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# 1990 Worldwide Developers' Conference

Macintosh Graphics Today

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**Bruce Leak**  
**Konstantin Othmer**  
Macintosh System Software  
Graphics Group

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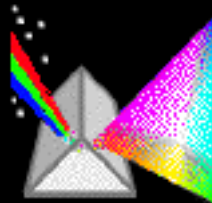


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# 32-Bit QuickDraw

Recent History

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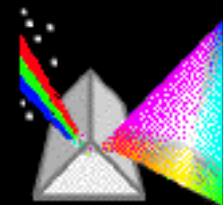


# Last May

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## 32-Bit QuickDraw 1.0

- Developers conference



# Last May

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## 32-Bit QuickDraw 1.0

- *Developers conference*
- Extensive color capabilities on all '020/'030s



# Last May

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## 32-Bit QuickDraw 1.0

- Developers conference
- Extensive color capabilities on all '020/'030s
- Licensing with 6.0.3



# Year of Independence

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What Have We Been Doing...



# Year of Independence

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What Have We Been Doing...

- Poland



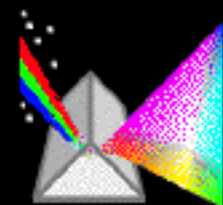


# Year of Independence

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What Have We Been Doing...

- Poland
- The Berlin Wall

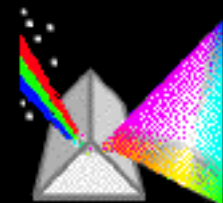


# Year of Independence

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What Have We Been Doing...

- Poland
- The Berlin Wall
- Nicaragua



# Year of Independence

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What Have We Been Doing...

- Poland
- The Berlin Wall
- Nicaragua
- Lithuania



# Year of Independence

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## What Have We Been Doing...

- Poland
- The Berlin Wall
- Nicaragua
- Lithuania
- Hostages...



# Year of Independence

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## What Have We Been Doing...

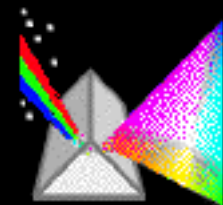
- Poland
- The Berlin Wall
- Nicaragua
- Lithuania
- Hostages...
- **Graphics**



# 32-Bit QuickDraw 1.2

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What's New...



# 32-Bit QuickDraw 1.2

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## What's New...

- Independence of resolution
  - OpenCPicture



# 32-Bit QuickDraw 1.2

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## What's New...

- Independence of resolution
  - OpenCPicture
- Font names in PICTs



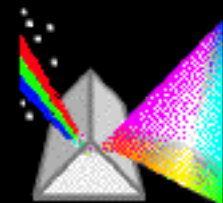


# 32-Bit QuickDraw 1.2

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## What's New...

- Independence of resolution
  - OpenCPicture
- Font names in PICTs
- Indexed dithering



# 32-Bit QuickDraw 1.2

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## What's New...

- Independence of resolution
  - OpenCPicture
- Font names in PICTs
- Indexed dithering
- Direct pixpats and cicns

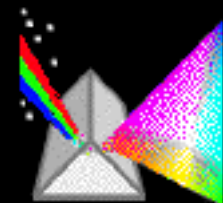


# 32-Bit QuickDraw 1.2

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## What's New...

- Independence of resolution
  - OpenCPicture
- Font names in PICTs
- Indexed dithering
- Direct pixpats and cicns
- ScrollRect/PlotCIcon



# 32-Bit QuickDraw 1.2

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What's New (cont.)...

- GWorlds in MFTemp memory



# 32-Bit QuickDraw 1.2

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What's New (cont.)...

- GWorlds in MFTemp memory
- 32-bit addressed pixmaps



# 32-Bit QuickDraw 1.2

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## What's New (cont.)...

- GWorlds in MFTemp memory
- 32-bit addressed pixmaps
- Faster arithmetic transfer modes



# 32-Bit QuickDraw 1.2

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## What's New (cont.)...

- GWorlds in MFTemp memory
- 32-bit addressed pixmaps
- Faster arithmetic transfer modes
- Faster line drawing



# 32-Bit QuickDraw 1.2

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## What's New (cont.)...

- GWorlds in MFTemp memory
- 32-bit addressed pixmaps
- Faster arithmetic transfer modes
- Faster line drawing
- Now shipping with 6.0.5 - for all Mac II's





# Imaging Help Line

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# Top Ten Imaging Questions

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10. Can I have a custom character set for each text page? Flashing and inverse characters?

