HAROLD E. EDGERTON

PAPERS

MC 25

Series III

Laboratory Notebooks

Number 10

Dated June 13, 1939 to Sept. 17, 1940

Massachusetts Institute of Technology

COMPUTATION BOOK

NAME	Number
HAROLD E. EDGERTON	10

Course .....

Used from JUNE 13, 1939, to SEPT. 17 1940

Notebook # 10

Filming and Separation Record

____ unmounted photograph(s)

____ negative strip(s)

2 unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located between page ____ and ____.
inside front cover

Item(s) now housed in accompanying folder.

The new model Strobotac has a jack whereby a spark coil can be introduced into the discharge circuit of the strobotron tube. In this way a controlled spark may be obtained which is useful for experimental work with spark chronographs, precise automobile ignition systems, surge generators, and timing systems for moving-film cameras.

The spark coil for this purpose can be any automobile type, although the primary should be of lower impedance for the best operation and life of the Strobotron. A small coil of low primary impedance is available which is the same type as used in the Strobolux unit. A photograph is shown with the Strobotac and coil used for putting timing marks on the edge of the film in the high-speed motion-picture camera.

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Wm Guild W.Nt. 2966

Lens 12 inch C.P. Goerz Am. Opt. Co.
Apochromat Artar f 9. No 758251

2152639 Electric Circuits S.N 127,187 Feb 23 1937 H.E.E.
2181879 Cutting Machines 610 045 May 9 1932 H.E.E.
2186013 motion picture apps. 714978 Mar 10 1934
Renew. Apr 4 1939

2185189 Gaseous discharge tube 48,669 Nov 7 1935 Germes.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

COMPUTATION BOOK

GENERAL INSTRUCTIONS

In all work in which *accuracy* and *ease of reference* are important, much depends upon carrying out the computation in a systematic manner. The following instructions, taken from the *Engineering Department Figuring Book of the Allis-Chalmers Co., serve as a guide in this matter.*

"All computations, of whatever kind, are to be made in these books, except in cases where special blanks may be provided for specific kinds of computation. Computations may be made in ink or pencil, whichever may be more convenient. Pencil figuring should be done with a soft pencil. All the work of computation should be done in these books, including all detail figuring."

"Each subject should begin on a new page, no matter how much space may be left on the previous page. The subject, with the date of beginning it, should be plainly written at the top of the first page of the subject."

"Work should be done systematically, and as neatly as consistent with rapidity. The books are, however, intended for convenience, and no unnecessary work should be done for sake of appearance only. Errors should be crossed off instead of erased, except where the latter will facilitate the work. Work should not be crowded. Paper costs less than the time which would be expended in attempting to economize space in making erasures."

"Where curves drawn on section paper (or sketches) are necessary parts of a computation, they should be pasted in the book, except where specifically otherwise provided for."

"Computations should be indexed, in the back of the book, by the person using the book."

* * * * * * * *"

TECHNOLOGY STORE
HARVARD COOPERATIVE SOCIETY, Inc.
40 Massachusetts Ave., Cambridge, Massachusetts

Harold E. Edgerton

June 13, 1939.

Mass. Inst. of Tech.

Office 4-134

Lab. 4-111.

Home address 205 School St.
Belmont Mass.

Belmont 0369 M.

June 14 1939.
Harold Edgerton.

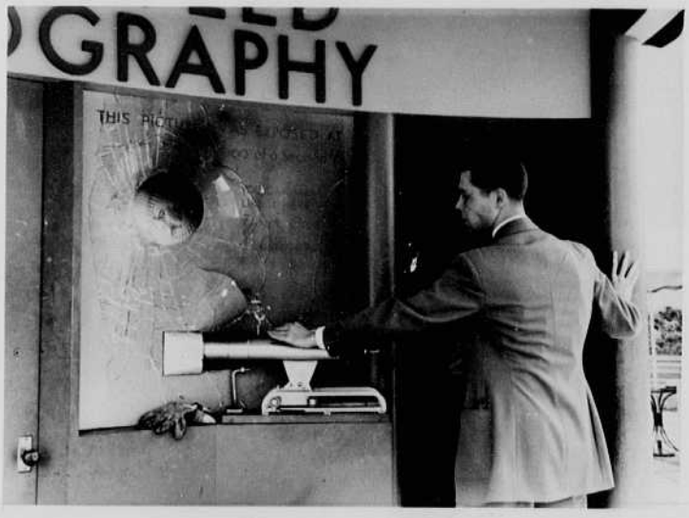
Tonight I plan to observe with a stroboscope the operation of the new 3600 r.p.m. turbo generator set in the L st station of the Boston Edison Co. Julian of the Jackson and Moreland co is going to go with me.

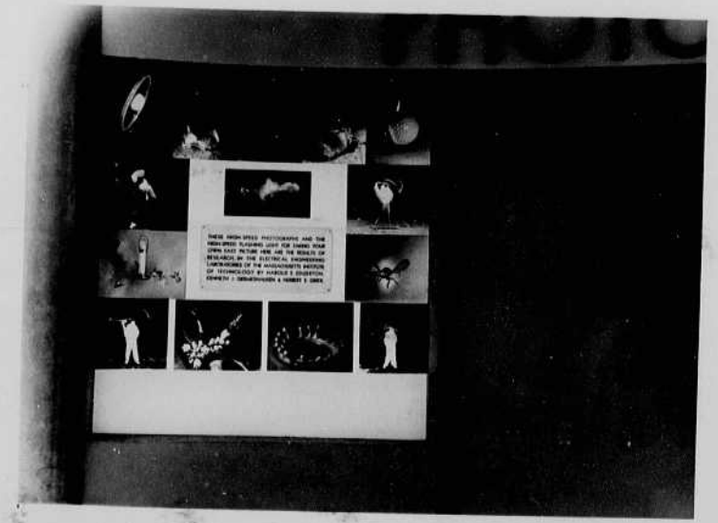
Calibration of microscope for use in measuring vibration.

Lens tube all the way out
50 divisions in scale = 0.026 inch
$\frac{0.026}{50} = .00051$ in/div

Lens tube in (short)
= 0.03 inches.

Photos taken
June 9 (Friday) in N.Y. Worlds Fair at Eastman exhibit.





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$\frac{0.026}{50} = .0005$ in/div

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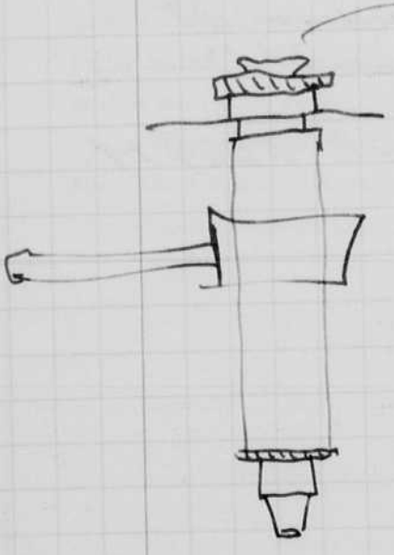
Lens tube in (short)
43.3 div = $\frac{0.03 \text{ inches.}}{43.3}$
$= .00069$ in

#2 eyepiece Carl Zeiss Jena.

Scale in eyepiece
0-5 each ~~div~~. 10 sections
Spencer total 50 divisions
Buffalo.



16 m m 0.25
10 X

Photos taken June 9 (Friday) in N.Y. Worlds Fair at Eastman exhibit.

were knee-high to a tripod, you may have let your interest in it slough off because of the lack of a definite motivating urge to prowl around and enjoy its colorfulness . . . its contrast to the familiar.

Now you've got a very good reason—your movie camera. And the pictures you get will almost be as much fun for your friends to see as for you to make.

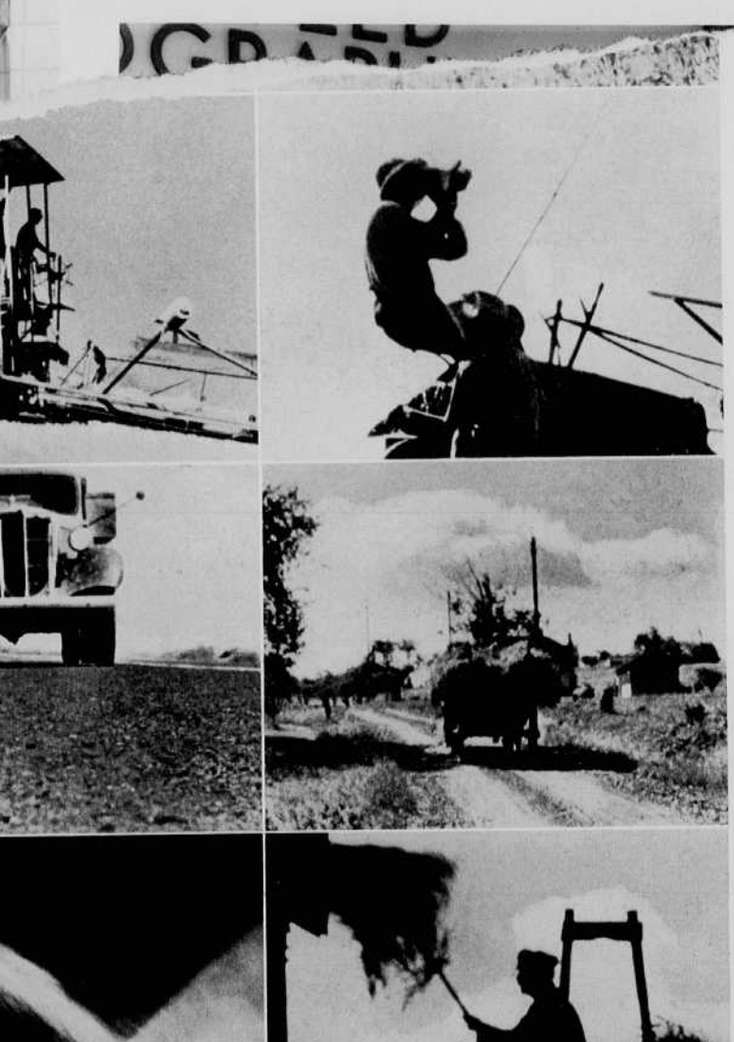
Movie subjects galore

All this is equally true of the circus—especially if it's the legitimate, out-of-doors, big-top show. It's more fun than a barrel of monkeys to get up and go out with the kids (from six to sixty, you'll discover) who are on hand when the circus train is unloaded, and to follow it every step of the way . . . to the circus grounds . . . downtown for the parade . . . and back out for the show.

It's a gold mine of picture material! And railroads are the same.

If you have ever run your youngster's toy train after you've ordered him off to bed, you'll get a real kick out of railroads. Forget the golf for one week-end—even if your putter behaves as you hope, that five iron will begin to act up—and just poke around the tracks until a theme for a swell reel on railroads presents itself. You won't be thrown off the right-of-way if you get a pass from some local railroad

(Continued on page 11)



● At the far left are six enlargements from the 16 mm. black-and-white reels—filtered, of course—of Mr. Kenneth Owsley of Pomeroy, Washington. A grain grower by vocation, and movie maker by avocation, Mr. Owsley has produced a really significant movie.

● At the left are six enlargements from the 8 mm. black-and-white reels—also filtered, of course—of Mr. Charles A. Ferrie, Jr., of Staten Island, N. Y. Mr. Ferrie is a chemical engineer and not an agriculturalist—but his 100-foot film, "Mother Earth," made during visits to a small Pennsylvania farm, was good enough to win first prize in the 1938 contest of the Metropolitan Motion Picture Club. His recipe—besides yellow and red filters—is continuity and camera angles.

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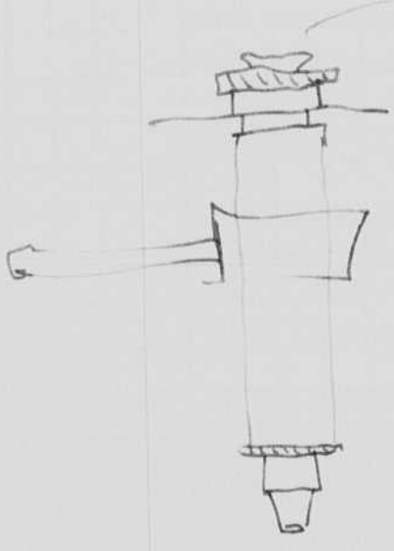

Scale in eyepiece
0-5 each ~~div~~. 10 sections
~~Spencer~~ total 50 divisions
Buffalo.

16 mm 0.25
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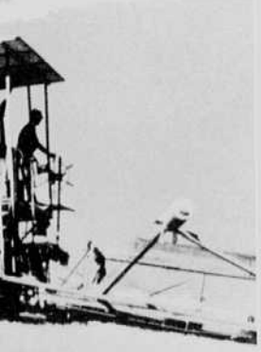

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June 16 1939.
Harold E. Edgerton

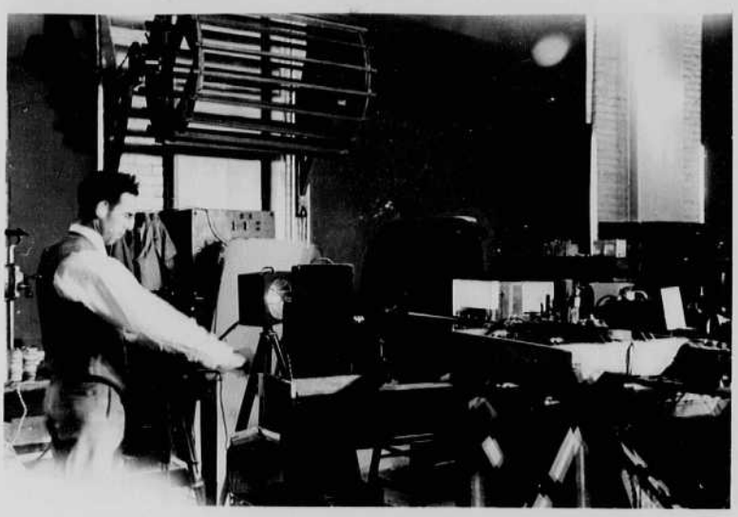
Last night Mr. Julian of J. and M. and I worked at the L.S.T. station as planned. 5:30 - 9:30. p.m.

We were unable to remove the steel plate on the air cooler in order to examine it with the stroboscope as planned due to an order from Mr. Dillon.

Experiments were made with a microscope and stroboscope as recorded on page 2. Results were recorded by Mr. Julian and kept by him. Readings were made on the platform floor and various points around the generator and turbine.

As I remember from last night the vibration of the middle of the generator had a double amplitude of about 2 mils normal to the shaft.

The vertical vibration as measured on the beam just below this was about 1.5 mils. Considerable difficulty was experienced in taking this reading because of microscope mounting troubles.



Mr. Holman.
Western Cartridge Co.
Shotgun tests.

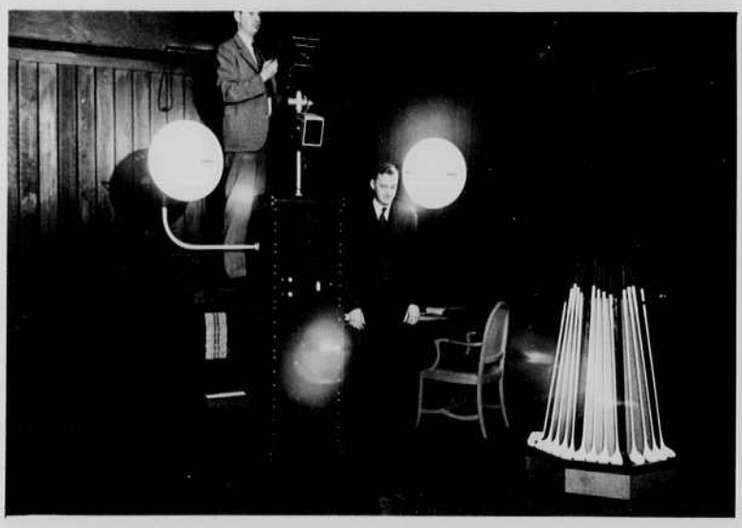


Photo taken June 8 1939
at A. G. Spalding
Store in N. Y.
5 ave at 42 nd.

Geo Temple operating
camera.

Herb Grier by mist.

F
W. L. Reach
Dickson
Grier
Baymiller
Eckert

Stevenson

June 16 1939.
Harold E. Edgerton

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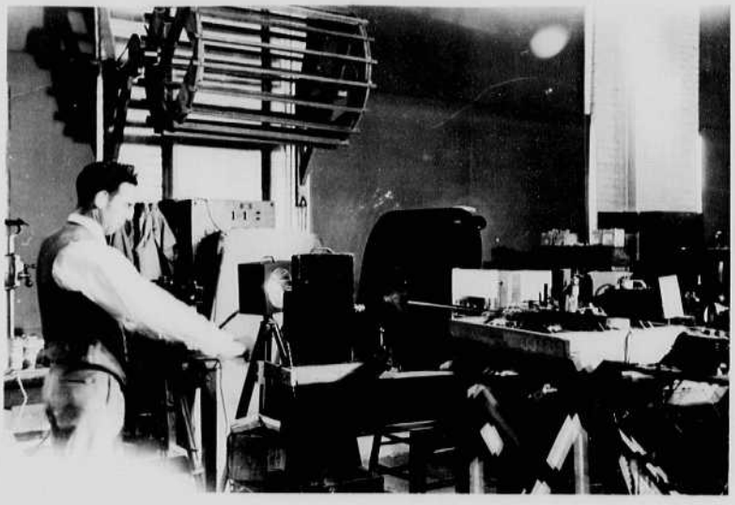

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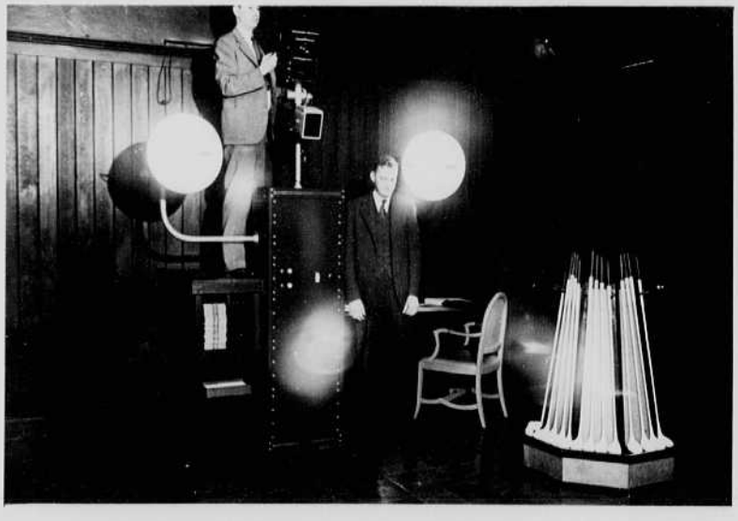

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Herb Grier by mist.

F
W. L. Reach
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Baumiller
Eckert

Stevenson

R.N. FEICHT. ~~Westinghouse~~ June 15, 1939.

Mechanical system

300 lbs .5 rad 3600 rpm

2000 lbs.

.002 $W = \frac{1}{2} w^2 J = \frac{1}{2} (2\pi f)^2 \frac{300}{32.2} \frac{1}{2}$

.800

Electrical ~~Equipment~~ 116 mf.

X 300

4 X 300 X 5 lbs. = 6000 lbs

MG Set = 1000 "

B-17	82" l	32" w	55" v	2 Bays
B-18	108 83	18"	18"	2 Bays

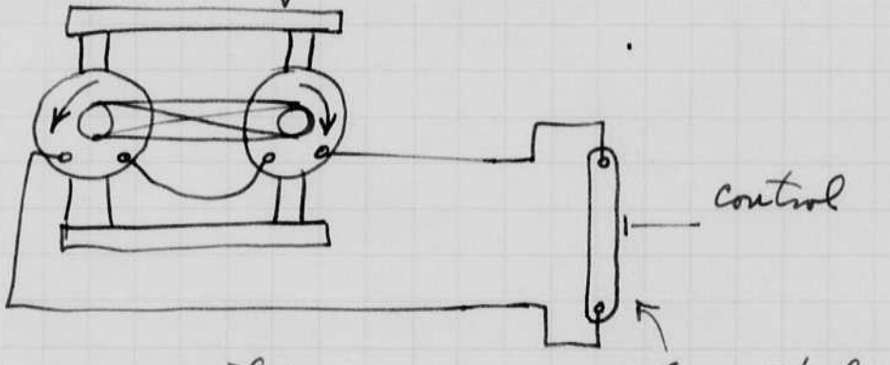
B-17	5000 lbs in BB	8000 elsewhere	
B-18	4100 " " "	2400 "	

#95 20 flash bulbs 15000 lumen seconds each
NE (85% total on spot) full flash,
5,000,000 c.p. flash 1/50 peak.

June 17 1939
Harold E Edgerton.

Notes on opposite page were made on June 15 1939 during the visit of Mr. R.N. FEIGHT of Wright field who came as a substitute for ~~Col~~ Major Goddard.

A considerable torque would be exerted on the frame of the machine when it discharged into the lamp. ~~It~~ suggested that the machine be constructed in two parts, one of which rotated in the opposite direction to the other. In this way their torques would oppose and thereby cancel. Provision would be needed so that the discharge rates and timing were exactly the same.



Series connection or parallel.

June 23 1939.
A. E. Ely. cl/A. Tuttle.

f 6.3 microfilm
4 - 150 watt lamps.

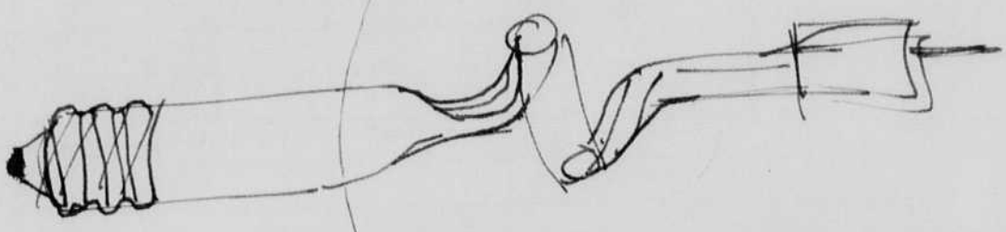
(1) Design – Sears. flash unit

1. Variable voltage.
2. Variable capacity.
3. Different socket arrangements.

6 weeks.

cost ~~+50~~ x2. at once

(a) ~~St~~ lamps



(2) ~~Strobolux~~ power supply for enlarger.

Vary the condenser. 30-1. (start.)
2 a second. flash.
f 4. max. 28X40 m.m. 2½ times.
Rapid velox. – Dif. source.
Kodabrom. –

(3) 2 lights – latest design. for portrait photography.
Specular type reflector.

at once

(4) Consider problem of microfilm.
(5) microscope illuminator. (6) Ballet Photography. (7) Stroboscope

June 25 1939
H.E. Edgerton.

Left June 18 aft for New York and spent evening at the Eastman Worlds Fair exhibit tuning up the high-speed photography exhibit. A new piston for the cannon and a new timer were installed. Also the glass holder was swung around so that a side view was obtained of the glass.

Took 5 o'clock train monday for Washington and stayed at the Willard Hotel. Hearing Board of appeals on June 20 at 9,30. Sanders, Clift, Porter. (Board). Int 94 402 and 74,896. with miller.

I had dinner with Margaret and Bob that night in Washington and took the night train for N.Y.

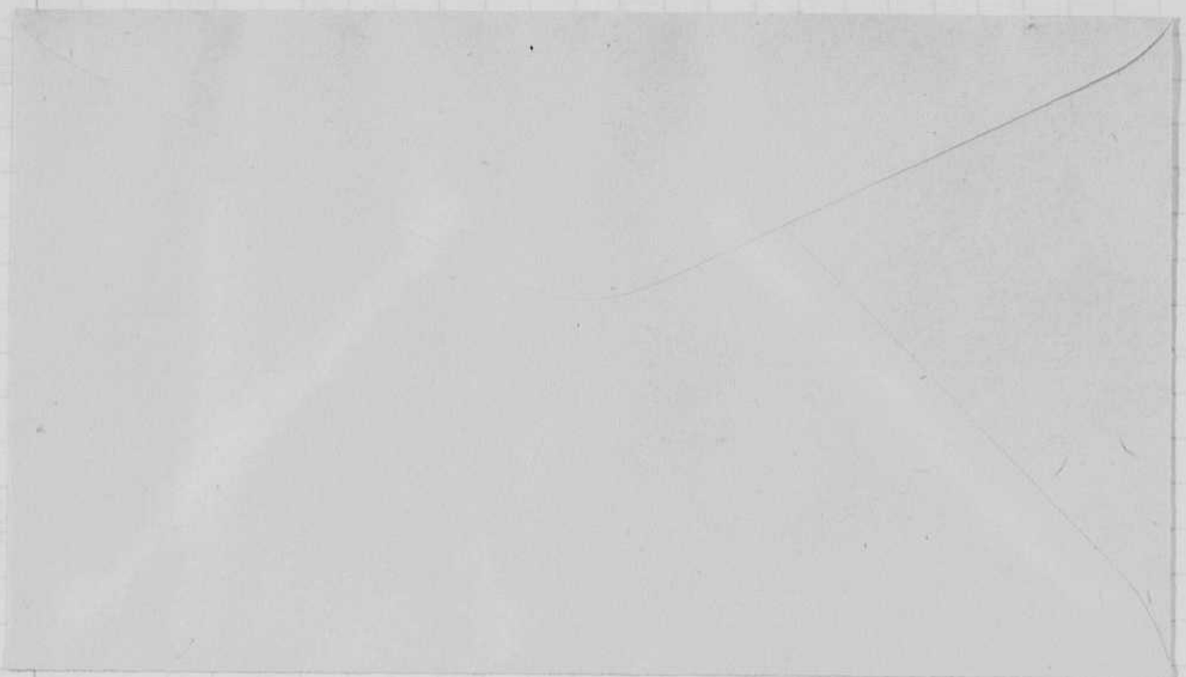
Spent some time with Temple at Spalding store 518 Fifth ave. discussing the multiflash unit for golf on June 21 (Wed.). Returned to Boston on aft. train.

Ray Stevens brought E.W. Rickmeyer of the Jefferson Electric Co in on June 22.

Took 8.10 pm train June 22 for Rochester N.Y. to visit Eastman Co. Delivered a high-speed camera timer to Mr. Boone for use on their camera. Saw Mr. Case first and discussed illumination of microfilm illumination with stroboscopic lights.

f 6.3. Microfile film.
now use 4 - 150 watt internal reflector spot lights - photocell meas.
1/2 full spread newspaper is max used.

then met Clifton Tuttle and discussed program of sensitometry for study of lights, and films and papers. including color etc. other items discussed are on opposite page.



Kodachrome test type A.

1	1 second	f 4	#1 Photoflood at 6 ft.
2	1/25	f 2	two sp xcktr lamps. No filter
3		f 4	
4		f 8	
5		f ~~4~~	→ Gelbglass L X 51
6		f 4	
7		f 2	
8		f 2	no filter.

Notebook # 10

Filming and Separation Record

___ unmounted photograph(s)

1? negative strip(s) inside envelope mounted on page 10

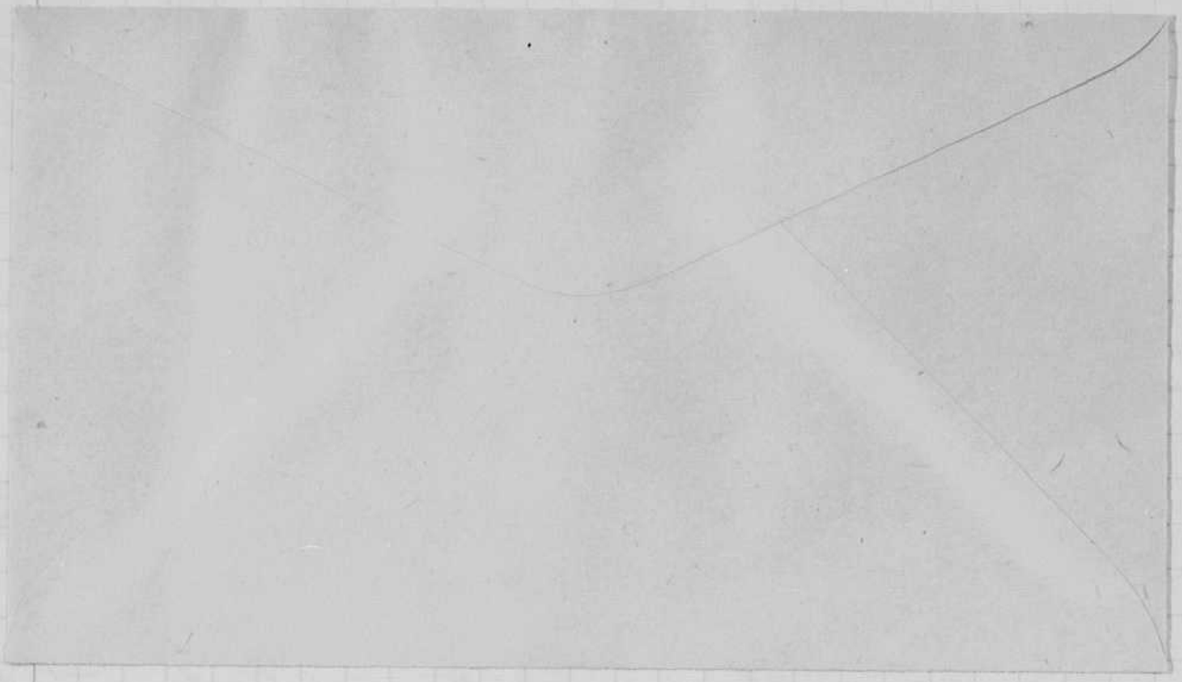
___ unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located ~~between~~ on page 10 and —.

Item(s) now housed in accompanying folder.

ok.

ok.



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1	1 second	f 4	#1 Photoflood at 6 ft.
2	1/25	f 2	two of xctr lamps. No filter.
3		f 4	
4		f 8	
5		~~f 4~~	→ Gelbglass 2 x 51
6		f 4	
7		f 2	
8		f 2	no filter.

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ok.

k.

June 27 1939
H.E. Edgerton

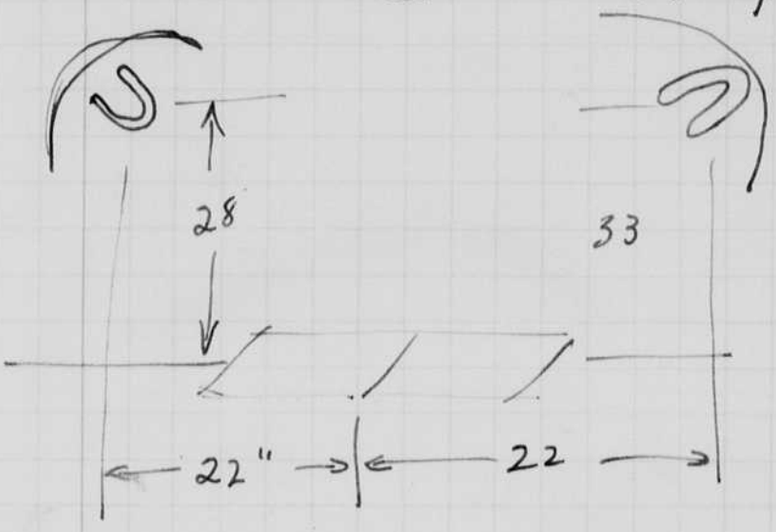
Exposure data. microfile film.
D72 3 or 4 H_2O to 1.
temp. 70° ±.
5 min.

min. distance.

Bantam special.

Lights Kr Xe 1 cm diam.
U shaped

24 mf 3000 v on each lamp.

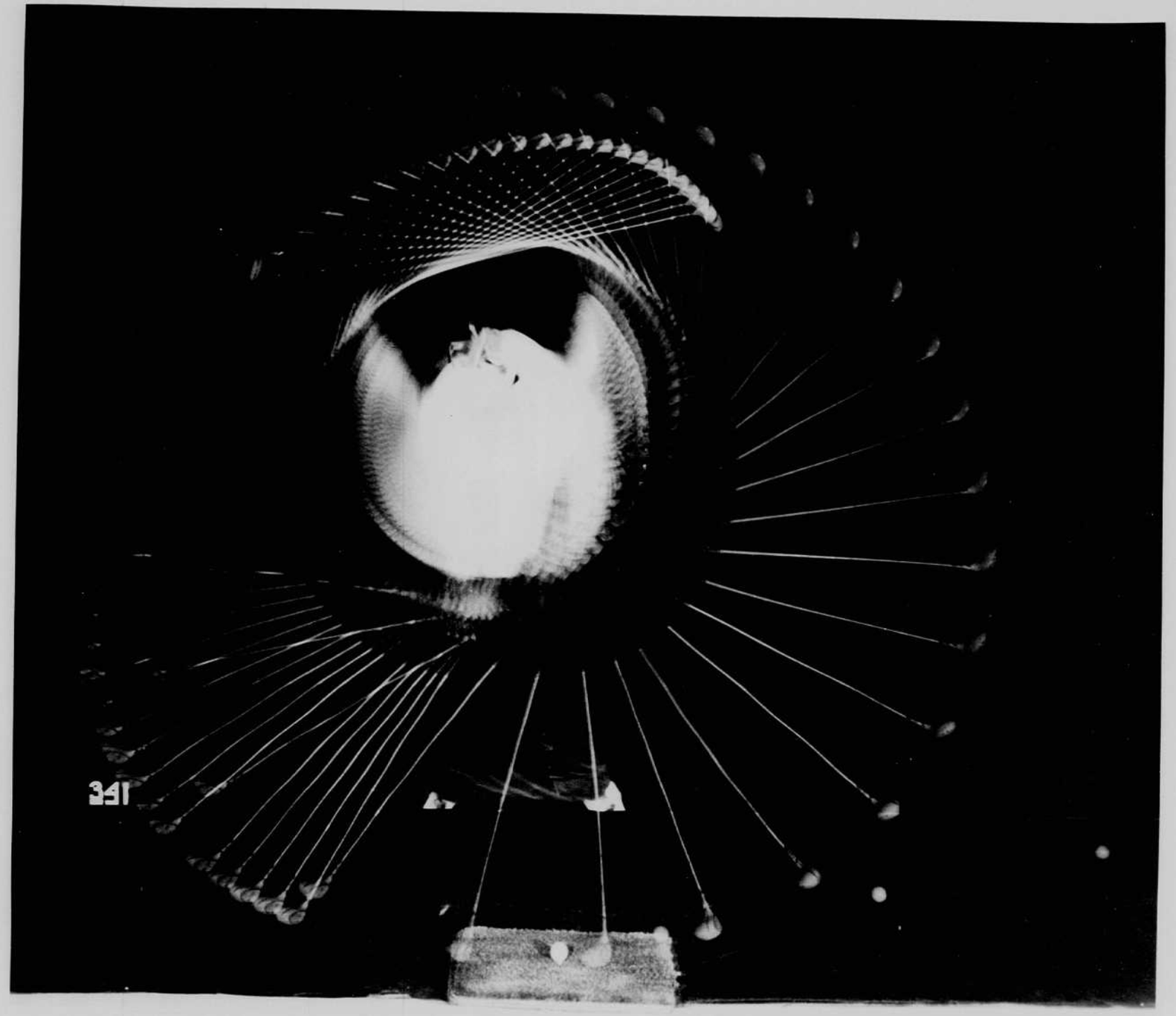


Double spread of "life" showing ad. for bear.

f 2.0 too dark.
f 5.6 ok.
f 16 under exposed.

Kodachrome test with Agfa Step color chart.
DAYLIGHT TYPE

1	1 second	f 4	#1 Photoflood 3 ft.
2	} maybe double.	2	no Filter
3		4	" " ok.
4		8 4.	" "
5		2	} Yellow F. Carl Zeiss
6		4	Gelbglass LX51 ok.
7		2	no F.
8 Boston	1/25	f 4	meter G.E. 1/25 (f 6) for 16 films. ok.



HORTON SMITH.

July 4 1939
H. E. Edgerton.

Horton Smith (golfer) was here June 28 (Wed). for photographing of swing. Shots at 100/sec and single flash were made.

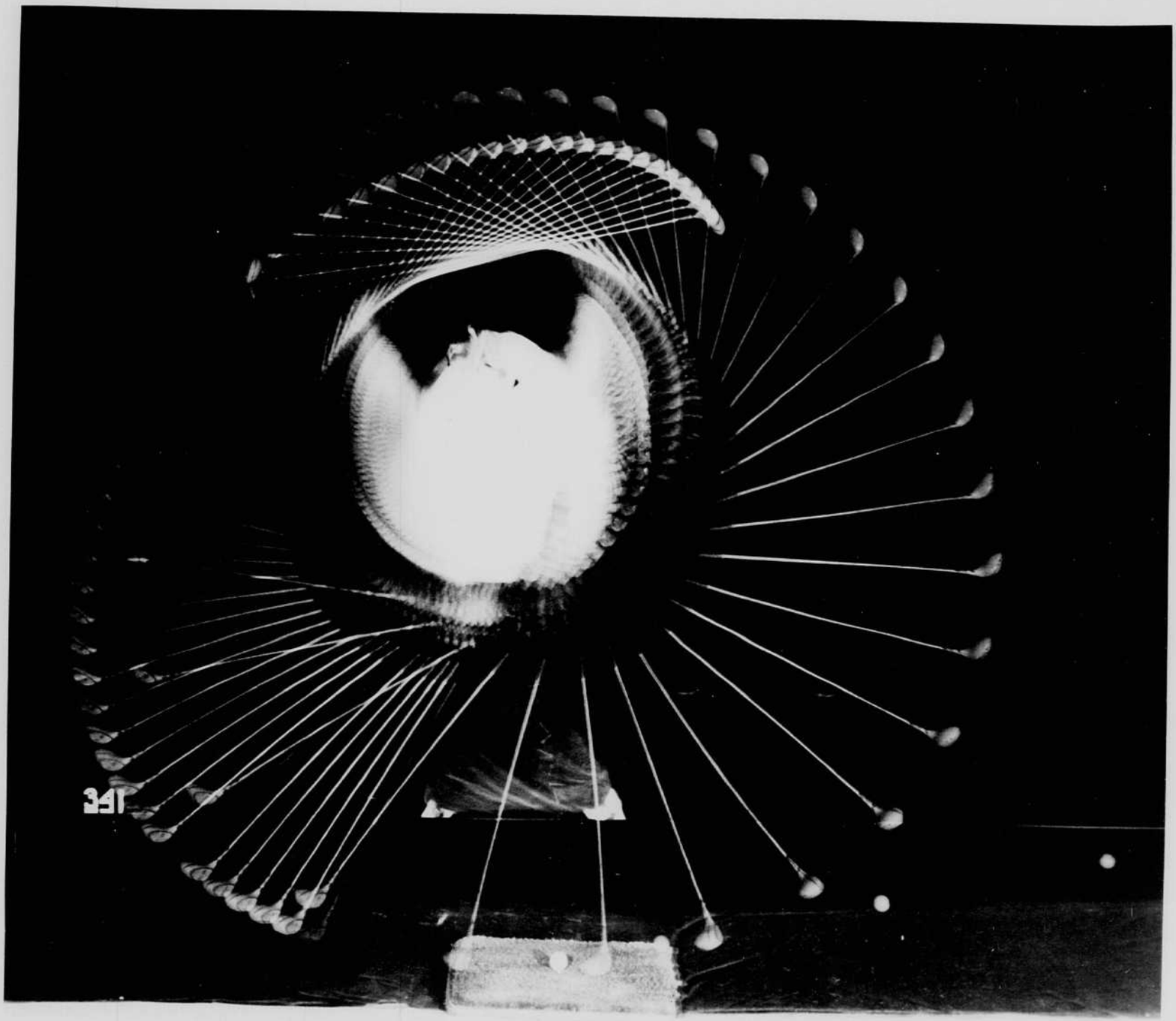
I gave a talk June 28 evening to the people attending the food conference sponsored by the biological department.

Friday June 30 I left early for Springfield mass. to see people at the armory about high-speed photography. Mr. Robt Le Doux is the photographer. Mr. Wood the metalurgist was interested and spent considerable time discussing the different methods of U. S. photography. I met Mr. Garand who is responsible for the new automatic rifle that the U. S. army has adopted. One of these may be brought here for test with high speed photography.

I was lead to believe that the Springfield armory wishes to purchase a high-speed motion-picture camera and also a single flash 1/10^6 second light for bullet photography.

Friday aft. June 30 I went to Pittsfield and saw the Gen. Elect. Co about condensers. I had 8 defective condensers with me. 7 of these were opened. 5 had breakdown within one turn of the connecting taps. Only one of the condensers showed any effect of burning at the junction of tap and foil. The G.E. will replace these with exp. units for test in the circuit. They were surprised that the failures resulted at 2000 volts. on 440 volt condensers. These cond. breakdown on dc at 4000 - 5000 volts. The service in the flash apparatus is not severe as the discharge is not oscillatory and is infrequent.

I spent Saturday and Sunday with Nottinghams on Lake George Sabbath Island. Reached home last night.



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I was led to believe that the Springfield armory wishes to purchase a high-speed motion-picture camera and also a single flash 10⁻⁶ second light for bullet photography.

Friday aft. June 30 I went to Pittsfield and saw the Gen. Elect. Co about condensers. I had 8 defective condensers with me. 7 of these were opened. 5 had breakdown within one turn of the connecting taps! Only one of the condensers showed any effect of burning at the junction of tap and foil. The G.E. will replace these with exp. units for test in the circuit. They were surprised that the failures resulted at 2000 volts. on 440 volt condensers. These cond. breakdown on dc at 4000 - 5000 volts. The service in the flash apparatus is not severe as the discharge is not oscillatory and is infrequent.

I spent Saturday and Sunday with Nottinghams on Lake George Baldwin Island. Reid home last night.

Inductance of Bosch coil 1.3 mh.
" " Small
Delco Remy. 0.015 mh. (25 turns.)

Need new coils with 200 turns or more.

July 5 1939
O. Eckley motor.

Discussed movie equipment for Springfield armory with Gunderman and Wilkinson today.

July 10 1939.

Movies at 8000/sec of 22 savage automatic rifle. Mr. LeDoux Mr. Wood Mr. Whitwood (?) all from Springfield armory were here.

Took movies of Evans cigar lighter last Sat. Sunday with Ed Hadding on Ballets through glass and tin cans full of water.

Horton Smith.

Notebook # 10

Filming and Separation Record

____ unmounted photograph(s)

3? negative strip(s) inside envelope mounted on page 15

____ unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located ~~between~~ on page 15 and —.

Item(s) now housed in accompanying folder.

Inductance of Bosch coil 1.3 mh.
" " small
Delco Remy. 0.015 mh. (25 turns).

tied new coils with 200 turns on primary.

July 5 1939
Darlington

Discussed movie equipment for Springfield armory with Cameraman and Wilkinsoday.

July 10 1939.

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" " Small
Delco Remy. 0.015 mh. (25 turns).

Need new coils with 200 turns or more.

July 5 1939
Stockyards.

Discussed movie equipment for Springfield armory with Genebaum and Wilkinsloday.

July 10 1939.

Movies at 8000/sec of 22 savage automatic rifle. Mr. LeDoux Mr. Wood Mr. Whitwood (?) all from Springfield armory were here.

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Horton Smith.

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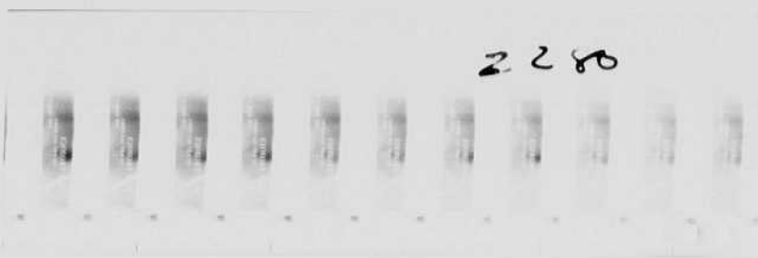
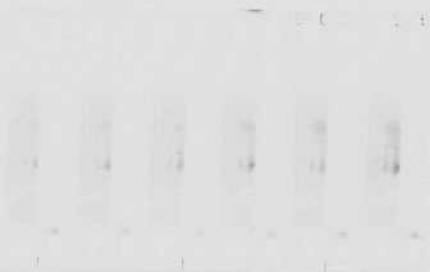
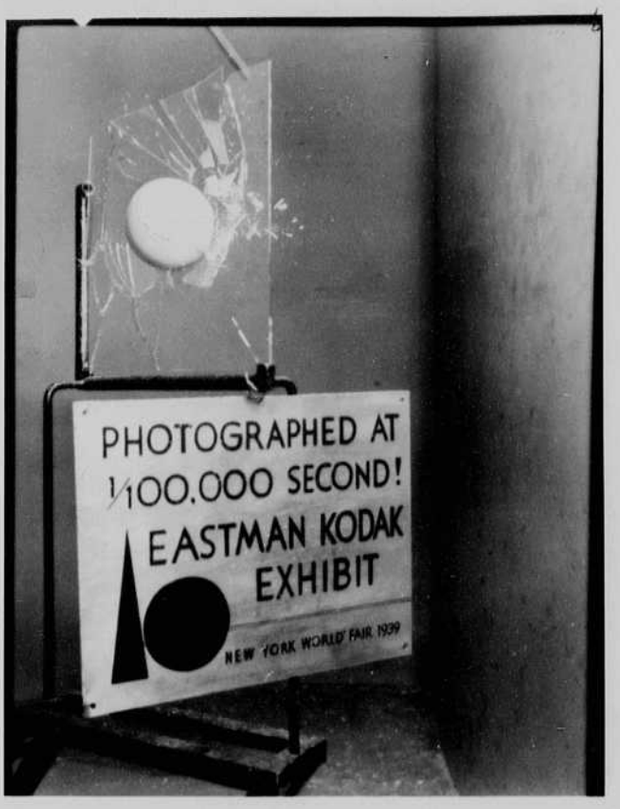

2280


3000/sec.
EASTMAN 14


EASTMAN 14
2000




KODAK

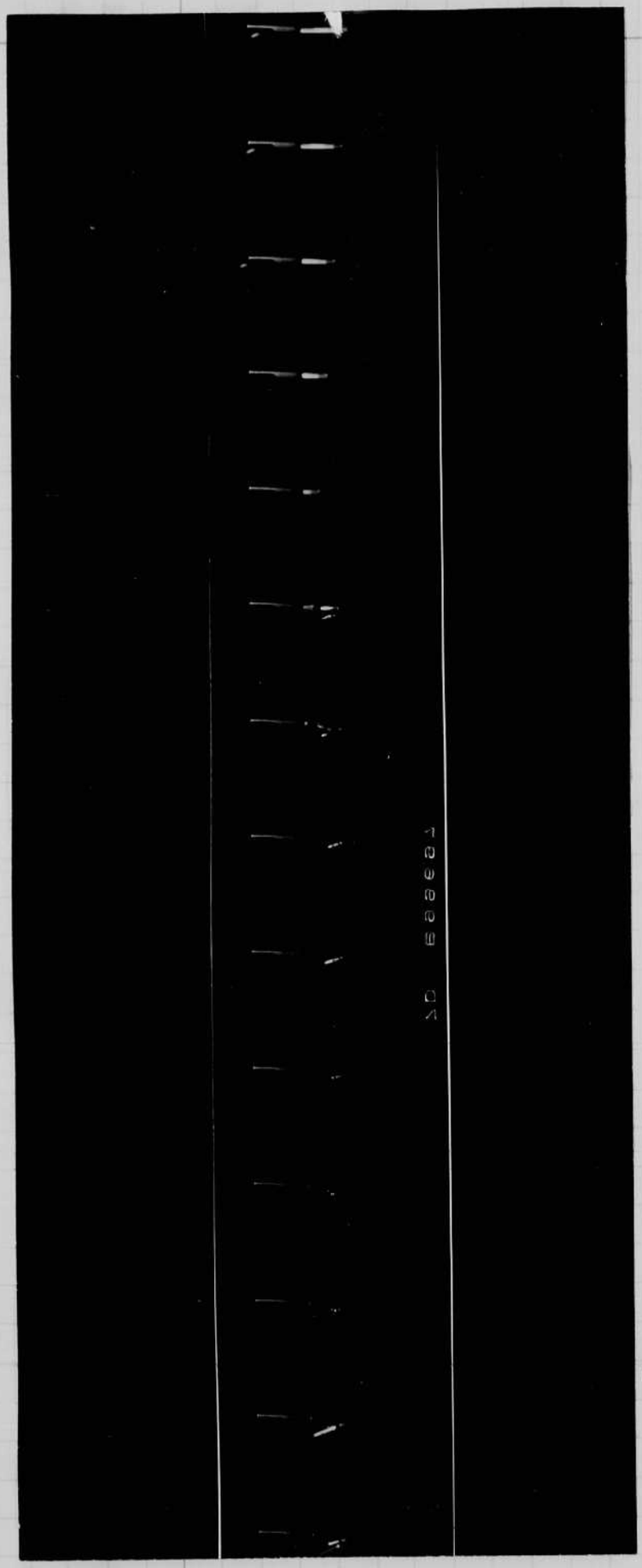


Kr. Campin.
enlarger.

Movies made with shut off grid mercury tubes by Zenus a week or two ago..
3000/sec.

Kr. Camera.
Enlarger.

Movies made with shutter off grid. Mercury tubes. By James a week or two ago.
3000/sec.

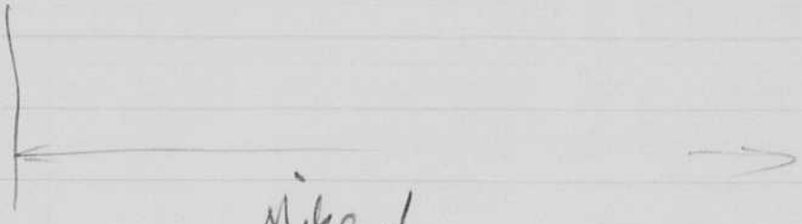


Dr Wower.
(Western Cartridge).

Gerwesbausen.

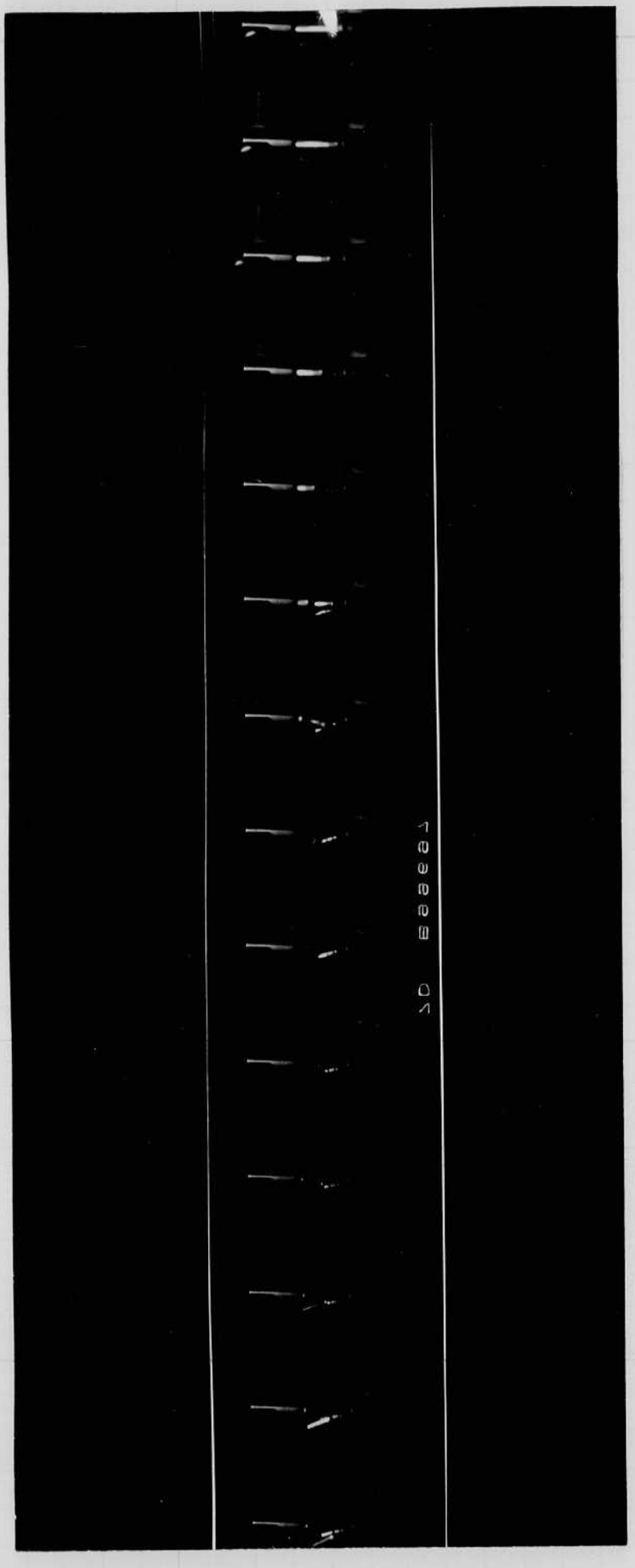
Stevens
automatic
Rifle.

