LEBANON CAMERA CLUB

Flash Photography Basics

9/6/2016

Flash Photography

Flash types

- Flash lamp
  - Flammable powder in a holder
  - Ignited by hand

Flash Photography

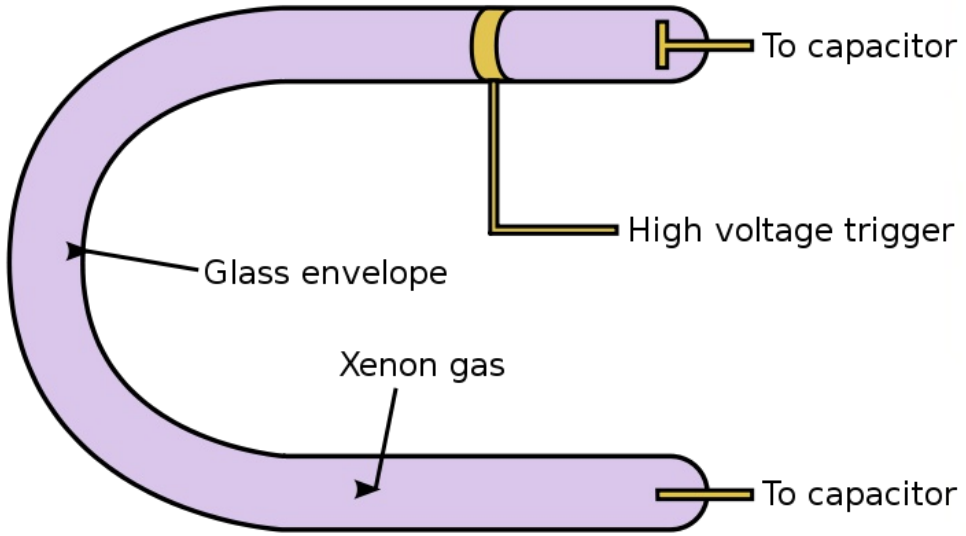
Flash types

- Flash bulb
  - Fine magnesium wire in a glass bulb filled with oxygen
  - Ignited by electricity from camera

Flash Photography

Flash types

- Electronic flash
  - High voltage flash tube filled with xenon gas
  - Capacitor discharge triggered by signal from camera



Flash Photography

Flash power

- Built-in flash
  - Low power, but convenient
- Speedlight
  - More power, may tilt/swivel, may 'zoom', still portable
- Studio strobe
  - High power, AC power (fast recharge), mounts on light stand

Flash Photography

Flash power

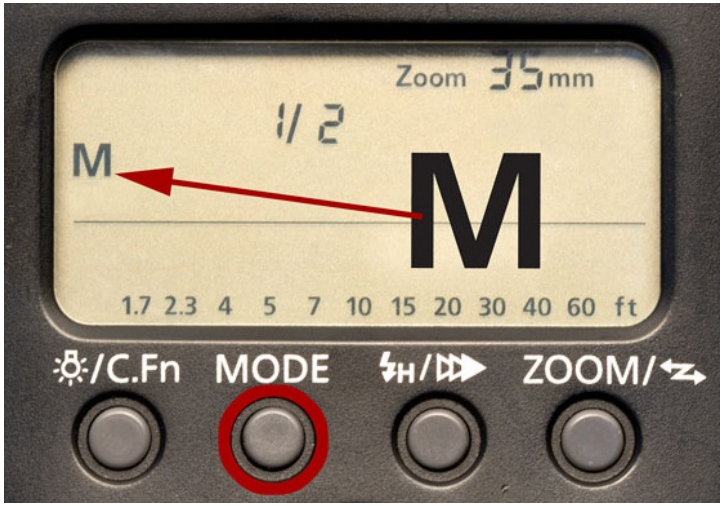
Note: flash light pulse duration is normally less than 1/1000 of a second