# Top Ten Imaging Questions

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9. I think my program is working. How do I add EGA, VGA, CGA, and PGA support?
10. Can I have a custom character set for each text page? Flashing and inverse characters?

# Top Ten Imaging Questions

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8. If I hook up a second monitor, do I need an A/B switch box?
9. I think my program is working. How do I add EGA, VGA, CGA, and PGA support?
10. Can I have a custom character set for each text page? Flashing and inverse characters?

# Top Ten Imaging Questions

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7. How does the user specify which graphics adapter he's using?
8. If I hook up a second monitor, do I need an A/B switch box?
9. I think my program is working. How do I add EGA, VGA, CGA, and PGA support?
10. Can I have a custom character set for each text page? Flashing and inverse characters?

# Top Ten Imaging Questions

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6. Will there be support for lava lamp displays?
7. How does the user specify which graphics adapter he's using?
8. If I hook up a second monitor, do I need an A/B switch box?
9. I think my program is working. How do I add EGA, VGA, CGA, and PGA support?
10. Can I have a custom character set for each text page? Flashing and inverse characters?

# Top Ten Imaging Questions

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5. How do I know if Multifinder is running?

# Top Ten Imaging Questions

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4. I'm almost done porting. How do I implement a call equivalent to CopyBits?
5. How do I know if Multifinder is running?



# Top Ten Imaging Questions

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3. Can I use GWorlds on B&W machines?
4. I'm almost done porting. How do I implement a call equivalent to CopyBits?
5. How do I know if Multifinder is running?

# Top Ten Imaging Questions

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2. Weeeeeee, is this the computer equivalent of Vahrfergnugen, or what?
3. Can I use GWorlds on B&W machines?
4. I'm almost done porting. How do I implement a call equivalent to CopyBits?
5. How do I know if Multifinder is running?

# Top Ten Imaging Questions

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1. At 4 bits/pixel it's 640x400; at 8 bits/pixel 320x200; what's the resolution at 32 bits/pixel?
2. Weeeeeee, is this the computer equivalent of Vahrfergnugen, or what?
3. Can I use GWorlds on B&W machines?
4. I'm almost done porting. How do I implement a call equivalent to CopyBits?
5. How do I know if Multifinder is running?

**The problem:**

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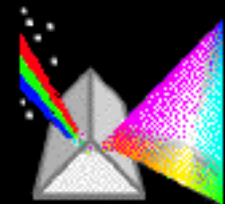
What to do...



**The solution...**

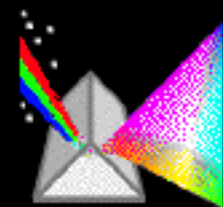
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# Object-Oriented Programming



# Object-QuickDraw...

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# Object-QuickDraw...

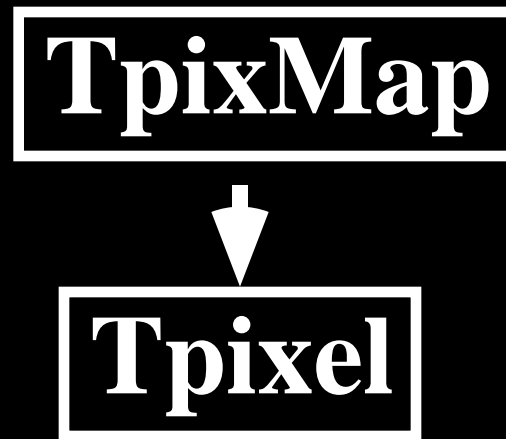
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**TpixMap**



