

EXP. NUMBER Mark I	EXPERIMENT/SUBJECT Breaking Glass	DATE October 24, 2008	
NAME Daniel Hernandez		LAB PARTNER Aubrey Tatarowicz John Hawkinson Adam Seering	COURSE & SECTION NO. 6.163 / Strobe 6

Materials

slides VWR Intl. VWR VistaVision cat. no. 16004-422
75x25x1 mm 72 per box

digital camera Sony DSC-P72 s/n 338694
(for setup photos) 3.2 MP

HSV camera Vision Research Phantom v7.1 "Phantom HSV"

laptop Dell Latitude D830 s/n MIT-0422773

Software: Phantom 640

Acquisition → setup & recording

Capture then Trigger
start rec. stop recording

- Click OK to view video

- mark Begin and mark end to trim file

- Save

"All HSV Files here" folder → Strobe 6

- Save as *.cin

for .avi, - Border data, standard
- 5 fps

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NAME Daniel Hernandez	LAB PARTNER AT, JH, AS —	LOCKER/DESK NO. — COURSE & SECTION NO. 6.163/Strobe 6

Fluke 179 multimeter s/n 93810559
w/TypeK thermal couple attachment

Lowel Pro 250W lamp

Fiber-Lite Fiber Optic Illuminator Model 190 made by
Dolan-Jenner Industries

~~375°C~~

Accupro 1500W hot air gun no s/n

(2) wooden boxes

black rolling cart 31" high
tripod Manfrotto 3021BPRO
safety glasses

eyedropper
metal stands
white paper
water

video #	aperture	PPS	temperature	notes	resolution (pixels)
Video #1	at F/4	4700	375°C	crack not recorded	800x600
Video #2	F/8	2000	365°C	crack and break recorded	800x600
#3	F/8	4700	390°C	crack, break recorded	800x600
#4	F/8	15037	390°C	crack, break recorded	512x256
#5	F/8	47058	380°C 350°C	height of water drop matters!; crack	256x128
#6	F/4	47058	360°C	crack not recorded	256x128
#7	F/4	47058	370°C	crack recorded	256x128
#8	F/4	75471	360°C	crack recorded	256x64
#9	F/4	75471	360°C	crack recorded	256x64

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John Hawkinson / Stroke 6

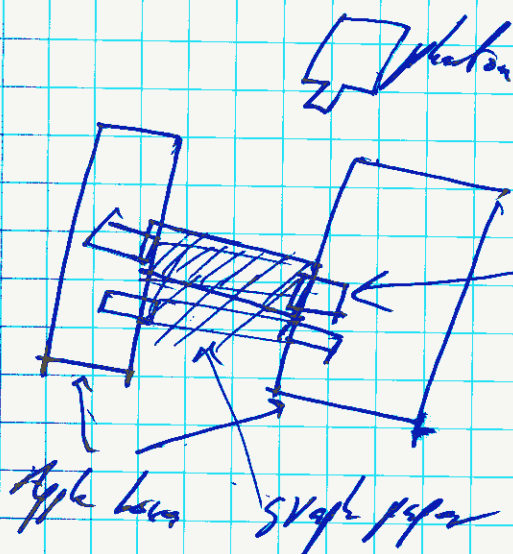
31 Oct 2008

Mark I Week 2

Expt	Rel. Fr. ^{fr}	Res.	Exp.	Av.	Temp.
1	97,560	128x64	7.25µs	F/4	250°C
2	"	"	"	"	

