HAROLD E. EDGERTON

PAPERS

MC 25

Series III

Laboratory Notebooks

Number 11

Dated Sept. 17, 1940 to Dec. 3, 1941

Massachusetts Institute of Technology

COMPUTATION BOOK

NAME	Number
HAROLD E. EDGERTON	11

ROOM 4-111 4-134 4-117 MIT

Course .....

Used from SEPT 17 1940, to DEC 3 1941.

Notebook # 11

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 ____ and ____.
inside front cover

Item(s) now housed in accompanying folder.

Penstemon.

4
75
3000

Graybeaded Junco

Ouzel american dipper

Flycatcher. Western.

Bluebird ~~West~~ Mountain.

Colorado Blue Spruce

640 8000 acres
10,000'

Dodge
Everett
Dr.

Harvard Wheeler Anthem Anthem
Hayes

Sondero '36

17 June. Storm this year
Rufous hummingbird.

Cosmic Ray people at Echo Lake.

Kistler 1636 Champa.

K greisen Ithaca N.Y. (cornell Univ)

J. Treat Ithaca N. Y. " "

Jim Hall

Ponderosa
Mill

Frank Marques
Patchet setter
Joe Williams
Turner

Off Bear

Pete Williams
Trim Down

Harold E. Edgerton.

M.I.T.

Sept. 17, 1940.

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."

* * * * * * * *"

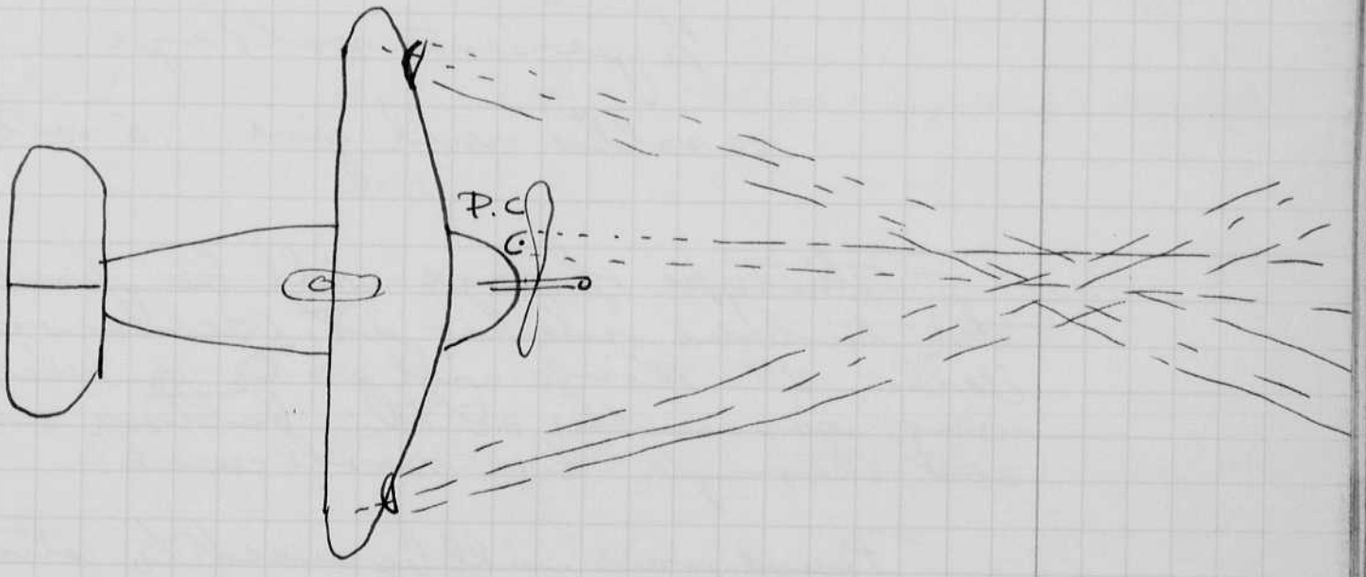
TECHNOLOGY STORE
HARVARD COOPERATIVE SOCIETY, Inc.
40 Massachusetts Ave., Cambridge, Massachusetts

Sept 19 1940
Harold E. Edgerton

Yesterday a light-blue background was put on the south wall in the photo service studio for color photography. Scheduled today to 11 am. photograph the DeMarco's dance team. I met them in San Francisco this summer at the Palace Hotel.

Discussed method of automatic firing of airplane gun yesterday with Barstow and Sage.

It might be better to use two lights that cross beam so that the range can be determined. In this way cloud formations at a distance would not give a false signal.



Sept. 25, 1940
Harold E. Edgerton

Carbon strip strain gage.

Planning

Strain .001 = 30,000 pounds sq inch.

$\frac{\Delta R}{R} = k \frac{\Delta l}{l} = k \varepsilon$ ε = strain.

Eas strips k = 9 or 10.

$\frac{\Delta R}{R}$ = .01 for 30,000 p. s. inch.

If an equal resistor is used the voltage change will be half of this.

1/2 percent voltage.

100 volts will give .5 volts.

This type of gage will be put on the turbine runner at Bellows Falls, Vt. Wires will go to a slip ring assembly at the bottom and out through the scroll case.

Picine wax will be used to stick the wires and gages to the runner.

I tested the slip ring assembly on Monday night and it is fine. Rand of Boston Laminated Products made the slip ring assembly for

Density Readings. center ↓ CHAIR.

Sept 26 1940

POSITION

FILM	1	2	3	4	5	6	7	8	9	10
55	.74	.82	.9	1.0	1.09	1.07	1.0	.91	.8	.66
56	.82	.9	.98	1.08	1.11	1.07	.99	.9	.82	.71
57	.9	1.02	1.15	1.32	1.46	1.45	1.26	1.09	.95	.81
58	.9	1.04	1.18	1.35	1.45	1.44	1.29	1.16	1.0	.85
59	.84	.94	.99	1.06	1.06	1.04	1.02	.96	.88	.77
60	.35	.52	.59	.66	.75	.88	.77	.67	.62	.50
5	.83	.88	.88	.91	.92	.92	.89	.86	.80	.68
56	.83	.88	.94	1.01	1.02	1.02	.93	.86	.76	.66

UNIT	LAMP.
1	1
2	2
3	3
3	2 no stippled light
4	2
5	STRIP.
4	2
6	2

Lamp 12 ft from blue wall
f 32 + 4x5 camera.
Kodak Super film.
Focus on DK 50.

Unit #1 2000 V 112 mf 18" al ref. Steel finish wood + lacquer.

2 2000 V 112 mf. " " " "

3 2000 V 112 mf. " Specular spot type. deep.

4 2000 V 112 mf. " Matte.

5 2000 V 58 mf + 58 mf. 20" straight tube in trough ref al.

6. 1800 V 112 mf 18" al Ref. Shiny

Lamp 3. Clear Glass. Spiral Krxe
1 frosted " "
2 " " "

Sept 30 1940.
Daniel E Edgerton.

One of the reflectors was highly polished with a power driven buffer. A picture of the blue curtain in photo-aerial was taken with this and with a comparison reflector with a surface treated with steel wool and lacquered.

Density readings.

DK 50 18 mins Super x x film.

Fog density = 0.22

	Density at edge	center	edge	
#1	1.06	1.28	1.12	Specular ref.
	.99	1.21	1.06.	Matte reflector

$\gamma = \frac{\Delta D}{\Delta \log \frac{E_1}{E_2}}$ = $.07 = \log \frac{E_1}{E_2}$

$\frac{E_1}{E_2} = 1.2$

$\log 2 = .301$

Discussed above and P3 data with Robt. Finlay of I.B. Co. Also looked at proofs of single-shot color pictures that were taken of my three children last Wednesday.

Plan to shoot Mr. Rogers children tomorrow at 3 pm. Also Mrs. Howell and baby.

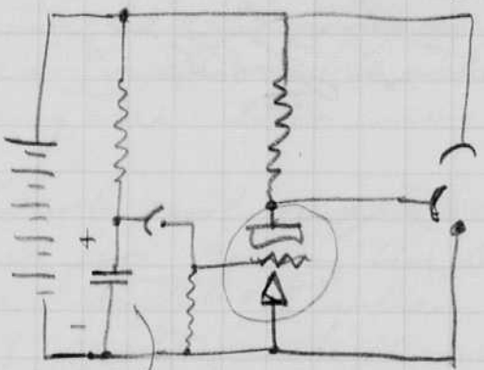
Have 4 pm date with man from N.E.P. concerning experiments for this weekend at Belcows Falls N.H.

cond.

Tested new sensitive photocell R.C.A. 929 in flash machine. Operated satisfactorily across the photo-service studio - 25 ft even if the reflector was almost against the wall.

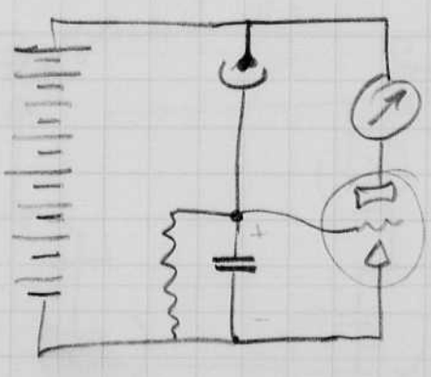
This photocell was connected directly into the trip terminals of the Kodatron speed lamp.

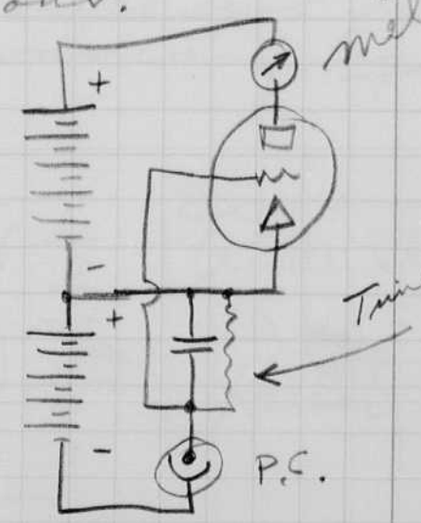
Photo all method of integrating light from flash lamps.



timing eye tube.

or leave condenser out.





Oct 14 1940
Harold E. Edgerton

School Started Oct 1. I teach 6.631 Gaseous conduction this term. 9 students.

Arnold Mengel
Norman Scott
Wesley Pendleton
William Root
Geo. Clark
William Hope
Gordon Lee
Pelle Hammarlund
Robert Cloud.

I spent Oct. 5, 6, 7, 8 at Bellows Falls. A full memo of my activities is in the New England Power folder.

Oct. 18, 1940
Harold E. Edgerton.

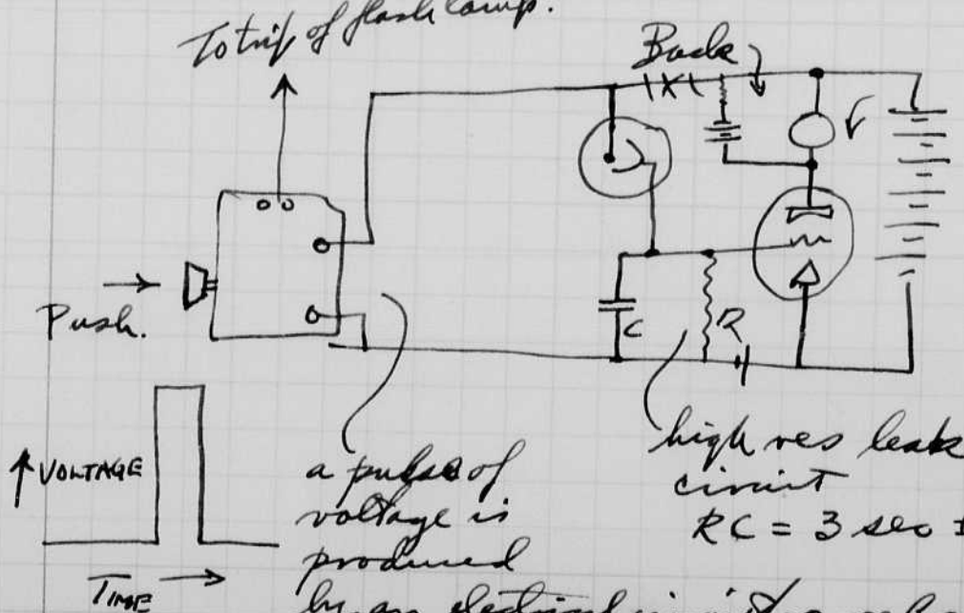
Photocell method of measuring light from an electrical flash lamp.

See p 97 4th note book 10.

Ordinary light will influence the exposure. The meter should give an indication of the ordinary light available as well as the flash light.

One way to do this would be to use a circuit that is effective for 1/100 of a second (or other suitable value). An integrating current would show the effect of ordinary light then the experiment would be repeated with the flash occurring during the 1/100 sec.

Herb just suggested a shutter with a contact for firing the lamp. I was considering such a method when the material on page 97 note book 10 was entered. By the use of the transient switching method it would not be necessary to use a shutter to exclude ordinary light.



Explained and understood
10-18-40
Herbert E. Grier

a pulse of voltage is produced by an electrical circuit or relay. The lamp is flashed at the proper time.

high res leak circuit
RC = 3 sec ±.

Nov 4 1940
Harold E. Edgerton.

I have spent considerable time during the past month at Bellows Falls, Vt testing a hydro electric generator there. #2 unit. A strain gage was mounted on one of the turbine blades and oscillograms were taken of the strain when load was dumped.

Osc opposite shows a dump test from 0.88 gate.

Torsional vibration of shaft is evident in strain indication. Also bumps from the hydraulic back swing. The shaft frequency is 5.6 cycles/sec.

Bellows Falls
Circ of inner vert face of brake ring 666.125"
Chord between arrows 7.93 84 gate.

Notebook # 11

Filming and Separation Record

1 unmounted photograph(s)

____ negative strip(s)

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

was/were filmed where originally located between page 8 and 9.

Item(s) now housed in accompanying folder.

Nov 4 1940
Harold E. Edgerton.

I have spent considerable time during the ~~past~~ month at Bellows Falls, Vt testing a hydro electric generator there. #2 unit. A strain gage was mounted on one of the turbine blades and oscillograms were taken of the strain when load was dumped.

One oscillograph shows a dump test from 0.88 ± gate.

Torsional vibration of shaft is evident in strain indication. Also bumps from the Hydraulic back swing. The shaft frequency is 5.6 cycles / sec.

Bellows Falls
Circ of inner vert face of brake ring 666.125"
Chord between arrows 7.93 84 gate.

Notebook # 11

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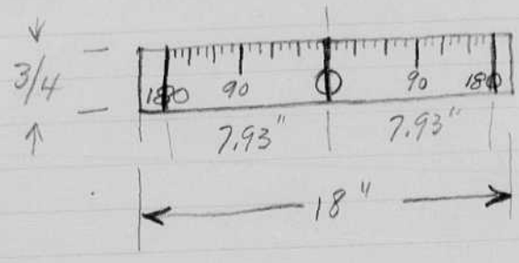
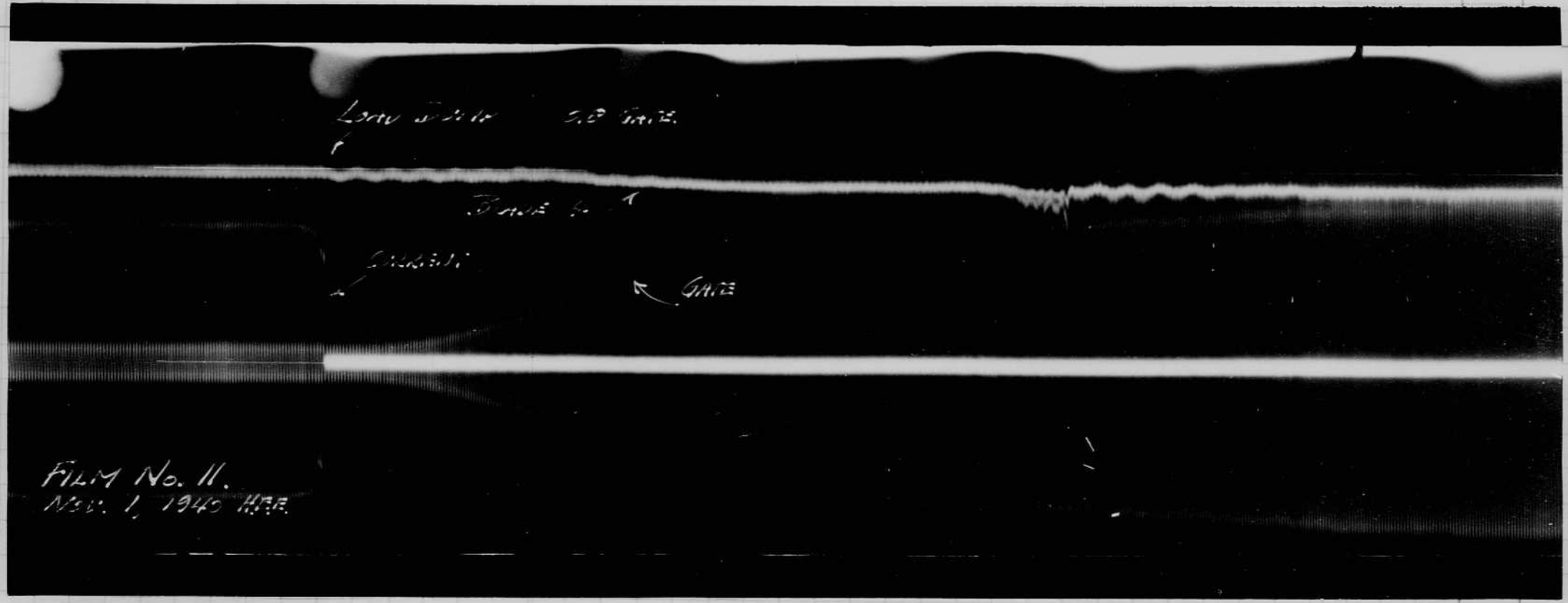
Dolores Falls.

Arc of inner vert face of brake ring 666.125"

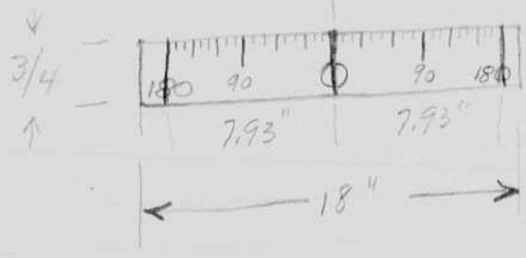
Chord between arrows - 7.93"

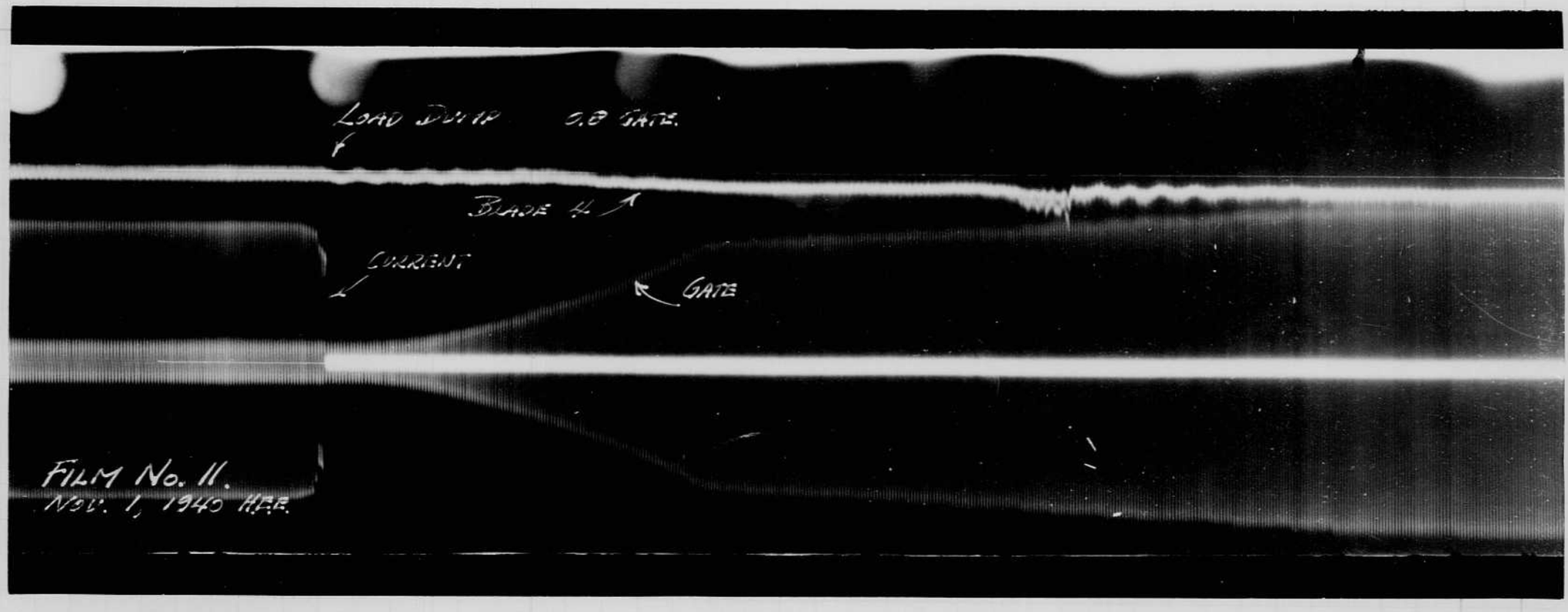



GATE
FILM No. II.
Nov. 1, 1945 H.E.R.


EASTMAN K
KODAK
NITRATE FILMS

Dellores Nelson.
Arc of inner vert face of brake ring, 666. 125"
Chord between arrows — 7.93"




LOAD DUMP
C.B GATE.
BLADE 4
CURRENT
GATE
FILM No. 11.
NOV. 1, 1940 H.A.R.


EASTMAN K
KODAK
NITRATE FILMS

Tests with Barslow using
Spiral lamp with 4000 mf at
2000 volts. Weight of condensers
about 720 pounds.

Nov 10, 1940 Took picture across the
Charles River with unit mentioned
above.

2500 ft with 4 superimposed
flashes was just coming.

The 8x10 aerial camera was used for
this test. Kodatron film and xxx
Eastman.

Camera 40 ft from light.

Chimneys are 1500 ft away.

f 3.5 4032 mf 2000 volts.

Camera at light.

Reflection from dust particles reduces effectiveness.

Daylight shot.

Tests with Barslow using
Spiral lamp with 4000 mf at
2000 volts. Weight of condensers
about 720 pounds.

Nov 10, 1940 Took pictures across the
Charles River with mist mentioned
above.

2500 ft with 4 superimposed
shades was just coming.

The 8x10 aerial camera was used for
this test. Kodatron film and xxx
Eastman.

Camera 40 ft from light.

Chimneys are 1500 ft away.

f 3.5 .032 mf 2000 volts.

Camera at light.

Reflection from dust particles reduces effectiveness.

Daylight shot.

Picture of Broadie was taken on Kodalux Pan film at f 3:5

Four superimposed flashes of light were used.

Each consisted of the flash from a 4000 mf condenser charged to 2000 volts. The lamp (spiral filled with Kr-Xe) was in a reflector, designed by Barstow.

The lamp and camera were 50 ft apart on top of East wing of M.I.T.

12

Picture of prostate was taken on Kodalux Pan film at f 3:5

Four ~~superimposed~~ flashes of light were used.

Each consisted of the flash from a 4000 mf condenser charged to 2000 volts. The lamp (spiral filled with Kr + e) was in a reflector, designed by Barston.

The lamp and camera ~~were~~ were 50 ft apart on top of East wing of M.I.T.

15
EASTMAN — SAFETY — KODAK

Nov 19 1940

Invention Textile Mill stroboscope.

For examining a loom in action to find how the threads are following the shuttle, I recently again considered the use of a stroboscope with a sound pick up.

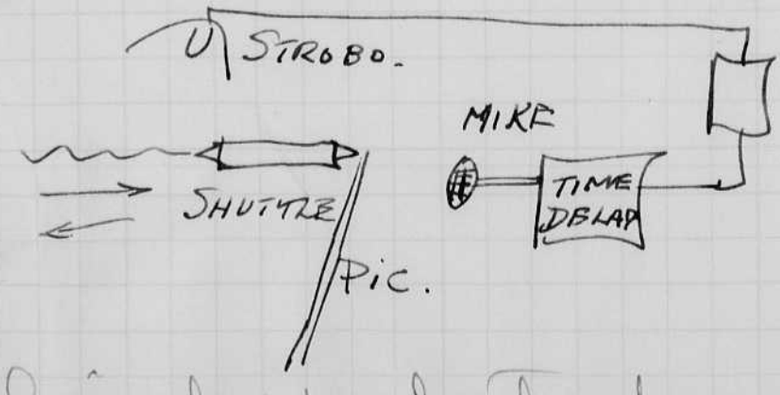
In this way a directional microphone could be pointed at a shuttle box or pick and operate a lamp at the necessary time.

It could be possible to also use a time delay unit if the maximum noise came at the wrong moment.

adjustment of the gain should be used so that the peak noise would trip the stroboscope or time delay unit.

a noise or filter could also be used to cut out or reduce the sensitivity to certain noises or frequencies of noises.

the microphone might consist of a sound or vibration pickup which would be damped or adapted to the loom.



Explained & understood
11-19-40 Herbert E. Grier

Nov 20 1940
Harold E. Edgerton

Yesterday at 2 there was a meeting at Sage's request of several from M.I.T. and Harvard concerning a N.D.R.C. project about camouflage for war purposes. Mr. Morrison is in charge. Col. Bogley - Harvard - aero photography.

1/100 sec exposure at 200 m.p.h.
plane must be over 3500 ft high.
motion = $\frac{200 \times 5280}{60 \times 60}$ ft./sec = 300 ft./second.

in 1/100 sec motion is 3. ft.

at 100 m.p.h. motion is 1.5 ft.

Mr. Jacques of the Boston Garden is going to buy 2 speedlamps and camera for high-speed shots of plows just coming into Boston. He was here yesterday. I called Hornyer of E.K. and he is going to give him a price of 600 on the two.

Herb has been designing the ballistic mounted portable unit. A few sample layouts have been made.

Nov 20 1940 Loom adjustment stroboscope
H.E.E.

For observing a loom I suggest a stroboscope with a nine powerful flash circuit. The light could be concentrated in a beam which would be very effective in picking up the thread.

A stroboscope has been operating continuously about once per second since the summer with 200 volts and 10 mf discharge. A 0.3 ohm resistor is of great assistance in preserving the life. Otherwise the bulb darkens within a few weeks.

I think a 50 mf condenser could be used at 350 volts.

At 90 picks a minute

$$\text{power} = \frac{350^2 \; 50 \times 10^{-6}}{2} \times \frac{90}{60} = 4.6 \text{ watts.}$$

Connected a stroboscope to 50 mf at 300 volts D.C. motor - and set in operation at 1 flash per second.

A C.R. tube showed that the condenser voltage did not reverse, as it did with the 10 mf condenser. Therefore no resistance was put in the discharge circuit.

Started on life test Nov 20 Wednesday at 3 p.m.

Nov 25 1940
H. E. Edgerton.

Yesterday Watertown arsenal - Dr. Allen of the Franklin Institute was there for discussion of ballistic problems. Dr. Reed Major - Dr. Lester.

Saw movies of amphibian tank today Collinswood (?). 800 lb. capacity.

Herb back from Rochester - enthusiastic reports of new portable lighting unit. 5000 doz. Kodatron film has been sold to date.

Dec. 5, 1940.

Large Shadowgraph design - using large Kodatron speedlamp.

Assume 100 watt input to lamp. at 30 flashes/sec.

$\frac{100}{30} = 3$ joules/flash.

$3 = \frac{CE^2}{2} =$ $\quad 6 = CE^2 \quad E^2 = 10^6$

$C = 6\ mf.$

I spent last weekend with Art Carlson of the N.C.R. Co and Wyle. We took about 3000 ft of movies.

On Sat. Nov. 30 I took pictures at a football game Fenway park. B.U. vs Holy Cross 7-0. I used a mimm (27 inch) 220 mf 2000 volt in a spiral lamp. f 9 was none to much! Should use two lights and more power. See print on opposite page. Barslow and Ashley helped.

