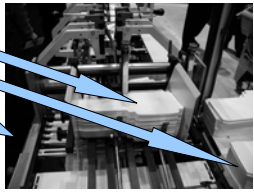


## Halftones

- ## Continuous tone
- Shades of gray
    - Photographs
    - Pencil drawings
    - Chalk drawings
    - Black and white water color paintings
  - Prescreened images

- ## Printing press limitations
- Cannot print shades of gray
  - Gravure - can vary the amount of ink lay down
  - Optical illusion required to create shades of gray by varying dot size

- ## Halftones
- Required for Continuous Tone Copy
  - Continuous tone
    - Whites
    - Grays
    - Blacks
- 

- ## Continuous tone copy
- Highlight areas - light areas - low density reading
  - Mid tones - middle grays
  - Shadows - dark areas - high density reading

- ## Halftone screens
- Contact screens
    - Vignetted dot
      - Pronounced - Vignetted
  - Tint screens
    - Hard dot
  - PhotoShop
    - Output to dots



## Screen ruling

- Lines per inch (lpi)
  - 85-100, newspapers
  - 120-133, small offset presses
  - 150-200, high quality, larger offset presses
- Choice - substrate to be printed, or special effect desired



## Halftone exposures

- Main
- Flash
- Bump



## Main exposure

- Single white light camera exposure
- Light reflected from highlight into midtone areas
- Exposure is made through the contact screen laid over the film
- If density range of photo and density range of screen are equal, dot pattern will be reproduced through the entire range of the photo



## Flash exposure

- Shadows do not reflect light
- Flash exposure used to place dots in the non - reflected area
- Exposure is made by flashing lamp with the contact screen over the film
- Camera back may be open or closed depending on the camera
- Lengthens the range of the halftone



## Dot Percent sizes

- Highlight - 5-10%
  - Produced by main exposure
- Midtones - 30-70%
- Shadows - 90-95%
  - Produced by flash exposure



## Halftone dots

- Refer to the printed dot size, whether negative or positive
- Referred to by percentage of black
  - 5% dot on neg. is almost solid black, but prints a pinpoint of black
  - 95% dot on neg. is only a pinpoint of black, but prints almost solid
  - 50% dot, checkerboard, middle tones

## Halftone exposure test

- On the camera
  - Main exposure test
  - Flash exposure test
- Process
- Strip and print the test

## Exposure Test Evaluation

- Locate best highlight and shadow dot on the printed gray scale
- Read densities of original gray scale
  - Shadow (high) - highlight (low) = screen density range
    - the range of density the screen will reproduce with a single white light exposure, Main
  - Photo with same range as screen will only need a main exposure
- Flash test - the smallest dot that printed solid is the basic flash exposure, shortest time
  - Excess density - flash places dots in the area beyond the Screen Density Range

## Density – what is it?

- a measure of the blackness of film or photographic paper
- All light reflected = 100 % reflectance = 0 density

## Logarithms

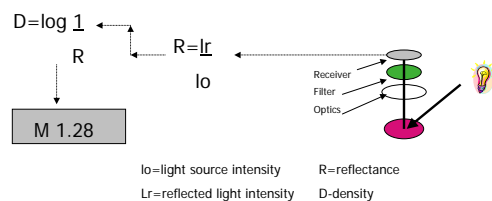
- A way to express large numbers using small numbers
- Density reading
  - A logarithmic scale - 0.0-3.0
  - Equates a number value to the ability of a material to absorb or transmit light
  - Higher density reading, denser the material

## Density measurement

- Densitometer
  - Reflection - measures reflectance from opaque copy
  - Transmission - measures transmission through transparent copy

## Reflection densitometer

- Illuminate the area at  $45^{\circ}$  and measure the amount of light at  $90^{\circ}$





## Relationships

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<b>Transmittance</b>	<b>Density</b>
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100.0%	0.0
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10.0%	1.0
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1.0%	2.0
------	-----

0.1%	3.0
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Theoretically – no maximum density

Actuality – 3.0 maximum printing density