EDR 4µs

• both recorded from "below" angle



3/32" glass

Advan. design
semicond. dev.
Cushman 41578

Lenses
50mm Nikon 2 (not used)
28mm Nikon 1

8"x2" cut piece of glass

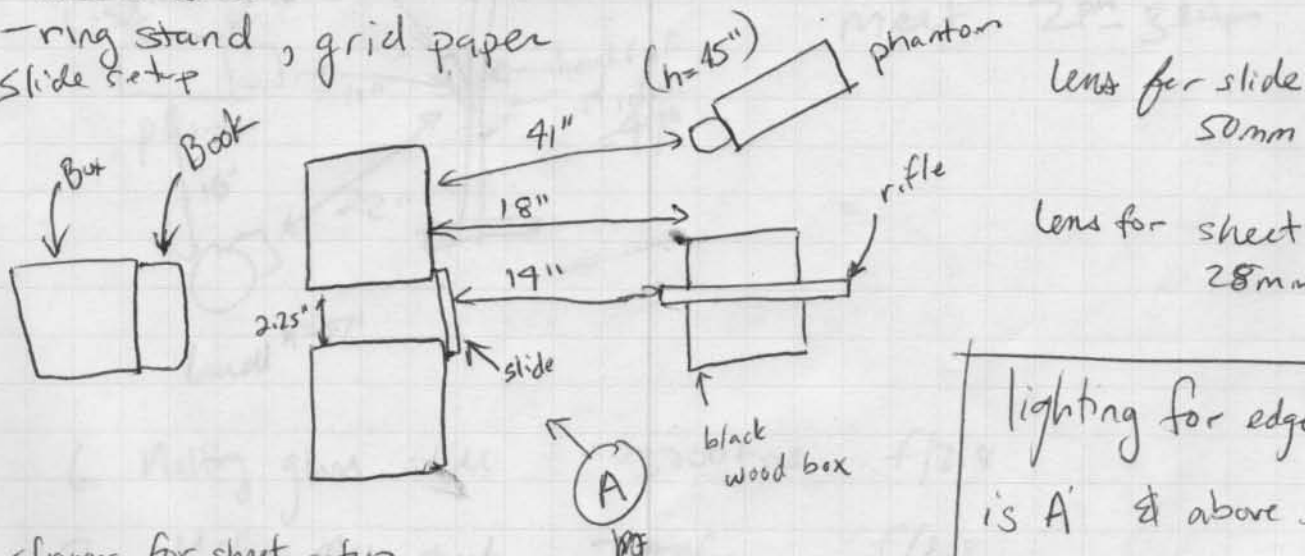
#3 did not break 8 1/2" height
 #4 DID BREAK 12" height
 47,058 gms 256x128µm 19.25µs EDR 4µs
 #5 putting in 38,918 P (also for #4)
 #6 Rem on 510µ paper

no seal HVD data
sent #4

EXP. NUMBER	EXPERIMENT/SUBJECT	DATE	29
	Mark 1 - week 1	11/7/08	
NAME	LAB PARTNER	LOCKER/DESK NO.	COURSE & SECTION NO.
Abrey Tatarov	stroke 6		

Shooting slide materials

- | | Manufact | Model | SN |
|--|-------------------|----------|-----------|
| - BB rifle - .177-caliber | Crossman Air Guns | 760-C | 188214595 |
| - Digi-Key Catalog | very thick | | |
| - Fiber-Lite - fiber & optic illuminator | Dolan-Jenner | 190 | N/A |
| - Lowell Pro 250W | Lowel | 250W Pro | N/A |
| - Phantom & Computer | | | |
| - 50mm lens | Nikon | 50mm | Nikon 2 |
| - Manfrotto | (tripod) | 3058 | A0747258 |
| - 2 apple boxes & other wood box | | | |
| - microscope slides | | | |
| - BBs .177 caliber | | | |
| - box | | | |
| - 28mm lens | Nikon | 28mm | Nikon 1 |
| - laser level | | | |
| - ring stand | | | |
| - slide setup | | | |
| - grid paper | | | |



changes for sheet setup

- distance between apple boxes 4.25"
- camera to subject distance 55"

Changes for grid proj setup

camera to sub d = 39.5", h = 39"

lighting for edge illuminator
is A' & above slide
10"

Projected grid
light A' level w/
slide, grid paper

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EXP. NUMBER	EXPERIMENT/SUBJECT	DATE
	Mark I - week 1	
NAME	LAB PARTNER	LOCKER/DESK NO. COURSE & SECTION NO.
Aubrey Tatarowicz	Strobe	