Shadow from Big Strobe

4577

Notebook # 11

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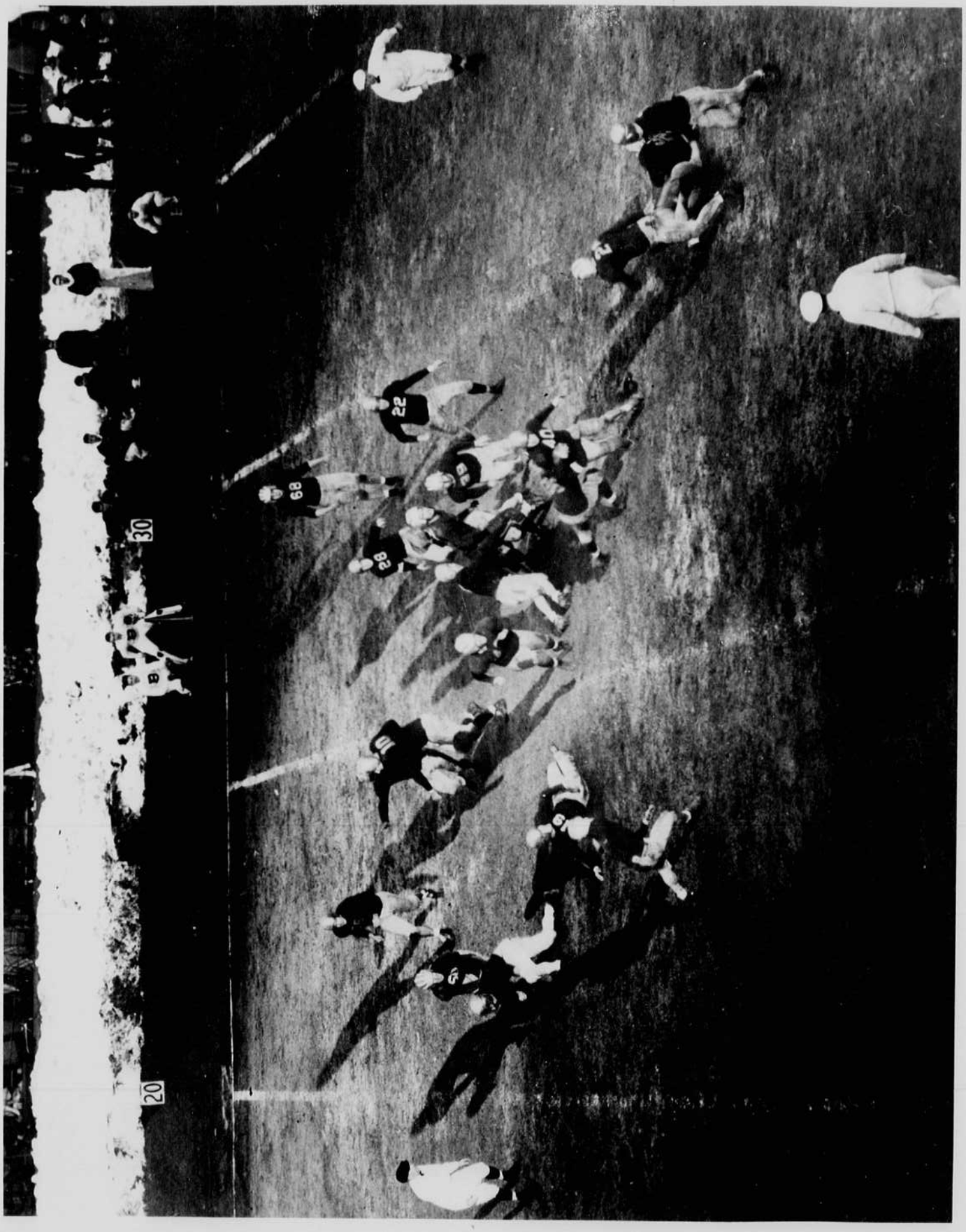

Shadow from Big Strobe

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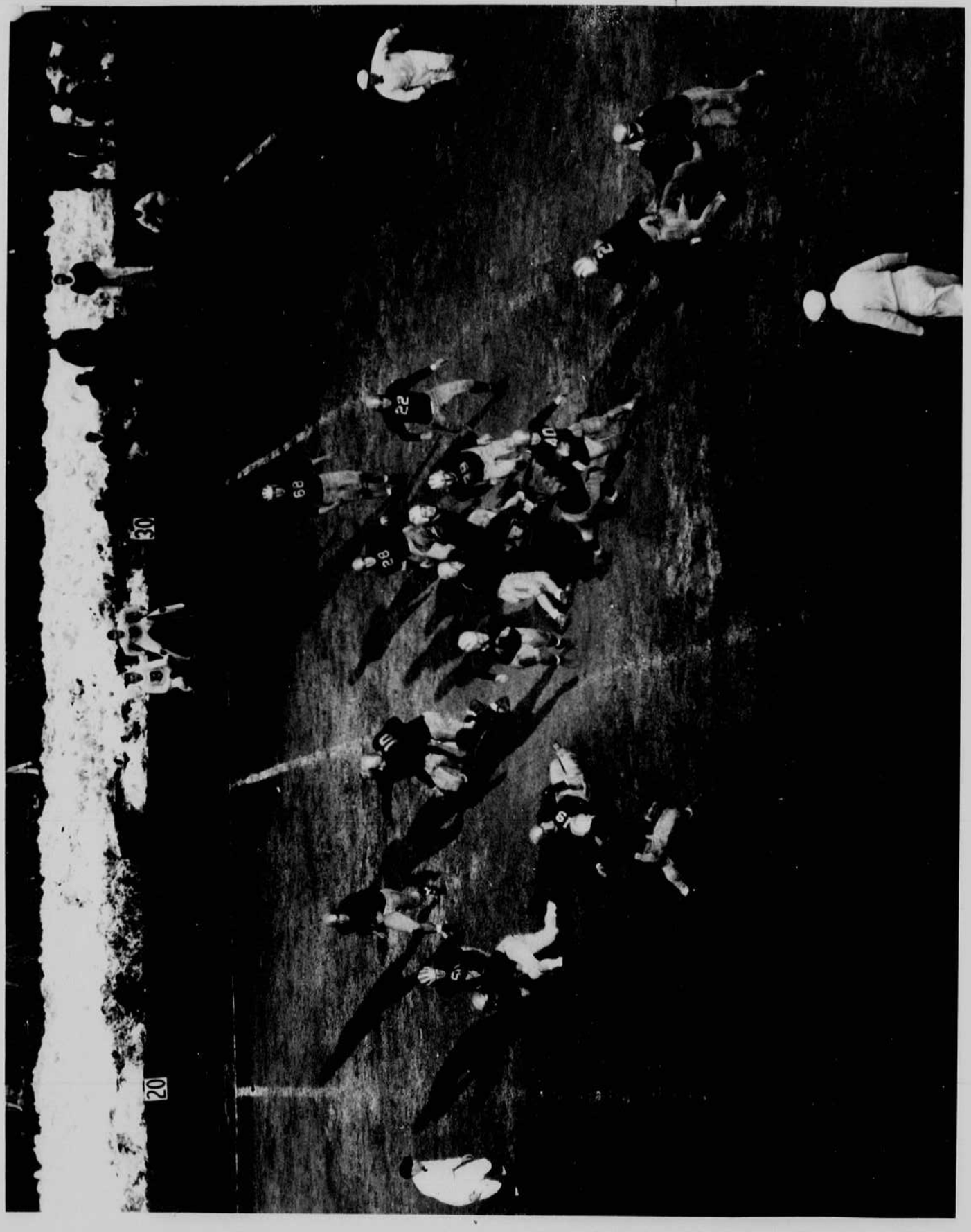

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Kr-Xe Standard Edgerton Plate
Spiral 112 mf 2000 V

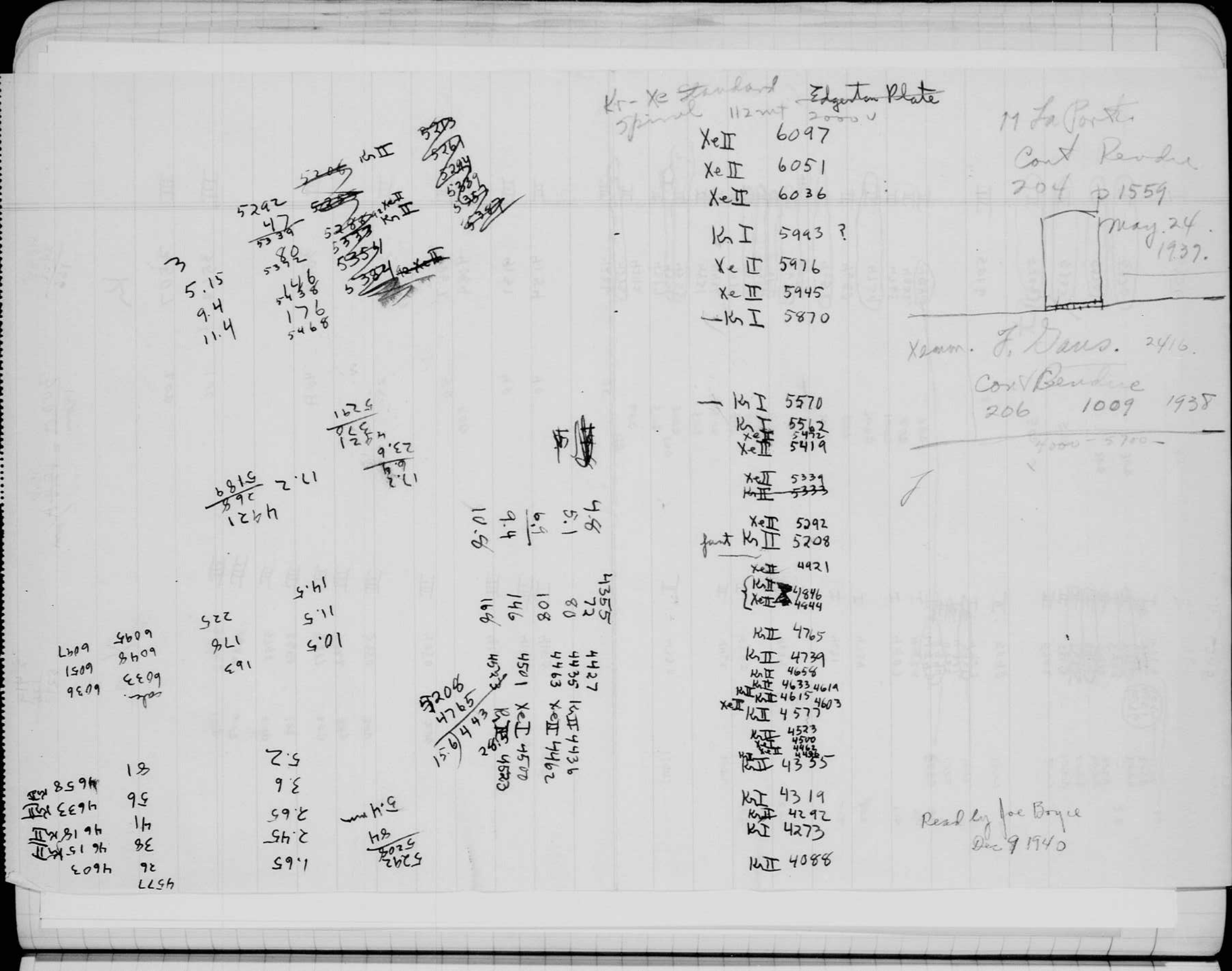
XeII	6097
XeII	6051
XeII	6036
KrI	5993 ?
XeII	5976
XeII	5945
KrI	5870

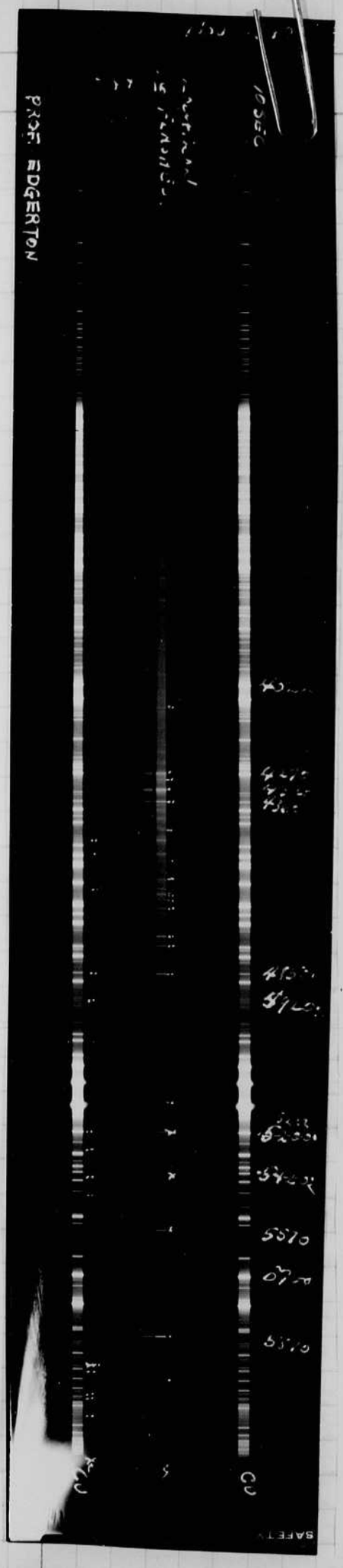
11 La Porte
Cont Rendus
204 p 1559
May. 24.
1937.

Xenon. F. Daus. 2416.
Cont Rendus
206 1009 1938
4000 - 5700

KrI	5570
KrII	5562
XeII	5492
XeII	5419
XeII	5339
KrII	5333
XeII	5292
KrII	5208
XeII	4921
KrII	4846
XeII	4644
KrII	4765
KrII	4739
KrII	4658
KrII	4633 4619
KrII	4615 4603
XeII	KrII 4577
KrII	4523
KrII	4500
KrII	4463
KrII	4435 4388
KrI	4319
KrII	4292
KrI	4273
KrII	4088

Read by Joe Boyce
Dec 9 1940





Kr-Xe Standard Spiral 112 mfd. 2000 v.

	Xe II	6097
	Xe II	6051
	Xe II	6036
	Kr I	5993 (?)
	Xe II	5976
	Xe II	5945
	Kr I	5870 · —
	Kr I	5570 · —
	Kr I	5562
	Xe II	5472
	Xe II	5419
	Xe II	5339
	Xe II	5292 —
faint	Kr II	5208
	Xe II	4921
(	Kr II	4846 · —
(	Xe II	4844 — ?
(	Kr II	4765
	Kr II	4739
	Kr II	4658
	Kr II	4633
	Kr II	4619
	Kr II	4615
	Xe II	4603
	Kr II	4577
	Kr II	4523
	Xe I	4500
	Xe II	4462
	Kr I	4436
	Kr II	4355
	Kr I	4319
	Kr II	4292
	Kr I	4273
	Kr II	4088

Data read by Joe Boyce
December 9, 1940

Edgerton Plate

Xe II 6097
Xe II 6051
Xe II 6036
Kr I 5993 ?
Xe II 5976
Xe II 5945
Kr I 5870

Kr I 5570
Kr I 5562
Xe II 5472
Xe II 5419
Xe II 5339
Kr II ~~5333~~
Xe II 5292
Kr II 5208
Xe II 4921
Kr II 4846
Xe II 4644
Kr II 4765
Kr II 4739
Kr II 4658
Kr II 4633 4619
Kr II 4615 4603
Xe II 4577
Kr II 4523
4500
4463
4430
Kr II 4355
Kr I 4319
Kr II 4292
Kr I 4273
Xe II 4080

Kr II 5315
5269
5244
5239
5193
Kr II
Kr II
5292
47
5339
5302
5333
5354
5384
Kr II
4438
176
5468

3
5.15
9.4
11.4

5.1
9.4
10.9

43355
72
80
108
146
166

44427
44359 Kr II 4436
4493 Xe II 4462
4504 Xe I 4500
4523

4765
4743
15.6

5242
84
5.4 mm

1.65
2.45
2.65
3.6
5.2

5577
26
38
41
56
81

4603
46 15 Kr II
46 18 Kr II
4633 Kr II
4658 Kr II

6036
6033
6051
6048
6047
6095

163
178
225

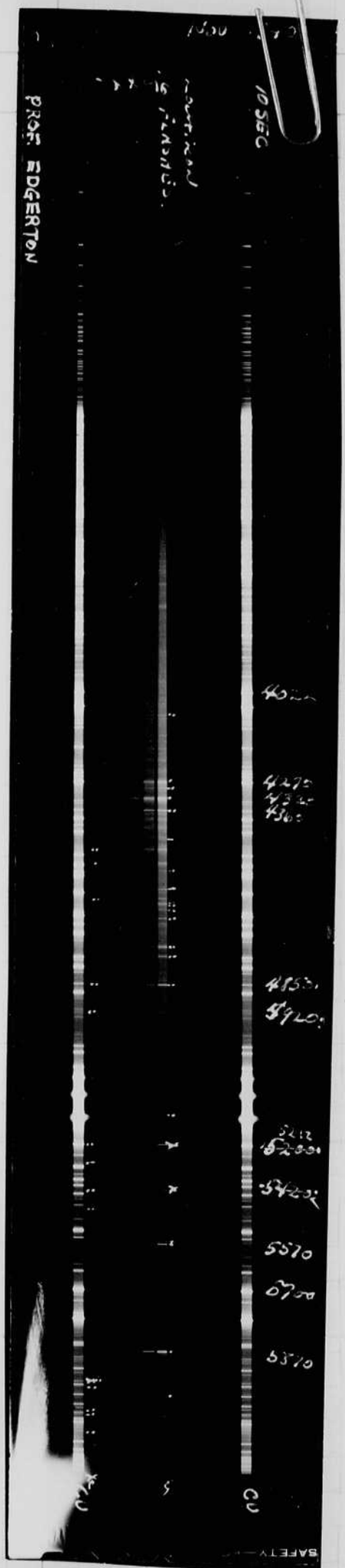
10.5
11.5
14.5

4921
2648
5189

17.2
23.6
4921
3720
5291

Read by Joe Boyce
Dec 9 1940

May. 24. 1937.



Kr-Xe Standard Spiral 112 mfd. 2000 v.

	Xe II	6097
	Xe II	6051
	Xe II	6036
	Kr I	5993 (?)
	Xe II	5976
	Xe II	5945
	Kr I	5870·
	Kr I	5570·
	Kr I	5562
	Xe II	5472
	Xe II	5419
	Xe II	5339
	Xe II	5292
faint	Kr II	5208
	Xe II	4921
(	Kr II	4846·
(	Xe II	4844
	Kr II	4765
	Kr II	4739
	Kr II	4658
	Kr II	4633
	Kr II	4619
	Kr II	4615
	Xe II	4603
	Kr II	4577
	Kr II	4523
	Xe I	4500
	Xe II	4462
	Kr I	4436
	Kr II	4355
	Kr I	4319
	Kr II	4292
	Kr I	4273
	Kr II	4088

Data read by Joe Boyce
December 9, 1940

4088
3922
166

$\frac{300\,A}{192\,mm} = \frac{15.6}{15.8}\,A/mm$

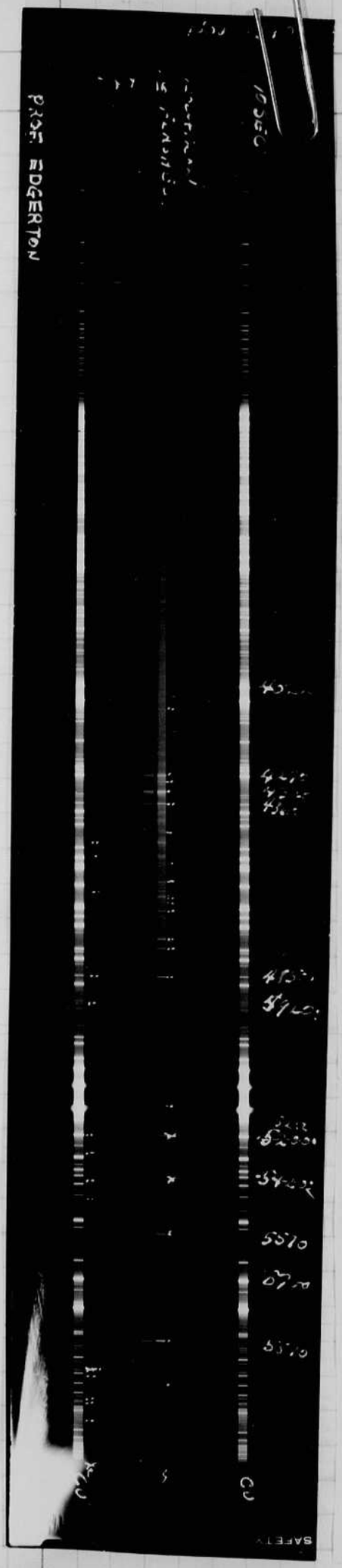
5419
126
5293

Kr

III	3507	200
III	3564	100
III	3868	40 H
III	3957	25
III	4067	50
III	4088	500
III	4131	40
III	4154	40
III	4226	25
III	4273	100
III	4292	600
III	4317	500
III	4319	3000 150
III	4355	
III	4431	500
III	4436	600
III	4475	800
III	4577	800
III	4615	500
III	4689	1000
III	4633	800
III	4658	2000
III	4680	500
III	4734	3000
III	4765	1000
III	4832	800
III	4846	700
III	5016	20
III	5206	500
III	5333	500
III	5570	200
III	5870	300
III	6456	50

Xe

III	3579	100
III	3624	600
III	3780	300
III	3841	100
III	3877	200
III	3922	500
III	3950	300
III	4050	200
III	4109	100
III	4145	100
III	4180	1000
III	4330	1000
III	4462	1000
III	4560	100
III	4624	200
III	4671	300
III	4734	100
III	4807	100
III	4829	70
III	4843	8000 60
III	4844	
III	4862	1000
III	4916	50
III	4923	1000 60
III	5080	1000
III	5292	2000
III	5313	1000
III	5339	2000
III	5419	3000
III	5472	3000
III	5823	20
III	5976	2000
III	6036	2000
III	6051	1500 30
III	6097	
III	6318	
III	6469	40
III	6595	1000



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	Kr II	4292
	Kr I	4273
	Kr II	4088

Data read by Joe Boyce
December 9, 1940

Thursday.
Dec. 20, 1940
Harold Edgerton.

On Monday Dec. 17 I took the portable flash unit to the Brown garden and helped Geo Woodruff of the International News shoot some photographs of Joe Louis and Al. McCoy.

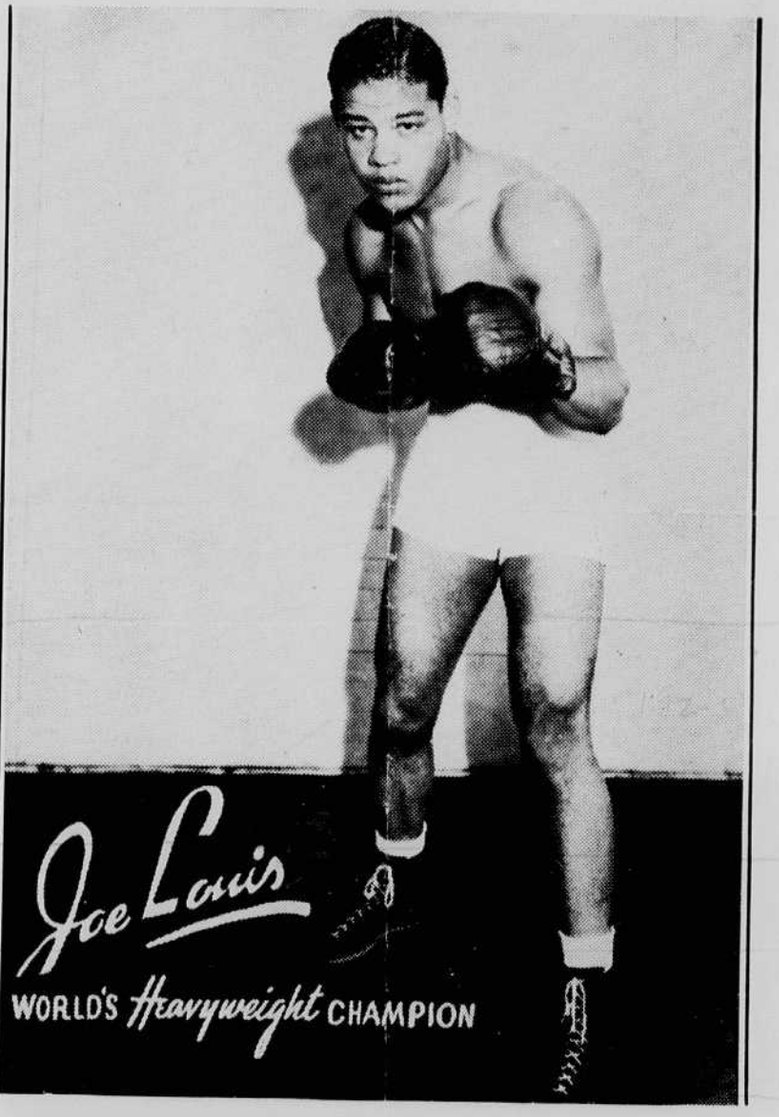
This unit operates from a Wheatland wet battery of 4 volts. A vibrator operates from a special transformer that Raytheon has made for us. A 28 mf condenser flashes into a small spiral Kr x E lamp from the conventional trip circuit using a strobotron tube. 2000 volts. Kodatron film at f11 was used and the pictures were run in the Record and American on Tuesday.

On Friday Dec. 13 I was in Washington D.C. In the morning I talked to Mr. Lauger and Mr. for several hours. They demonstrated to me the strobotron controlled flash lamp and photocell pickup device that was used for determining the height of clouds, the method works fine at night but the daylight operation is bothered by shot effects in the amplifier. Lauger and I went over to the Weather bureau and talked to Mr. about further funds for the problem. It was stated that the flash method had promise and that it should be persued further.

In the afternoon Lieut Munroe from Carrederock came to the Bureau of Stds and we spent the afternoon discussing applications of high-speed photography. Several pictures were taken in the propeller tank of propoir action.

GOODWIN A. C.

Presents



BOSTON GARDEN

NORTH STATION BOSTON, MASS.

December 16, 1940

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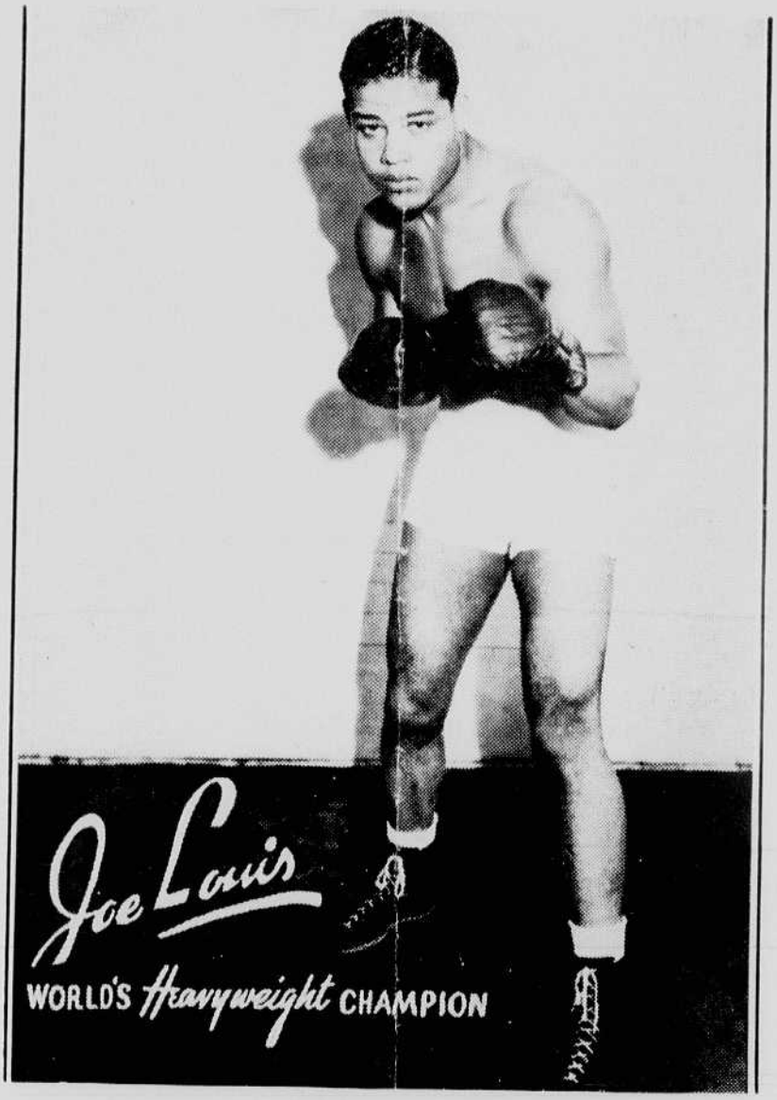

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using a strob
Kodatron filter
pictures were
American an

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100 – 50 volts.
30 – "

PROGRAM

Main Event

15 Rounds

JOE LOUIS
Heavyweight Champion of the World

vs

AL McCOY
Dorchester, Mass.

Supporting Events

All 6 Rounds

FRANKIE BRITT (FALL RIVER)	vs	**HOLMAN WILLIAMS** (DETROIT)
BILL WEINBERG (CHELSEA)	"	**TONY FERRY** (FALL RIVER)
BILL TORDIGLIONE (NORTH END)	"	**FREDDIE CABRAL** (CAMBRIDGE)
AL DUTRA (CAMBRIDGE)	"	**NICK SULLO** (EAST BOSTON)
HAROLD HARRIS (MALDEN)	"	**FRANK TOPASIO** (BRISTOL, R. I.)

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Dec 26, 1940.
Harold E. Edgerton

Spent Friday Dec. 20 at Aberdeen Md on tanks with Booth's committee of the N.R.C. Left ~~Jordan~~ Thursday night on the Federal with Prof. Jay. Also Morse, Eddie Taylor, Sunsaker, from tech were on the trip. Met Booth in Washington and went to the Carnegie Institution. Mr. Moore and Mr. Mc of the Diesel co were there and went with us to Aberdeen in two cars.

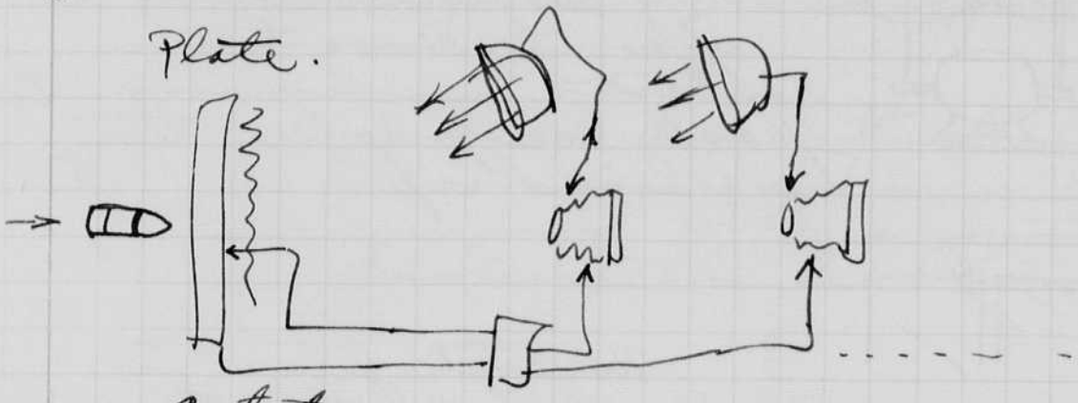
I took several pictures of tanks in action with the battery operated portable. Took train at Baltimore for New York city. Commander Hotel Saw Nitti in morning and took 1 o' clock train for Boston.

Plymouth car today from Belmont auto company Tom Malone
4 door Gun metal P12 4 Dr. $799.
Serial 1194360
Motor P 12 147204.

Sat Dec. 28 1940
Harold E Edgerton.

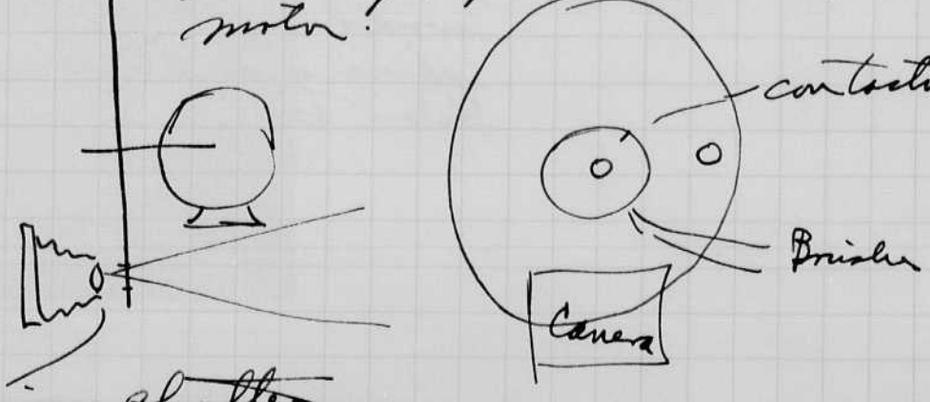
Received letter from Algon yesterday concerning tests scheduled Jan 13 - 17 at Dahlgren, Va. I may go there on tests at that time with high-speed flash equipment.

May suggest multiple cameras with delay between, each with elpante flash lamp for illumination.



Contact device on back of plate to start shutter. Then switch on shutter fires lamp 1. a delay is arranged before shutter 2 and ~~camera~~ light 2 is flashed. Any number of units could be arranged in sequence.

Flash synchronizer - high speed shutter.



ordinary shutter with contact when open.

over

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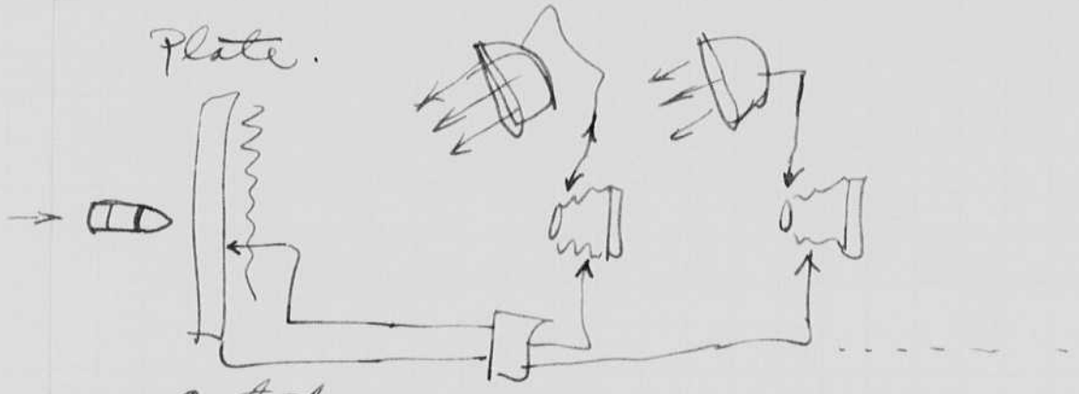

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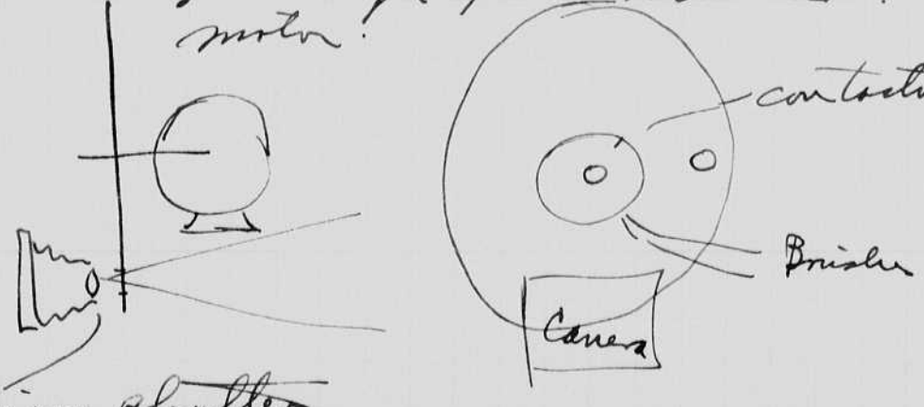


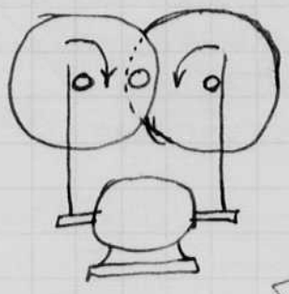
ordinary shutter with contact when open.

over

Cont.

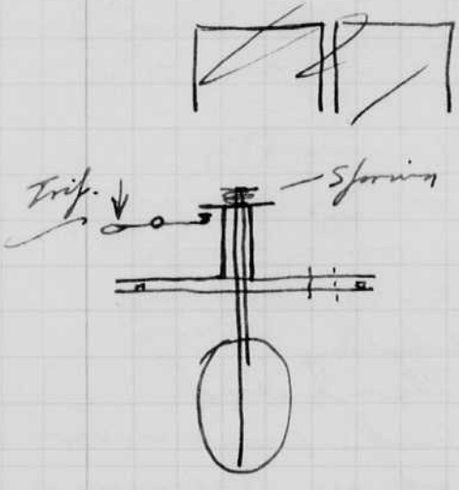
High-Speed shutter.

