

SHOOTING FALLING WATER

Arne Thesen
March 17 2010





This image:

- ▣ Was not enlarged



This image:

- ▣ Was not enlarged
- ▣ Was exposed at $1/40,000$ seconds



This image:

- ▣ Was not enlarged
- ▣ Was exposed at $1/40,000$ seconds
- ▣ Has a depth of field of less than one inch

We need

- ▣ *A source of water.*

My water source is a 2.5 gallon drinking water jug with a spigot



My water source is a 2.5 gallon drinking water jug with a spigot

- ▣ I had to punch a hole in the top to get air to flow into the container.



We need

- ▣ A source of water.
- ▣ **A macro lens.**

My lens is 80 mm macro lens.
A longer lens would allow me to work
further away.

The lens has a very narrow depth of field:

| | Subject distance | |
|--------------|------------------|--------------|
| F stop | 12 inches | 18 inches |
| f/1.8 | 1/32 | 1/16 |
| f/2.8 | 1/16 | 3/16 |
| f/5.6 | 1/8 | 1/4 |
| f/8.0 | 3/16 | 3/8 |
| f/11 | 1/4 | 9/16 |
| f/16 | 3/8 | 13/16 |
| f/22 | 1/2 | 1 1/8 |
| f/32 | 9/16 | 1 3/8 |

