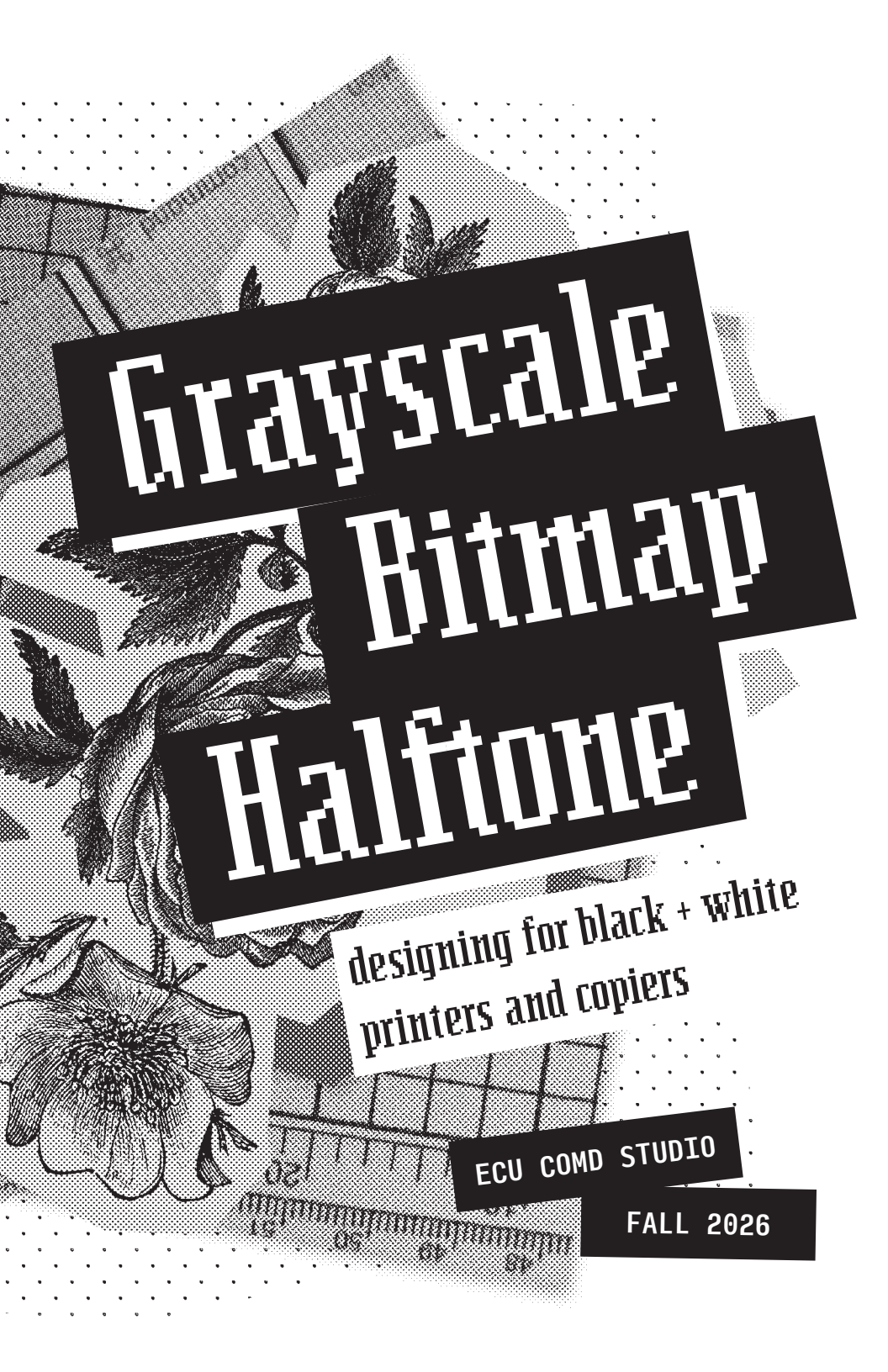
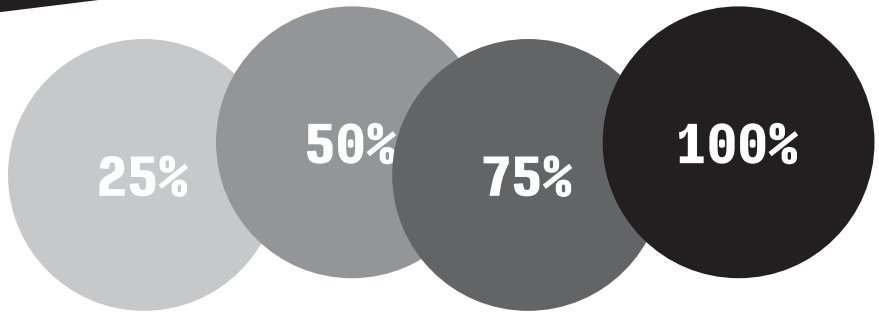

Grayscale
Bitmap
Halftone
designing for black + white
printers and copiers
ECU COMD STUDIO
FALL 2026

Instead of colour, think about...

VALUE



The only colour information in a black + white print is the range of light to dark, 0 to 100%. With most types of printing, the ink or toner for the darker shades will also look denser and more solid than the lighter shades.

CONTRAST



Black + white prints often look better with higher contrast art. This is especially important if you want to make sure details are clear and text is legible. Try to avoid having a lot of similar middle grays.