Microphone	Bullet	
19"	15"	distance from muzzle
10	10	
~~13~~	34	

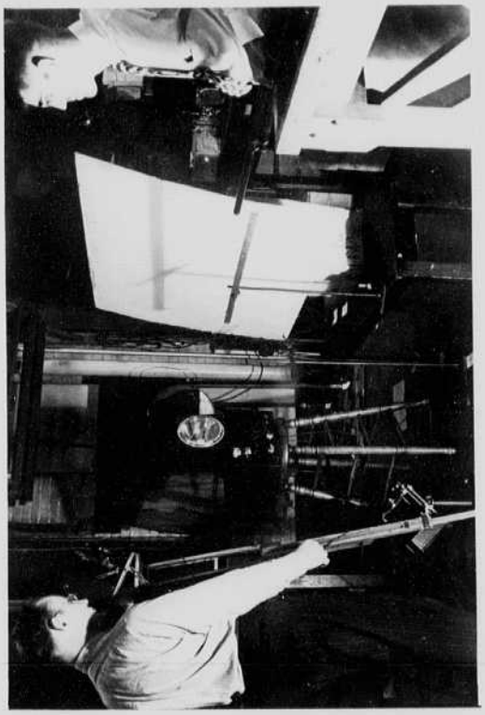


Miked.

Feburary		
	6	0 gun not fired.
	7	0
	8	12"
	9	24"
	10	24
	11	16"
	12	8"



Dr Womer.
(Western Cartridge).



Germeshausen.

Stevens
automatic
Rifle.

Microphone	Bullet-	
17"	15"	distance from muzzle
10	10	
~~136~~	34	

Mike d.

Film #		
	6	0 gun not fired.
	7	0
	8	12"
	9	24"
	10	24
	11	16"
	12	8"

July 19 20 1939.
H. E. Edgerton.

Robt Womer - East Alton with Western Cartridge here this and last week. Took several hundred photos of shot gun on July 11 and 12.

Mr. Radford was here Monday July 17 to discuss close-ups of ball and club.

#5	Panatomic X Film	125 foot candles. f16	1/25 sec.	
#6		f8	1/25 sec.	85B Filter
#7		f4	1/25.	85B "
#8		f8	1/25	yellow Zeiss.

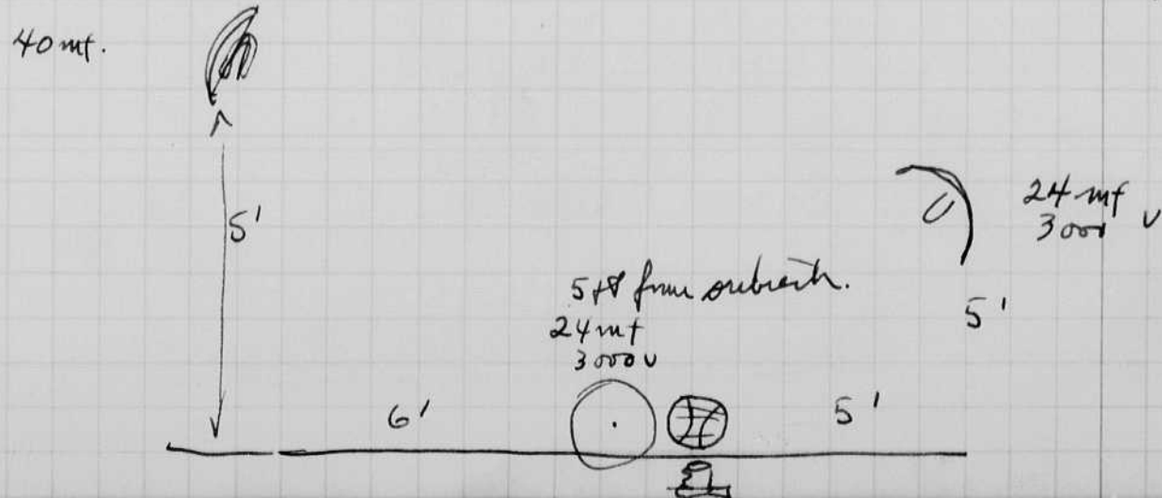
Kodachrome A + 85B Filter.

July 19 1937
H.E. Edgerton.

Camera Bantam Special. f2 lens.
Kodachrome test shots. type A Film.

L x 51 is similar to K-1.

No.	Exp.	Aper.	Filter	distance	Subject.	
1.	1/250	2.8	85B.	5 ft.	Soccer ball & Color chart.	
2	"	4.	85B	"	"	+ Hallibaugh.
Double. 3	"	4	85B + (L x 51) Zeiss yellow.	"	"	—
4	"	2.8.	85B + (L x 51)	"	"	—
	"	4	85B + (L x 51)	"	"	
5	"	5.6	85B	"	"	+ Grier
6	"	8.0	"	"	"	+ Edg.
7	"	4	85B + 85	"	"	+ Grier
8	"	4	85	"	"	—



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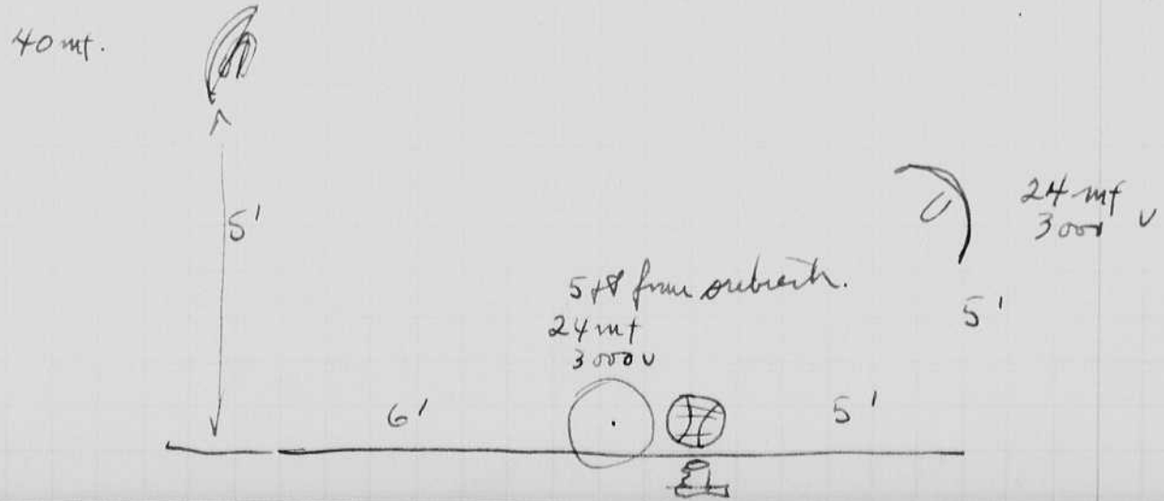
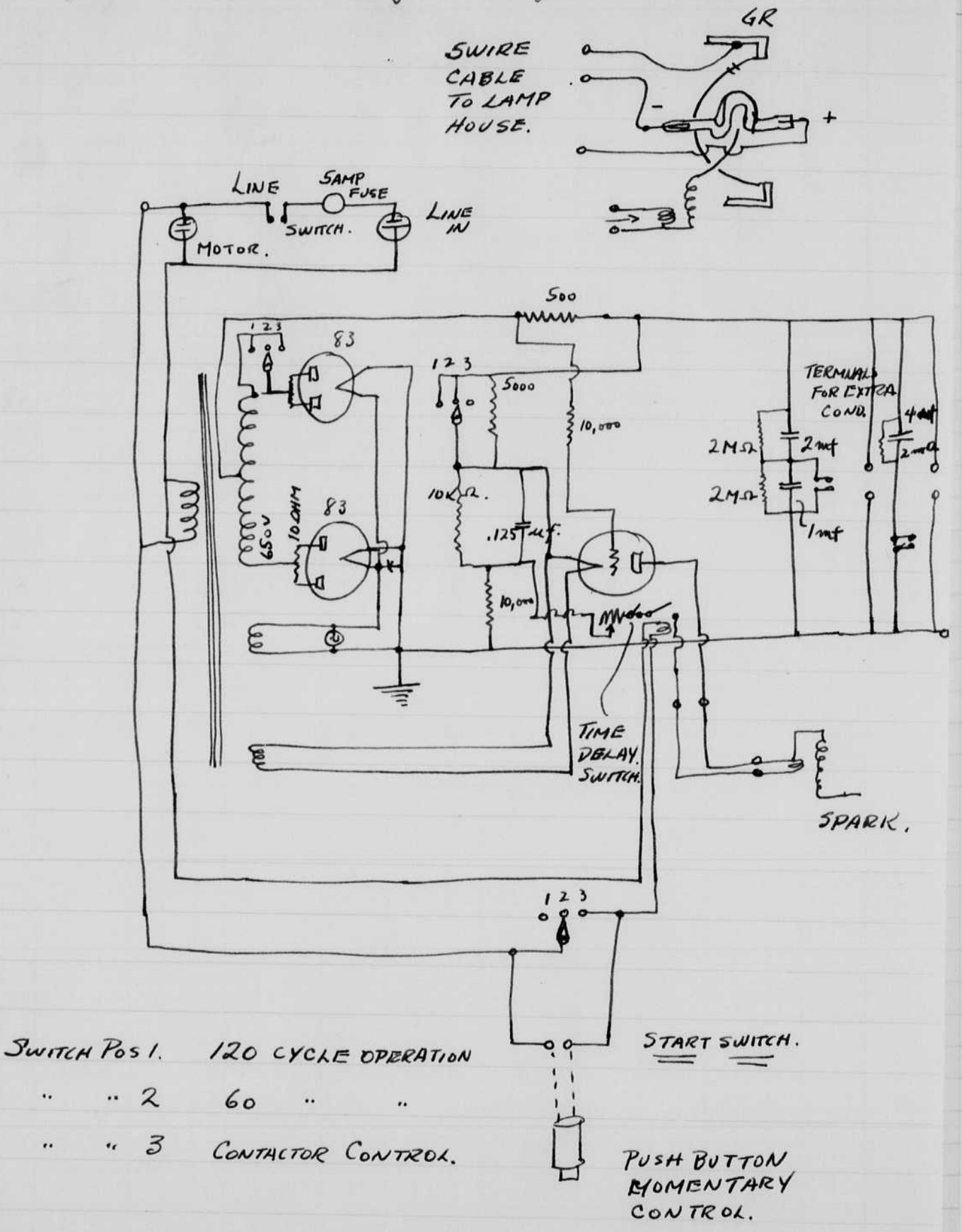
Double. 3	"	4	85B + (L x 51) Zeiss yellow.	"	"	—
4	"	2.8.	85B + (L x 51)	"	"	—
	"	4	85B + (L x 51)	"	"	
5	"	5.6	85B	"	"	+ Drier
6	"	8.0	"	"	"	+ Edg.
7	"	4	85B + 85	"	"	+ Drier
8	"	4	85	"	"	—



Wiring Diagram for G.R. Strobo #172.

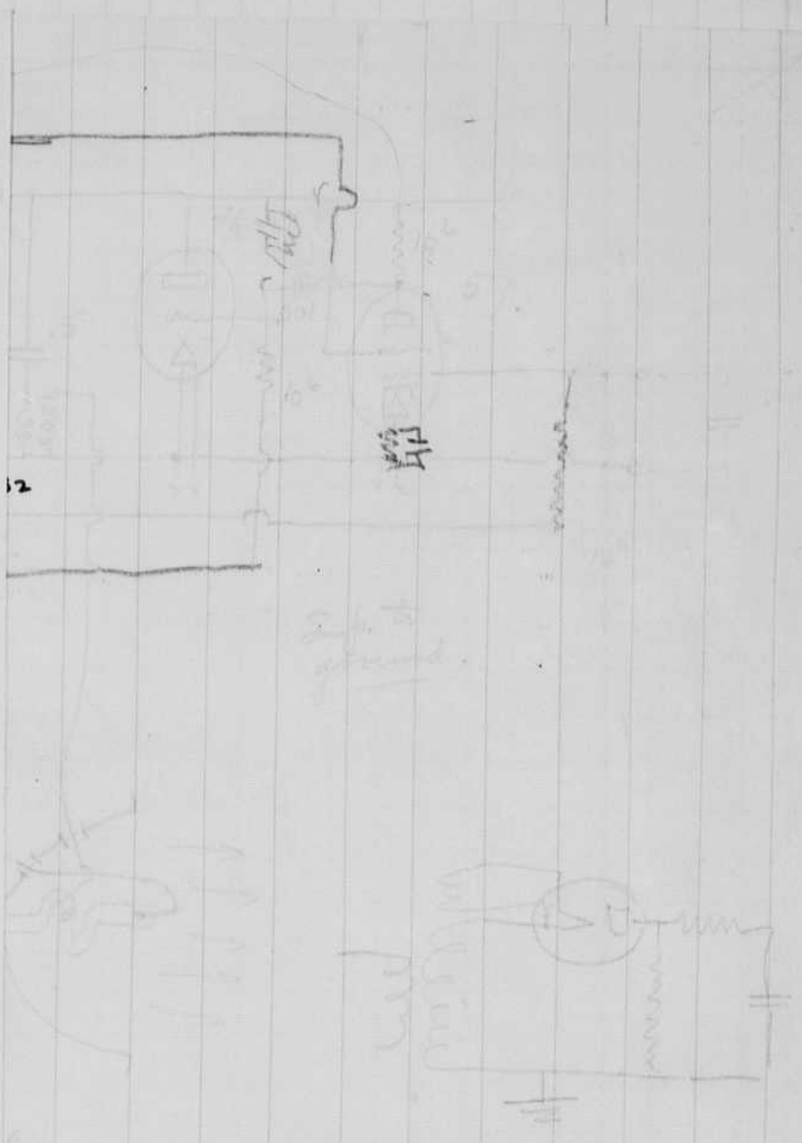
Furnished to the Navy. Washington D.C.



Switch Pos 1. 120 cycle operation

" " 2 60 " "

" " 3 Contactor Control.



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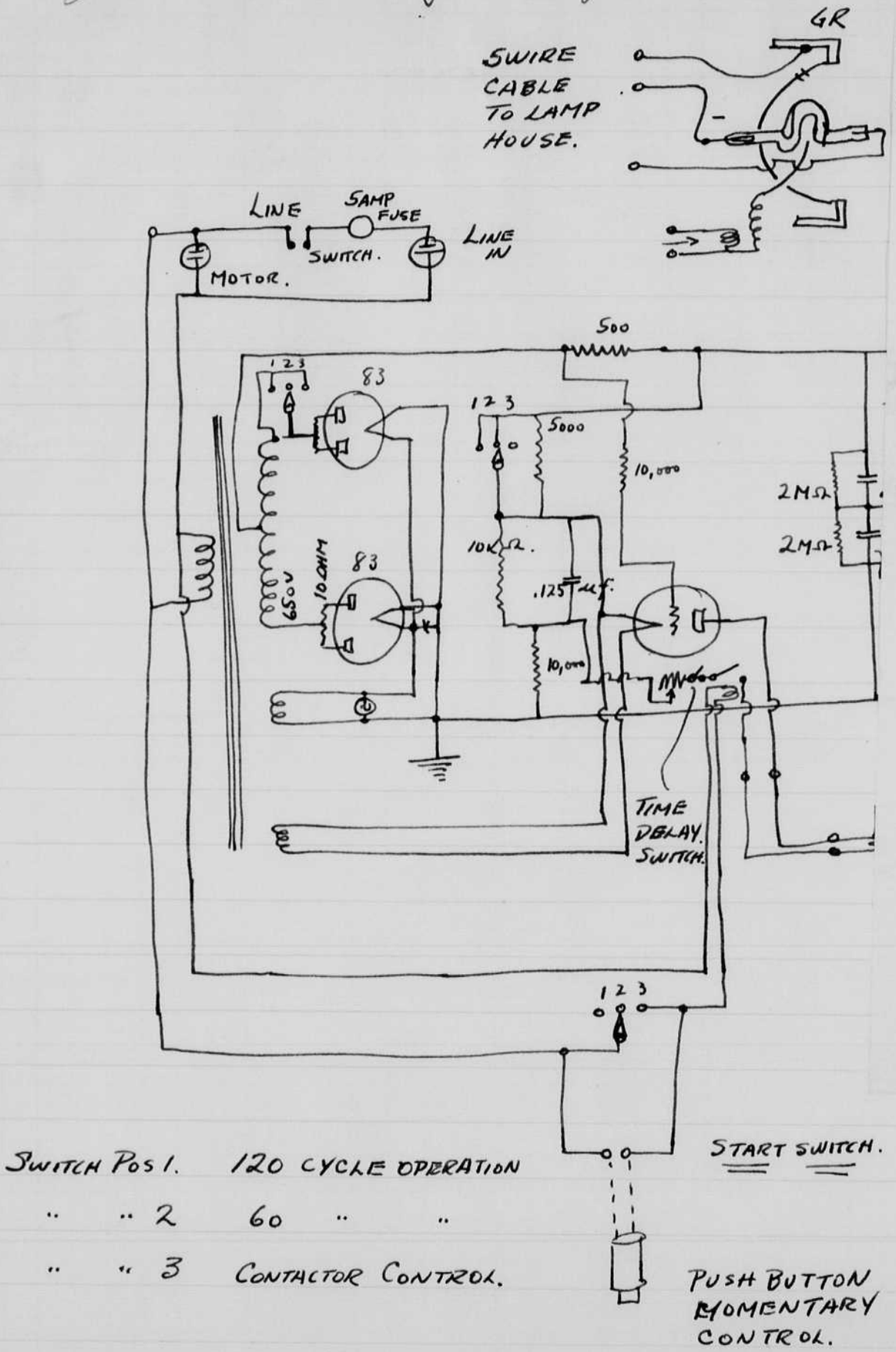
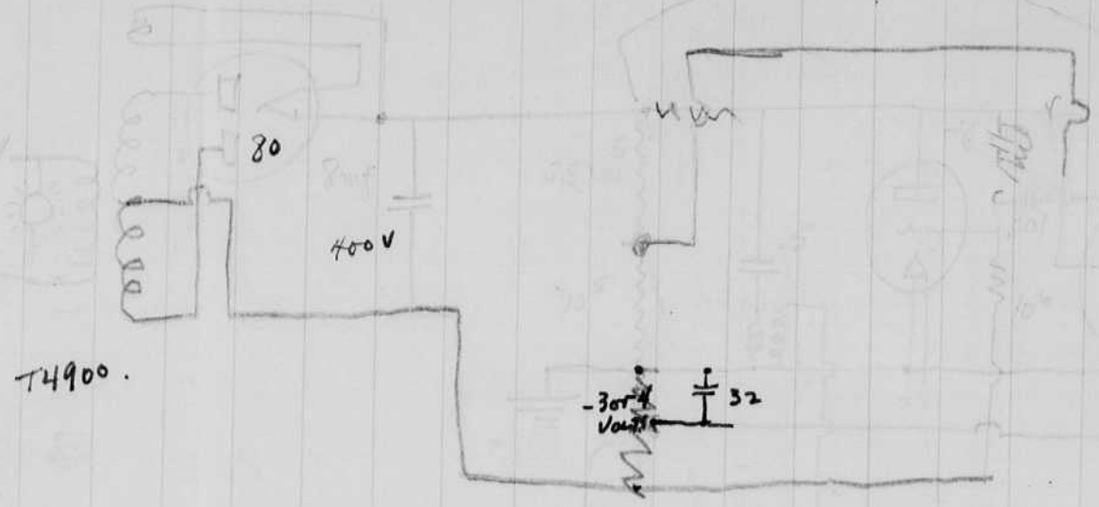


Car circuit to P.

Switch Pos 1. 120 cycle operation

" " 2 60 " "

" " 3 Contactor Control.



RCA. VG3 Ref. MVG 3 megohm

RCA. 9561.
Television Part.
Camden N.J.

July 31 1937 Trill Studio.

Color Photography.

Newfork 6 and 23rd St Trill Studio

	9x12 cm	Outdoor Kodachrome			
1	4.5	85B	}	VK	Anne & Duncan + Pete
2	5.6	85B	}	"	two by canoe.
3	6.3	85B	By	"	Sitman
Best. 4	5.6	L51		"	" "

Kodachrome type B.

X (1	5.6	85B	Pete	"	Stick.
2	4.5	85B + L51	Pete	"	no stick

Bantam type A Outdoor filter — 85B.

1	2	85B	Nofoto 1/30 sec. Neil and setup. UK dan
2	4	85B	" " " "
3	4	85B	" " above
4	4.0	85B	UK dancer. ~~Heads up~~ flash.
5	5.6	85B	" flash
6.	5.6	85B+251	" "
7.	58	85	" "
8.	Neil Mrs. Temple	f 2.8	1/50 ? 1/30 with lamp 5 ft. under exposed.

Joe Maniaci 535 2nd St Brooklyn. So 8-4262

Football Outdoor. Kodachrome.

8x9.x12

1	f45	85B	Button-up vest
2.	5.6	85B	
3	6.3	85B	
4	f6.3	85B	Fired early. top view
5	f6.3	85B	"
6	5.6	85B	"
7			
8			

Bottom Footwall

	f	Filter.		
1	4.	85B	3ft	Red
2	5.6			Red
3	5.6			Red
4	~~5~~ 5.6	L51		ok.
Blanks. 5	56	L51	Brecc	
" 6	2.8	85B	Full length Post.	
" 7	2.8	↓	"	
" 8.	2.8	✓	"	

Lt. D. Haley. Davidson. Giles.
Coningtn.
Lt. Edgerton. Lt. Kulp. McCabe "Slim".
July 26 1939 Venable

Photography of Bakelite Boxes.
American Viscose Corp.
Marcus Hook Pa.

On Monday July 24 took ~~#~~ 20 photographs through window in side wall of Boxes. Contact trip ~~to~~ wires fired the light. f11 24 mf 3000 v.

July 25 took one photo side view then built top platform for photography from above.

July 26. #15 neon type. Spiral lamp 4 mf 3000 volts Spot reflector + flood light at side. Bent shaft of motor on one test.

Lft 5.30 for Washington D.C. - Pogue 116
Chevy Chase Dr. Chevy Chase. Md. Margaret had baby Janice Lynn. yesterday.

August 7. 1931

W.P.
Reported to Roop. Lt Comdr. at C & R Washington Navy Yard. July 27.

Aug 2 - Dalgren Va (also aug 3.)
Riffolt arranged magnet on shutter 1/25 sec setting .06 sec before shutter open.
Two photos were taken of 8" shell striking a 2" Deck plate. A contact was placed back of the plate to flash the tube. See data on o/p page.

Taken at Dalgren Va.

H. E. Edgerton
Aug. 3, 1939

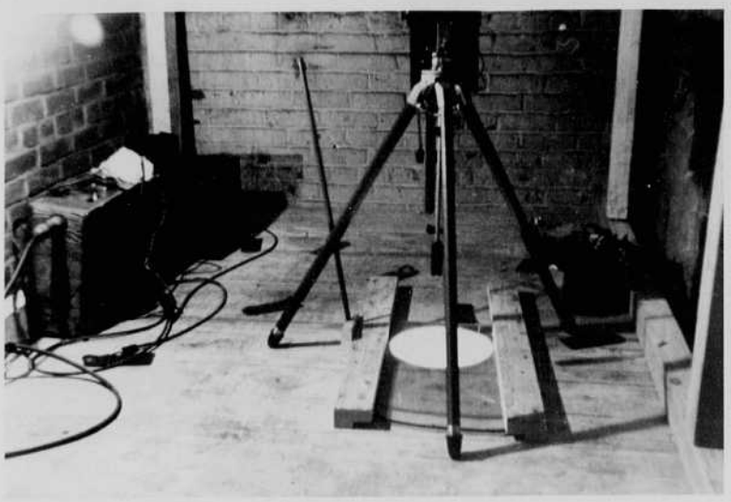
1832 Strobe.

1. f 22 1/25 sec. 1422 ft/sec. 70°
Time lag from osc .06 sec
Shutter open. .04 sec.
1422 x 6 = 8532 ft
wires set at 100 ft.
contacts about 1/8" back of plate.

Photo after taken at f 22 1/25. no light from Strobo.
Impact No. 10185 at striking velocity of 1932 f.s.
1.7866 STS Plate at 70° obliquity. Proj 260 # (8")

2. 1832 f.s. 1856 muzzle. at 80° 30'
125 ft space for .06 time delay.
f 16 1/25 —
3 lamps all about 3 ft.
Proj ahead by 2 ft.

Impact No. 10187 at striking velocity
of 1832 f.s. 1.7866 STS. Plate at
80°30' obliquity Proj. 250 lbs. (8")



Camera at
Amer. Viscose

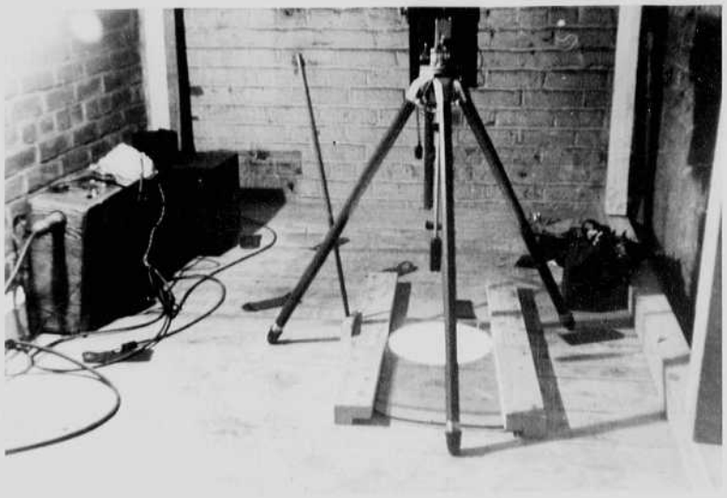
R. D. Haley.
Slim.
?

Box

Rotated to
14 - 18,000 R.P.M.
to Break.

Circuit sent to Western Cartridge.

3



Camera at
Amer. Viscose

R. D. Haley.
Slim.
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14 - 18,000 R.P.M.
to Break.

Circuit sent to Western Cartridge.

H.E. Edgerton.
Aug 4, 1939. Monday.

On my trip to Washington Navy yard, a few photographs were taken of specimens breaking in a tensile test. Two methods of synchronizing were used - one a microphone a few inches from the break - the other a contactor which would go together when the specimen parted. I suggested the use of a phonograph pickup on the metal as a very rapid signaling device.

On Friday Aug 4 I went with Kaye and Curl to the Navy Research Lab at Anacostia. Drs Irwin and Kinzer were there and helped to take photographs of .30 cal bullets striking an iron plate.

Commander Roop rode with me to Wilmington Del Aug 4 after work was finished. Stayed at Dupont Hotel.

Aug 5 morning was spent in American Viscose Co at Marcus Hook. Discussed results of last weeks tests with Haley. Also went over microscope tests with Kulp and Venable. A trip is planned to take movies of the mix come as it comes from the nozzle into the acid bath.

On Sat. (Aug 12) I worked with James Hansen on the set up for photography through microscope. A condenser system was tried but could not get image of the 3 mil capillary in the glass jet. Our 9" reflector with a strobat tube at the focus was put directly behind the specimen and focused on it. 1 mf at 1000 volts produced ample exposure with a 40 mm objective with about a 4x enlargement. A 25 mm obj was also used giving about an 8x enlg. both above on positive sound recording film

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____ unmounted photograph(s)

3? negative strip(s) 1? negative inside first envelope
2? negatives inside second envelope
envelopes mounted on page 31

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(notes, drawings, letters, etc.)

was/were filmed where originally located ~~between~~ on page 31 and —.

Item(s) now housed in accompanying folder.

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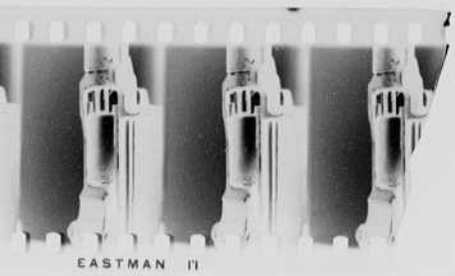
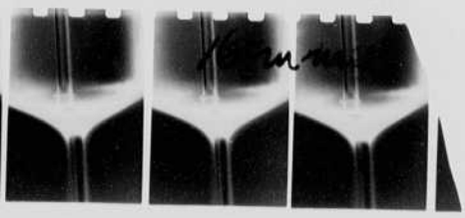
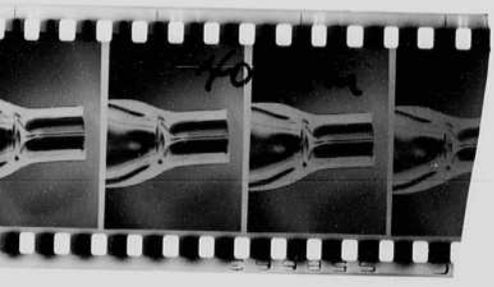
NITRATE FILM**


EASTMAN

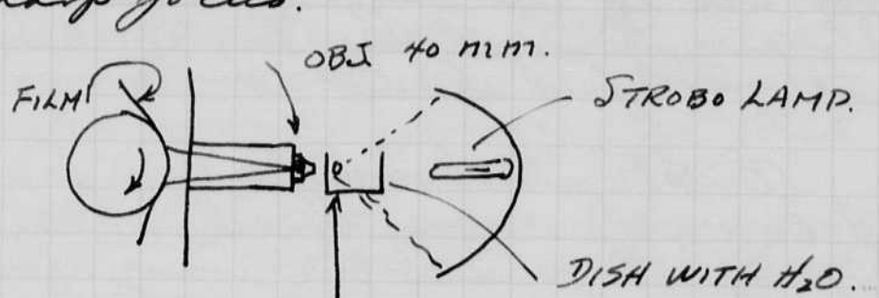



40 mm



a 25 mm objᵉ was also used giving about an 8x enlarg
both above on positive sound recording film

The next experiment was to put the jet in a dish of water. We found that the glass side needed to be close to the jet to get sharp focus.



Aug. 10.

Germs and 2 spent day at Springfield Armory Springfield taking high-speed movies of .30 cal. Garand semi automatic rifle.

#13932

1 mf 1000 volts.
Garand Semi-Automatic Rifle.
Springfield Mass.
Bodegrokund x Film
800 frames/second f 3.2

Amer. Viscose

Setup shots. 1 mf 1000 volts. 9" reflector.

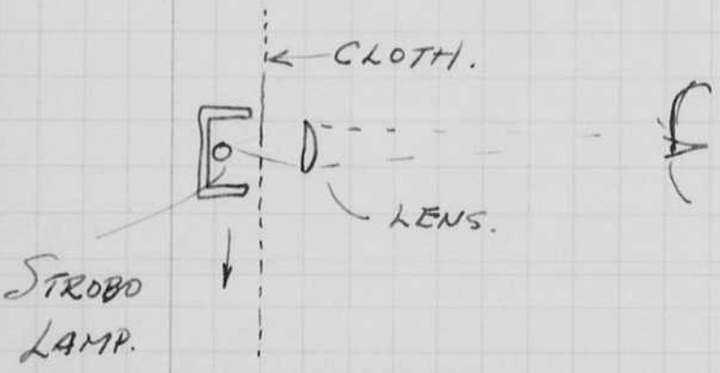
40 mm obj pos film no H_2O
76 " " " " " H_2O from neg.

40 mm Submerged. Bode x film

Harold Edgerton
Aug 16 1939

Yesterday I spent all day at the Nashua Mfg Co in New Hampshire. This trip was at the suggestion of Geo Radford. I saw F. Lindsay Dexter last Tuesday with Radford about it.

A 48" stroboscope lamp operated at 60 cycles was tried on the tender frame to show the way in which the threads were twisted. The lamp was put close to the cloth and on the back side. A cylindrical lense was used to observe the threads. No effort was made to synchronize with the threads. This was tried with out success with a variable-speed stroboscope but a synchronous adjustment was not very evident since the cloth varies so much in spacing of the thread.



I thought the demonstration was encouraging and some of the men there did also. The tilt of the sheet as well as local bows etc were very evident with the glass.

My cylindrical lens was not long enough or wide enough but it did show that the oyster was of some use.

At lunch I discussed with Dexter the use of ultra violet dye markers on the edge which would make possible an automatic method of doing the job. This dye would go on when the sheet was in the looms. It would need to

go through the dye and bleach processes.

The automatic scheme would be to use a light and pickup on ~~the~~ one side to indicate when the spot was opposite some mark. Then a stroboscope would flash at this instant on the other end of the web. A split beam arrangement would enter two photo cells that were ultra violet sensitive only and give the proper stimulus to the machine to go forward or backward to exactly line up the two sides.

Replaced by Invention Disclosure No. 2137 H.E. Dion

Aug 16, 1939

Analysis of bolt action.

	FRAME	Bolt	Cartridge		
Scratch at top	1	0.69	3.36		
	2	0.69	3.37		
	3	1.11	3.47		
	4	2.56			
	5	3.65			
	6	4.85			
	7	6.03			
	8	7.12	3.6		
	9	8.12	4.68		
	10	9.20	5.68		
	11	10.25	6.6		1.55
	12	—	7.75	6.04	1.55
	13	—	turned		1.55
	14	—	—	—	—
Blank frame	15	~~Blank~~			
	16	—	—	—	—
	17	—	—	—	—
	18	—	—	—	—
	19	—	—	—	—
	20	—	9.5	—	—
	21	—	9.4	—	—
	22	—	9.28	—	—
	23	—	9.18	—	—
	24	—	9.08	—	—
	25	—	8.95	—	—
	26	—	8.82	—	—
	27	—	8.70	—	—
Blank frame	28	—	8.40	—	—
	29				
	30	} skips			
	31				
	32	—	7.46	—	—
	33				
	34	} skips			
	35				
	36	10.05	6.4	—	—
	37				
	38	} skips			
	39				

$\frac{16}{12} \times 8.437 \times 60 = 675$ frames/sec

1 frame = .00148 sec.

8.656 x 80 = 692 frames/sec.

$\frac{1}{692} = .00145$

Notebook # 10

Filming and Separation Record

____ unmounted photograph(s)

____ negative strip(s)

__1__ unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located between page __34__ and __35__.

Item(s) now housed in accompanying folder.

Aug 16, 1939

Analysis of bolt action.

	FRAME	Bolt	Cartridge		
Scratched at top	1	0.69	3.36		
	2	0.69	3.37		
	3	1.11	3.43		
	4	2.56			
	5	3.65			
	6	4.85			
	7	6.03			
	8	7.12	3.6		
	9	8.12	4.68		
	10	9.20	5.68		
	11	10.25	6.6		1.55
	12	—	7.75	6.04	1.55
	13	—	turned		1.55
	14	—	—	—	—
Blank frame	15	~~Blank~~			
	16	—	—	—	—
	17	—	—	—	—
	18	—	—	—	—
	19	—	—	—	—
	20	—	9.5	—	—
	21	—	9.4	—	—
	22	—	9.28	—	—
	23	—	9.18	—	—
	24	—	9.08	—	—
	25	—	8.95	—	—
	26	—	8.82	—	—
	27	—	8.70	—	—
Blank frame	28	—	8.40	—	—
	29				
	30	} skips			
	31				
	32	—	7.46	—	—
	33				
	34	} skips			
	35				
	36	10.05	6.4	—	—
	37				
	38	} skips			
	39				

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1 frame = .00148 sec.

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Notebook # 10

Filming and Separation Record

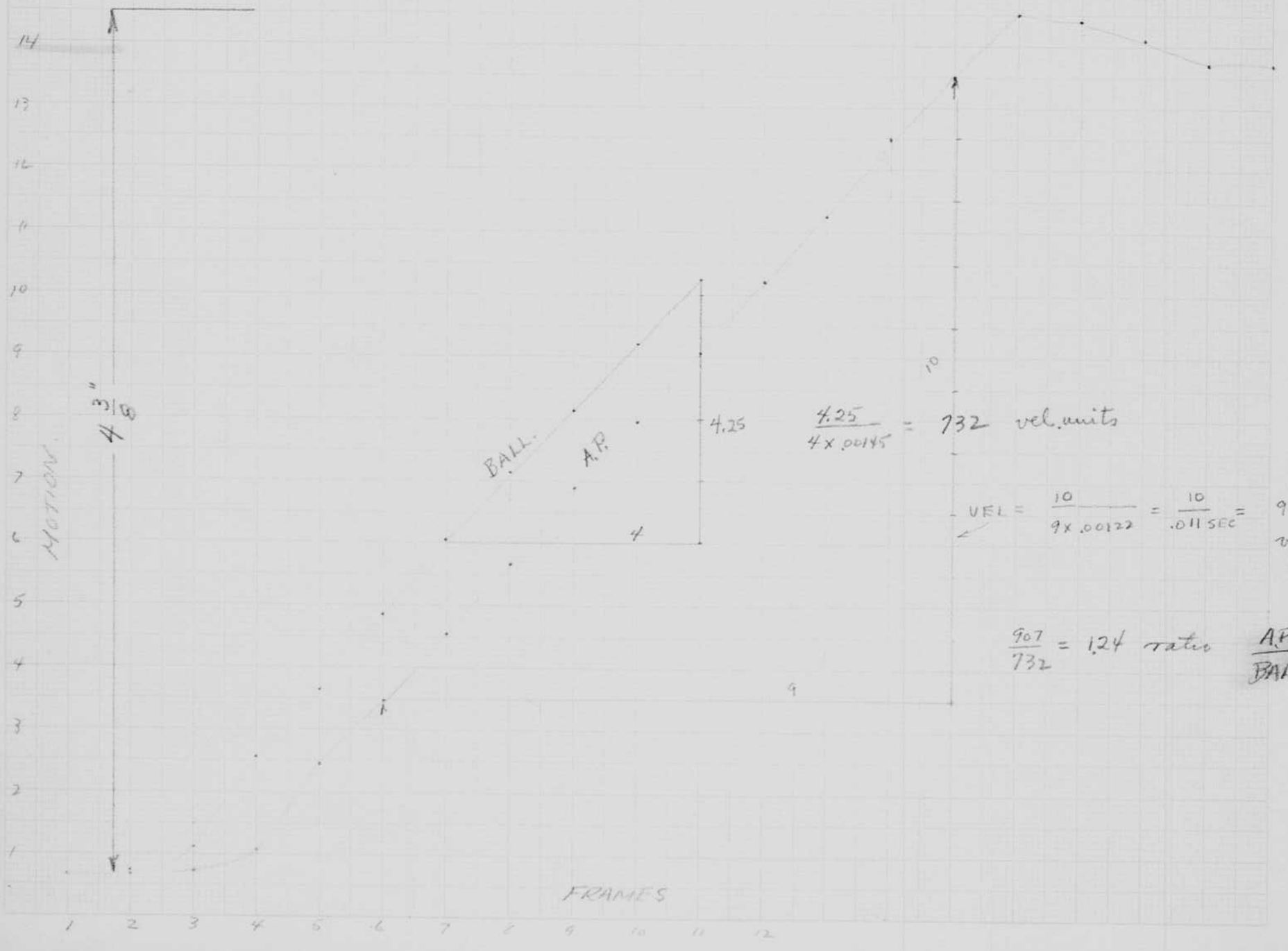
____ unmounted photograph(s)

____ negative strip(s)

__1__ unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located between page 34 and 35.

Item(s) now housed in accompanying folder.



$\frac{4.25}{4 \times .00145} = 732$ vel. units

VEL = $\frac{10}{9 \times .00122} = \frac{10}{.011 \text{ SEC}} =$ 907. vel. units.

$\frac{907}{732} = 1.24$ ratio $\frac{A.P.}{BALL.}$

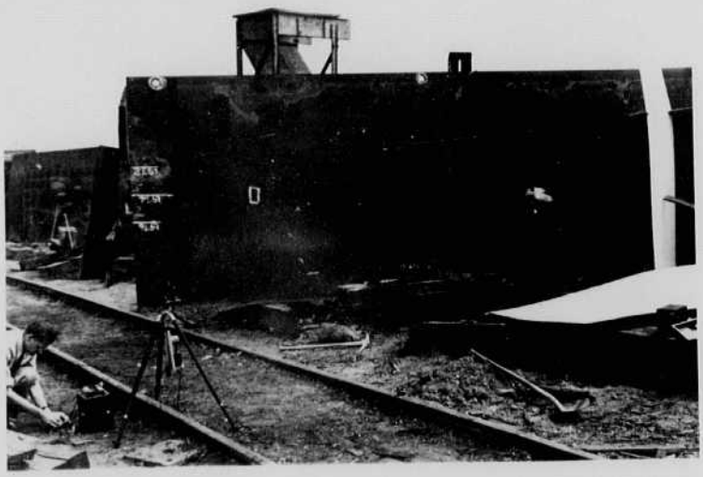
73
116
189

Travel of bolt 4 3/8" (one way

FRAME	BOLT	CARTRIDGE
40	8.75	5.25
45	7.1	3.8
49	5.7	2.4
53	4.05	0.85
57	2.30	—
58	1.92	—
59	1.52	—
60	1.12	—
61	0.72	—
62	0.72	—
63	0.84	—
64	0.90	—
65	0.88	—
66	0.83	—
67	0.78	—
68	0.72	—
69	0.72	—
70	0.7	—
71	0.7	—
72	0.7	—
73	0.7	—
189	0.72	—
190	1.08	—
191	2.45	—
192	3.48	—
193	4.53	—
194	5.67	—
195	6.90	—
196	7.95	—
197	9.09	—
198	10.20	—
199	—	11.25
200	—	12.50
201	—	13.50
202	—	14.50
203	—	14.40
204	—	14.10
205	—	13.70
206	—	13.70
207	—	13.60
208	—	13.50
212		

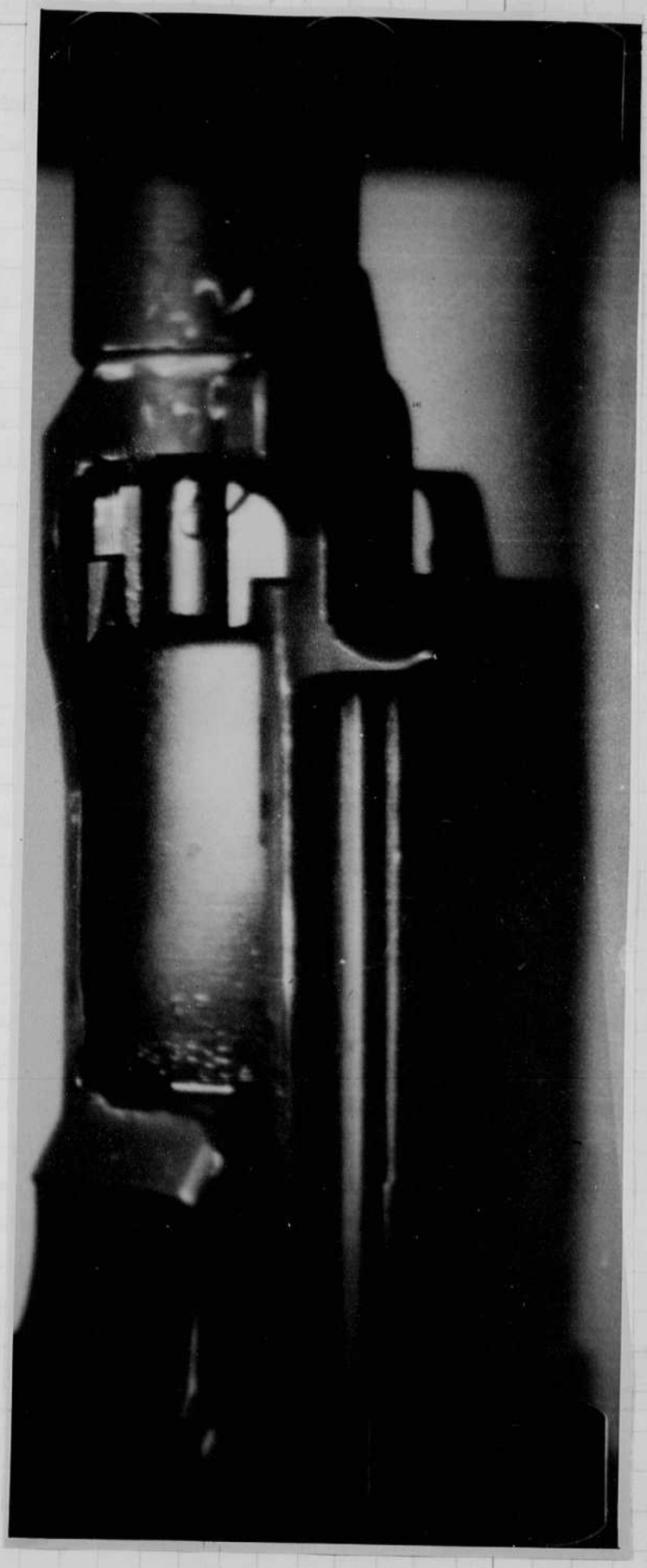
6.9
1.05 7.95 - 1.
2.30 9.20
3.30 10.2 8.10
4.3 N.2
4.2 N.1
3.9 10.8
3.5 10.4
36 10.4
3.4 10.3
3.3 10.2
10.

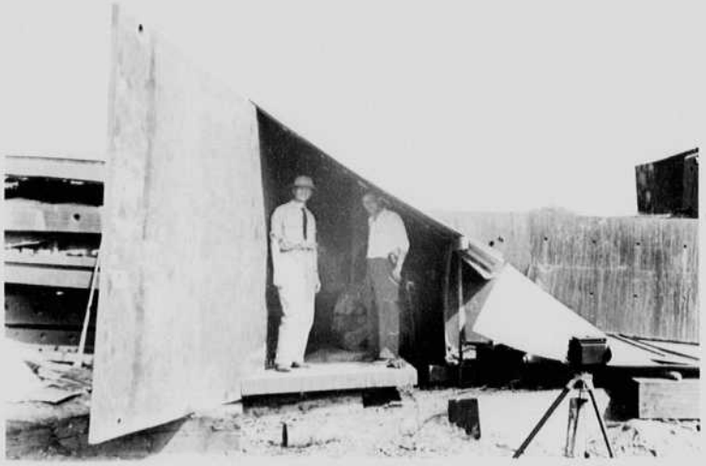
Riffolt & ?.



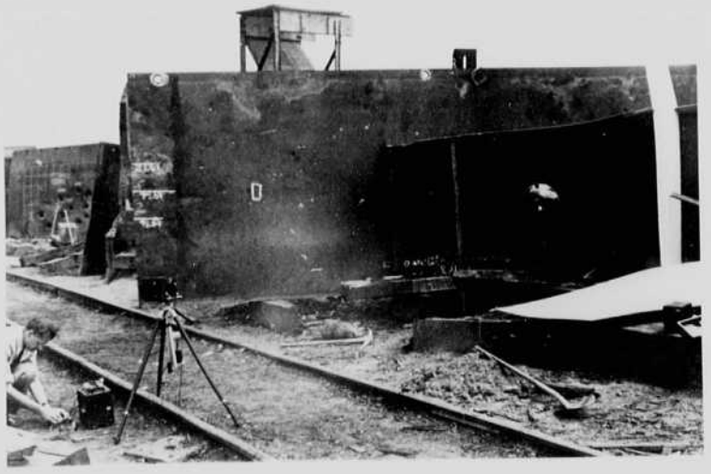
Set up for
armor plate grapby
at Dalgren Va.

Mr. Riffolt



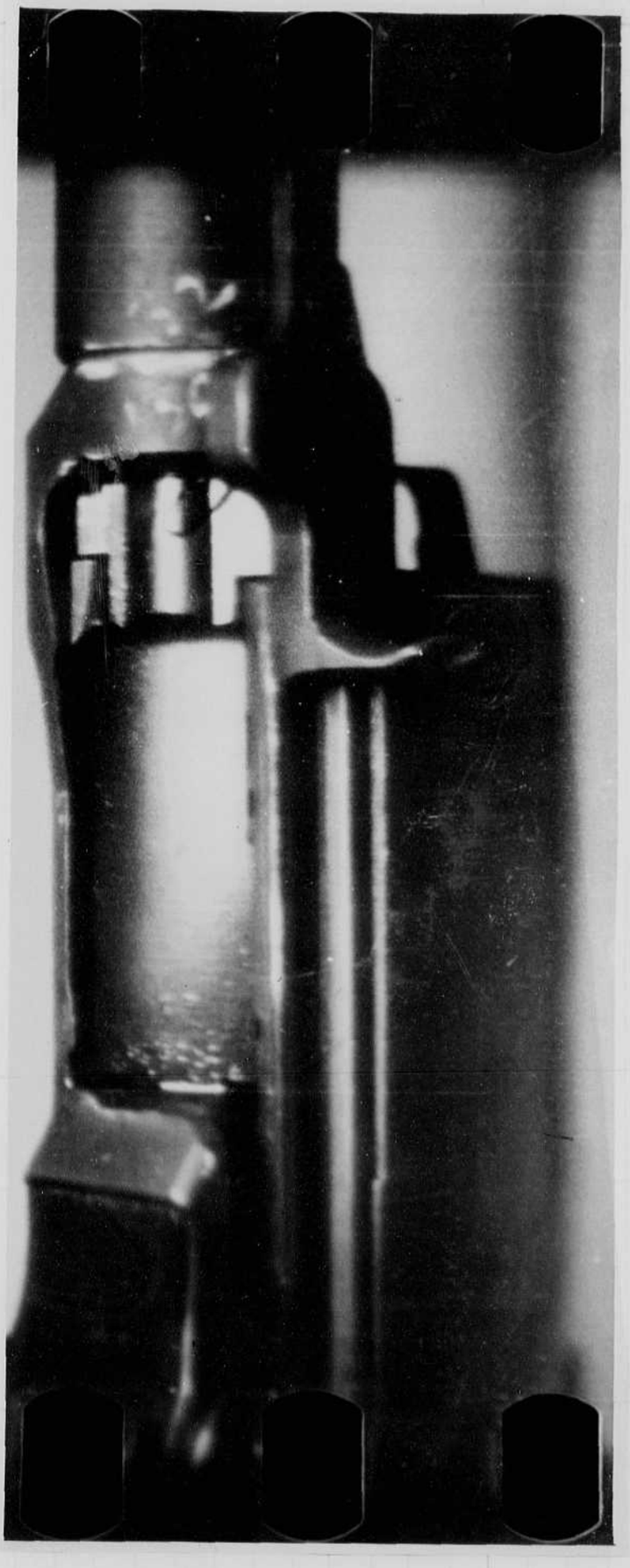


Riffolt & ?.



Set up for
aerial photography
at Dalgren Va.

Mr. Riffolt



Aug 22, 1939.
Harold E. Edgerton.

Killian and I spent several hours with Rapp and Cashman at 116 Newbury St Boston discussing book. Proposed title is

Flash!
Split-Second Seeing with Super-speed Photography.
Sight

The copy will be done this week for final check. Printed copies will be available by Oct 1 (maybe) surely by Aug. 15.

Promotion.

Eastman store display and sale of books.
A. D. Little Inc. Ind. Bul.
Gen. Radio Exp. and mail list.

Stroboscopic Display for book stores.

Photo Technic add.
U. S. Camera. "

Bjon Nili studio.

Doctors offices.
Dentists "

H. E. Edgerton.
Aug 26 1939

Loom Adjustment.

At the Nashua Co ~~one~~ two weeks ago ~~it~~ occured to me that a stroboscope might be very useful to loom fixers in adjusting the looms and also looking for trouble before it occured.

This was taken up with the Palmer of Crompton and Knowles Co and he indicated some interest.

A special stroboscope would be needed capable of a very powerful flash 2 times per second.

Timing could be arranged by an oscillator similar to that of the stroboscope. A method using a contactor would be very useful as phase would remain constant. Variable adjustment is possible by changing position of contact. Still another method of obtaining phase would be to introduce a variable delay in the electrical circuit - of which there are several well known methods.

A sound pickup might be useful to start the time delay circuit at the moment the shuttle is hit. The time delay would be adjustable covering an entire throw of the shuttle.

H. E. Edgerton.
Sept 2 1939
Amer. Viscose Corp.
Marcus Hook Pa.

Left Boston at 3.30 pm on Aug 27 - stayed that night at Westport Conn. Next morning at Deluxe Lab. (motion picture processing plant) 441 West 55 N.Y. Mr. Bertram, Mr. Grignon, Hogan, Whitmore?. Discussed stroboscopic projection 8x10 picture for use on the end of dryer.

Arrived here about 3.30 pm and set up movie apparatus on experimental spinning machine in research laboratory. Morris Kulp worked with me. Dr. C.S. Venable in charge of lab.

First series of photos taken at 600/sec. These were processed Wednesday night at the News Reel Laboratory Sansom St Philadelphia (Mr Kellman owner) by Shirley.

The pictures indicated

1 mf. argon lamp in 9" reflector back lighting 40 mm x4 and 16 mm obj. x10

1. Vibration of jet needed to be reduced.
2. Focus very important
3. More light needed
4. Faster rate of movies
5. Particles to show flow should be larger.

A new bath was built with a thin cover glass between the objective and jet the thickness was reduced to 1/2" inch of liquid. A 2" condenser lens (of 3 or 4" focal length) was used to image the lamp on the jet.

cont.

Aerosol (Chlorinated Diphenol) 1269 was used as particles. A settling method was employed to remove the large and small particles.

~~Last night~~ two movie shots were taken ~~at~~ using a .007 inch jet (The other pictures were taken with a .005 jet). 220 volts ac was used in the motion picture camera and the governor was shorted to get maximum speed.

Spark 1/8 mf. 4000 ohms.
Light 1 400&800 in parallel.

Chlorinated Diphenol
1269

#1 Viscose 40mm
not spinning.

#2 "

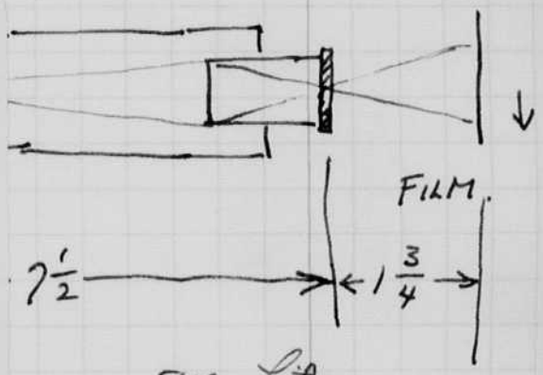
#3 Viscose spinning 40mm.