- Guide number
  - Expresses maximum flash power: GN = distance × f-number
    - Example: GN = 80 ft = 20 ft × f/4 or 10 ft × f/8
    - If you want 10 ft @ f/4 → flash must operate at lower power
  - Higher number = more power
    - Sony A55 on-camera flash = 33 ft, Sony F43M speedlight = 141 ft
    - Studio strobe ≈ 400 ft (strobes actually measured in watt-seconds: 500 Ws)
  - Assume ISO 100 (unless otherwise stated)
    - Flash exposure: sensitivity (ISO), aperture (f-number), GN (instead of SS)
    - Shutter speed doesn't matter for exposure (if flash is the only light source)
    - ISO 200 → 80 ft × 1.4 = 28 ft × f/4 or 20 ft × f/5.6 or 10 ft × f/11
    - ISO 400 → 80 ft × 2.0 = 40 ft × f/4 or 20 ft × f/8 or 10 ft × f/16
  - Guide number given at max 'zoom' (for example: 105 mm)
    - As flash 'zooms' out, effective GN decreases (larger area illuminated)

Flash Photography

Flash power

- Manual control
  - Can select full power or some fraction of full power
    - 1 (full power), 1/2, 1/4, 1/8, 1/16, 1/32, 1/64, 1/128
  - Half power is equivalent to lowering ISO by 1 stop
    - Full power: 80 ft = 20 ft × f/4 or 10 ft × f/8
    - 1/2 power: 80 ft ÷ 1.4 = 14 ft × f/4 or 10 ft × f/5.6
    - 1/4 power: 80 ft ÷ 2.0 = 10 ft × f/4 or 10 ft × f/4
  - Not convenient
    - May be useful if camera cannot expose correctly on auto mode

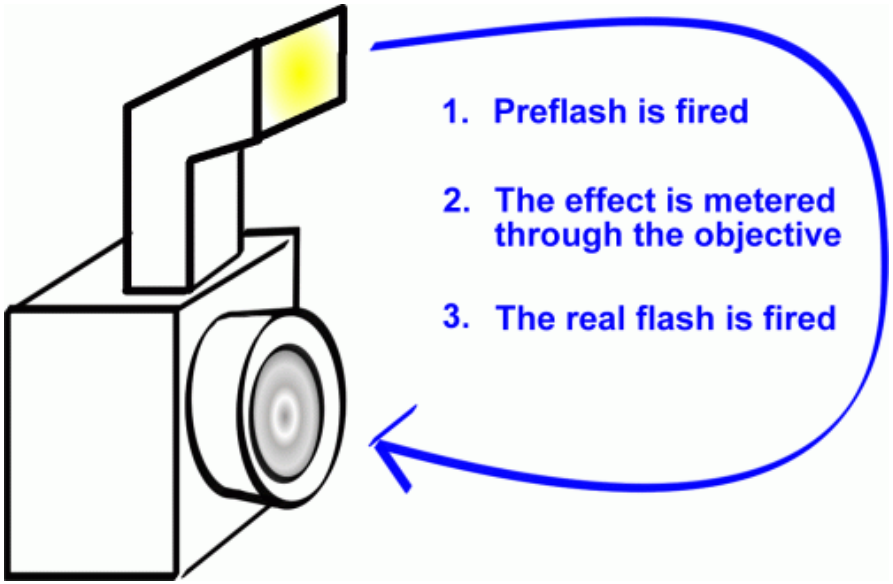


Flash Photography

Flash power

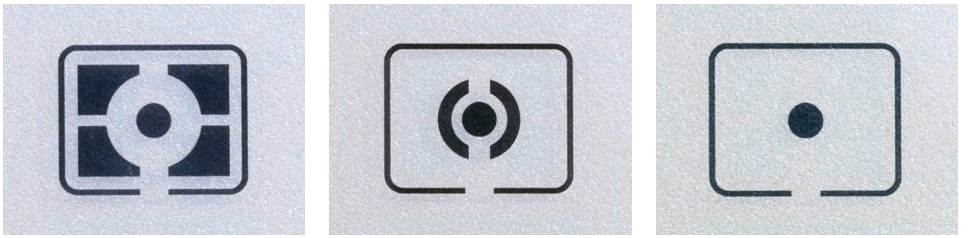
Note: Manufacturers often have their own TTL implementations: P-TTL, E-TTL, i-TTL, etc.