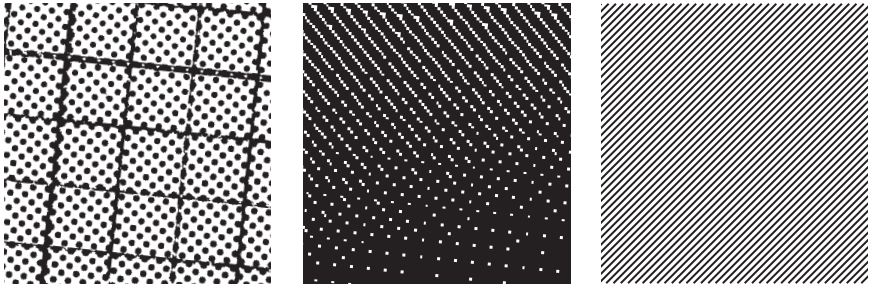
POSITIVE + NEGATIVE





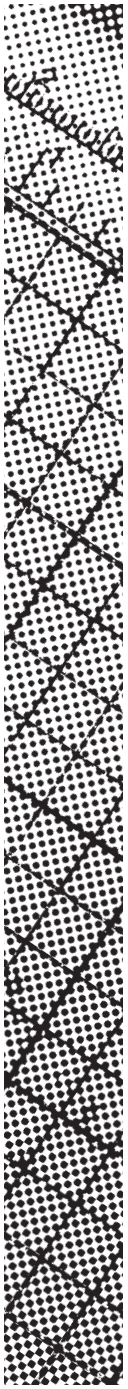
Choices about which elements are light or dark (and which might be reversed) can be a valuable way to establish visual hierarchy and guide the viewer’s eye through a black + white design. This can also change the feel and mood of an image.

TEXTURE



Flat shades of gray will usually show some rough grainy texture when printed on black + white laser printers or photocopiers. If you don’t want that look, think about using high contrast patterns or textures instead, for a visual pop that reproduces well in cheap BW printing.

Tips for Black + White Artwork



Make intentional decisions!

- **The worst option is just sending colour files to a black and white printer, and hoping for the best.**
- **Convert your artwork to a black + white or grayscale version** before printing to get much better control of the contrast and the look.
- **If your black/white/gray art is a RGB or CMYK file,** that's better than using colour art for a BW print... but it's less accurate than a Grayscale or Bitmap mode file. RGB files make grays and blacks with combinations of red/green/blue, and most CMYK files will default to creating grays and blacks by mixing all 4 colours.
- **Not all art or design programs have the options for true grayscale or black and white modes.** You can still get nice black + white prints if this isn't available in your software: it just gives you more control of the result. In the standard Adobe programs, we ususally convert art to grayscale or bitmap in Photoshop.
- **You can also make warmer or cooler looking black/gray in colour files and prints on purpose!** CMYK black that adds some C, Y, or M to 100% K is called "Rich Black". For example, a rich blue-black is 100 K + Cyan.
  Take a look at the "Appearance of Black" setting in InDesign or Illustrator preferences to see whether it's automatically making all your black colours look like a uniform rich black, or letting you customize it.

Extra high resolution, when possible!

300 is still the minimum resolution for a standard high-quality print, but...

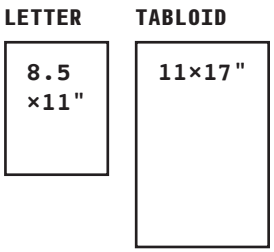
600+ allows for finer and clearer detail in black and white prints, especially in halftone bitmaps. This actually makes more of a difference for black + white than it does for full colour CMYK.

Black + White Printing Options

ECU SELF-SERVE PRINTERS

Send to "Any BW Laser Printer on Campus"

- Letter or Tabloid size white paper
- It's a lot cheaper than colour!
- You can also use the self-serve laser printers like a copy machine: there's a scanner in the top. You can choose to print the copies right away, or have the scan sent to your email.
- After your file is sent, you can tap your card to pay and pick up your prints at any of the self-serve laser printers on each floor.



PRINTER LOCATIONS

» Floor 1: Near Ceramics
» Floor 2: In the Library, near the entrance
» Floor 3: Two printers: one near COMD studio, one near Foundation
» Floor 4: Hallway in front of the DOC

Installing the self-serve printers on your laptop

- Go to **print.ecuad.ca** and log in
- Go to **PaperCut Client Installers** on the sidebar, and choose Mac or Windows. Double-click the installer application after it downloads.

Printing from a school computer

- Don't have a laptop with the school printers installed? You can send prints from most school computers, including the two Macs in the COMD Studio, the two Macs next to the Design area printer, and the computers available in the Library.

ECU DIGITAL OUTPUT CENTRE

The Digital Output Centre currently offers black + white printing on many paper options, including coloured paper. They will also accept most studio papers purchased from COMD for black + white printing!

OUTSIDE SCHOOL

- Try searching "copy shop" + your city or neighborhood. There are many local places that offer fast + affordable BW printing on coloured paper, and some have printers/copiers that you can use yourself.
- "Copies Plus" on West Broadway is a popular Vancouver recommendation from past ECU COMD students.

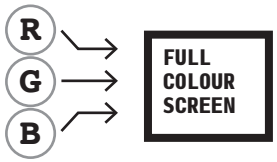
Image Modes

Every image file has a mode. The mode determines how colours are handled.

Colour Image Modes

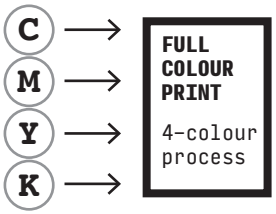
RGB COLOUR

Set up for colours on screen to be created with red, green, + blue light.



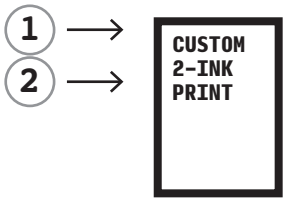
CMYK COLOUR

Set up for colours in print to be created with cyan, magenta, yellow, + black inks or toners.



DUOTONE and MULTICHANNEL

Set up for colours in print to be created with specific inks that are different than standard CMYK.



Black + White Image Modes

GRAYSCALE

Contains the range of value from light to dark, 0% to 100%, but no other colour information. Great for designing 1-ink artwork for print.

BITMAP

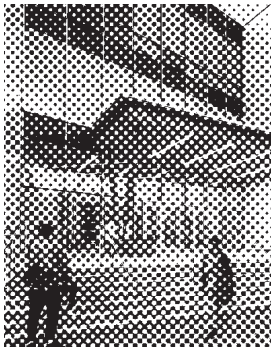
Allows ONLY black and white (0% or 100%), and no midtones or grays. Image areas are either “on” or “off”.

HALFTONE

A method of converting art to bitmap where the shades of gray become patterns like dots or lines. It’s still just black and white with no gray.







How do colour modes work in different file types?

Photoshop + Image Files

.psd .psb .tif .jpg .png

One mode at a time per file, set under Image > Mode

The next pages of this booklet contain instructions and reference for changing Photoshop colour mode to gray or bitmap.