4 diff RPM. 40mm

5 Same as 4 exp 16mm

6. " .5 ex Bath.

Focus.
Lighting
Speed 3.
Particles.



8X Leitz
ocular.
Periplan ok.

morning several
- - oodel using a
ere developed
seem to be oky
is kulps has the

H. E. Edgerton.
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Amer. Viscose Corp.
Marcus Hook Pa.

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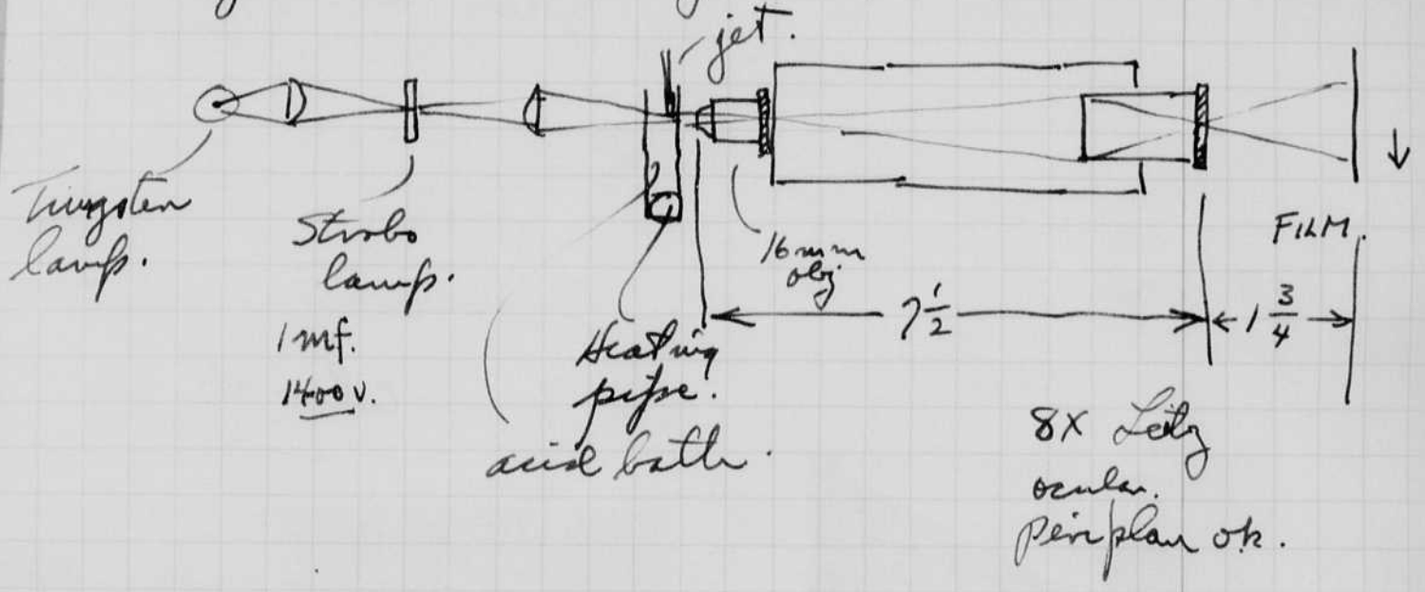
Last night two movie shots were taken at using a .007 inch jet (The other pictures were taken with a .005 jet). 220 volts ac was used on the motion picture camera and the governor was shorted to get maximum speed.

Spark 1/8 mf. 4000 ohms.
Light 1 4000&880 in parallel.



Sept. 5. — On Sat. morning several other shots were taken - some using a .007 inch jet. These were developed at Harvard today and seem to be ok although their Mr. Morris Kulp has the data on these shots.

Kodachrome negatives of
Hummingbirds taken several weeks ago.

B Series.

1. B FILM 9X12 f8 1/100 85B.
2 females.

2. Ditto. Male & Female

3. " f8 Male Female

4 " f Male Male.

16.5 Stereo

5 1. Outdoor 9X12 f8 1/100 85B.
2 females one
pair of feeder

6 2. Ditto Ann male at side.
7 3. " Male back from Feeder.
8 4. K.Y. F14 f8 Male looking away.
9 5 " f11 Male behind Female
10 6 " f8 Male Female.
Lft.

Exposure ok. one bird
out of focus
color ok.

focus. ±

two red
exp ok.

Background under exp.
more light needed

color ok.

No 1, 2, 3 f are best

3 lamps 1½ ft.
10,5 cm lens.

11 1. L.Y. Tilt f4.5.
3 females

12 2. Ditto 1 male left
f9. 2 females

13 3 Ditto. 1 male

14 4 f5.6 2 males high
1 female

15 5 f9. male at
Island left.

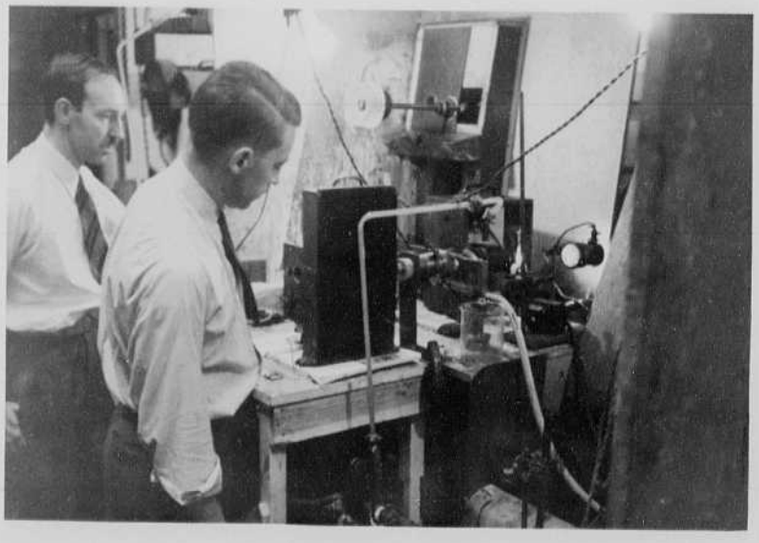
16 6 L51 f9. 2 males
1 female
2 on right.

Eyes and color ok.

Dark. but ok.

V

Yellow.



Sanford Moss

Maurice Kulp.
American Viscose Corp.
Marcus Hook Pa.
Sept. 1, 1939.

Lindsey Dexter.

Kodachrome negatives of
Hummingbirds taken several weeks ago.

5

6
7
8
9
10

color. ch.

Nos 1, 2, 3 & are best

11

12

13

14

15

16

Exp and color ok.

Dark. but ok.

V

yellow.

Sanford
Mass

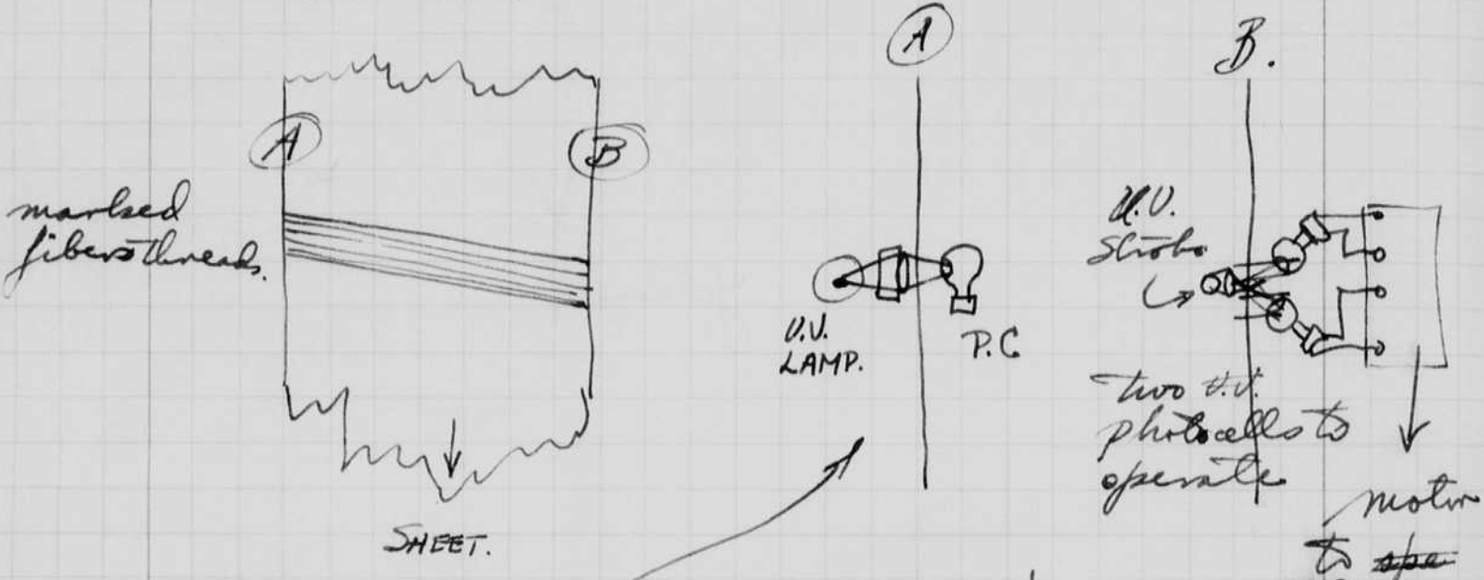
Maurice Kulp.
American Viscose Corp.
Marcus Hook Pa.
Sept. 1, 1939.

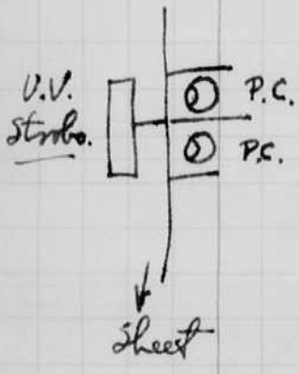
Lindsey Dexter.

H. E. Edgerton
Sept. 5, 1939

Sheet straighting method (p 39). (p 32)

Called Mr. Drew of the Plymouth Cordage Co today about ultraviolet dye for marking sheets. Also talked to B. Parsons about the use of dyed yarn on a spindle - say one in 10 - to show the way the sheet was stretched or warped. Another method would be to mark the sheets with a stamp on the loom.





An ultraviolet lamp gives photocell an indication when the threads come into field of view.

Output is amplified and used to trip an ultraviolet stroboscope lamp. The band of dyed threads can then be seen by eye or a double photocell method could be used to operate a motor.

Mr. Mickelly is going to bring in a sample of cloth tomorrow so that we can see it with a strobscope to determine time lag of glow in dye.

K.E. Elgarten
Sept 8 1939.

A piece of cloth with dye on it was put on a wheel and run at several thousand R.P.M. The pattern as observed by a 60 cycle U.V. lamp ~~was~~ indicated that the time lag of the dye material was not greater than ~~any~~ 1/120 sec or possibly 1/500 sec.

Sept. 9, 1939. #4 obj #3 oc #7 Leitz microscope.

1-D Muscle fiber complete and attached at both ends.
Direct Stim. Slight bujaw.

2. Stim through nerve.

3. No polarizing filters.

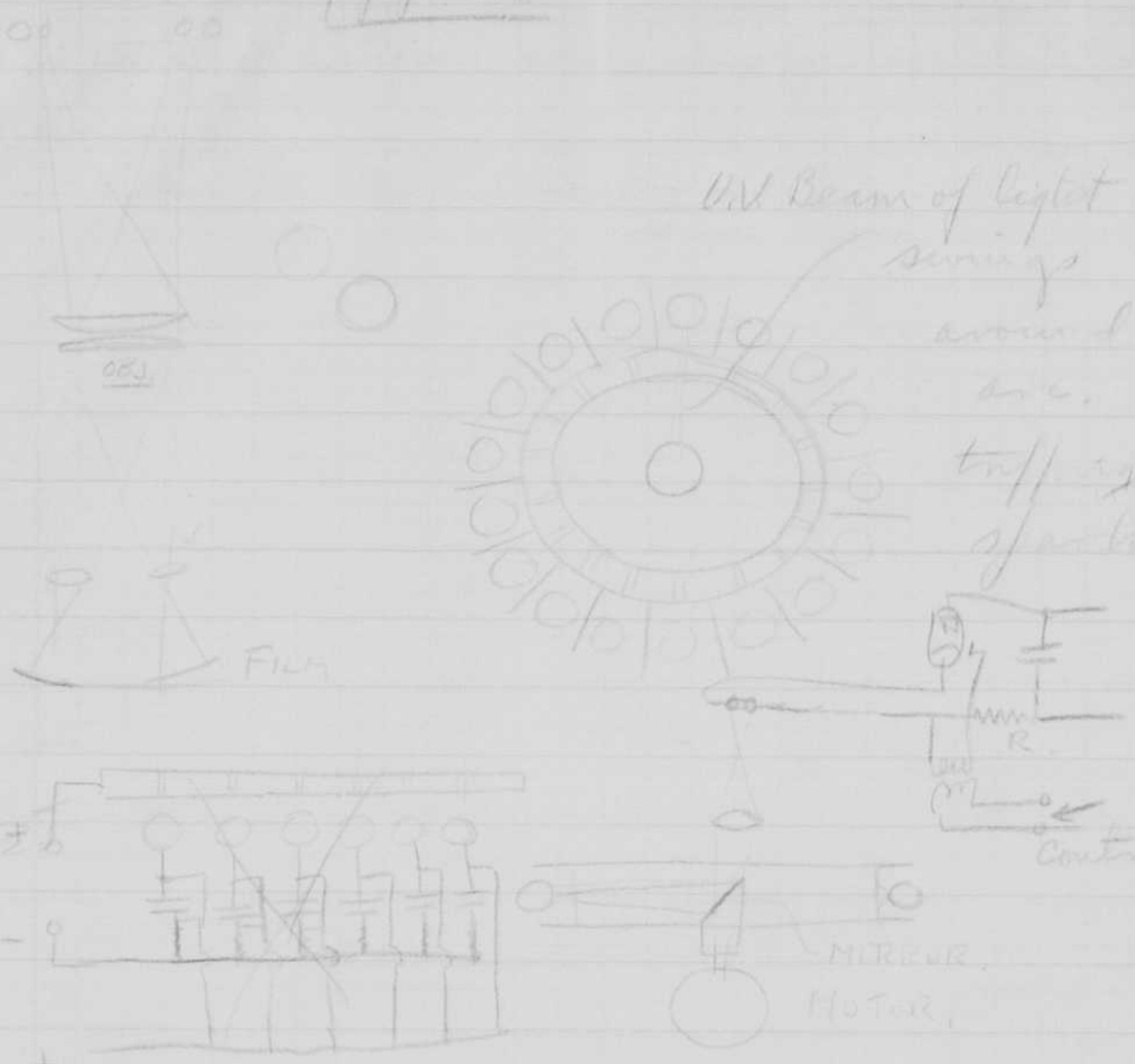
4. Same as 2.

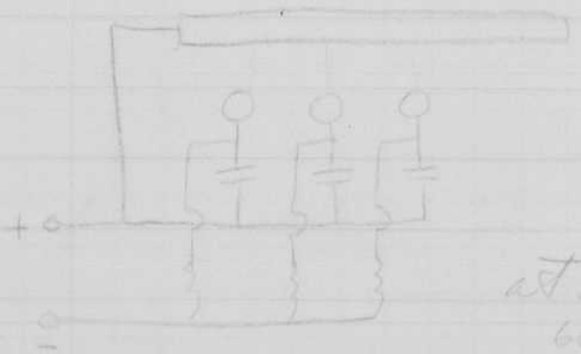
5. Direct Stim.

6. " "

Same fiber 2-6 incl.

Ring of Lights





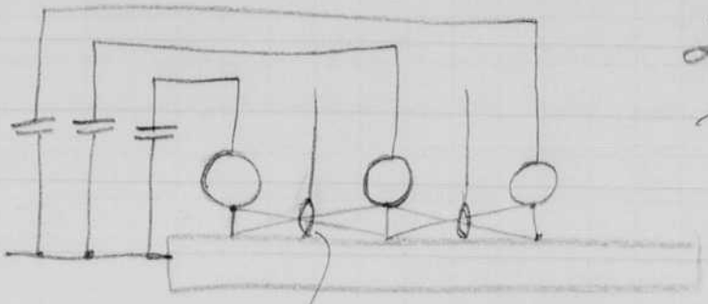
3" circle 1/4" apart.

$\frac{3 \times \pi \times 4}{\frac{1}{4}} = 37.7$

say 36 sparks around circle

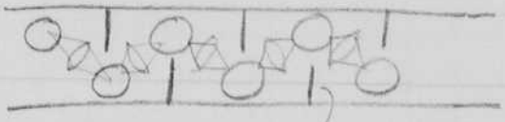
at 3600 r.p.m.
60 r.p.s.
or 1 rev in 1/60 sec. $60 \times 36 = 2160$ p.s.
$10 \times 60 = 600$ p.s.

600 r.p.s. — 21,600 pts/sec.



Zigzag the gaps slightly so that the light from one to the next will not trip the third.

lens to focus first spark on second to trip it. Time delay in gap after light strikes it >



light barriers.

300 cm.

3×10^8 cm/sec.

Trip first spark with third electrode or by light from another gap or by series control tube.

These were discussed with Barton on Sept. 12, 1939

AB

Thursday Sept 21 1939
Harold E Edgerton.

Thursday sept 14 and Friday I worked with Trimmer on the oscillograph and pickup unit for use at the L St station on the high pressure unit

This was taken to the Edison Station on Saturday with Mr. Julian of Jackson and Moreland and Mr. Knowles of the Westinghouse Co.

Some 70 or 80 oscillograms were taken of both horizontal and vertical vibration of the machine and foundation. The records were developed that night and studied the next day.

Also on the next day I went into the air cooler compartment with Mr. Julian and Mr. Bascome (?) (W) There were some indications of violent oscillations such as loose bolts and clamps.

Data sheets for oscillograms on pages 50 and 51.

Mr. Feicht from Wright field was here on monday and tuesday (18, 19) and we discussed high-speed lights for use on an airplane for night photography. A week or two ago Major Goddard was here for a short time and discussed the same problem. An attempt is to be made to get a program started for this work at M.I.T. Dean Moreland discussed this aspect of the problem

I spent yesterday in New Haven delivering a single flash high-speed light unit to the Winchester Co for the photography of bullets. Mr. Robinson Mr. Bellmore in Lab. Mr. Boak.

Tests with high energy.

4

1	3 ft tube.		f 11
2.	"		f 22
3.	3 ft.	with.	f 8
4	"	without.	f 8.
5	3 ft x 1"		f 8
6	"		f 16.
7	#75 Photoflash		f 8
8	"		f 16
9	2" tube 1 ft.		f 8
10	"		16
11	Small U. Lamp.		f 8

2000 volts.
100 mf.
Kr-Xe lamps.

Sept. 11, 1939
[illegible] Jones Herb.

Form 308
32M-3-15-39
J & M

JACKSON & MORELAND
ENGINEERS
BOSTON NEW YORK

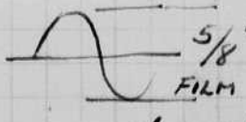
PREPARED DATE
CHECKED DATE
RECORD NO.

REEL NO 2.

FILM No	STAT. No	R.			
9840	42	✓	.1	V	Repeat Ex. center
9841.	43	✓	.1	V	perfect wave. Ex Bear.
9842	44	✓	.1	H.	
43	45	✓	.1		
44	46	✓	.1		
45	47	✓	.1		
46	48	✓	.1		Ex end floor on Beam South
315. 47	49	✓	.1	V	" " " " center
48	4	3H ✓	.1	V	Large Vib element was
49	5	✓	.1		upside down for
50 BLANK	6	✓	.1		the prev. readings
51	7	✓	.1		of these. ✓
52	8	✓	.1		
53	9	✓	.1		Large vib!
54	23.	✓	.1		
55	10	✓	.1		Large Check readings.
56	11	✓	.1		
57	12	✓	.1		
58 BLANK	~~24~~ 27	✓	.1		
59	~~25~~ 28	✓	.1		
60	~~26~~ 29	✓	.1		
61	~~27~~ 24	✓	.1		
62	~~28~~ 25	✓	.1		
345 63	~~29~~ 26	✓	.1		
64	13	✓	.1		
65	14	✓	.1		
66	15	✓	.1		
67 BLANK.	3	✓	.1		Small amp. Basement.
68	1	✓	.1		" " " South
69	50	✓	.1	H	nose south peaked wave.
70	50 51	✓	.1		56
71	51 44	✓	.1		
72	44 45	✓	.1		nose east.
73 74	45 46	✓	.1		Jumping bearing.
74	46 47	✓	.1		Large amp " East Beam
75	47 48	✓	.1		
76	48 49	✓	.1		
77 end	49				6 ft end.

H 9878 Calib-at M.I.T. .075" Double ampl. 50. H 2000 rpm

9879 " " " " " " " V. 1800 "



with A at .1 5/8" = .0015 INCHES.

Notebook # 10

Filming and Separation Record

____ unmounted photograph(s)

____ negative strip(s)

5 unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located between page 50 and 51.

Item(s) now housed in accompanying folder.

Form 308
32M-3-15-39
J & M

JACKSON & MORELAND
ENGINEERS
BOSTON NEW YORK

PREPARED DATE
CHECKED DATE
RECORD NO.

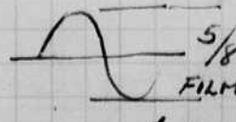
REEL NO 2.

FILM No	STAT. No	R.		
9840	42	.1	V	Repeat Ex center
9841	43	.1	V	peaked wave. Ex Bear.
9842	44	.1	H.	
43	45	.1		
44	46	.1		
45	47	.1		
46	48	.1		Ex end floor on Bomb South
315. 47	49	.1	V	" " " center
48	4 3#	.1	V	Large Vib element was
49	5	.1		" upside down for
50 BLANK	6	.1		the prev. readings
51	7	.1		of these.
52	8	.1		
53	9	.1		Large vib!
54	23.	.1		
55	10	.1		Large Check readings.
56	11	.1		
57	12	.1		
58 BLANK	~~24~~ 27	.1		
59	~~25~~ 28	.1		
60	~~26~~ 29	.1		
61	~~27~~ 24	.1		
62	~~28~~ 25	.1		
345 63	~~29~~ 26	.1		
64	13	.1		
65	14	.1		
66	15	.1		
67 BLANK.	3	.1		Small amp. Basement.
68	1	.1		" " " South
69	50	.1	H	nose south peaked wave.
70	5~~0~~ 51	.1		56
71	5~~1~~ 44	.1		
72	4~~4~~ 45	.1		nose east.
73 74	4~~5~~ 46	.1		Jumping bearing.
74	4~~6~~ 47	.1		Large amp " East Den
75	4~~7~~ 48	.1		
76	4~~8~~ 49	.1		
77 end	49			

6# end.

9878 Calib at M.I.T. .075" Double ampl. 50. H 2000 rpm

9879 " " " " " " " V. 1800 "



with A at .1 5/8" = .0015 INCHES.

Notebook # 10

Filming and Separation Record

____ unmounted photograph(s)

____ negative strip(s)

5 unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located between page 50 and 51.

Item(s) now housed in accompanying folder.

Vertical Limit #2

~~9769~~ 2500 rpm Att. 10 .26 .35
9770 (2') Med. Light 25 ½ sec
9771 (2') High Light Att. 5 .26 .94
9772 (2') " " Att. 20 .26 .12
Horiz. Limit #1
9773 (5') 2110 KPM Att. 10 .26 .32
9774 (2') ← High Light (Med Light Att. 20) 25 ½ sec
9775 (2') Low Light Att 5 .86 .85

9739 Probably forged
9740 (1') Att. 10 #1 reads 0.3 #2 0.48 .010" drill 2500 rpm
9741 (2½') Med. Light Intensity
9742 (1') High Light Intensity
9743 (1') Low Light Intensity
9744 (1') Att. 20 Med. Light

5 P.M. 9/16/39

9880 { Double Amp: .075" Att. 50 2000 rpm High Light Horizontal #1
9881 { Double Amp. .075" Vertical #2 High Light Att. 30 1800 rpm

21

Thursday pickups and clamps.

1mm = 1.049 mills double dn

FT.
18

1	slight beg .2 mils	
11	1.8 "	Base of phase
10	2.5 "	in
12	1.3 "	"
5	1.8 "	"
4	2.4 "	"
6	—	
3	—	
14	1.5	"
13	.7 ?	"
15	2.1	"
8	1.4	"
7	1.5 ?	"
9	2.4	"
34	.3 ?	"
33	1.5	180
40	.8	90
31	1.0	in phase
44	1.1	
32	.7	90°
47	.3	
42	1.0	
47	1.2	

36	1.3	135
36	1.9	135
38	1.3	180
39	1.5	90
37	.8	?
48	.3	
30	1.7	
23	1.7	
22	.6	
21	1.2	
50.	.6	45
51.	1.1	45

FT.
18

Form 308
32M-3-15-39
J & M

JACKSON & MORELAND
ENGINEERS
BOSTON NEW YORK

PREPARED BEE DATE SEPT 1939.
CHECKED DATE
RECORD NO.

TIME	FILM NO.	STAT NO.	A.		FT.
			Reel No 1.		
11.30±	9796	1 BLANK.	0.1		18
↓	9797 →	2 ↓	0.2		
	9798	3 BLANK	0.1		
	9799	4 ↓ ↑	.1	} small South Beam.	
	9800	5 ↓	.1		
	9801	6 ↓ NG.	.1		
	2	7 ↓	.1	} North Beam	
	3	8 ↓ ↓	.1		
	4	9 ↓	.1 ↓		
	5	10 ↓	.2	}	
	6	11 BLANK.	.2		
	7	12 ↓	.2		
	08	13 ↓	.1		
	09	14 ↓	.1		
	9810	15 ↓	.2 ↓		
	11	16 ↓	.1	moved to top deck	
	12	17 ↓	.1		
	13	18 } B	.2		
	14	19 } ↓	.2] — ?	Repeat. ?	
1.30	15	20 ↓	.2	Horiz.	
2.30 pm	16	21	.1	Horiz. Vert.	LAMH.
	17	22	.1		
	18	23	.1		
	19	24	.2	small vibration.	
	9820	25	.2	sine wave.	
	21	26 B.	.2	" "	
	22	27 ↓	.2	" "	
	23	28 B	.2		
	24	29	.2		
2.50	9825	30 ↓	.2	Horiz.	Complicated wave. 82
	26	31	.1	VERT.	turbine and
	27	32	.1		" Bearing
	28	33	.1		
	29	34	.1		
	30	35	.2		}
	31	36	.2		
	32	37	.2		
	33	38	.2		
	34	39	.2		Sine wave.
	35	40	.2		
	36	41 ↓	.2		Large end of exciter.
	37 →	42 MISSING.	.2		side of exciter.
	38	43		↓	
		44			

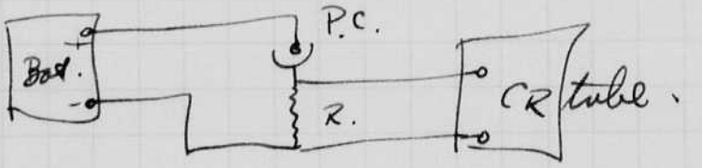
End of film.

Sept 23 1939
Harold E. Edgerton.

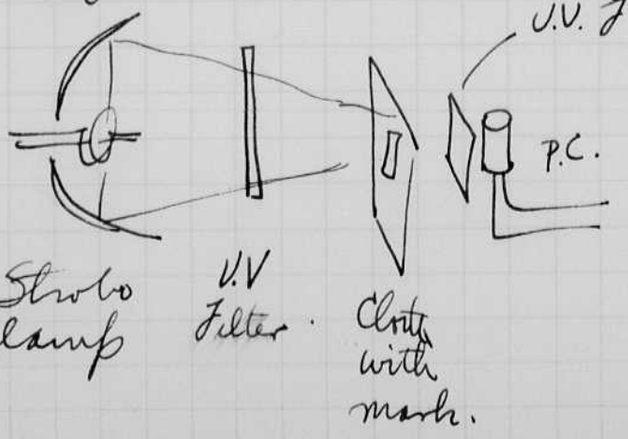
Just finished experiments with stroboscope using ultra-violet filter. A 648 type stroboscope tube puts out enough U.V. to show up the blue dye on the sample cloth recently supplied by the Plymouth Cordage Co. A quartz lamp was also used.

Cloth with the dye mark was put on a disc and run at 1800 r.p.m. the pattern stood out clear and sharp.

A photo cell was connected to pickup the light. Load resistor 250,000 and 125 000 ohms.



The cloth was put between the p.c. and light and moved back and forth over the dyed spot. A slight difference in signal was observed. Apparently enough U.V. or Red comes through to affect the photo cell. I need a filter between the cloth to cut out the U.V. so that only the visible glow goes through.



Sept 30 1939.
Harold E. Edgerton

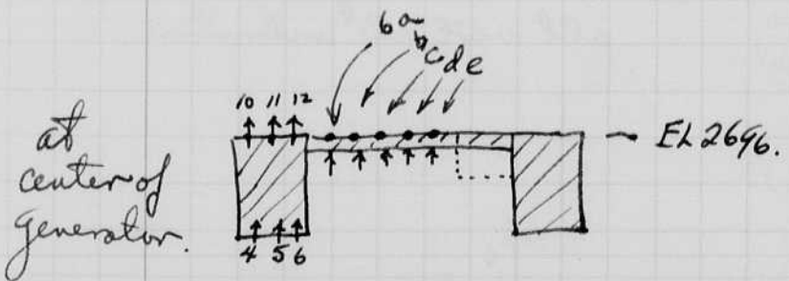
Spent yesterday afternoon with Mr. Julian of the Jackson & Moreland Co at the "L" St Station in Boston measuring the vibration of the foundation of the generator at the south end of the plant.

A piezo-electric crystal phonograph pickup was mounted inside of a tube of steel formed by welding two L sections together. The output from this was amplified in a 3" R.C.A. Cathode ray oscillograph. The sweep circuit was adjusted for 60 cycles and locked in to step with the 60 cycle output from the generator.

Photos were taken of the end of the tube with a universal motion picture camera – one picture for each wave.

A number and attenuator setting was marked in crayon on the tube jack. Full gain of the amplifier was 10. Many of the records were taken with a 2.5 setting of the knobs. The accuracy of adjustment was probably 10%.

Data concerning stations was marked on ~~the pedestal~~ foundation drawing (isometric).



at center of Generator.

these readings indicate that the beams and floor vibrate together. the amplitudes of 6 a-b-c-de are less than 4, 5, 6. #4 is the greatest in amplitude.

cont.

A series of oscillograms numbered I H and I V were made on the south wall of the foundation around the opening at the bottom (generator end). I H were for horizontal while I-V were for vertical motions.

Series 103 - 115 were for the top opening, just above. Both vertical and horizontal readings were made. One (horizontal?) was made all under the number 103.

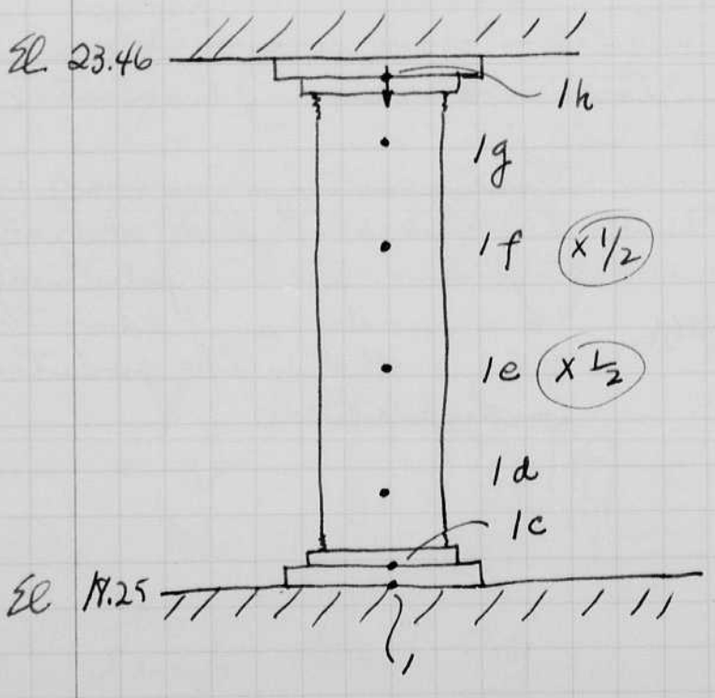
119 Corner Horizontal

120 Wall at plaster Elevation 31.' ± 6"

121 " between Pilasters.

122-127 Platform El 26.96 122 (turb) 127 (RR platform).

A series 1a to 1 h inclusive were made in and around the large pipe in the opening at the bottom. This pipe was put in to stop the vibration but it did not help.



Note change in sensitivity of 1e and 1f.

These readings were all vertical vibration.

Notebook # 10

Filming and Separation Record

____ unmounted photograph(s)

5? negative strip(s) inside envelope mounted on page 55

____ unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located ~~between~~ on page 55 and —.

Item(s) now housed in accompanying folder.

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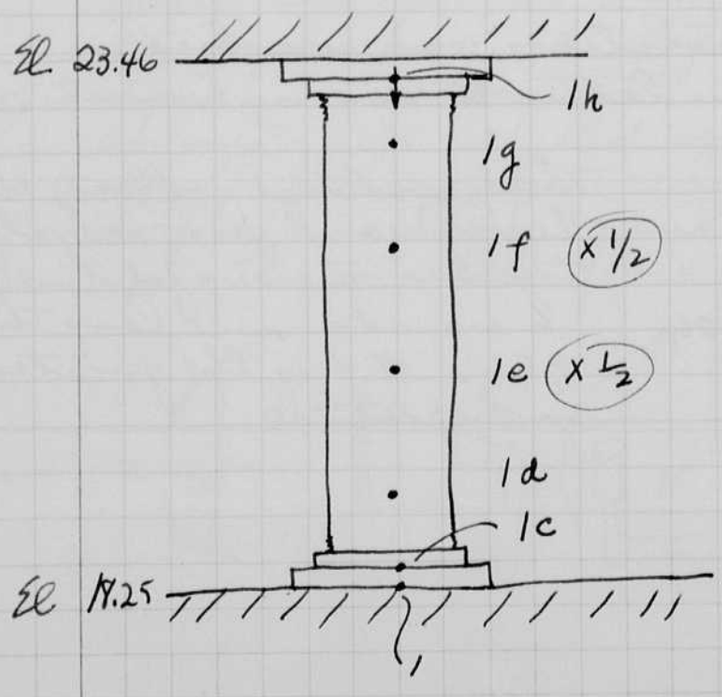

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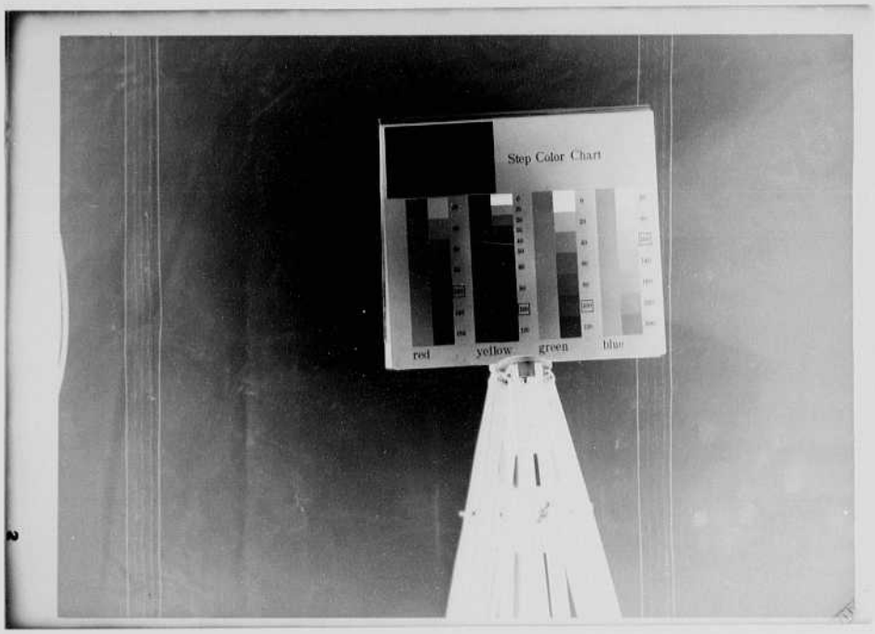
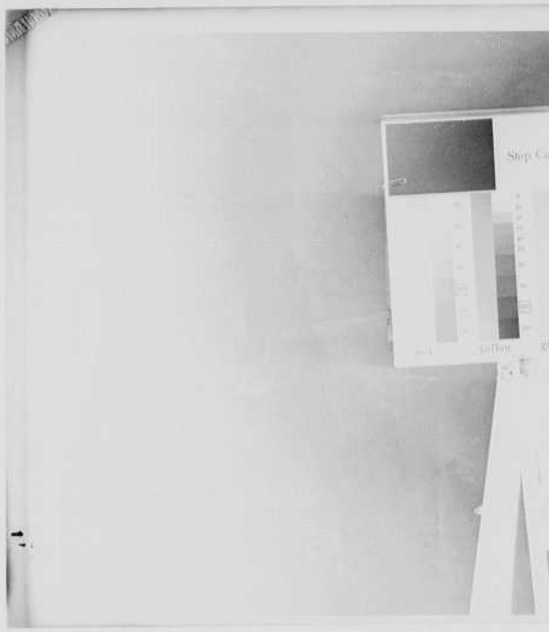
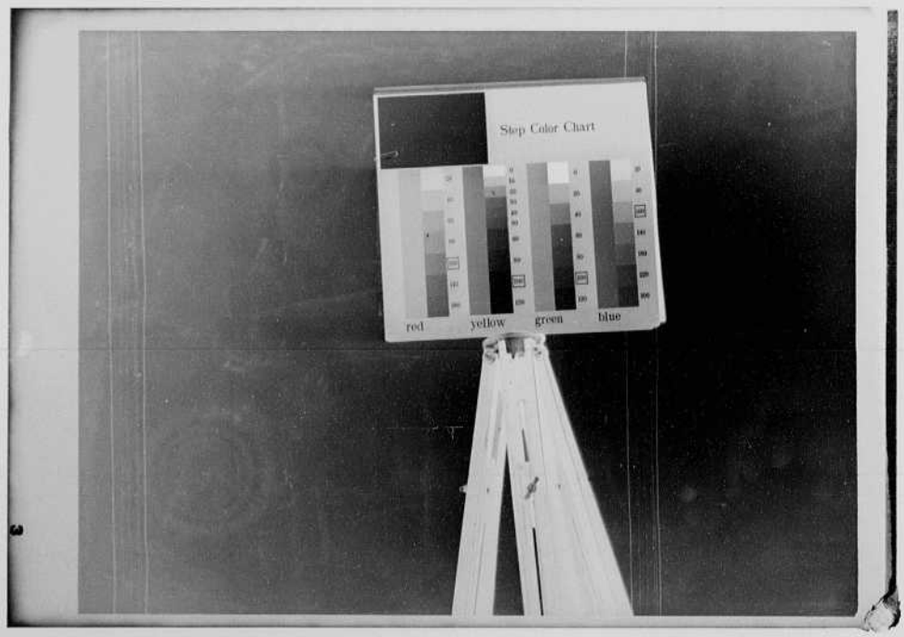
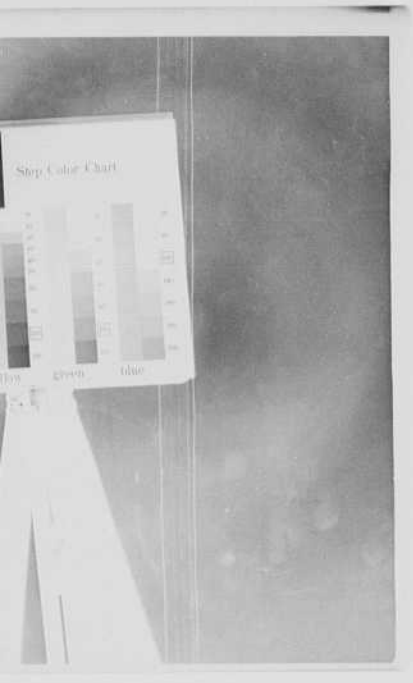
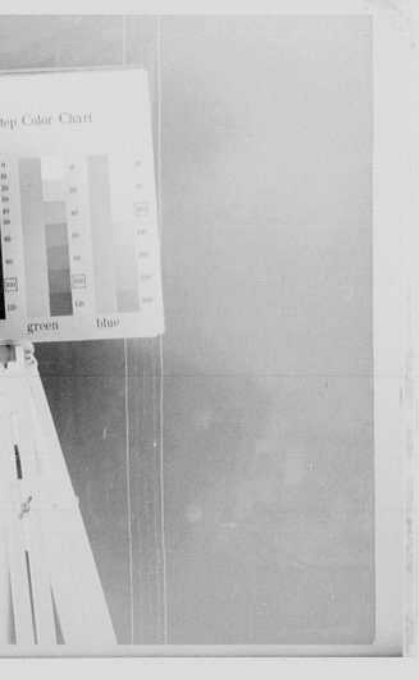

Step Color Chart
red
yellow
green
blue




Step Color Chart
red
yellow
green
blue


red
yellow


Step Color Chart
green
blue


green
blue

Sept 30 1939
J. H. Edgerton.

Exposure tests with Spark machine from Owens Illinois Glass Co. (1936 model).

3 mf 16000 volts. open gap. ↑

Test object Agfa color chart against white background.

#1. 4 mf 3000 volts argon spiral lamps. f16 xx Sup

#2. 3 mf. 16000 volts. open sparks. f16 xx ..

#3. 28 mf 3000 .. argon straight lamps. 22 ..

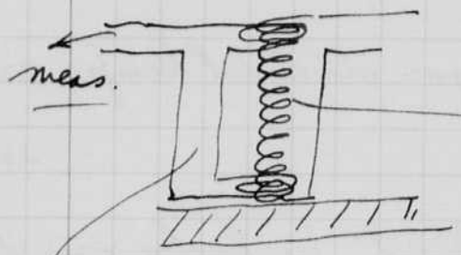
#4. 3 mf 16000 .. 22 ..

#5 1/200 sec f22. Room light for background.

Oct 9 1939
Harold E. Edgerton.

Method of measuring thickness of iron sheet or plate.

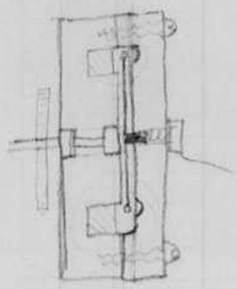
A surge of current through a magnetizing coil on the surface will saturate the iron. A pickup coil will indicate the change of flux.

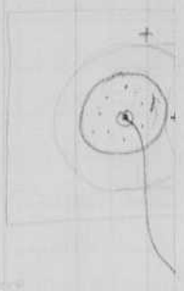


two coils that bucks. they measure the difference in flux between the two ends of the mag. coil.

This was discussed with K.J.B.

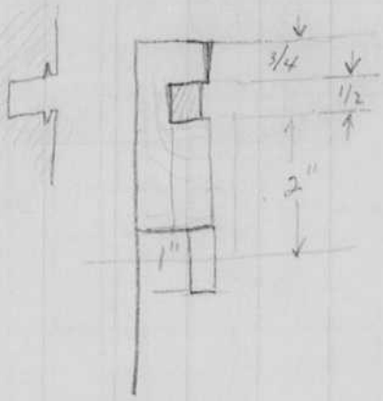
Homopolar Generator. Belt type.
with brushes at axis.



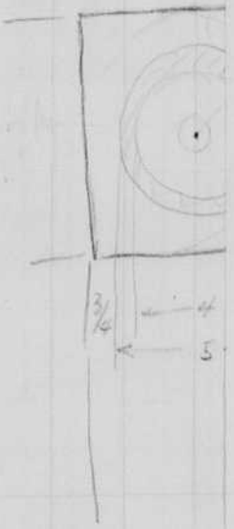


60
$2\pi 5$

$e = Blv$
$= 1.5 \times 600\pi \times 10^{-4} = .94$ volt.
$\frac{2}{1.88}$



$\frac{1}{2} \times \pi \times 5 = 7.8$
50



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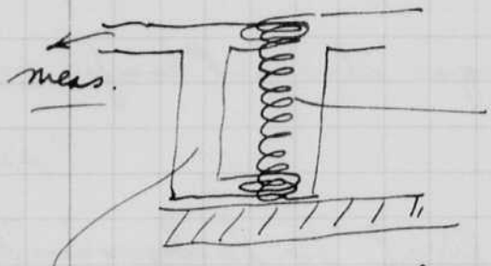

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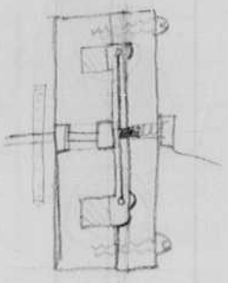
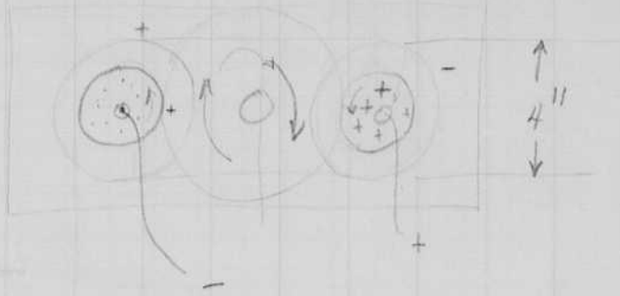
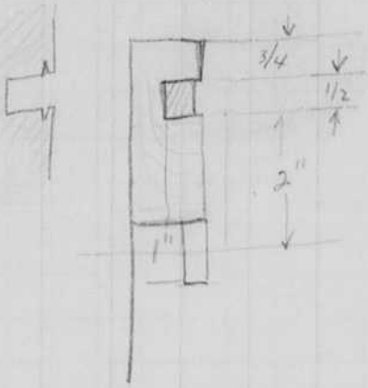




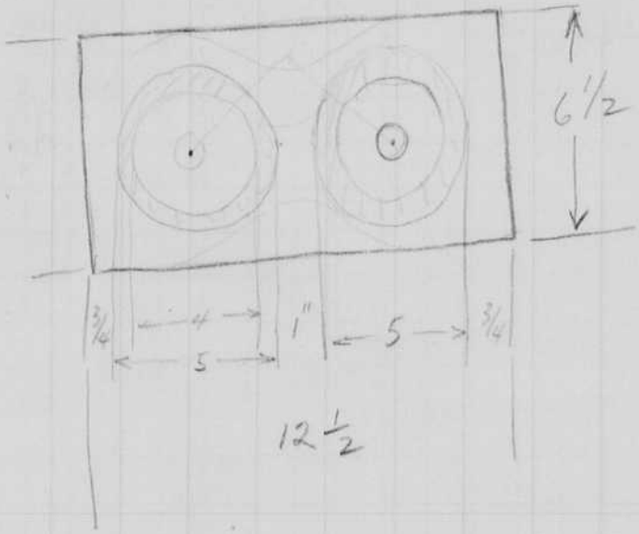
60
$2\pi 5 \times$

$e = Blv$
$= 1. \; 5 \times 600\pi = .94 \text{ volt.}$
$\times 10^{-4}$
$\frac{2}{1.88}$

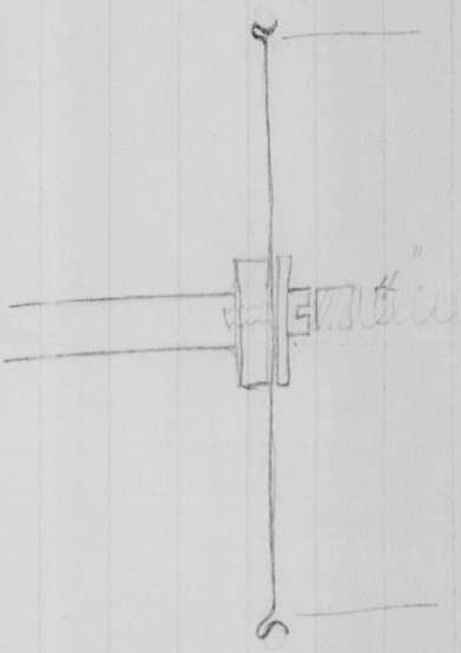
$25\pi = 78.5 \text{ ergs/cm.}$
$\frac{}{75 \text{ ergs/cm.}}$



$\frac{1}{2} \times \pi \times 5 = 7.8 \text{ ergs/in}$
50.5 ergs/in



$12\frac{1}{2}$

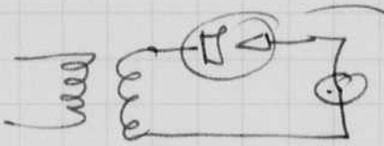


Short circuit test of Raytheon trans. U4576

Secondary Shorted.

V = 80
I = 6 amps.

Secondary Shorted.
Rectifier tube in circuit



1616

V = 115
I = 6.7 amp.

BLOW HERE.

Crack started before blow.

Wave set up by release of chip.

Polarized light photo.

H. E. Edgerton
Oct. 13, 1939.

I have had several discussions with a graduate student, Mr Magnusson, concerning the pulling-into-step problem. The angle switching scheme involving a pulse of current in a coil adjacent to a metal part on the rotor was explained to Mr. Magnusson.

Mr. Tiselius came in Wed Oct 11 concerning a thesis. We discussed accelerometers at length. He was given a list of theses at M.I.T. to investigate. These were

Silvey 1939
Nied & Summerfield 1938
Corson
Silbert
Byrne & Mason.

I am now writing a brief paper describing the disc armature type of generator with Mr. Silvey. Also this generator is being mounted in the laboratory on a 1200 r.p.m. motor-wound rotor West. induction motor. I plan to take oscillograms of the acceleration of the motor.

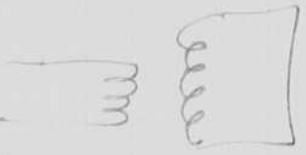
One of the objections to a homopolor generator is the fact that a brush must be put where there is considerable velocity. Difficulties are experienced with vibration and high brush drop.

For the purposes of an accelerometer it is not necessary to carry much current and variable brush drop is very serious.

It might be possible to use a flame as a brush to connect from a disc to a grid of a tube.

Short circuit test of Raytheon trans. 04576

Secondary Shorted.



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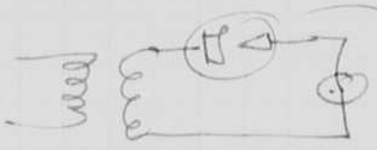
1616



V = 115
I = 6.7 amps.

BLOW HERE.

crack started before blow.

Wave set up by release of chip.

Polarized light photo.

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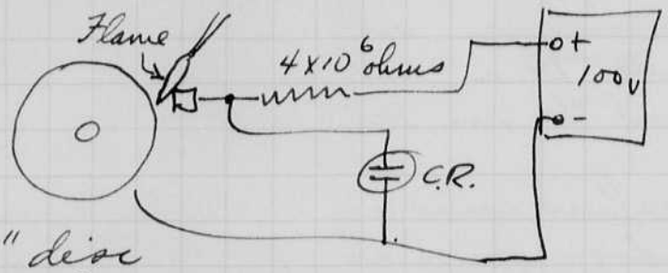
It might be possible to use a flame as a brush to connect from a disc to a grid of a tube.

Oct 14 1931
Harold E Edgerton.

I tried to use a flame as a brush last night. The experiment



4" disc
rotated
at 2000 r.p.m.

a deflection of about 10 volts was obtained. This was very unsteady indicating turbulance in the gas.

$$\text{current} = \frac{E}{R} = \frac{10}{4\times10^6} = 2.5 \text{ microamps}.$$

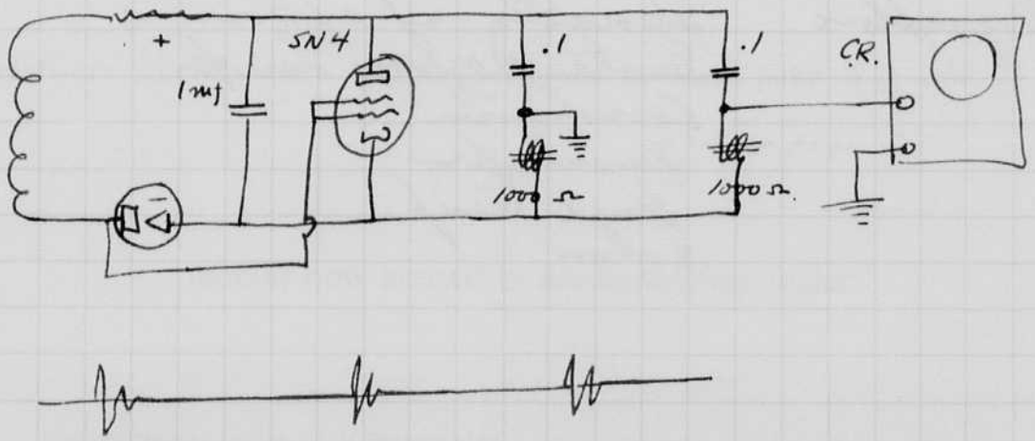
Several weeks ago Mr. Dowell was here with a proposal to study the boundary layer of air around different types of air foils. He indicated that a ~~micro~~ strobe would be necessary for the experiment.

It would be possibly easier to move the air foil than ~~to~~ to move the air. A stroboscope flash could be used to flash the light at the time when the foil was in front of the camera. A slight draft could be used to move the air past the foil so that fresh filament of smoke would be presented.

Yesterday I met Mr. Bilhuber, Paul H. and Mr. Steinway at the General Radio Co in Wilkins office. Mr. Gilman was there. They want to study the strings of a piano. A cut away piano will be sent to M.I.T. so that we can take motion pictures of the action.

We discussed multiflash photography using a moving film. Also single flash photography timed accurately with a time delay circuit. (or by moving the microphone) as used in Bullet photography.

Transient Bridge.