BB shooting slide

Trial

Notes

trids 1 & 2 $\rightarrow$ 50mm lens
rest 28mm lens.

gun pumps

edge lighting	1 slide	shot bottom of slide	75000 fps	f/4	8
	2 slide	shot center of slide	75000 fps	f/1.8	4
	3 sheet	resolution for 1 & 2 is 256 x 64 pixels			
	3 sheet	BB binned back	75000 fps	f/2.8	8 w = 9.25"
	4	BB went thru	75000 fps	f/2.8	4 4"

glass width = 1.75"

proj grid shots

5. glass h = 1 1/8"

75000fps

f/2.8

4

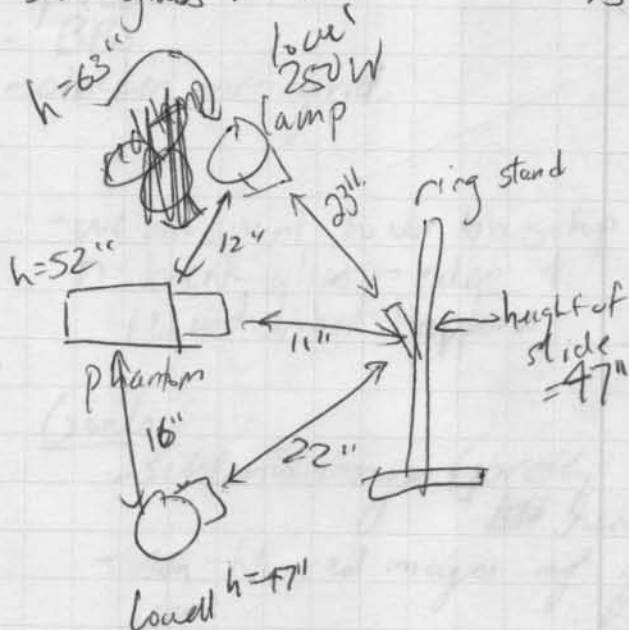


figure for torching glass slide

Monday
meet 2pm - 3:30pm

6. Melting glass slide 75000fps f/2.8
7. Melting glass sheet 25000fps f/2.8

Notes: a little glass piece fell off
glass fell later

torch #297

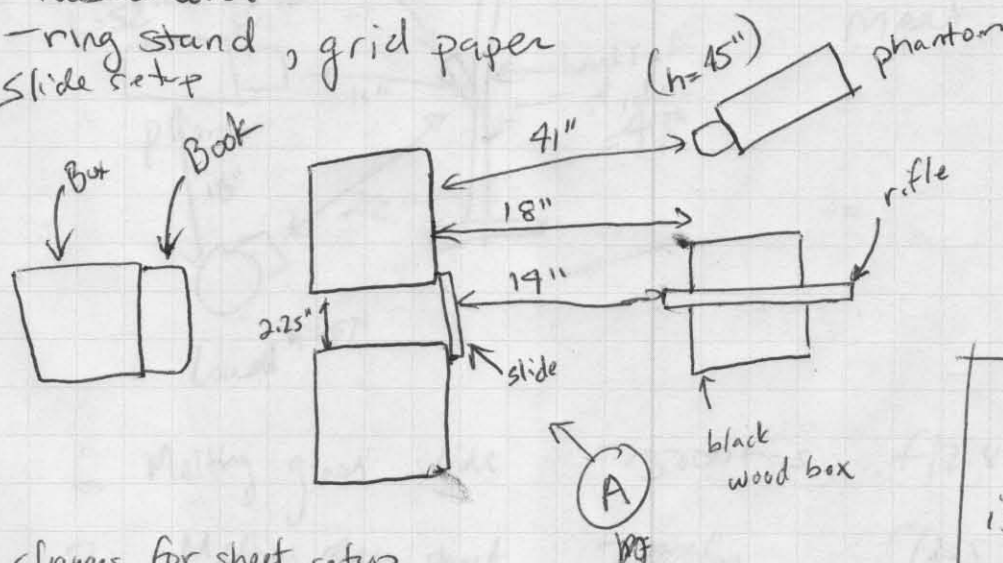
cylinder 400gram propane cylinder Bernzomatic