We must shoot at f/22 or smaller

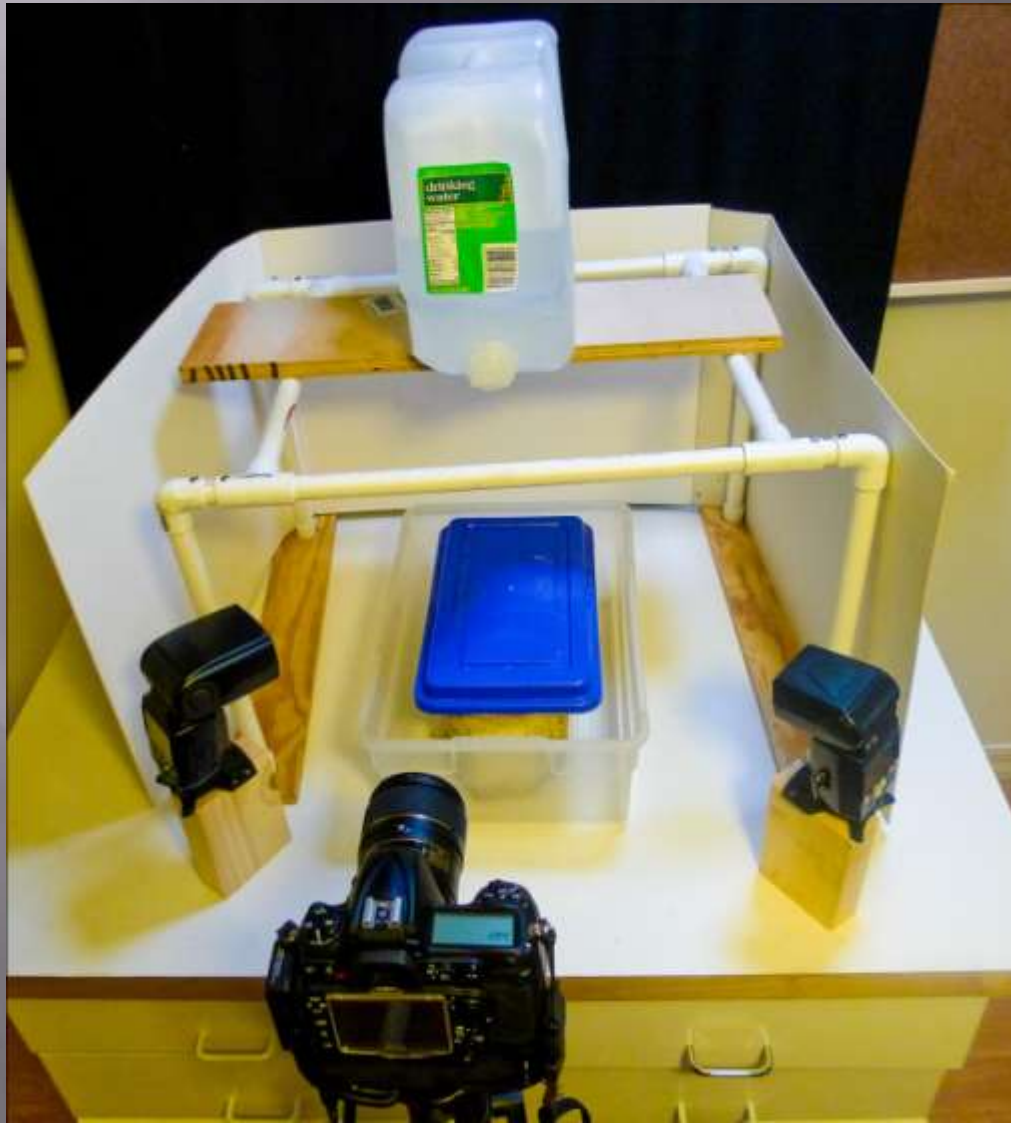
We need

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- ▣ A macro lens.
- ▣ **A tripod.**

We need

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- ▣ A macro lens.
- ▣ A tripod.
- ▣ Off camera flash.

Off camera flash reduces reflections



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- ▣ A macro lens.
- ▣ A tripod.
- ▣ Off camera flash.
- ▣ *A few tricks to obtain fast exposures.*

1/40,000 shutter speed is not available. Instead we control the duration of the flash. This duration depends on the power setting:

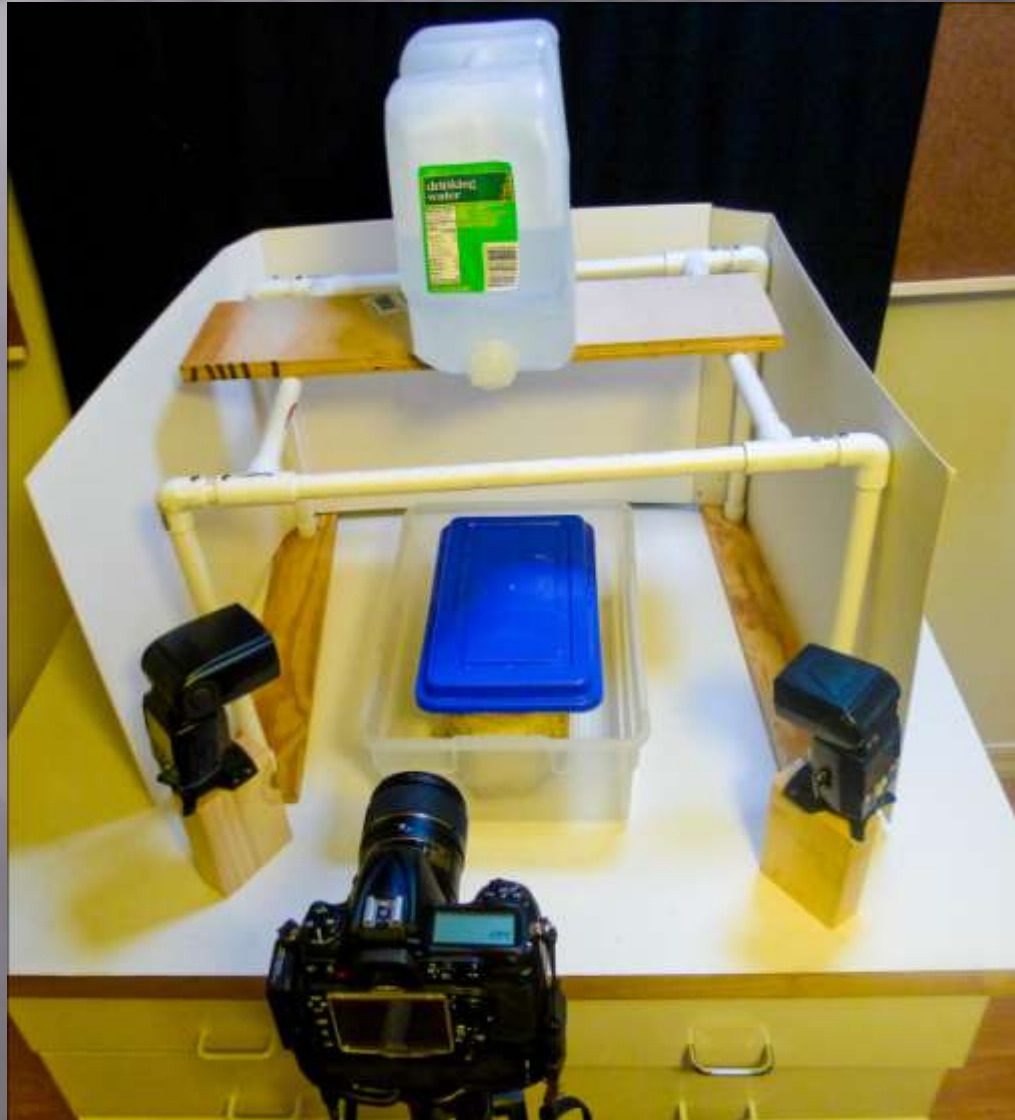
| Power setting | Duration of light on my Nikon SB-900 flash |
|---------------|--|
| Full Power | 1/1,005 sec |
| 1/2 | 1/1,100 sec |
| 1/8 | 1/5,900 sec |
| 1/16 | 1/10,900 sec |
| 1/32 | 1/17,800 sec |
| 1/64 | 1/32,300 sec |
| 1/128 | 1/41,600 sec |