A piece of iron near one of the coils would give a voltage of about 50 volts peak.

This is the circuit proposed for use in the angle switching circuit.

Mr. Andrews is testing FG-32 tubes for a motion-picture rectifier circuit. 6 tubes are used in a 3 phase double circuit rectifier.

Oct. 17, 1939
H. E. Edgerton.

Mr. Tyler is testing films to be used with argon lamps for high-speed movies. He took a few trial exposures last week using a sensitometric unit which is going to the Eastman Kodak Co.

Variables to investigate.

Electrical - Voltage
Capacity
Time of flash (series leads).
in tube. { Gas pressure
tube diameter
type of gas.

Photographic Density of exposure
Distance from lamp.
Emulsion
Developer
Time temp.
color.

Notebook # 10

Filming and Separation Record

____ unmounted photograph(s)

2? negative strip(s) 1? inside envelope mounted on page 62
1? inside envelope mounted on page 63

____ unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located ~~between~~ on page 62 and ____.
and on page 63

Item(s) now housed in accompanying folder.

Oct. 17, 1939
H. E. Edgerton.

Mr. Tyler is testing films to be used with argon lamps for high-speed movies. He took a few trial exposures last week using a sensitometric unit which is going to the Eastman Kodak Co.

Variables to investigate.

Electrical — Voltage
Capacity
Time of flash (series leads).
in tube. { Gas pressure
tube diameter
type of gas.

Photographic — Density of exposure
Distance from lamp.
Emulsion
Developer
Time temp.
color.

Notebook # 10

Filming and Separation Record

____ unmounted photograph(s)

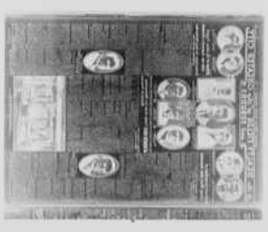
2? negative strip(s) 1? inside envelope mounted on page 62
1? inside envelope mounted on page 63

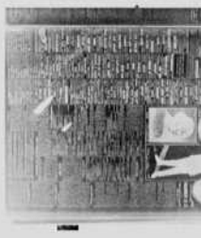
____ unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located ~~between~~ on page 62 and ____.
and on page 63

Item(s) now housed in accompanying folder.

EASTMAN 1





Oct 24 1939.
Bldg.

I spent ~~Friday~~ Oct. 20 in Rochester with Clifton ~~Ford~~ Tuttle installing an adjustable flash unit for sensitometric meas. of film and for a two light unit for photography.

The latter was set-up in Bldg 11 Basement (Mr. Joos?) for microfilm work. a sample looked ok. 2 lamps 6' away (or less). 48 mf 2000 volts. See below in envelope.

a photoelectric exposure meter is needed for flash photography.

$$E = \int_0^{\infty} i\,dt$$

Experiment with time of flash using an inductance (vanometer).

I talked to Ford Tuttle's class at Rochester Uni. in evening. Saw Prof O'Brian.

I_f	E	Speed 1200
.249	1.16	
.5	1.8	
.846	2.90	
.592	2.24	
1.17	3.9	
1.97	6.35	
3.22	8.7	
4.66	9.96	
3.05	8.75	
1.82	6.35	
1.19	4.40	
1.17	3.92	
4.95	10.25	
1.17	11.4.	
3.19	9.0	
4.30	10.0	
5.0	10.55.	

mag. curve of generator.

Mag curve of D.C. Generator built last year by Mr. Silvey.

Mr. Frank Wyle at Book Fair Oct 1939. Boston Garden.

The fan was running when the photo was taken.

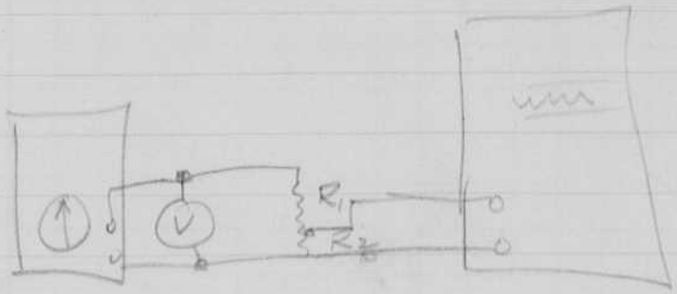
Bantam f 16.

Data for oscillograms

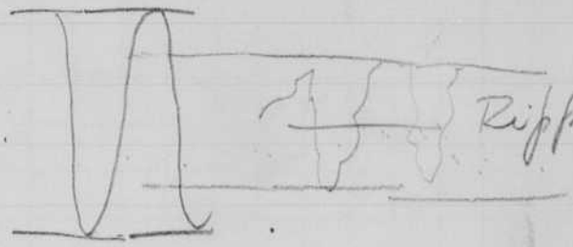
Oct 29 1939.

$C \frac{de}{dx} = \frac{.05}{10} = .005$ farads.

5000×10^{-6}



Von C.R. $5 \times \frac{10}{1000} = .05$ volts.



1200 rpm 10 volts dc.

$\text{ripple} = \frac{.025}{10} = .0025$

Calibration of osc vibrator

# 4. I (ma)	f	Def (P to P).	#5 I (ma)	f ~	Def cm
15.3	200 ~	1.8 cm	16.0	60 ~	3 cm
18.0	100 ~	2.1 cm	18.0	120 ~	2.9 cm
16.8	60 ~	2.0 cm	18.8	200 ~	2.3 "
18.0	200 ~	2.1 cm	19.4	500 ~	1.2 cm
18.4	500 ~	1.95 "	19.6	1000 ~	.7 cm
18.6	700 ~	1.8 "	19.6	2000 ~	.35 cm
18.4	900 ~	1.7 "			
18.4	1100 ~	1.4 cm			
18.4	2000 ~	.9 "			

I_f	E	Speed 1200
.249	1.16	
.5	1.8	
.846	2.90	
.592	2.24	
1.17	3.9	
1.91	6.35	
2.42	8.1	
2.66	9.96	
2.05	8.75	
1.82	6.35	
1.19	4.40	
1.0	3.92	
4.9	10.2	
4.7	11.4	
3.16	9.0	
4.30	10.0	
5.0	10.55	

mag. curve of generator.

Mag curve of D.C. Generator built last year by Mr. Silvey.

Silvey.

Mr. Frank Hoyle at Book Fair Oct 1939. Boston Garden.

The fan was running when the photo was taken.

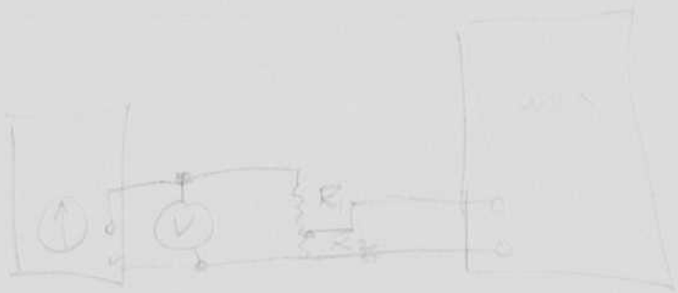
Bantam f 16.

Data for oscillograms

Oct 29 1939.

$e\frac{de}{dx} = \frac{.05}{10} = .005$ /cm.

5000×10^{-6}



For C.R. $5 \times \frac{10}{1000} = .05$ volts.

1200 rpm 10 volts d.c.

$\frac{.025}{10} = .0025$

Calibration of osc vibrator

# 4.	I (ma)	f	Def (P to P).
	15.3	200 N	1.8 cm
	18.0	100 N	2.1 cm
	16.8	60 N	2.0 cm
	18.0	200 N	2.1 cm
	18.4	500 N	1.95 "
	18.6	700 N	1.8 "
	18.4	900 N	1.7 "
	18.4	1100 N	1.4 cm
	18.4	2000 N	.9 "

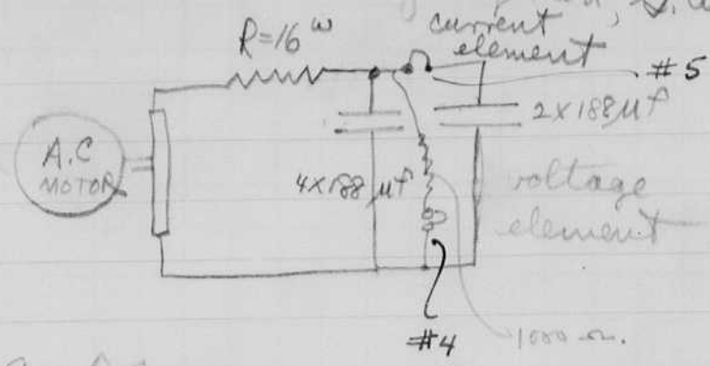
#5	I (ma)	f N	Def cm
	16.0	60 N	3 cm
	18.0	120 N	2.9 cm
	18.8	200 N	2.3 "
	17.4	500 N	1.2 cm
	19.6	1000 N	.7 cm
	19.6	2000 N	.35 cm

Data for acceleration oscillograms.

Oct 28, 1939

Prof Edgerton, G. Andrews

Film # 4



On A.C. Motor:
Field current = 4.0 amps
No resistance in armature circuit

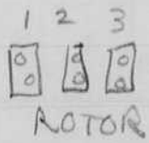
#3 used as timing wave 60 cycles.

Film # 5
Motor - Field current 4.0 amps
Rotor switch on point 10

Film # 6
Motor - Field current 4.0 amps

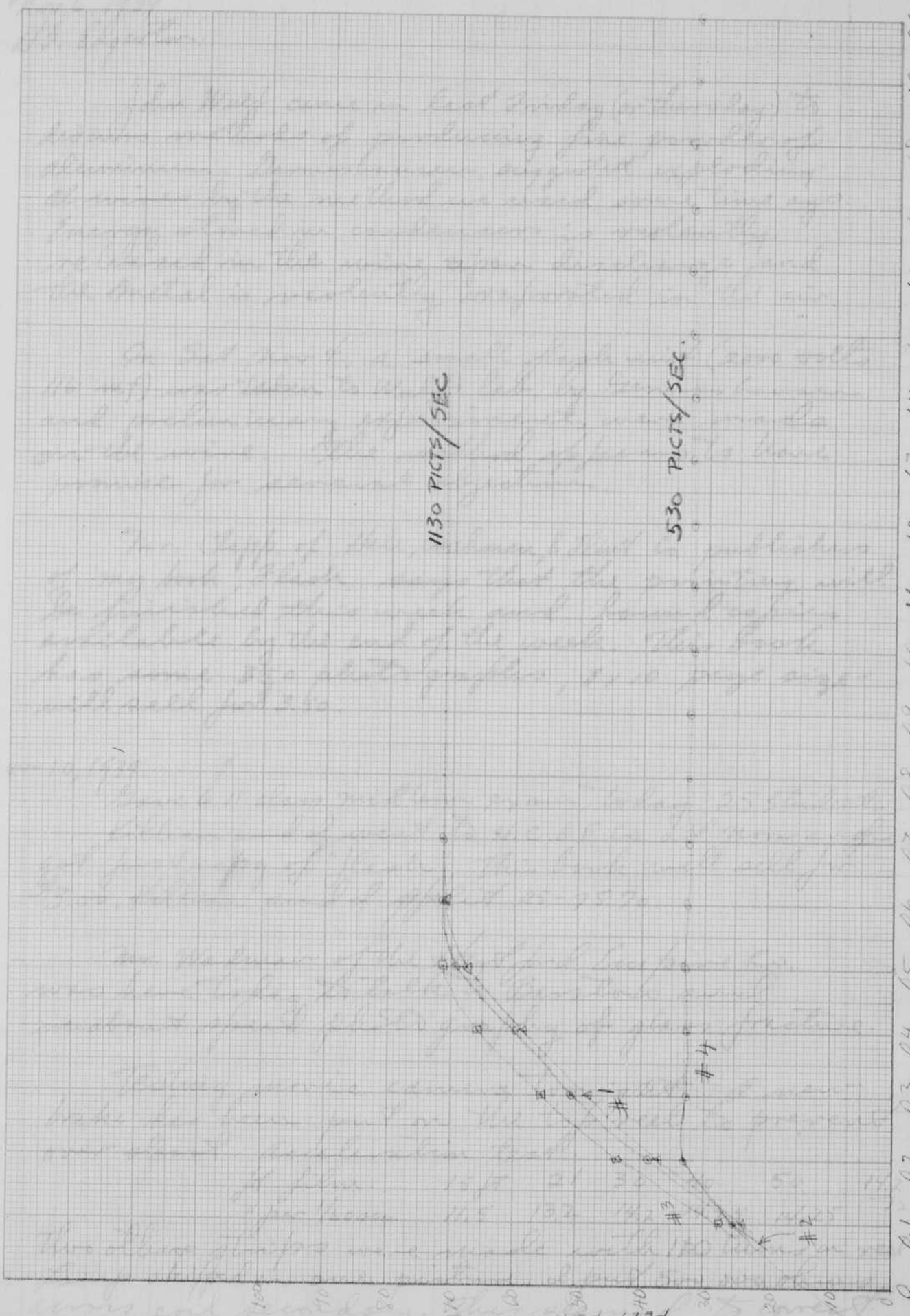
$R = \frac{E}{I} = \frac{230}{5} = 46$

Rotor switch on point 12
46 ω between pts. 1 and 2 of rotor



7. 9.75 ma 1000 ohms. 4.05 V on fld. Calib.
Start Rotor shorted Full line voltage.

8 Full volt start. Rotor shorted 400 ohms reactance in fld.
I_f = 3.92 amps.



60 = 36 pixels / sec.

3 for last shot. Stuck in photo.

Do
o

Ju

On A.C.
Field
No re

Note
R

No
Ro

7. 9.
5

8 Ju

Nov. 6. 1939
H.E. Edgerton.

John Wulf came in last Friday (or Thursday) to discuss methods of producing fine powder of aluminum. Germeshausen suggested exploding al wires by the method we used some time ago. Energy stored in condensers is violently released in the wire vapor discharge and the metal is violently evaporated in the air.

On Sat, nov 4, a small flash unit (2000 volts 116 mf) was taken to Wulf's lab. by Germeshausen and preliminary experiments were made on the wire. The method appears to have promise for several objectives.

Mr. Clapp of Hall, Cashman, & Flint Co. publishers of my book, Flash, says that the printing will be finished this week and bound copies available by the end of the week. This book has some 350 photographs, 8 x 10 page size - will sell for $3.50.

Nov 10, 1939.

Gave 6.11 class midterm exam today. 25 students. Killian and I went to H.C.&F Co at noon and got first copy of "Flash". This book will sell for $3.00. Killian and I split 25-75%.

Mr. Wadman of the Stanford Empire Co. was here today to talk to Barstow and me about speed photography of glass fracture.

Testing movie camera tonight. A new brake has been put on the top reel to prevent over shoot. Acceleration test.

ft film.	15 ft	21	30	40	50	$\frac{14.2 \times 16}{12} \times 60 =$
" per 1/60 sec.	11.5	13.2	14.2	14.25	14.25	1136 pict/sec.

two other strips were made with 100 turns on reel. One Lamp skipped in one picture. I put 500,000 ohms across coil secondary. this seemed to correct the hold over trouble. Agfa sound recording film f 6.3 for last shot. Send in photos.

3

cont

Camera set at 500 frames off per sec
lens at f 6.3 Two lamps 1 mf. Hallibaugh
clapping hands. Eastman sound recording
film.

Nov 12 1939

Yesterday I connected all the flash machines
to operate in parallel ~~that~~ I coved find
and took them to the Boston Garden to
take photos of the Rodeo. Andrews and
Barstow helped.

The following lights were used in
parallel in the press box next to the
judges stand at Box 30.

Right	78 mf	3000 v	V lamps.	old box with various.
	8 mf	"	Spiral Spot light.	
left.	116 mf.	2000 v.	V Special new type.	
	78 mf	3000 v.	V " "	" lamps old reflex

Camera 9x12 cm Zeiss Jewell. f 5.6 on most photos.

Film Super XX D72 developer.

ajs

	#6.	#5	#4	#3	#2	#1	NEG. 3	neg. 3	
						0.72	0.09		400'
					0.49	0.80	0.13		330'
	0.38	0.52		0.56	0.52	0.85	0.19		meter
	0.42	0.60		0.62	0.57	0.96	0.34	3.0	broom.
	0.46	0.67		0.68	0.70	1.08	0.48	2.81	
	0.56	0.82		0.86	0.92	1.28	0.71	2.55	
	0.72	1.02		1.10	1.10	1.48	1.01	2.30	
	0.88	1.30		1.41	1.32	1.66	1.35	1.98	
×	1.12	1.59	0.00	1.82	1.55	1.79	1.90	1.70	
	1.36	1.67	0.52	2.15	1.82	2.08	1.98	1.35	
	1.65	1.95	0.54	2.54	1.97	2.28	2.30	1.01	
	1.77	2.22	0.56	2.86	2.16	2.48	2.55	.71	
	1.91	2.26	0.72	3+	2.27	2.70	2.81	.48	gist.
	2.09	2.58	0.81		2.37	2.72	3.0	.34	tank.
	2.28	2.59	0.96		2.45	2.82	too far	.19	
	2.22	2.54	0.98		2.52			.13	
	2.31		1.02					.09	

Cont

4 Ca
lens
class
film

Nov 12

to ope
and
take
Bar

pr
jud
C

Right .

Left. {

Nov 13 1939

FILM TESTS.

(A) Reed film from Eastman Plus X 5241-75-29. 400'

(B) Infra Red 5212-6-1 330'

Lamp U large old type x cter 2.04 ma on voltmeter

2 mf. Flat al. Reflector. in door of dark room.

Graded strip contact print.

(C) Background X

Strip #	FILM TYPE	Distance	
1	A	4'	
2	A	8'	
3	B	4	
4	B	8	
	B		no flash for fog etc.
5	C	4	
6	C	8.	

Developed in D76 at 67° 15 min with agit. Leica spool tank.

Nov 22 1939

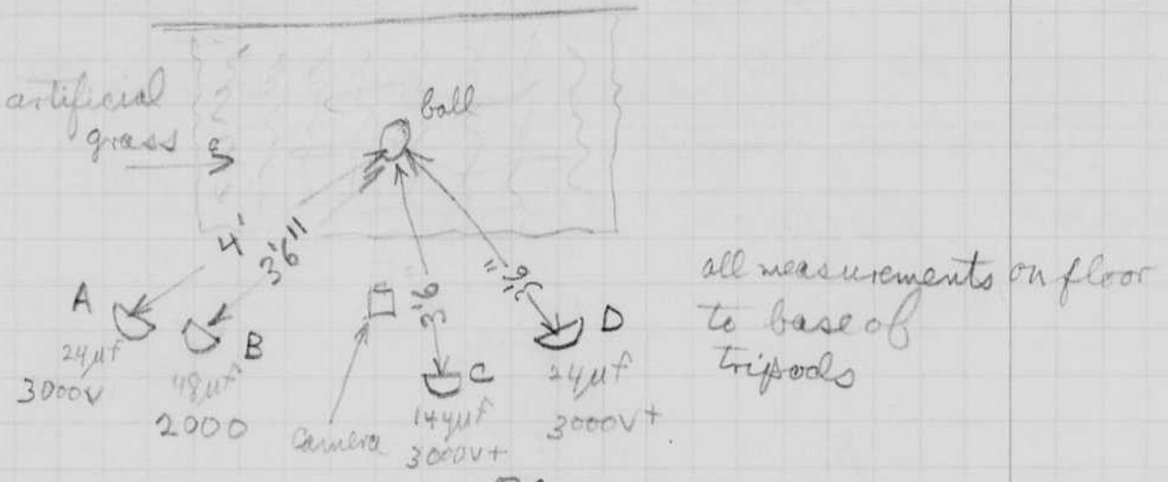
H Edgerton

football

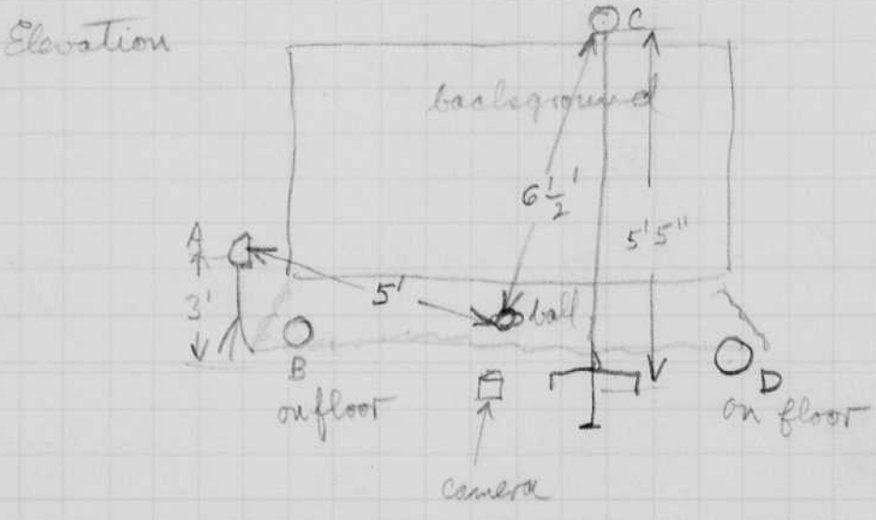
Sexton, John. Nik. 0196 M. football kicker.

Kodachrome type B. 85B filter. f 5.6

Top view



Elevation



Nov. 27, 1939. Took lights home last weekend and took pictures of the children in action and still. f 5.6 Kodachrome type B 85 B film.

Took several Kodachromes of Mary Louise pouring milk from a milk bottle into a glass

2 Type B – 85 B Filter – . 2¼ × 3¼

3 Type A 85 B Filter f 4. 5.6 8. Bantam.

Mr. Radford and Mr. Fogler were at M.I.T. today about 5 p.m.

Killian and I had lunch ~~with Mr. Hunt~~ at the Westminster Hotel after talking to Mr. Hunt of H.C.&F Co. He will send us the remainder of amount due as per contract on the book "Flash".

On Sat I took 10 books "Flash" to the Harvard Coop and they put 5 of them in the window, the Yale-Harvard game was that day. Yale 20 H-7. Also I left 10 at the Talbot camera exchange Mason took one as a complimentary copy.

I spent considerable time over the weekend studying application serial no. 610,045 and 685,501. also Int. 74,402.

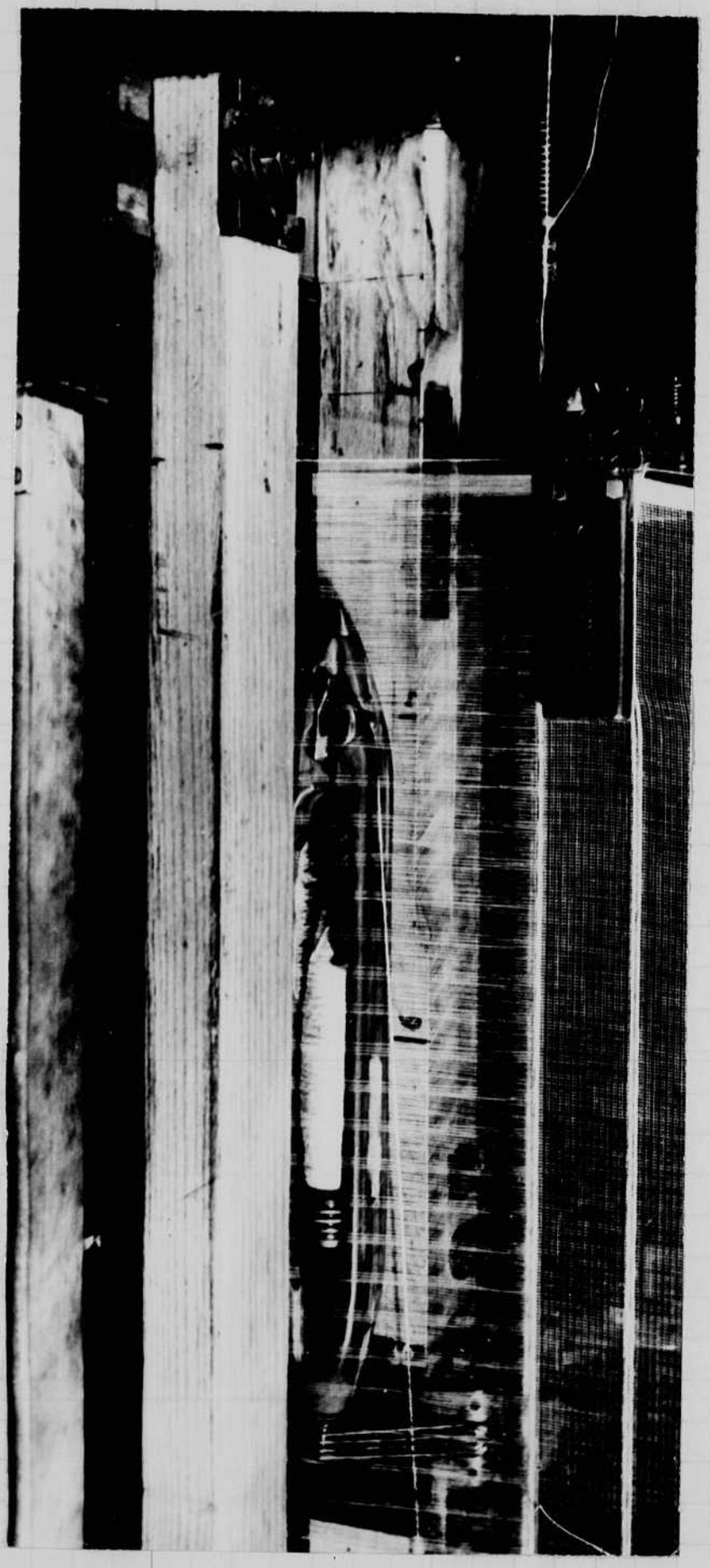


Photo by Mr. Victor Sepulveda of Compton Records

Nov 29 1939
H. E. Edgerton
Tyler

H-5 movies of Piano.

FILM No

1	f 3.2	Backing.	7	under in D72/2	Short end 30' dense			
2	f 4.5	"	"	Piano tuned to 1570 /min.	100 ft.	HEE	Soft.	
3	f 4.5	"	"	"		Sam Caldwell hand.		
changed Strings								
4	f 4.5	"	"	27 cycles 1620	Style M # 1 String	100 ft.	"	"

Dec 4 1939.

On Dec 1 and 2. Mr. Friedemann of West. Co was here and concluded the syn. motor applications. three were sold to Westinghouse. He left ~~Sat~~ noon for Pittsburgh.

Today Mr. Bennett Terry and mr. Wickbaugh of I.B.M. were here to discuss speed photography and its possible use for items that they might manufacture.

Dec. 7, 1939.

Gave a talk last night at the Dedham Country and Polo club. mr. Peabody, Mr. White, mr. Taylor at dinner.

Last week I took the flash units to Photo services studio and put a synchronizer on Mr. Jackman's camera. We took 4 photos of me with the lights. the eyes showed a large pupil since the room light was of low intensity.

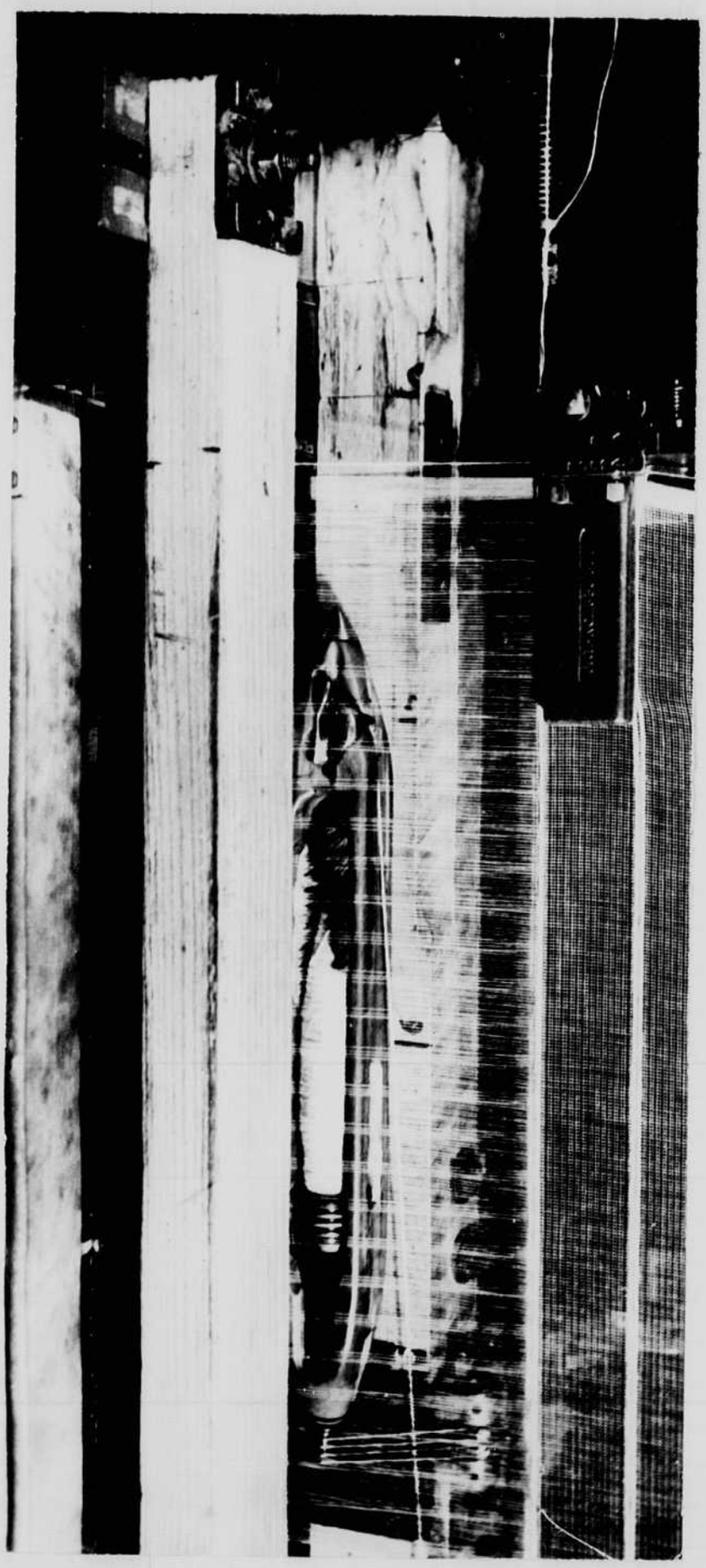


Photo by Mrs. Victor Sepulveda of Campo Verde.

Nov 29 1939
H.E. Edgerton
Tyler

H-5 Movies of Piano.

FILM No

1 f 3.2 Backing. Thunder in D 72/2 Sound end 30' down

2 f 4.5 " " Piano Tones 2 to 1570 / min. 100 ft. | DEE Soft.

3 f 4.5 " " | Same as #2 Hard.

Hard Strikes
4 f 4.5 " " 27 cycles 1620 Sets M # 1 Strike 100 ft. " "

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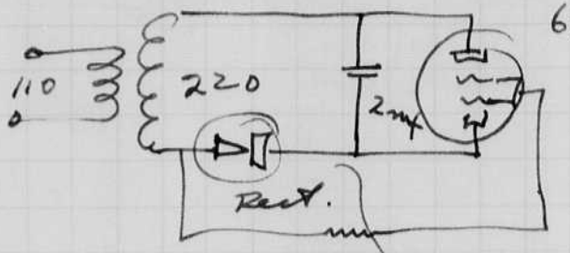
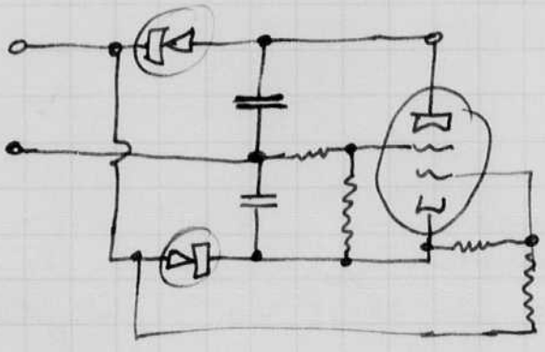
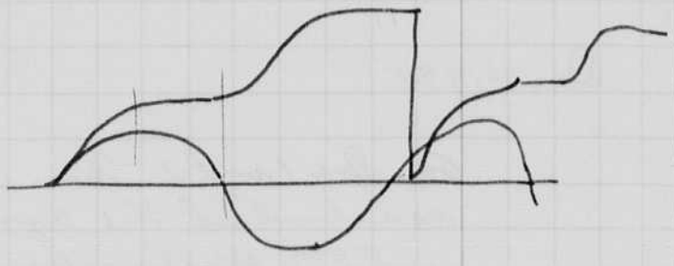
Dec 7 1939
WBE.

The L.T. and T. selenium rectifiers look interesting for oscilloscope circuits.







Type 2D9A1 rated 180 volts .06 amps.
2D9A1

110 v input ac 4.85 mf for each capacity.

4 oz. 1" x 3 1/8"

Phillips of G.E. Co Schdy N.Y. wrote asking for WGY talk on Jan 25. 10 min.

Mary Lou jump rope.
William, Robert Indian suits.
Jumping from chair.
Portraits of three children.

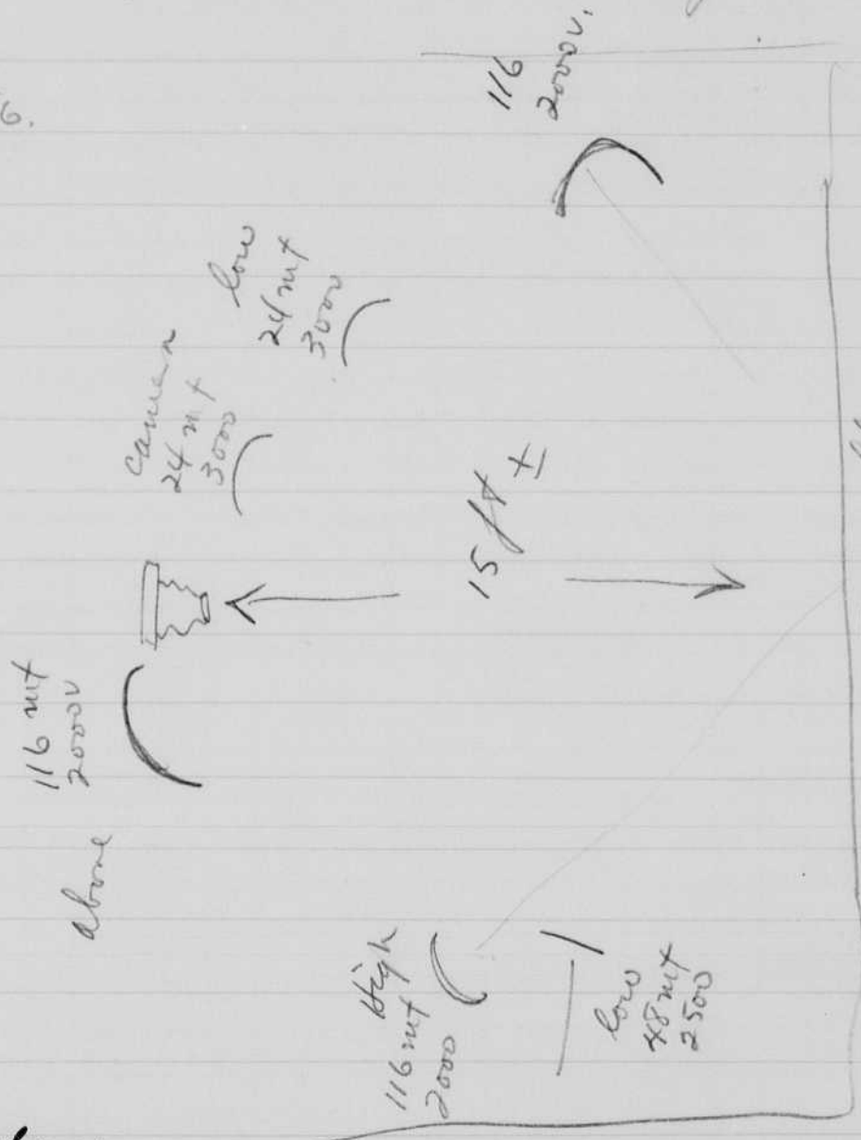
Date for photos taken in photo service
Sunday Dec. 10, of children
in action: camera set at f 4.5 for
most of the shots.
Mr. Jackman & son present.

Dec 10 1939.

11 color photos 2¼ x 3¼.

f 4:5 Filter T-A. Kodachrome B film.

f 5:6.



The photos above ~~prints~~ were under exposed and blue in color.
Evidently the T-A filter is too blue for the lights.

~~H.E. Edgerton~~
Dec. 12, 1939.

Yesterday I helped mr. Jackman take some portraits of John Trumps boy in the M.I.T. Photo service studio. The boy was very active (one year old ±). Three flash tubes were used-each 116 mf at 2000 volts.

Took H-S. movie (1000± frames/sec) of Barstow hitting a piece of tempered glass with a hammer. Camera at f2. Two lights were used at 45° ± and about 4 ft from the action. Background X film, Eastman, developed in D72 at 8 minutes. ~~F~~ 65° F.

1 mf. in each lamp.

Also took shot of hand-clapp 100 ft. One light at camera, one at side. (800 f.p.s ±). Same as above. This was not developed.

Talk last night in 6-120 at M.I.T. to Radcliffe Alumni Club. at the invitation of miss Mc Masters (tech Review). Barstow operated the projectors. After talk inspected the high voltage generator, cyclotron and wind tunnel.

Dec 14 1939.

Silmer Andrews put plugs on movie apparatus yesterday. A trip is planned for Saturday with the movie outfit to Compton & Knowles Loom Works. Worcester.

Case and Darrow are expected today from New York to discuss single-flash photo.

Dec. 19, 1939.

Sat. Dec. 16 I went to Compton Knowles with Andrews and took 500 ft of 35 mm high-speed movies at 600-700 per second of a loom in action - scenes below. Shots 2 and 8 were developed that night in D76 at 65° for 10 min and good density resulted. The film was Plus-X furnished by Tuttle.

#	speed	lights	Aper.	
1	600	2	2.2	Bob trans
× 2	600	2	2.2	" "
3	600	2	2.2	" N.G. action
4	600	2	2.2	"
5	600+	2	2.	Shuttle in shed during transfer.
6	600+	2	2	center of warp
7	"	"	"	left side of loom
	135 ft.			
8	"	"	"	lower view of Bob changer.

× Developed Saturday ok. ✓

16 Print mailed to Palmer on Dec 21 1939.

Dec 22, 1939
Harold E. Edgerton

at 4 pm yesterday I arranged a meeting in 4-134 of Mr. B. Parsons of the Pepperell co, Mr. Drew and Mr. Miskally of the Plymouth cordage Co. to discuss the stroboscopic observation of sheeting marked by fluorscent dye.

Mr. Drew mentined that the Curtis and Marble co had developed a marking machine. He estimated that the cost of dye would be $1500-3000 to put 3 marks every yard on the sheeting. Each mark would be 3" x 5/16" in dimension. The dye costs $3 a quart. Additional is royality - $2000 per year.

Data on Pepperell plant from Parsons.

30 yards a minute ($\frac{1}{2}$ yard a second).

15,000,000 yards treated a year.

90 inch wide sheeting.

Mr. Parsons mentined that this method was in competition with the G.E. method which sells for $3000. installation.

(Dec 20)
Took movies for Dowell of smoke cut by a 1/4" rod. 700/sec f 3.5 Background x Enlargement on film about 1.2 - 1 argon lamps. used 1 mf 1300 volts ±.

Took single-flash pictures of smoke for Jennison. f11 Plus x x film.

Dec 23 1939.
Exeter.

Color Photography. Kodachrome with ~~Kr~~ Xc lamps.

Clifton tuttle when here on tuesday Dec 19 suggested a filter combination for use with the Kodachrome B film. this was on the envelope

#86
0.10 minus red
dilute #38.

Two filters one (orange) the other a ~~plate~~ pale (Blue).

they are to be used together.

Curves showed that a good exposure or over exposure was better than an under exposure for proper color rendition.

Tuttle left data indicating that Verichrome is the fastest film. His tests were developed in D-50.

We are to furnish tuttle with lamps filled with

Argon
Helium
argon + mercury drop.
Neon
Nitrogen

He will test these for color and amount of light from a photographic standpoint.

Dec 23 1939 cont.
H. E. Edgerton.

Joe Keithley and Virginia were at M.I.T. this morning. I took some high speed movies of Virginia. Back x film.

ft.			
50	1.	f.2	Full face Wink. 2 lamps 1 mf 1400 v.
"	2.	f2	" "
"	3	"	Quarter view cigarette " " "
"	4	"	Eye closeup.
100	5	"	" " plus flash from 1/6 mf. 2000 v. to show reaction time.
100.	6	f2.	Atomizer 1000/sec±. front and back lighting.

I tested the spark machine that is to go to the Owens Illinois Glass Co. It has been rebuilt by Forier.

Dec 29 1939.

Spent considerable time with Int 76771 (miller) 4 counts and cont. in part of S.N. applin 685,501. (Int 74,402) the last few days.

Kines is on his return from South America - now in Miami. Miss Schlosberg wired him today that the Commission did not give an extension of time beyond Jan. 2. He plans to come tonight by train!

Beer bottle photos tonight for the Hartford Empire Co.

1/3 mf 8000 volt time pickup as used for bullets.

Verichrome f8 film D50.
1. Test for exposure 5 or 10 sec no flash.
2. Dropped bottle about 1 1/2 ft - did not break.
3. " " " 5 ft. broke!

Dec. 30 1939.
H.E. Edgerton.

Took movies of Hg drops, spinning coin, with N.S. camera today.

Edited 16 mm pants of old pictures taken in last several months.

Wire from Rice asking me to meet him in New York at 8.55 N.Y. Florida Limited and go over material in 76771 but with miller on train to Boston. I plan to go on night train to N.Y. Penn Station.

Herb and Harry Lawrence are making stands for high-speed light today. Zemansky has been experimenting with the resistance strip pickup for some weeks past. He says that he can get .03 volts which is about 1/10 or 1/30 that of a crystal.

Dec. 31, 1939.

I went to New York last night on the Owaka and met Mr. & Mrs. Rines at 8.55 a.m. upon arrival from Florida.

We rode together to Boston on the 9^{55} arriving at South Sta. at 3 p.m. discussed 76771 on the way.

In New York Mr. Rines called Mr. Borden on the phone about 8.30 and requested that the testimony be set for 9 a.m. instead of 11. Mr. Borden agreed to 9 a.m. Tuesday Jan. 2.

We discussed the records in both my notebooks and in Zemansky's on the way to Boston.

Jan 1 1940
H.E. Edgerton.

11:45 - 7:30 with Semenchanen Gries, and Rice discussing 76,771 in 4-134 M.I.T. Testimony tomorrow morning at 9 in Rices office.

I plan to go to Pittsfield on Jan 2 tomorrow to address the A.S.E.E. at the High School at 8 p.m. Probably will go on the 1 pm train arriving at 5 - .

Jan 4. 1940

Int 76,771 testimony was started on Tuesday Jan 2 at 9 am by mr. Rice and mr. ~~Semenchanen~~ Gries. Mr. White arrived shortly after nine and mr. Miller about 10. It was agreed that an addional day was granted to enable me to go to Pittsfield mass on the 1 o'clock train. I testified from about 10 to 12.30 before going to the train.

Mr. Le Bleiu met me at the train and took me to the Hotel Wendel. There I met mr. Sandell and mr. S. Fisher of the Eastman company at the hotel.

Sandell went with me to the dinner at the Stanley Club where the officers of the A.S.E.E. met before the meeting. Mr. Reed was the chairman of the meeting.

The talk was also given in the morning at 8.45 to the high School children.

I returned on the 10.55 am train and was met in Newtonville by my wife. Then I left my apparatus at home and went immediately to mr. Rices office where Semenchanen was being cross examined by mr White and mr. Miller. I testified from 8 to 12 pm.

Jan 14 1940
Harold Edgerton.

Grier is finishing sample co and contactor type of strobomps to send to Central Sci co in Chicago next week with Mr. Geese of the cambridge office. Mr. Parker called. these gentlemen saw the strobs. work a month or so ago. Grier also set up and tested a circuit to supply stroboscopic light for photographing for Eastman co. Minifile camera. this was the unit discussed with Tuttle on his recent visit to Cambridge. the circuit uses a voltage regulator and an adjustable auto transformer. a relay disconnects the regulator when the surge of power is needed to build up the charge in the condensers.

On tuesday Jan 9 about noon Mr Wright called from the Copley Plaza concerning the proposed photographing of glass fracture. I went over to their room meeting

Mr. North Wright.	Libby Owens Ford Glass Co.
Mr. McLean	Fisher Body. Detroit.
Mr. Frank Chance	Arthur Kudner Inc Advertising agency. Int. Bldg. New York.
Mr. James Wines	" (Detroit office).
Mr. H. Stubbs	Fisher Body. Detroit.
Mr. ?	?

after lunch we came to M.I.T. and took some photos of glass breaking. a steel ball 2 inches in diameter when dropped from the ceiling would not penetrate the hitest glass. 24"x24" samples were used.

the movie apparatus was connected and strips were made of a 16 pound ball (shot) or (hammer) going through an acetate plate and into a high test plate. the ball was dropped from a height of two feet.

Jan 14 1940
cont

Enlargements of these movie strips were given to Wire yesterday.

On ~~this~~ Wed. I went with Wire and Stibbs to the Buick. Bldg. & the floor and made arrangements to experiment with the cutaway Buick 1939 model. Mr. May and Mr. Nichols - Buick Co.

On thursday ~~the~~ three light studio unit was taken to the Buick Bldg and set up for the evening for Mr. Bumpas Hadley - NYY pitcher. He came at 10:30 and ~~threw~~ fired balls ~~threw~~ at the the wind shield. None penetrated the glass.

Two cameras were ~~to~~ used for this. I operated one at the side and Barstow the other in ~~Ba~~ back. A micro phone trip was used to start the lights.

On Friday Mr. Dick Shaughnessey.
95 Lincoln
Dedham Ded 1657 W.
brought over his skeet guns and shot some #9, 7½, and 6 shot (12 gage) at the glass from a distance of 45 ft.

Two photos were taken in the evening of shot hitting the car.

On Sat. Jan 13 Photos of Barstow breaking samples (side view) with spark photography. (Bob? Bill) Wide bored photos ~~took~~ pictures with a peak gun on Thurs. Friday. and Sat.

I gave Mr. Blakeslee two 16 mm films and about 30 or 40 slides to use in lectures.

Jan 9 1940. #2 Sd gator

Glass Photos.

3

1/2 lt. 34 ft.

mv^2

$d = \frac{1}{2}at^2$

1 - Lamp 9-ft 3# ball Hitest f 12 V.
contacts 3/8" below bottom.

1½ - 1 lamp 5 lamps above camera
15° below. 9'-3# ball Hitest f 12 Volt.
contacts 3/8" under.

2. - Ditto 1/8

3. Safety acetate Ball 9 ft ball dig not g. thru.

4. " " " " "

5 Hammer Hitest

6. " acetate.

1-10-40

#7 - movie 475-500/sec. High test
Camera 5°-10° below. fixed film

#8 - same as 7 acetate Dev NG.

#9 - Hitest 15# ball drop 2'

#10 acetate 15# ball 2'

Jan 14 19
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Jan 14 19
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Dennison

Jan 18 1940
Daniel Edgerton

Yesterday I spent in Wilmington with Dr Rossander of the Jackson Lab of the Dupont Co. Saw the Dupont Experimental Station, Hercules Powder Co, and part of Dye works.

The talk followed the dinner at the Y.M.C.A. Amer. Chem. Society Del. Section. then Dr Rountree of Johns Hopkins gave a most interesting talk on Addison's disease.

Took 11:48 train for Boston arriving about 7:30 at Back Bay.

Wines and Stubbs were here in morning to wind up the photography for the L.O.F. and Fisher body.

Jan 20 1840.

Mr. Goff and mr H.E. Trekell of the General Electric Co West Lynn works arrived about noon in my lab. and we worked until 1130 pm taking movies and oscillograms of the acceleration and deceleration of a watt hour meter disc. Al Wood ran the oscillograph (a 4 element Westinghouse). He used 3a Kodak film.

The movies were taken 1:1 of the disc with a hair line across the edge of the disc. There are (720)? milled notches in the edge of the disc.

A 3 mf condenser (400 ohms) on the 10 KW pack was used for light. Sound recording film was used and a good exposure was obtained with an f 4.5 setting of the Summar f 2 lens. Dev in D 72 65° 6 minutes. Argon lamp. Quartz cap tube in 9" reflector. White card put back of the lighted area for even light.

Jan 20 1940 cont
H&C.

Tom Green was here about noon discussing bottle photography. Barstow and I plan to go to Hartford next week or the following.

Spent most of morning sending off material to W. S. McLean, Fisher Body Div., Gen. Motor, Detroit mich.

Nili called from N.Y. this morning about apparatus and about tennis photos.

Jan 27 1940. H&C Eq.

Talk on h-s photography last night at the N.E. Branch of Amer Phy. Society in room 2-390. Took photos of Margo Kent jumping with argo flash and also shot the audience watching the movies.

Herb sent Nili two rebuilt spark machines this morning.

On Wed. night I took photos of the cast of the play which was put on by the dramatic club.

also took a few color shots on Kodachrome film with 86 filter which failed on my last trip.

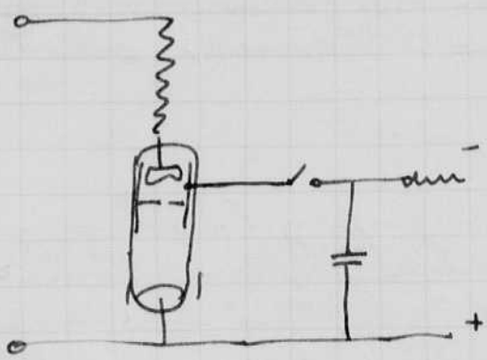
Jan 28

Semmelman is working on the phono pickup that using a resistance strip. He is making up an outfit to use at his home.

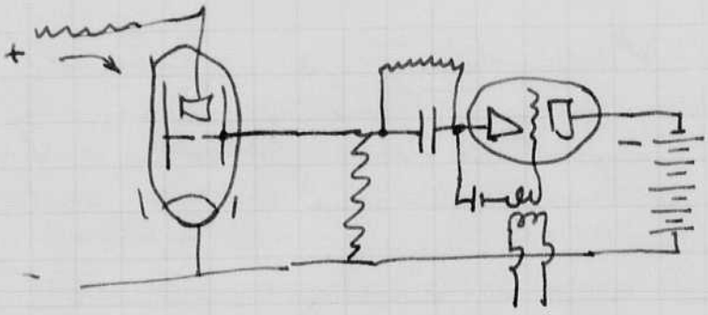
Heard Prof Saunders of Harvard talk yesterday afternoon on violins and the measurement of their acoustics.

H. E. Edgerton.
Jan. 28 1940 cont.

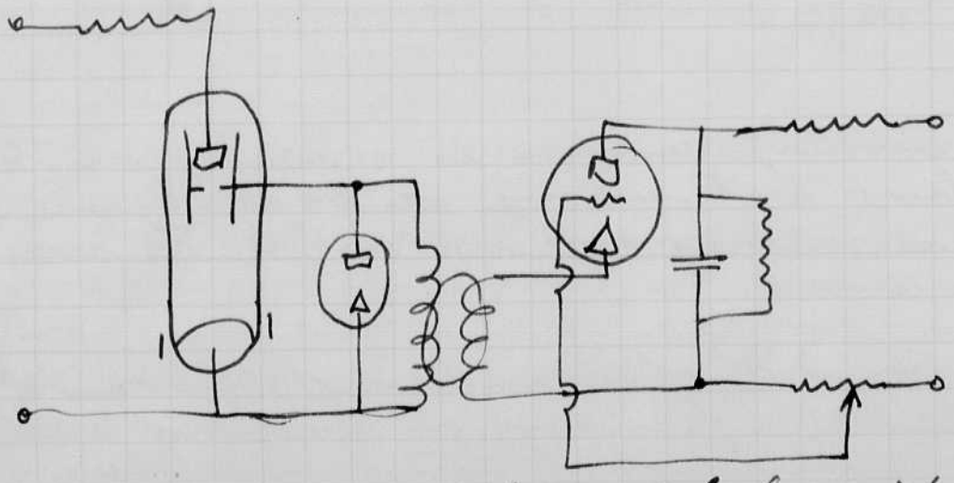
Working today on SN 296,746 rectifier double grid. application. Circuits to shut off current in an arc with a surge are shown below. I used some of these with thyratrons some years back and know that they will extinguish the arc.



Negative surge to put out arc.



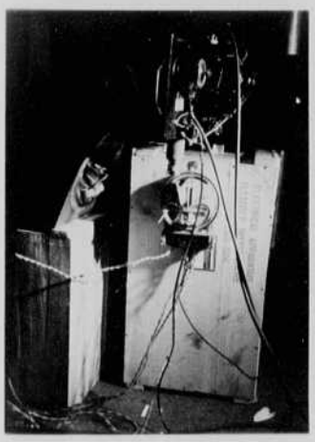
thyratron or hard tube to control voltage on the third electrode in arc quenching method.



neg surge on grid to put tube out. Rect tube prevents + surge through transformer.

Wines & Jackman

Stubbs / Wines.

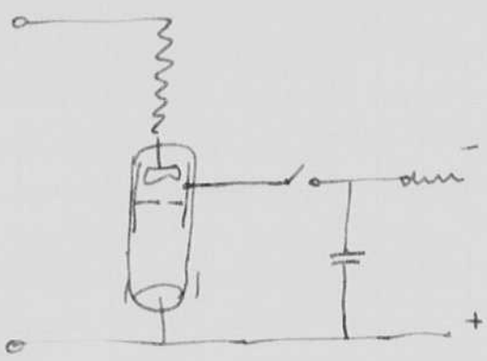


Setup for movies of Watthour meter disc for G.E. Co. Trekle and Boff. 360 frames/sec. 3 mf. Positive film f 4.5. 1:1 image.