Illustrator files

.ai or Illustrator .pdf

Either CMYK or RGB mode can be set per file for colours, under File > Document Color Mode

Illustrator files can also contain raster images in grayscale or bitmap modes. You can also use Object > Rasterize to convert Illustrator objects to CMYK, grayscale, or bitmap raster art.

InDesign Files

.indd or .idml

Every placed image and swatch has a colour mode, and you can have different modes all in the same InDesign document.

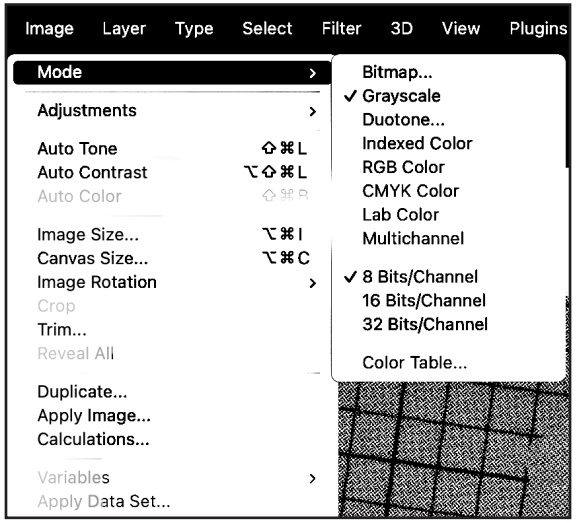
For handling colour in blending and transparency effects, you can choose either RGB or CMYK with Edit > Transparency Blend Space

PDF

.pdf

Depends entirely on the settings you choose when you save or export the PDF. In the Adobe programs, look at the PDF options under Output and Color Conversion. You can force everything to convert to CMYK, RGB, or Gray, or leave it unchanged with no conversion.

Changing Image Mode in Photoshop



Go to the Image menu, then Mode.

- The tab with the file name for each file you have open shows its colour mode:

× **filename.psd @ 50% (Gray/8)**

  InDesign + Illustrator also let you check the colour mode for placed/linked image files.
- **Files for saving in grayscale:**
  - » **PSD** or **TIF** (best for placing in InDesign for print)
  - » **PDF** (No Color Conversion)
- **Duotone** and **Bitmap** modes both require converting the mode to Grayscale first.

- **Bits/Channel** affects the maximum number of colours or grays that can be in the file. Higher means bigger file sizes that might run slower on your computer.

	Gray	RGB
8	256 shades of gray	16 million + colours
16	60,000 + grays	Trillions of colours

The difference may not actually be visible unless you're working with smooth gradients or very detailed photo editing.

A FEW USEFUL PHOTOSHOP IMAGE ADJUSTMENTS FOR GRAYSCALE ART

- **Levels** or **Curves:** adjust the balance of light, dark, and midtones
- **Threshold:** force black/white with no gray, without converting mode
- **Black & White:** use this on a RGB image to customize how colours convert to grayscale, before using Image > Mode to switch the whole file to gray mode.

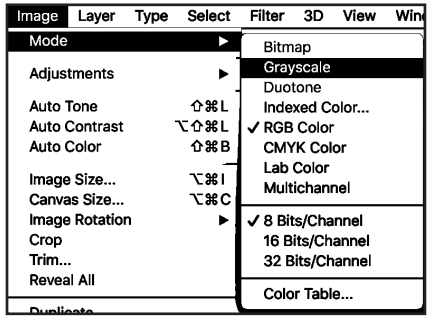
Converting to Bitmap in Photoshop

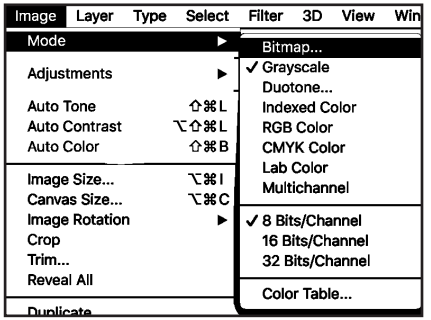
1. If you're starting with a colour file, it first needs to convert to gray:

Image > Mode > Grayscale

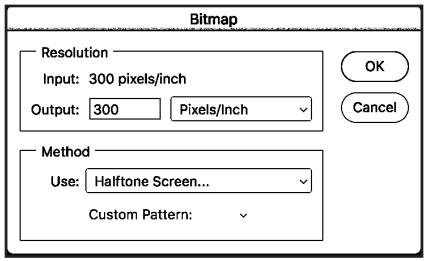
2. Once you have a grayscale file, Bitmap mode will be available in the menu, and you can go to:

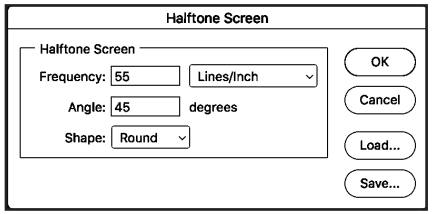
Image > Mode > Bitmap





BITMAP SETTINGS





Q: Is the "Color Halftone" filter the same thing as Halftone Screen?

A: *No. It can look similar if used on a gray file, but has fewer options + doesn't convert the image to bitmap.*

You'll get to choose some settings for your bitmap, and unfortunately there isn't a visual preview here.

Input: The resolution of the gray file that you're starting with

Output: The resolution of the new bitmap file. Unlike most types of image files, it's okay to make this higher than the original.

Method: You can choose Threshold, Pattern Dither, Diffusion Dither, Custom Pattern, or Halftone. There are samples of these on the following pages.

Halftone has even more options: lines per inch, angle, and shape.