# Object-QuickDraw...

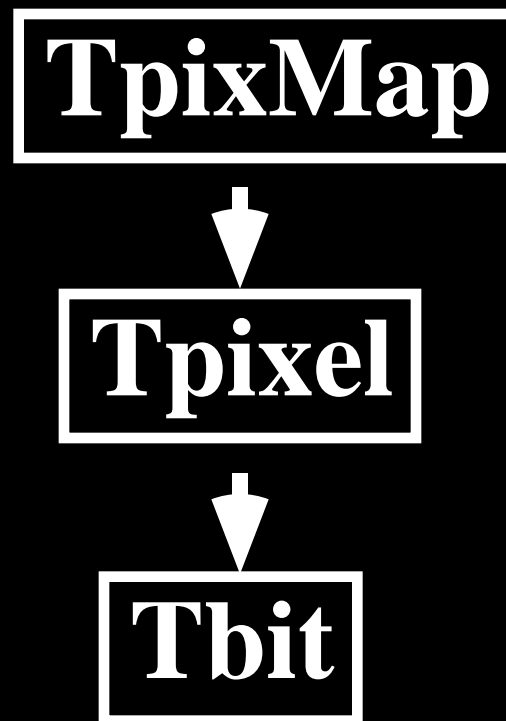
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# Object-QuickDraw...

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# Object-QuickDraw...

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**Telectron**

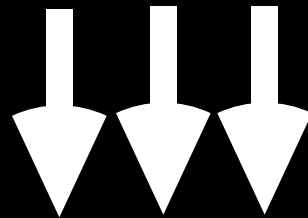


# Object-QuickDraw...

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**Telectron**



**Multi-Media**



# 32-Bit QuickDraw in 7.0

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What's New for Classic Machines...



# 32-Bit QuickDraw in 7.0

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What's New for Classic Machines...

- BitMap to Rgn



# 32-Bit QuickDraw in 7.0

---

What's New for Classic Machines...

- BitMap to Rgn
- GWorlds



# 32-Bit QuickDraw in 7.0

---

What's New for Classic Machines...

- BitMap to Rgn
- GWorlds
- QDError



# 32-Bit QuickDraw in 7.0

---

## What's New for Classic Machines...

- BitMap to Rgn
- GWorlds
- QDError
- 16- and 32-bit/pixel PICT display





# 32-Bit QuickDraw in 7.0

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What's New for Color Machines...

- Picture utilities



# Picture Utilities

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## Overview

- Profile a picture

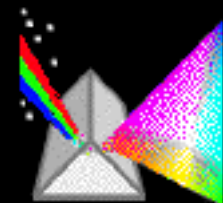


# Picture Utilities

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## Overview

- Profile a picture
- Extract resolution and imaging rect



# Picture Utilities

---

## Overview

- Profile a picture
- Extract resolution and imaging rect
- Font names, sizes, and styles



# Picture Utilities

---

## Overview

- Profile a picture
- Extract resolution and imaging rect
- Font names, sizes, and styles
- Determine optimal 'clut'



# Picture Utilities

---

## Images

- Number of colors



# Picture Utilities

---

## Images

- Number of colors
- Best 'clut'



# Picture Utilities

---

## Images

- Number of colors
- Best 'clut'
  - Popular method





# Picture Utilities

---

## Images

- Number of colors
- Best 'clut'
  - Popular method
  - Median cut method



# 32-Bit QuickDraw in 7.0

---

What's New for Color Machines...

- Picture Utilities
- Image shrinking



# 32-Bit QuickDraw in 7.0

---

## What's New for Color Machines...

- Picture Utilities
- Image shrinking
- Classic transfer modes



# Transfer Modes in 7.0

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Old Transfer Modes...



# Transfer Modes in 7.0

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## Old Transfer Modes...

- 'or' -> tend towards black
  - image 'or' white = image



# Transfer Modes in 7.0

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## Old Transfer Modes...

- 'or' -> tend towards black
  - image 'or' white = image
- 'bic' -> tend towards white
  - black 'bic' image = white



# Transfer Modes in 7.0

---

## Old Transfer Modes...

- 'or' -> tend towards black
  - image 'or' white = image
- 'bic' -> tend towards white
  - black 'bic' image = white
- 'xor' - black in src inverts, white doesn't



# Transfer Modes in 7.0

---

## Old Transfer Modes...

- 'or' -> tend towards black
  - image 'or' white = image
- 'bic' -> tend towards white
  - black 'bic' image = white
- 'xor' - black in src inverts, white doesn't
- Use transparent mode or CopyMask





# 32-Bit QuickDraw in 7.0

---

## What's New for Color Machines...

- Picture Utilities
- Image shrinking
- Classic transfer modes
- CopyBits Colorizing



# 32-Bit QuickDraw in 7.0

---

## CopyBits Colorizing

- Foreground/background colors



# 32-Bit QuickDraw in 7.0

---

## CopyBits Colorizing

- Foreground/background colors
  - Black -> foreground color



# 32-Bit QuickDraw in 7.0

---

## CopyBits Colorizing

- Foreground/background colors
  - Black -> foreground color
  - White -> background color



