview .............................................................................................. 1

Hi- and Lo-res ...................................................................................... 2

A Bit of Binary ...................................................................................... 3

Memory Allocation ................................................................................ 3

Screen Display ...................................................................................... 4

A Bit of Color ........................................................................................ 5

### 2 – Applesoft Graphics Commands

Graphics Commands ............................................................................ 9

HGR ................................................................................................. 9

HGR2 ............................................................................................ 10

HCOLOR ...................................................................................... 10

HPLOT ......................................................................................... 10

HPLOT TO ................................................................................. 11

Making Rectangles ............................................................................. 12

POKE Text On and Off ..................................................................... 15
# 12 – Animating Larger Pre-Shifted Shapes

First, a Shape ................................................................. 115  
Moving in Twos ............................................................. 118  
Entering the Shape Data .............................................. 120  
Putting It All Together .................................................. 125

# 13 – Picture Packing

The Original Recipe ...................................................... 129  
Variations on a Theme ................................................... 130  
Dramatic Improvement ............................................... 131  
The Packing Program ................................................. 134

# 14 – Packing by Saving Artist's Moves

Overview ........................................................................ 143  
*The Graphics Magician* ............................................... 144  
Drawing Lines .............................................................. 144  
Adding Brushes ........................................................... 146  
Pictures on Pictures .................................................... 146  
Surprise Animation ....................................................... 147  
Saving Picture Files .................................................... 147

# 15 – 3-Dimensional Graphics

3-D Perceptions ............................................................. 151  
Size .............................................................................. 152  
Rotation and Perspective .......................................... 152  
Shading and Shadowing .............................................. 153  
Creating 3-D Shapes ................................................. 153  
A Few Things You Can Do With Your Coordinates .. 157
Available in Paperback and Hardback: callapple.org/books
Join Our User Group & Get Our New Magazine: callapple.org/members

--- Programming ---

--- Magazines, Fun, History ---

--- Programming ---