PHOTOSHOP BITMAP METHOD SAMPLES

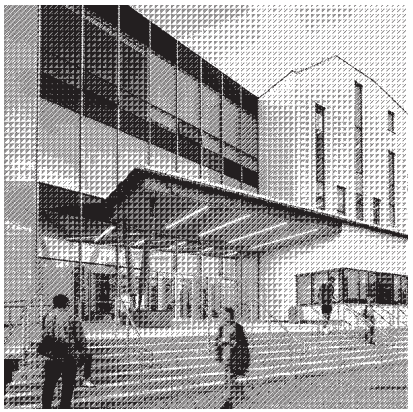
300 PPI GRAYSCALE ORIGINAL



50% THRESHOLD



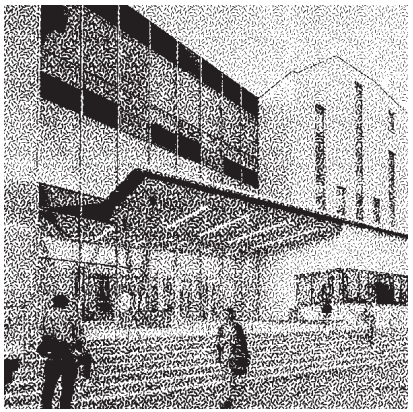
PATTERN DITHER



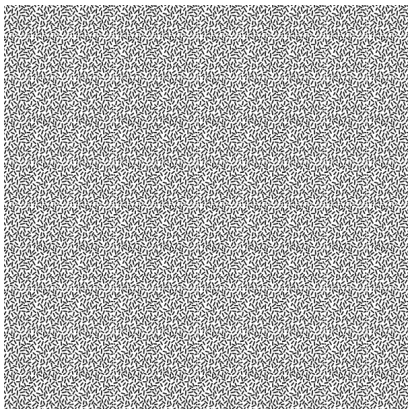
DIFFUSION DITHER



CUSTOM PATTERN

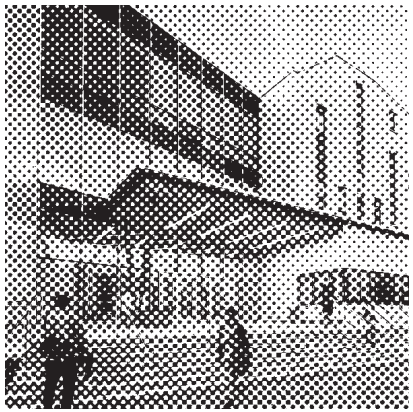


(CUSTOM PATTERN USED)