- Automatic control: TTL (Through The Lens)
  - Uses camera metering system to control flash power
    - Pre-flash pulse(s) used to determine needed flash power

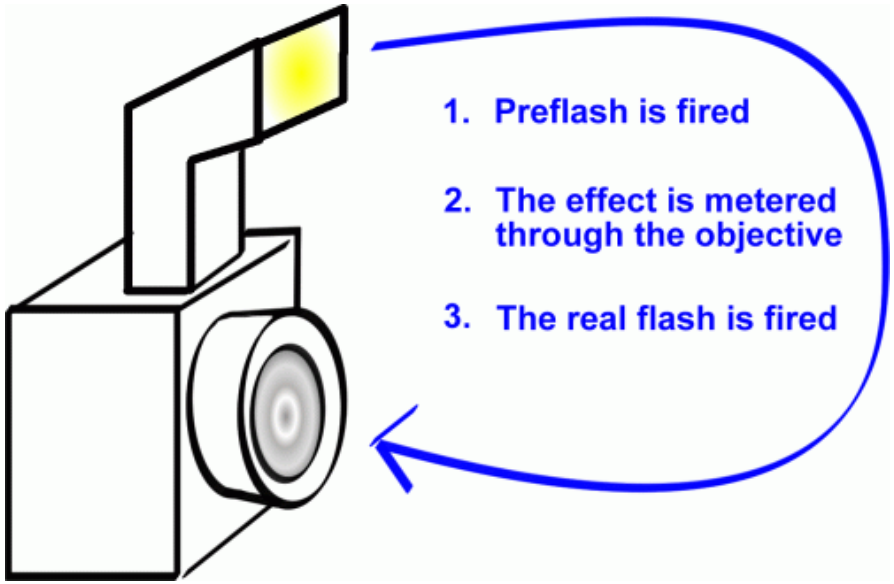


Flash Photography

Flash power



- Automatic control: TTL
  - Uses camera metering system to control flash power
    - Pre-flash pulse(s) used to determine needed flash power
    - Dependent on metering mode: matrix, center weighted, spot
    - Advanced systems use lens focus distance to set flash power
  - Much more convenient, but doesn't always get it right