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EXP. NUMBER	EXPERIMENT/SUBJECT	DATE
	Mark 1 - week 1	11/7/08
NAME	LAB PARTNER	LOCKER/DESK NO. COURSE & SECTION NO.
Aubrey Tatarovitz	strobe 6	

Shooting slide materials

- | | Manufact | Model | SN |
|--|-------------------|----------|-----------|
| - BB rifle -.177-caliber | Crossman Air Guns | 760-C | 188214595 |
| - Digi-Key Catalog | very thick | | |
| - Fiber-Lite - fiber & optic illuminator | Dolan-Jenner | 190 | N/A |
| - Lowell Pro 250W | Lowell | 250W Pro | N/A |
| - Phantom & Computer | | | |
| - 50mm lens | Nikon | 50mm | Nikon 2 |
| - Manfrotto | (tripod) | 3058 | A0747258 |
| - 2 apple boxes & other wood box | | | |
| - microscope slides | | | |
| - BBs .177 caliber | | | |
| - box | | | |
| - 28mm lens | Nikon | 28mm | Nikon 1 |
| - laser level | | | |
| - ring stand | | | |
| - slide setup | | | |
| - grid paper | | | |



Changes for sheet setup

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Changes for grid proj setup

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lighting for edge illuminat
is A' & above slide
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Projected grid
light A' level w/
slide, grid paper

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EXP. NUMBER	EXPERIMENT/SUBJECT	DATE	
	Mark 1 - week 1		
NAME	LAB PARTNER	LOCKER/DESK NO.	COURSE & SECTION NO.
Aubrey Tatarowicz	strobe		

BB shooting slide

Trial

Notes

trids 1 & 2 $\rightarrow$ 50mm lens
rest 28mm lens.

gun pumps

edge lighting
1 slide

shot bottom of slide

75000 fps

f/4

8

2 slide

shot center of slide

75000 fps

f/1.8

4

~~3~~ resolution for 1 & 2 is 256×64 pixels

3 shut BB bounced back

75000 fps

f/2.8

8 w=4.25

4 BB went thru

75000 fps

f/2.8

4 4"

glass width = 1.75"