The disc described on the previous page is brought up to speed with the ordinary shutter closed. Then when it snaps, there is a series connection through two contactors to flash the lamp when everything lines up.



Another method

Two discs rotating in opposite directions. Contactors mechanism to flash lamp when they are lined up.



Use catch between two discs to hold the holes out of phase so light cannot pass through. Then friction on outer disc will cause it to slip over the stop for one revolution of slip.

It could be made so that a sliding clutch would work against a spring and let the outer disc slip one revolution.

Dec. 29, 1930.

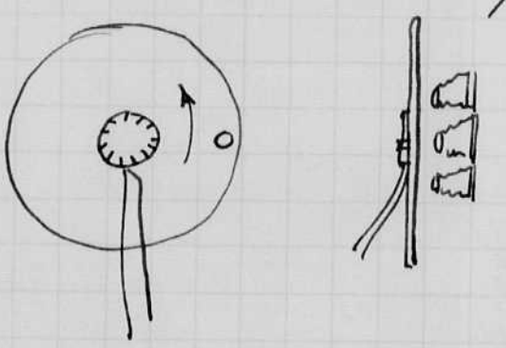
Harold E Edgerton

Went to U.Y. on 3 p m train and attended Jim Mili's party at 6 east 23rd. Returned to Boston on the 12 30 train. Took the portable flash lamp along. Battery operated.

Hi[illegible] speed shutter camera.

1. Disc with multiple holes over film such as the Legg camera but modified with a contactor mechanism for flashing the lights in sequence.

2. a disc with one hole but with a series of lenses and cameras in a circle - also equipped with a contactor for flashing the lights in sequence.



Taken at Jim Mili's party Sat Dec. 30, 1940.

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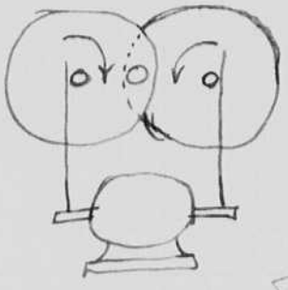

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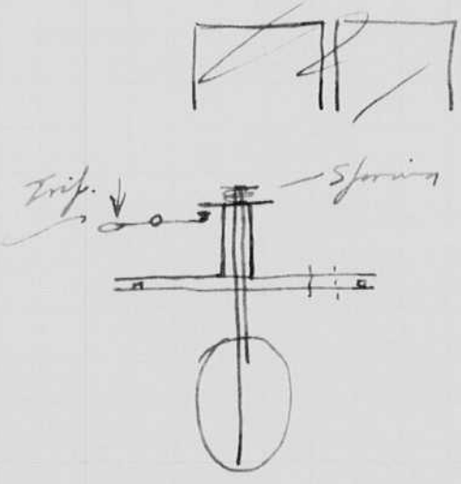

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High speed shutter camera.

1. Disc with multiple holes over film such as the Legg camera but modified with a contactor mechanism for flashing the lights in sequence.

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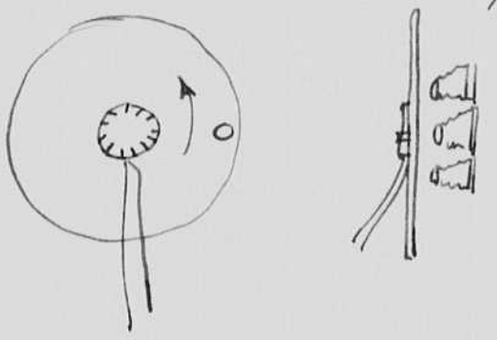


Taken at Jim Mills party Sat Dec. 30, 1940.

Jan. 8, 1941.
~~Trace & Effect~~.

My parents came Dec 31 for a short visit. Dad left for Syracuse on Jan 6, mother will leave on Jan 9 or 10.

Experimented with Barstow on Monday with bullet photography. He also ~~spent~~ the weekend on glass picture.
The exposure time was found to have a 200 microsecond after glow when an open gap was used with a center electrode. Small wire (about #14) was used.
The capsity type was tried with success as before with a 10 microsecond time after glow.

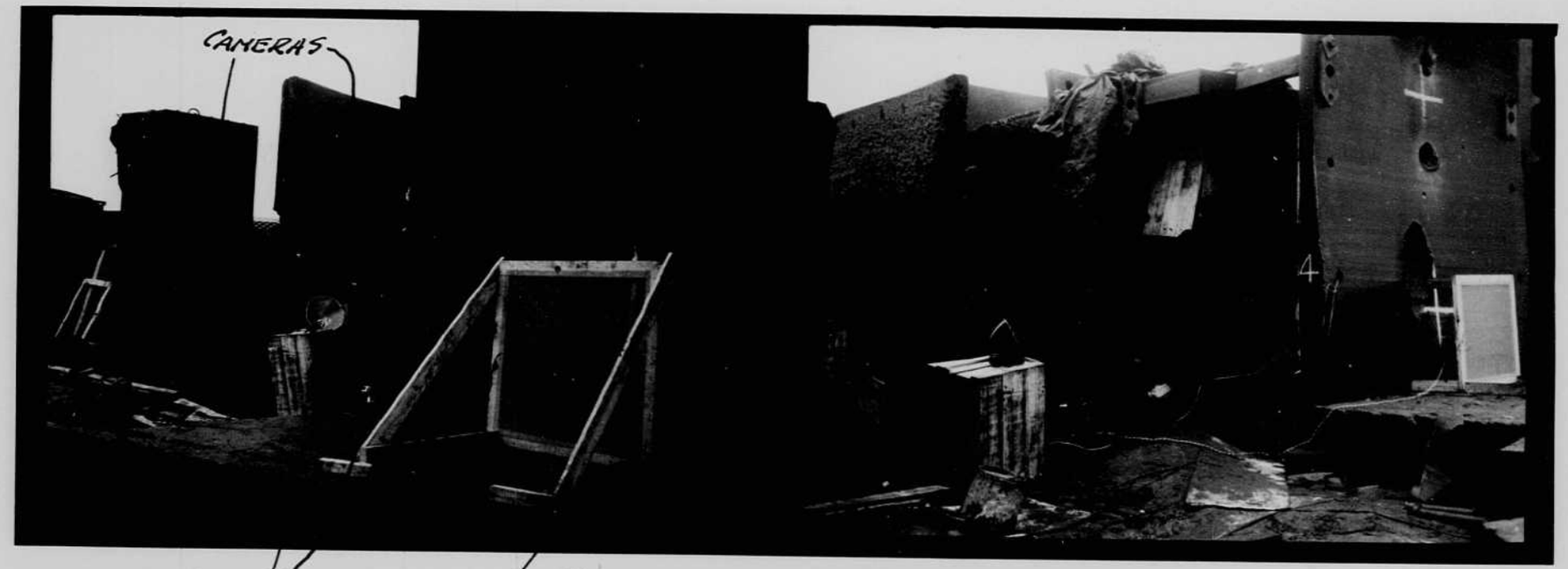
Jan 20 1941

Went to Dahlgren Va. Tuesday night Jan 14 on Federal. Spent 15, 16, and 17 at Naval Proving Ground.

Tests were made on ~~a~~ plate with 8" shell impact. Switch gear from the G.E. Co was tested.

Delay in shutter = .0167 – .025 seconds ?

the screen in test 4 was 12 ft from the plate.
3 " 20 or 30 " " "
(the bullet was 1 ft before impacting 3.)



Set up at Naval Proving Ground Dahlgren Va Jan 17 1941 for shot #104.
8" shell 1797 ft/sec. velocity.

Jan. 8, 1941.
Bruce E Eyster.

My parents came Dec 31 for a short visit. Dad left for Syracuse on Jan 6, mother will leave on Jan 9 or 10.

Experimented with Barstow on Monday with bullet photography. We also spent the weekend on glow pictures.
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Tests were made on armor plate with 8" shell mount. Switch gear from the D.E. to was tested.

Delay in shutter .0167 – .025 seconds ?

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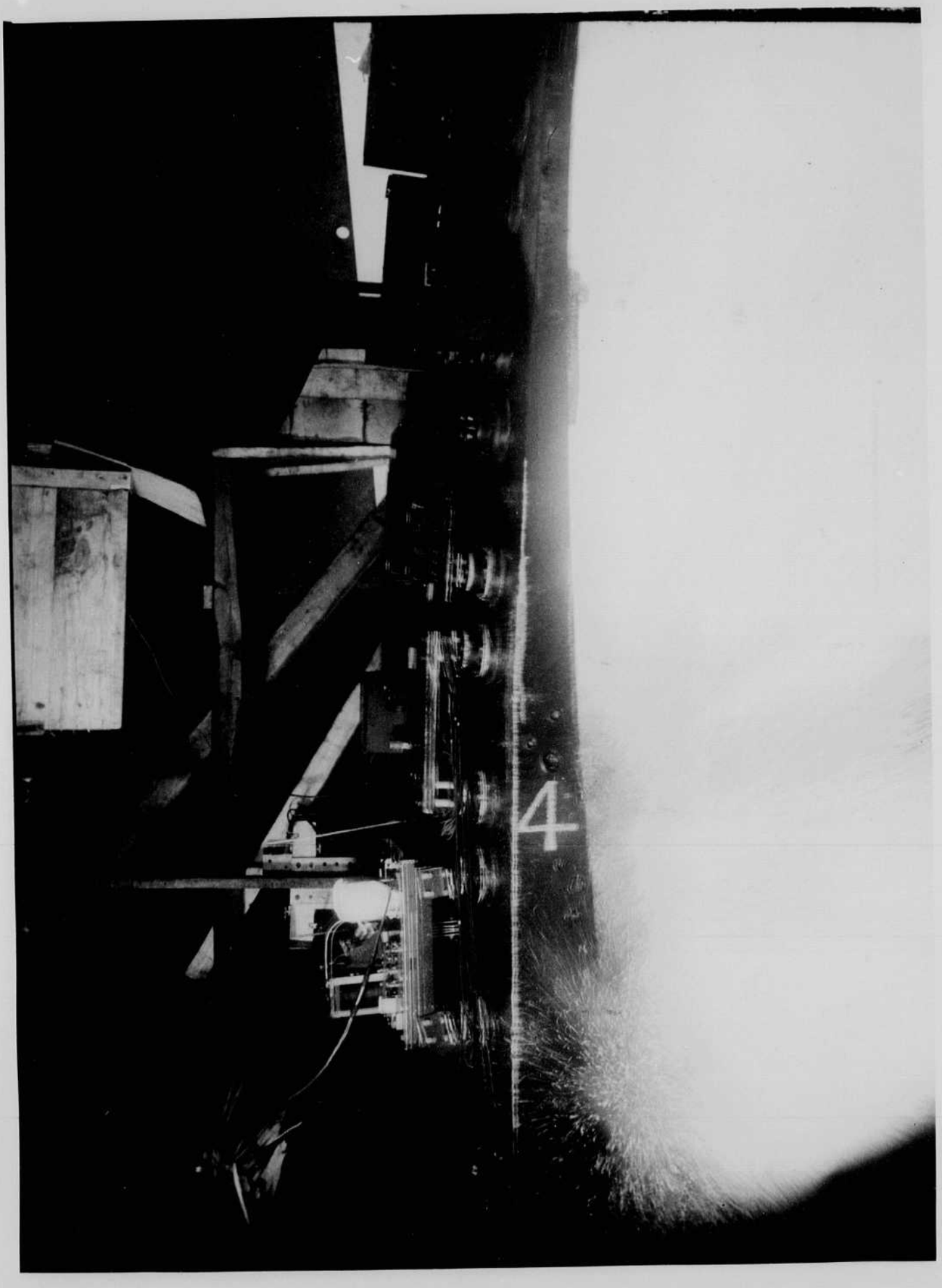
LIGHTS

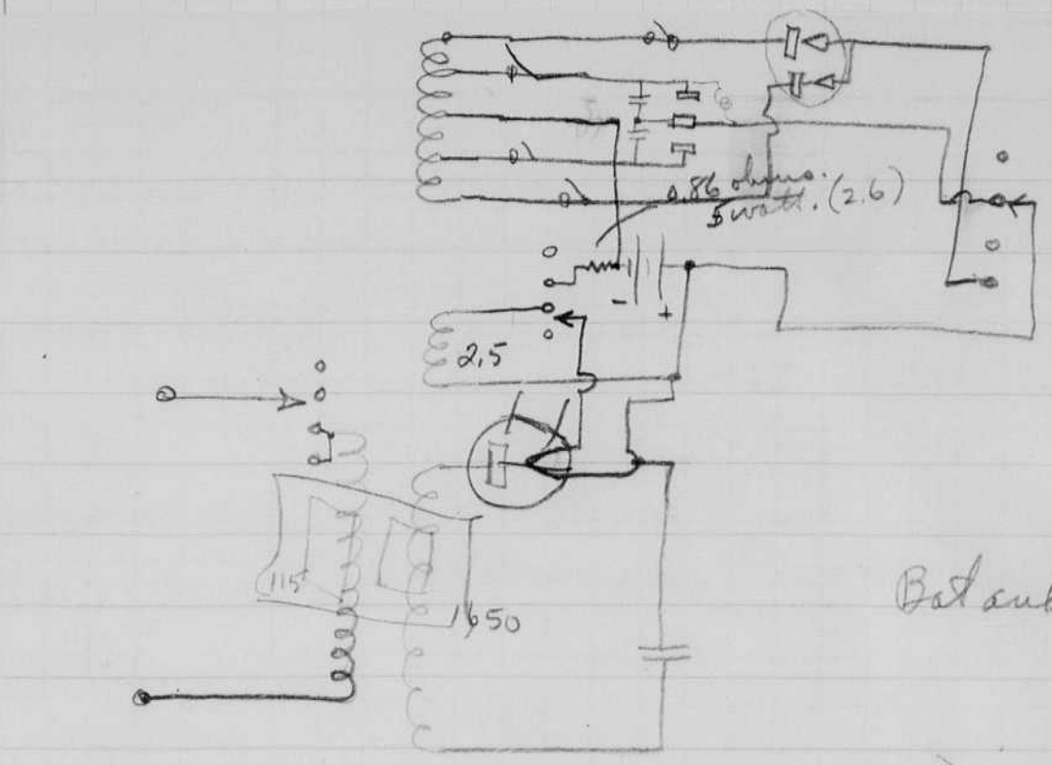
SCREEN FOR C.R. OSC.

← SCREEN FOR CAMERA — 12 FT.

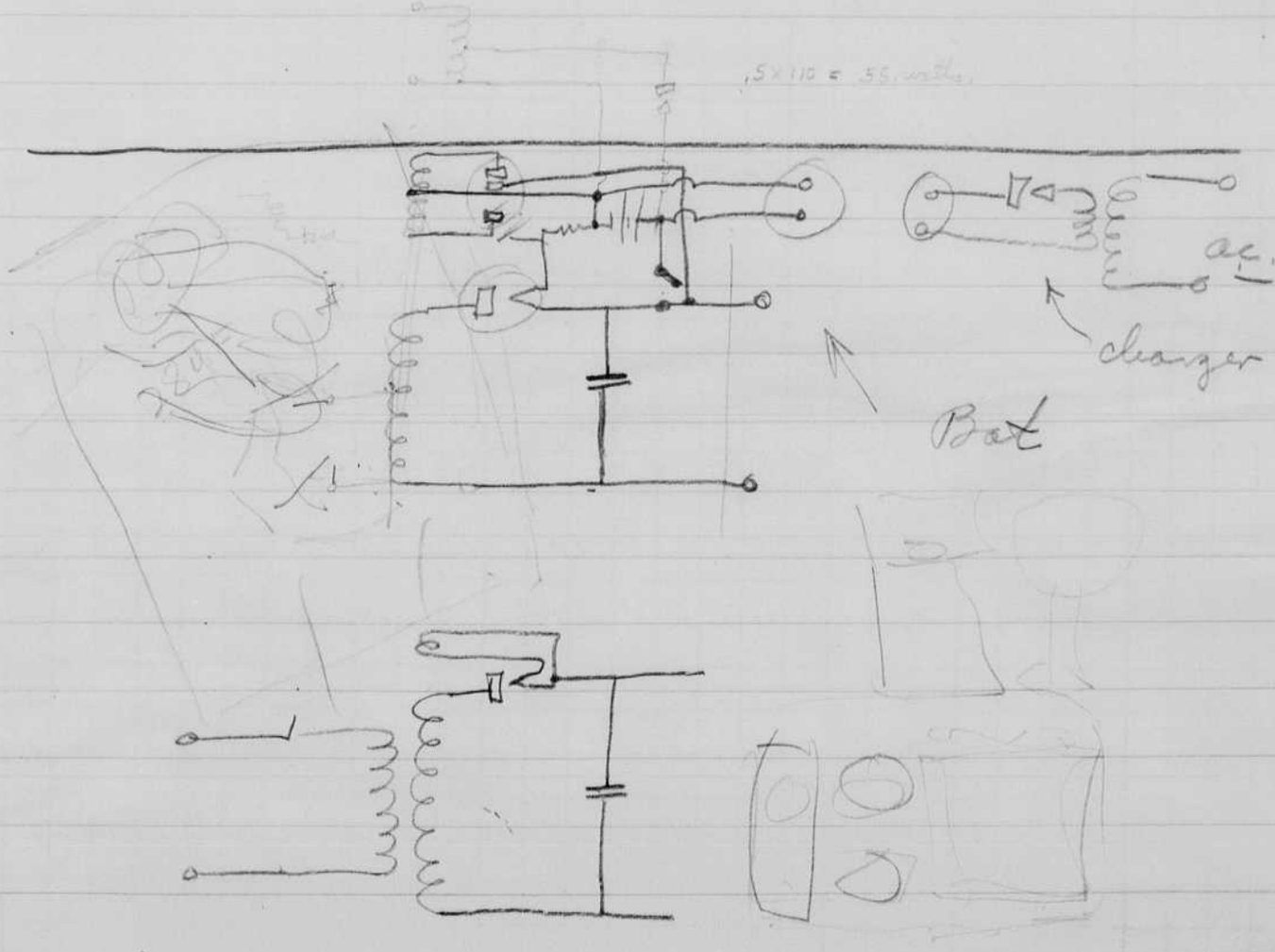
Test w/ A Naval Proving Ground Dahlgren Va Jan 17 1941 for shot #64.
8" shell 1797 ft/sec. velocity.



8" shell 1797 ft./sec.

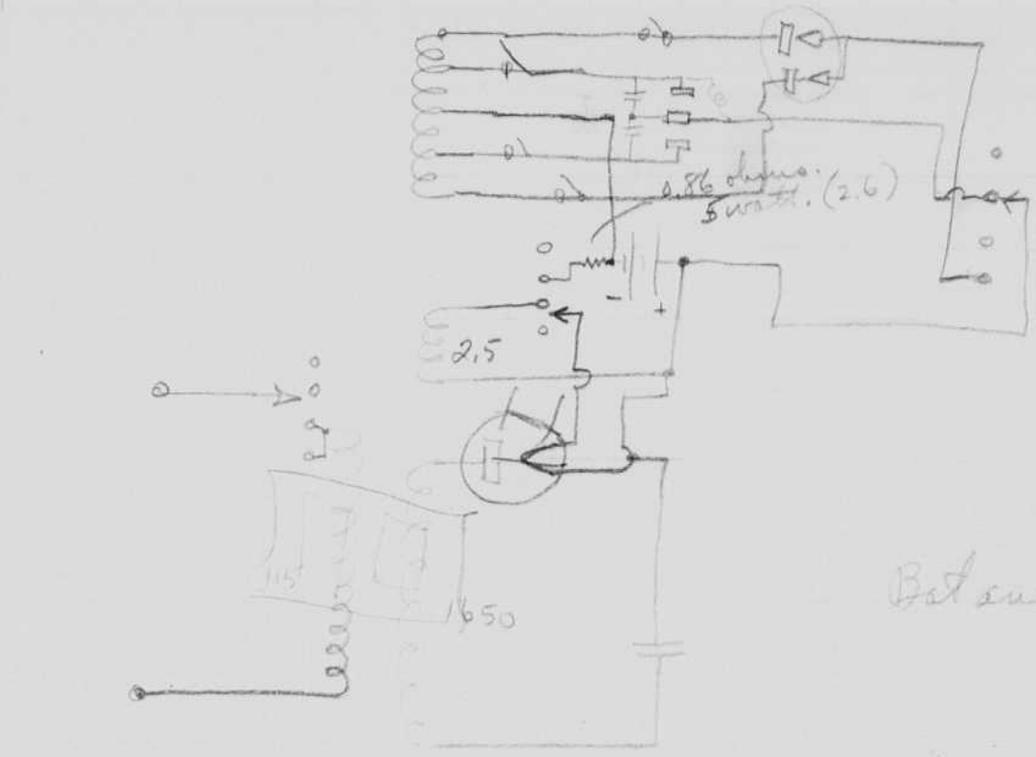


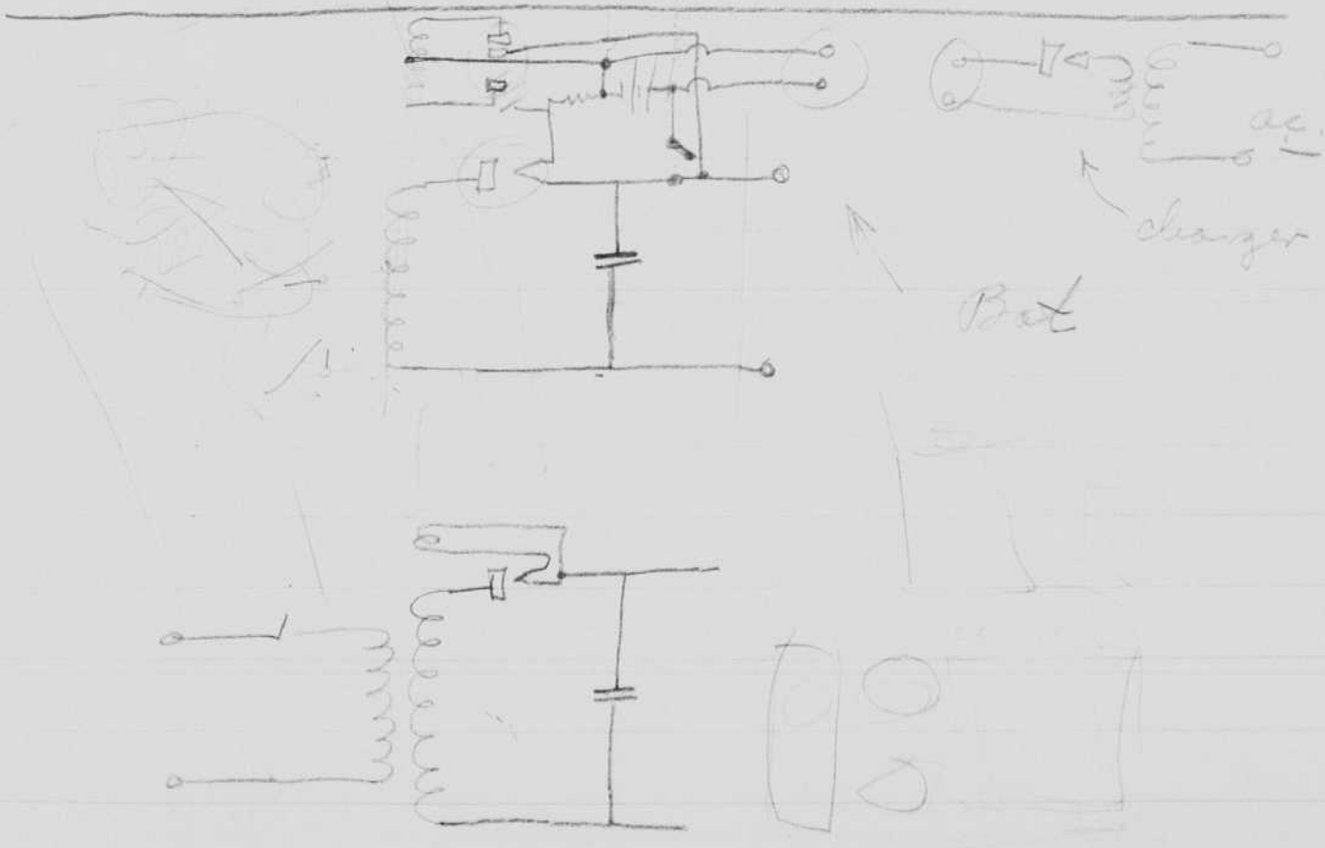
Bat and A.C.



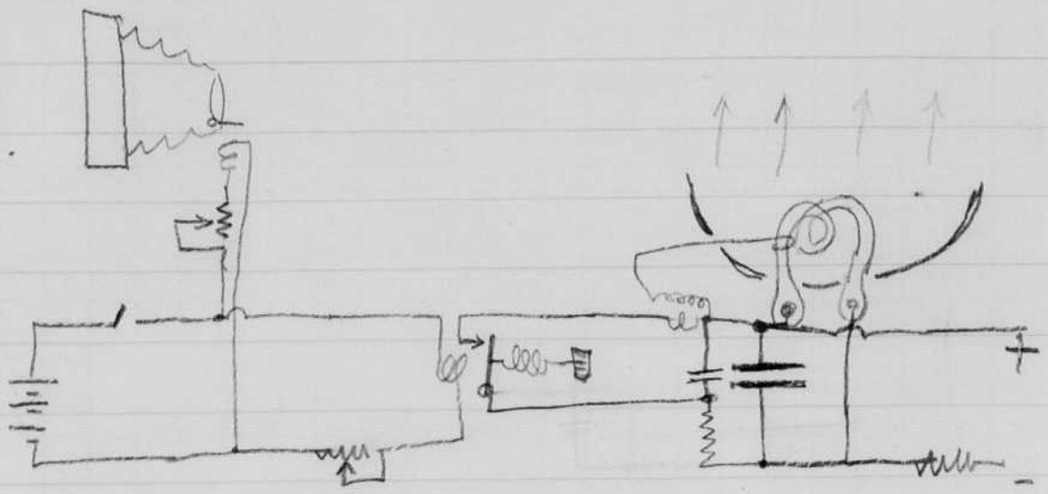
Pages 29-34. Discussion of circuit Design with Herb Grier Inc. for Battery Portable Spotlight Jan. 21, '41.

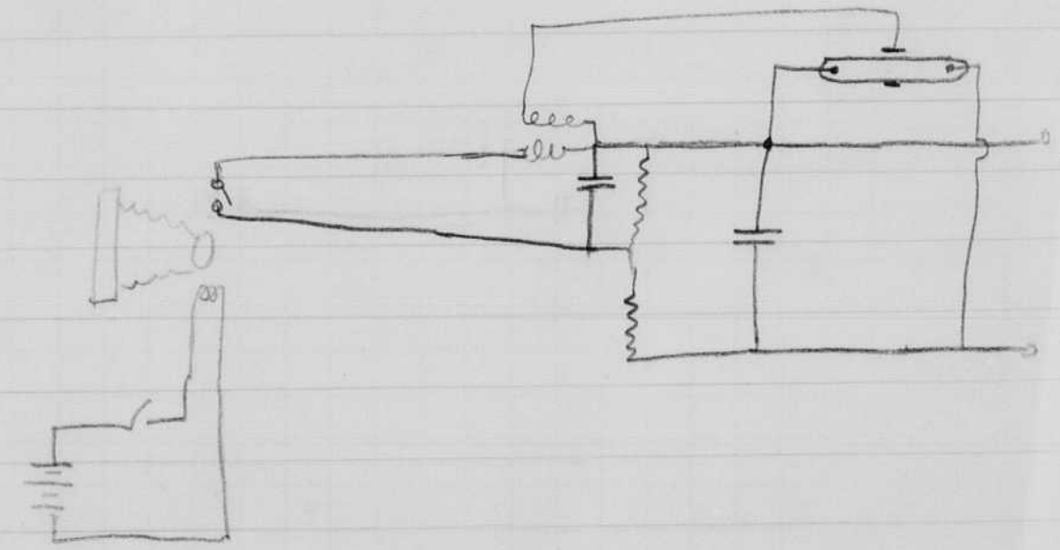
8" shell 1797 ft./sec.





Pages 29-34. Discussion of circuit design with Herb Zinn Inc. for Battery Portable Spotlight Jan. 21 '41.