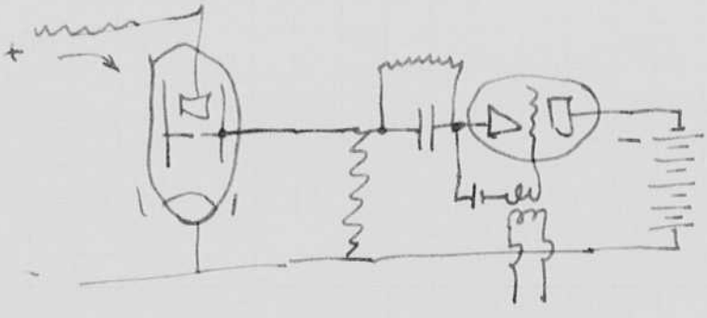
Mrs. Brodrick.

H. E. Edgerton.
Jan. 28 1940 cont.

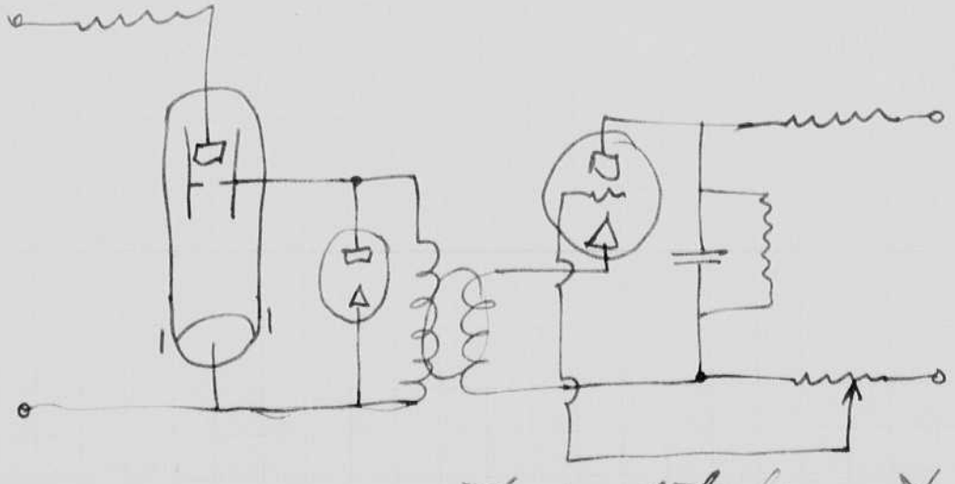
Working [illegible] on SW 296, 746 rectifier double grid. application. Circuits to shut off current in an arc with a surge are shown below. I used some of these, [illegible] thyratrons some years back and know that they will extinguish the arc.



Negative surge to put out arc.



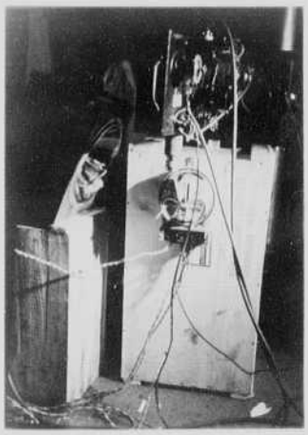
thyratron or hard tube to control voltage on the third electrode in an automatic method.



neg surge on grid to put tube out. Rect tube prevents + surge through transformer.

Wines & Jackman

Stubbs, Wines.



Setup for movies of Watthour meter disc for D.E. Co. Trekle and Boff. 360 frames/sec. 3 mf. Positive film f 4.5. 1:1 image.

Mrs. Brodrick.

Feb. 1, 1940.
Harold E. Edgerton.

Barstow and I drove to Hartford in Barstow's car on Monday Jan. 29. to take pictures for the Hartford Empire Co. Tom Green, Mueller, Shipman, were there to help get started. A hydraulic press had been set up in the basement & attached to a device for breaking the bottles.

A piezo-electric phonograph pickup was put on a support attached to the bottle - the needle was against the bottle. The surge from the pickup after the bottle was broken tripped the light and took the picture. The cracks had reached completion at the moment the photo was taken but the water had not yet come out.

On Jan. 30. the conducting gold strip was tried. This enabled a photo to be taken with the cracks partially developed.

On Jan 30 I set up the lights and took some photos of one of the bottle-making machines. a contact was made on the cam that operated the machine.

Spent time today arranging an exhibit of photographs for the exhibit in hall outside of Osnant studio.

Took photo in 3¼ x 4 1/4 Jadsman of me with three lights f 5.6 Comm. film ef/some ok.

Application:

Cantilever beam $\frac{1}{2}$" long, $\frac{1}{16}$" square crosssection. Beam driven at frequencies of 20 to 10,000 per second, max. amplitude .002". Would like critically damped material. Modulus of Elasticity $\frac{1}{5}$ to $\frac{1}{6}$ that of celluloid or 50,000 lb. in^{-2}

Feb. 1, 1940.
Harold E. Edgerton.

Barstow an
Barstow's car on
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Took photo in 3¼ x 4¼ Jadsman of me with three lights f 5.6 Comm. film 4 pomm ok.

Feb 7 1940
H. E. Smith.

Attached sheet gives requirements for plastic voltage generating phono graph needle.

Several ~~Days~~ ago Mr. Greenough (?) of Dupont Experimental Station was here and he said he would send Jones some undrawn nylon.

CALL GEORGE TAYLOR, JR., NEWTON NORTH 3412
AND ASK HIM FOR 3, 4, 1, or 2 TICKETS

February Meeting

The Claflin Club

CALL GEORGE TAYLOR, JR., NEWTON NORTH 3412
AND ASK HIM FOR 3, 4, 1, or 2 TICKETS

February Meeting

The Claflin Club

HEAR HAROLD E. EDGERTON

Scientist and Inventor of the Stroboscope

SPEAK ON

"The Lamp that Freezes Motion"

SEE Photographs taken at one millionth of a second

Bubbles bursting - bullets in motion - glass breaking

The wonder pictures of the century

(Articles on Prof. Edgerton's remarkable invention now appearing in current issues of "Reader's Digest" and "Scientific American")

at the

CLAFLIN CLUB

NEWTONVILLE METHODIST CHURCH

FRIDAY, FEBRUARY 16, 1940 6:30 P. M.

Dinner Tickets 50 cents (note reduced price)

OWING TO THE DEMAND FOR TICKETS, RESERVATIONS MUST BE MADE BY TUESDAY NIGHT. PHONE GEORGE TAYLOR, JR. NEWTON NORTH 3412

Feb 7, 1940

Announcing A New Service

"Quicker-Than-A-Wink" Portraits of Children

By High-Speed Photography

No longer need your children sit in the glare and discomfort of bright lights while their pictures are being taken. No longer need they hold themselves self-consciously still.

These difficulties of child portraiture are avoided in our studios by the use of high-speed, stroboscopic lamps. These lamps, supplied by Professor Edgerton and his associates, permit light modelling in the same manner as do ordinary lights; but they free the photographer from the restrictions of slow exposure and the subject from the necessity of sitting still. As a result, perfectly natural, dynamic pictures of children may be made with ease.

We believe that stroboscopic lighting opens up a new era in portraiture. Bring in your children and let us show you what may be done with the new lamps. No other studio in Boston is equipped to do this kind of work.

A display of portraits taken with high-speed lights will be hung in the gallery at our studios from February fifth to February twenty-fourth. Also, a collection of Professor Edgerton's pictures and a few Kodachrome slides of action in color will be shown. You are cordially invited to visit this exhibit and the studios.

Technology Photo Service

Room 3-017

Massachusetts Institute of Technology, Cambridge

Sitting and six finished prints, all different poses, for five dollars. Additional prints of your own choice at fifty cents each. Size: four by six inches.

For Appointment

Phone Kirkland 6900

And Ask For

Technology Photo Service

HEAR HAROLD E. EDGERTON

Scientist and Inventor of the Stroboscope

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And Ask For

Technology Photo Service

Feb 17, 1940
Harold E Edgerton

Feb. 3.
Took photos at Wellesley College with miss Powell and miss Waugh of a golf player, both a girl player and a man. I used a 60 cycle stroboscope and the 35 mm universal camera. f3.5 Plus X film developed in D 76.

Feb 5 was registration day. I teach Adv. Electronics 6.632

Gave a talk on W.G.Y. at Schdy. at 7 pm also at 4 in afternoon on short wave. Emerson Markum, Phillips, Reynolds. McAlliste. Had lunch with Boucher.

Took three lamps 116 mf 2000 v each to the track meet B.A.A. at the Garden last Sat Feb 10. Barstow, Wylie, Wycoff helped to set up the lamps. Bill Jones of the Int. Nebo shot the photos with his camera of runners coming around the curve at the end of the track. The photos were used in the advertising and sent out on the Int. News, service.

Set up lamps same as above in Boston Garden for Sonja Henie on Feb. 14 Wednesday. A single lamp was hung from above about 50 feet off the ice, A trip cord 150 ft long was dropped at the side for the camera. A few of the photos were seen in the Record or American in the morning edition before the storm new pushed it out.

there was a 12 inch snow starting at 4 pm with a strong wind that made bad drifts. Most of the 12000 people attending the Garden had to stay all night at North Station since the trains did not run. I got

stuck in a drift when I came down the ramp at the back of the Garden. I got home at 2 a.m., by luck, catching a taxi at Harvard square.

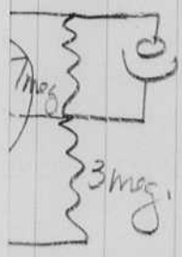
It took till noon to dig out at the Garden. the photos were ok. and run by Lut. news.

I mentioned to Barstow and Geo. Woodruff that it would be fine to trip the top lights with a photo cell pickup. the flash from the camera light would give the pulse to start timing. This would eliminate the trip wire.

Last night Barstow and Woodruff took three lights to the mechanics bldg and shot some prize fights.

I gave a talk at the Chaffin Club in Newtonville Methodist Church.

3 element grid
geon tube.



I saw two
ed by a third
ve circuit
- g. Hawkeswood

This trip was tried last night in the Boston Garden at a Hockey game between the Olympics and Hyde Parks. The lamp behind the fence back of the goals was about 60 or 70 ft from the lamp at the side in which the photo cell trip was located. Mr. Jackman, Frank Wyle, Chas. Wycoff helped with the set ups in the Garden. Photos were shot at f 9 with a 12 inch lens of the game by Mr. Mahoney of the Record.

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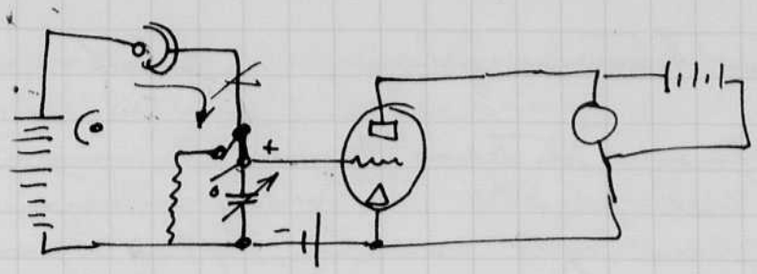


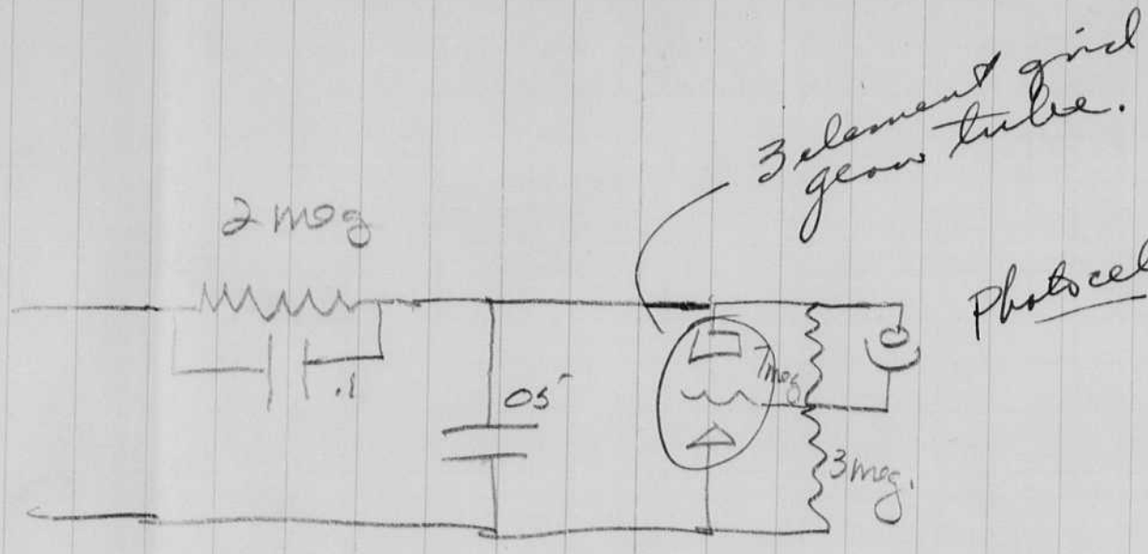
Switch
1st shunt condenser
2 flash lamp with P.C. in ckt.
3. Discharge photocell.

As discussed with Barstow.

Barstow is testing the use of a thermocouple and galvanometer to measure the total light × time output of the flash tubes.

Reviewed in a discussion on the design of a photo cell exposure meter October 18 - 1940

Herbert E. Grier



Today Mar. 2, 1940 I saw two flash units controlled by a third by means of the above circuit

Kenneth J. Hanselaer

trip
2-29-40
A. J. O'Brien

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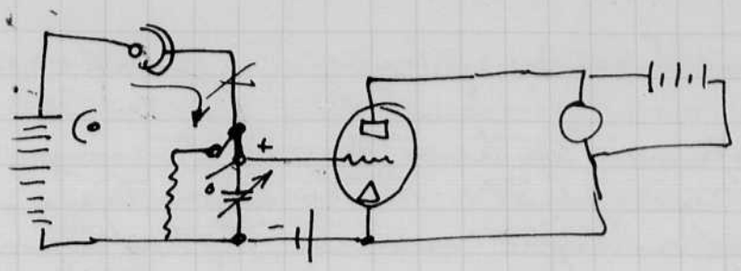


Switch
1st shunt condenser
2 flash lamp with P.C. in ckt.
3. Disconnect photocell.

As designed with Barstow.

Barstow is testing the use of a thermocouple and galvanometer to measure the total light × time output of the flash tubes.

Reviewed in a discussion on the design of a photo cell exposure meter October 18 - 1940

Herbert E. Grier

Hotel Deputy
March 2 1940

Have been very busy the past week.

Mr. Rineo is here this morning to inspect the photo electric pickup devices on the speedlight units. Left at 2 pm for his office.

March 3.

I gave a 5 min talk on WEEI yesterday afternoon at 5 p.m. Then left with Mycoff for Providence. Reached the Biltmore Hotel at 7 and attended meeting of the graduate apprentices of the Brownand Sharpe Co.

Mr. Baker toastmaster
Mr. Burk Pratt & Whitney Co.
or Burt.
Neil McLaren Experimental dept.
got home about 1 a.m.

On Monday Feb 26 Barslow, Mycoff and I set up three lights at the Boston Opera house and wired the box to the Box 27 where I had a 12 inch fg lens. The photos were used in the Record and in the american the next day.

Publicity Agent Robinovitch
Jensgate Hotel.
Clifford Fischer Producer
Follies Beregere.

Geo Woodruff was on the other side of the theater and took pictures also with his 4 x 5 speedgraphic.

The lights were placed - one in each wing and are directly overhead.

Mr. Baker of the Int. news from New York was in the box with me when the photos were taken.

Howard Elgert
MARCH 4 1940

The publicity agent of the Follies, Mr. Robinovitch was in this morning and made arrangements for me to take some more pictures of the show. Plan to go Thursday night. Also plan to shoot some multiple flash photographs on Tuesday, that is tomorrow of hand springs from the first act.

March 6 1940

Dick Cobean, Chas Wycoff, and I took the multiple flash unit to the opera house and took photos of the 4 morocco tumblers. I developed them at 6 pm and got home at 8 pm.

Clifton Tuttle of Eastman (via a letter from Jimmo) sent two copies of his report on the sensitivity of films with speed light lamps.

Hotel Dupont
March 2 1940

Have been very busy the past week.

Mr. Rineo is here this morning to inspect the photo electric pickup devices on the spotlight units. Left at 2 pm for his office.

March 3.

I gave a 5 min talk on WEEI yesterday afternoon at 5 p.m. Then left with Mycoff for Providence. Reached the Biltmore Hotel at 7 and attended meeting of the graduate apprentices of the Brownand Sharpe Co.

Mr. Baker toastmaster
Mr. Burk Pratt & Whitney Co.
or Burt.
Neil McLaren Experimental dept.
got home about 1 a.m.

On monday Feb 26 Barsdow, Mycoff and I set up three lights at the Boston Opera house and wired the box to the Box 27 where I had a 12 inch fq lens. The photos were used in the Record and in the american the next day.

Publicity agent Rabinovitch
Jensgate Hotel.
Clifford Fischer Producer
Follies Beregere.

Geo Woodruff was on the other side of the theater and took pictures also with his 4 x 5 speed graphic.

The lights were placed - one in each wing and one directly overhead.

Mr. Bolen of the Int. News from New York was in the box with me when the photos were taken.

Howard Eley
MARCH 4 1940

The publicity agent of the Follies Mr. Robinovitch was in this morning and made arrangements for me to take some more pictures of the show. Plan to go Thursday night. Also plan to shoot some multiple flash photographs on Tuesday, that is tomorrow of hand springs from the first act.

March 5 1940

Dick Cobeam, Chas Wycoff, and I took the multiple flash unit to the opera house and took photos of the 4 morocco tumblers. Developed them at 6 pm and got home at 9 pm.

Clifton Tuttle of Eastman (via a letter from Jimmo) sent two copies of his report on the sensitivity of films with speed light lamps.

H. E. Edgerton
March 10, 1940.

A few from some 11 dozen photos taken March 7 Thursday. at the Boston Opera House.
"Folies Bergere"

Back Stage
Chas Wycoff.
Dick Cobean

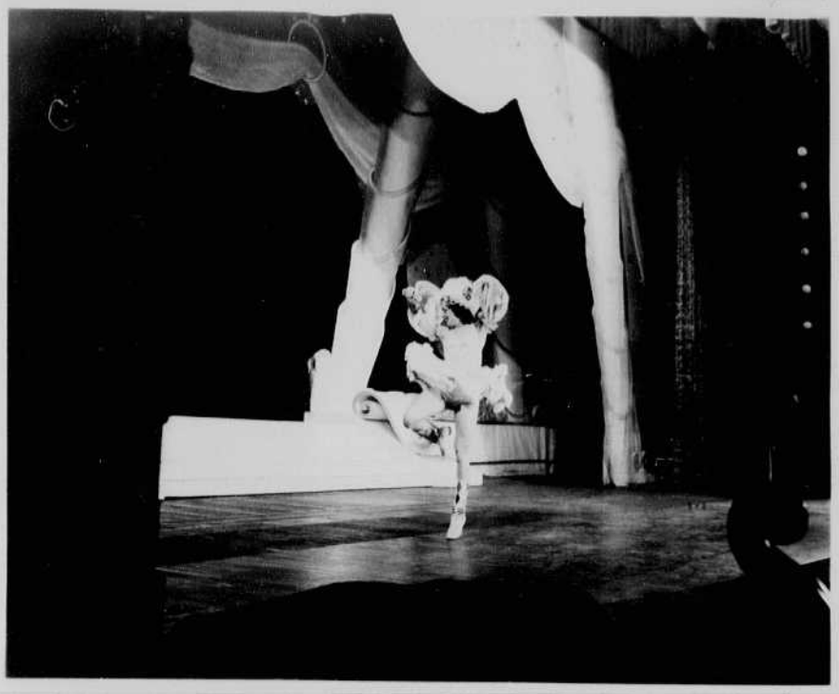
Fred Barstow
Frank Wylie.

Geo Woodruff had camera at left side of stage.
f 11 4 x 5.

I had my camera at side and back with an f 11-16 12 inch lens.

Mr. Jackman tended one light. Mr. Wilkins helped me shift film packs.

Seven lights were used.
Three in front at top in Border light holder. Each of these had a photocell trip with an OA#G tube.
One light was just in the left wing light another at right in orchestra pit.
Two 24" tubes were put in the footlights. 20 mf on each.
all other lights 112 mf 2000 v.



Willard Morgan.
New York.

A Z Edgerton
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all other lights 1/2 mf 2000 V.

Willard Morgan.
New York.

Harold Edgerton.
March 13 1940

Tried color shots yesterday in M.I.T. Studio.

Irogene Coca as Miranda.

Iris Wayne Specialty dancer.

~~Zosha~~
Pamela Devorme } did not come.

Used Kodachrome B with the special filter that Clifton Tuttle sent some time ago.

#86
10 minus red. } ? on envelope
dilute #38

f45

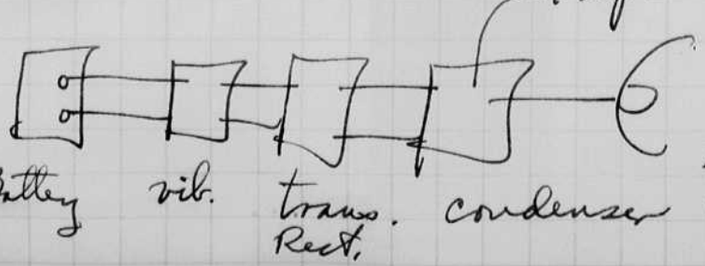
I had three lights 112 mf 2000 each and two lights 24 mf 3000 each. Chas. Wyckoff took a photo of the set up.

In evening Miss Barnett brought Melvene Ley for dancing photographs a few color were taken.

Tuttle sent a new filter today

86C & 86C & 86B.

The battery operated flash unit for portable use was tried last week and it seems to be ok. the drain is about 7 amps peak and 1.6 to 2 amps continuous.



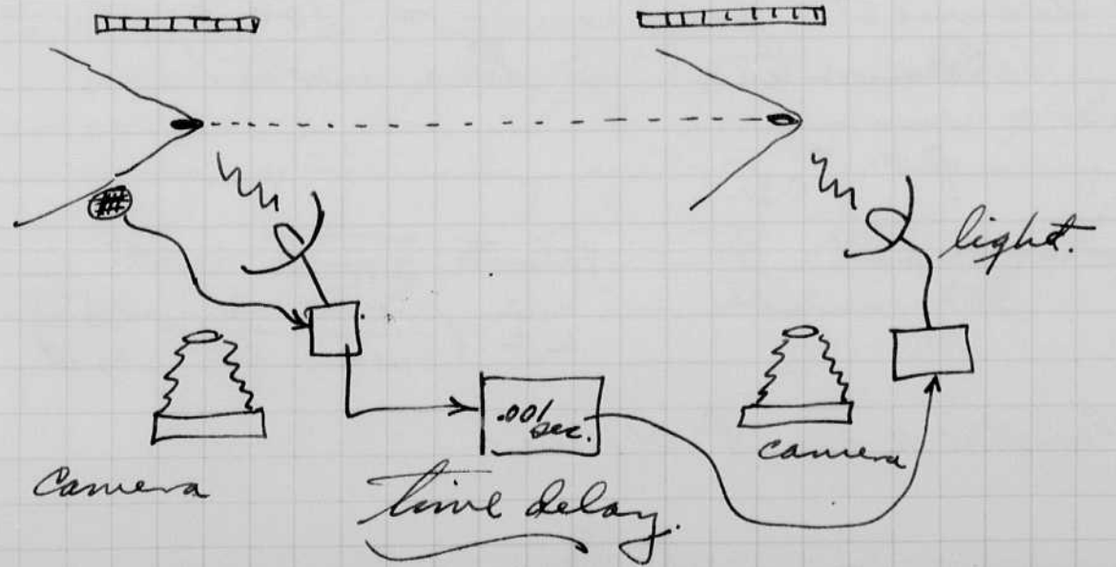
Harold E Edgerton.
March 14 1940

Dave Kenyon suggested the use of a "hard" three element tube in place of the thyratron in our circuits for tripping. He tried to devise one in the laboratory and found the requirements too severe.

I suggested that he try a "hard" tube and inductance, cutting the current quickly by the sudden application of a negative potential to the grid of the tube to cut off the plate current. This he has tried with success. One tube blew up when a cathode spot was formed on the screen grid. A protective resistor should have been used.

Cobean and Sackett are endeavoring to make a double light unit for photographing bullets. The object is to measure the velocity to 0.1% or better if possible.

The first light will be operated in the usual manner from microphone control. Then a time delay circuit is started which flashes the second tube at 1/1000 second later. The accuracy should be to better than one microsecond.



Harold E. Edgerton.
March 16 1940

Just discussed with Bitter methods of producing a magnetic field intensity of 300,000 gauss. (He gets 10,000 gauss or 100,000? now)

The method would be to use a small coil and give it a pulse lasting 1/100 of a second. The measurement would be by the system used by Kapitza in England.

I suggested the condenser discharge method again.

Figuring from an energy basis.

10 ergs per cm. for field.

$B = 300,000$ gauss

$$\text{Energy} = \frac{B^2}{8\pi} = \frac{(3\times10^5)^2}{8\pi} = \frac{9\times10^{10}}{24} = .4\times10^{10} = 4.\times10^9 \text{ ergs.}$$

$4.\times10^9 \times 10^{-7} = 4\times10^2 = \underline{400 \text{ joules.}}$

$\frac{CE^2}{2} = 1000.$

$C = \frac{1000}{2} \times \frac{1}{200^2} = \frac{1000}{8}\times10^{-6} = 120$ mf. use 200 mf.

Assume the frequency = 100 cycles.

Calculate the inductance.

$$f = \frac{1}{2\pi\sqrt{LC}}$$

$$\sqrt{LC} = \frac{1}{2\pi\ 100}$$

$$L = \left(\frac{1}{2\pi 100}\right)^2 \frac{1}{C} = \frac{1}{40\ 10^4}\ \frac{10^6}{200} = \frac{1}{80} \text{ h}$$

Resistance about .01 ohms.

March 16 1940

These single-flash outfits are going over big with the news men. Geo Woodruff of the Jnl. News has done most of the work. He took me to New York last week and wrote a very enthusiastic letter about it to me.

Kendric of the A.P. was in and got

Geo Hill of Wide World came in to see the light and get data for his company.

Monday March 18 1940.

On sat mar. 16 the movie apparatus was set up for 300 frames/sec. for photographing a heart in action. Dr. Walter Garvey Com. 6080 and Dr. Ash Kir. 8602 supplied the animals Friends of Ed Lamar.

Used 2 mf 1200 volts on an argon gnatz tube Hg controlled. Plus x film f 3.5 and f 4.5 with 25 - 30 min development in D 76 at 65-68° c. Some short ends of the negatives are attached in an envelope.

about 800 ft of negative stock was used. I took it to Howard Palm service yesterday after processing.

Made more prints with Chas Wyckoff yesterday of Tokio for Mr. Patrinotis.

1 test shot ligature ƒ 3.5.
2 50 ft ditto ƒ 4.5.
3 " mass enlarged without string ƒ 3.5
4 " ventricle fibrillized

DOG.

5. view of r. ventricle. ƒ 3.2
6. " " auricle & l. ventricle "
7. Auricular fibrillation & flutter of auricles
8. Ligature broke. 100 ft "
9. Ligation of coronary artery
10. Ventricular fibrillation

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASS.

Movies Heart.
March 16 1940
300 sec ƒ 3.5.
2 mf 1200 v.
Plus X film.

Notebook # 10

Filming and Separation Record

____ unmounted photograph(s)

8? negative strip(s) 3? inside envelope mounted on page 106
5? inside envelope mounted on page 107

____ unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located ~~between~~ on page 106 and ____.
and on page 107

Item(s) now housed in accompanying folder.

1 test shot Hyd. suspended in gelatine ligature f 3.5.
2 50 ft ditto f 4.5.
3 " mouse enlarged without X ray f 3.5
4 " ventricle fibrillated

DOG.

5. view of r. ventricle. f 3.2
6. " " auricle & l. ventricle "
7. Auricular fibrillation & paral. of auricles
8. Ligature broke. 100 ft " "
9. Ligation of coronary artery
10. Ventricular fibrillation

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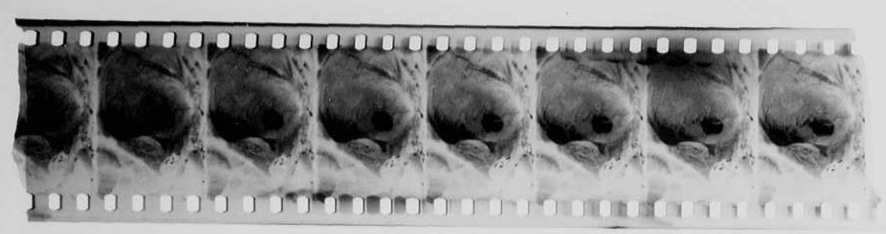
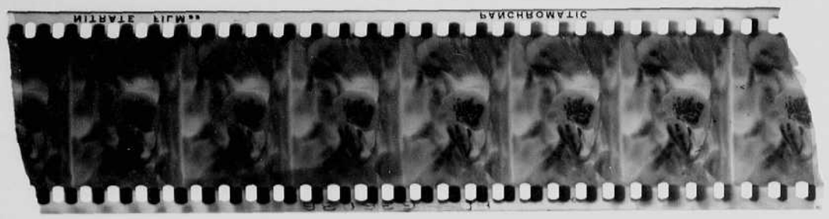
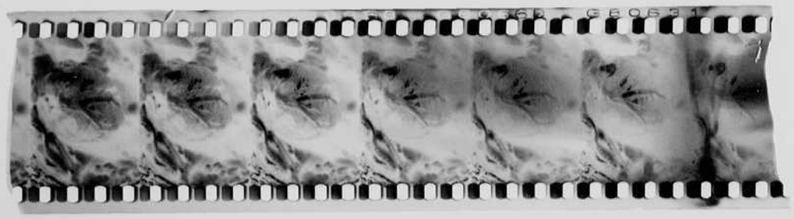
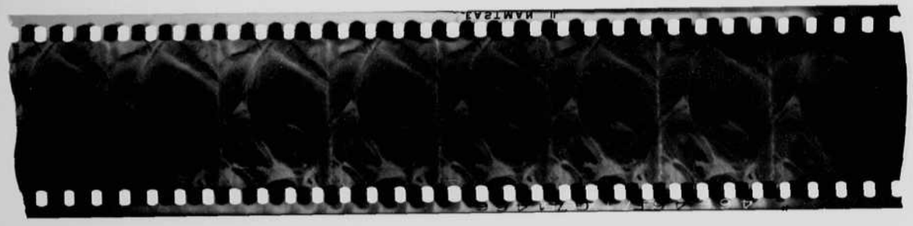
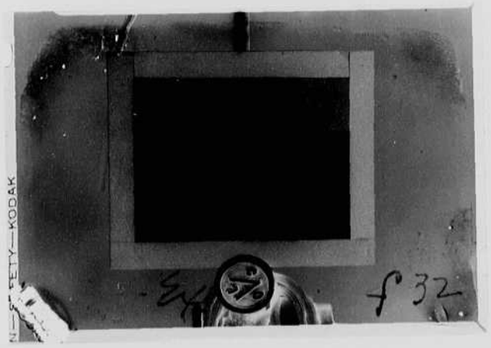



PANCHROMATIC






f8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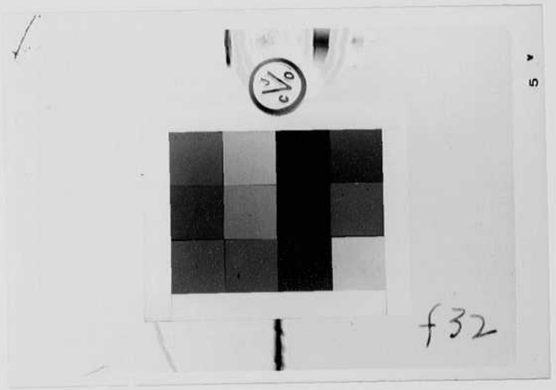
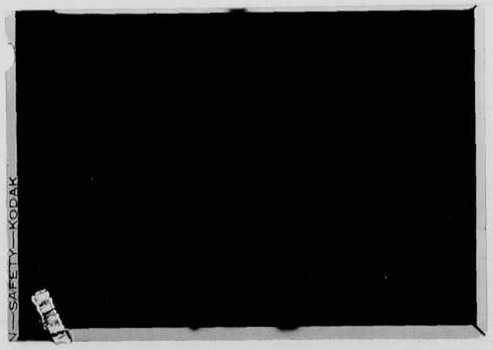

f32


f32



Test exposures of
3 Kinds of Film

	fog	coff
Verichrome	0.2 - 0.	
Experimental	0.34-0.	
~~X ortho X~~ (super)	0.30-0	

V .11 .16 .14 .15 .19

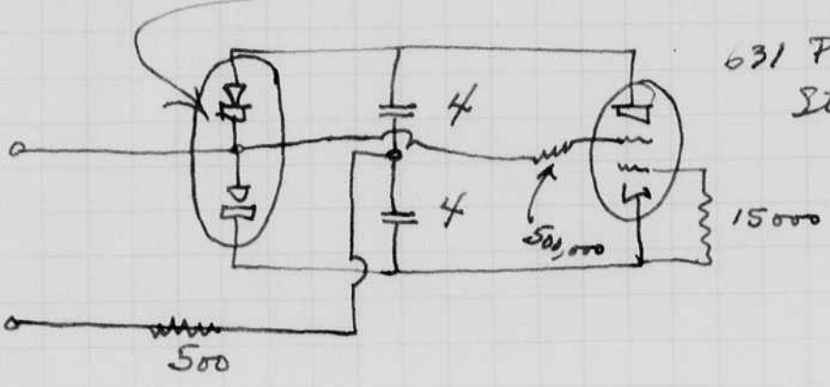
E

This data was taken March 18 monday during Dr. Tuttles visit. The new experimental film was made by him at the Eastman Company.

March 19 1940
Harold E Edgerton. 60 cycle Strobo.

Selenium Rectifier 2D9A1.

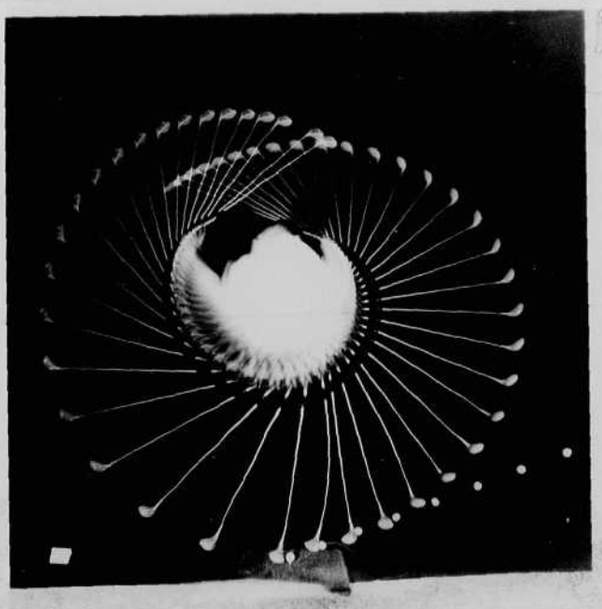
See page 14.



this works just as a strobo scope

March 23 1940 Saturday.

Mr. Morgan of M.G.M. was here again today at noon. Discussed with Rowlands the proposed trip to Hollywood & made a short of the strobo scope and speed photography story.



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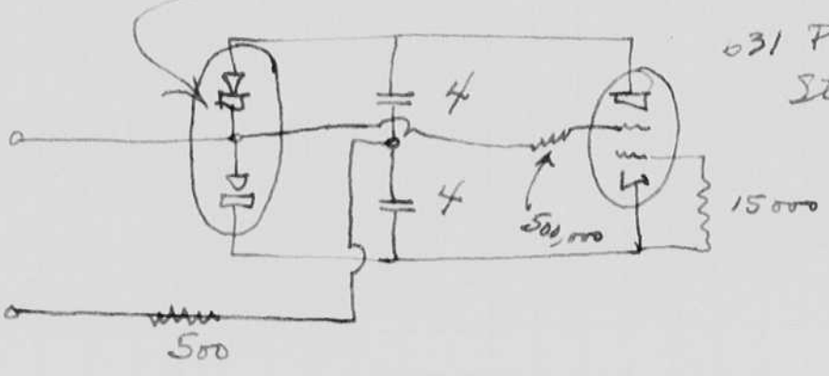

031 P1
Strobotron.

this works fine as a stroboscope

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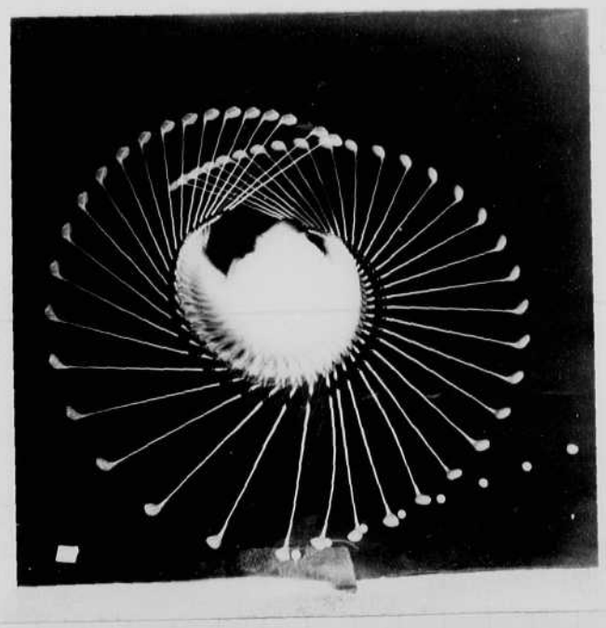

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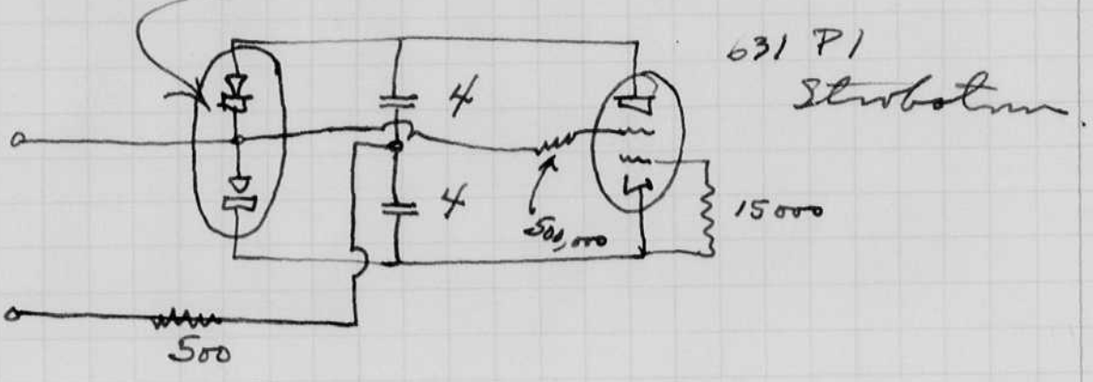

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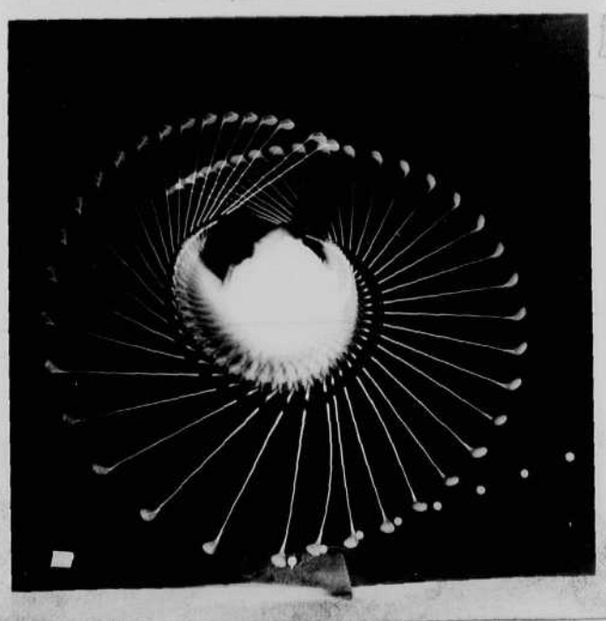

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Eleventh Annual

VISUAL EDUCATION CONFERENCE

Theme:

"What is New in Visual and Radio Education?"

Under the Auspices of the
NEW ENGLAND SECTION
DEPARTMENT OF VISUAL INSTRUCTION
of The
NATIONAL EDUCATION ASSOCIATION

SCHOOL OF EDUCATION, BOSTON UNIVERSITY
84 Exeter Street, near Boston Public Library

SATURDAY, MARCH 30, 1940

Morning Session at 9:30
Afternoon Session at 2
Continuous Exhibits 9:30—5

PLEASE SAVE THIS BOOKLET FOR FUTURE REFERENCE!
In Addition to Announcing Our Program, It Will Serve You as a Reliable Trade Directory for Your Needs In Visual and Radio Education

March 31 1940

ATTENTION is called to the BOSTON SECTION I.R.E. MEETING

Friday, March 29

6:30 P.M. Informal Dinner. Hotel Continental, Harvard Sq., Cambridge.

8:00 P.M. Jefferson Laboratory, Large Lecture Room.
More Work for the Electron.
Mr. B. J. Thompson

Electronics conference last week.

I showed the studio lights to quite a few people

B.J. Thomson.
Dr A.W. Hull
Dr. Chauncy Guy.
Dr Mailey
Dr. Johnson Geo.

Jackson took a photo of Mailey and Johnson.

Had a third rehearsal on Friday night at the photo service with miss Dyar for the april 2 dance. a stroboscope variable speed was used to light the dance. The effects are striking. Miss Bennett and a friend (or student) of Miss Dyar were present. Also Mr Mason and Mr. Valentine? tech students.

moved the office from 4-111 to 4-134 yesterday.

PROGRAM

Registrations and exhibits, 9:30 to 10:00 A.M.
Morning session begins at 10:00 promptly

What is being done in Visual and Radio Education in Rhode Island?

PROFESSOR HENRY E. CHILDS, Supervisor of Visual Education.
Providence Rhode Island Public Schools.
Professor of Visual Education at Brown University.

What in being done in Visual and Radio Education at Dartmouth?

PROFESSOR R. HAVEN FALCONER, Director of Audio-Visual Education.
Dartmouth College.

The Boston University Radio Institute.

A demonstration of popular adult education courses by radio.
Executive Director
DR. HOWARD M. LESOURD, Dean of Boston University Graduate School.

Motion Pictures on Human Relations.

A discussion and demonstration of the work of the Progressive Education Association Commission on Human Relations
DR. ALICE V. KELIHER, Director

Organized Effort to Open New Sources

Mr. FANNING HEARON, Executive Director, Association of School Film Libraries

---

EXHIBITS 11:30 until 2:00 LUNCHEON

A special three course luncheon awaits you at the Copley Sq. Hotel Dining Room. Meet with others interested in the visual field and discuss your problems.

AN EXCELLENT LUNCHEON FOR ONLY FIFTY CENTS
One minute walk to corner of Exeter and Huntington

A Review of the Literature in Visual and Radio Education.

MISS ETTA SCHNEIDER, Managing Editor,
Visualized Curriculum Series
Special Editor Educational Screen

Eye Witnesses to World Affairs

A discussion of the project which made the films available and a demonstration of a sample film.
MR. ROGER ALLBRIGHT, Secretary of Film Custodians, Inc.

Ultra High Speed Photography.

A demonstration of the applications of strobic light to photography
PROFESSOR HAROLD E. EDGERTON, Massachussets Institute of Technology.

The School and the World at Your Fingertips.

MR. PAUL C. RICHARDSON, Educational Director, Radio Corporations of America

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EXHIBITS 4:00 — 5:00 EXHIBITS

Silent and sound motion pictures—Lantern slides—Filmslides—All types and makes of still picture projection equipment—Screens for all purposes—Flat pictures individual and in units—Maps—Globes—Models.

COME AND STAY ALL DAY

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Ignitron type tube.
10-15 amps.
50-75 volts.

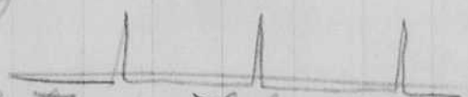
Power 500+ watts.

300 watts per phase
200 volts
20 mf.

676 thyratron
H.O. expensive
Rectox charger

no tubes

(1.) Rotating dry pulse generator.



Rectox rectifier to prevent back current.

(2.) Saturating transformers
Series condenser.
Power needed 500 to 1000 per phase

From lectures by Mr. Cox
Westinghouse
about April 2.

April 6, 1940
Dear Edgerton.

M.L. Sandell of Eastman Kodak Co was here the past week. (Rochester N.Y.). Arrived Monday April 1. We showed him all our developments. Practiced monday night with miss Dyear and miss Barnett on strobo dance. -
Tuesday. Mili from N.Y. took photos with Nelson * took P.C controlled lamps for this. Swimm. and horses.
Wednesday - Mili from N.Y. to Forbes Litho. -
Thursday. - Dinner with Irazies.
Friday - Dance rehearsal. Main night of Polaroid brought over the projector for color slides. Sandell left Friday night.

Mr. Teicht of Wright Field came by plane on Tuesday at 2:30. Sage Barstow, Sandell and I met him and went over the ship. Pilot: Capt. Warburton.

Movie Camera

I suggest the use of an electric magnetic pull down with flash control of the light for movie work. the condenser charging circuit could supply the energy to move the film.

May. 1, 1940.

The arrangement with the Eastman Kodak Company was approved by the receipt of a letter today.

The last weekend was spent in an attempt to "shoot" the show "Keep off the Grass" in color Kodachrome. Jim Mili brought 7 lamps from New York. (Joe Kithley and Pete came by automobile. I supplied 8 lamps and two rotary converters. 1000 watts each. f 4.5 on Kodachrome B. with special filter I received from Clifton Tuttle of Eastman. Mili used outdoor Kodachrome with some filter.?

May 8, 1940

Mr. Case and Dr. Tuttle of Eastman Co arrived by plane in the late afternoon from Rochester. I had dinner with them at the Copley-plaza. Then Clifton Tuttle and I came to lab for some experiments. Discussed movies with stroboscopic light again, especially for staged affairs like in Hollywood.

At M.I.T. we flashed an 18 inch tube with about 1500 mf at 2000 volts. Also flashed a spiral with 224 mf 2000 volts in an 18" mirror. a photo of the piano factory was taken on the new film with this combination at f 3.5 in the aircraft camera 13.5" lens. Developed in D x 50 about 15 min. The developer was several weeks old. Chas Wyckoff and Fred Barlow assisted with these experiments.

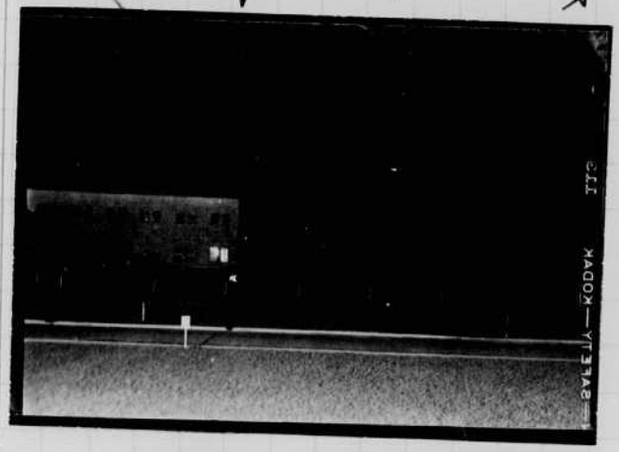
Film F.E. 14917

A smear photo of an 18 inch tube with 112 mf 2000 volts was taken to show the light from the tube. I plan to paste a print in this book showing the variations and waves in the light.

May 8 1940 cont.

completed arrangements with mr. morgan of M-G-M about trip to Hollywood to make shots in the stroboscope. Dennis and I plan to go the end of June or the first of July.

↓ chas Wyckoff running



f4.5
1400 wtf
2000 v.
line lamps
20" long.

spiral lamp in a 28" mirror. to throw a beam

f: 3.5
army camera
12" lens? ±.

1400 wtf.
2000 v.

Fred Barstow
chas Wyckoff
Dr Edgerton.
Clifton Tuttle.

20 inch lamps.

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May 8, 1940

Mr. Case and Dr. Tuttle of Eastman Co arrived by plane in the late afternoon from Rochester. I had dinner with them at the Copley-Plaza. Then Clifton Tuttle and I came to lab. for some experiments. Discussed movies with stroboscopic light again, especially for staged affairs like in Hollywood.

At M.I.T. we flashed an 18 inch tube with about 1500 mf at 2000 volts. Also flashed a spiral with 224 mf 2000 volts in an 18" mirror. a photo of the piano factory was taken on the new film with this combination at f 3.5 in the aircraft camera 13.5" lens. Developed in D x 50 about 15 min. The developer was several weeks old. Chas Wyckoff and Fred Barton assisted with these experiments.

Film F.E. 14917

A smear photo of an 18 inch tube with 112 mf 2000 volts was taken to show the light from the tube. I plan to paste a print in this book showing the variations and waves in the light.

May 8 1940 cont.

Completed arrangements with Mr. Morgan of M-G-M about trip to Hollywood to make shots on the Skyroscope. Dennis and I plan to go the end of June or the first of July.

↓ Chas Wyckoff running ↓

f4.5
1400 wt
2000 v.
Five lamps
20" long.

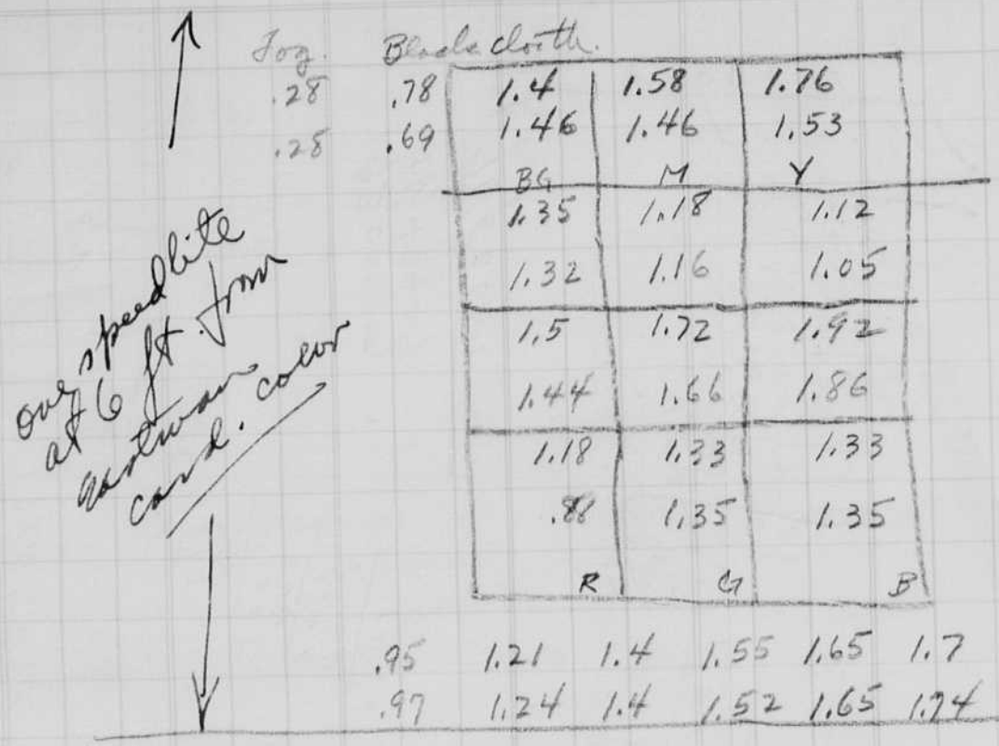
Spiral lamps in a 28" mirror. to throw a beam

f: 3.5
army camera
12" lens? ±

1400 wt.
2000 v.

Fred Barstow
Chas Wyckoff
Dr Edgerton.
Clifton Tuttle.

20 inch lamp.



	Fog	1	2	3	4	5	6	7	8	9	10
15152 ↓ 52	.20	.33	.38	.44	.52	.63	.72	.84	.94	1.04	1.1
14917 FE	.21	.24	.29	.34	.43	.54	.63	.72	.81	.86	.92
↓ XX	.22	.24	.28	.34	.40	.48	.60	.73	.87	.96	1.00
↓ XX		.24	.28	.32	.39	.50	.60	.74	.84	.92	.99 check.

→ Eastman Gray Scale one speedlite at 12 ft.

Super XX.

Eastman Experimental Emulsion

" Received on " May 14, 1940.

Dan Wakeloff
H Edgerton
May 14 1940.

In May of the IB corps took several photographs with his single shot camera using Eastman Ex Emulsion 15152.

May 15, 1940.
Harold E. Edgerton.

Extended trip last week.
Left Wed night for Cleveland where I arrived at noon. Mr. Enfield met me at the station and showed me the plant. Met Mr. Jeffries and discussed the manufacture of our flash lamps in the Nela Park plant of the G.E. Co.
Thursday May 9 evening talked to the M.I.T. Club at the terminal Bldg.

Friday May 10 Wright field in the afternoon and then talked to the Dayton Engineering Club in the evening. Stayed with Goldsmith.