proj grid shots

5. glass $h = 1\frac{1}{8}"$

75000 fps

f/2.8

4

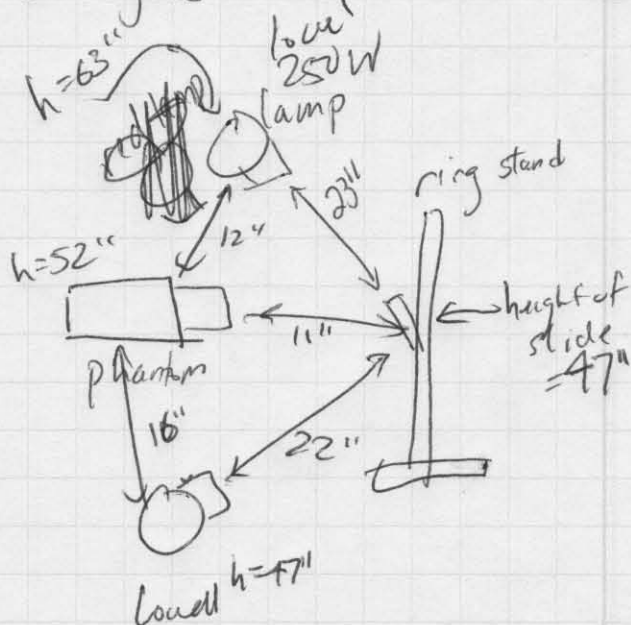


figure for torching glass slide

Mondy
met 2pm-330pm

6. Melting glass slide

75000 fps

f/2.8

7. Melting glass sheet

25000 fps

f/2.8

Notes: a little glass piece fell off
glass fell later

torch #297

cylinder 400gram propane cylinder Bernzomatic

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John Hartigan / Steve 6

14 Nov 2008

Session set-up

Equip

DS Laser level
Sharp 9000 XC-9000
TRK 9-120 HSBH videstop

jack
211325

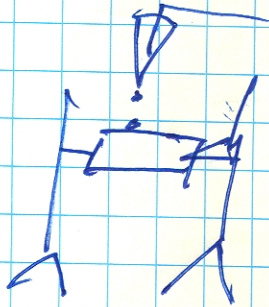
Dan's Camera VHS-400
VCR
Fluke 179
28W battery unit

} 6m 42 sec
00:00:00
jack
H5 H6 50513 SN
MET 0403445

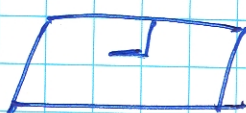
Trial 1

HHS / DV
- 5:03 / - 1m 19.22

drop on edge

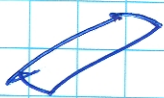


Control slightly



Trial 2

2:57 / 11:10:00



probe & VHS!

Trial 3
Trial 4
Trial 5
Trial 6
Trial 7

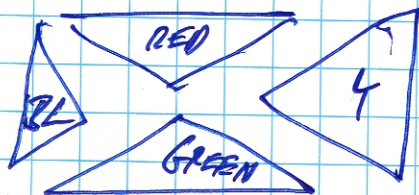
Level
Look on one side only
don't wait BREAK!

- 01:18.24
- 1:53:17
- 2:36:06
- 3:03:07
- 3:14:03

John Hawkins / Stage 6

14 Nov 2008

Sharon 1.3 ft same



RED: RASOLUX #200 / Stormio
 GR: #89 Miss GREEN
 BL: #70 Nike Blue (X2)
 Yaka: #310 D. H. H. (X2)

Sharon lamp "1"

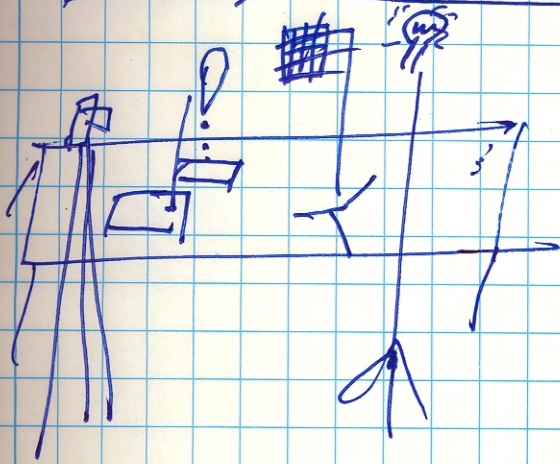
Prod 8: 2x8" glass

- 4:21:28

Prod 9: FS mirror

- 6:31:26

relation grid with water & heat & scrubber.



47,058 eps

5 ps Exp
3 ps EDR

43,422 f pathfinder
256 x 128 px
Zoom 1
0.919 sec Duration

Trial 1

Glass broken from heat stress (unexp'd)