Jan 23 1941
H. E. Esperti

Camera tripmethod.

$$CE^2 = \frac{1}{.01}\frac{300^2 \times 10^{-6}}{} = LI^2$$

$$I^2 = \frac{.1 \times 100}{} = 10$$

$I = 3.3$ amps.

$$\frac{L}{R} = \frac{.01}{1} = .01 \text{ sec}$$

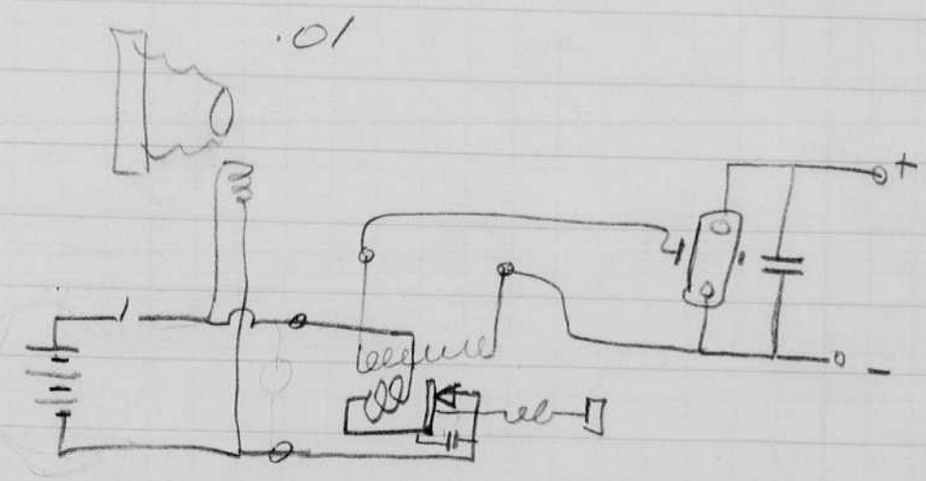
Cabinet

$16\frac{1}{4}$"

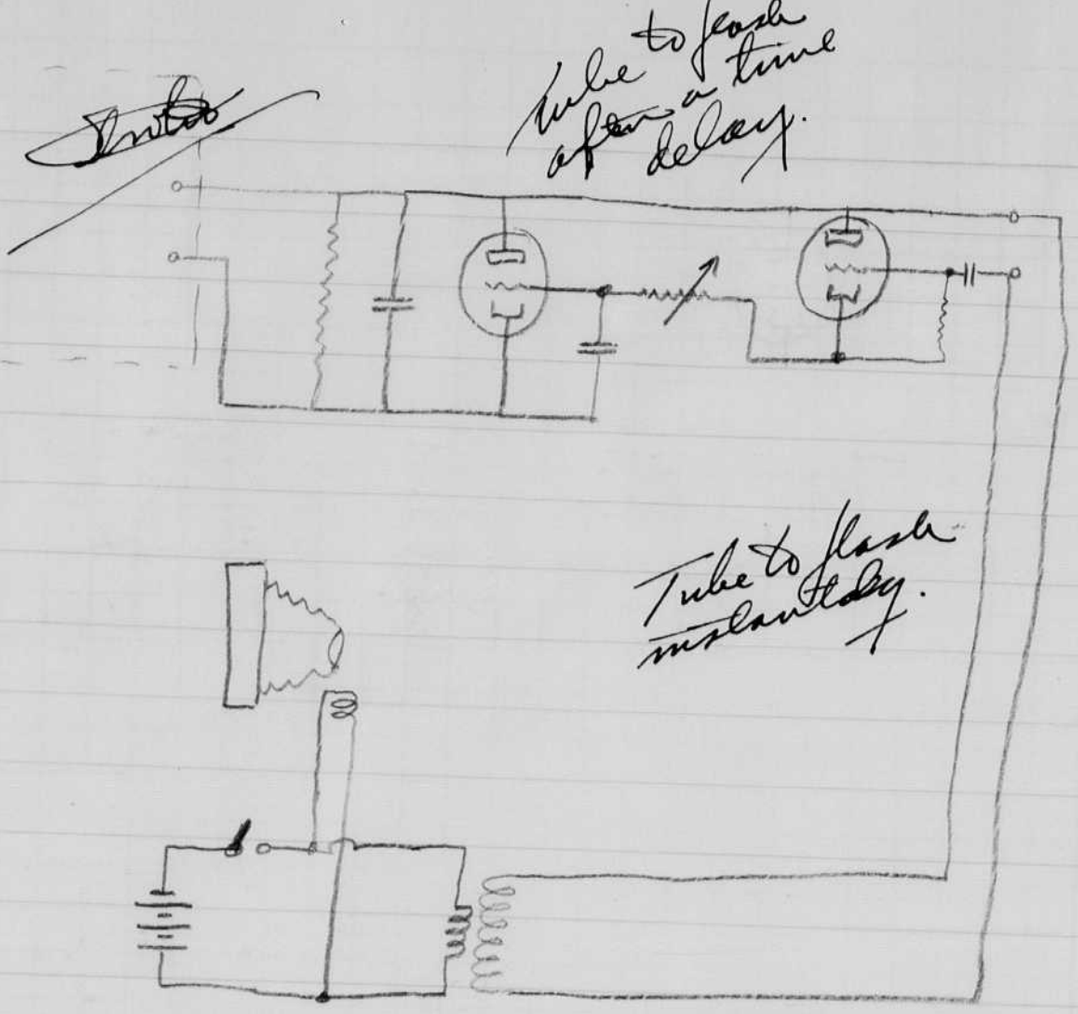
$13\frac{1}{2}$

.02

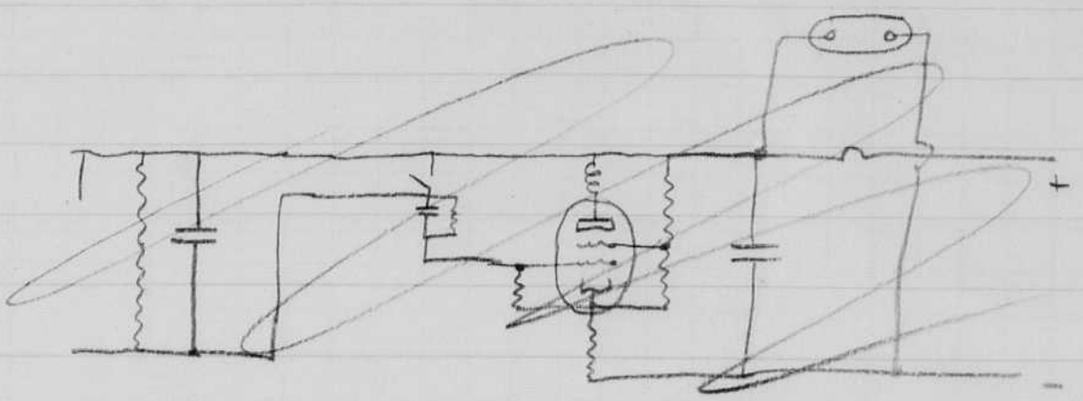
.01

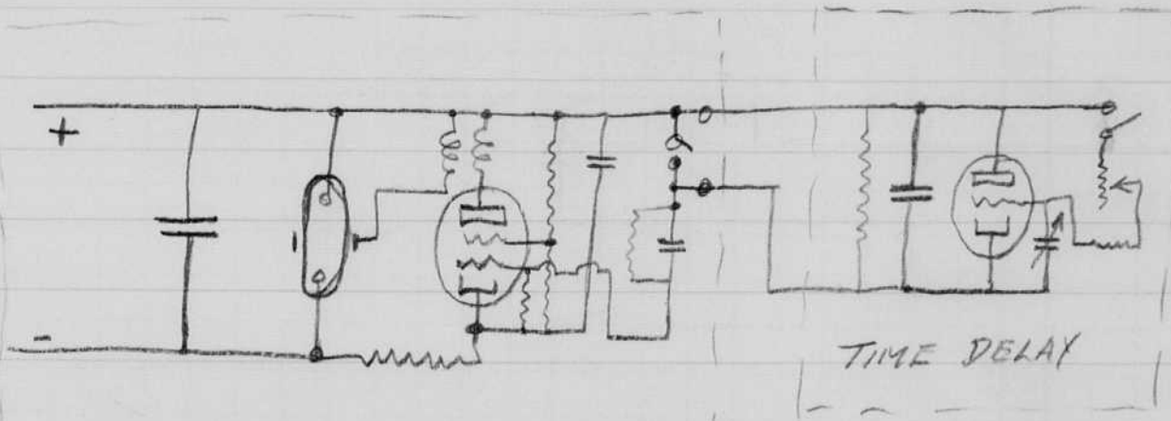


→ 1

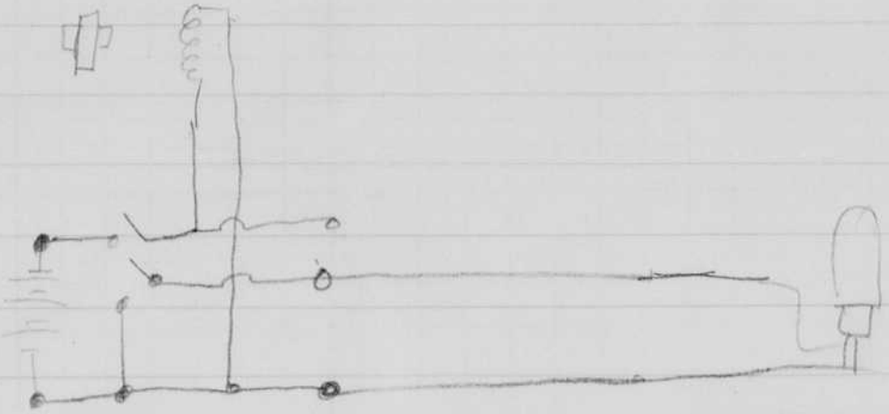

Switch
Tube to flash after a time delay.
Tube to flash instantly.

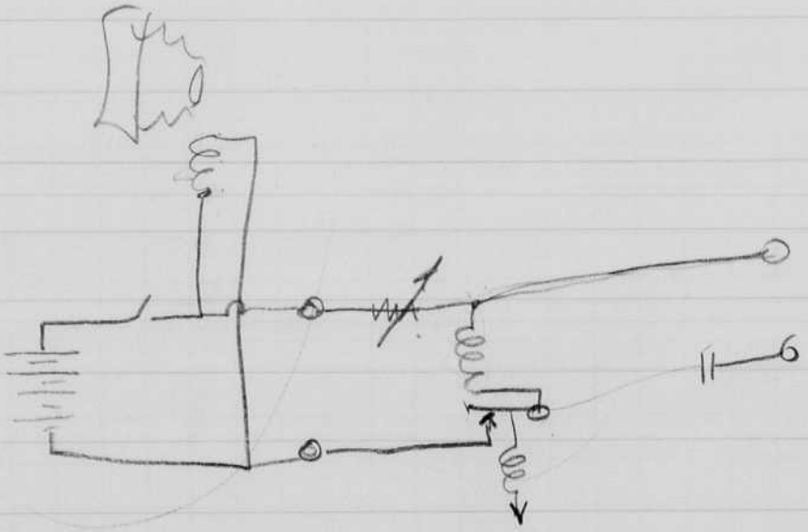
Jan 23 1941

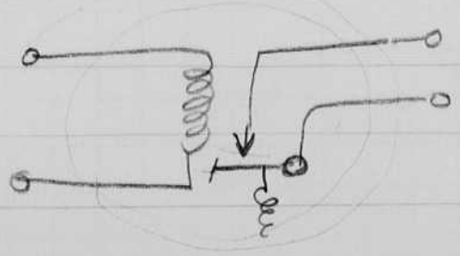




Jan 23 1941
Howard E Edgerton

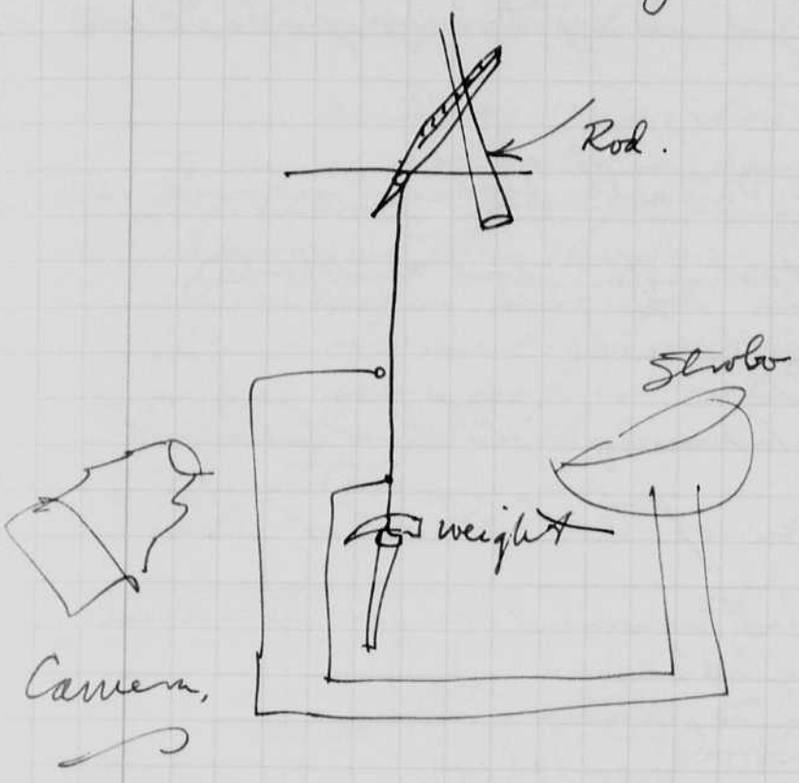


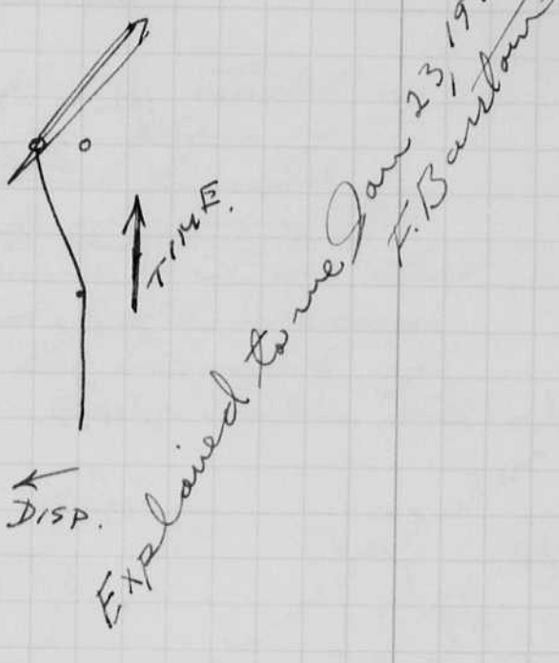




Jan 23 1941
Harold E Edgerton.

Experimented with Bandtron last night on a method of tracing a time-displacement curve on a string or wire in tension.





the above method was the result of ~~experiments~~ observations of photographs of impact tests made at Dahlgren Va on Jan. 17. I noticed a wave in the wire when the prints were made on Sunday morning with Chas. Wyckoff.

Feb 14 1941
Harold E. Edgerton.

Log of activities

Jan 27 1941 Bellows falls with Coe, Anderson, & ?
Movies of torque using torsion of shaft with str.

Jan 30 - 31
Dahlgren Va. with 300/sec movie camera

Feb. 1. left for Washington, and New York.

Feb. 2. N. Y. with Mili

Feb. 3. Left at noon for Phil. Y.E. Plant.

Feb. 4. movies of test stand at Phil.

5. Packed movie 1200 for Aberdeen in Mylar's car.
6. Plane to Phil.

7. movies of tank treads at Aberdeen.

8. Back to Cambridge.

Used the slowing method of plotting the displacement-time curve of the impact tests at Dahlgren and at Philadelphia. The method works fine.

Gym Mili and Don Burke covered the track meet here last Saturday night at the Boston Garden, Feb. 8.

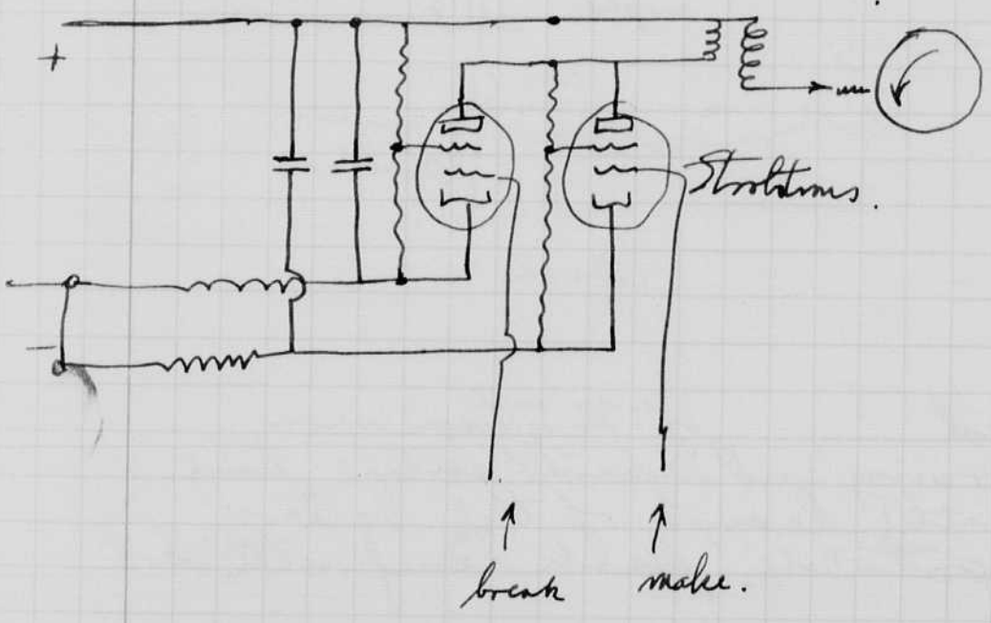
I worked last night on a circuit to recommend to F.C. Rushing of Westinghouse to use in a balancing machine.

Saw Coe about trip to Bellows Falls. Plan to go next Wed.

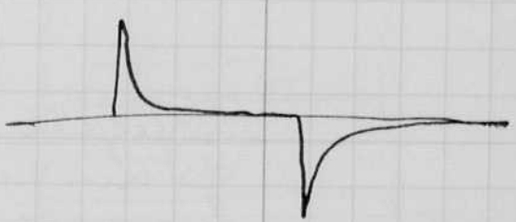
Feb 15 1941
Howard E Hyatt.

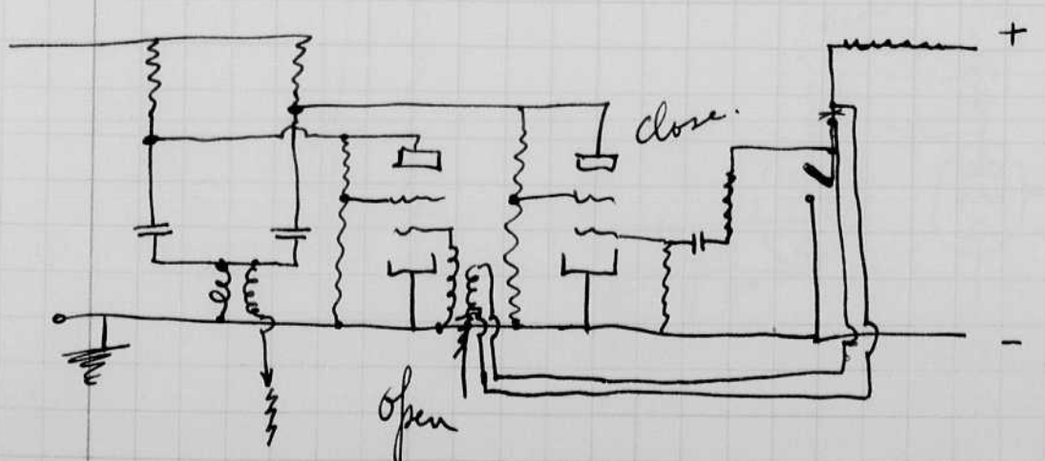
Discussed with Deforest the string experiment and its possible application to his impact testing apparatus. We plan to set up an experiment next week for trial.

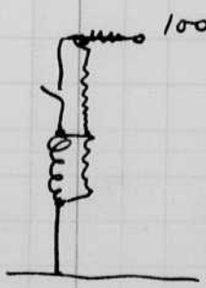
Mr. Sipsy (?) wished to apply the strobotron to engine indicator apparatus in place of the thyratron. Semenhauser and I will supervise this thesis. I thought of using two Strobotrons through the same coil so that the make and break would both record on the wax paper without the trouble of turning a switch as is now done with the thyratron.

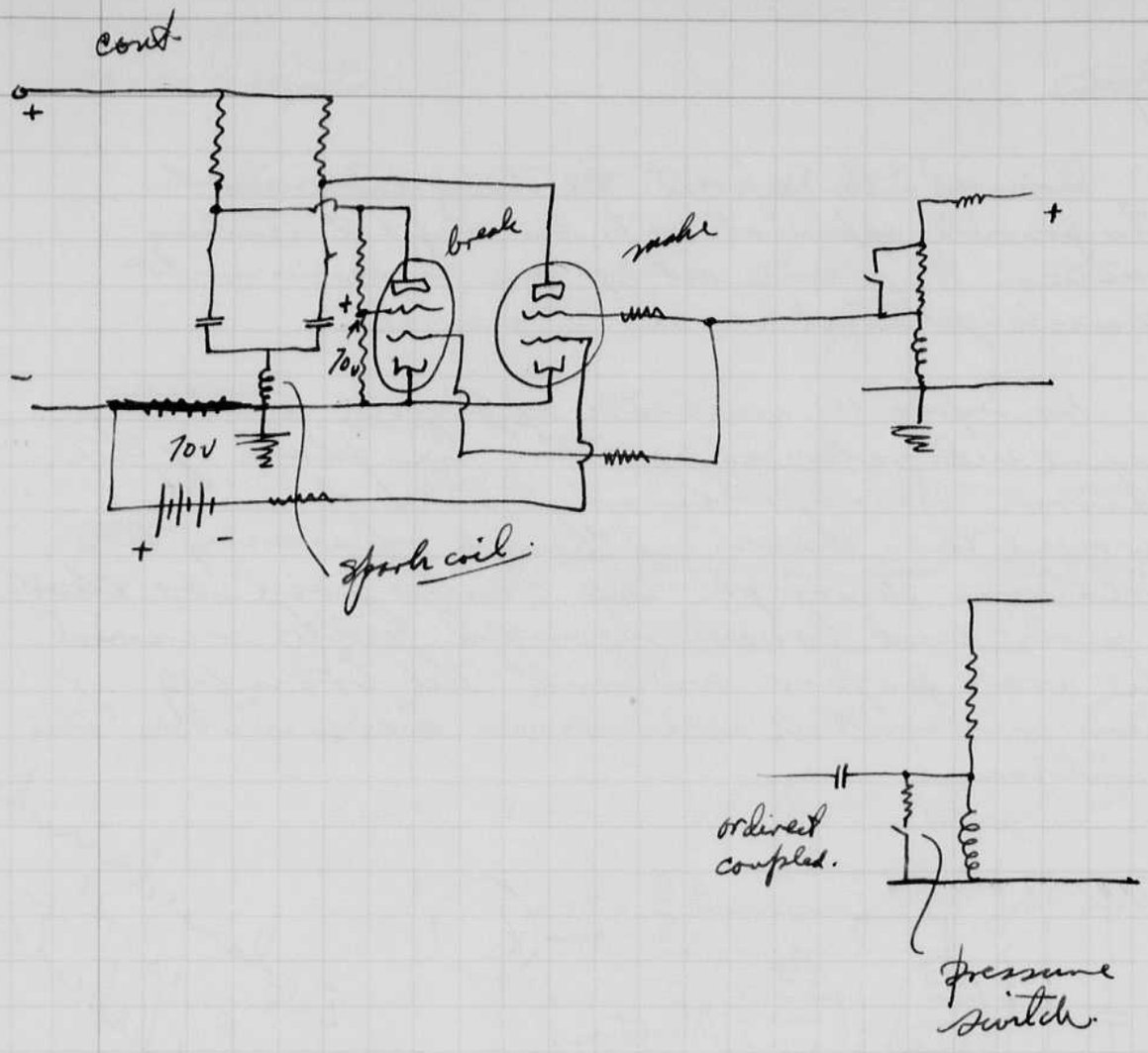


Explained & understood
2-15-41
Herbert E. Sipsy





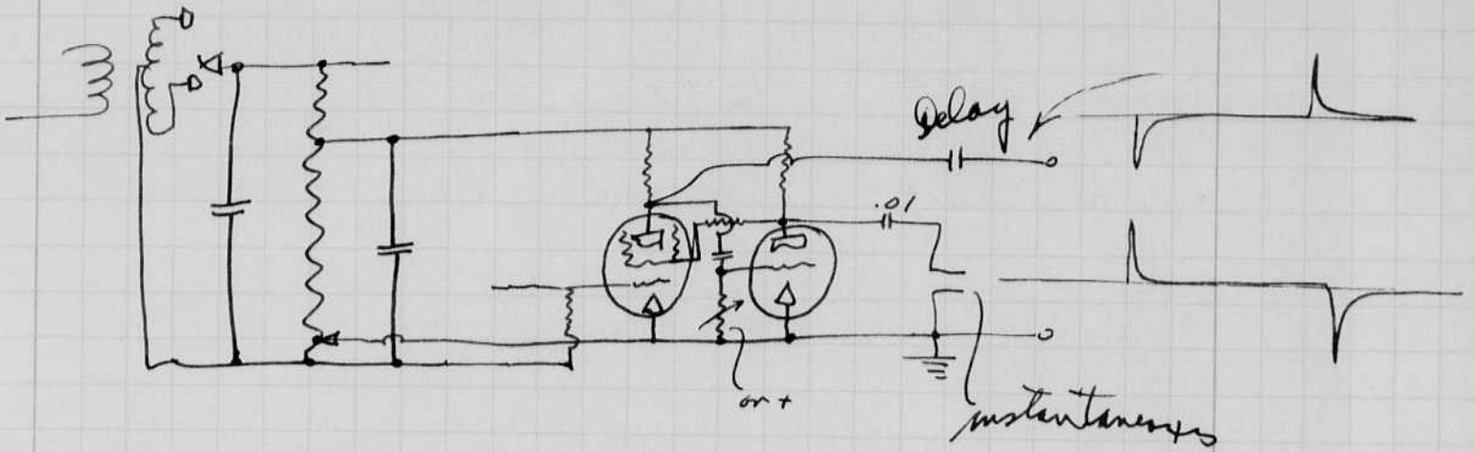


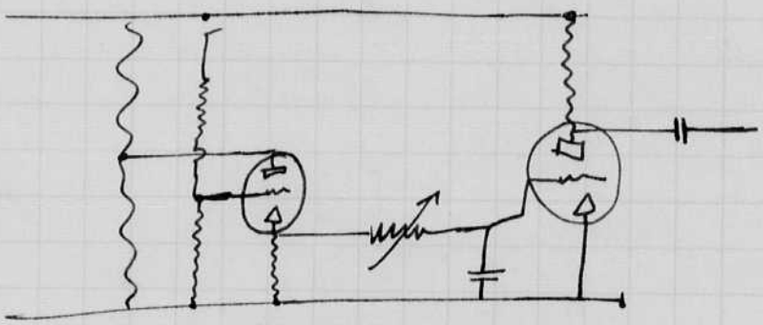


Fletcher and [illegible] of Raytheon were in this morning and spent entire time discussing the design of the battery operated portable flash lamp with Herb.

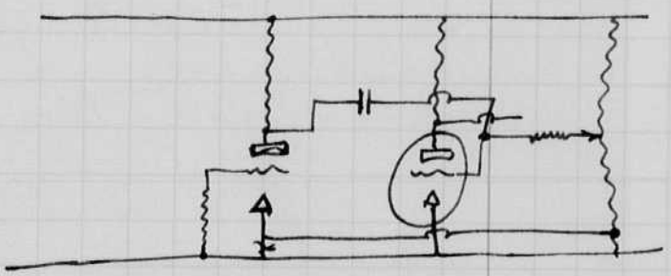
cont.

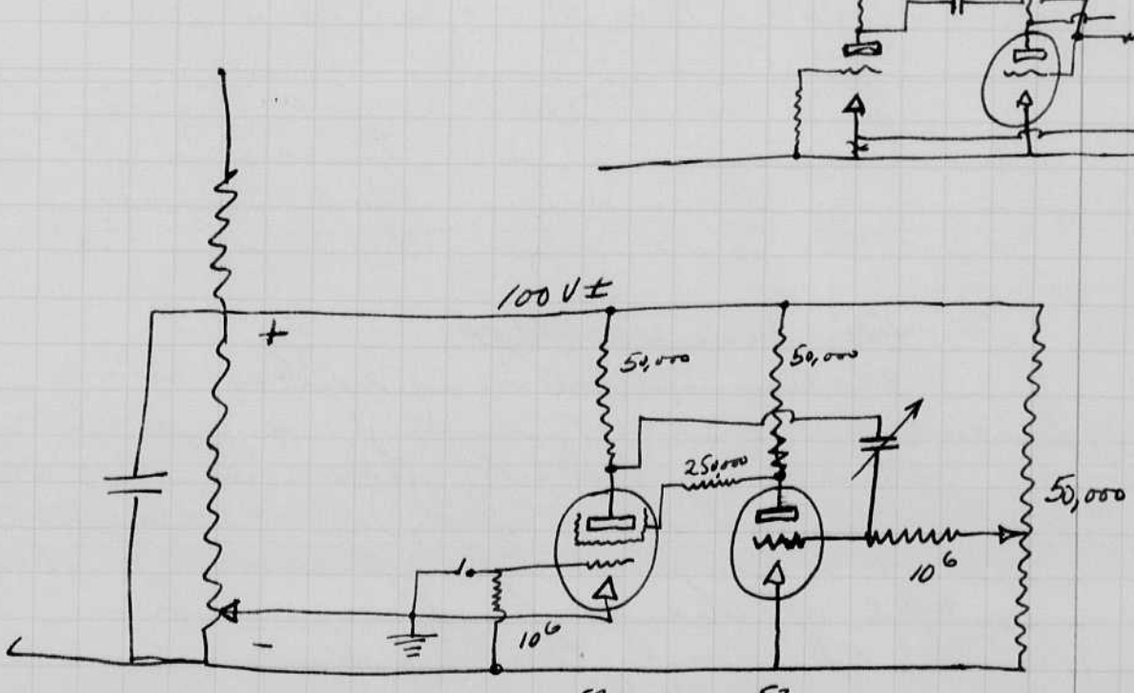
Time delay circuits.





thyratron.





String photos were taken with anderson in Defrees lab. 4 strings were used on a bar impact apparatus.

Photo on opposite page shows double flash record of a trigger operation in a model 52 Winchester.

March 1 1941 Hagerstown.

Mr. J Winton Lemen was here this week from tues to today. He went over the portable with Brien and others. Mr. Spurling was with him on tues and Friday. Mr. Faber on Friday. Today Lemen is going to shoot some regular assignment photos with the Record photographers.

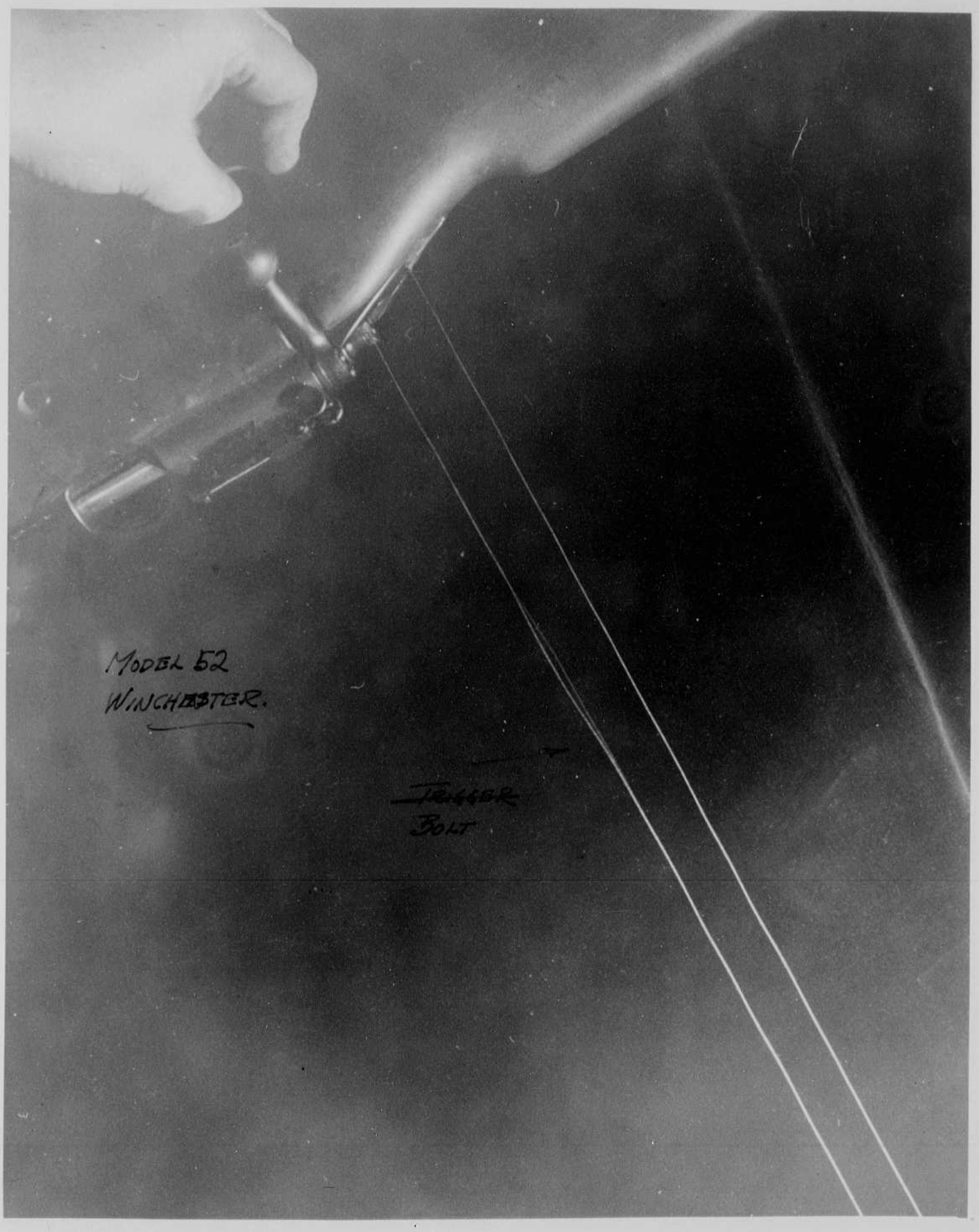
Woodruff was over tues night and we took pictures at a basket ball game and at the swimming pool with the portable. 28 mf 200 v.

Last night Woodruff, Brien, and I had dinner with Lemen at the Parlor Lounge - discussed the portable at length.

~~On Monday Feb~~

Discussed movie apparatus with Wilkins Gunsharmen and Brien on Monday Feb 24. Also stopped at B.R. Rand on Feb 27 and made layout of 1 and 2 lamp units. A request for one of these had come from the Naval testing division. Cannonsburg Md.

The final setup for the movie apparatus is glued on the next pair of pages. 42 43.


MODEL 52
WINCHESTER.
TRIGGER
BOLT

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March 1 1941 Hyattsville.

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Woodruff was over tues night and we took pictures at a basket ball game and at the evening pool with the portable. 21 exp used.