Flash Photography

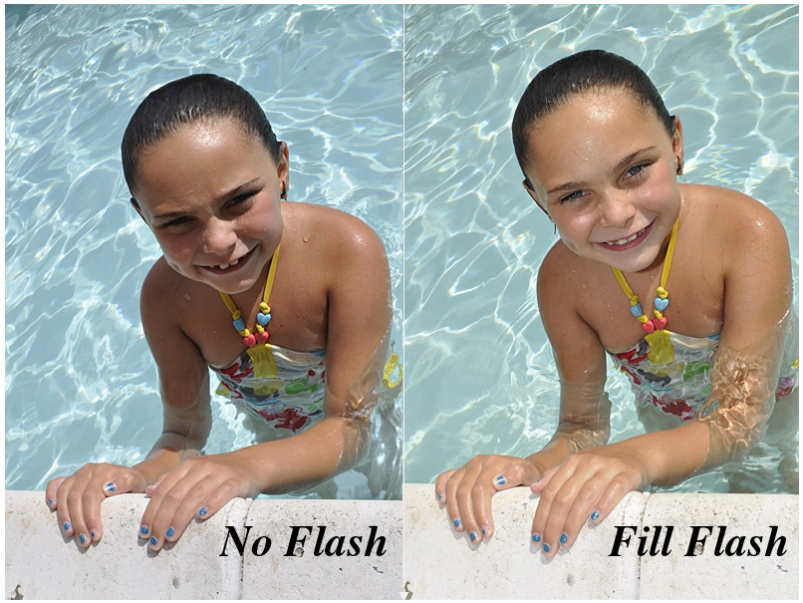
Flash power

- Flash exposure compensation (FEC)
  - Allows the user to adjust flash power in TTL mode
    - Similar to "normal" exposure compensation in **A**, **S**, and **P** modes
  - Exposure control
    - No flash → sensitivity (ISO), aperture (f-number), shutter speed
    - Flash → adds FEC, which is +/− some # of stops (often in 1/3 stops)
    - **M** mode (fixed ISO, f-#, SS) → fine tune exposure with FEC
    - **A** mode (fixed ISO, f-#) → camera sets SS & flash pwr (EC & FEC adjust)

Flash Photography

Flash power

- Flash exposure compensation (FEC)
  - Flash ratio → mix of flash and ambient light
