Map Reproduction

- Slocum: Chapter 12 p. 229 -
- Map reproduction
- Map dissemination
- Planning ahead
- Map editing
- Raster image processing
- Screening
- Process color
- Low-volume printing options
- Offset lithography
- Non-print – reproduction and dissemination

Reproduction Versus Dissemination

- Reproduction
  - Printing or electronic duplication in digital form
- Dissemination
  - Distribution of maps in print or non-print form
  - Download from Internet
    - Disseminated and reproduced at same time.
  - Print – distinct processes

Planning Ahead

- Who is intended audience? Purpose of map?
  - Influences almost every aspect of reproduction process.
- What is your budget?
- When is your deadline?
- What is the final medium for display?
  - Printed – Paper, cloth, plastic?
  - Displayed – file size, optimal resolution

Planning Ahead

- Black and White (gray tones)? Color?
  - Influences cost dramatically.
- What size will map be?
- How many copies required?
- Will map be folded?
- What level of quality is acceptable?
- Copyright issues

Map Editing

- Critical evaluation and correction
- Map design:
  - Does the design serve the purpose based on intended audience and use?
  - Does it communicated clearly and unambiguously?
- Completeness: are any features, map elements or type labels missing?
- Accuracy: Position, spelling, attribute values

Map Editing

- Over familiarity
  - Loss of objectivity – separate producer from editor
- Edit with “fresh eyes” at the beginning of a work session
- Edit large maps in sections
- View maps upside down and sideways
- Edit after a period of time has elapsed.

Raster Image Processing for Print Reproduction

- Raster printing devices predominate
  - Pen devices obsolete
- Vector "model" may be used in preparation – linear features, type etc.
- But will be transferred to raster form for printing

Raster Image Processing for Print Reproduction

Raster and vector models in digital map file

Convert digital map file to page description data PDD

Interpret PDD to raster image

Process raster image prints map

Application Software

Printer Driver

Raster Image Processor (RIP)

Printing Device

PostScript device independent page description language PDL - ISO standard

Screening for Print Reproduction

- Screening
  - lighter colors –reduce ink / toner applied to print medium
    - Tints - gray shades
  - Halftone screening
    - Equally spaced dots of variable size
    - Size of dot determines lightness of tint
    - >50% tint white dots on color background
  - Stochastic screening pseudorandom spacing

PDL

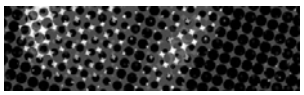
- page description language

A page description language (PDL) specifies the arrangement of a printed page through commands from a computer that the printer carries out. Hewlett Packard's Printer Control Language (PCL) and Adobe's Postscript are the two most commonly used PDLs.

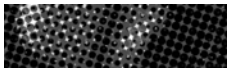
- http://whatis.techtarget.com/definition/0,,sid9_gci788491,00.html

Halftone Screen Process

- The term Halftone Screen refers to the pattern of dots of varying sizes applied to an image of varying tones, or same sized dots applied to a tint of color
- http://www.dtp-aus.com/hlftone.htm
- http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/003/T0390E/T0390E10.htm



Halftone Screening Parameters



- Tint percentage
  - Cell type – shape
  - Transitions
- Screen frequency /(ruling)
  - Line spacing (lines per inch lpi)
  - Low frequency individual dots seen – coarse
  - High frequency interpreted as solid, light color
- Screen Angle
  - Multiple colors on same page
  - Moiré patterns – only rosette acceptable
- http://www.dtp-aus.com/hlftone.htm

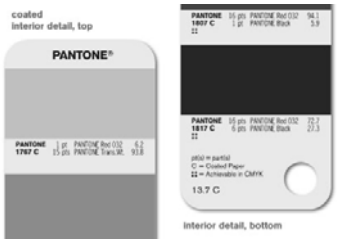
Aspects of Color Printing

- Process colors versus Spot colors
  - Additive, subtractive
  - CYM – muddy not pure black, lacks crispness
  - CYMK – Process colors – new colors created where semi-opaque dyes overlap
  - Four color process printing
  - Screen angle – mixes colors – moiré patterns
    - Rosettes
  - Vibrant colors difficult to reproduce
    - Red, Orange, Green, Blue
    - RGB can produce a greater color range