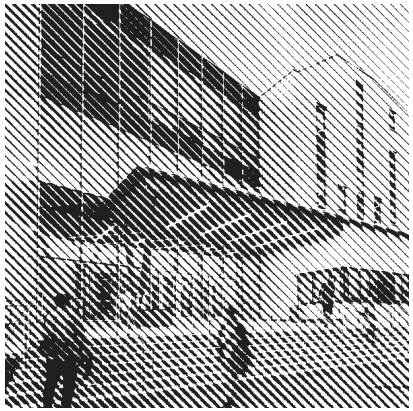


HALFTONE SAMPLE: 300 PPI | 30 LPI | 45 ANGLE

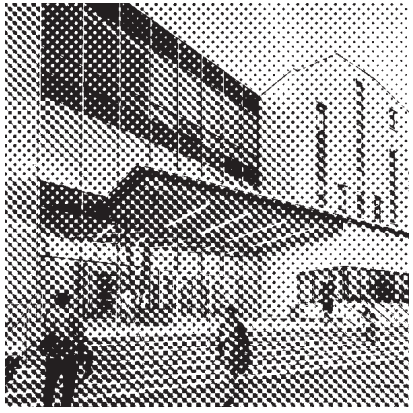
ROUND



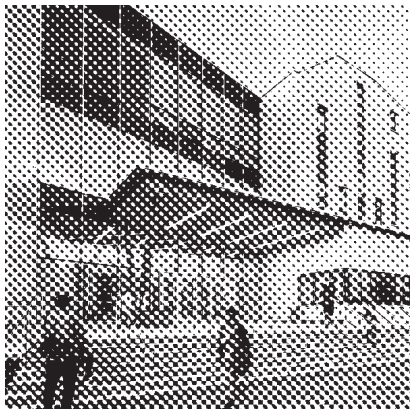
LINE



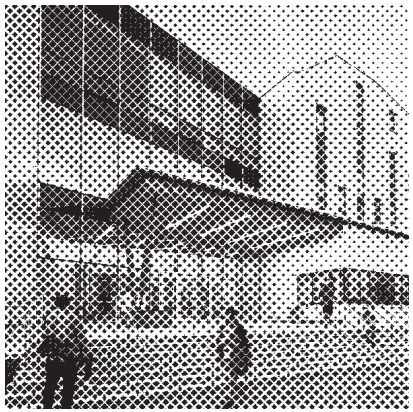
DIAMOND



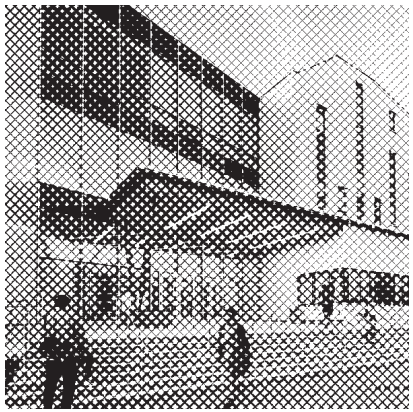
ELLIPSE



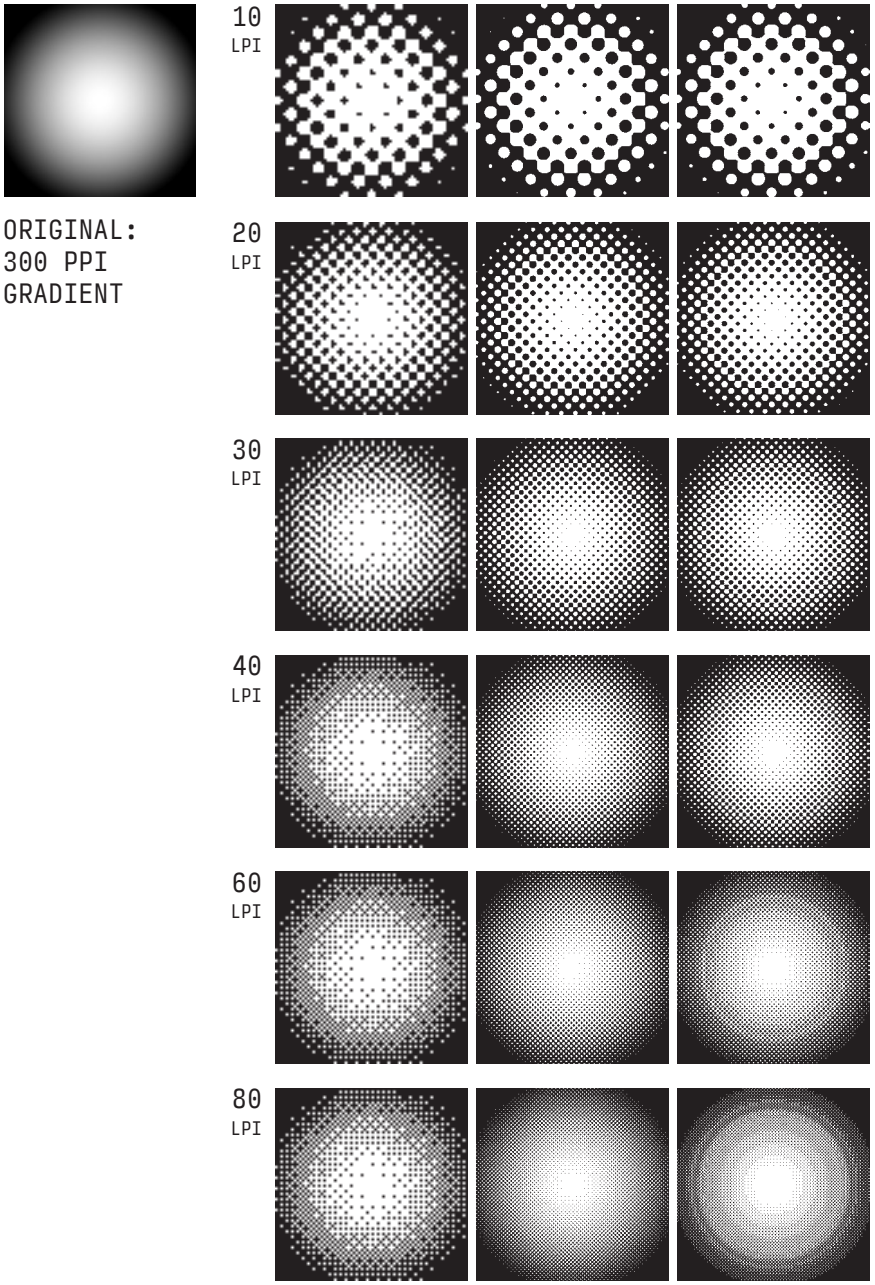
SQUARE



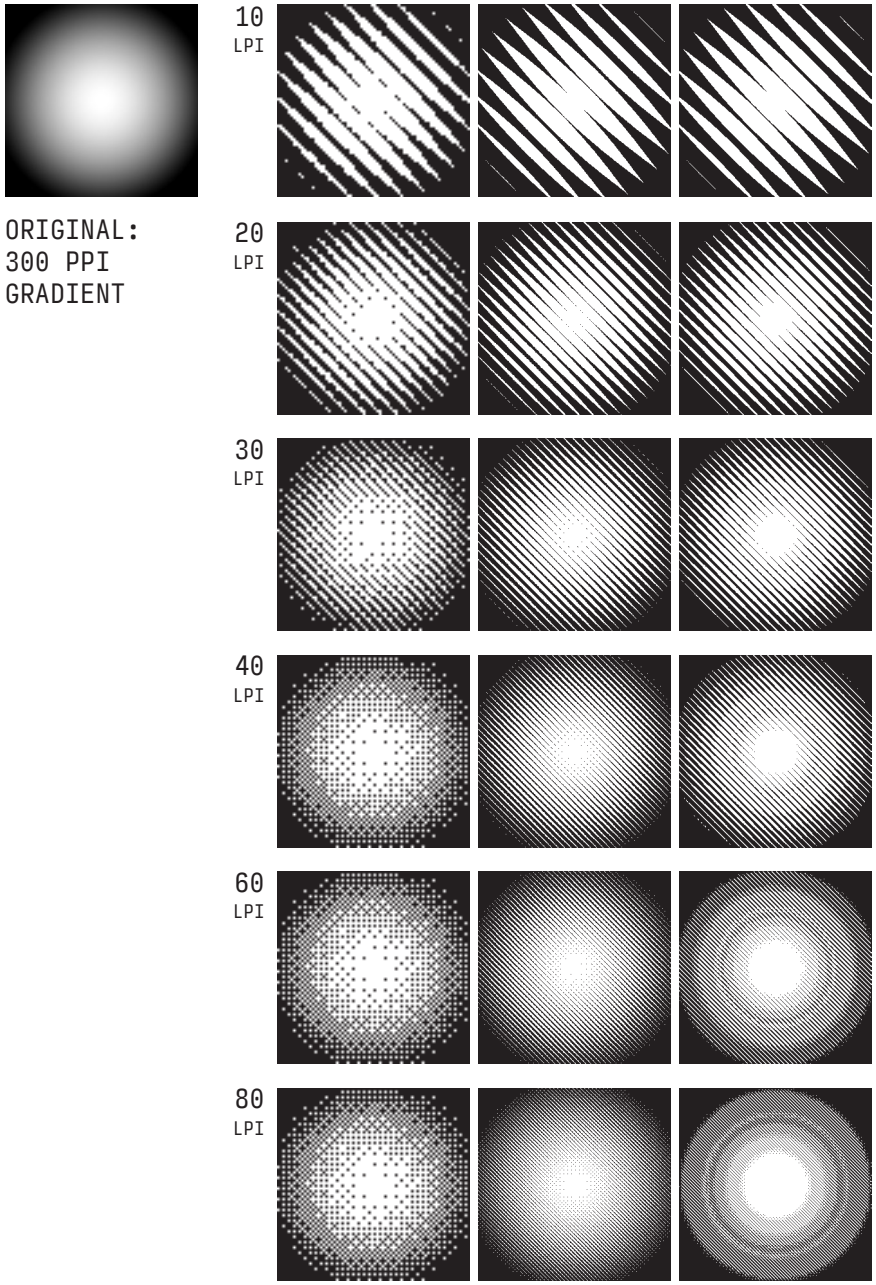
CROSS



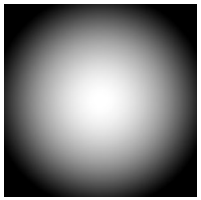
ROUND HALFTONE SAMPLES 45º ANGLE



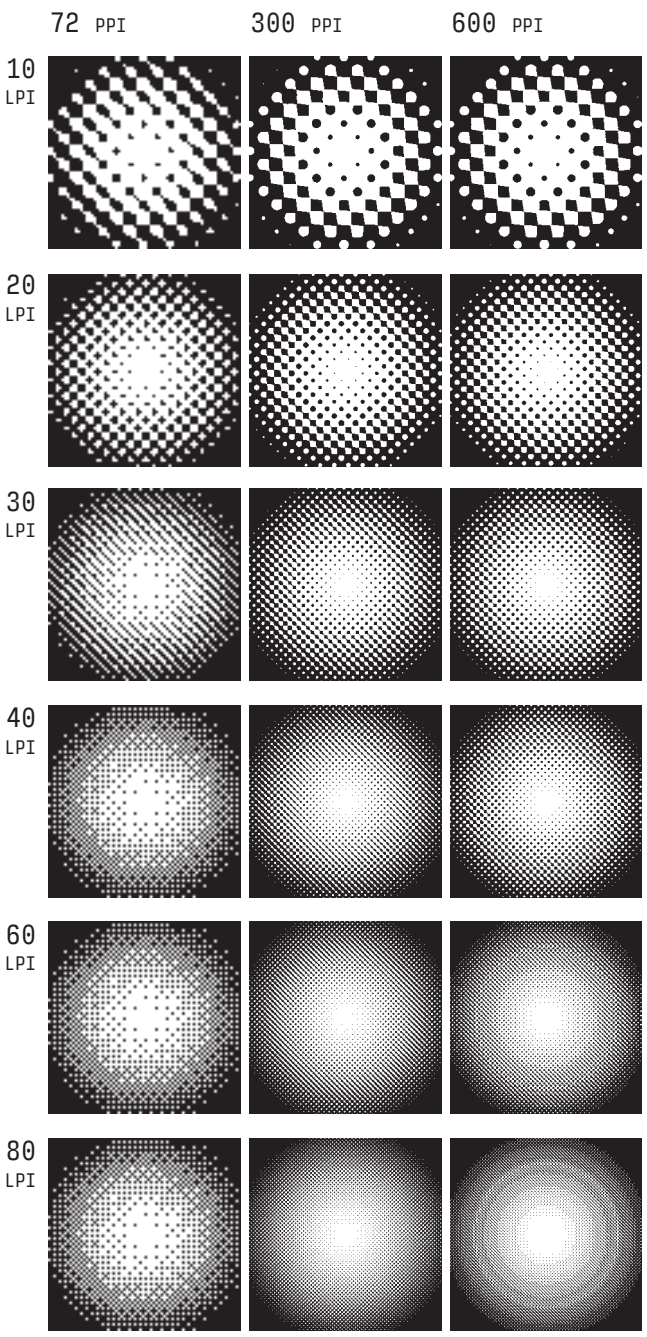
LINE HALFTONE SAMPLES 45º ANGLE



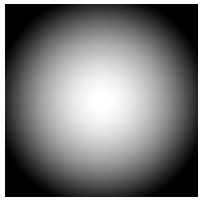
DIAMOND HALFTONE SAMPLES 45º ANGLE



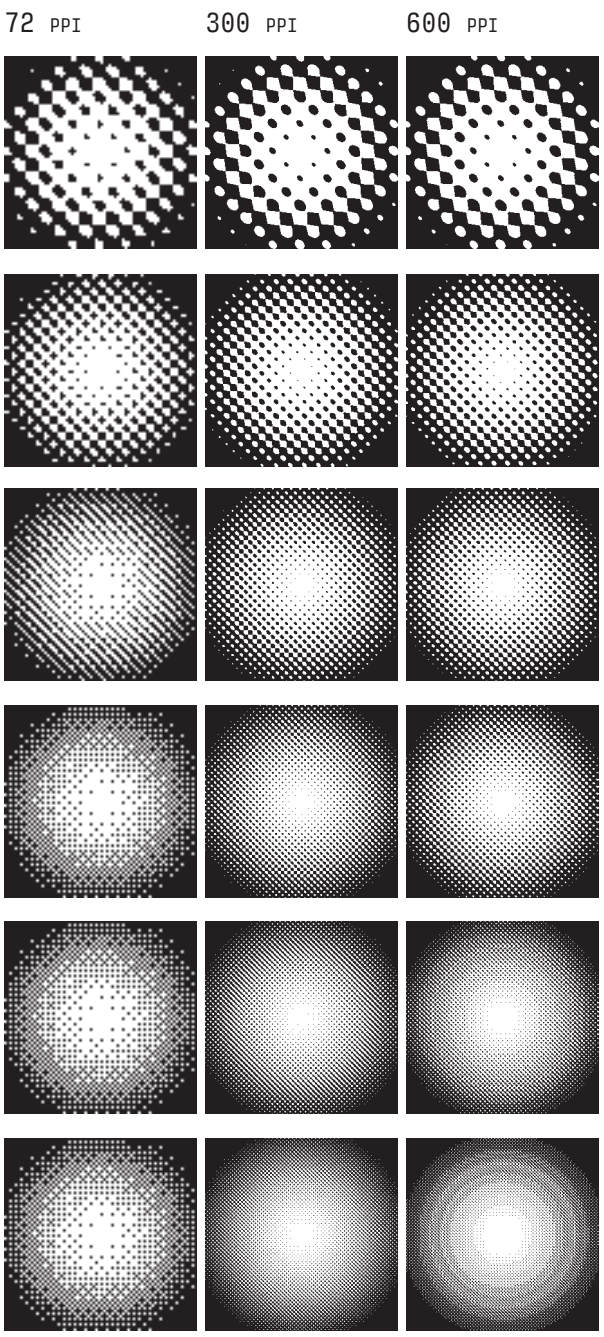
ORIGINAL:
300 PPI
GRADIENT



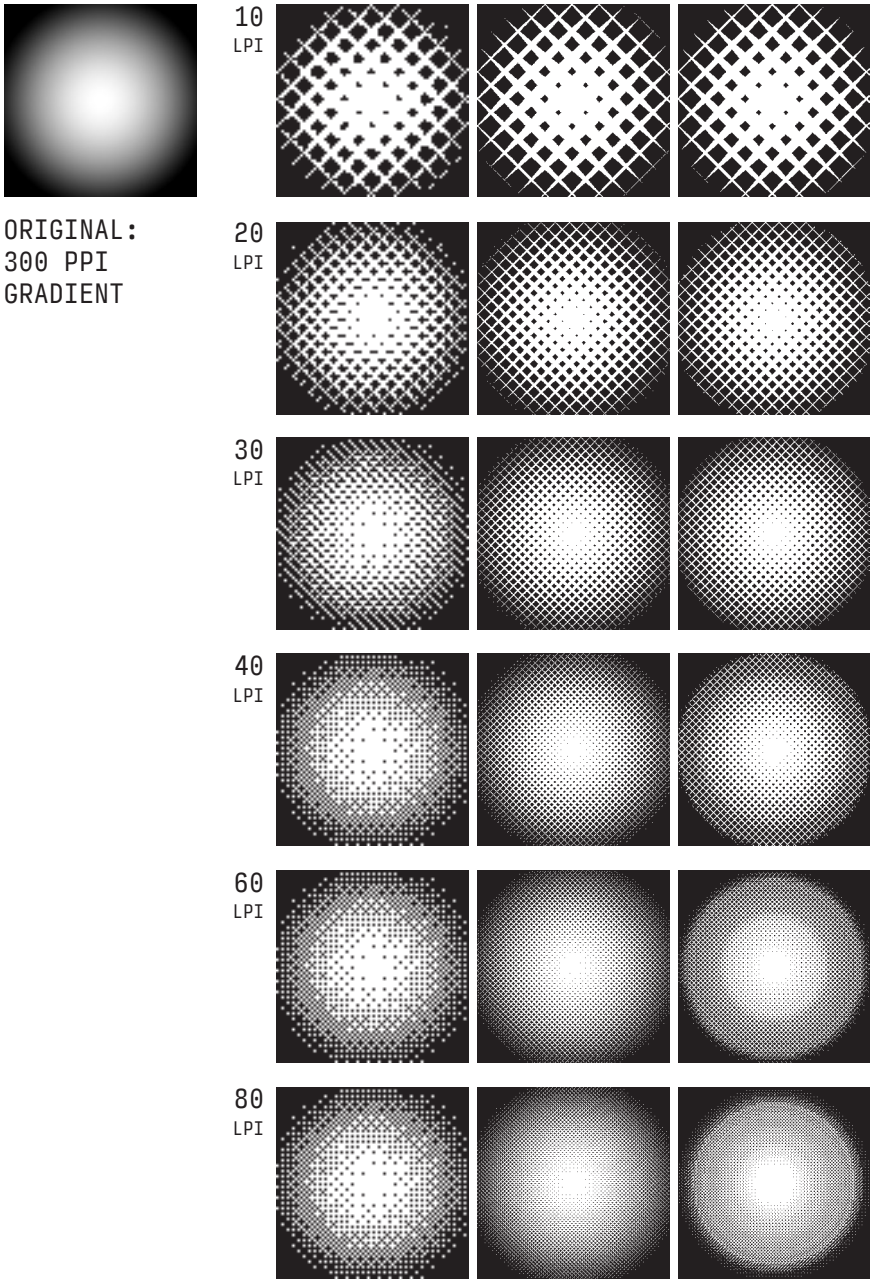
ELLIPSE HALFTONE SAMPLES 45º ANGLE