Saturday May 11. Arrived in Cincinnati about noon and had lunch with Crosley and others (Goss etc). Talked that night in Wilson auditorium to the Sigma Xi society.

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May 27 1940
Harold Edgerton.

Set up movie apparatus and took pictures Friday May 24 for Dewey and Almy Chemical Co Cambridge. Mr. Gray (Adv.) and Mr. Brown (Patent) authorized the work.

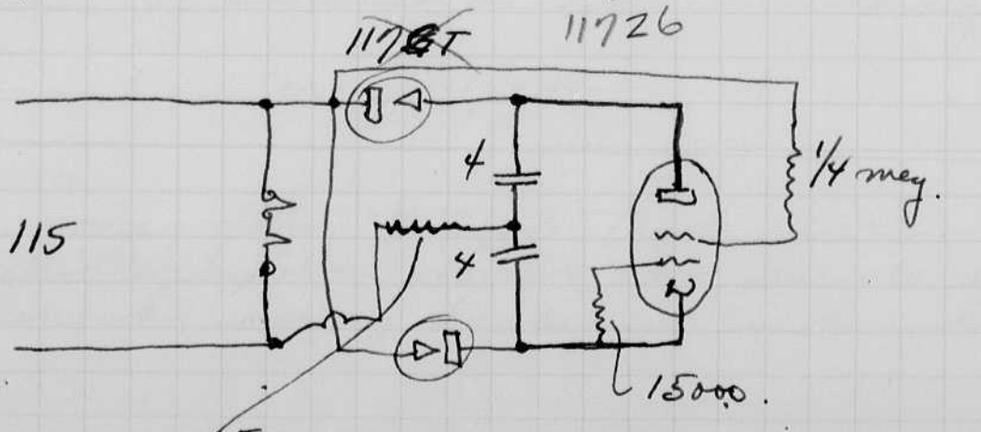
f:3.2 Background X
One lamp 1 mf 1200 volts.
3 phase power supply.

Developed at Steward and print run today. also shot another machine this morning, in the same plant.

The picture were of nozzles depositing rubber compound into the lids of tins cans.

On May 23 Barstow and I went to Providence. First we visited the U.S. Rubber Co. Mr. E. Hazel. Then we went to the R.I. Country Club for an M.I.T. dinner. K.T. Compton, Killian, Thrasher, Locke, Jope. from Boston were there.

On Saturday May 25 Barstow helped me write up a new type of full wave rectifier tube ~~that~~ Bemelmans suggested for the 60 cycle stroboscope.



a 500 ohm resistor was used here but it is not necessary.

May 27 1940 cont.
H. E. Edgerton

During dinner with Barstow at Walter's discussed flash photography from airplanes.

It seems that a lamp 20 inches long and 1/2 an inch in diameter can "take" 1500 microfarads at 2000 volts without any difficulty whatever. This tube will be coiled into a special reflector that Barstow is designing. There will be 6, 8 or possibly 10 of these in the bomb bay of the type B-18 plane (army Bomber).

Suppose 8 lamps x 1500 microfarads
8
12,000 microfarads.

assume that this will photograph a 50° cone from 3000 ft. then a second photo will need to be taken every 2500 ft or so along the travel of the ship. Assume a speed of 250 miles per hour. This calls for 500 flashes per hour or $\frac{500}{60 \times 60}$ = .14 flashes per second.

or 7.1 seconds between flashes.

With a constant current generator

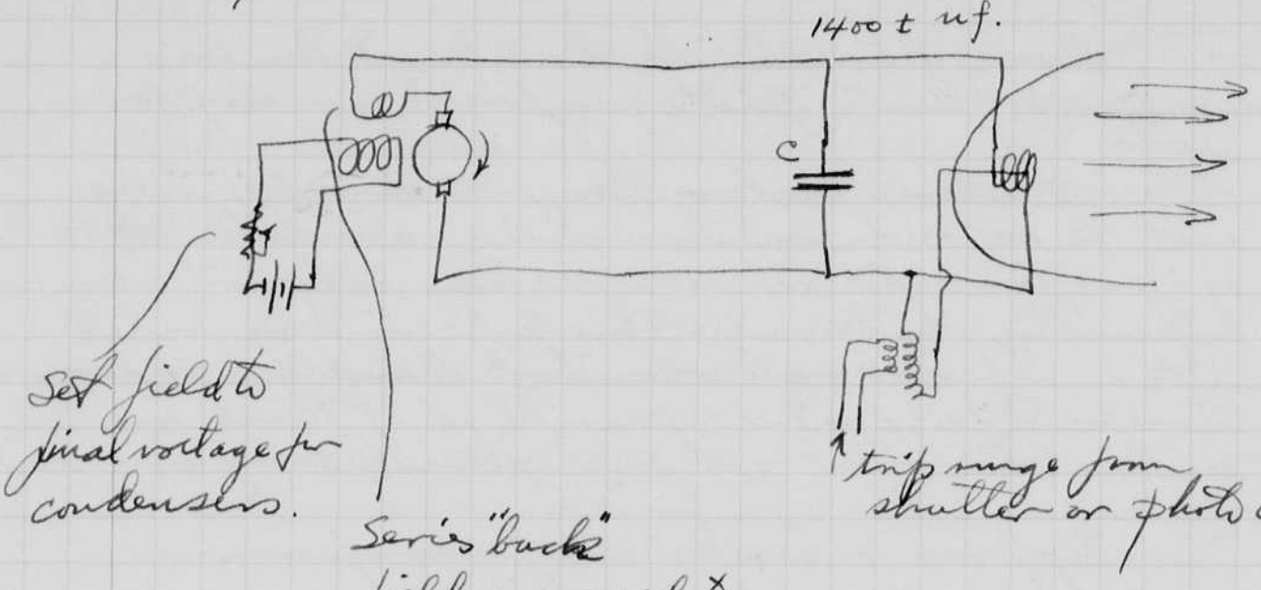
$$\frac{CE^2}{2} = EI \times t.$$

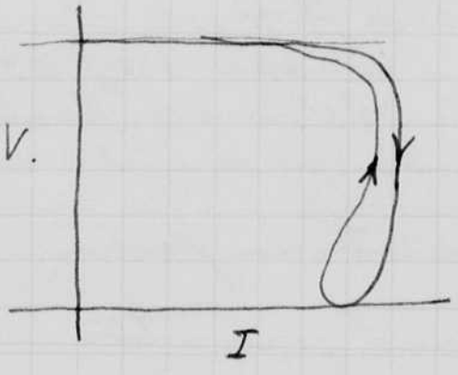
$$I = \frac{CE}{2 \times t} = \frac{2000 \times 12{,}000 \times 10^{-6}}{2 \times 7.1} = \frac{12}{7.1} = 1.7 \text{ amps per lamp.}$$

$8 \times 1.7 = 13.6$ amps

I suggested a constant current generator of the shunt under compounded type that should level off to the right voltage and go to short circuit with the condenser-tube circuit without a series resistor to hold back the current. circuit next page.

May 27 1940 cont.
H. E. Edgerton.



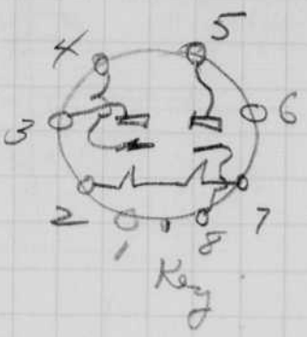


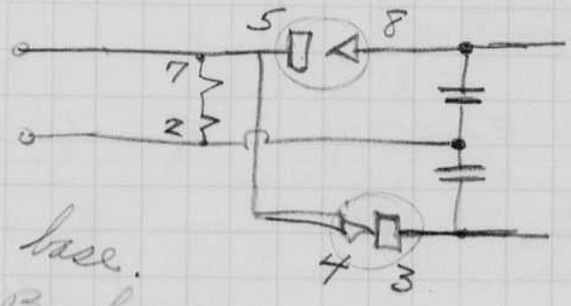
V-A curve of d.c. generator to charge condenser.

Cathode 2,7 heater.

Tube 1 C 8 P5

2 C 4 P 3.





25z6 base.

RCA Book

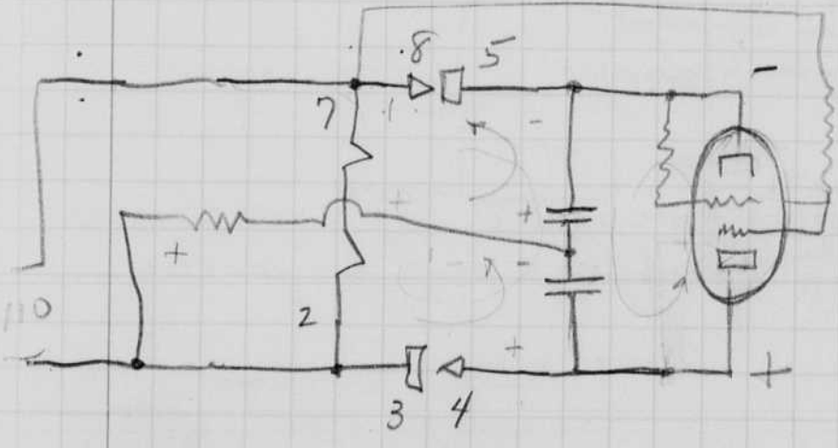
Connections used yesterday and yesterday. !!!

line 2 and 3 ▽ 4 +

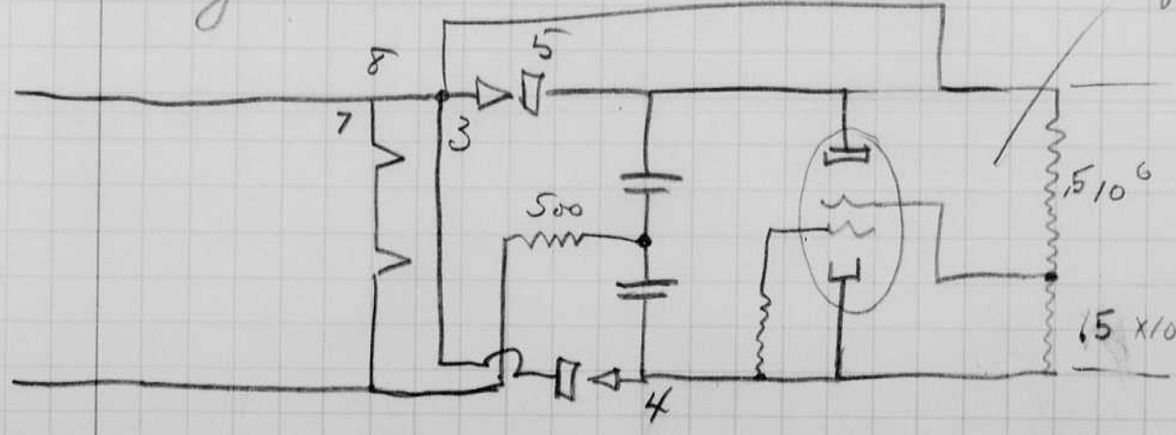
line 7 and 8 5 −

6 open.

1 open



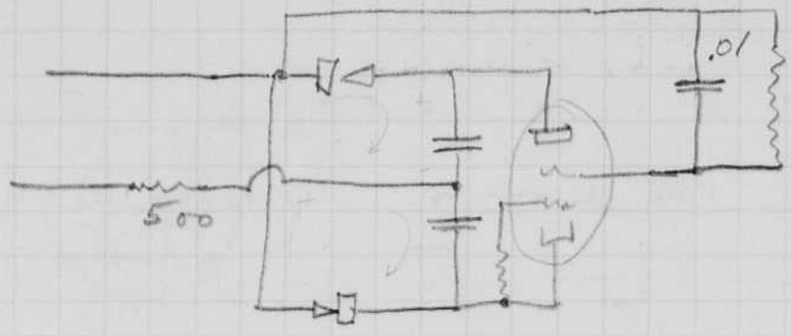
Changed to



Does not work with an old tube (63, P1) which requires grid current. Otherwise fine.

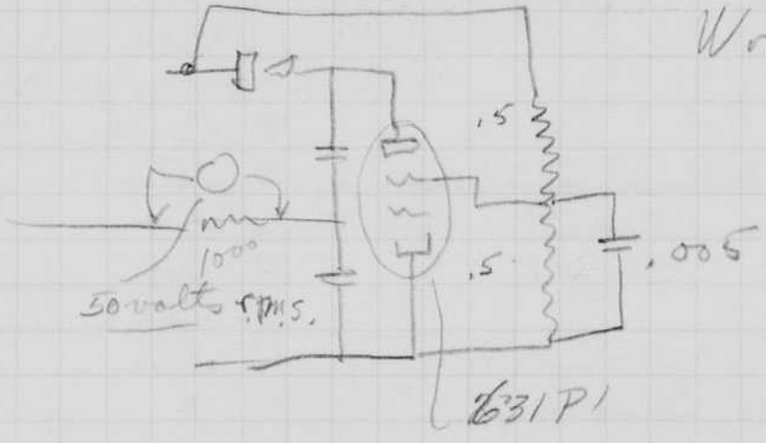
300.

150.



Jitters.

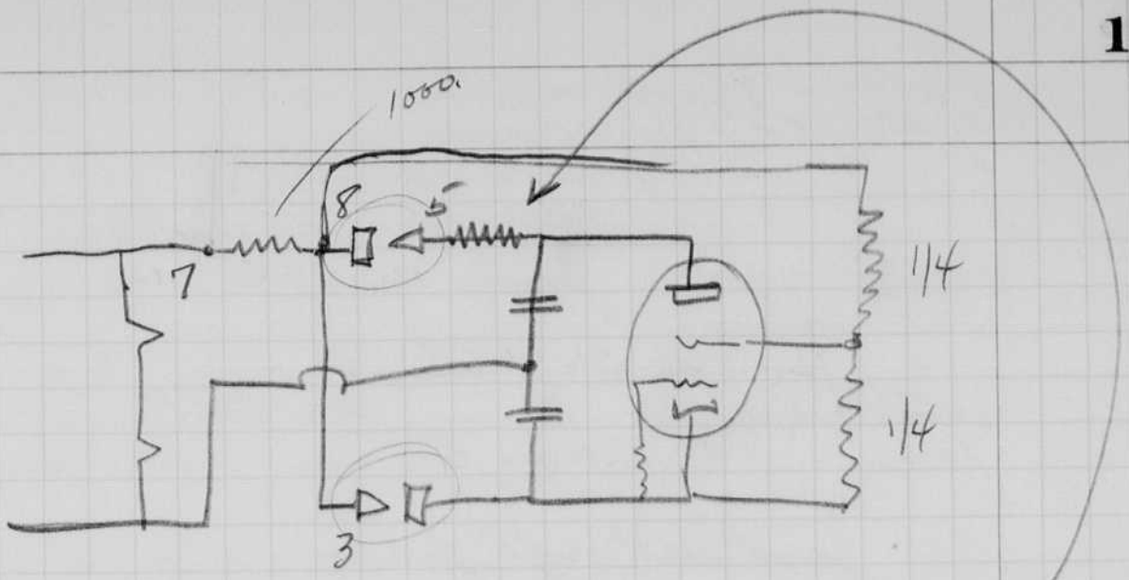
$.01 \text{ sec} = RC = R \times .01 \times 10^{-6} \quad R = 10^6 \text{ ohms.}$



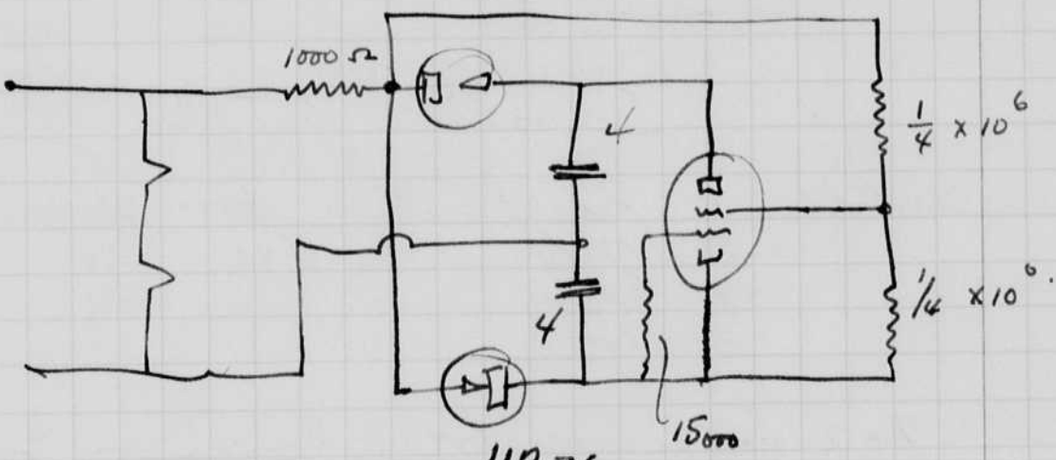
Works ok.

$\frac{50^2}{1000} = 2.5 \text{ watts.}$

Increased charging resistor to 1000 ohms
This reduces plate voltage and improves operation



The top condenser charges first. Increase the charging resistor in this side to hold it back for half a cycle.



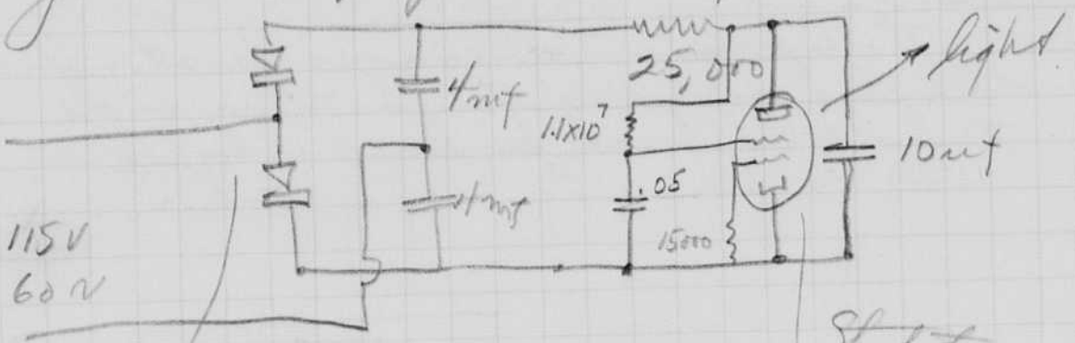
11726.

June 1 1940
Harold E Edgerton

Blinker Stroboscope
from 110 volt ac.

James Dadaleo wired from U.Y. yesterday coming a blinker. Suggested a circuit in a letter yesterday.

Just set up following circuit.



Stroboscope.

Selenium rectifier.

Stroboscope 1 82 flashes per minute.
2 72 "
1 82 "
3. 100 "

checks.

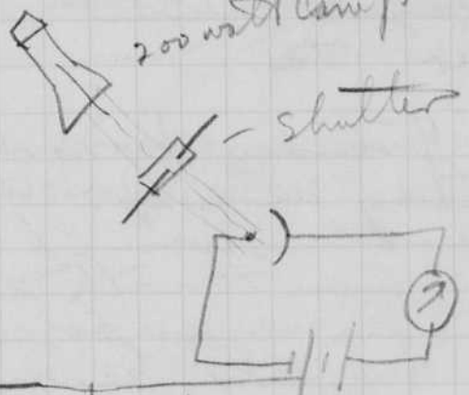
no 2 has a high breakdown voltage
no 3 " " low " "
1 " " med " "

Operation is also ok when a 1 mf condenser is used for each of the ones above marked 1/4 mf. The ripple of the rectified output is about 20-3 times as much.

Shutter test

Compur 11.5 cm lens 3¼ × 4¼

~~1/25~~	8.2 mm deflection.
1/100	1.7
1/250	1.1



Eastman

1/50	6.2
1/400	1.4

1/25	9.7	9.8		.04	440v.
50	4.6	4.6		.019	
100	2.9	2.9		.012	
400	1.0	1.0	.95	.0041	.0025 ?

Compur. 25	9.7	9.7		.04	
50	4.9	5.0		.020	
100	2.1	2.1		.0087	.01
250	1.35	1.35.		.0056	.004

Harold E Edgerton.
June 11, 1940.

Just returned from trip to Providence R.I. U.S. Rubber Plant. to show them movies that were taken on Sunday June 7 1940. Subject - golf ball winding machine. Mr. Hagedorn, Barnett, Fisk, Kurt Fisher etc.

Yesterday I was at the Pratt and Whitney aircraft to see if any of our apparatus would help them. Merchant with the study of air flow in a supercharger. Prof of R.P.I. aeronautics dept.

June 12 Making final plans for departure on Saturday noon June 15 via albany, Chicago, and Grand Island, for Aurora.

June 14, 1940 All set for leaving at 2.20 ~~E.S. Dst~~ time tomorrow via Band A & albany — N Y central to Chi. Stay at Stevens Hotel. Then U.P. to Central city, Nebr.

August 7 1940
Harold E. Edgerton

I returned yesterday on train no 14 from the west with my family. Left Grand Island on Sunday at 4.35 pm on the Union Pacific. I came from San Francisco the week before on the same train and was met by Estin.

Below is a sheet showing how some of my time was spent while west. Some on back of sheet.

Harold E. Edgerton.
July 2 1940.

Progress Report.

BEVERLY HILLS HOTEL AND BUNGALOWS
BEVERLY HILLS, CALIFORNIA

June 24
arrived Los Angeles Monday June 24 1940.
arranged to work in Stage 2 on MGM Lot. Harry Cohen.
June 25 tues. Set up apparatus for tests on Stage 2.
26 Wed. made first tests of full length figure at 600/sec.
27. Thurs. Shot pictures all day.
28. Fri. " " " "

Harvard & Dayton.
June 11, 1940.

last rented from Lufkin to Providence R.I. U.S. Rubber Plant. To show them movies that were taken on Sunday June 7 1940. Subject - golf ball winding machine. Mr. Hayden, Barnes, Fisk, Kurt - Fisher etc.

Yesterday I was at the Pratt and Whitney aircraft to see if they could help us in any way with the study of air flow in a supercharger. I met Mr. Gray of R.P.I. aeronautics dept.

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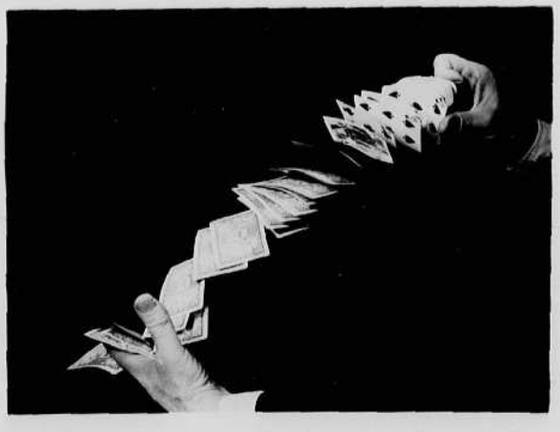

August 7 1940
Harold E. Edgerton

I returned yesterday on train no 16 from the west with my family. Left Grand Island on Sunday at 4.35 pm on the Union Pacific. I came from San Francisco the week before on the same train and was met by Eaton.

Below is a sheet showing how some of my time was spent while west. Some on back of sheet.

Harold Edgerton.

Progress Report. July 2 1940.

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28. Fri. " " " "

U.S. Rubber Plant. To show them movies that were taken on Sunday June 7 1940. Subject - golf ball winding machine. Mr. Hagen, Barnet, Fisk, Kurt Fisher etc.

Yesterday I was at the Pratt and Whitney aircraft to see if my explosive apparatus would help me. Bergeland with the study of air flow in a supercharger. Prof of R.P.I. aeronautics dept.

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Grand Island on Sunday at 4.35 p m
on the Union Pacific. I came from
San Francisco the week before on the
same train and was met by Estes.

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Harold E. Edgerton.
July 2 1940.

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27. Thurs. Shot pictures all day.
28. Fri. " " " "
29. Sat. Screened photos arranged to repump lamps.
30 Sun. Long beach. Gemes left for S.F.
July 1 Mon. Screened movies - discussed changes. pumped 4 lamps.
1.5 mm H_2 15 inches argon.
July 2. Tues. Shot cat drinking, cat drop, soap bubble, Bullet with
Globe. Golf ball through board. 9 am to 6.30 p m.
Stayed until test shots had run through neg developer.
July 3. Reviewed pictures taken on tuesday.
July 4. Thurs. Swim in morning with Frank Wyle - spent the
rest of the day with his family in Westwood.
July 5. Fri Discussed high-speed single flash photography and color.
Meeting with Smith planning for next weeks.
July 6. Sat. Moving in Hollywood. Left on 4 p m boat for Catalina Island to
see flying fish for photographing.
July 7. Sun. Returned on 3.15 Plane to L.A.
" 8 mon Test shots with strobe.
9 Tues. Dress set for movies.
10 Wed Production Golfer Football
11 Thurs. " Drill tooth, Bubble, Strobe,
12 Friday. no film
13 Sat. Rashot bubble, milk splash, bullet, drum.
14 Sun. Wyle swim.
15 Mon. Rashot bubble. Cut neg tomorrow.
16 Tues. took trip to Pasandena with Smith G.R.C. Potters Washburn.

Harold E Edgerton.
June 11, 1940.

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July 17. Wed - Made plans for retakes and more material.
18 Thurs. - Shot 50 takes high speed also scene.
19. Frid - Demonstration at 4 p.m. Stills in morning.

Aug 7 1940.
Harold Edgerton.

Summary of activities after July 19.

July 20. Bert Sperling and Dick Evans Geo. Young helped me pack my apparatus Saturday for shipment to Boston.

~~July 20~~ In afternoon Frank Wyle and I drove in his car to Wilmington for trip to Catalina Island to get photos of flying fish and birds. Mounted two tubular lamps 24 mf on each 2000 v and one speed light (Herald-Express of July 21.)

Mrs. Edna Overholt publicity agent.
Ted ~~Feldman~~ Smith Photographer.
Mrs Overholt boy.
Sid Feldin Photographer.
Miles Overholt.
Oscar Wick Electrician.
Claude Walton Boat owner.
Geo. Demiliere Jr.
Chick Upton Guide on boat.
Lester Baldwin. St. Catherine Hotel.

We took pictures also on Sunday night July 21 on a trip to the Lagoon and return. Left on morning boat July 22 for Wilmington. Spent day at Studio N.B.C. then dinner with the Wylies in West L.A.

Left on July 23 at 12 pm on S.P. for San Francisco co. Registered at Roosevelt Hotel.

July 24 Called Tiny Ford in morning and took a cab to his house. then went to Mills field and rode over the city in a twin engined Beechcraft plane. One of the pilots was taking his blind flying test at that time.

Fairchild N.C. 28508
Ford's plane.

cont.

after landing at mills field Gov. Ford and I went to the Ice Follies and took picture with six lights of

Roy Shipstead
Evalyn Chandler
Bess Ehrhardt

Commercial photographer in S.F. Irving Moulin

Pub. Agent Ice Follies W. H. Hadlick.

Ford's crew from Carmel Laurence Dutton technician.
Bob. Carter. electrician
Monterey Calif.

We then went to the Palace Hotel and took some photos of the De Marcos who were then dancing in the Rose Room.

At hotel. Wallace Marley and Ted White.

Mr. M.F. Elwess of the Eastman Kodak Co came over to the Palace to see the photography.

July 25. Went to the S.F. Fair in the morning. Had lunch with Ford and . at the Union and Pacific Club. then took Ford's plane from mills field for Carmel. Ford was at the controls. Mr. Bixby went along. Flew down the coast line and landed at Monterey.

July 26. I worked with Bob Carter several hours to locate trouble in a speedlamp apparatus. a ground connection was loose at one place which caused trouble. Took the afternoon plane back to mills field in S.F. Taxi to hotel. then to Challenger train from the Ferry terminal Bldg. Arrived in D.C. on July 28 at 4.20 Nebraska.

Aug 7 1940
Harold E. Edgerton.

Motion-Picture Still Photography.

It occured to me when in the studio at M.G.M. that the "still" pictures could be best taken during the action by the use of electrical flash photography. The method would be; to snap the picture at the moment that the shutter was closed on the motion picture camera.

Now the still photographer takes ~~the~~ his pictures after the movie. He requires the actors to hold a pose and he generally uses an exposure of about a second. This time is needed because the film in the still camera is larger (4x5) or (8x10) ~~and~~ than the movie film and therefore a much smaller aperature is needed — incidently more time.

With the flash method, the exposure time would be less than 1/10,000 second, and the pictures could be taken to catch the natural action ~~and~~ of the scene. Since the flash occurs during the time the camera shutter is closed — there will be no exposure on the movie film.

Without camera synchronization, one frame might be over exposed part of the time.

The electrical flash lamps can be mounted in the actual lamps and reflectors of the ordinary light sources and can in this way produce exactly the same illumination as the regular lights for the flash.

Also they flash lamps can be put in

separate reflectors and thereby the lighting for the still picture can be different than the movie.

I discussed this method of "still" photography with Mr. Arnold ~~the~~ of the camera department at M.G.M. and with several others at that studio shortly after I arrived there. Mr. Don Mc Elwaine of the publicity dept. thought the most important factor would be the saving of time that is now required for the taking of the still picture. About 20 minutes a day would be saved and this is worth money to the studio.

"

There are several methods of accomplishing the method just described. One possible method would be to include the still camera in the blimp with the movie camera. The synchronization could be either mechanical, electrical or a combination of the two. Care ~~must~~ needs to be taken that the click of shutter is quiet enough ~~that~~ not to record on the sound track.

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Aug 10 1940
Harold E Edgerton

Worked last night and yesterday with P. M. Murphy who is through today. He has been working with Barstow this summer and adding to ~~the~~ his thesis. S.M.

We experimented with a cathode-ray oscillograph method of taking characteristics of flash lamps. Voltage and current curves were taken of spiral lamps and straight tube.

Germeshausen is going to make a series of tube on Monday of different diameters from 4 to 12 mm I.D. ~~—~~ length about 10 inches. We will determine the effect of diameter with Xe Kr gas.

A telegram came ~~from~~ Cleveland ~~for~~ yesterday that Lyman Johnson of the General Electric was on his way to Boston and would be here Monday.

I phoned Jay Jeffries last ~~Tuesday~~ Wednesday to get action on the manufacture of lamps to be used in the Eastman Kodak units.

I

	O.D.	I.D.	Length	Press.	
Spiral	9 mm	6 mm	18 inch	3.5 cm	Kr-Xe
St tube		15.	8 "	15 cm.	Argon.
old V		6 cm.	9.5/10 "	5 cm.	Xe Kr.

Aug. 12 1940
Harold E. Edgerton

Lyman Johnson was here all day yesterday and received information from Bernesthausen concerning the manufacture of our flash lamps for the Kodatron unit.

~~On~~ Aug 10 (Sat) the first 6 ~~Kodatron~~ flashlamps were sent. 3 to Sandell and 3 to Kaufmann & Fabre, Chicago.

dimensions and data on three lamps that we use a great deal. The spiral is used in the Kodatron unit. The ST tube is used by amateurs, the old U tube is one that was used before the Kodatron type spiral.

With 2000 volts 112 mf the spiral takes a peak current of about 500+ amperes.

The capacity needs to be reduced to 2 mf before the ST tube current is reduced to 500.

Aug 14 1940
Harold E Edgerton

~~Strobotron~~ Blinker.

The blinker life test started on June 1, p 122 this book, was discontinued by Orrin on Aug 2 when lamp started to miss. Dennis and I examined the tube today, apparently the anode had sputtered due to inductance in the circuit. The top half of the tube was quite black.

I put another 631P1 Strobotron in the blinker today and also a resistance in series with the discharge circuit a resistance of 0.3 ohm was enough to prevent the reversal of the plate voltage as observed by a cathode Ray Oscillograph.

The peak current was about 300 amperes in this circuit.

The low resistance was put in and the blinker again started on another life test. The rate was 122 flashes per minute.

I worked yesterday with Volt-amps curves on the spiral that is used in the N.E.L. Exhibit in N.Y.

New coils were made for the CR tube to decrease the sensitivity. The factor for these is

$= \frac{1.4}{5.3} \times 585 = \frac{165}{1.4} \times 110$ amp/cm old coils

$\frac{585}{1.4} = 393 = 393$ amps/cm new coils.

With 2000 volts and 30 mf the G.E.C.R. type tube (G.R. Stroboluxwith 1.5 cm Kr-Xe) drew a peak current of 2 x 393 ≅ 800 amps.

The Kodalum spiral drew a current of 0.9 x 393 with 30 mf. at 2000 volts.

Portable Battery Operated Flash unit.

Herb Grier has wired up a battery operated model. With 28 mf and 2 lb GR type spiral, the life was too short.

I used this unit last night when setting up the experiments recorded above and on the previous page.

I set up a life test this morning with 11 mf 2000 volts - flashing twice a minute by clockwork.

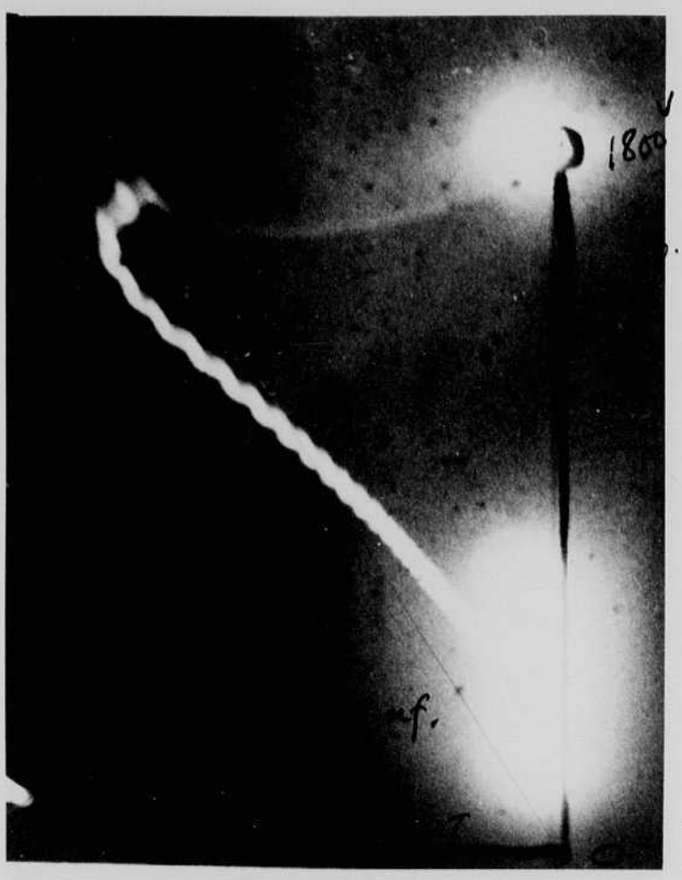
Aug. 17, 1940.

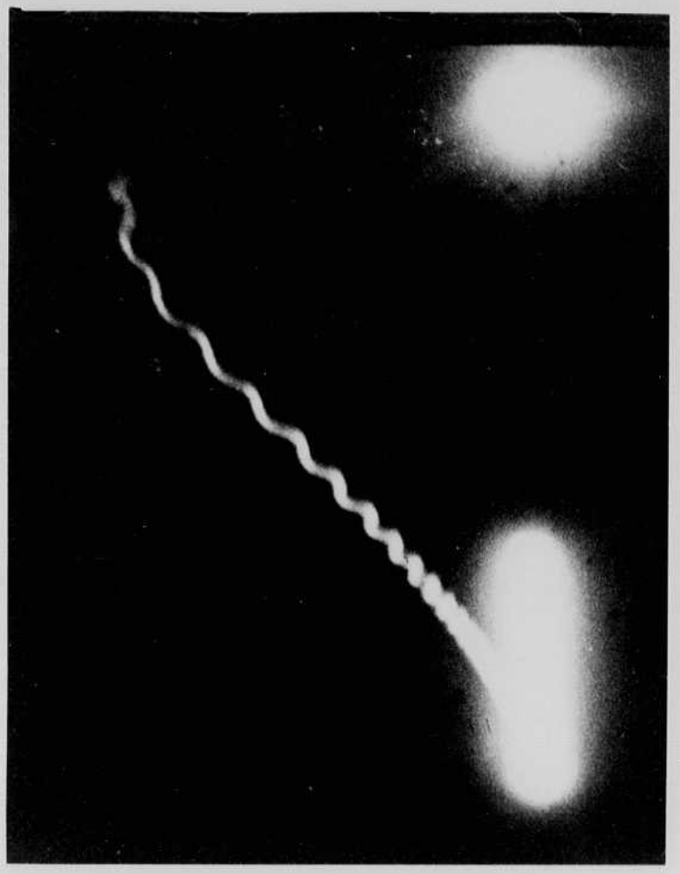
The life test with 11 mf ran several thousand hours without damage to the tube.

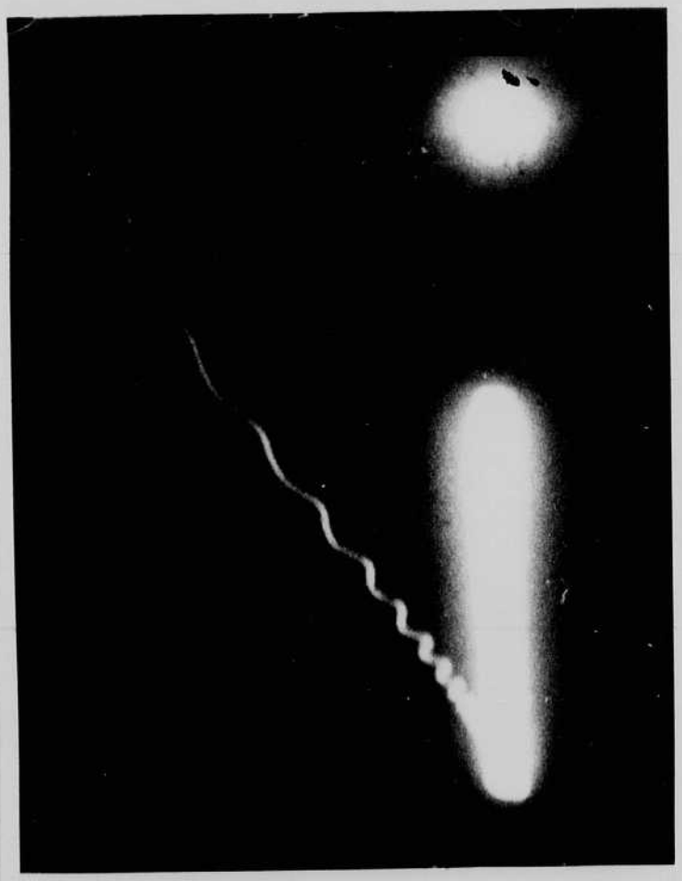
I put the apparatus including the (9 mf) battery in a cardboard box and took it home Thursday night Aug 15. Several Pictures of the kids were taken at f 4.5 and f 11. They were o.k.

Last night I took a picture in Room 10-250 at f 4.5 25 ft - seemed ok. Woodruff I.N. Photos came over today and we shot a few in 10-250. He would like more light and a less spotty reflector.

Aug 24 1940. H. E. Edgerton.







These are two of oscillograms that were taken with Murphy. Aug. 10 or 9-th. See Barstow's note book for records.

Timing wave 40,000 cycles.

Current calib on page 137.

Kohlrausch Speech Amp's unit used on all tests.

Notebook # 10

Filming and Separation Record

____ unmounted photograph(s)

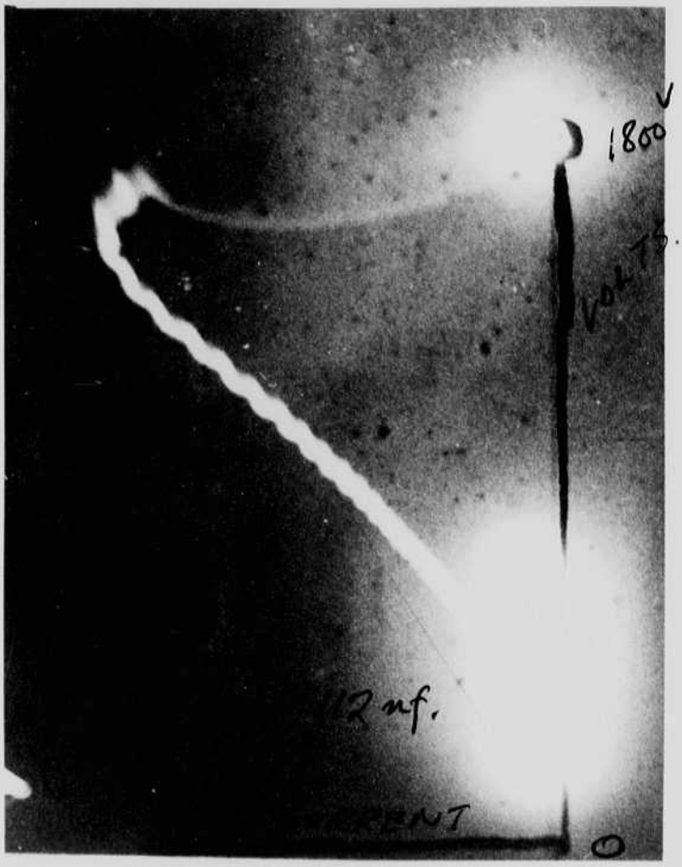
____ negative strip(s)

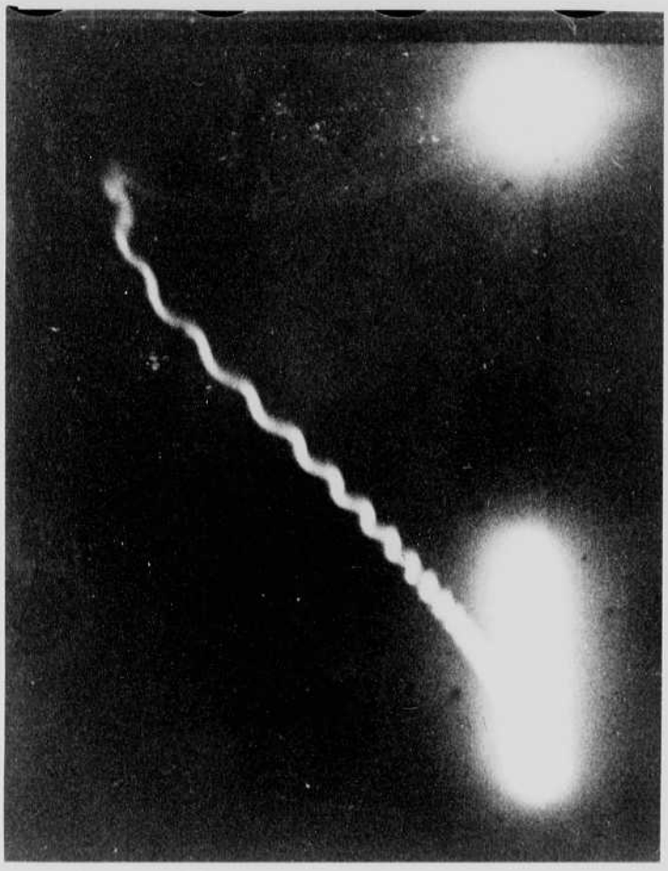
1 unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located between page 134 and 135.

Item(s) now housed in accompanying folder.

Aug 24 1940. H. E. Edgerton.





These are three of oscillograms that were taken with mumpby. Aug. 10 or 9-th. See Viarto with note book for records.

Timing wave 40,000 cycles.

Current calib on page 137.

Kodatron Speedlamp unit used on all tests.

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____ unmounted photograph(s)

____ negative strip(s)

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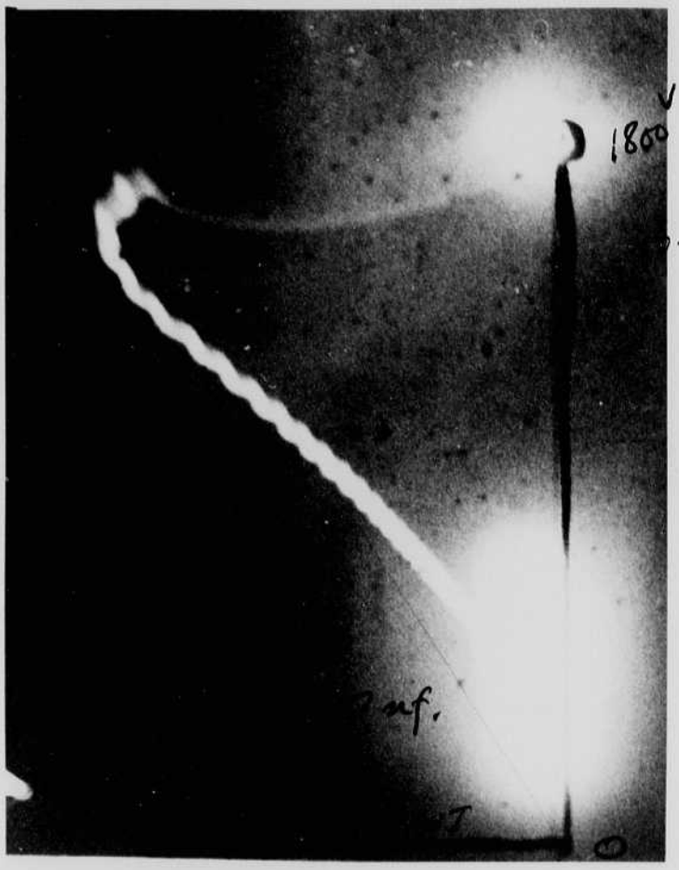
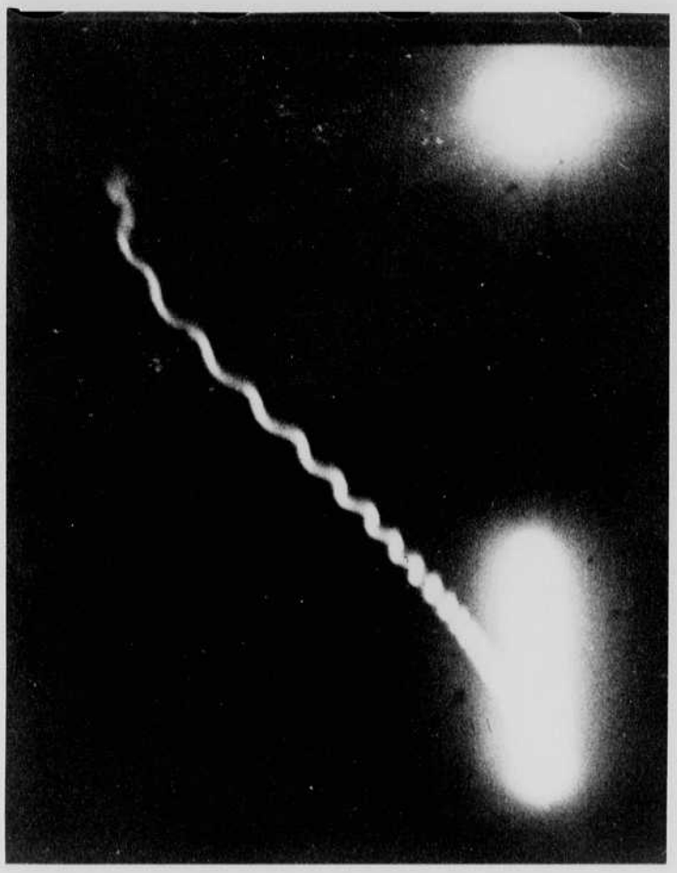
Aug 24 1940. H. E. Edgerton.





These are prints of oscillograms that were taken with Murphy. Aug. 10 or 9th. See Varsto wood's note book for records.

Timing wave 40,000 cycles.

Current calib on page 137.

Kodatron Speedlamp's were used on all tests.

Notebook # 10

Filming and Separation Record

____ unmounted photograph(s)

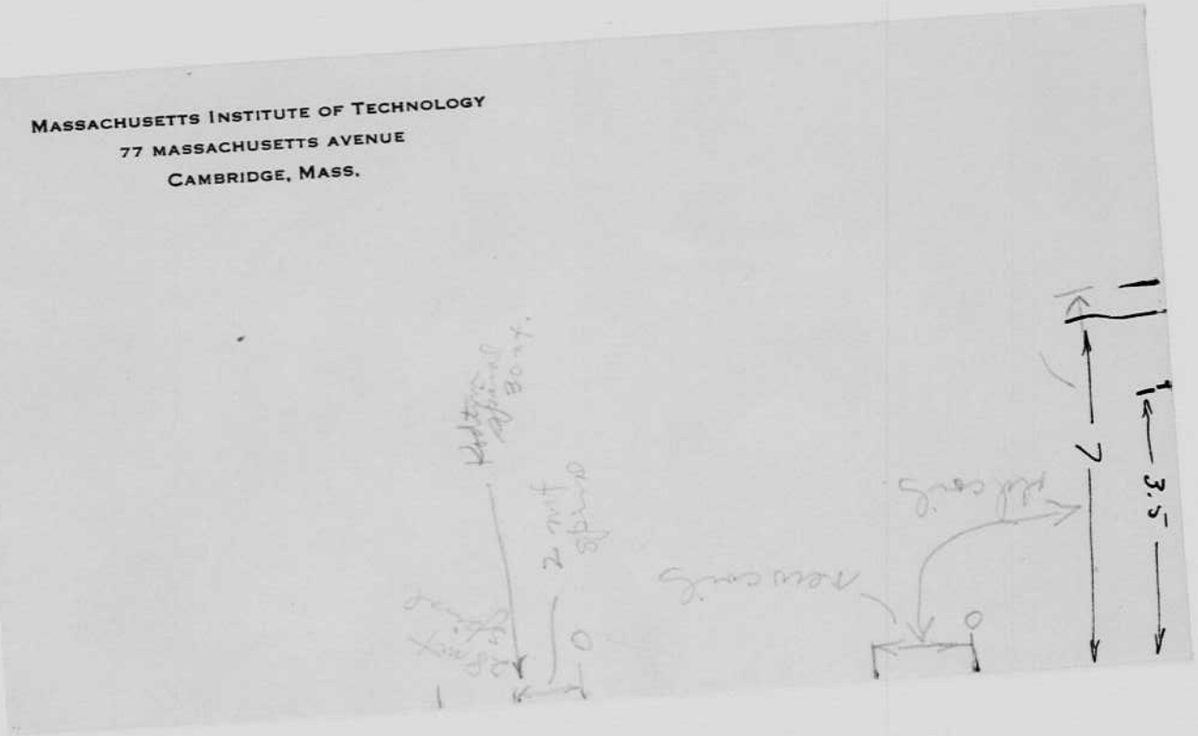
____ negative strip(s)

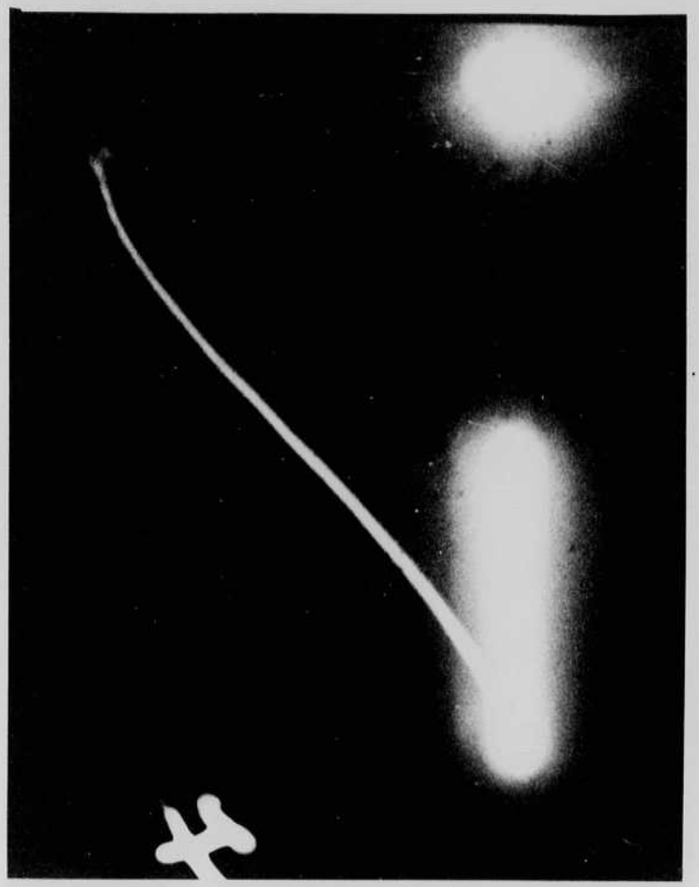
1 unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located between page 134 and 135.

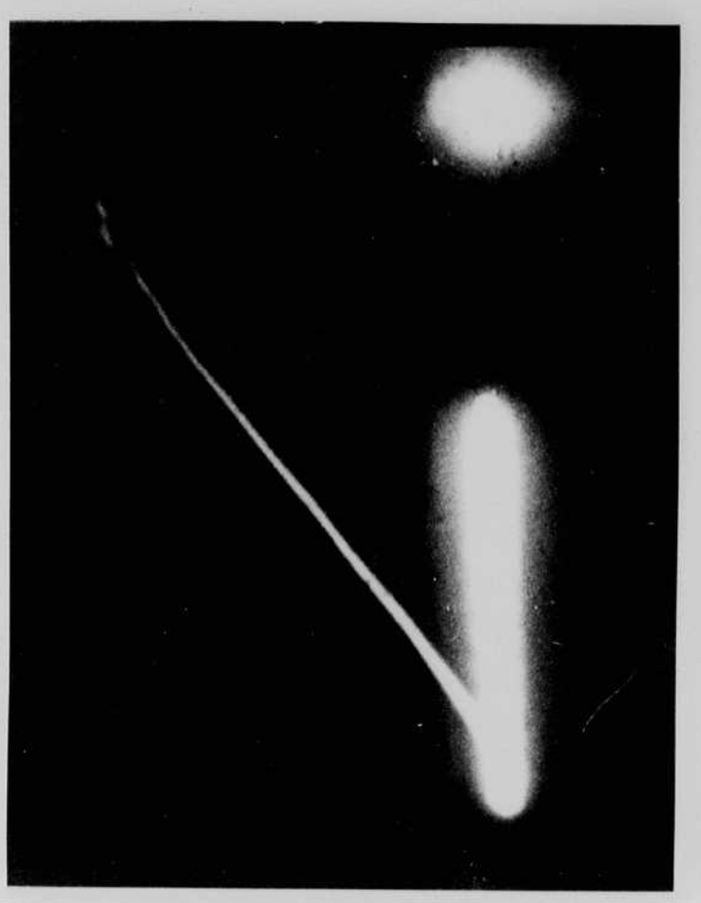
Item(s) now housed in accompanying folder.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
77 MASSACHUSETTS AVENUE
CAMBRIDGE, MASS.