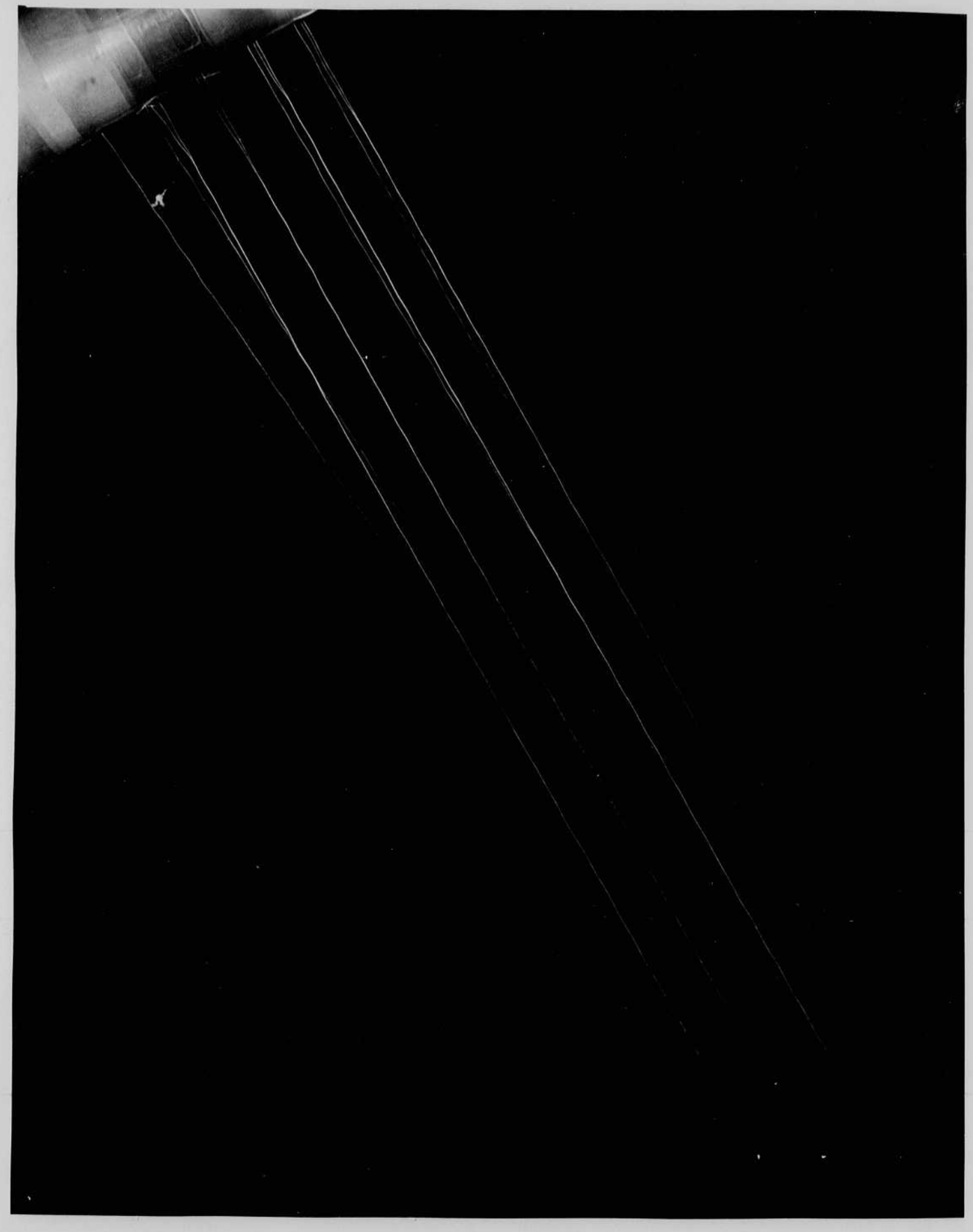
Last night Woodruff, Brian, and I had dinner with Lemon at the Parker House and discussed the portable at length.

~~On Monday last~~

Discussed movie apparatus with Watkins Kennebarne and Brian on Monday Feb 24. Also stopped at B.R. Rand on Feb 27 and made layout of 1 and 2 lamp units. A request for one of these had come from the Naval testing division. Annapolis Md.

The final setup for the movie apparatus is glued on the next pair of pages. 42-43.


MODEL 52
WINCHESTER.
TRIGGER
BOLT



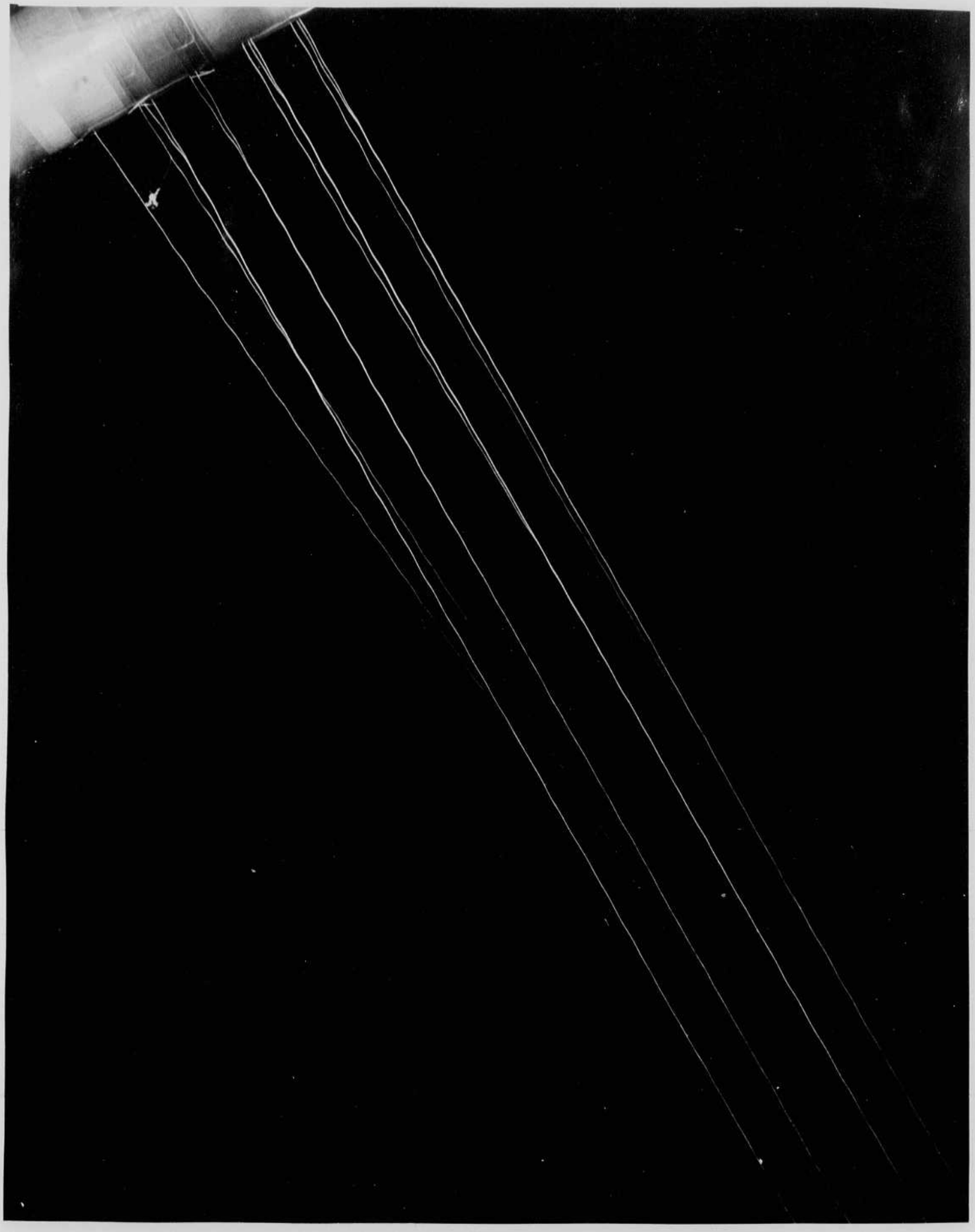
w tw w tw

Film 2½ Speed Aperture Distance
15 ½ 400 f16 12 ft
17 " 200 f25 5 ft. 2 men
12 " " 16 8
11 " " 5.6 50
14 " 1 25 5 ft. Hartley Hillside
13 25 5 Hartley Bldg.
1 5.6 50
2 11 12 Willis

Input 110 or 220. Single phase.
4 rectifier tubes 866A type.

1 quartz lamp. 0.5 mf 1500 volts 1200 cycles.
1.0 mf 1500 " 600 "
2 lamps. 1.0 " " 300 "

Cost. Power supply — 1500 camera 600 ±.
Lamps 150 each.



w +w w +w

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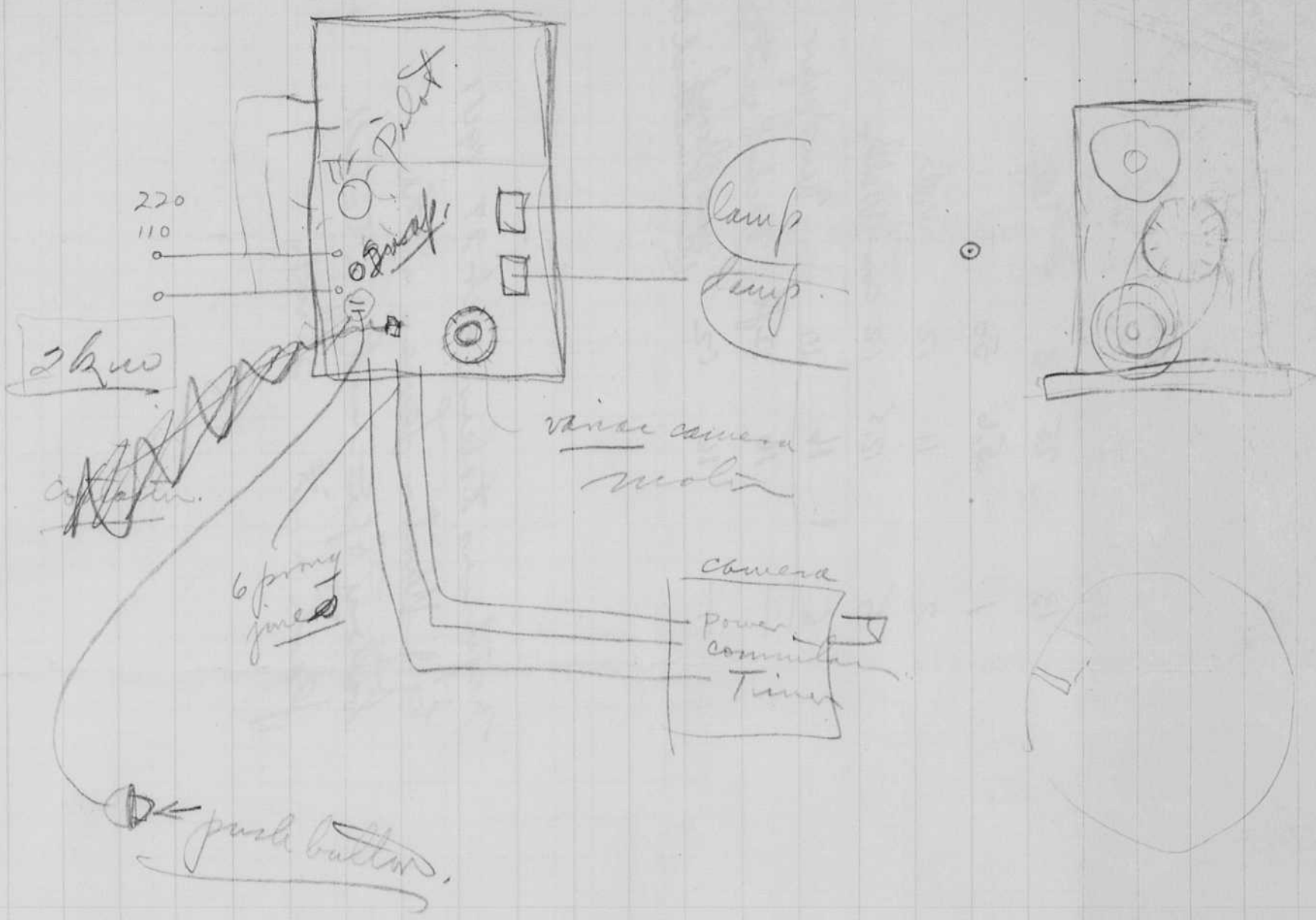
1.0 mf 1500 " 600 "

2 lamps. 1.0 " " 300 "

Cost. Power supply — 1500 camera 650 ±.
Lamps 150 each.

4) - 3



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Lamps 150 each.

Edgerton Geo Woodruff. Lamen Herb. Dice Portable flash unit

March 17 1941
Harold E. Edgerton

Took train march 12, Wed, for East Pittsburgh, Westinghouse Elect and Mfg. A movie apparatus was taken by express to shoot the effect of the test stand (2000 ft lbs) on the elastic mounting brackets that were tested at Dahlgren, Va with 8" shells.

The tests were made on thursday march 13, completed about 6 30 p.m. Dr. Rushing brought down a group from the research laboratory to see the motion picture apparatus.

A conference was held in Mr. Rubin's office on Friday. Rushing, Friedman, Diamond, also present. Rushing plans to use a strobotron in a balancing machine and arrangements were being made for this after the development has been completed. It is possible that they may ask us to make the strobotron part for them.

Mr. Deval (?) of the Pittsburgh Plate glass co called for me at 10 am. and took me to the Collinswood plant. I saw the tests with the 50 caliber rifle that were being made by Mr. Ulemann. After lunch, inspected the plate glass plant and then had a conference with Mr. Gregorius, Ulemann, and Deval on the possible application of high speed photographic methods. Ulemann took me to the office where I met Mr Schultz. Then I took the 5 p.m. plane to New York. Saw Bill and took bus to Boston.

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March 17 1941 cont.
D. E. Edgerton.

Mr. Lew Rosenbloom and I took photographs of the sowing mat on Saturday afternoon. Also took pictures on Sunday of David Howland and Mc Namara.

Just had a long talk with Rice of I. P. corp this afternoon concerning color portraits. Suggested that the matraises should be made in the camera. Rice then told me of a method of using a screen above the film to give a similar effect but to produce dots of getatin. The screen should be a few inches (or ½ inch) from the film when a 12 inch lens is used. The method seems to have some promise.

March 19, 1941.

An exhibit of color portraits was put up in the lobby of building 10 on Tuesday march 18 by Mr. Arthur Watson. Some 18 prints were hung. A few have been changed from time to time.

Westinghouse
Negative 13,1941

Welch

Rushing

Stephens

Simpson

28 mf
Portable
f 11

March 17 1941 cont.
Dr. Edgerton.

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Westinghouse
Newark 13, 1941

Welch

Rushing

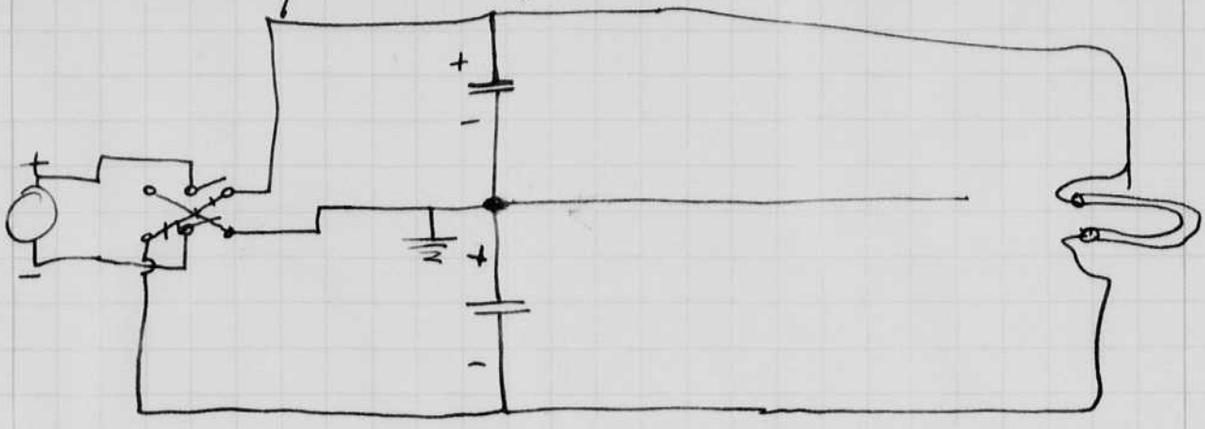
Shepherd

Simpson

28 mf
Portable
f 11

April 1, 1941.
Harold E. Edgerton.

Method of speeding up flash time by doubling voltage.



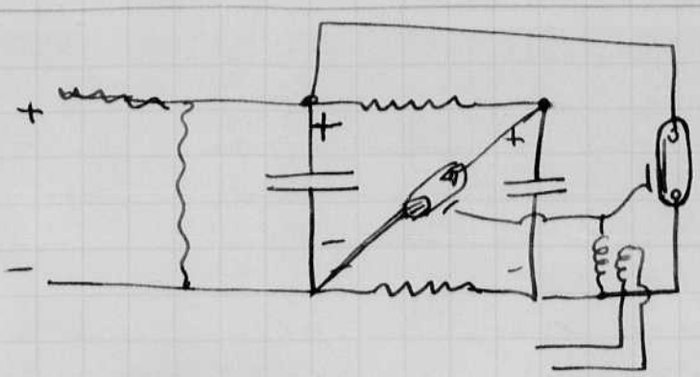
Photos were taken last night with 4000 mf 2000 volt unit, Wright field. Bob Zeight, Chas Wyckoff, Fred Baratow. Gil. Andrews.

350 m.p.h. bomber. $\times \frac{5280}{3600} = 515$ ft/sec.

1/100 sec. 5 ft motion

1/400 sec. 1¼ ft. motion.

exposure.



Mr. Weiss.
Bemis
Bag.

Ed Edg Chas Wyckoff

Fred Barstow

Bob Reichl

March 31, 1941 experiments with 4000 mf 2000 volt unit.

f4.5

April 1, 1941.
Harold E. Edgerton.

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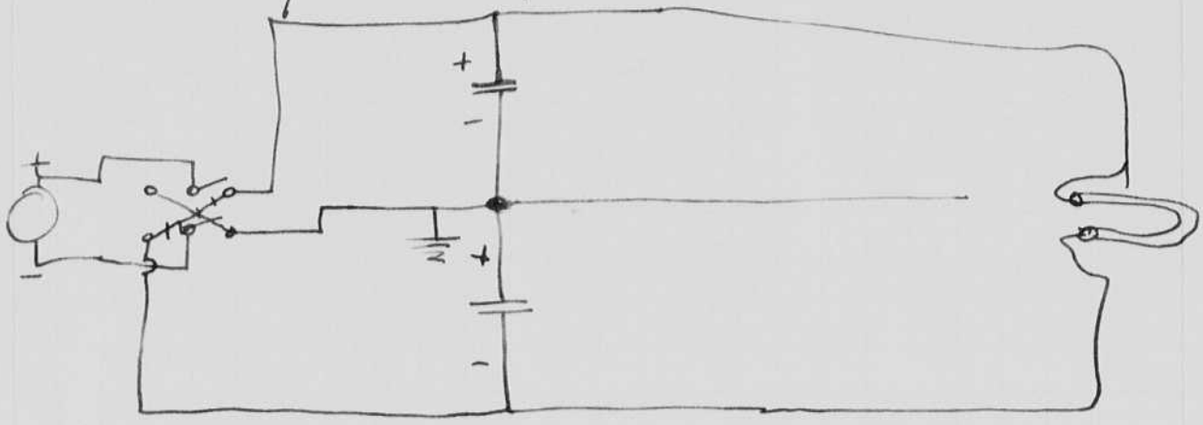

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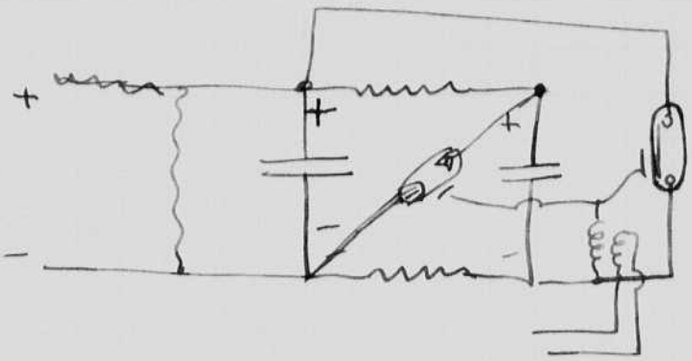

Mr. Wales.
Bemis
Bag.

Ike Edg chgrs Wyckoff

Fred Barstow

Bob Heidt

March 31, 1941 experiments with 4000 mf 2000 volt unit.

f 4.5

April 2 1941
Harold E. Edgerton

Mr. Enfield of the General Electric Co was here today and discussed a price reduction on the Rotalux lamp. The new proposed schedule is a retail list price of 25.00. 10.50 to Eastern and 7.88 to G.E. Co.

We also discussed a new lamp that is smaller in size. this will be used on the portable. the price will be decided again upon Mr. Enfield's return.

Mr. Arthur inspecting Portable and photo all trip at Hotel Baltimore on April 4 Taken by Woodcutt with the portable.

Joe Louis

(1 SX)

Prize winning photo by Joe Costa New York Daily News.

Bottom-!

April 2 1941
Harold E. Edgerton

Mr. Enfield of the General Electric Co was here today and discussed a price reduction on the Kodatron lamp. The new proposed schedule is a retail list price of 25.00. 10.50 to Eastman and 7.88 to G.E. Co.

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Mr. Arthur inspecting Portable and photo at Hotel Biltmore on April 4 Taken by Woodcutt with the portable

Joe Louis

Prize winning
photo by
Joe Costa
New York Daily News.

Bottom - !

Herb Grier working on portable april 2 1941

Photo of Bill with other portable at 15 feet.

Below is a photo taken at the Biltmore ~~Hotel~~ room 110 on april 3 1941 with the portable 28 mf 200 volts. A second unit with photo cell ~~control~~ was used for side illumination.

Rush Grier Woodruff Dorwart Metzger Edgerton Milli Sandell

April 9 1941
Harold E Edgerton

Yesterday with Rice and Mitchell (of RCA) taking testimony for Glenn Hansen oscillator interference. Finished about 3.30 and then went to M.I.T. to demonstrate stroboscope.

Frank Wyle took a portable flash lamp in case with the power supply to Chicago in order to get photos of his new neptune. 4 mf 2000 volts. enough for closeups at f 5.6 the tube was the spiral in a bulb that we have used for the past few months in the battery operated portable. the tube had a 4 prong radio base.

Joe Costa
in U.S. Photographers exhibit
Radio City.

Prize winning photo in Speed Flash Class.

Herb Grier working on portable april 21 1941

Photo of # 11 with other portable at 15 feet.

Below is a photo taken at the Baltimore ~~Hotel~~ room 110 on april 3 1941 with the portable 28 mf 200 volts. A second unit with photo cell control was used for side illumination.

Russ Andrews Grier Woodruff Dorman Metzger Sgt Arthur Miller Sandell

April 9 1941
Harold E Edgerton

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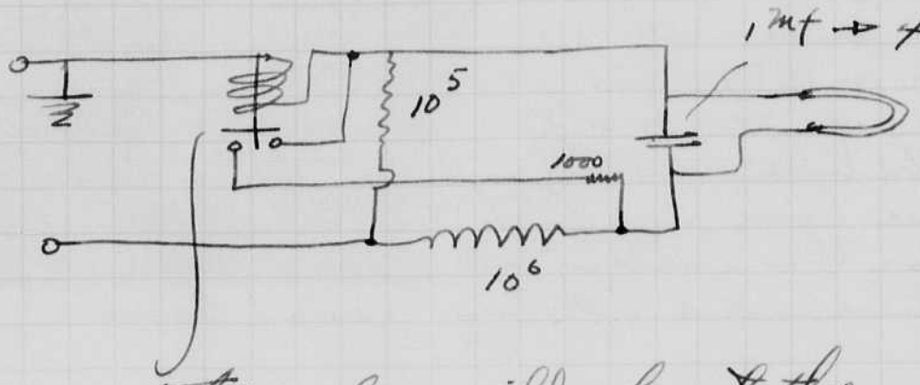
Joe Costa
in U.S. Photographers exhibit
Radio City.

Prize winning photo in Speed Flute Class.

April 14, 1941.
Harold E Edgerton

Extra plug in lamp for the Kodatron to give a short flash.



This relay will short the condenser when the plug is pulled out. This overcomes the objection of the short prongs.

This was discussed with Herb this morning.

Flash time data is available from P.M. Murphy's thesis 1941 M.S.

April 21 1941

On April 16 I went to N.Y. on the 1:50 pm plane to attend the N.Y. Press photographers show in Radio City. Joe Costa and I made brief talks in the lobby after I heard Prof. Arthur's talk.

Neither took the portable to the skating rink (Ice) and Costa took some pictures of Margaret K Goldsmith 353 East 53rd N.Y. York.

I then took the train for Rochester at 11.50 and met Herb and Spindell at the Rochester Hotel for breakfast.

We first went to the Eastman Co. and showed them the portable

and discussed synchronizers. They showed us a new magnet assembly and battery operated flash lamps that was to be announced soon. This is to be coöperative with Graflex on the development since the portable and the Graflex camera will be used together.

The rest of the morning was spent at Eastman Kodak. I had a discussion with Mr. Case. After lunch 1:30 a meeting was held in the conference room on the 15th floor. Those present.

McGhee	Case Andrews
Sandell	Tuttle. Bishop
Pillar	Vaughn
Scott	Scott (Wash D.C.)
Farrow.	

A demonstration was made with two portables with a 4x5 graphic camera. Photocell synchronizer was used with a 929 R.C.A. plugged into the contactor outlet.

Herb had mounted a photocell on top of one of the lamp houses so that it could be pointed in any direction.

We took the train at 6± pm to Boston

Vaughn Jarrow Gillon

Taken
April 17 1941
at Rochester
with Bantam
camera f 8 ± ?
Plus x film.

Ed Jarrow examining
weight of the battery
operated portable.

April 22 1941
Harold E. Edgerton.

Modeling lamp scheme using the flash lamp as a continuous lamp source before the flash.

1. Disconnect the condenser and operate as a glow tube.

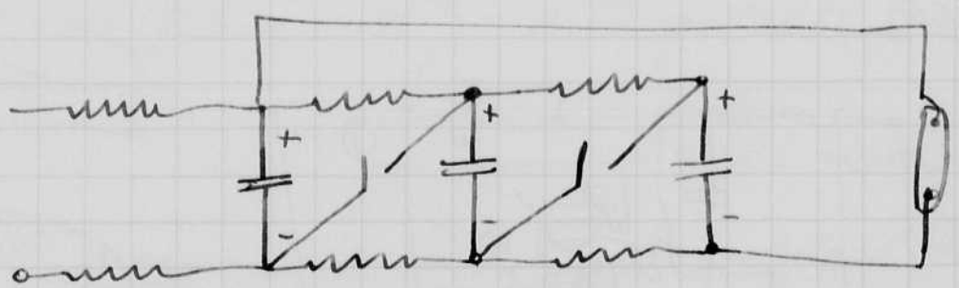
2. Operate the tube with a sign transformer.

3. Introduce resistor in series with lamp

Explained to Dr. Edgerton by H. E. Edgerton Nov. 22-41 Herbert E. Grier

The below method of flashing a high intensity tube was just proposed to me by Mr. H.E. Edgerton.

A switching scheme is devised for connecting condensers in series that have been charged in parallel.



this circuit is similar to the surge generator circuit (Marx generator).

Explained Apr. 22, 1941
K Germeshausen

We proposed to use this on the airplane unit for night photography that is being made for the Army, Wright Field.

Vaughn Jarrod Dillon

Taken
April 17 1941
at Rochester
with Bantam
camera f 8 ?
Plus X film.

Ed Jarrod examining
weight of the battery
operated portable.

April 22 1941
Harold E. Edgerton

Modeling lamp scheme using the flash lamp as a continuous lamp source before the flash.

1. Disconnect the condenser and operate as a glow tube.

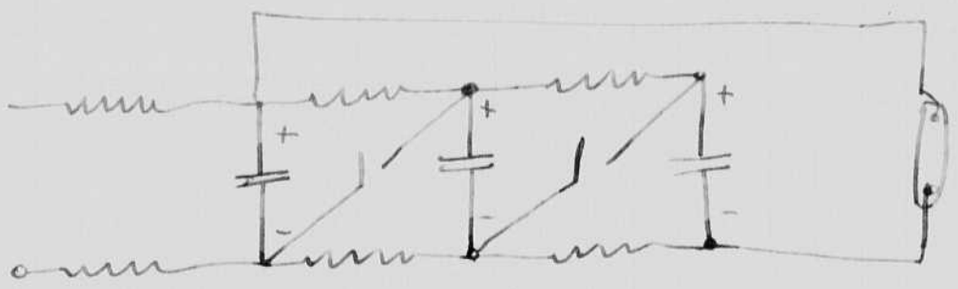
2. Operate the tube with a sign transformer.

3. Introduce resistor in series with lamp

Explained to Dr. Edgerton and Mr. Germeshausen by H. E. Davis

The below method of flashing a high intensity tube was just proposed to me by Mr. H.E. Davis.

A switching scheme is devised for connecting ~~parallel~~ condensers in series ~~that~~ have been charged in parallel.



this circuit is similar to the surge generator circuit (Marx generator).

Explained Apr. 22, 1941
K Germeshausen

We proposed to use this on the airplane unit for night photography that is being made for the Army, Wright Field.

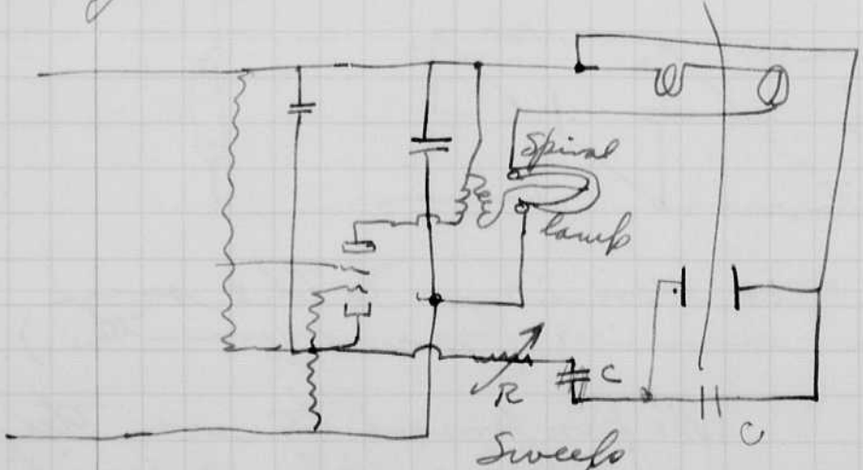
April 24 1941
Harold E. Edgerton.

Barstow and I worked last night on the Kodatron flash unit, measuring the peak current as a function of capacity. Range 0.1 mf. to 400. mf. A plot of I_{max} vs $\log C$ is a straight line from 10 mf to 400.

I spent the morning with a sweep circuit for recording the time variations of the current. An f 4.5 lens was not fast enough to record on Ansco film.

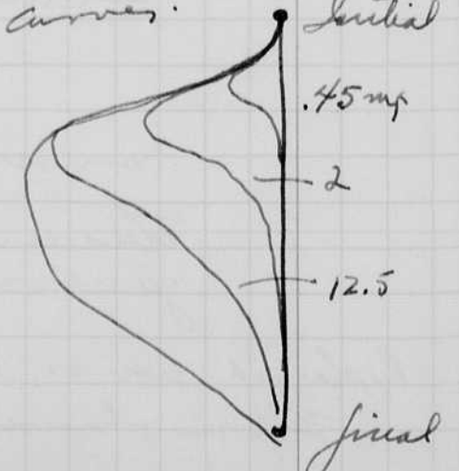
Herb. tried today the double lamp scheme that we discussed some months ago. We may use a double outlet on the portable. If the lamps are similar, the condenser charge will divide between them equally if the stimulation comes simultaneously.

April 25 1941 More experiments yesterday with lamps using cathode-ray oscillograph. Connections for a sweep were taken from the spark circuit of the stroboscope as follows.



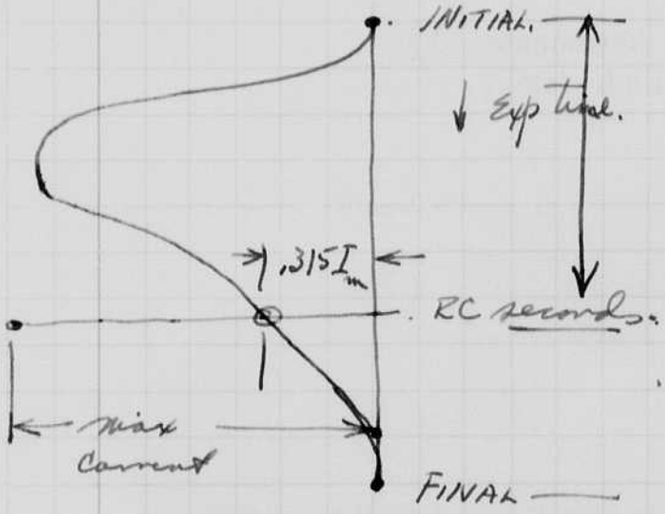
Sweep
Exponential type.

Form of curves.



Method of measuring time of flash

A cathode ray oscillograph is connected as on page 58. At 63% of the sweep a line is marked - RC seconds. This is variable as R is varied. Then the peak current is measured and $\frac{1}{\sqrt{10}} = .315$ of this ordinate is marked. The discharge curve on the CR tube is then made to pass through the point thus located on the CR screen. R is then read and the duration is RC seconds.



Example.
Std Spiral Kodatron.
1820 volts.

82 microfarads on lamp.
Sweep C = .051 mf.
R = 9800 ohms
T = RC = 500×10^{-6} seconds.

31 mf. on lamp
$T = RC = 2600 \times .051 = 132 \times 10^{-6}$

1 ft of 6 mm tubing. O.D.