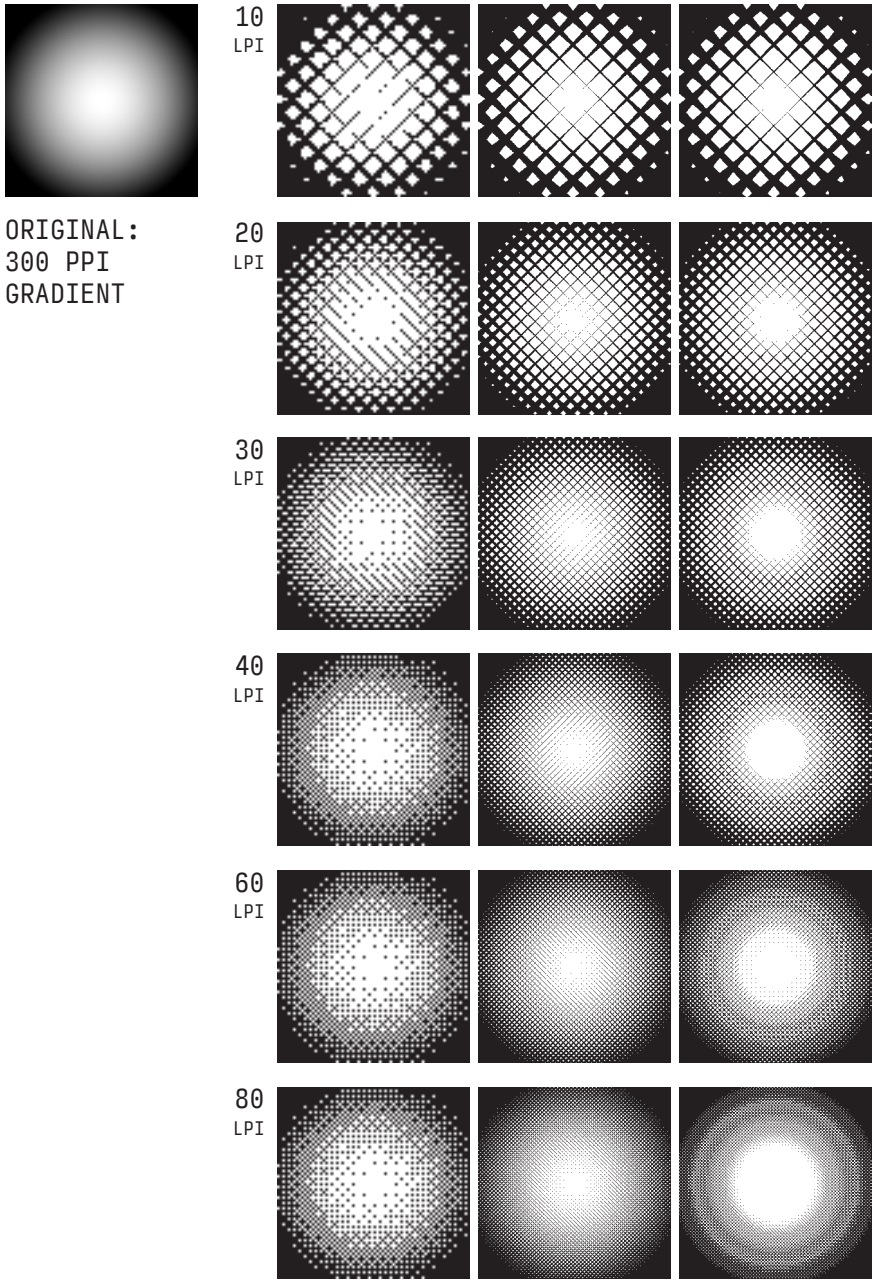
ORIGINAL:
300 PPI
GRADIENT



SQUARE HALFTONE SAMPLES 45º ANGLE



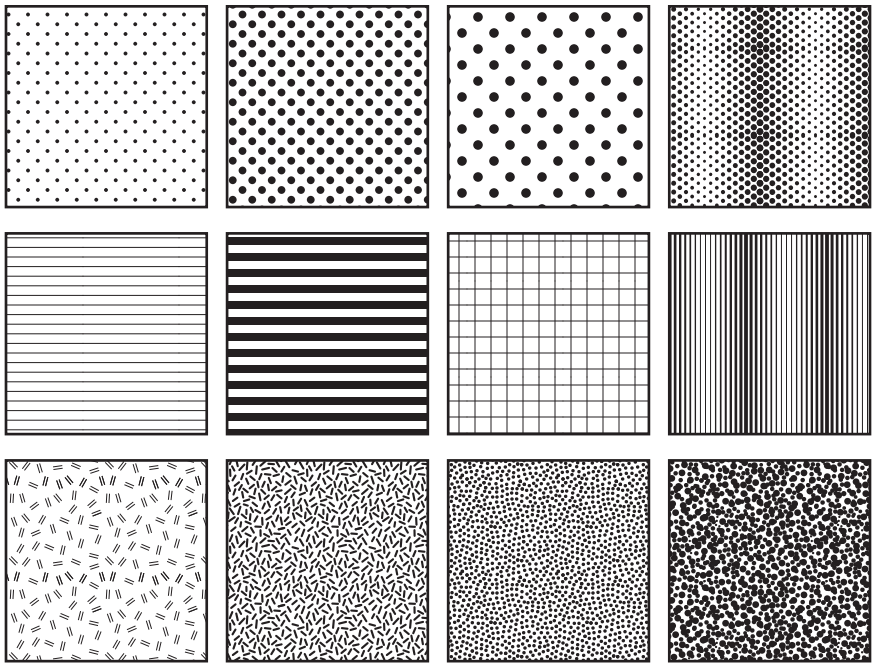
CROSS HALFTONE SAMPLES 45º ANGLE



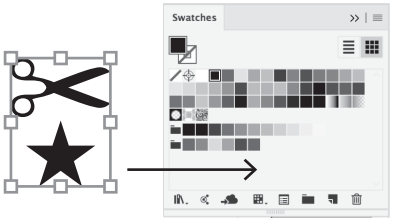
Vector Patterns in Illustrator

Another method for getting great crisp-looking patterns and textures in your black + white prints: try using + making vector pattern swatches that have no colors other than black or white.

Here are some of the pre-made patterns available in Illustrator under: **Swatches > Open Swatch Library > Patterns > Basic Graphics**



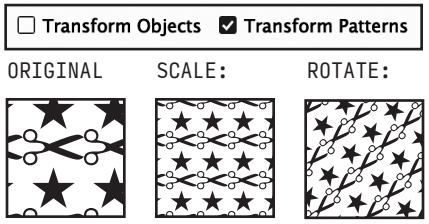
MAKING A PATTERN



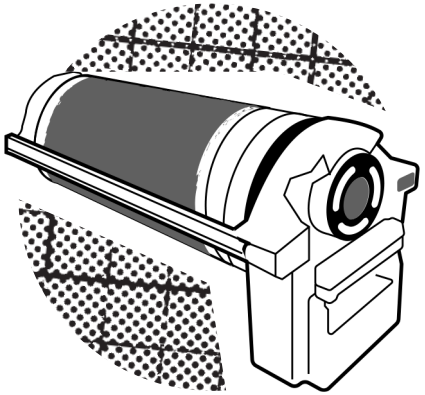