Trial 2

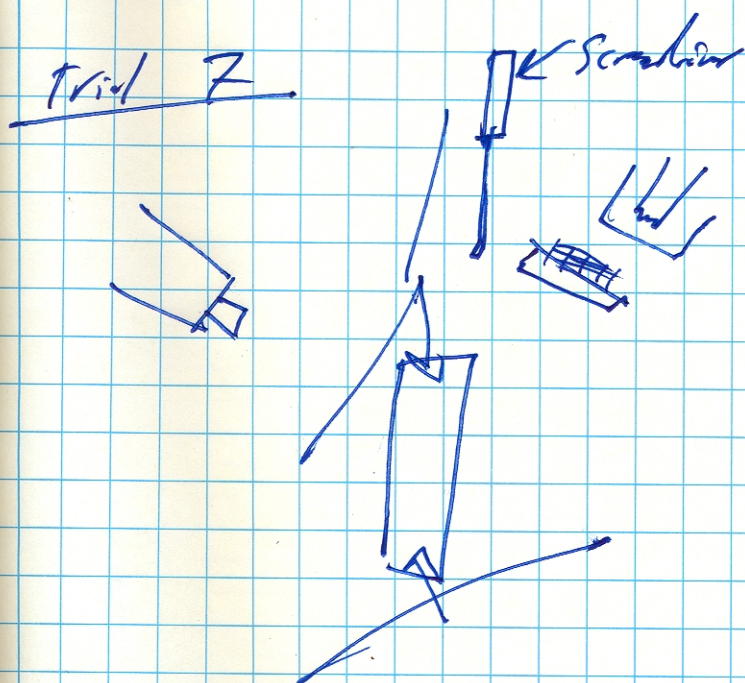
3rd gun on broken piece - no action

Trial 3

1st pathfinder & heat
area f/2.4 (PDR)

Trial 4 & T5

f/5.6



58
 $47,000$ f_{ps}
 5 f_{ps} E_{sp}
 3 f_{ps} E_{MA}
 $43,242$
 256×128
 0.7075

Nikon 2
 50m,

DO NOT BREAK!

EXP. NUMBER AA11	EXPERIMENT/SUBJECT Final Project - Breaking Glass	DATE Nov. 14, 2008
NAME Daniel Hernandez	LAB PARTNER Aubrey Tatarowicz John Hutchinson Adam Seering	COURSE & SECTION NO. 6.163 / Strobe 6

BB gun Match Grade
Daisy Quick Silver NO. 7541 BB's
Cal. 4.5mm, zinc plated

HSV camera Phantom
Dell computer
tripod Manfrotto 3058, lab stand, boxes
front surface mirror 77x19 → 3 1/8" 3 1/16"
4 DIA Sciplus.com
ground glass

level heights, 45° angle
camera-to-subject
22.5" for 01, 02, 03
subject to -diffuser
9.5"
subject-to-lamp
45.5"

#	aperture	sample rate	exp. time	EDR	resolution	notes
01 mirror	F/8	1000 fps	60 μs	2 μs	256 x 128 pixels	ruler + metal grid
02 mirror	F/8	47000	5 μs	3 μs	256 x 128	8 pumps metal grid
03 mirror	F/8	47000	5 μs	3 μs	256 x 128	10 pumps center
04 3/32" glass	F/4	47000	5 μs	3 μs	256 x 128	6 pumps
05 mirror	F/5.6	40000	22 μs	22 μs	128 x 128	ruler
06 05 mirror	F/5.6	40000	22 μs	22 μs	128 x 128	ruler
06 mirror	F/8	66666	5 μs	3 μs	128 x 128	10 pumps
07 3/32" glass	F/4	66666	5 μs	3 μs	128 x 128	6 pumps

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EXP. NUMBER	EXPERIMENT/SUBJECT	DATE
Final Project	Breaking Glass	Nov. 14, 2008
NAME	LAB PARTNER	LOCKER/DESK NO. COURSE & SECTION NO.
Daniel Hernandez	AT, JH, AS	6.163/Strobe 6

Switch to 50mm lens "Nikon 3"

08 ruler	F/5.6	24096 fps	27 μ s	27 μ s	320x240 pixels	ruler
09 mirror	F/8	24096	5	3	320x240	10 pumps
10 3/32" glass	F/4	24096	5	3	320x240	6 pumps

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EXP. NUMBER <i>Final</i>	EXPERIMENT/SUBJECT <i>Breaking Glass week 5</i>	DATE <i>21 Nov 08</i>	
NAME <i>Aubrey Tatarowicz</i>	LAB PARTNER <i>strobe 6</i>	LOCKER/DESK NO. <i>—</i>	COURSE & SECTION NO. <i>6.163/Strobe 6</i>