# 32-Bit QuickDraw in 7.0

---

## CopyBits Colorizing

- Foreground/background colors
  - Black -> foreground color
  - White -> background color
- Multi-color sources



# 32-Bit QuickDraw in 7.0

---

## CopyBits Colorizing

- Foreground/background colors
  - Black -> foreground color
  - White -> background color
- Multi-color sources
- Colorize in RGB space



# 32-Bit QuickDraw in 7.0

---

## CopyBits Colorizing

- Foreground/background colors
  - Black -> foreground color
  - White -> background color
- Multi-color sources
- Colorize in RGB space
  - (fgcolor 'and' ~src) 'or' (bkcolor 'and' src)



# 32-Bit QuickDraw in 7.0

---

## CopyBits Colorizing

- Foreground/background colors
  - Black -> foreground color
  - White -> background color
- Multi-color sources
- Colorize in RGB space
  - (fgcolor 'and' ~src) 'or' (bkcolor 'and' src)
- NotCopy mode





# 32-Bit QuickDraw in 7.0

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## What's New for Color Machines...

- Picture Utilities
- Image shrinking
- Classic transfer modes
- Colorizing
- Screen and monitor management



# 32-Bit QuickDraw in 7.0

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Screen and monitor management



# 32-Bit QuickDraw in 7.0

---

Screen and monitor management

- Miss Manners Matters



# Miss Manners Matters

---

## Be User Friendly

- The user is in control



# Miss Manners Matters

---

## Be User Friendly

- The user is in control
- Applications
  - Must run at any depth



# Miss Manners Matters

---

## Be User Friendly

- The user is in control
- Applications
  - Must run at any depth
  - Should run on any screen or screens



# 32-Bit QuickDraw in 7.0

---

Screen and monitor management

- Miss Manners Matters
- Looking for Mr. GoodScreen



# 32-Bit QuickDraw in 7.0

---

## Screen and monitor management

- Miss Manners Matters
- Looking for Mr. GoodScreen
  - DevLoop





# 32-Bit QuickDraw in 7.0

---

## Screen and monitor management

- Miss Manners Matters
- Looking for Mr. GoodScreen
  - DevLoop
- HasDepth and SetDepth



# SetDepth

---

Save the user a trip to monitors, but...



# SetDepth

---

Save the user a trip to monitors, but...

- Never change depth without user request



# SetDepth

---

Save the user a trip to monitors, but...

- Never change depth without user request
- Never change depth from background



# SetDepth

---

Save the user a trip to monitors, but...

- Never change depth without user request
- Never change depth from background
- Do not abuse this call



EXTINGUISH  
SMOKE  
SLATE

NO. 102  
RED FIVE

NO. 102  
RED FIVE  
FOR NEWS

DATE 1.26.84

TIME 09:14

FRONT MENTOR

TOP 2470  
PRESIDENT CITY RACE  
BLUES TO  
CANCEL 800

52

AND WE WILL BURY THEM

# 32-Bit QuickDraw in 7.0

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## What's New for Color Machines...

- Picture utilities
- 16-bit/pixel shrinking
- Classic transfer modes
- CopyBits Colorizing
- Screen and monitor management
- CopyMask



# 32-Bit QuickDraw in 7.0

---

Copy Mask





# 32-Bit QuickDraw in 7.0

---

Copy Mask



- Mask is not just one bit anymore



# 32-Bit QuickDraw in 7.0

---

Copy Mask



- Mask is not just one bit anymore
- Gray scale masks



# 32-Bit QuickDraw in 7.0

---

Copy Mask



- Mask is not just one bit anymore
- Gray scale masks
- Color Masks



# Copy Mask

---

How it works...

**$(1-MSK) SRC + (MSK) DST$**

**MSK = BLACK -> take SRC**

**MSK = WHITE -> take DST**



# 32-Bit QuickDraw in 7.0

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## What's New for Color Machines...

- Picture utilities
- 16-bit/pixel shrinking
- Classic transfer modes
- CopyBits Colorizing
- Screen and monitor management
- CopyMask





The power to be your best



The power to be ugly at best

®

The power to be or not to be





The power to be plaid



The power to be your best