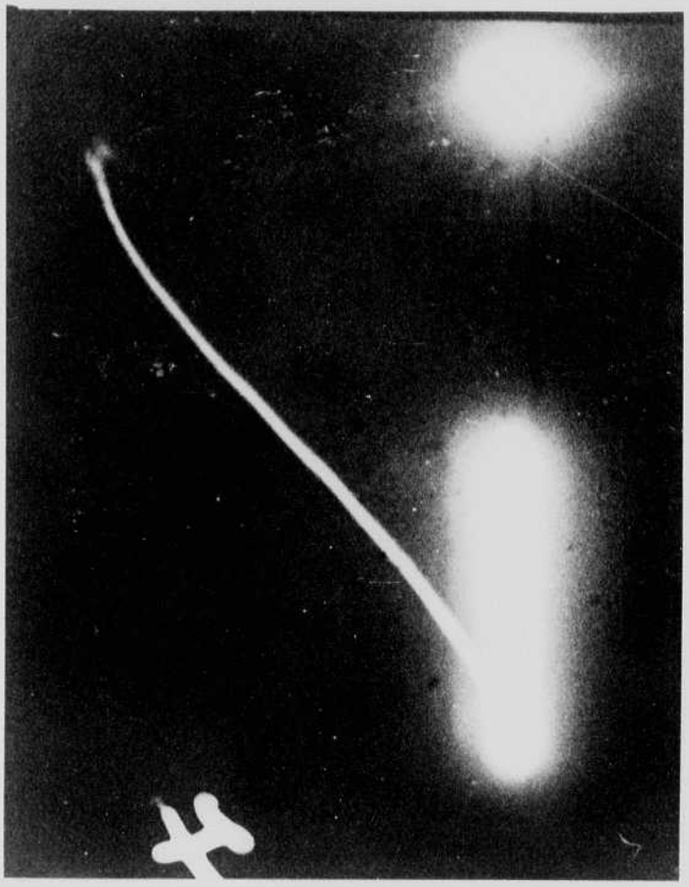
56 mf.



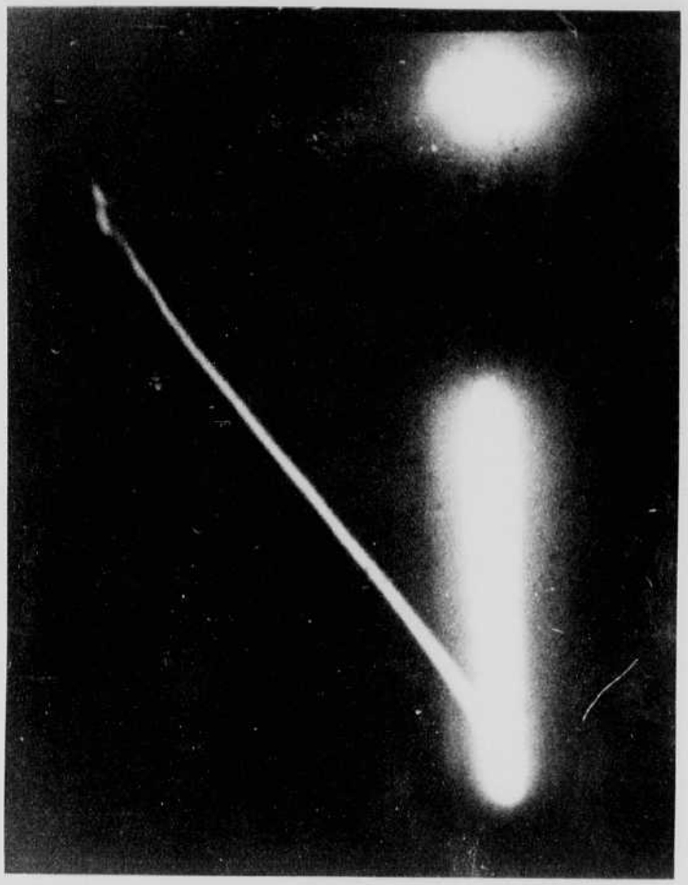
28 mf.

Cathode curves

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
77 MASSACHUSETTS AVENUE
CAMBRIDGE, MASS.

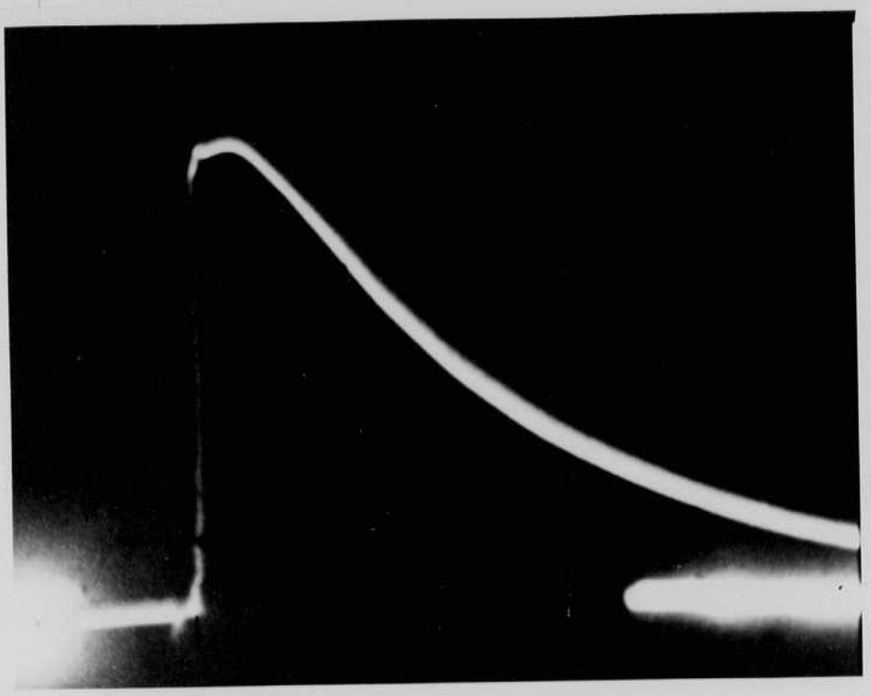


56 mf.



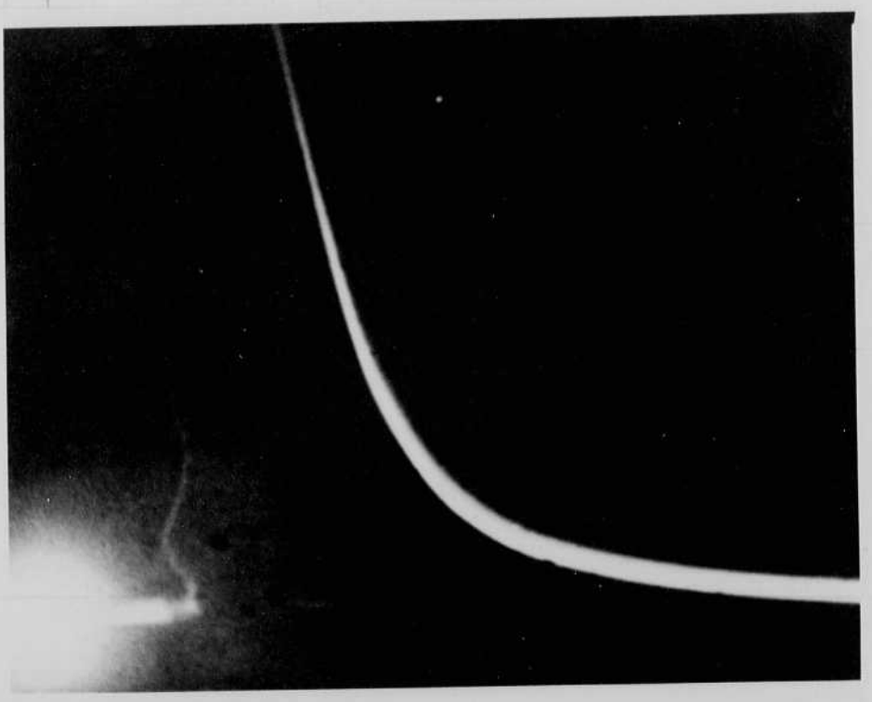
28 mf.

Bästa amp. curves



Spiral
Kodatron Speedlamp.
112 mf
1800 V.

↑ This shows when the strobotron grid was excited in the Speedlamp.



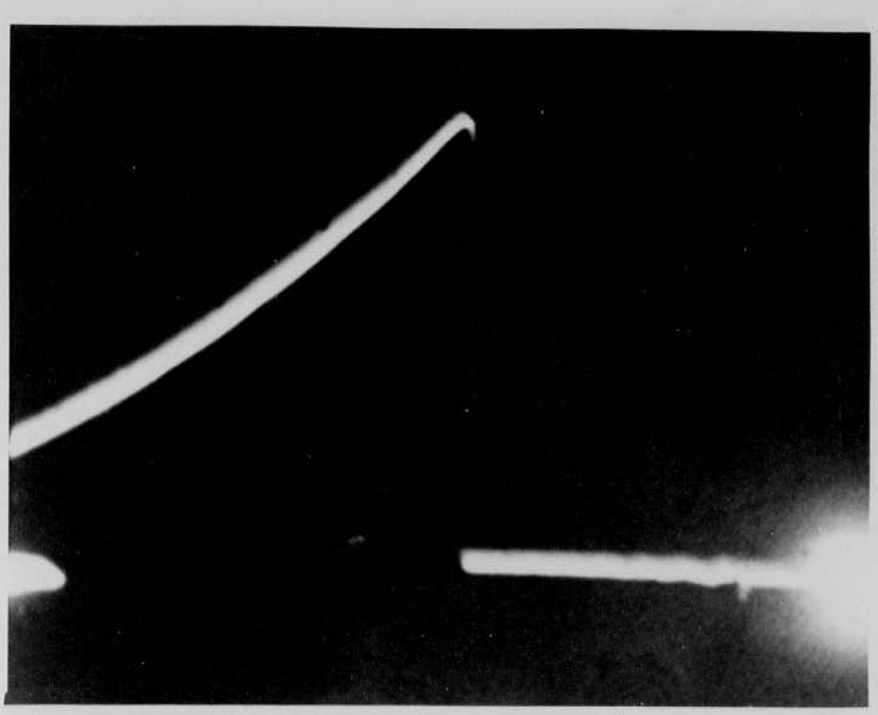
old V tube.
112 mf.
This lamp had given 20,000 flashes on life test and was still OK.

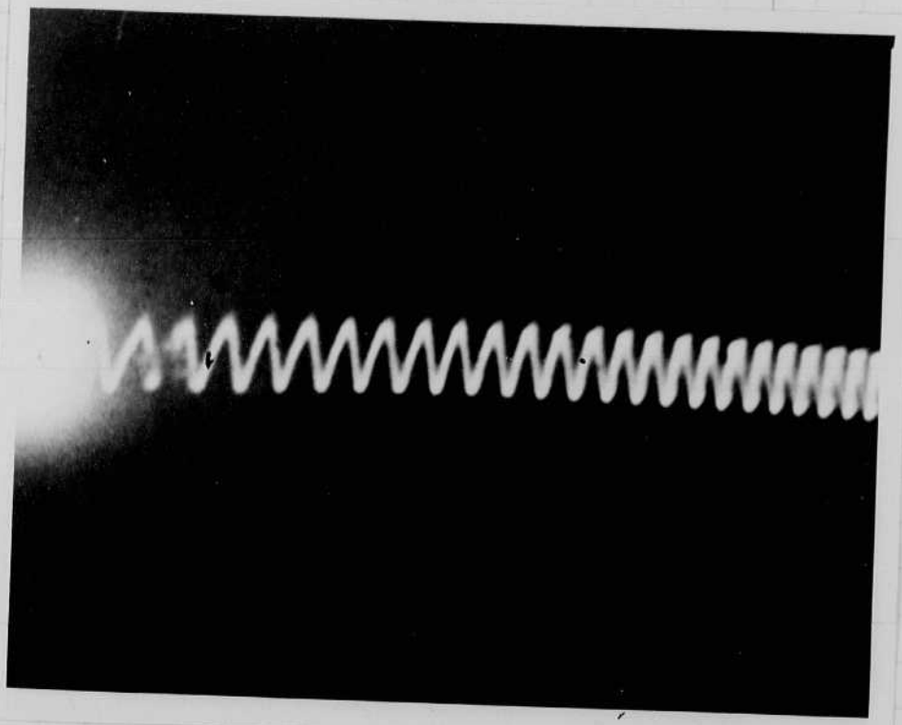
Discharge through a resistor for calib.

3 ohms.
1800 volts.

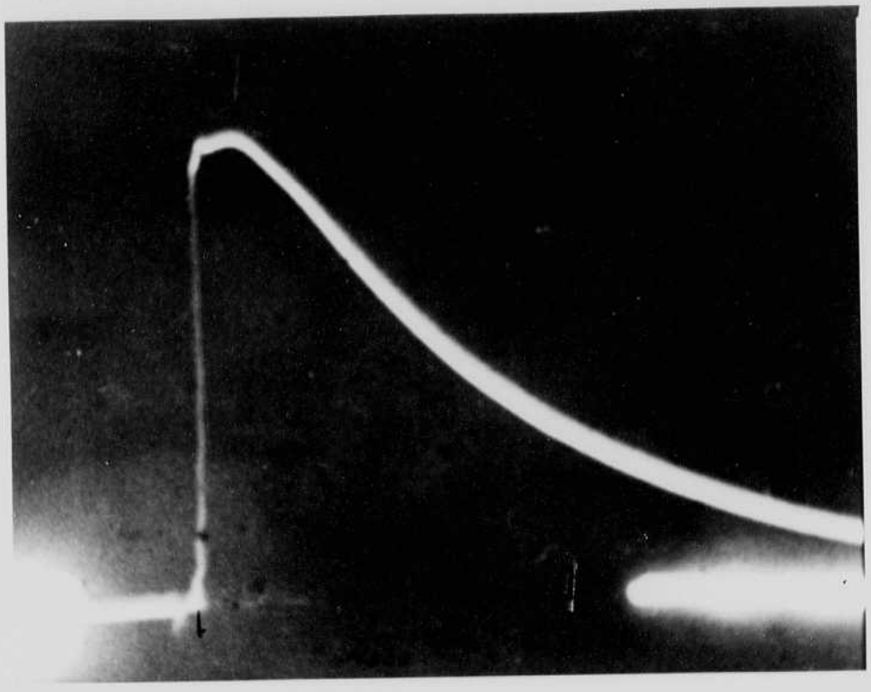
$\frac{1800}{3}$ = 600 amps peak

note delay in start.



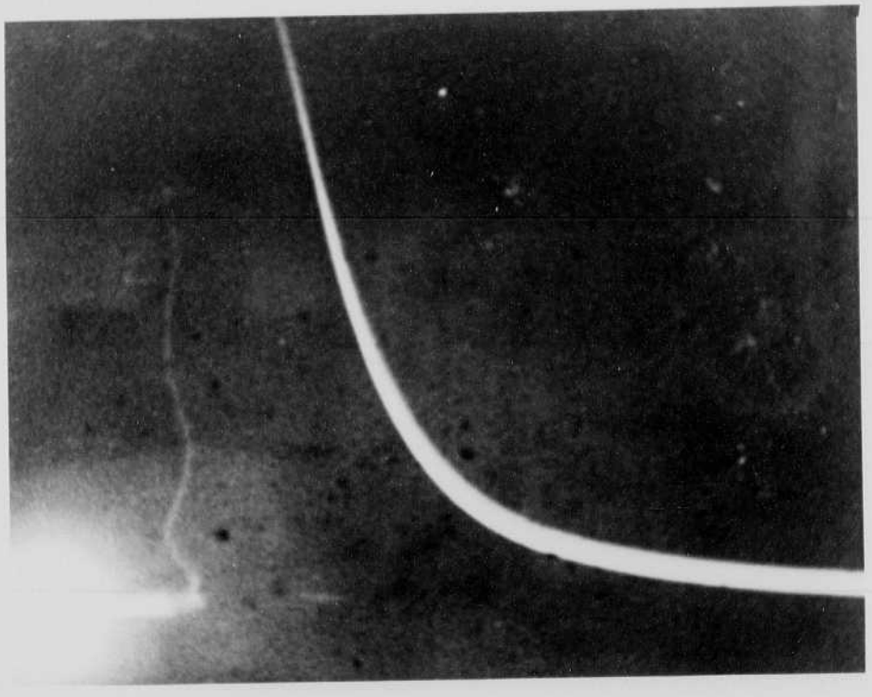


40 Kc
Timing wave for sweep calib.



Spiral
Rotatron Speedlamp
112 uf
1800 V.

↑ This shows when the rotatron grid was excited in the Speedlamp.



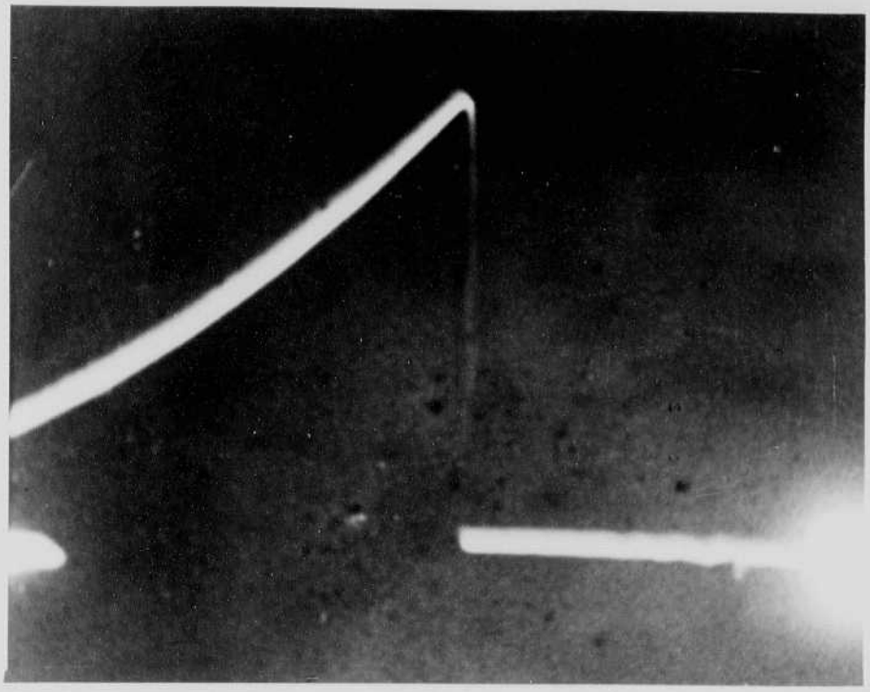
old U tube.

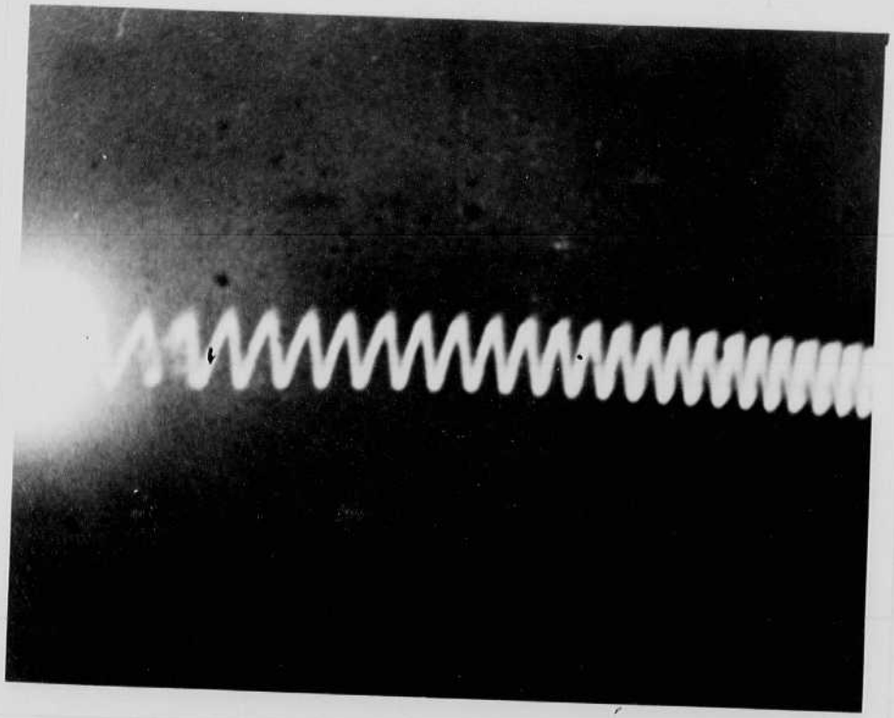
112 uf.

This lamp had given 20,000 flashes on life test and was still OK.

Discharge through a resistance for calib.

3 ohms.
1800 volts.
1800/3 = 600 amps/spark
- note delay in start.





70 KC
Timing wave for sweep calib.

Aug 25 1940

Harold E. Edgerton

On the 19th (Sunday) I left by train for Chicago 3:30 - arriving at 7:30. Monday the 20th was spent with Sandell arranging the exhibits for the photographers convention.

On the 21st I met my father J. E. Edgerton of Aurora Nebraska in the morning. At 3 pm Mr Chas Kaufmann gave a talk and demonstration of the Kodalux speedlamps. Ed Cook and Del. Lodge helped him & shot some pictures of dancers, boxers, etc. There were some thousand people in the ballroom of the Stevens Hotel and they seemed to be very much interested.

I left on the 11:30 train for Cleveland. Ed Rock went with me from the station to the G.E. Co's mazda plant, there met Bailey, Johnson Enfield, Hodge, and others.

Discussed focussing lamps a 50 watt light designed for a sewing machine was located for trial. This lamp has 3 supports for the filament. Enfield gave me three samples of this lamp.

Johnson finished his first spiral lamps on the 21st. They were pumped while I was there and I took one to Boston. However it was a leaker and did not run.

Leo Walters from Eastman was in Cambridge on Sat Aug 24 and while there helped two Army Signal students in the Hydraulic Lab take some

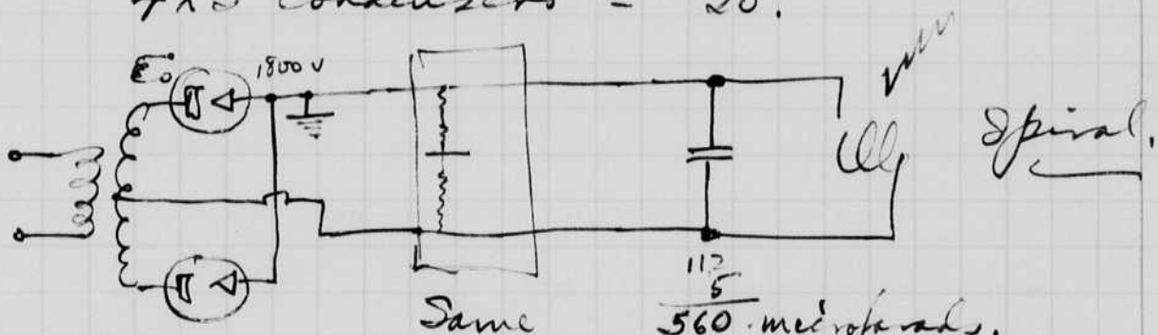
high-speed, single-flash pictures of bullets in flight through jets of water with Bentonite over obstructions. Polarized light showed standing patterns in the flow.

High-power flash unit.

Plan to wire up a unit with 5 times the power of the Kodalite speedlamp.

It should be full wave with 1616 tubes otherwise the same.

4 × 5 condensers = 20.



mount condensers in vertical rack.

TUESDAY — AUGUST 20 (Continued)

P. A. of A. Portrait Program

Grand Ball Room—Second Floor ..... 1:30 P.M. to 4:45 P.M.

(Only for those who have badges with ribbons)

President A. R. Buehman in the Chair.

1:30 P. M.—Miss Emme Gerhard, Port Washington, N. Y.: "Making Portraits for Exhibition," a talk and demonstration.

3:00 P. M.—Charles D. Kaufmann, Del. Long and Edward J. Cook, all of the Kaufmann & Fabry Studios, Chicago, Ill.: "New Light on Photography," an illustrated talk and demonstration during which negatives will be made. A totally new development in photography of such importance that this will be a joint feature of the Portrait and Commercial Programs.

P. A. of A. Commercial Program

1:30 P.M. to 4:45 P.M.

Aug 25 1940

Harold E. Edgerton

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Discuss[ed] ... lamps
a 50 watt ...
saving ...
trial ... this
for the fil...
me three ...

Johnson ...
lamps on ...
pumped ...
I took me ...
was a leak ...

Geo Walters ... from ... Aug 24 and
in Cambridge on Sat
while there helped two Army Signal
students in the Hydraulics Lab take some

TUESDAY — AUGUST 20 (Continu

Manufacturers' and Distributors' Business Meeting
North Assembly Room—Third Floor ..... 8:00 P.M. to 9
A Business Meeting of The Photographic Manufacturers & Distr
eau, Inc.—Non-member manufacturers and distributors are invited t

P. A. of A. President's Night
Grand Ball Room—Second Floor ..... 8:15 P.M. to 9
(Only for those who have badges with ribbons)
President A. R. Buehman in the Chair.
Introductions of P. A. of A. Officers, Past Presidents, State and Se
sociation Officers.
President's Address.
Condensed Report of Treasurer James M. Caufield.

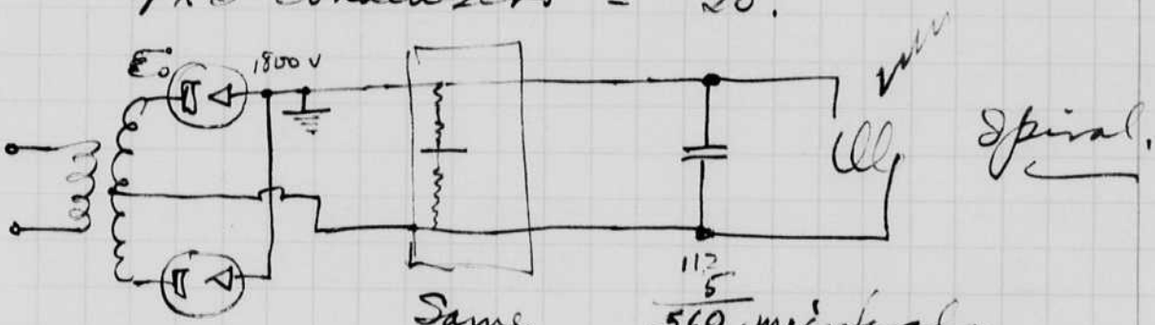
high-speed, single-flash pictures of two-foot-thick jets of water with Bentonite over obstructions. Polarized light showed standing patterns in the flood.

High-power flash unit.

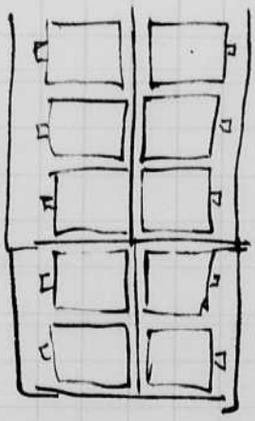
Plan to wire up a unit with 5 times the power of the Kodalite speedlamp.

It should be full wave with 1616 tubes otherwise the same.

4 x 5 condensers = 20.



Mount condensers in vertical rack.



Another method would be to mount them 3 x 3 in two decks.

This would give a box 1/3 larger in cross section and about twice as high as the present unit.

40 lbs x 4½ = 180 pounds per unit. approx weight.

4.
18.

Film tests.

Aug. 31 1940

28 mf 1800 volts.

Film no 67 f32 no filter 2 ft agfa chart Kodatron 9 min DK50 74°

68 f8 C5 Blue " " " " "

55 f8 C5 Blue 14 ft Kodatron. DK50 12 min

56 f16 no filter 14 ft " "

Sept. 1 1940 Mary Louise Jumping rope on shady side of the house. 15 ft candles.

28 mf 1800 volts Battery operated.

76° DK50

67 no flash f11 C5 10 ft Kodatron film 12 min

68 flash f11 C5 " "

69 no flash f11 none " "

	C5		C5	Density Measurements
67	68	67	68	
Red		Blue		
.84	1,39	.48	1,31	
.98	1,48			
1,02	1,55			
1,06				
1,08				
1,12	1,61			
1.12	1,61	.8	1,55	

-f16.	C5 f8
56	.55
.51	.82
.99	1,29
1.39	1.60

Portable unit.
Pigeons
Jump Rope

Jan 1980 Put in neg file (ock).

Sept 5 1940
Harold E Edgerton. Strobotron darkening.

Blinker life test. See page 132
page 122.

On aug 31 after continuous operation from aug 14 the strobotron was not dark. The 0.3 ohm resistor was taken out on aug 31 and the blinker operated until today. The tube in these 5 days had become slightly dark at the top near the anode.

I again put in the resistor and started operation to see if the darkening would continue or not.

Mr. & Mrs.
Barton Weller.

f 16 Kodatron
film.
DK 50 9 min.

28 mf 1800 V.
Battery operated 20 bb. unrid
portable.

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Mr & Mrs.
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f 16 Kodatron
film.
DK 50 9 min.

28 mf 1800 V.
Battery operated 20 Sb. unit
portable.

Sept 10 1940
Harold E. Edgerton.

Lamp tests. (Barstow).

112 mf capacity.
2000 volts charged.

LAMP.		cathode rays on. Peak Current *	light. Photo cell
Std Spiral.	1.5 cm Kr-Xe	1.5 cm	117
old V lamp.	5 " "	7.8 "	86
~~18~~ inch argon		—	38
2 " spot argon.		—	18
Same with 56 mf.		7.5	

* 1.5 cm = 600 or 700 amperes.

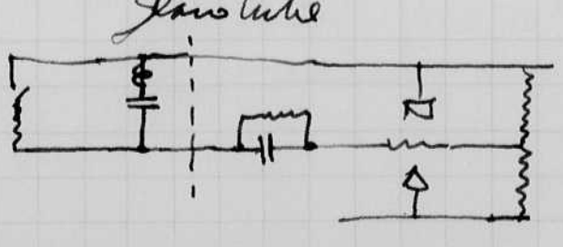
The 2" spot lamp will produce a much shorter flash of light and the quantity of light is also less. This type will be sold as an alternative lamp for very short exposure such as golf balls, tennis balls, etc. It will not be short enough for bullets.

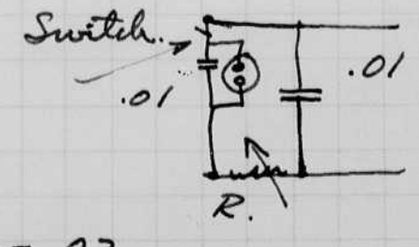
Sept. 11, 1940
Harold E. Edgerton.

At Jas. Irvin's suggestion I went to the Brockton Fair to attempt pictures of Lindy Leter doing the auto jump. Irvine is the camera man for the Grantland Rice films. Chas Wychoff helped with the lamps. We had trouble with the rain. Also had help with mr. W.G. Sweetman 73 Bowne Rd Brockton 7093 phone. M.I.T. man now in power plant.

Also shot some pictures at the Geo. White Scandals show. Miss. E. Counts posed some for color and for black and whites. She will come in to the studio at 10 Friday for a portrait in Kodachrome.

We need a time delay circuit - 0.02 seconds - for moving our light with synchronizers. Eastman are trying to do this mechanically with the apparatus that was demonstrated in Chicago. We should be able to do this electrically in some easy manner.



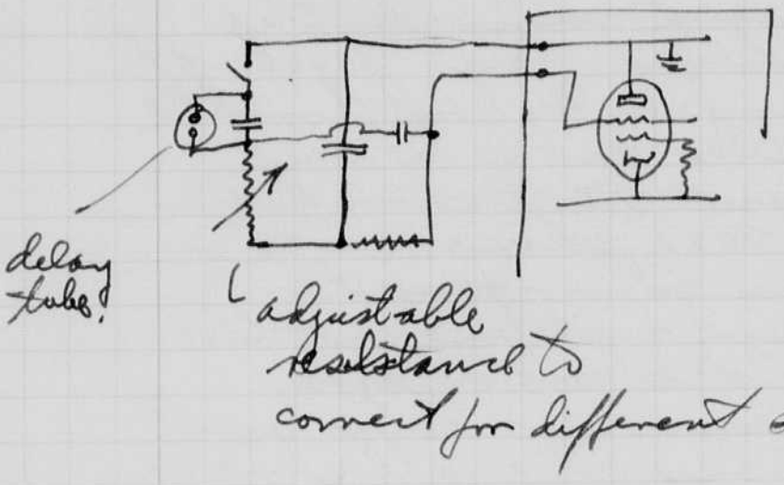


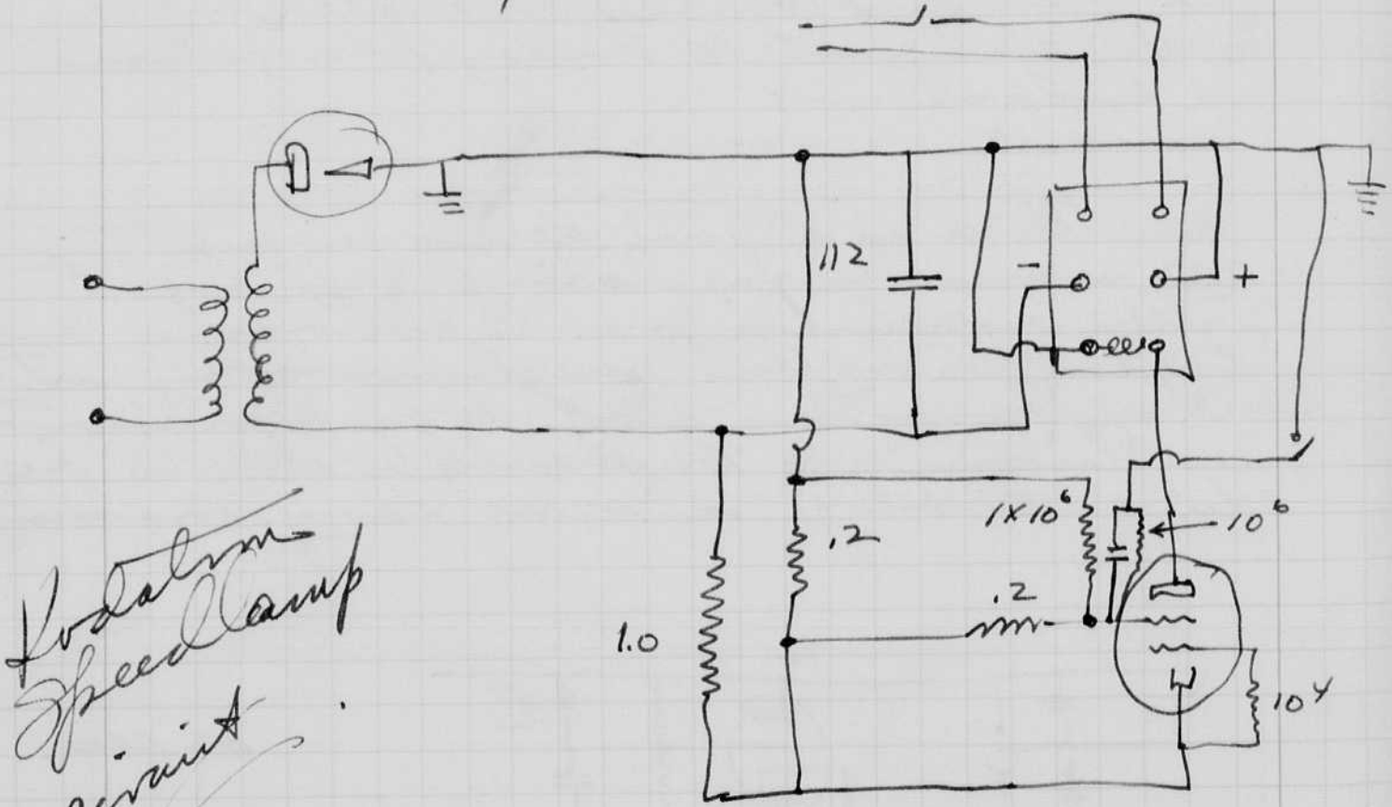
make adjustable.

$RC = .02$

$R = \frac{.02}{.01 \times 10^{-6}} = 2 \times 10^6$ ohms. over.

continued. Time delay unit.



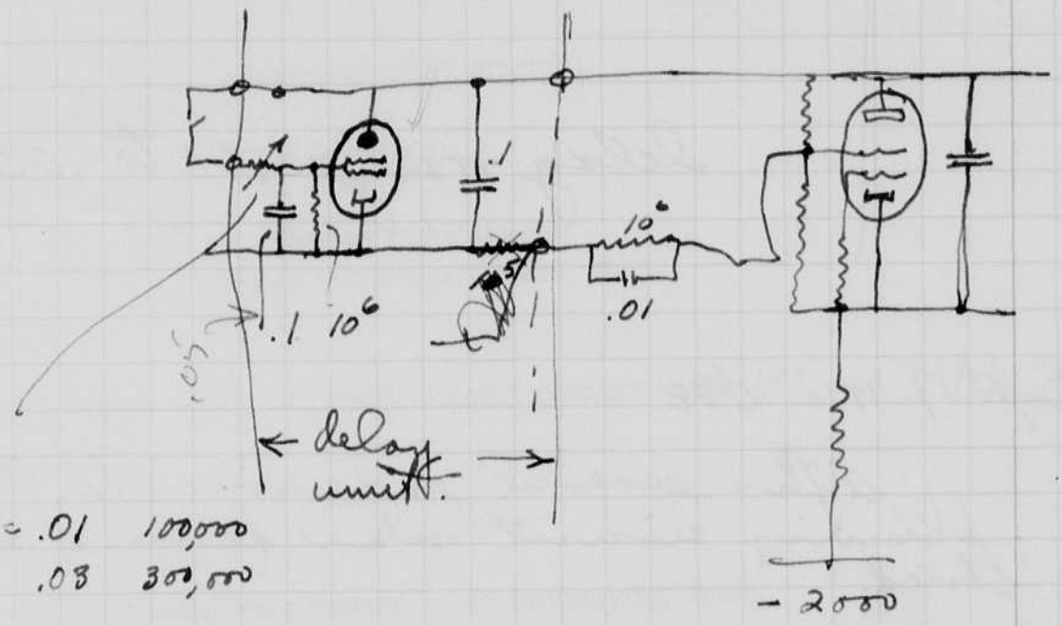


Kodatron Speedlamp circuit.

Friday Sept 13 1940
Harold E Edgerton

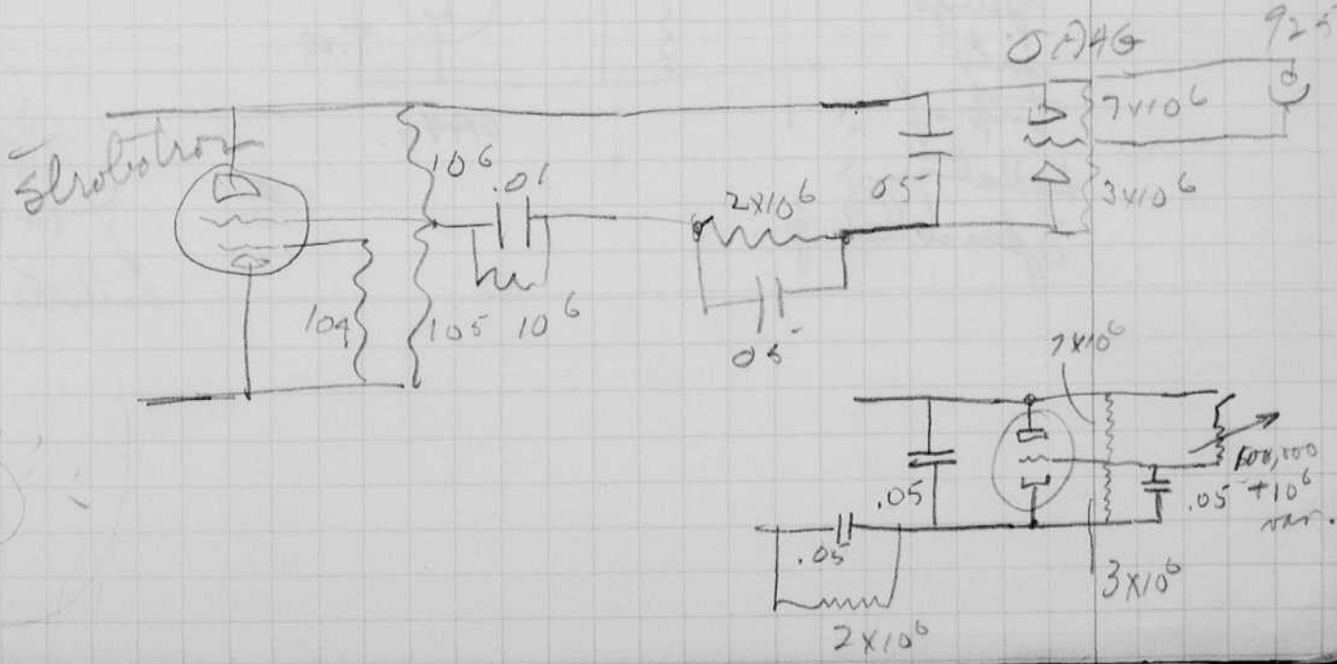
Took photos of Neon counts at M.I.T. in Photo service studio today assisted Chas Wyckoff took data. Herb. Grier helped.

Time delay unit.



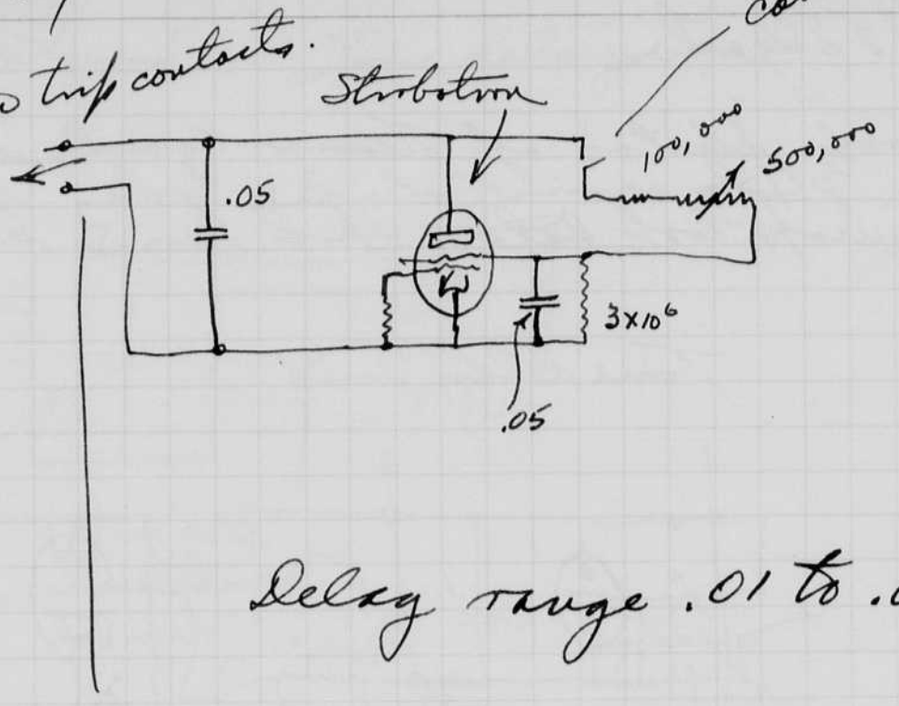
$\left\{\begin{array}{ll} RC = .01 & 100{,}000 \\ .03 & 300{,}000 \end{array}\right.$

R = 100,000 + 500,000
fixed variable.



Time delay circuit for camera shutter

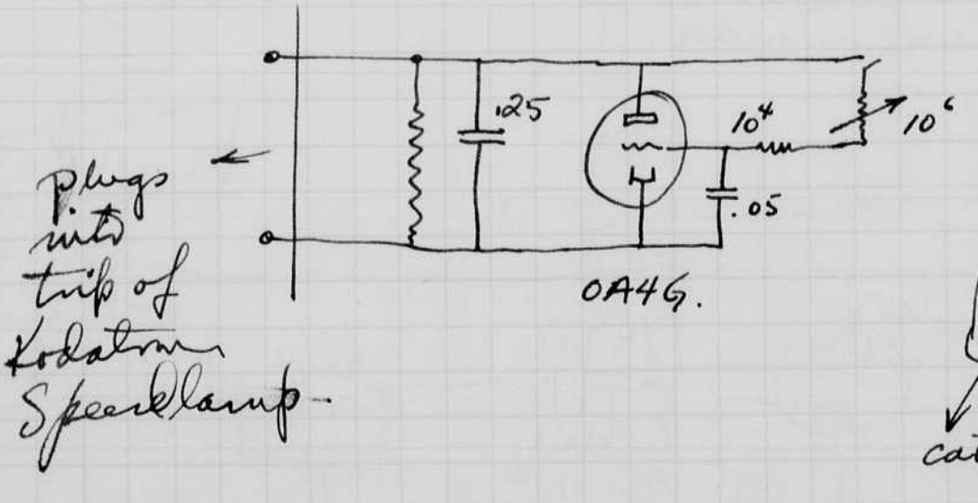
Sept 14 1940
Harold Edgerton and Herb. Gries.



Delay range .01 to .05 seconds.

Sept 17 1940 H.E.

After several experiments the following circuit was decided and tried.



Notebook # 10

Filming and Separation Record

____ unmounted photograph(s)

____ negative strip(s)

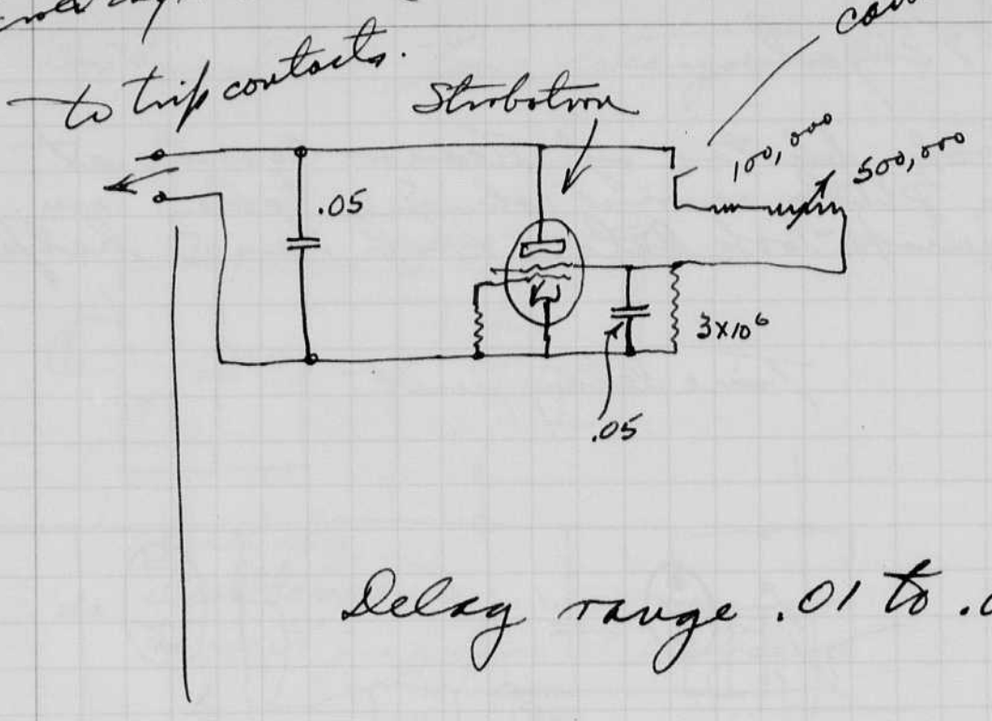
__1__ unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located between page 148 and 149.

Item(s) now housed in accompanying folder.

Time delay circuit for camera shutter

Sept 14 1940
Harold Edgerton and Herb. Gries.



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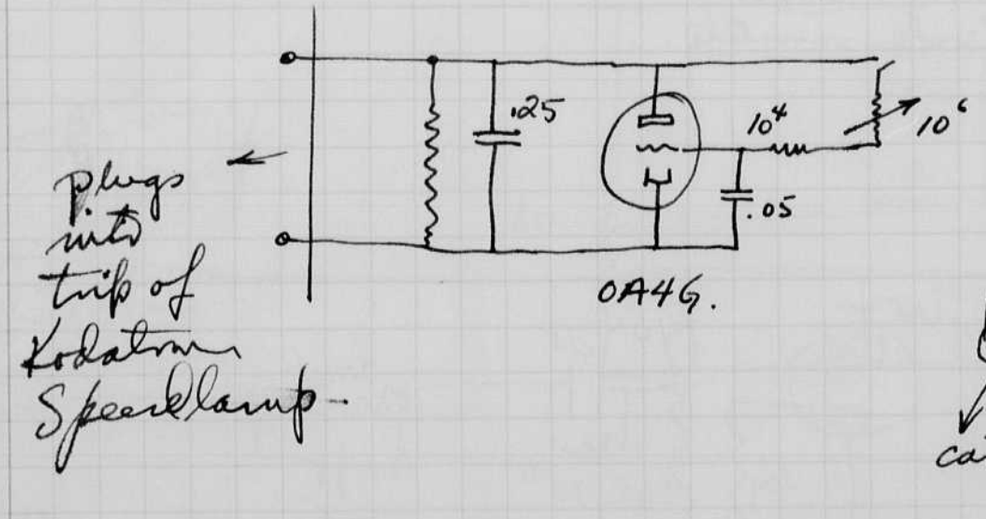

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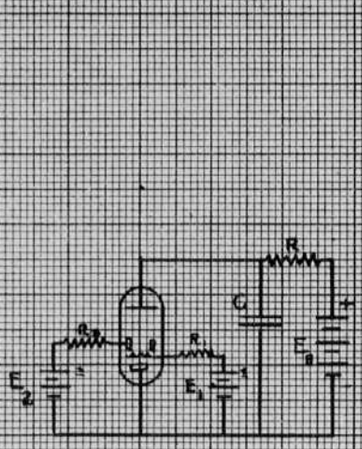


If R, R_2 = 0.1 megohm
C_1 = 1 μf.

OUTER GRID.

$+E_2$

INNER GRID.

$-E_1$ $+E_1$

$-E_2$

450

500

400

350

300

250

E_B = 350

GRID-VOLTAGE BREAKDOWN CHARACTERISTICS
of a
STROBOTRON
for
several values of Plate Voltage

(E_1, E_2, and E_B in volts)

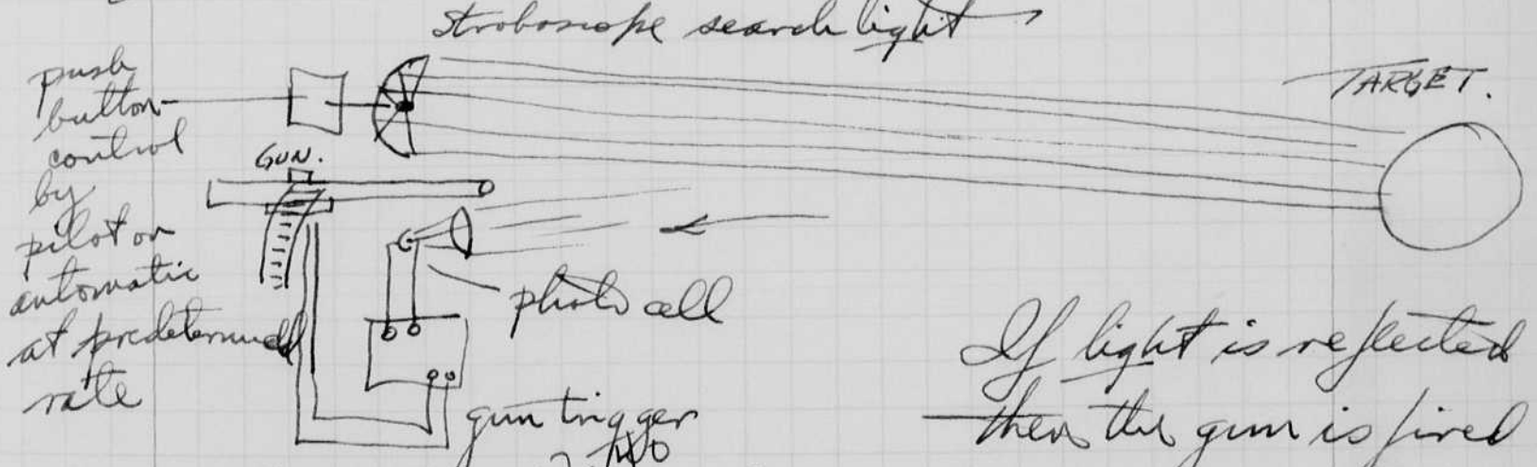
H. u. Davis 12-29-36

Sept 17
H. E. Edgerton.