Aspects of Color Printing

- Spot colors
  - Opaque inks
  - Premixed
- Tints created from spot colors through screening
- Pantone Matching System (PMS)
  - Printed color swatches
  - Inks mixed to specific formulae
    - Pantone Color Formula Guide

Pantone Matching System (PMS)



Aspects of Color Printing

- High-Fidelity Process Colors
  - Based on CYMK include 2 or 3 additional colors
  - Variety and vibrancy of colors
  - Accurate color matching
  - Pantone – Hexachrome six-color system, more saturated CYM and orange and green
  - Plug-in software

Aspects of Color Printing

- Continuous Tone Color Printing
  - Full-color prints without screening techniques
  - Subtle variations in density or volume of toner applied to page
  - Photographs, images
  - Expensive

Low Volume Print Reproduction

- Laser Printing
  - Monochrome, color
  - 600 – 1200 dpi
  - Up to 11" x 17"
  - Color copy machines
- Ink-jet Printing
  - 600 – 1200 dpi
  - Large format, 6-color process possible
  - Streaking and fading problems
- Thermal wax transfer
- Dye-sublimation
  - Problems crisp lines, fine detail and small type

Dye Sublimation Printers

Used at the high end where quality is very important, "Dye" in the name comes from the fact that the process uses solid dyes instead of inks or toner

"Sublimation" is the scientific term for a process where solids (in this case dyes) dyes are converted into a gas without going through an intervening liquid phase.

These printers produce photo-realistic continuous-tone images that look like they came from a photo lab. Cost per page is as high as $3 to $4 dollars for a letter sized page.

- *Olympus P-400 dye-sublimation printer*
  - *A4-size (8.25"x 11.7") photograph in only 90 seconds.*
  - *True, continuous-tone dye-sublimation technology provides professional photo prints with accurate color reproduction for ultimate output quality*
    - *(The cost per A4-size print, including paper and ink, is a competitive $1.90.)*

How printers work

Color Management Systems

- Matching colors of graphic display with printed color
- Devices in work flow – scanners, monitors, printers etc. introduce variation in color
- Same device – different colors
  - Calibration, operating conditions
- Color Profile
  - Colorimeter, spectrophotometer
  - Measure precise color values for outputs from each device
  - Compare devices color profile with colors as originally defined.
- International Color Consortium (ICC)
  - Vendor neutral cross-platform standard

High Volume Print Reproduction

- Lithography
  - 200 year old technology
- Offset Lithography
- Large volume reproduction
  - Volume discounts
- Offset Printing Technology

- http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/003/T0390E/T0390E12.htm

Links

- Page 235
  - Pantone Matching System (PMS)
  - Pantone Color Formula Guide
- Page 236
  - Hexachrome
  - Color management systems (CMSs)
  - International Color Consortium (ICC)
- Page 238
  - How ink-jet printers work
  - Portable Document Format (PDF)
- Page 242
  - Dupont's Cromacheck
  - Dupont's Cromalin

Links

- Page 245
  - Digital television (DTV)
  - Digital Versatile Disc (DVD)
- Page 246
  - Hypertext Transfer Protocol (HTTP)
  - Hypertext Markup Language (HTML)
  - Java
- Page 247
  - JavaScript
  - Common Gateway Interface (CGI)
  - ESRI's ArcIMS
  - Geography Network
  - eXtensible Markup Language (XML)
  - Scalable Vector Graphics (SVG)
- Page 249
  - Fleming (2002) reference

Additional Readings - Chapter 12

- Burnett, M. (2004) "Working with your printer." *Cartographic Perspectives*, no. 49: 64-66.
- *(New)* Loppnow, M. (2005) "Pre-press and technical support technician." *Cartographic Perspectives*, no. 50: 47-50.
- *(New)* Pavlicko, P. and Peterson, M. P. (2005) "Large-scale topographic web maps using scalable vector graphics." *Cartographic Perspectives*, no. 50: 34-46.
- Peterson, M. P. (ed.) (2003) *Maps and the Internet*. Amsterdam: Elsevier.