    - Equal → 1:1; flash dominant (FD) → 2:1, 4:1, 8:1; fill → 1:2, 1:4, 1:8
    - Camera may choose flash dominant or fill in certain exposure modes
    - FEC controls how much flash is added within allowable limits



Camera Mode	Flash Ratio
Auto	FD if dim; none if bright
P (program)	fill if bright; otherwise FD
A (aperture priority) **S** (shutter priority)	fill
M (manual)	whatever is necessary

Flash Photography

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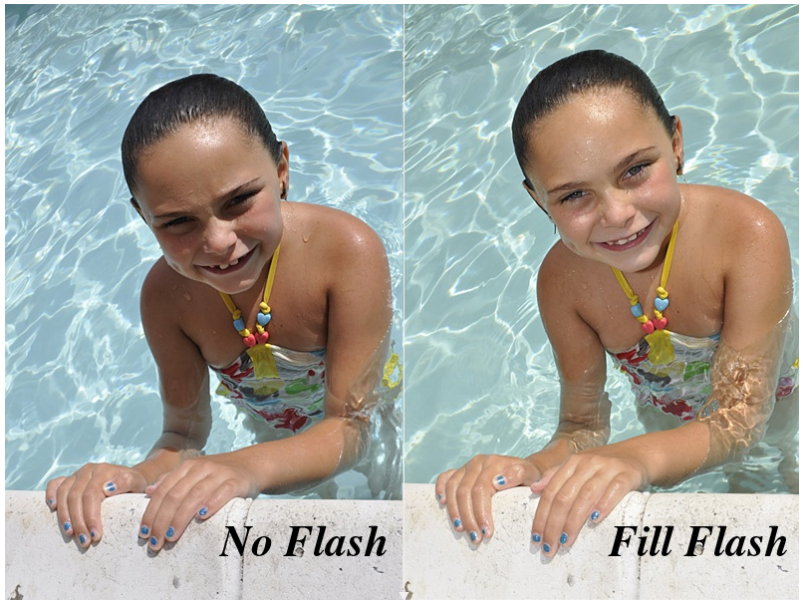
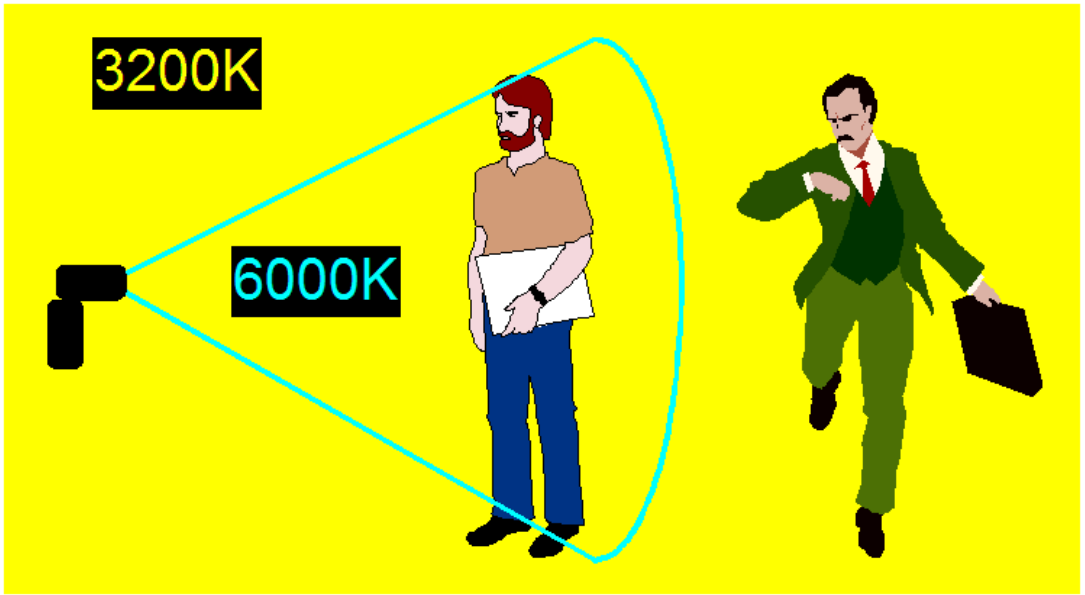
    - FEC controls how much flash is added within allowable limits
    - Can cause mixed white balance situations (flash color temp ≈ 6000K)