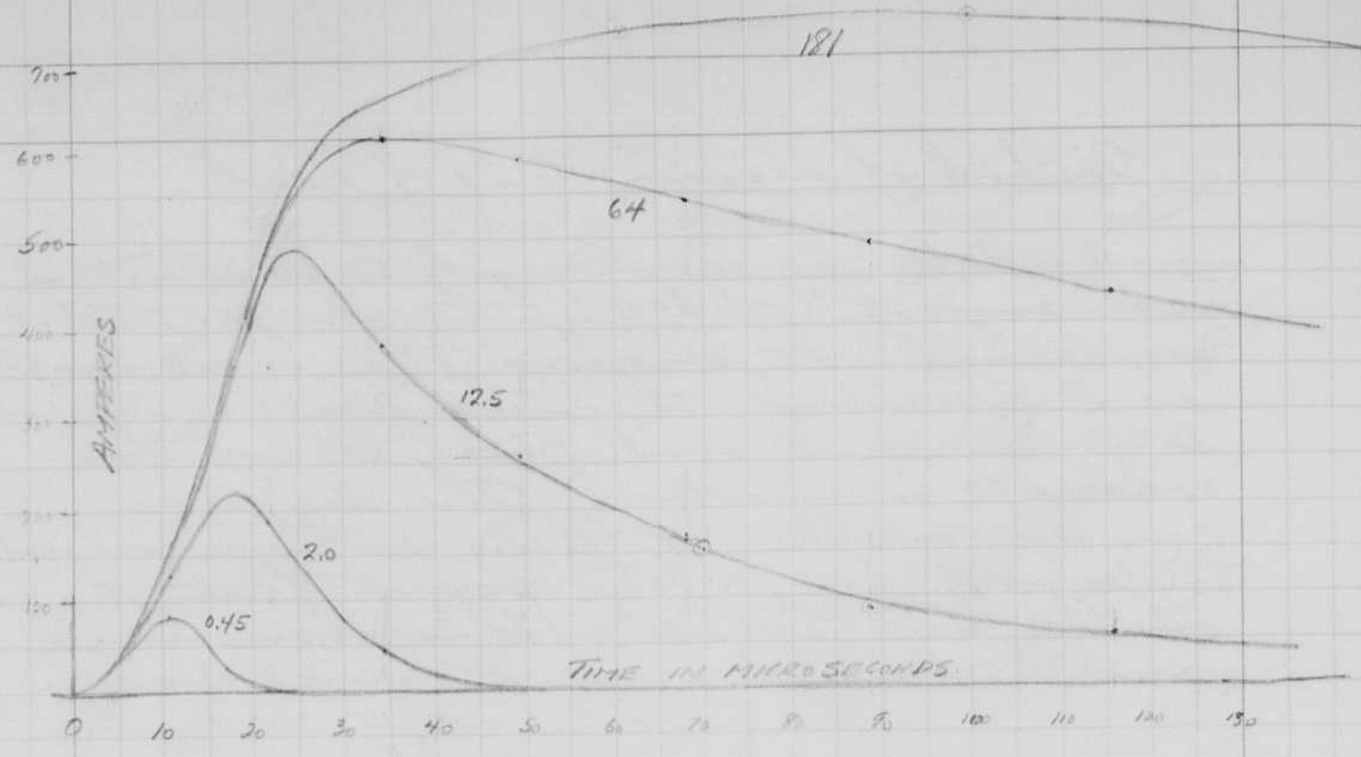
With portable lamps

31 mf.
$T = RC = 5000 \times .051 = 255 \times 10^{-6}$.

Photocell measurements of parallel lamps.

82 mf. Kodatron 93 units.
182 mf Kodatron 62 (from Kodatron only)
(with small spiral portable lamp in parallel

182 mf. Kodatron & Port. 88 light from both lamps.



28
56
84
112
+160 272

Notebook # 11

Filming and Separation Record

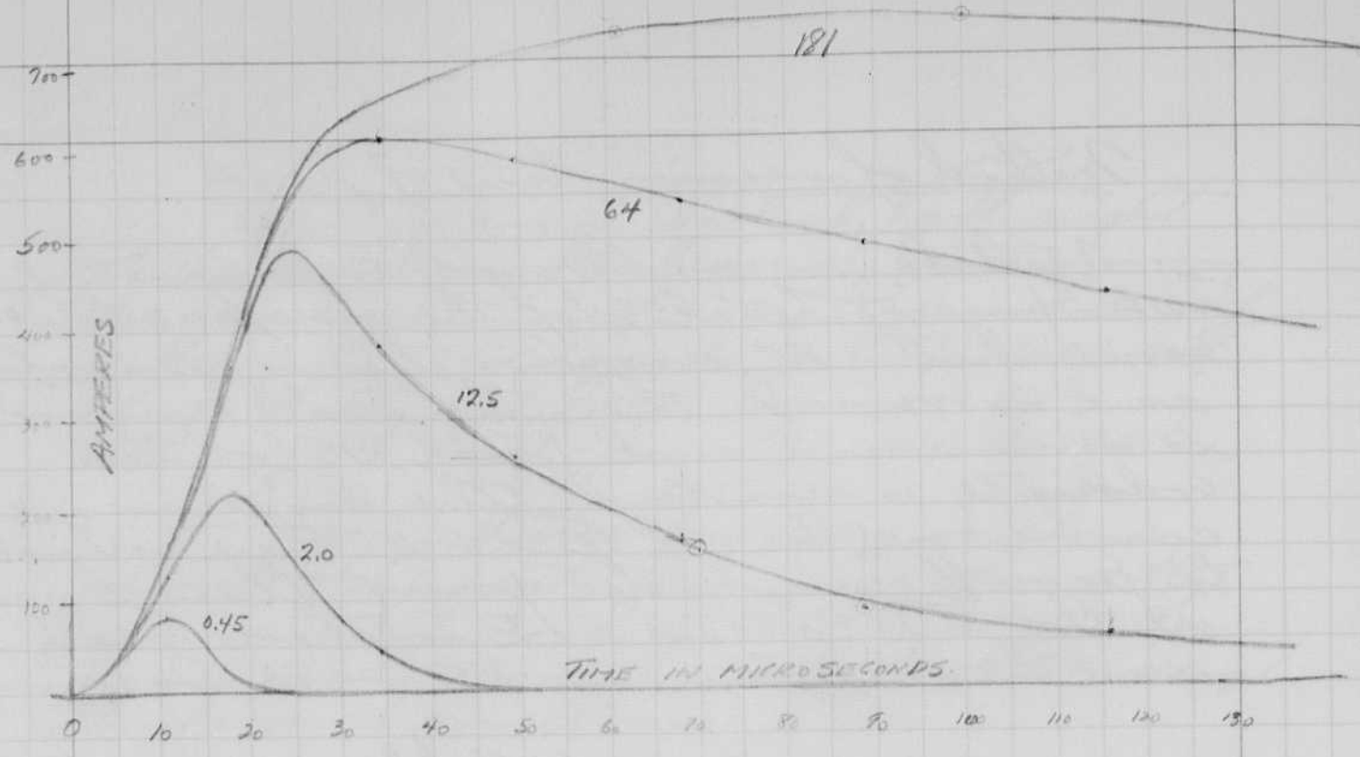
____ unmounted photograph(s)

____ negative strip(s)

17 unmounted page(s) inside envelope mounted on page 60
(notes, drawings, letters, etc.)

was/were filmed where originally located ~~between~~ on page 60 and —.

Item(s) now housed in accompanying folder.



28
56
84
112
+1160 272

Notebook # 11

Filming and Separation Record

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____ negative strip(s)

17 unmounted page(s) inside envelope mounted on page 60
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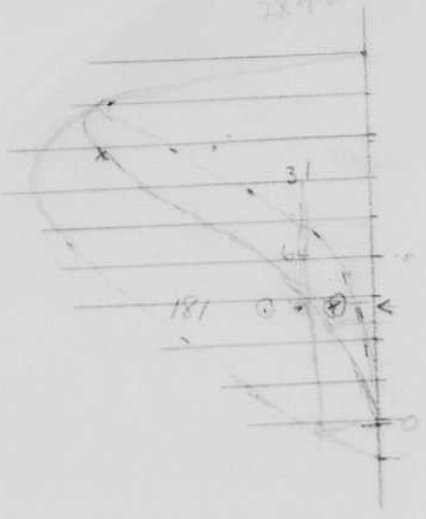
was/were filmed where originally located ~~between~~ on page 60 and —.

Item(s) now housed in accompanying folder.

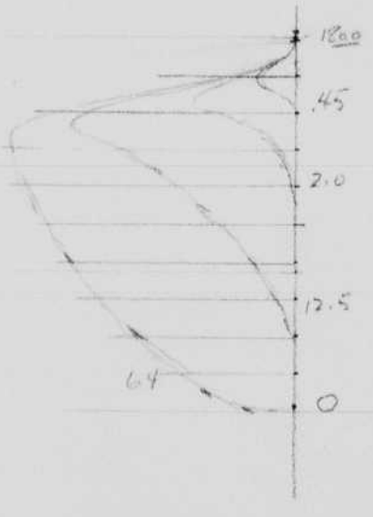


C = 0,051 SWEEP
R = 5500

5.7 cm = 910 a.

2x 4 turns

5.7 cm = 910 AMP.



C = .051 SWEEP
R = 1900

$RC = 1900 \times .051 \times 10^{-6}$

$= 97.0 \times 10^{-6}$ sec.

$$\frac{e}{E} = \#\left(1 - \Sigma^{-t/RC}\right)$$

$$\left(1 - \frac{e}{E}\right) = \Sigma^{-t/RC}$$

$$\ln \frac{E-e}{E} = -\frac{t}{RC}$$

$$t = -RC \ln\left(\frac{E-e}{E}\right) = \ln .63$$

$\ln 63$ — $4.605 - 3.611 = .994$

$-\ln 100$ — $4.143 - 4.605 = .462$

$= RC$

$\frac{E-e}{E}$ =	$-\ln\left(\frac{E-e}{E}\right)$	$-RC\ln\left(\frac{E-e}{E}\right)$ μS	550 Ω .051 μf 281.	64 mA	18 mA
1.	2.3026 / 2.3026	0	0	0	0
.9	2.3026 / 2.1972	.1042	10.1	28.4	600
.8	2.3026 / 2.0794	.2232	21.7	61.0	632 / 600 / 730
.7	2.3026 / 1.9459	.3567	34.5	100.0	502 / 752
.6	2.3026 / 1.7918	.5108	49.5	144.0	360 / 705
.5	2.3026 / 1.6094	.7032	68.0	198.0	233 / 622
.4	2.3026 / 1.3863	.9163	88.5	248.0	144 / 517
.3	2.3026 / 1.0986	1.2040	116.5	326.0	80 / 458
.2	2.3026 / 0.6931	1.6095	156.0	439.0	32 / 288
.1	0.000	2.3026	223.0	629.0	- / 168
.0	—	∞	∞	∞	0 / 0

$\frac{910}{5.7} = 160$ amp / cm.

5.5 cm = 0 - ∞ Thick.

April 25 1941
Harold & Esther Edgerton

C.R. Oscillograms of current & time.
Standard Kodatron Power unit - disassembled so that capacity could be changed easily.
CR. connected as before.

	rated.
C_1	28 mf.
C_6	56 mf.
C_{15}	160 "
C_{10}	28 "

			C_1		C_6		C_1+C_6			$C_1+C_6+C_{10}$	
$\frac{E-e}{E}$.	$\ln \frac{E-e}{E}$.	RC .051 x 2150	m	AMP	m	AMP	RC .051 x 5000	m	AMP	m	AMP
1	0	110 mf	0	0	0	0	255	0	0	0	0
.9	.1042	1145	1.9	317	1.9	317	266	4.14 4.32	690 721	4.18	700
.8	.2232	~~2145~~	3.8 3.86	634 645	4.05	670	57	4.25	710	4.5	753
.7	.3567	39.2	3.25	542	3.97	662	912	3.82	638	4.28	715
.6	.5108	56.0	2.65	442	3.78	630	132	3.17	530	3.66	612
.5	.7032	76.3	2.1	350	3.4	568	179	2.43	406	3.05	510
.4	.9163	101.0	1.55	260	2.9	485	233	1.8	300	2.45	410
.3	1.2040	133.0	1.1	184	2.32	385	308	1.29	215	1.84	308
.2	1.6095	177.0	.65	110	1.56	260	410	0.82	137	1.34	224
.1	2.3026	253.0	.25	417	.85	142	594	0.43	72	.81	135
0	∞		0	0	0	0	∞	0	0	0	0

910 amperes = 5.45"
167 amperes per centimeter
424 amp/inch

Notebook # 11

Filming and Separation Record

____ unmounted photograph(s)

____ negative strip(s)

1? unmounted page(s) inside envelope mounted on page 63
(notes, drawings, letters, etc.)

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

Item(s) now housed in accompanying folder.

April 25 1941
Harold & Esther Edgerton

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C_1	28 mf.
C_6	56 mf.
C_{15}	160 "
C_{10}	28 "

			C_1		C_6		C_1+C_6			$C_1+C_6+C_{10}$	
$\left(\frac{E-e}{E}\right)$.	$\ln \frac{E-e}{E}$.	RC .051 x 2150	m	AMP	m	AMP	RC .051 x 5000	m	AMP	m	AMP
1	0	110 mf	0	0	0	0	255	0	0	0	0
.9	.1042	114.5	1.9	317	1.9	317	266	4.14 4.32	690 721	4.18	700
.8	.2232	~~114.5~~	3.8 3.86	634 645	4.05	670	57	4.25	710	4.5	753
.7	.3567	39.2	3.25	542	3.97	662	91.2	3.82	638	4.28	715
.6	.5108	56.0	2.65	442	3.78	630	132	3.17	530	3.66	612
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.1	2.3026	253.0	.25	41.7	.85	142	594	0.43	72	.81	135
0	∞		0	0	0	0	∞	0	0	0	0

910 amperes = 5.45"
167 amperes per centimeter
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(notes, drawings, letters, etc.) on page 63

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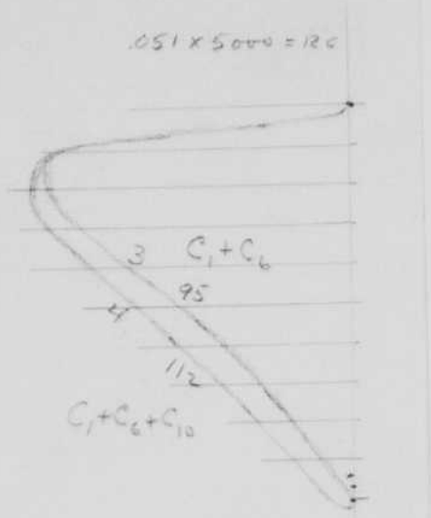
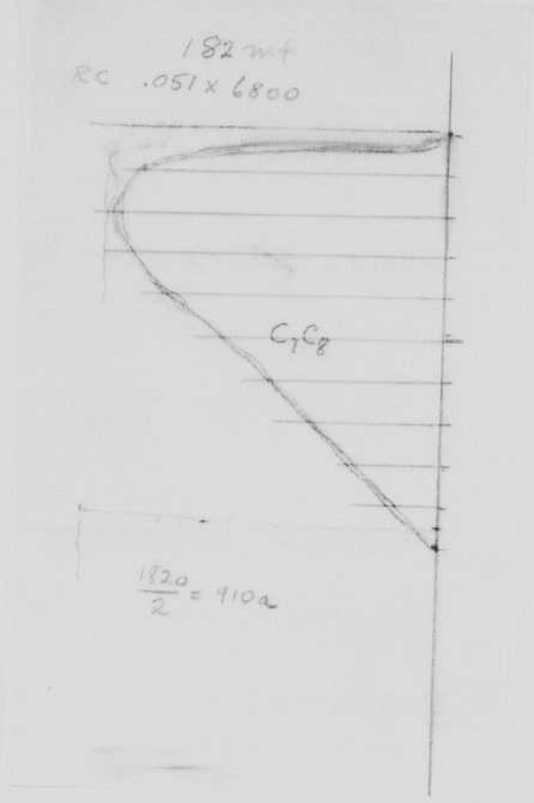
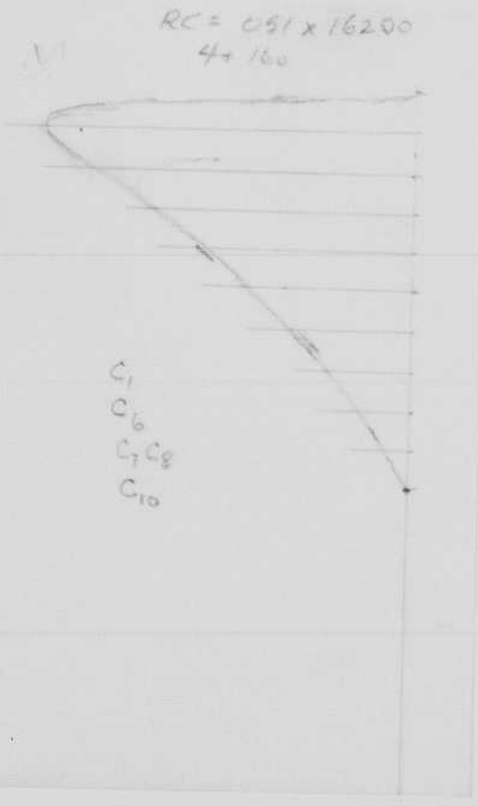
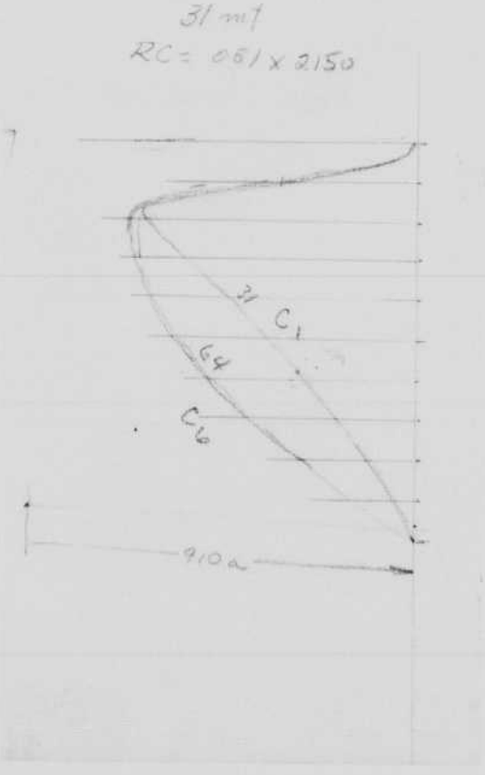
RC = 962
.0535
18,000

	$C_7 + C_8$			$C_1 + C_6 + C_7 + C_8 + C_{10}$		
	RC .051 x 6800 347	m	AMP	RC .051 x 16200 827	m	AMP
1	0	0	0		0	0
.9	36.2	4.35	726	86.2	5.25	877
.8	77.2	4.75	792	184.5	4.52	754
.7	123.5	4.42	738	295	3.67	612
.6	177	3.9	650	423	2.92	487
.5	243	3.1	518	561	2.30	385
.4	317	2.4	400	756	1.70	284
.3	419	1.8	300	995	1.15	192
.2	560	1.22	204	1330	.71	118
.1	800	.65	110	1910	.35	58.5
0	∞	0	0	∞	0	0


.051 x 5000 = RC
3
C_1+C_6
95
4
1/2
$C_1+C_6+C_{10}$


182 mf
RC .051 x 6800
C_1C_8
$\frac{1820}{2} = 910\Omega$


RC = 051 x 16200
4+ 160
C_1
C_6
C_1C_8
C_{10}


31 mf
RC = 051 x 2150
31
C_1
64
C_6
910Ω

RC = 962
.0535
18,800

$C_7 + C_8$ | $C_1 + C_6 + C_7 + C_8 + C_{10}$

	RC .051 X 6800 347	m	AMP	RC .051 X 16200 827	m	AMP
1	0	0	0		0	0
.9	36.2	4.35	726	86.2	5.25	877
.8	77.2	4.75	792	184.5	4.52	754
.7	123.5	4.42	738	295	3.67	612
.6	177	3.9	650	423	2.92	487
.5	243	3.1	518	561	2.30	385
.4	317	2.4	400	756	1.70	284
.3	419	1.8	300	995	1.15	192
.2	560	1.22	204	1330	.71	118
.1	800	.65	110	1910	.35	58.5
0	∞	0	0	∞	0	0

April 28 1941
Harold E Edgerton.

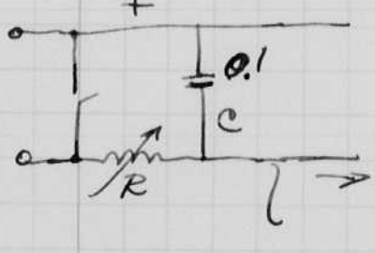
current-time curves of flash lamps.

112 mf. } Spiral lamps.
281 mf. }
2 mf.
31. mf }

Ec trip condenser.

2 } 8" straight tube.
31 mf }

A sweep circuit was made using a switch to initiate the discharge in the tube. A mercury switch was finally used although it was not entirely free of bounce.



The strobotron trip condenser is discharged in 20 or 30 microseconds.

The results of today test check the ones of Apr 28 very well.

Notebook # 11

Filming and Separation Record

____ unmounted photograph(s)

____ negative strip(s)

4? unmounted page(s) inside packet mounted on page 64
(notes, drawings, letters, etc.)

was/were filmed where originally located ~~between~~ on page 64 and —.

Item(s) now housed in accompanying folder.

April 28 1941
Harold E Edgerton.

current-time curves of flash lamps.

112 mf. } Special lamps.
281 mf. }
2 mf.
31. mf

Ec trip condenser.

2 } 8" straight tubes.
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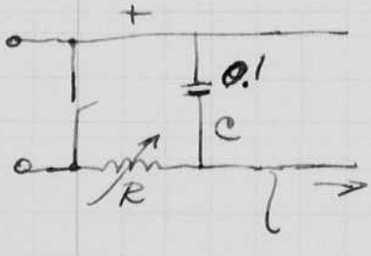

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112 mf. } Spiral lamps.
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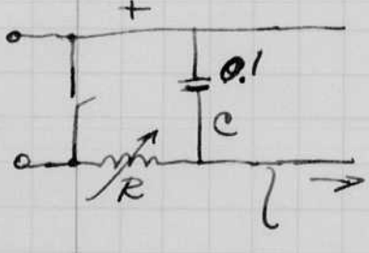

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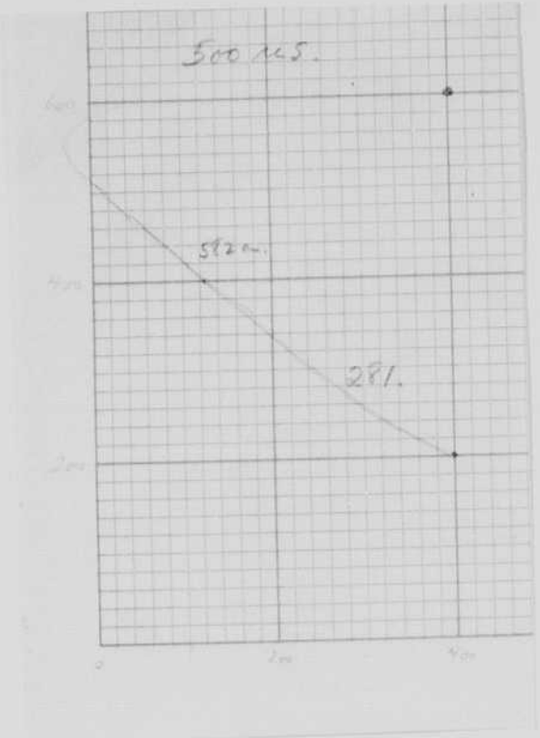
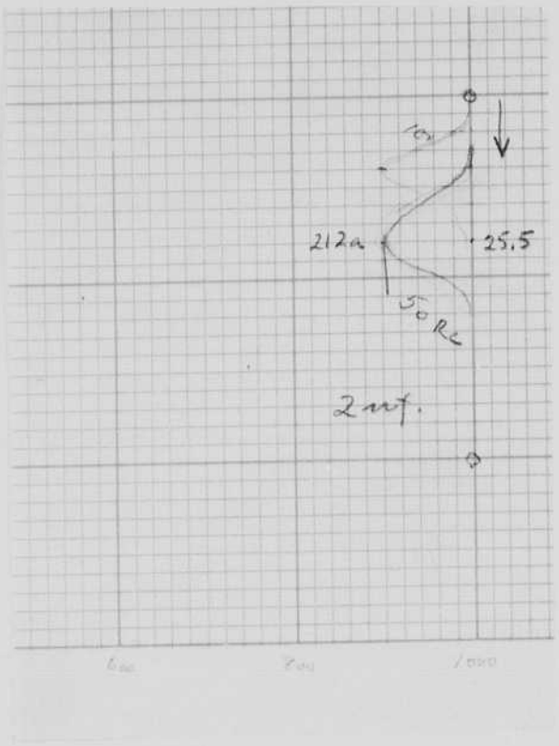
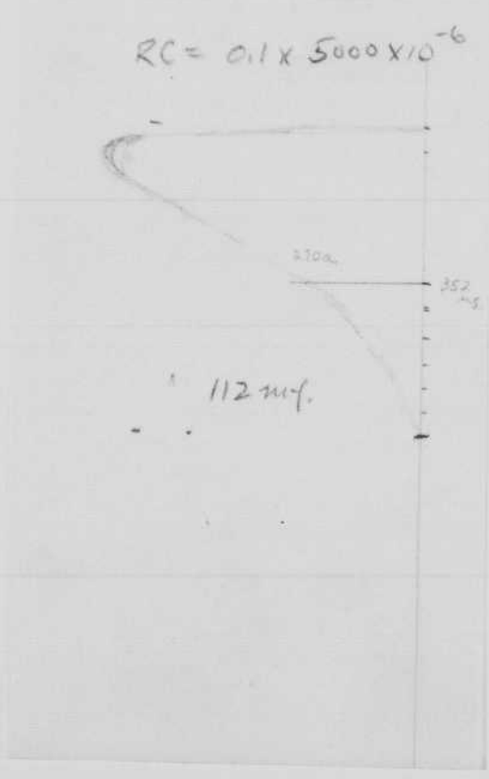
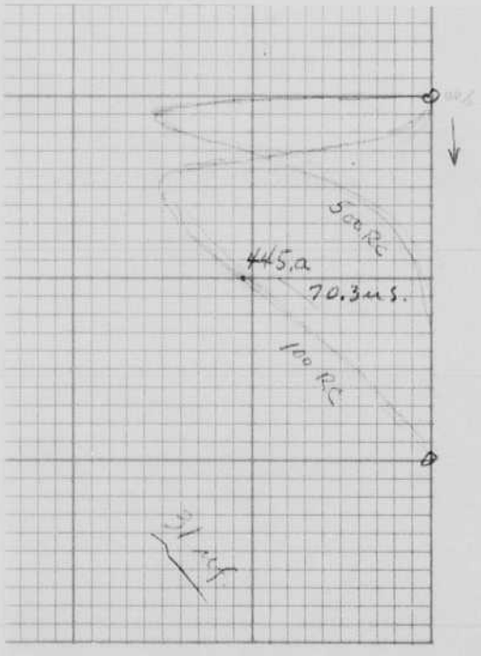
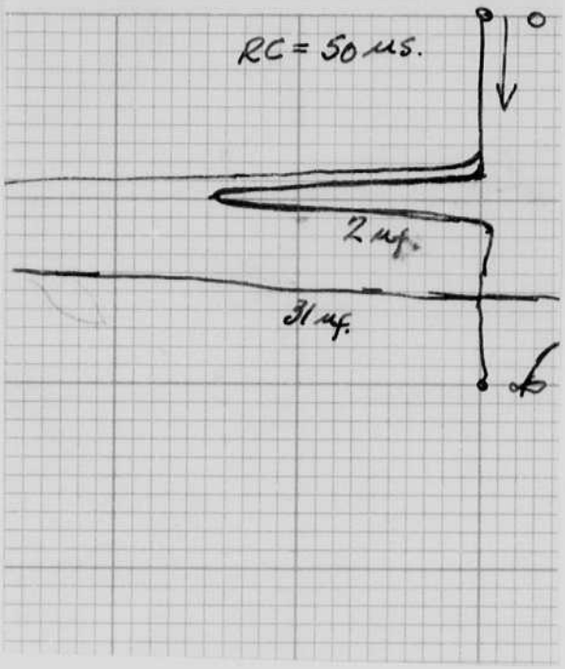

500 μs.
512a.
281.

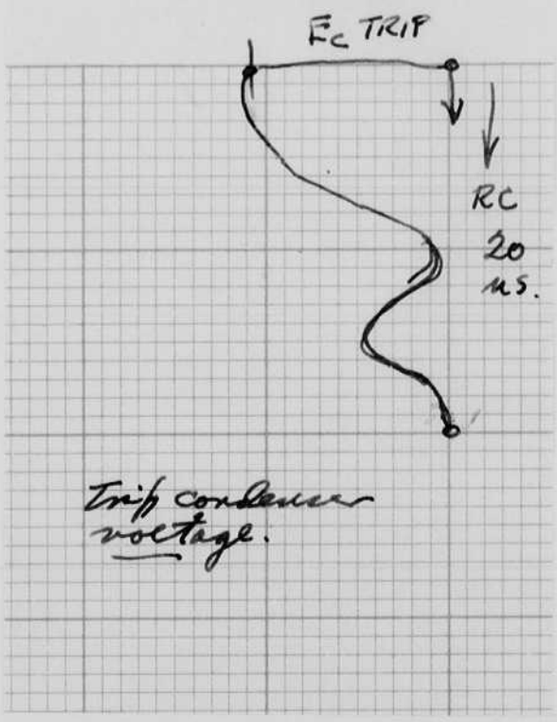

10
212a
25.5
50 RC
2 mf.


RC = 0.1 x 5000 x 10⁻⁶
352 μs
112 mf.

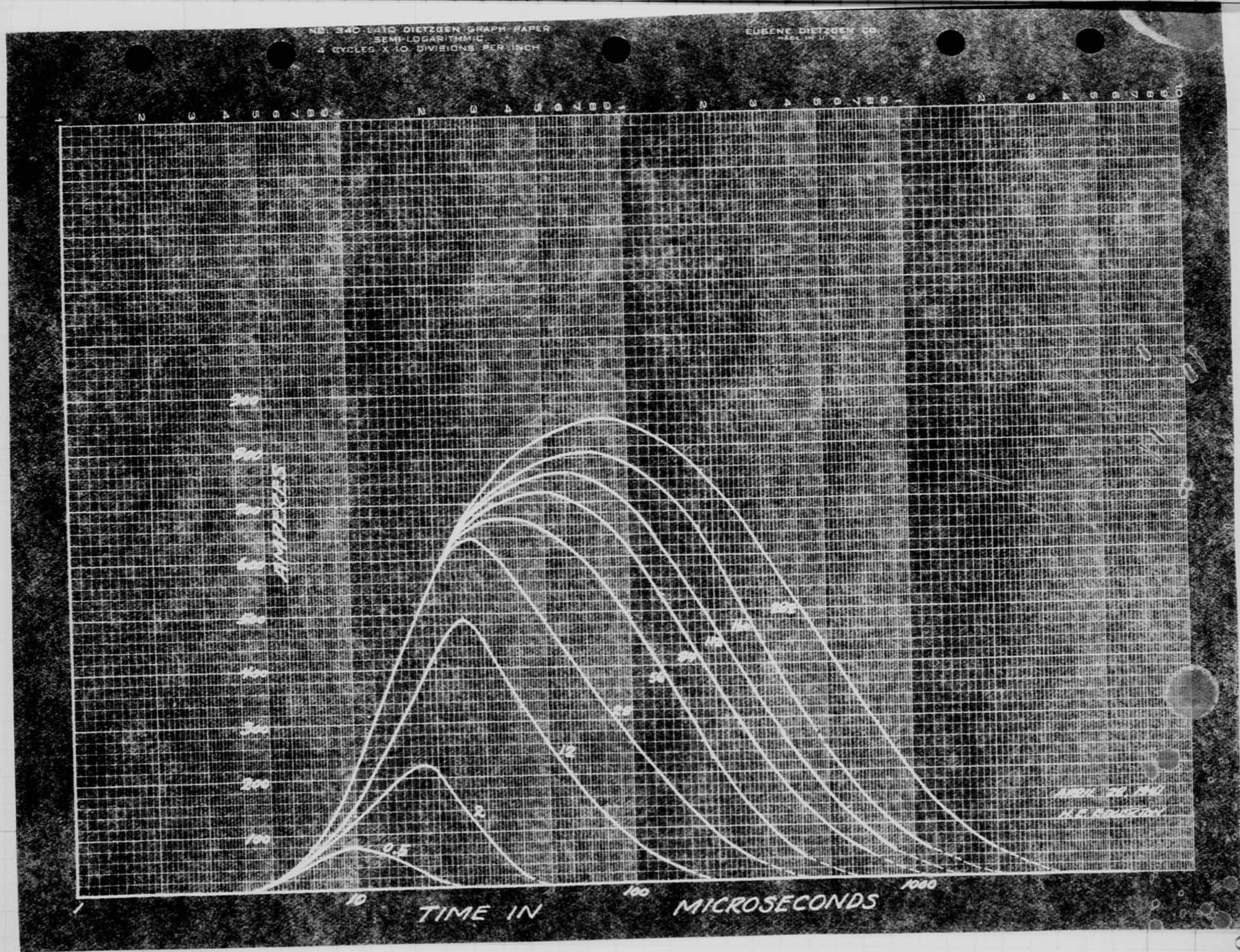

500 RC
445.a
70.3 μs.
100 RC
51 mf.

8" straight tube.