Select your artwork, and either drag it into Illustrator's Swatches window, or go to Object > Pattern > Make in the menu.

TRANSFORMING

When you go to **Object > Transform** in the menu (Rotate, Reflect, Scale, or Shear), there's a checkbox for whether it affects the object, the pattern, or both.



Bitmap + Halftone for Risograph



Risograph is a stencil process, and the machine will convert any shades of gray in your artwork into bitmap/halftone texture.

It's easier ***not*** to make your own halftones in Riso files, unless you want to customize a look that we can't get with the built-in Riso dot settings.

SCANNING PAPER ARTWORK

- The default setting when making masters from the Riso machine scanner is a diffusion texture (a fuzzy, grainy look)
- We can turn on "Dot Process" to get a choice of 4 sizes of halftone dots:

  1 = 212 lines/inch
  2 = 106 lines/inch
  3 = 71 lines/inch
  4 = 53 lines/inch

SENDING FILES

When we send files to the Riso machine from the computer, we can choose either grain texture or halftone dots. Dot options are:

- Lines per inch: can be any number between 38 and 200. The smaller the number, the bigger the dots.
- Angle: can be any number from 0 to 90 degrees
- Default setting: 71 lpi, 45º

Riso Tips: *Small text should usually be at 100% / black, not gray, so that the legibility isn't affected. You don't want it to be too dotty to read! If you make your own halftone patterns in the file, they should usually be just black/white with no grays, so that they don't clash with patterns/textures generated by the Risograph.*