But: $f/22$ at $1/40,000$ at ISO 200
is very dark.

Here is how we do

- ▣ We set the units very close to the water.
- ▣ We place a white reflective enclosure around the setup.

Note the reflective enclosure



To avoid splatters I focus
at 18 inches.



So here are our camera settings:

| Setting | Value | Why |
|---------------|-----------|--|
| f-stop | 1/22 | Need 1 inch depth of field |
| Shutter speed | 1/30 sec | Value is irrelevant |
| Flash power | 1/128 | Only way to get a flash duration of 1/40,000 |
| Distance | 18 inches | Far enough away to keep the camera dry |

We need

- ▣ A source of water.
- ▣ A macro lens.
- ▣ A tripod.
- ▣ Off camera flash.
- ▣ A few tricks to obtain fast exposures.
- ▣ **Several hundred shots**

Here is what we are most likely to see:



With some luck we may see this:



After a while images like this
will appear



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- ▣ **Manually. Use a remote shutter release to avoid camera shake. (Tedious and boring).**

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Three ways to shoot a sequence of images

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- ▣ Use the interval timer in your camera.
- ▣ **Use a program such as the free “Camera Control 5.2” to trigger the exposures and download the images to your computer.**

I set the computer to take 400 pictures at one second intervals.

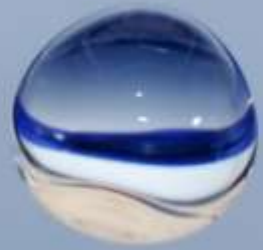














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- ▣ **Sufficient brightness from:**
 - **Using two flash units placed very close to the water**
 - **Enclosing the setup with reflectors**
- ▣ .

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 - Using two flash units placed very close to the water
 - Enclosing the setup with reflectors
- ▣ **Most images are not interesting**

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- ▣ Low power flash gives fast exposures
- ▣ Sufficient brightness from:
 - Using two flash units placed very close to the water
 - Enclosing the setup with reflectors
- ▣ Most images are not interesting
- ▣ **Use automated interval exposure to shoot several hundred images.**

Questions