Trip condenser voltage.


NO. 340-L410 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
4 CYCLES X 10 DIVISIONS PER INCH
EUGENE DIETZGEN CO.
MADE IN U.S.A.
0.5
1
2
4
8
12
16
20
24
28
32
36
40
1
10
100
1000
TIME IN MICROSECONDS

Consistency tests of Kodalux lamps from G.E.

Lamp used in tests apx 24.
112+ mf 4.35 x 167 amp. peak.

1	3.9 to 4.1			x 167
2.	3.9	3.8	3.8	1 "
3	3.9	3.9		
4	3.9	3.9		
5	4.0	4.0		
6	3.6	3.9		then 3.6
7	3.8	3.8		
8	3.8	3.8		
9	3.6			
10	3.7			
11	3.9			
12	3.9			

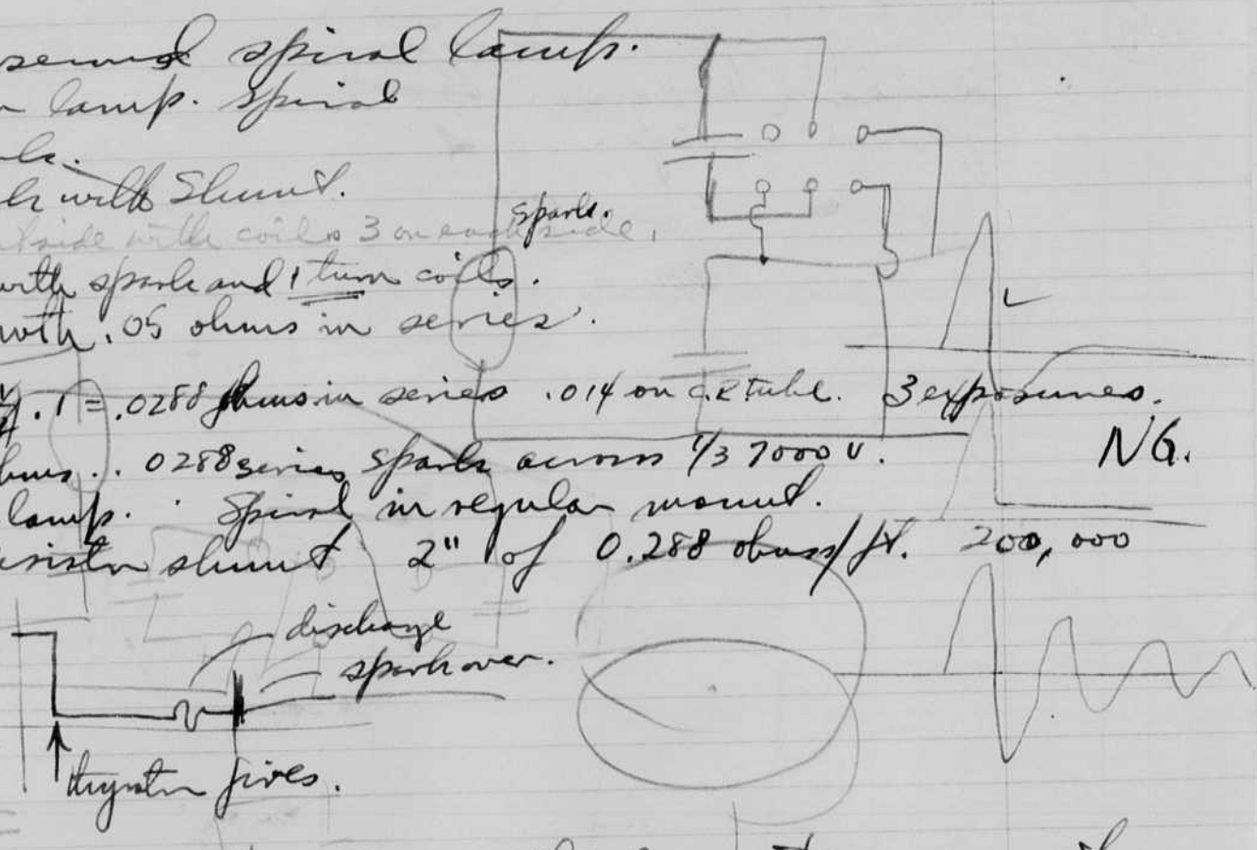
Neon Kr. experimental. 3.6

old V thin. more than 8.0 off scale.

May 3 1941
Harold E Edgerton.

Mr. Zeicht has been here for the past week. Grier and Barstow have been working with him on the flash unit for the army. A B-18 Douglas airplane was brought from Wright field for the tests. Suitable fittings have been made for submerging cameras

1. Microsecond spiral lamps.
2. argon lamp. Spiral
3. Spark.
4. Spark with Shunt.
5. 1/3 mf outside with coil to 3 on each side.
6. 1/3 mf. with spark and 1 turn coils.
7. 1/3 mf with .05 ohms in series.
8. 1288 x (1/14) .1 = .0288 ohms in series .014 on a.c. tube. 3 exposures.
9. .003 ohms . . 0288 series Spark across 1/3 7000 v.
10. argon lamp. Spiral in regular mount.
Resistor shunt 2" of 0.288 ohms/ft. 200,000



NG.

11. Straight argon 1/3 mf 7000 v outside resistor meas current. 4 x 2.
1/2 h 60 argon total.

XX 12. Argon movie lamp. 2,000,000 cycles.
" Spiral 10^6
" Straight 1 1/4 gap 1.2 cm tubing.

2. 13. 790 volts calibration plate. Coil volts. 790 volts
Spiral tube current.
Spark volts peaks

6866. volts.

14. 3/4 | 2060 x 10/3 = 14.5 mf 8" Argon 200,000 to. Volt amps.
18 | 26/24
15. 29/20 200,000, Spark, Current. vs. time ditto tube.
16. 2 ohms 14.5 mf Spark calibration.
9 16. 2 ohms 14.5 mf Spark calibration.
10 18 2 " 12.8 Spark. Voltage across 2 ohm resistor

Notebook # 11

Filming and Separation Record

____ unmounted photograph(s)

12? negative strip(s) inside envelope mounted on page 67

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

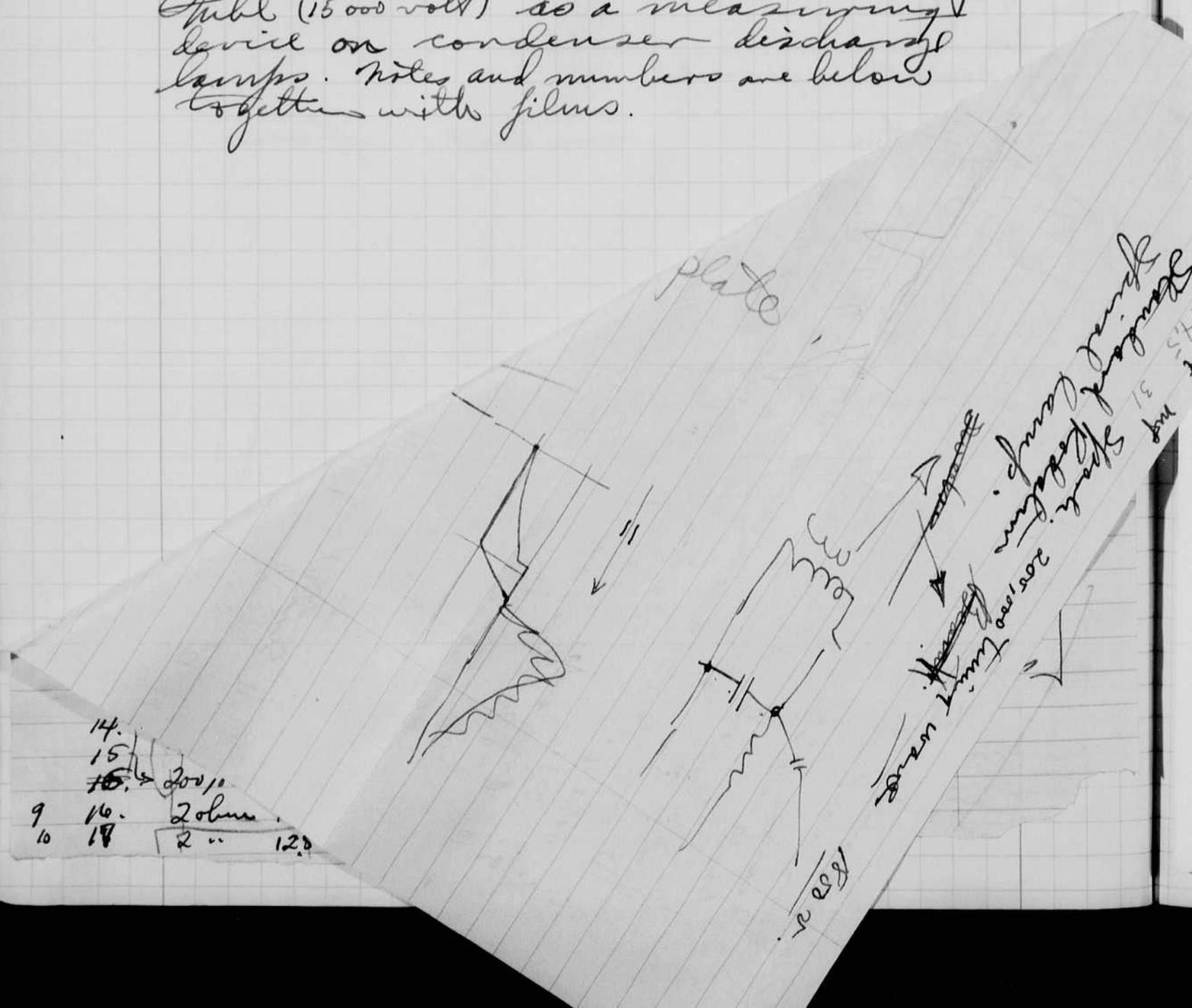
was/were filmed where originally located ~~between~~ on page 67 and —.

Item(s) now housed in accompanying folder.

May 3 1941
Harold E Edgerton.

Mr. Zeichst has been here for the past week. Grier and Barstow have been working with him on the flash unit for the army. A B-18 Douglas airplane was brought from Wright field for the tests. Suitable fittings have been made for supporting condensers, power supplies, and lamps in the bombbay. It was tried this noon and seems to fit ok. except for minor details.

I spent a great deal of time the past week with a cathode-ray tube (15000 volt) as a measuring device on condenser discharge lamps. Notes and numbers are below together with films.



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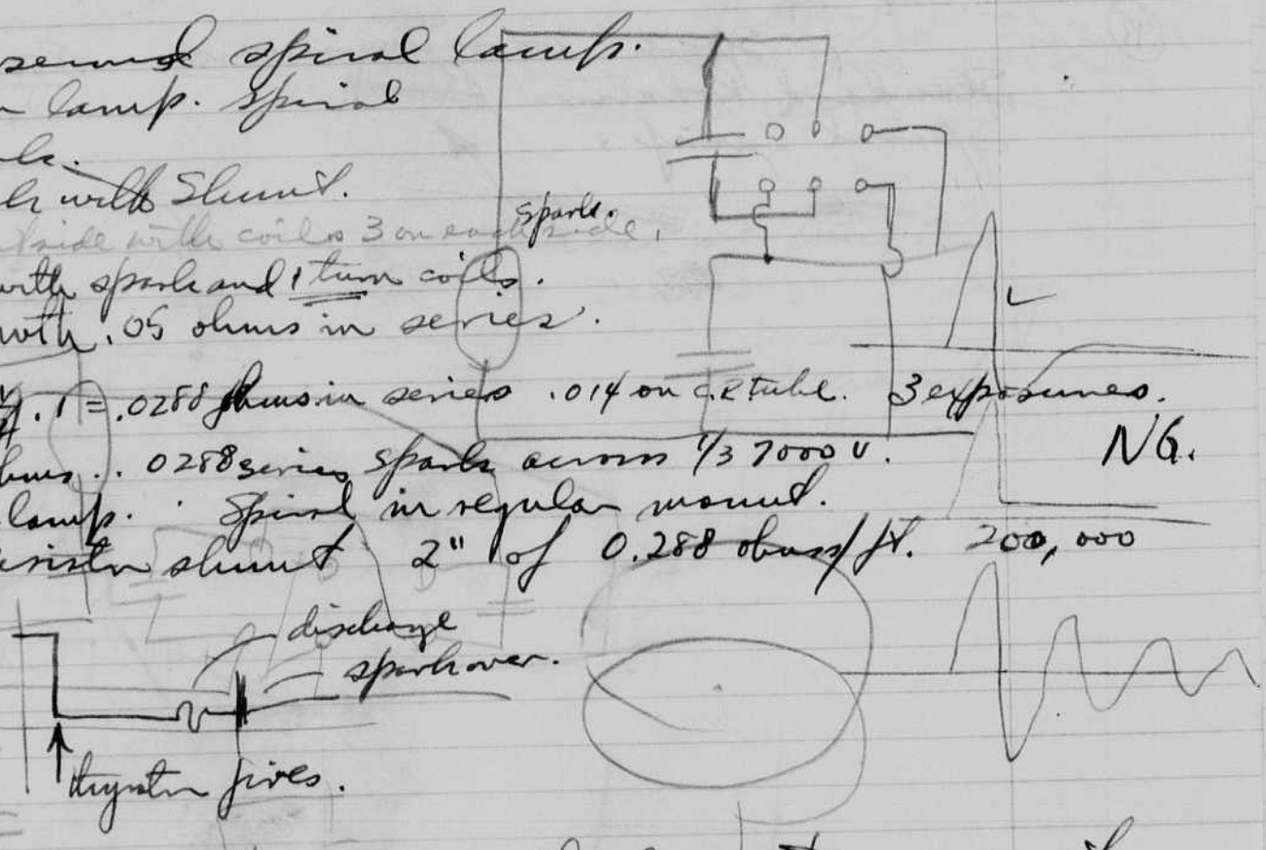
1. Microsecond spiral lamp.
2. Argon lamp. Spiral
3. Spark.
4. Spark with Shunt.
5. 1/3 mf outside with coils 3 on each side.
6. 1/3 mf. with spark and 1 turn coils.
7. 1/3 mf with .05 ohms in series.
8. .288 x 1/14 · 1 = .0288 ohms in series .014 on c.r. tube. 3 exposures.
9. .003 ohms .. 0288 series spark across 1/3 7000 v.
10. argon lamp. Spiral in regular mount.
Resistor shunt 2" of 0.288 ohms/ft. 200,000



N6.

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1/2 h 60 argon total.

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15. 200,000 20/20, Spark, Current. vs. time ditto tube.
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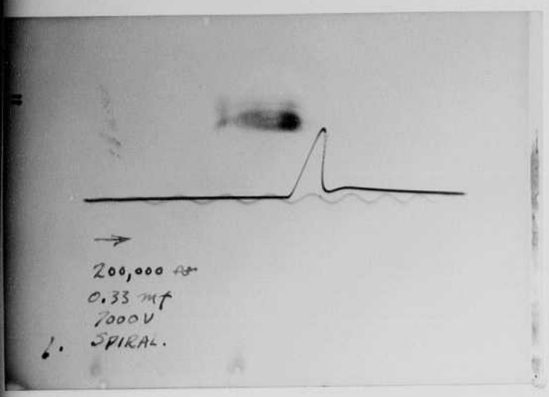
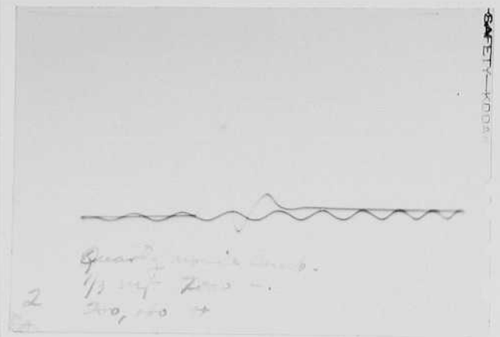

200,000 ~
0.33 mf
7000V
1. SPIRAL.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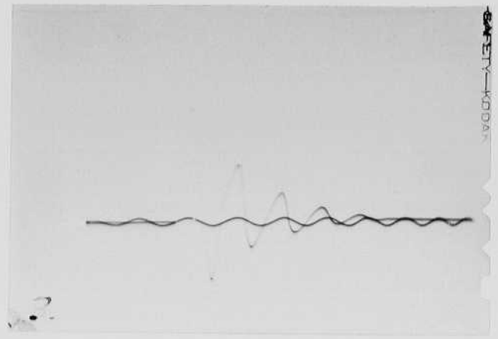
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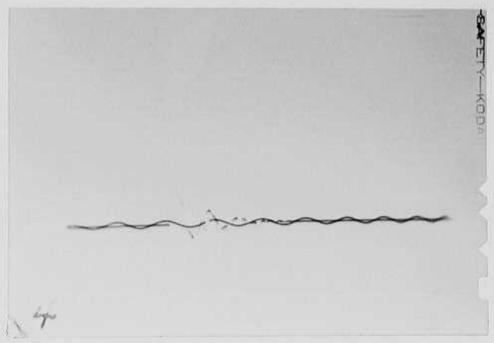
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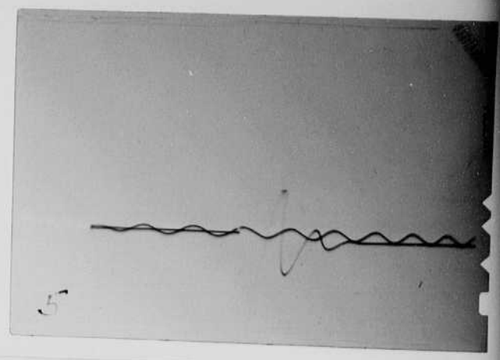
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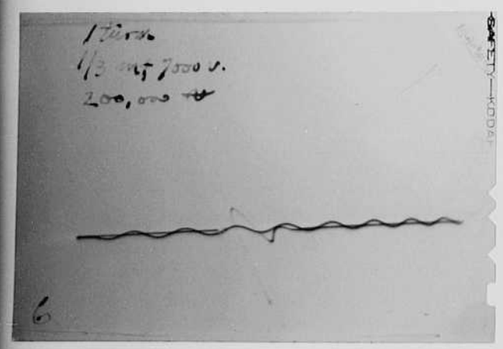
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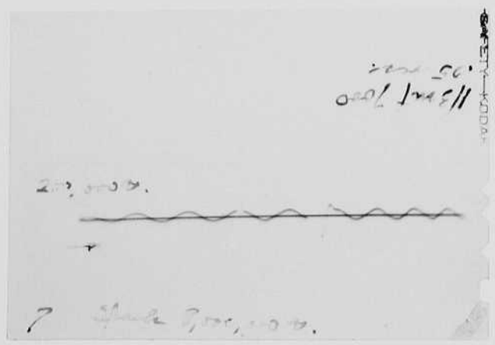
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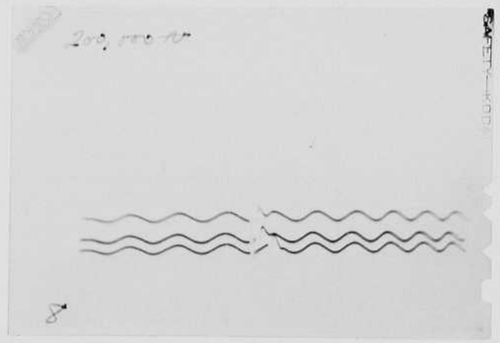
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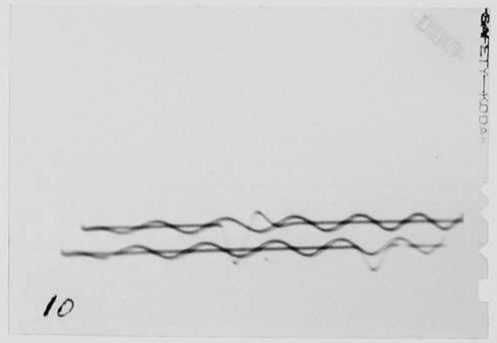
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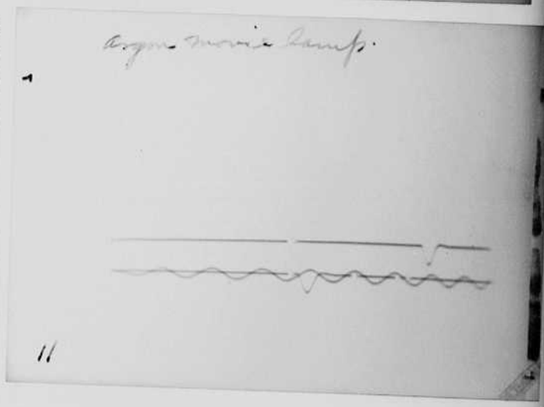
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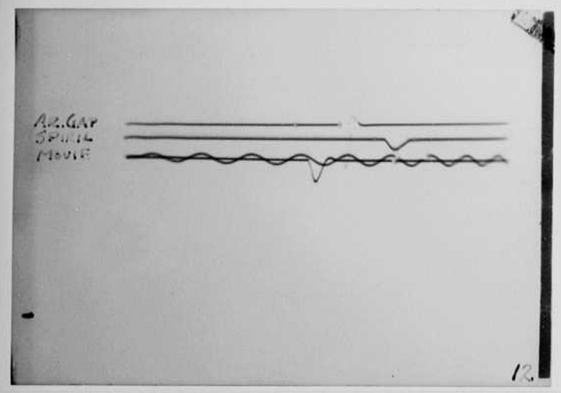
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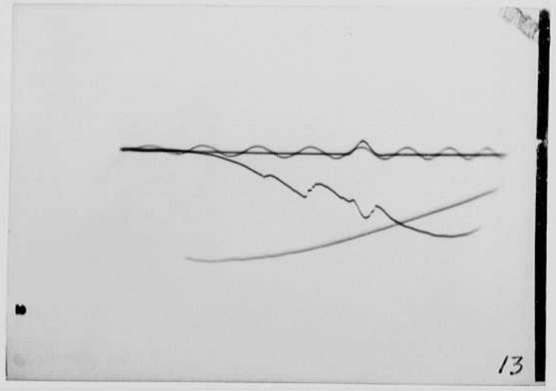
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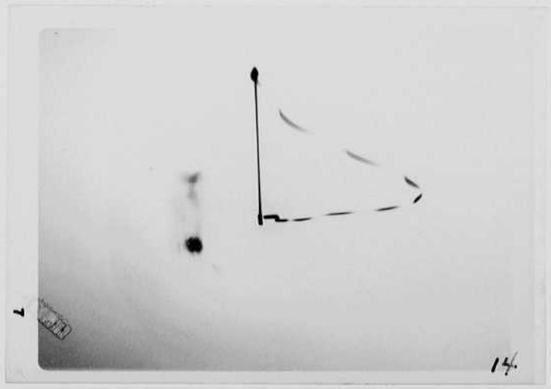
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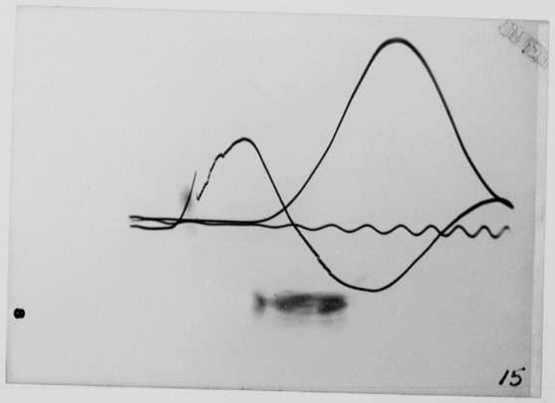
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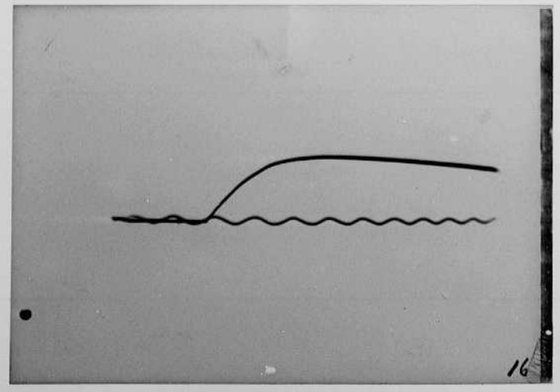
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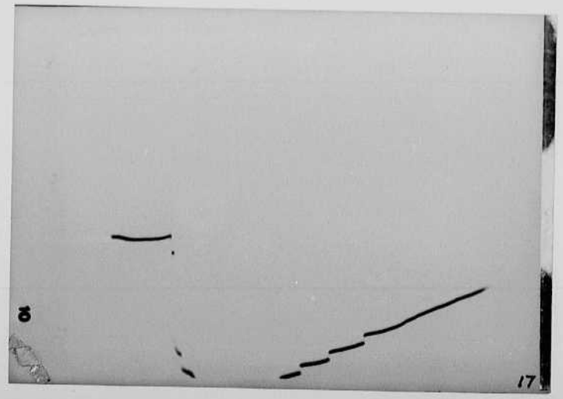
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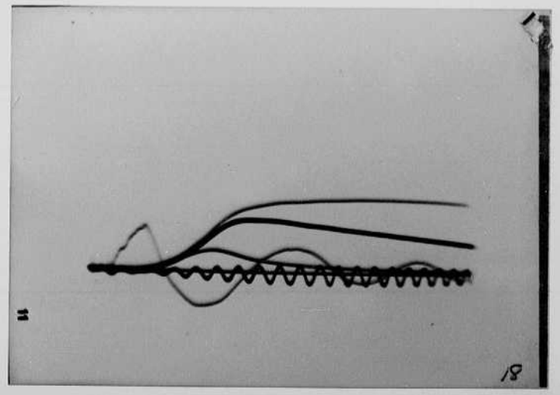
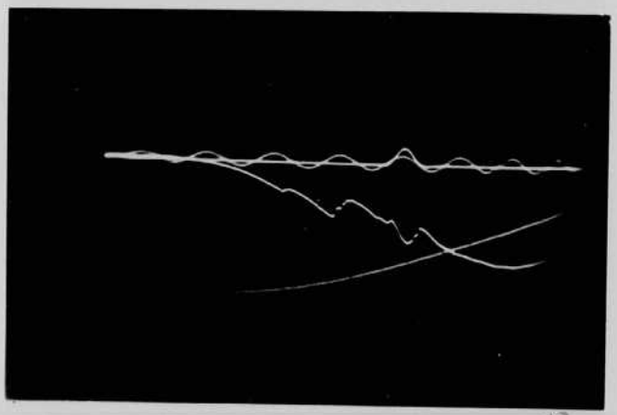

18

Oscillographs.
Films 1-18 inc.



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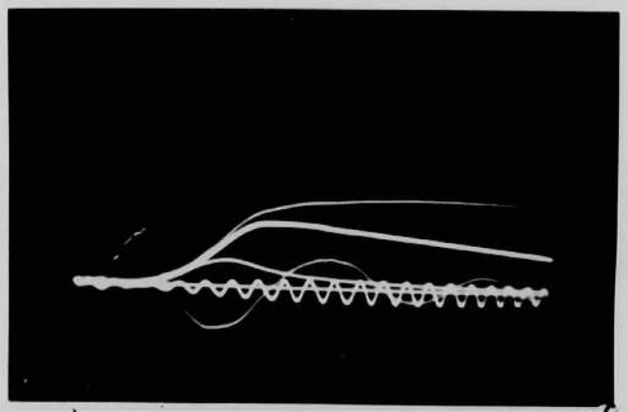

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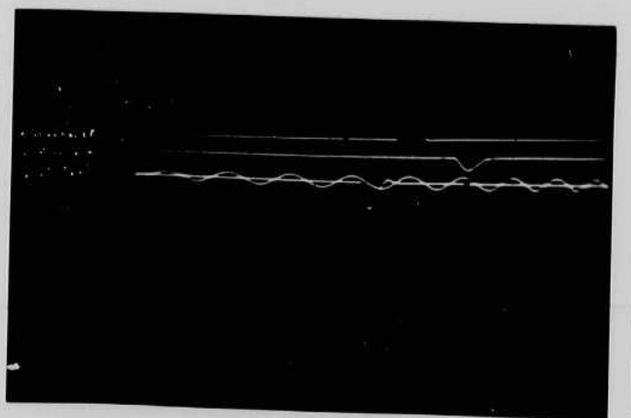

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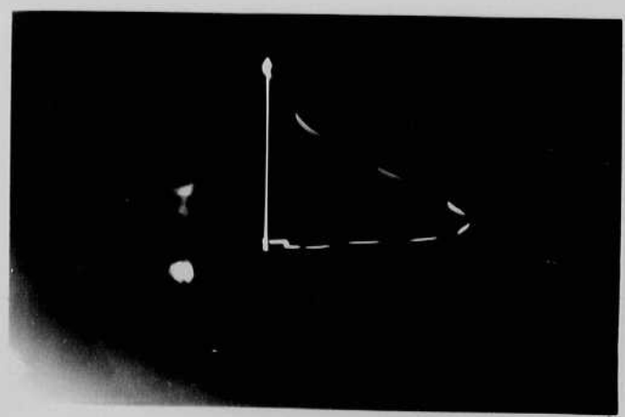

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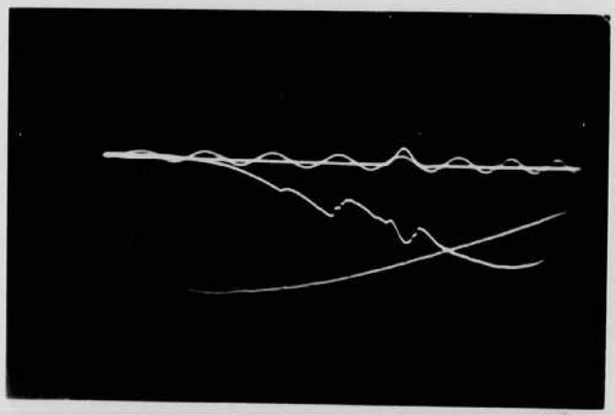

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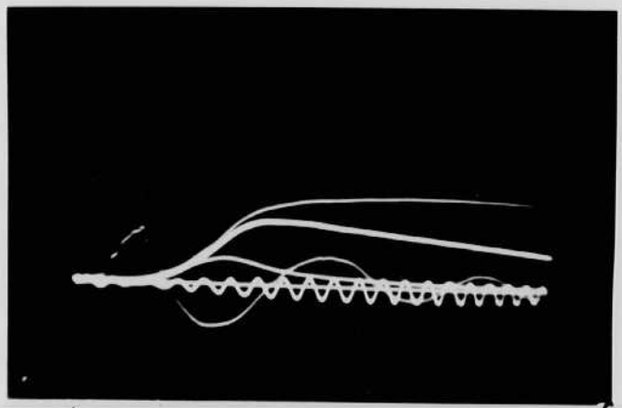

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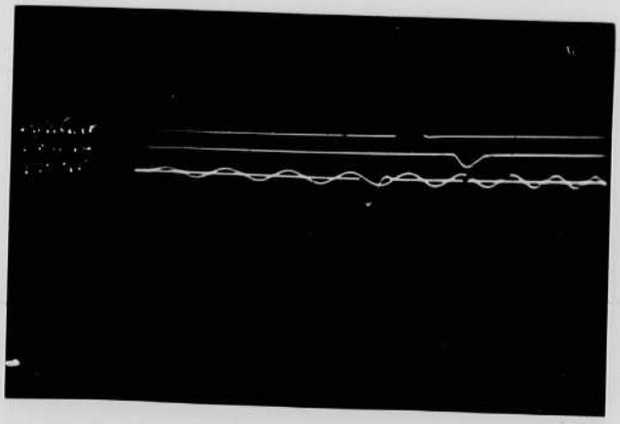

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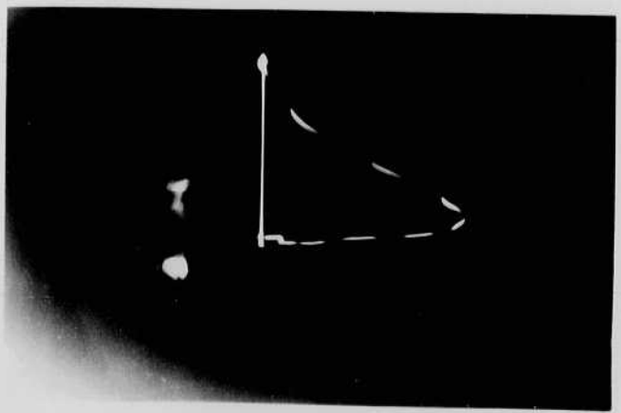


17

May, 5, 1941.