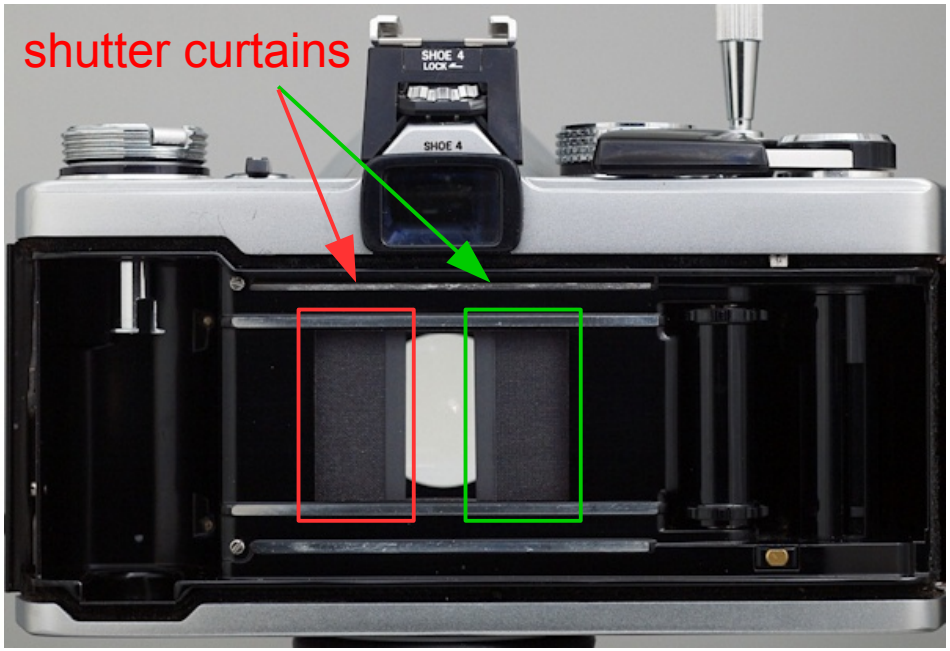
Flash Photography

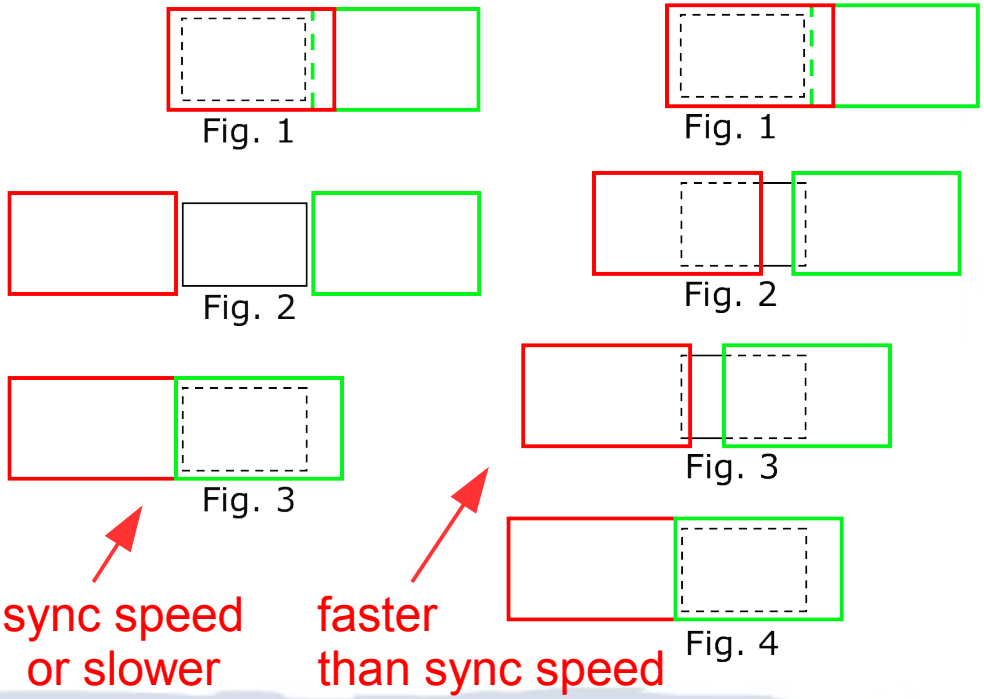
Flash sync

Note: High Speed Sync (HSS) allows for faster shutter speeds by firing pulses of light as the curtain "window" moves across the sensor → at much lower power

Note: Electronic shutters can be as fast as flash pulse

- Sync speed
  - Fastest shutter speed with fully open shutter
    - If shutter is not fully open, sensor will not be evenly illuminated
    - Mechanical property of shutter mechanism → often 1/160 sec
    - More expensive cameras may have higher sync speeds → 1/250 sec





Flash Photography

Flash sync

Note: The Front/Rear curtain option is found in the menu system of your DSLR

- Front/Rear curtain
  - Determines when flash fires relative to shutter actuation
    - Front → flash fires when shutter becomes fully open
    - Rear → flash fires just before shutter is about to close
    - Rear curtain can be used for special effects


Fig. 1

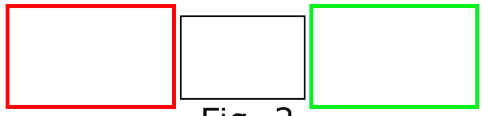


Fig. 2

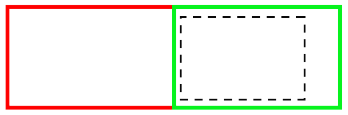


Fig. 3

sync speed or slower

Front/Rear curtain is only useful when the shutter speed is slower than the sync speed

Flash Photography

Flash modifiers

- Change the quality of the flash light
  - Softeners → soften the light by enlarging the emitting area
    - Light from a point source is harsh, shadows have a hard edge
    - Examples: diffuser, softbox, reflector, umbrella, light panel





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  - Restrictors → control the lighted area
    - Examples: snoot, barn doors

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  - Restrictors → control the lighted area
    - Examples: snoot, barn doors
  - Bounce → reflecting the flash off the ceiling or wall
    - Softens the light and changes its direction

no bounce
girl dist = 4 ft
wall dist = 8 ft
wall is 1/4 as bright as girl

bounce
girl dist = 11 ft
wall dist = 16 ft
wall is ~1/2 as bright as girl