Mr. Case and Mr. Jarrow of the Eastman Kodak Co were here yesterday to discuss the photo cell selector.

Case suggested again the flash method of observing an airplane from another airplane. It thought it would be useful for night fighters to find their targets.

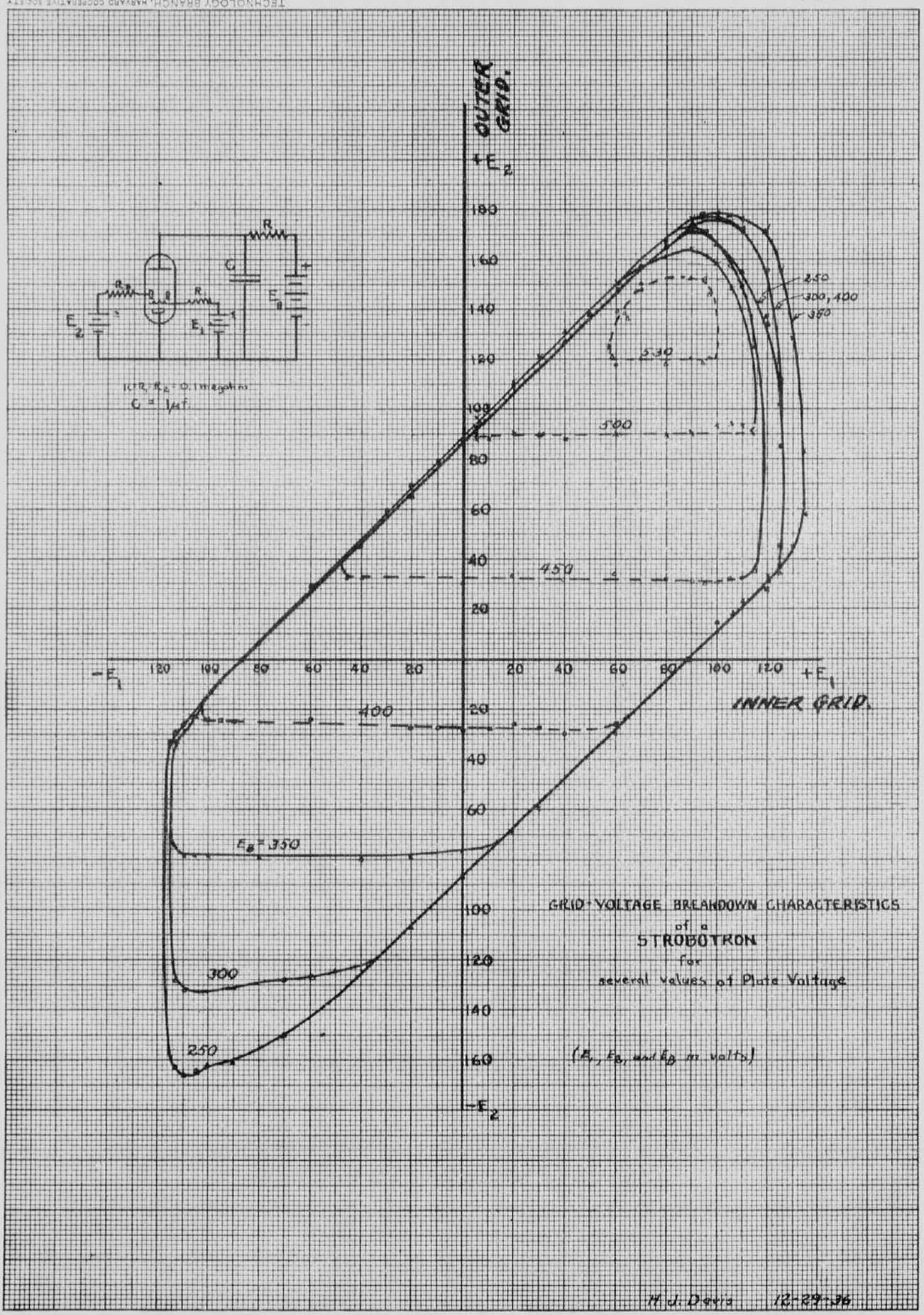
It might be possible to use a photo cell pickup to fire the guns on a fighter ship at night. First the flash of light would be directed in a beam along the sight of the gun. Then if there was a reflection back into the cell, the gun would fire at the target. The level of light could be set to control the fire.



If light is reflected then the gun is fired

Explained and understood by Charles H. Yockey September 17, 1940

Explained & understood 9-17-40
Discussed in conference 9-16-40 H.E.E.



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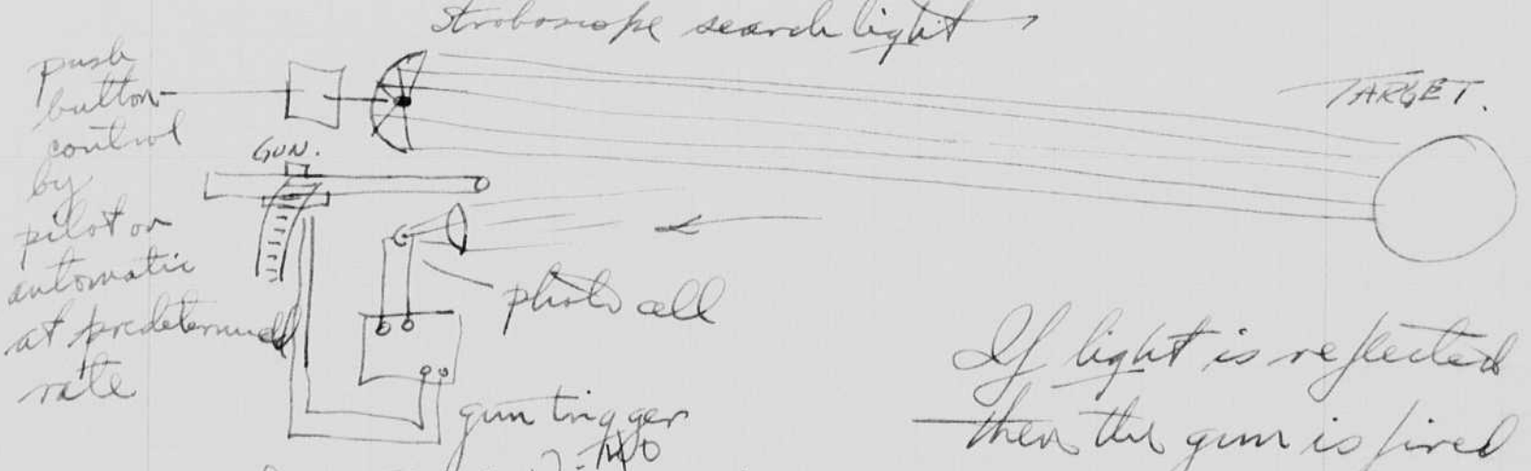

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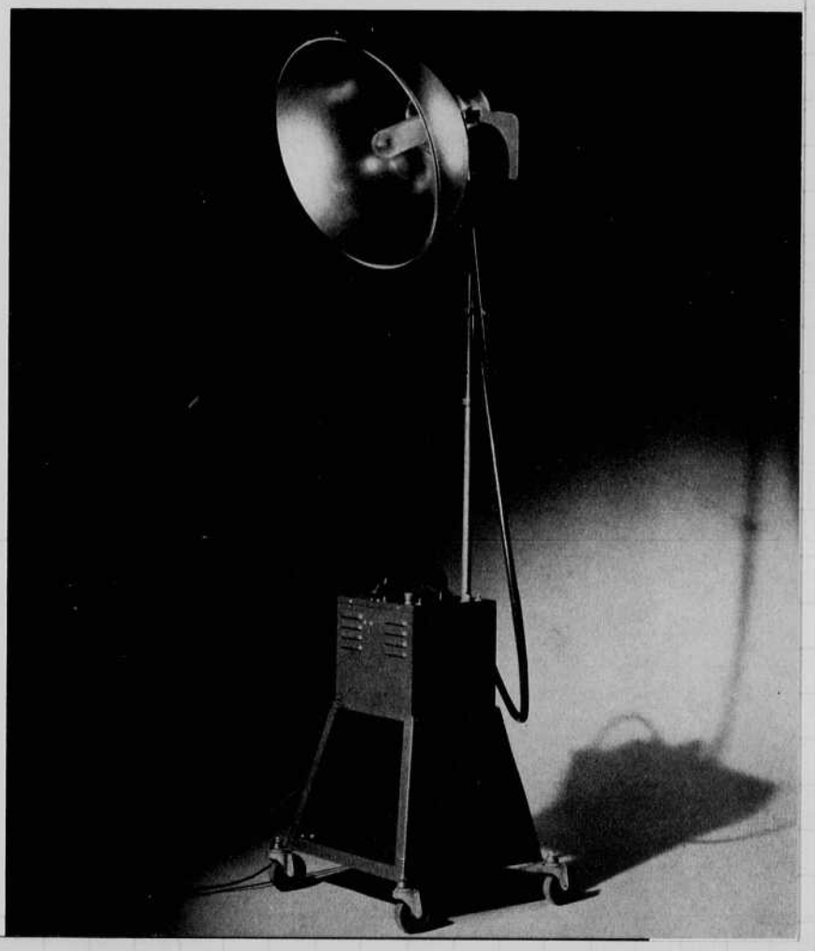
Explained and understood by
Charles H. Wyckoff
September 17, 1940

Explained & understood 9-17-40
discussed in conference
9-16-40 Chas. H. Wyckoff

OPERATING INSTRUCTIONS

FOR THE

KODATRON SPEEDLAMP



Presenting the
KODATRON SPEEDLAMP
FOR ULTRA-RAPID "FROZEN-MOTION" STILLS

Through a licensing arrangement with Dr. Harold E. Edgerton and associates of the Massachusetts Institute of Technology, the Eastman Kodak Company has acquired the exclusive sale and distribution of the ultra-speed lamp, previously known as the Speedlite or Speedray. The complete unit is now called the Kodatron Speedlamp.

HIGH-SPEED still photography, far beyond the limits of the fastest shutter, is now a simple matter with the Kodatron Speedlamp. An electrically operated, gas-filled tube produces a brilliant flash of an effective photographic duration of about 1/30,000 of a second. This is an incredibly thin slice of time. Just for comparison let a half mile represent one second, and only one inch of that distance will equal 1/30,000 of a second.

The Kodatron flash is about 800 times as fast as ordinary flashlight. Furthermore, the Kodatron tube is good for thousands of flashes. Experience has shown that its life is well over 5,000.

The quality and intensity of the light from the Krypton-Xenon-filled tube make it highly suitable for photographic purposes. For example, with recommended Eastman negative material and developer, the quantity of light generated is sufficient to produce a fully timed

Stopping this graceful dancer and the swirling folds of her skirt in mid-air. Two Kodatron Speedlamps at 1/30,000 of a second. Lens stopped down to *f*/32. Kaufmann and Fabry photograph.

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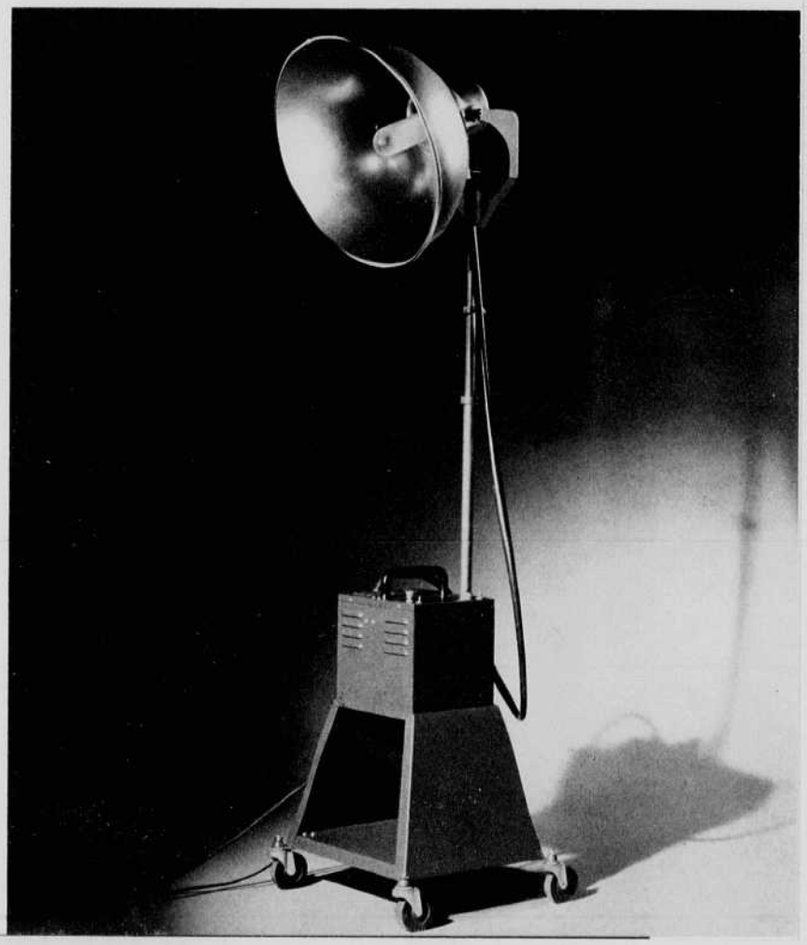
KODATRON SPEEDLAMP



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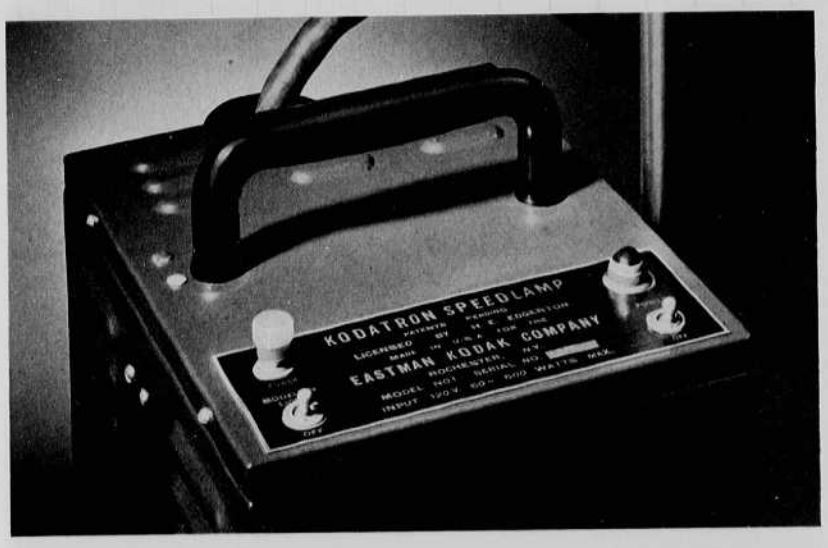
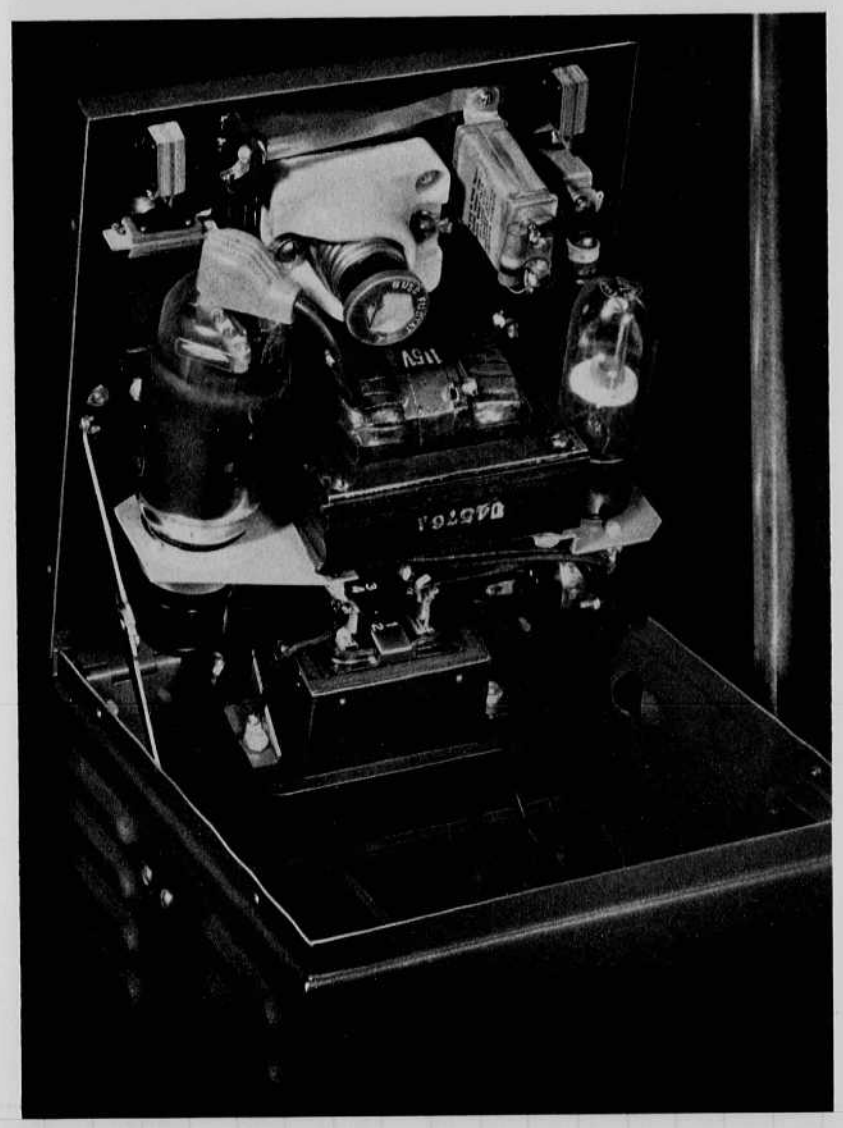
The condensers inside the Speedlamp Power Unit operate at 2000 volts and there is danger of shock *even after the power is disconnected.* For this reason, always push the red "FLASH TRIP" before the unit is opened for inspection or repairs. We recommend that only an experienced radio technician service the unit if the need should arise.

Procedure for Operation

1. Plug the flash tube into the reflector.
2. Both toggle switches on the power unit should be at OFF.





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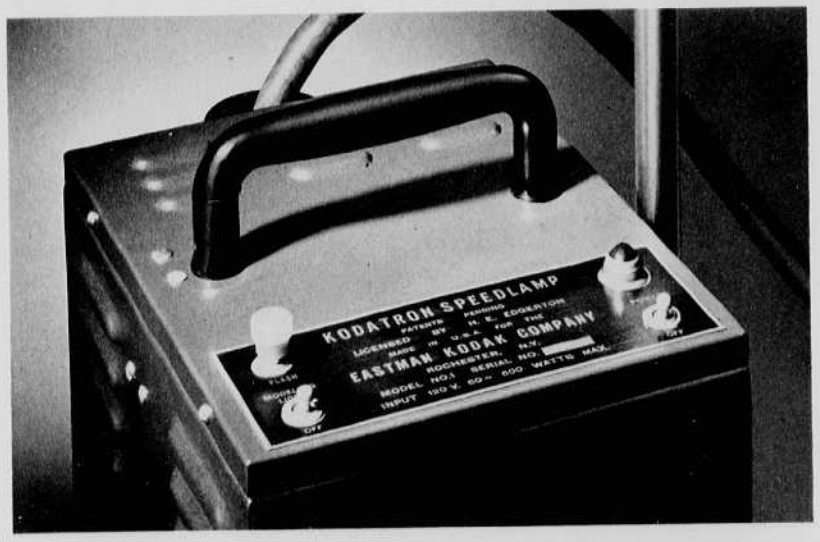
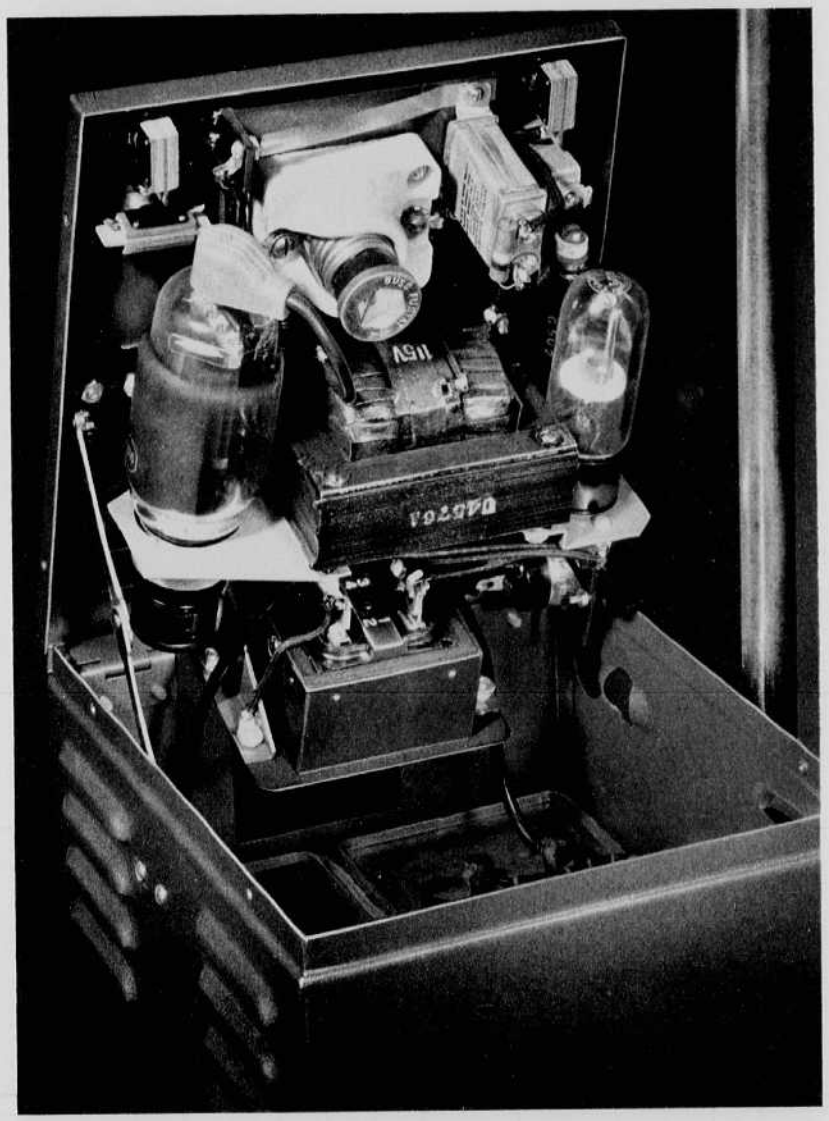
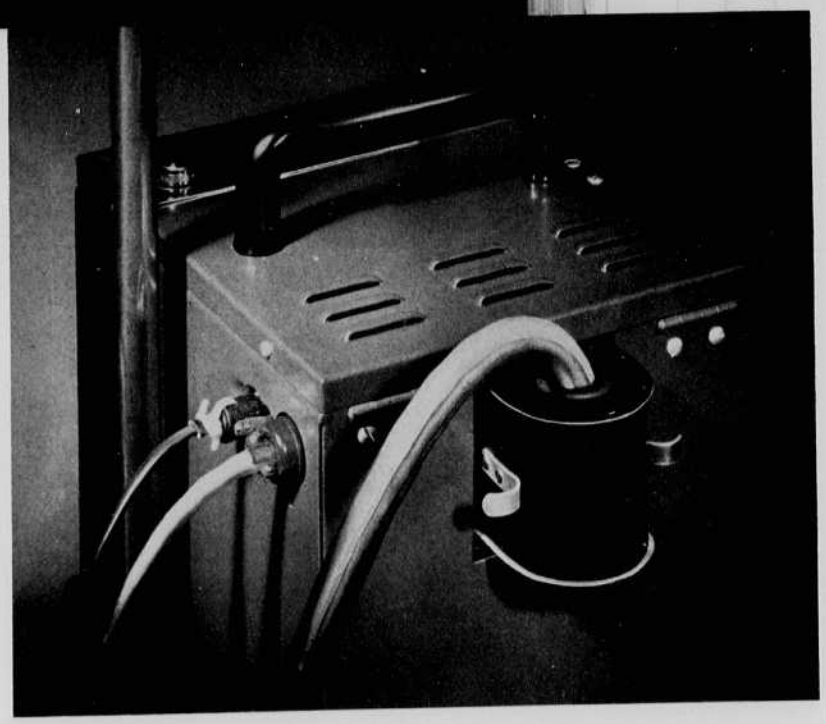


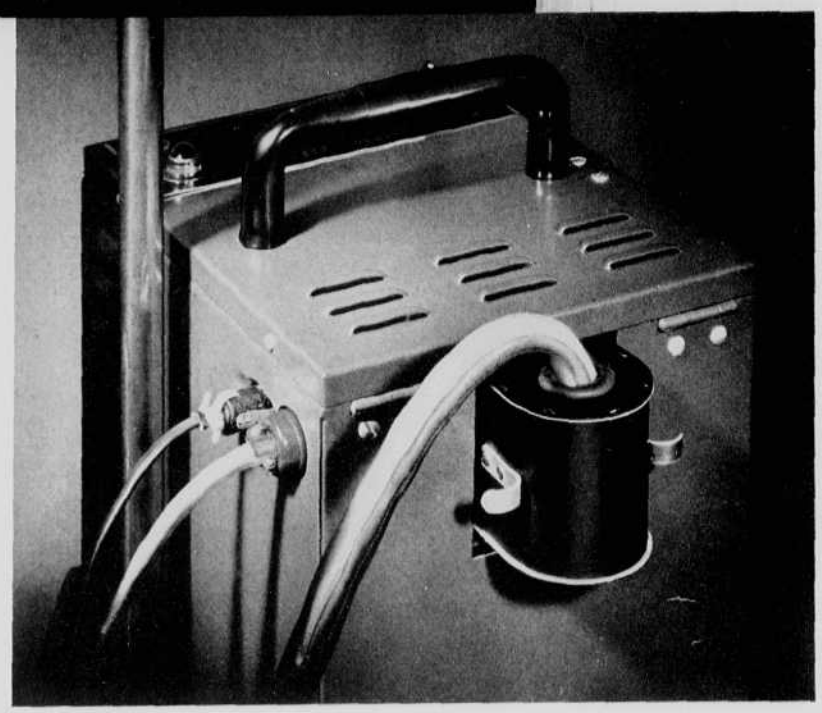




3. Connect the 6-prong plug and the small plug on the power cord to their respective receptacles on the power unit. The power cord can be locked in its receptacle by turning the plug clockwise.
4. Plug the power cord into a 110-120 volt, 60 cycle outlet capable of supplying at least five amperes.
5. If a synchronizer is to be used, plug the synchronizer cord into its receptacle in the power unit and plug the other end into the synchronizer.
6. Turn on the toggle switch, marked "Modeling Light"; arrange your lighting and focus the camera.
7. Turn on the switch marked "Power" and wait ten seconds for the condenser to charge.
8. Push the "FLASH TRIP" which will flash the lamp. If the unit is flashed before ten seconds have elapsed, the resulting flash, if any, will be weaker since the condenser has not had sufficient time to charge. The Kodatron Speedlamp produces a brilliant flash of extremely short duration—about 1/30,000 of a second—capable of photographing an average scene 50 feet distant at *f*/11.
9. After taking the desired pictures, always turn off the "POWER" switch and immediately push the "FLASH TRIP." This will discharge the condensers.

To obtain the most from your SPEEDLAMP it should be synchronized

COURTESY OF KAUFMANN FABRY, CHICAGO, ILL.



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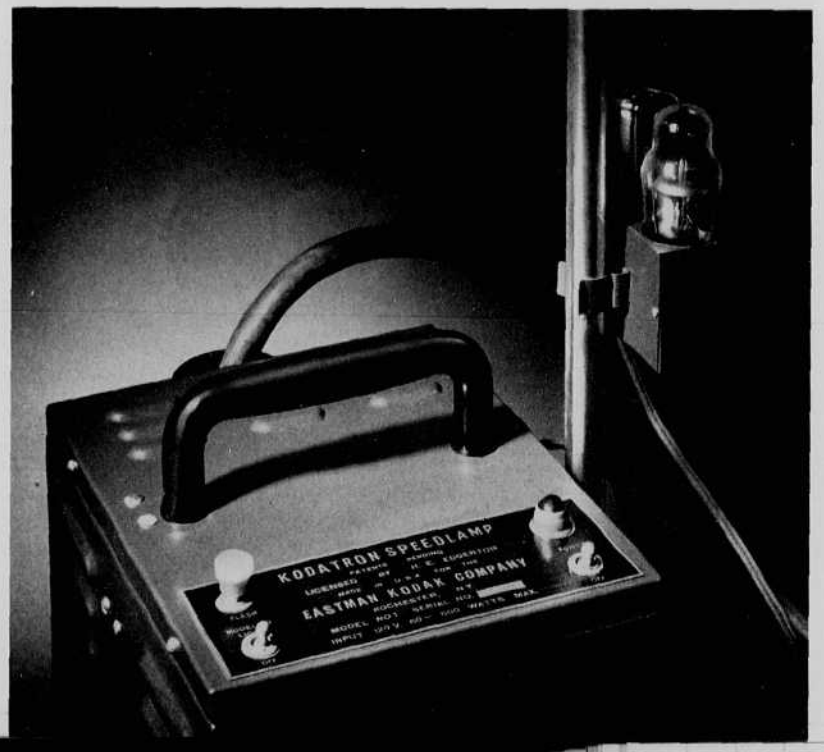
When two or more lamps are to be fired simultaneously, they may be connected in parallel with extra cords or more conveniently by means of *photocell trip units, sold as an accessory. The photocell trip* is a small unit which plugs into the receptacle and clamps to the telescoping steel stand. The photocell should be high enough so that it is not shielded. The camera is synchronized to one SPEEDLAMP by the synchronizer cord and the flash from this unit sets off all the others that are fitted with photocell trips. This method of intersynchronization is operable up to distances of approximately 50 feet. In a studio with reasonably light walls the photocells will function by reflected light regardless of the position of the first light, but outdoors or in a place with dark walls the photocell units must be in such a position that they can see the first light.

It is possible to control a SPEEDLAMP installation with two cameras covering the same scene from different points of view. Such operation requires that the synchronizers on both cameras be connected in parallel. In this way either camera will control the lights but the operators must remember that at least 10 seconds must elapse between successive flashes regardless of which camera initiates the flash.

The quality and intensity of the light make it highly suitable for photographic purposes. For example, with Eastman Kodatron Panchro-



Child Portraiture offers another opportunity for the Kodatron Speedlamp.

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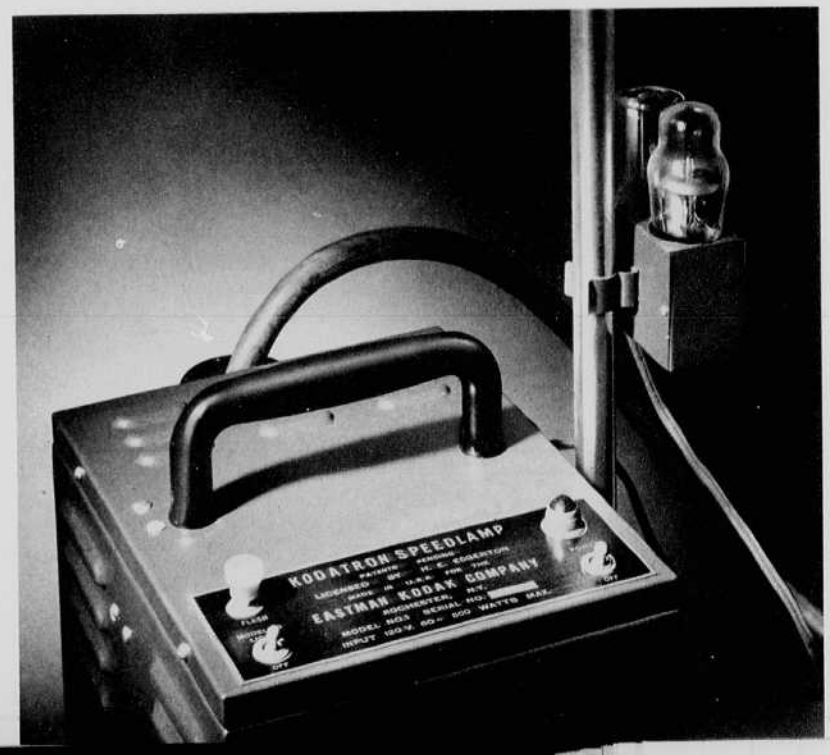

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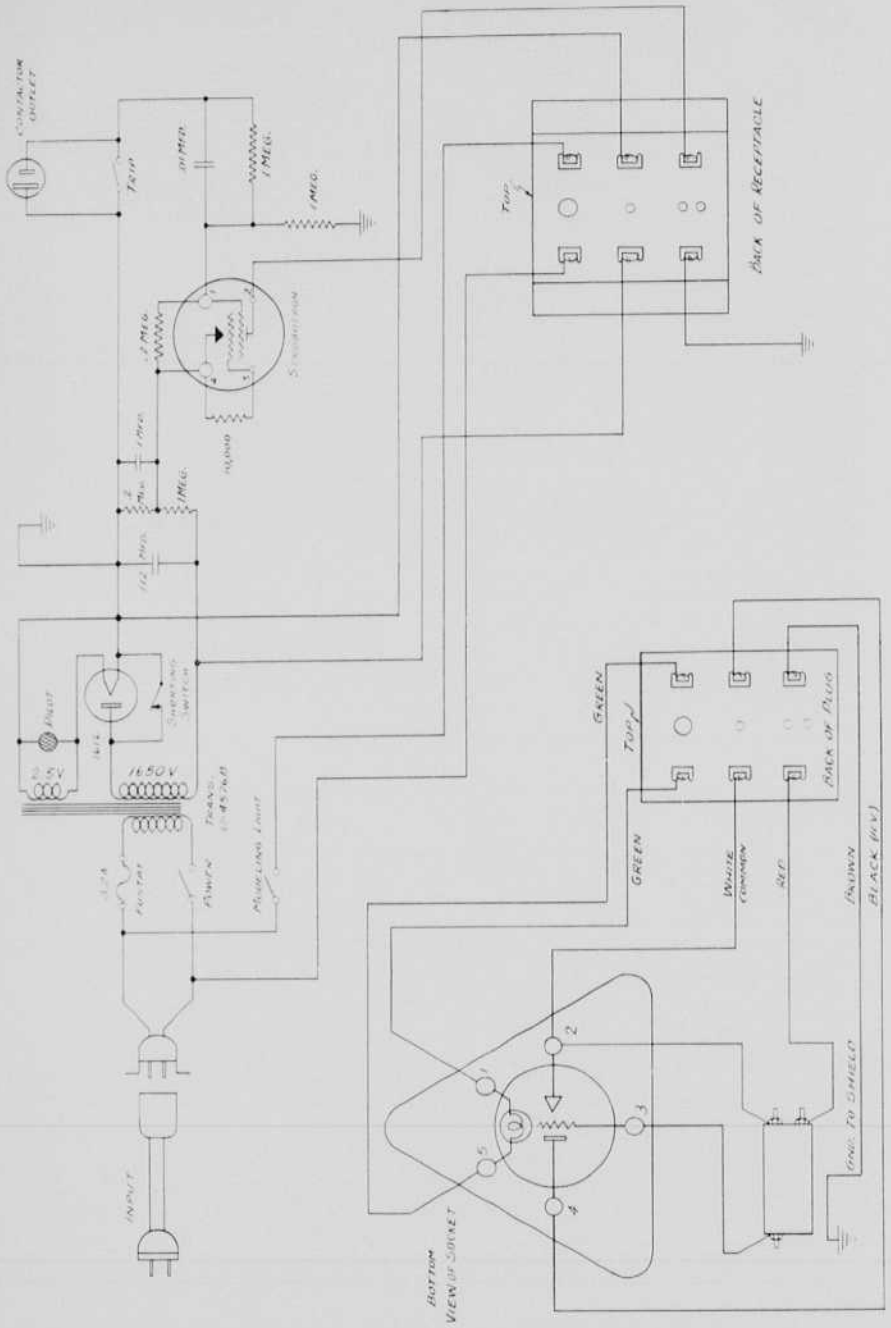

matic A-II Film the quantity of light generated is sufficient to produce a fully-timed negative of an average subject 50 feet away at *f*/11 on a line of 115 volts. In general, 50% longer development time should be used to obtain comparable gammas. The spectral distribution of the light of the Speedlamp is such that it can be used with Kodachrome Professional Film and a special filter. Special instructions will be supplied on request.

Exposure Table for Kodatron Panchromatic A-II Film

Distance	*1 Lamp*	*2 Lamps*
12	*f*/45	*f*/64
17	*f*/32	*f*/45
25	*f*/22	*f*/32
35	*f*/16	*f*/22
50	*f*/11	*f*/16
70	*f*/8	*f*/11
100	*f*/5.6	*f*/8

Precautions

There are a few simple precautions that, if followed, will materially increase the life of the flash lamp and power unit.

1. Don't leave the modeling light on more than necessary. This lamp is a projection type and has a limited life.
2. Don't connect the unit to a line which has an abnormally high voltage—i.e. over 120 volts. This will burn out condensers, transformers, and modeling light.
3. Don't leave the "POWER" switch on when the unit is not being used.
4. After turning the "POWER" switch off, press the "FLASH TRIP." This empties the charge from the condensers.
5. Don't flash the light needlessly, especially at a fast rate, as the lamp and transformer may become overheated.
6. Do not push anything into the lamp socket or the high voltage connectors as a serious shock may result.

Servicing

Should the SPEEDLAMP fail to operate at any time, first check the power outlet being used. If the outlet is alive and the fuse is not blown, first change the flash lamp. If the unit is still inoperative, the power must be turned off and the tubes and circuit in the power unit checked.

It is inadvisable for a person inexperienced with high-voltage electrical equipment to attempt repairs or tests on the inside of the power unit, since there is considerable possibility of a serious shock from the trans-

former, condenser, tube, or wiring even if the power is off. The services of a competent radio service man should be secured in case of trouble.

The following comments will be useful to an electrically-trained service man:

If the pilot light fails to light and is tight in its socket, check the Fustat within the power unit. Before checking the Fustat or the tubes, wait at least 5 minutes after the power is turned off before opening the power unit. This is necessary to allow the charge on the condenser to leak off. Be careful not to touch any of the terminals or the wires, until both sides of the condenser have been shorted to the case with an insulated-handle screwdriver. If the charge has not leaked off the condenser because of a faulty leak resistor or shorting switch, shorting it may result in a violent spark which is harmless to the condenser. ***Caution:*** *Be sure the screwdriver has an insulated handle with no rivets running through it.* After making sure that there is no charge on the condenser, check the tubes to see that they have not loosened in their sockets or that the plate cap of the 1616 Rectifier Tube has not come off the plate terminal of the tube. Should the tubes check all right, trace the circuit with an ohmmeter referring to the circuit diagram for the correct values and connections. Give special attention to testing the condensers for shorts. Test voltages are also marked on the diagram. A blown fuse indicates that there is either a short circuit in the unit or that the wrong power was used (such as a direct-current source). Do not replace a blown fuse until the trouble has been located and corrected.

Replacement Rectifier 1616 and Strobotron tubes and other components as well as factory servicing may be obtained from the dealer through whom the unit was purchased.

EASTMAN KODAK COMPANY · ROCHESTER, N. Y.
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PRINTED IN THE UNITED STATES OF AMERICA.

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Stopping this graceful dancer and the swirling folds of her skirt in mid-air. Two Kodatron Speedlamps at 1/30,000 of a second. Lens stopped down to *f*/32. Kaufmann and Fabry photograph.

negative of an average subject 50 feet away at *f*/11. The spectral distribution of the light is such that with a suitable compensating filter* excellent color shots of rapidly moving subjects are easily made with Kodachrome Professional Film.

COMPLETE EQUIPMENT

The Kodatron Speedlamp consists of a power unit for the operation and control of the Kodatron Flash Tube, and an 18-inch aluminum reflector on an 8-foot telescoping stand. The complete unit is carried on a steel base, equipped with rubber-tired casters.

The power unit converts 110-volt, 60-cycle current to 2,000 volts, through a specially constructed transformer. This current passes through a rectifier tube and the direct current is used to charge a condenser. (The charging cycle between flashes takes about 10 seconds.) When the trip circuit is closed, either by a synchronizer on the camera, by a photocell, or manually by a switch on the power unit, this energy stored in the condenser is discharged by a Strobotron Tube through the Kodatron Flash Tube in approximately 1/30,000 of a second. The Strobotron and Rectifier Tubes need replacement only at long intervals, and the power unit itself will last indefinitely.

IMPORTANT A

1. Critically sharp pictures of rapidly moving objects.
2. Simple, positive synchronization with most types of shutters. No adjustment necessary for lag.
3. Two or more lamps may be flashed in unison by photocell control.
4. High-speed color photographs with Kodachrome Film.
5. Great light intensity permits use of small apertures with consequent increase in depth of field.
6. Uniform amount of light per flash. No loss of efficiency during life of lamp.
7. Long-lived flash lamp.
8. Freedom from heat produced by conventional studio lamps.
9. Subject lighting modeled as with ordinary lights, using the modeling lamp incorporated with the

SIMPLE SYNCHRONIZATION

Synchronization is simple, easy, and positive, as the lamp fires instantaneously by electrical contact when the camera shutter is open. No adjustment for lag is necessary. Shutters of the between-the-lens type and certain of the roller-blind shutters are easily synchronized. Even relatively high speeds, such as 1/400 second, are so much slower than the 1/30,000-second flash that the latter can be checked for synchronization by inspection at the full opening of the shutter during the instant of flash. An easily adjusted synchronizer, called the Kodatron Speedlamp Timer, is soon to be available as an accessory.

PHOTOELECTRIC TRIP

As many lamps as desired may be readily

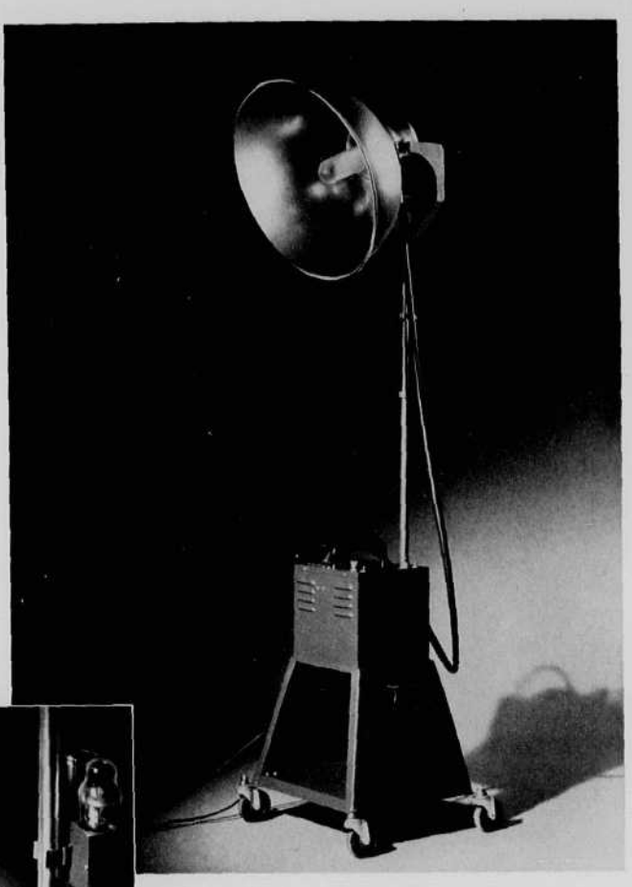
Informal, startlingly lifelike portraits are just simple snapshots for the Kodatron Speedlamp. The modeling light is cool and comfortable. The flash can be synchronized at highest shutter speeds. All possibility of subject motion is eliminated at 1/30,000 of a second.

*Available in the near future.

T ADVANTAGES

flash tube. Modeling lamps give faithful preview of the light balance in the photograph.

10. Because of its extreme brevity, the flash produces no eye discomfort.
11. Subjects' eyes retain normal pupil size because of low illumination level while modeling or focusing.
12. Specially designed reflector gives illumination intermediate between a spotlight and a floodlight. Directional enough to increase the intensity along the axis to a considerable degree.
13. Economy of operation considering great number of flashes without tube replacement.
14. Low power consumption effects a substantial two-way saving: lower electric bills and a much lower investment in special wiring required by ordinary studio lights.



The Photoelectric Trip Unit clamps to the stand above the power unit. The photocell discharges a second lamp from the flash of the first. Any number of lamps, so equipped, can be flashed simultaneously. Note the few controls grouped on the name plate of the Kodatron Speedlamp.

(ABOVE)
The Kodatron Speedlamp is easily moved about on its swiveled casters. The telescoping stand holding the Kodatron Flash Tube and reflector has a maximum height of 8 feet. Note the storage space beneath the power unit in the base.

flashed in synchronism to cover large areas or to obtain better modeling. This may be done by a wire connecting the units or by a photoelectric trip which flashes one or more lamps simultaneously with the first without any connection between them. The photoelectric trip, sold as an accessory, will function at distances well beyond fifty feet. One trip is required for each additional lamp. In a studio with reasonably light walls, the photocell will function by reflected light regardless of the position of the first unit, but with dark walls or outdoors the photocell must be able to "see" the first light directly. A multi-plug receptacle also will be supplied as an accessory to facilitate wiring several lamps together for a combined flash, synchronized with the camera shutter.

MODELING LIGHT

The Kodatron Flash Tube is a spiral tube into the center of which is inserted a projection-type incandescent modeling light. The modeling light is sufficiently low-powered to cause no discomfort to the subject. With two or more Kodatron Speedlamps in use, these modeling lights give a faithful preview of the balance of light on the subject. No additional illumination is required.

PICTURES HERETOFORE IMPOSSIBLE NOW EASILY MADE

Now, dancers in full career, acrobats in mid-air, and countless other action-packed subjects

negative of an average subject 50 feet away at *f* 11. The spectral distribution of the light is such that with a suitable compensating filter* excellent color shots of rapidly moving subjects are easily made with Kodachrome Professional Film.

COMPLETE EQUIPMENT

The Kodatron Speedlamp consists of a power unit for the operation and control of the Kodatron Flash Tube, and an 18-inch aluminum reflector on an 8-foot telescoping stand. The complete unit is carried on a steel base, equipped with rubber-tired casters.

The power unit converts 110-volt, 60-cycle current to 2,000 volts, through a specially constructed transformer. This current passes through a rectifier tube and the direct current is used to charge a condenser. (The charging cycle between flashes takes about 10 seconds.) When the trip circuit is closed, either by a synchronizer on the camera, by a photocell, or manually by a switch on the power unit, this energy stored in the condenser is discharged by a Strobotron Tube through the Kodatron Flash Tube in approximately 1/30,000 of a second. The Strobotron and Rectifier Tubes need replacement only at long intervals, and the power unit itself will last indefinitely.

Informal, startlingly lifelike portraits are just simple snapshots for the Kodatron Speedlamp. The modeling light is cool and comfortable. The flash can be synchronized at highest shutter speeds. All possibility of subject motion is eliminated at 1/30,000 of a second.

*Available in the near future.

IMPORTANT A

1. Critically sharp pictures of rapidly moving objects.
2. Simple, positive synchronization with most types of shutters. No adjustment necessary for lag.
3. Two or more lamps may be flashed in unison by photocell control.
4. High-speed color photographs with Kodachrome Film.
5. Great light intensity permits use of small apertures with consequent increase in depth of field.
6. Uniform amount of light per flash. No loss of efficiency during life of lamp.
7. Long-lived flash lamp.
8. Freedom from heat produced by conventional studio lamps.
9. Subject lighting modeled as with ordinary lights, using the modeling lamp incorporated with the

SIMPLE SYNCHRONIZATION

Synchronization is simple, easy, and positive, as the lamp fires instantaneously by electrical contact when the camera shutter is open. No adjustment for lag is necessary. Shutters of the between-the-lens type and certain of the roller-blind shutters are easily synchronized. Even relatively high speeds, such as 1/400 second, are so much slower than the 1/30,000-second flash that the latter can be checked for synchronization by inspection at the full opening of the shutter during the instant of flash. An easily adjusted synchronizer, called the Kodatron Speedlamp Timer, is soon to be available as an accessory.

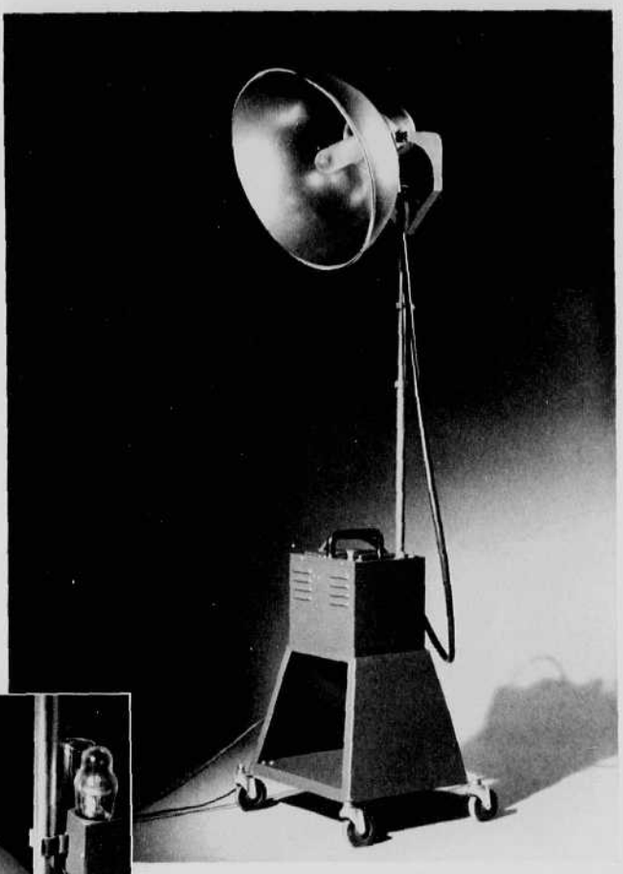
PHOTOELECTRIC TRIP

As many lamps as desired may be readily

T ADVANTAGES

flash tube. Modeling lamps give faithful preview of the light balance in the photograph.

10. Because of its extreme brevity, the flash produces no eye discomfort.
11. Subjects' eyes retain normal pupil size because of low illumination level while modeling or focusing.
12. Specially designed reflector gives illumination intermediate between a spotlight and a floodlight. Directional enough to increase the intensity along the axis to a considerable degree.
13. Economy of operation considering great number of flashes without tube replacement.
14. Low power consumption effects a substantial two-way saving: lower electric bills and a much lower investment in special wiring required by ordinary studio lights.



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can be "stopped cold"—a phrase, by the way, which achieves added significance in connection with the cold light of the gas-filled Kodatron tube. Subject motion becomes an asset. This complete freedom from traditional limitations makes new prospects of such hitherto difficult subjects as fathers and squirming children, unpredictable pets. The offhand, unposed, characteristic shot at last comes into its own. Wherever the impression of motion is a vital part of the picture, the Kodatron Speedlamp is indispensable.

Banquets, conventions, stage spectacles, athletic events are ideal subjects for Kodatron lighting. Large areas require comparatively few lights because of the long throw and great intensity of the light from each unit. The light exceeds that of 50,000 forty-watt tungsten lamps, and the flash is 800 times as fast as an ordinary flash lamp.

Speedlighting is no longer a stunt. The Kodatron Speedlamp opens up entirely new fields for portrait, commercial, and illustrative photographers. Scientific, technical, and medical uses are practically unlimited. Capitalize the spectacular things it can do. See your Kodak dealer. You'll find the lamp a "must" on your list of new equipment.

KODATRON SPEEDLAMP SPECIFICATIONS

The Kodatron Flash Tube is spiral-shaped and filled with a combination of the inert gases Krypton and Xenon. The tube in test runs has demonstrated a life of well over 5,000 flashes. Duration of flash, 1/30,000 second. Intensity equal to 50,000 forty-watt bulbs. Uses ordinary 110-volt, 60-cycle current. Power unit raises to 2,000 volts, rectifies and stores the energy in condensers. A special triggering circuit through a Strobotron Tube discharges this energy in 1/30,000 second with no lag. Charging time, ten seconds. (Uses 5 amperes for first few seconds, only one ampere thereafter.) Power unit fully protected against accidental discharge. Impossible to open cover without fully discharging condensers. Easily synchronized with practically all types of shutters.

Modeling light, "V"-filament projection-type, tungsten bulb, 50 watts. Aluminum reflector of special design, 18-inch diameter. Three-section telescoping steel stand, 8 feet high fully extended. Power unit measures 8 x 10 x 9 inches, removable from shelf of base. Storage space for connecting cords below power unit. Weight complete, 59 pounds. Attractive gray finish; some metal parts have chromium finish. Photoelectric trip unit available as an accessory. Multi-plug receptacle for interconnecting the power cords of several lamps also to be available. See price list below.

LIST PRICES

Kodatron Speedlamp, including power unit complete with Strobotron Tube and Rectifier Tube, Kodatron Flash Tube, 18-inch reflector, telescoping standard, synchronizer cord.	$400.00
Kodatron Flash Tube	30.00
Strobotron Tube	7.50
Rectifier Tube	7.50
Photoelectric Trip Unit	20.00
Extension Lamp Cable, 12 ft.	36.00

Prices subject to change without notice

EASTMAN KODAK COMPANY
ROCHESTER, N. Y.

J. Barstow
41 E. Grier

9-17-40

	Standard 1124F	Spiral 284F	1.5 small Spiral 284F	3 small spiral 284F
1800'	106	22	3.5	11
2000'	137	29	4	13

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No 1571.

page 20. Navy Strobosafe wiring diagram.