Materials

- D200 camera, Nikon
- 90mm lens - Tamron 1, ~~Atikon~~ Macro lens
- 250 W Lowell Pro
- ~~chicken~~ wire
- sheet of paper
- Sheet of plexiglass $\approx 13" \times 13"$
- tape
- apple boxes
- Spot $\rightarrow$ edgerton 1
- time machine, Mumford Micro Systems
- neutral density filter (beam break)

heights

camera: 39.5"

gun: 40.5"

strobe: 42"

grid/center: 42"

glass: 41"

Shot

- f/3, $\frac{1}{2}$ sec exposure, exposure 56, 8 pumps on gun
- notes: looks blurry, no delay on trigger
- glass is 2 inches wide

f/3, $\frac{1}{2}$ sec, exposure 57, 4 pumps on gun

notes: better, still blurry, no delay on trigger

Camera-to-subj.: 37"
strobe-to-subj.: 47"
gun-to-subj.: 23"

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- Attempted to replicate D200 setup from wk 4

- larger mirror -

#1: $8'' \times 5''$ - diagonal cut
longer short side
is actually $5\frac{1}{4}''$

Quick Silver Match Grade BB's, 4.5mm
No. 7541

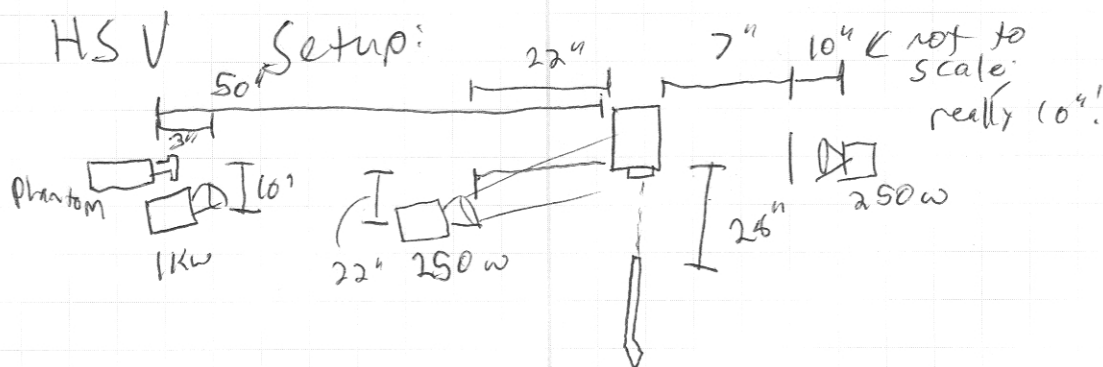
Test #	Exposure	Flash duration	pumps	Notes
1	1/2 sec	500 ms	8	mirror didn't break; black image
2	Bulb	"	10	mirror still didn't break

	P#	Exposure	Flash duration	# pumps	Exposure #	Glass size
3)	5	B	500ms	4	55	8" x 3"
4)	5	B	"	2	56	8" x 3"
5)	5	B	"	3	57	8" x 4"
6)	5	B	"			8" x 2 ¹⁵ / ₁₆ x 3"
7)						

Notes

Glass shattered dramatically. Blurry.
Fewer waves visible in photo.

> couldn't get photocell aligned for further



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HSU shots:

	F#	Lens	fps:	Exposure:	EDR:	Resolution	Pumps	Tape?
1)	11	25mm	47054	18.254s	8.45	256x128	4	Yes
2)	5.6	25mm	47054	18.254s	8.45	256x128	4	No
3)	"	"	"	"	"	"	"	"

Equipment:

Hsu Camera
 2x 250w Halogen
 1x 1kw Halogen
 Tripod
 3x Applebox
 2x wooden spacer
 BB gun
 BB gun frame

PHANTOM 7

n/a

n/a

Manfrotto 3021 BPRO

n/a

n/a

1082/4595 (Grosman Air Guns)

n/a

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