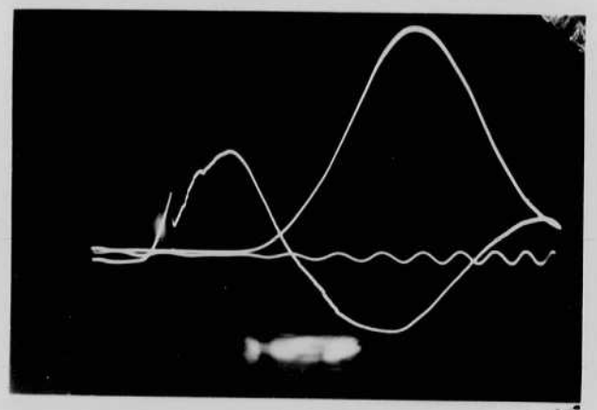
Harold E Edgerton

Lyman Johnson from Nela was here today discussing lamps. Decided to increase pressure and reduce size of lamps. Also to try Xenon gas 90% to Kr 10%.

10 hour lamps.
1 kw
110-150 volts
not plane use.
air cooled SiO2 lamps.

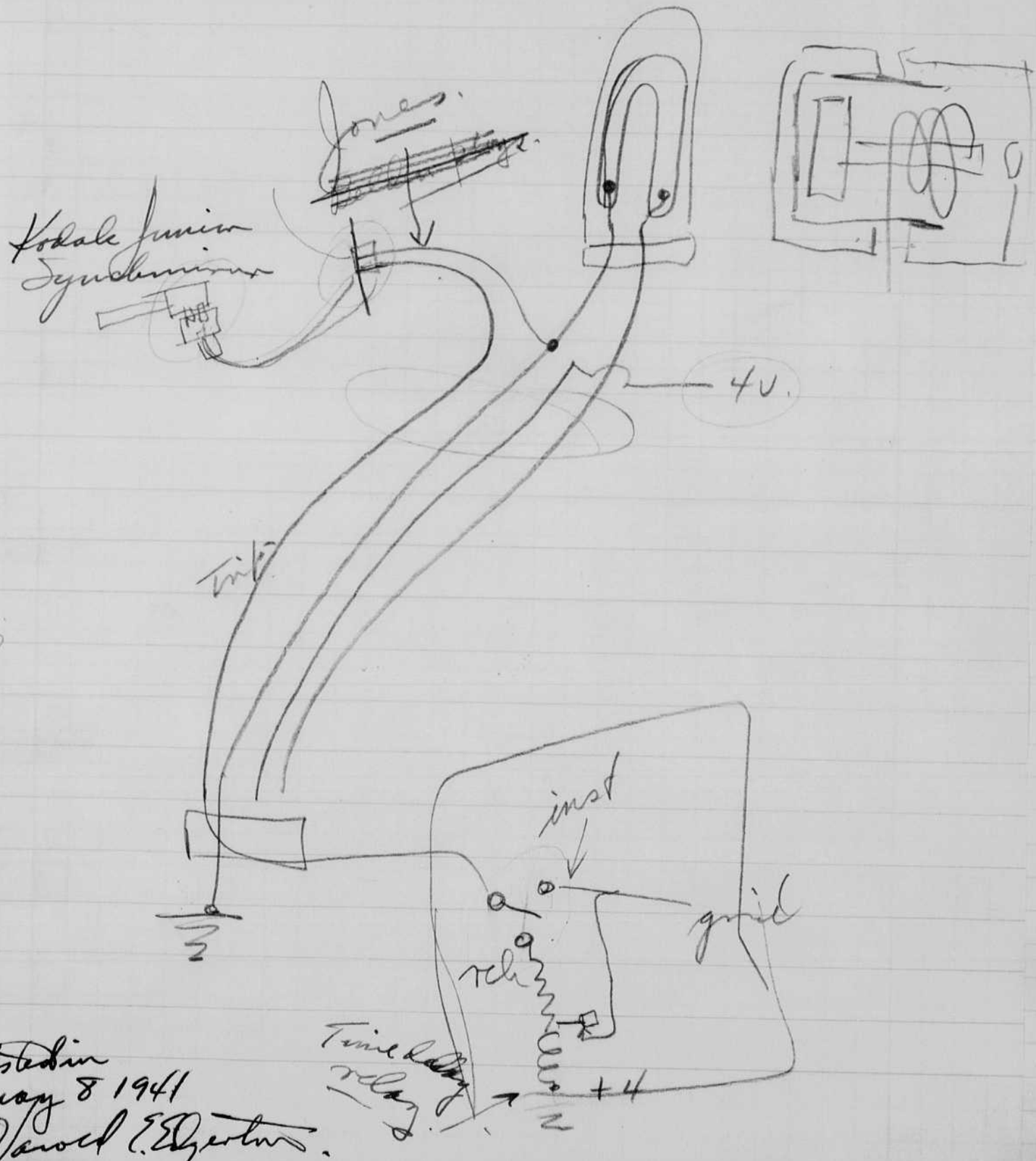
A Major Wyman from Wright field was here today and discussed with Johnson, Entwistle and myself a stroboscopic light source for some aircraft use. He intended to use the ultra violet Johnson suggested the infrared.

One of Johnson's associates at nela has used the strobotron for firing a group of flash lamps in parallel.



15

The below sketch was used to discuss a relay time delay with Gilbert Bornemann on May 8, 1941



Posted in
May 8 1941
Jarod E. Egerton.

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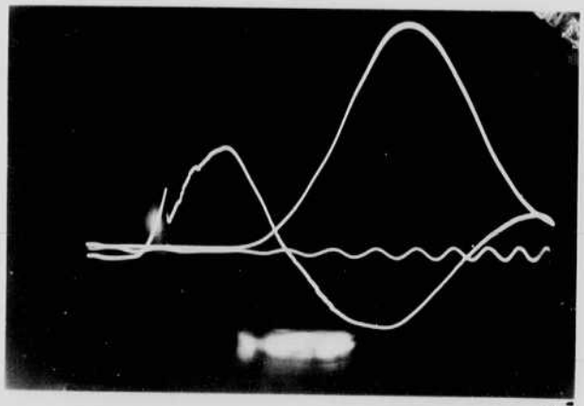
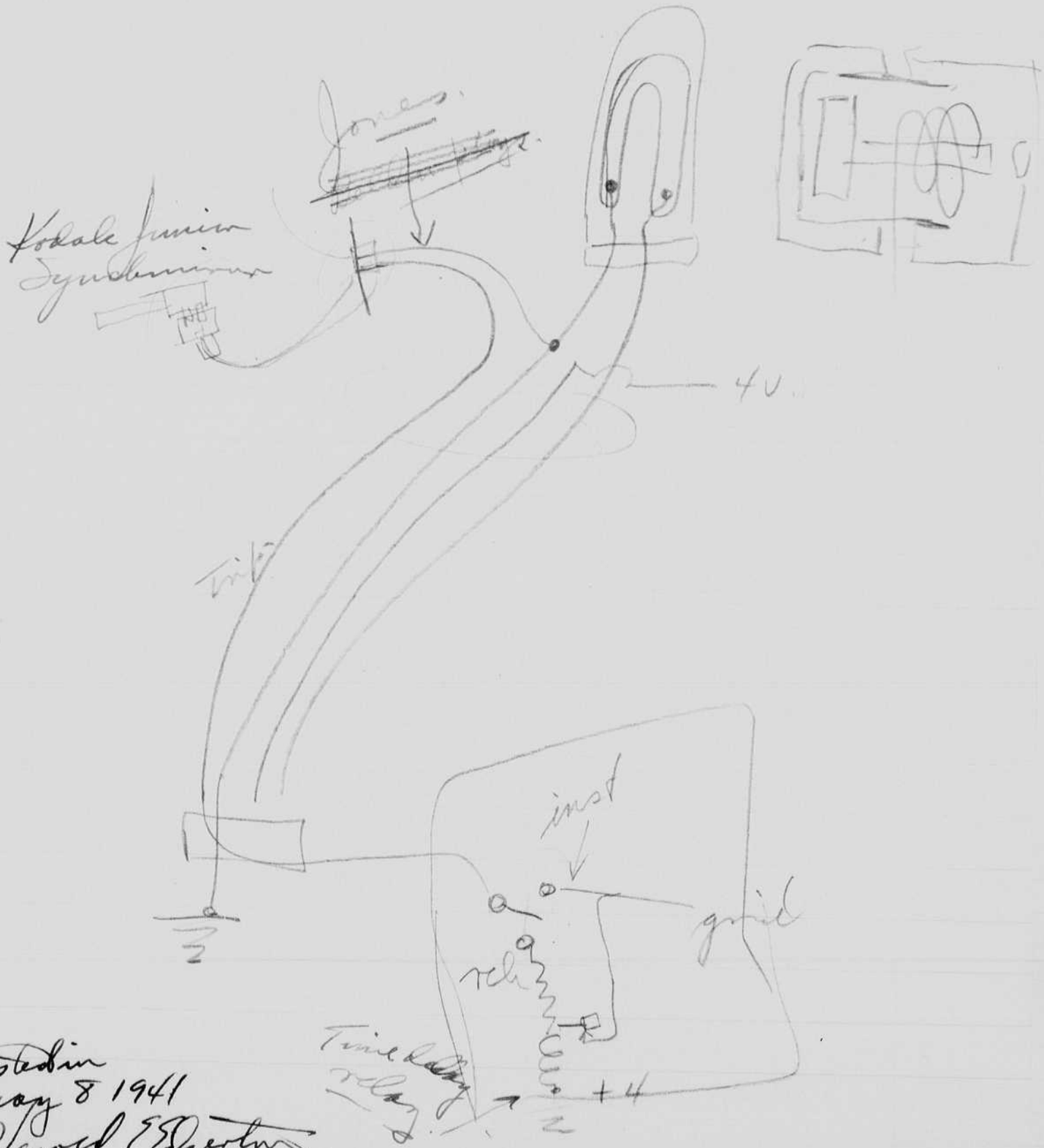


The below sketch was used to discuss a relay time delay with Gilbert Bowerman, Jr. on May 8, 1941



Posted in
May 8 1941
Harold E. Edgerton.

May 8 1941

Harold E. Edgerton.

Most of this and last week or aerial photography with Feicht of Wright field. The apparatus was installed on May 6 and hung in the bomb bay of the B-18 no 96. from Wright field.

We took the apparatus up on tuesday night for trial photographs. I rode in an F-2 Beechcraft twin motor photographic ship. Feicht operated the camera. The pilot was Lieut. Davis.

Barstow held the photoelectric cell in the top rear blister of the B-18. Dave Harris operated a camera in the B-18 but the results were N.G. as expected since the camera was too close to the light (less than 4 ft.) the pilot - Major Tellman (Wright field). co pilot. Lieut Z---- ? Arlington Va.

Photos were taken at levels from 1000 to 4000 ft in 500 ft steps. Some 46 photos were taken in all. On the way home from our trip out which was north west we went over M.I.T. and took a picture from 1900 ft. It came out OK! but the negative was thin.

I discussed instantaneous infra red pictures with Prof Harris and Mr. Radford yesterday. Our flash lamps produce a large quantity of infra red. In fact the peak energy is in the infra red about 5000 Å.

May 9 1941 Last night I gave a talk for Boyer at the Westminster Hotel. B.U. physics students.

Test in Shop before installation

Condensers and lamp.

M-6. Set in place.

May 8 1941

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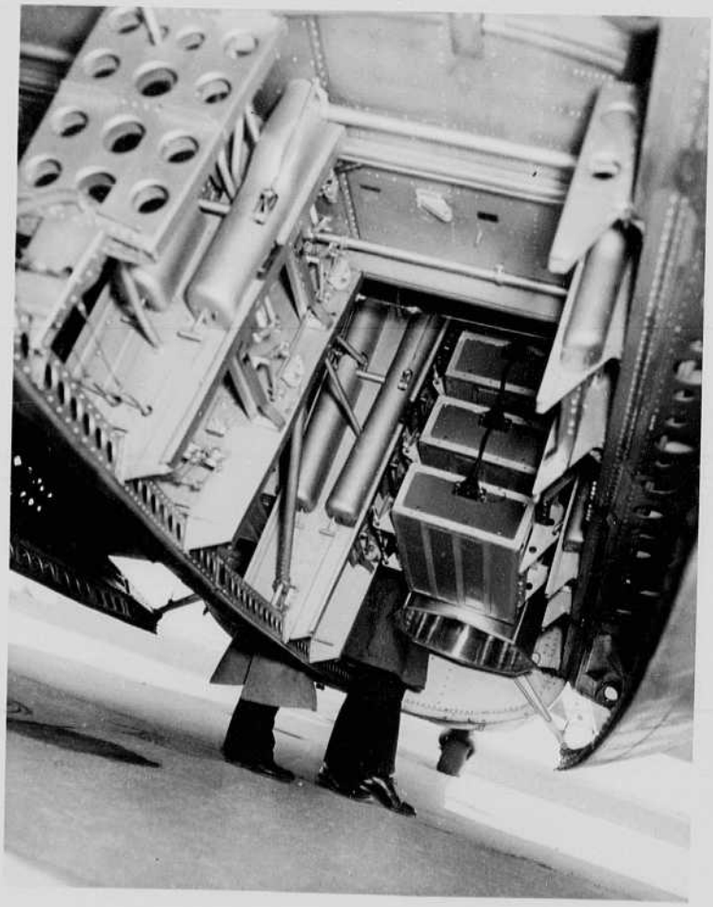

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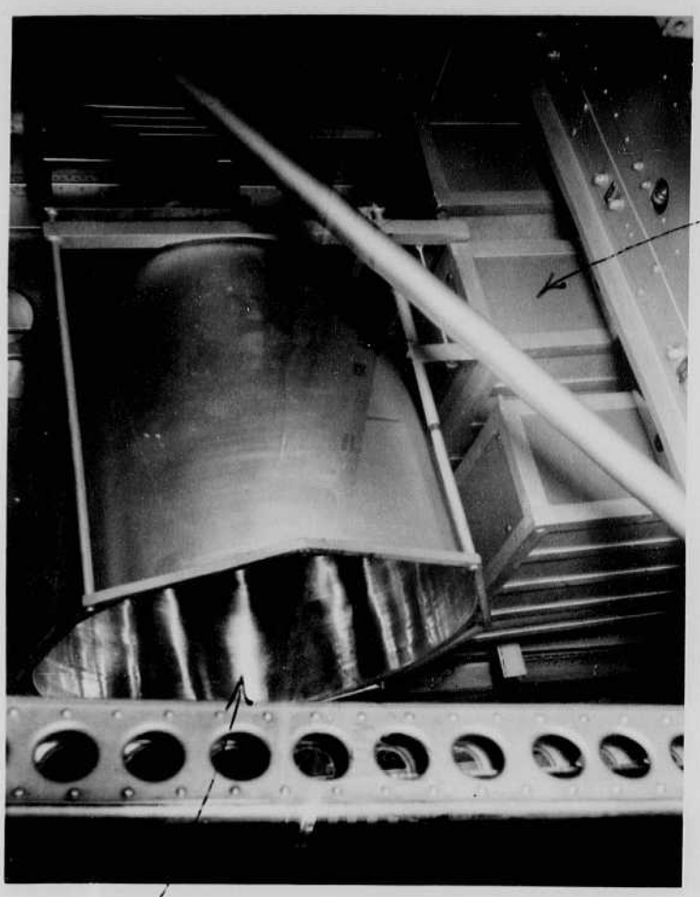

condenser banks

Reflectors with lamps.

#99

B18 with lamp operating at night over Boston

Barstow in ~~rear~~ blister with photo-cell

Barstow in B18 no 99.

The light was flashed from the portable. Note photocell in doorway.

condenser banks

Reflector with lamps.

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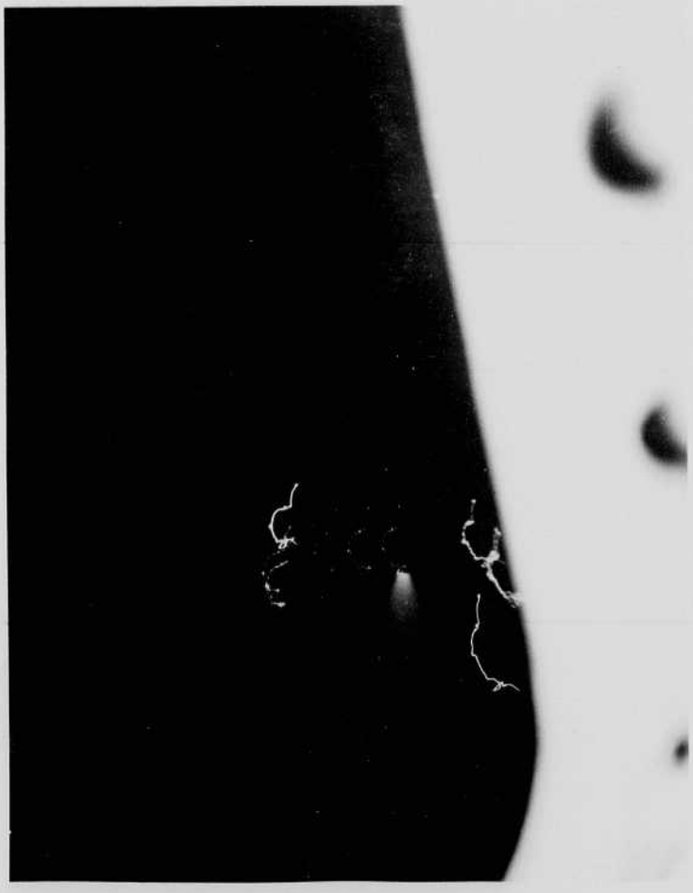
B18 with lamps operating at night over Boston



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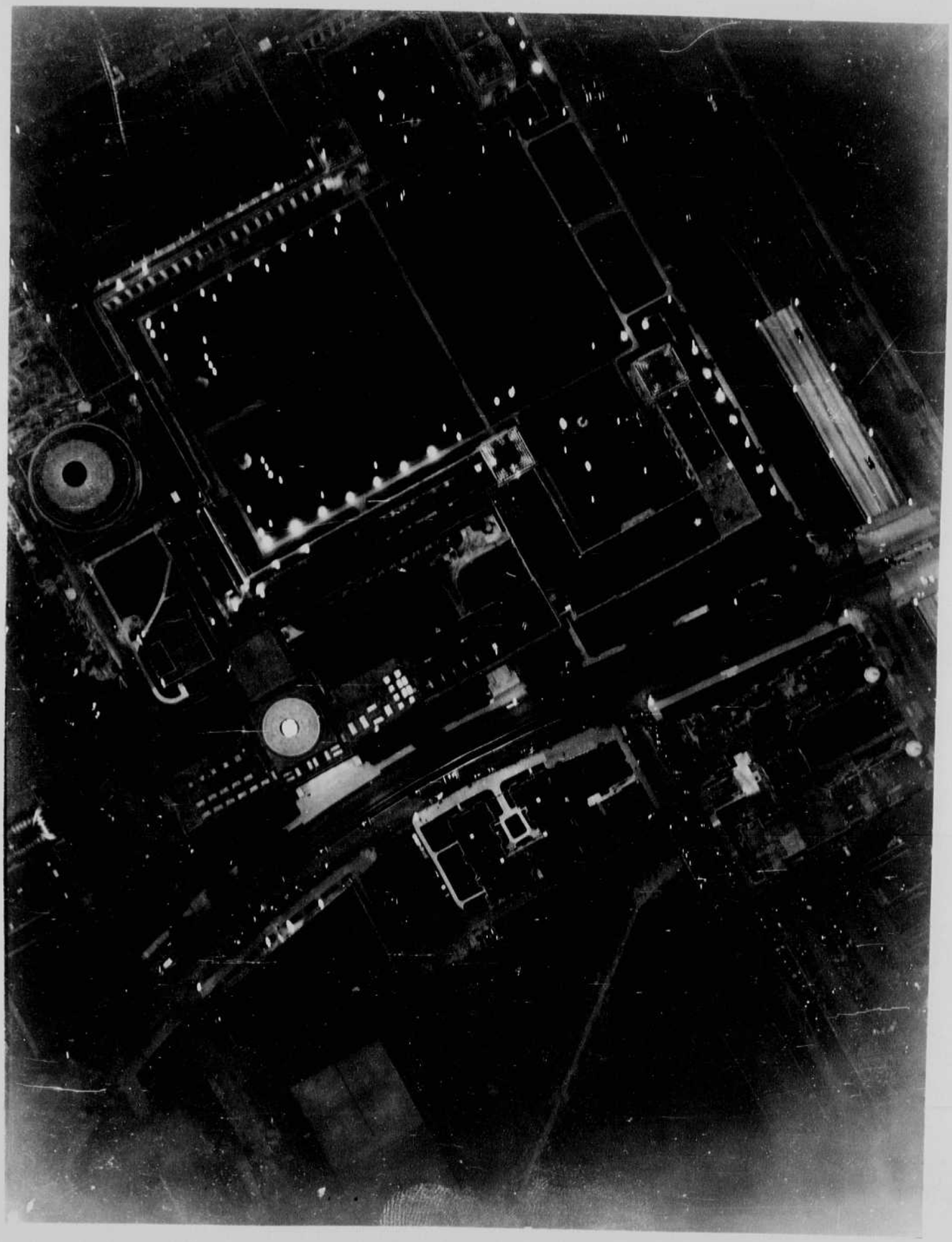
f 3.5 Kodatron film.



Monday May 19, 1941.

Left May 13 by auto for Aberdeen. Picked up Mili and Chas. Steinheimer in New York Arrived about 5 pm at Proving Grounds.

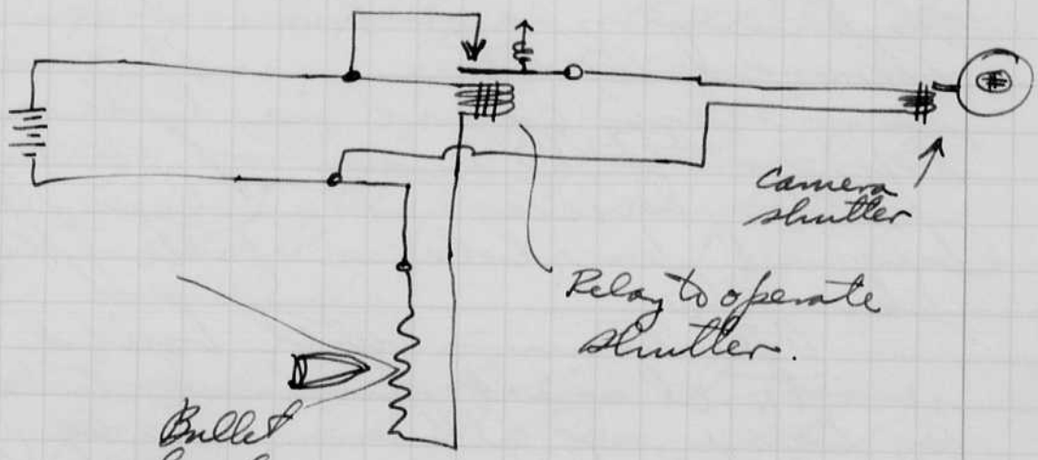
~~Lt. Rofkins~~. R.L. Rivkins
Col. Christmas.
Capt. Wells

Major Eddy.
Major Harrison. HH
Lt Gen. H.L.

Took pictures on the small arms range May 14, 15, and 16. 50 cal. to 75 mm.

The flare causes trouble when the tip strikes ~~the~~ plate.

Wired up a relay system so that a short time exposure could be used.

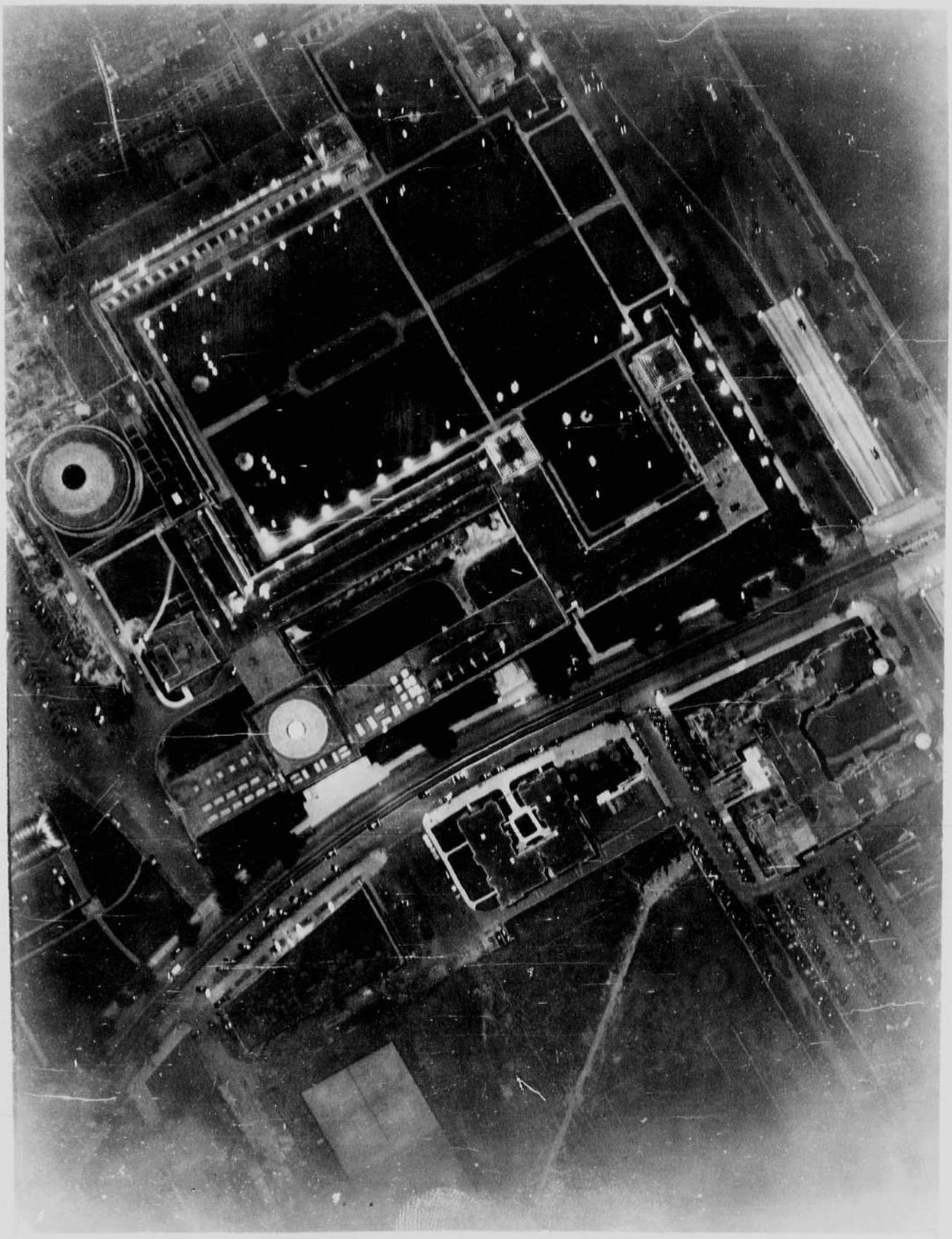


Delay measured at Aberdeen by Norman
24.5 25.25 24.6 17.75 4×5 ~~Kodamatic~~.

34 - 34 34 33.5 Mili camera 9" lens.

1600 f.p.s. × .034 = 54.4 ft.

f 3.5 Kodatron film.



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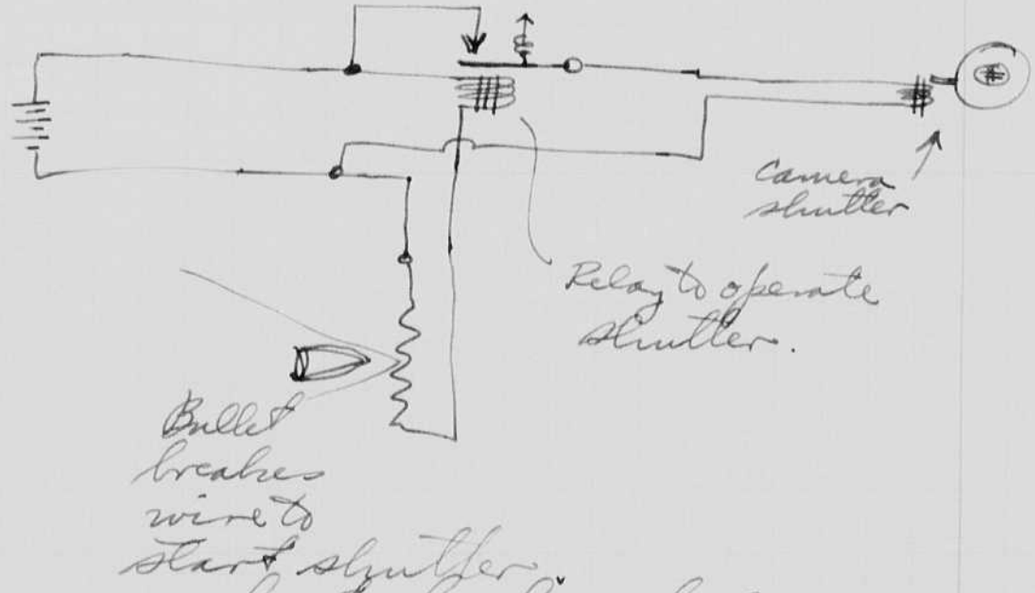
The flare causes trouble when the tip strikes ~~the~~ plate.

Wired up a relay system so that a short time exposure could be used.



Delay measured at Aberdeen by Norman
24.5 25.25 24.6 17.75 4x5 ~~Kollamatic~~.

34 - 34 34 33.5 mili camera 9" lens.

1600 f.p.s. x .034 = 54.4 ft.

May 27, 1941.
Harold E Edgerton

Left on 10 am plane for Phil on May 21 to attend Franklin Institute Medal Day program. Received Potts medal.

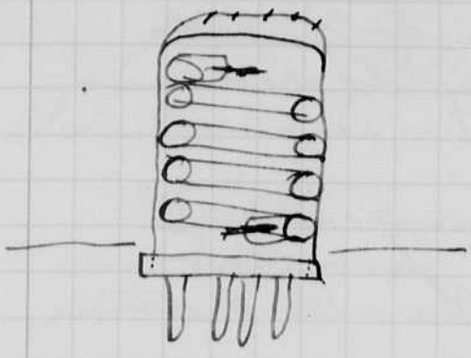
Took 10:02 train that night for Columbus Ohio. Prof Alex Smith met me at the train and took me to the school and entertained me in his home.

Had lunch with Bibber, Kimberly, Evans, ——?. at faculty club. Saw Events in the afternoon.

The dinner agenda x i at night was in the fac. club. Then the lecture was given at 8 in the Chemistry Hall on the campus. A crowd of about 300 were there.

I took the train for Indianapolis at 6:17 am. Ken Mumbulow Electrigic co where I saw Jarred Brown and Max ——. Jar Harry came in later with Major Ellerman of Wright field. Discussed at length the signal problem with flash lamps.

Electrigic will build a sample unit. I will furnish tubes, made by General Electric Nela Park. I called Johnson on the phone and met him at the airport to discuss the tube. It will be in the large 5 prong (power) base, the same as used in the Kodatron lamp. The spiral will be compressed as far as possible and the bulb as short as possible. See sketch on the next page.



Two of these lamps will be used on each plane, one on the top and another on the bottom.

Major Tillman experimented with the Kodatron unit and could see it 3½ miles. He wants the same amount of light from each lamp which means 112 mf at 2000 volts. The changing time is desired 1½ seconds. This is faster than the Kodatron unit.

It was suggested that 56 mf would be enough for the first unit for trial.

The lamps will be arranged to stick out of the wing or body, with the sockets flush or slightly recessed.

The power supply is 115 volts 400 cycles from a rotary converter.

A relay method will probably be used to flash the two lamps in sequence so that only one condenser will be needed.

In Indianapolis I saw Mr. Ingram and Mr. Mallory concerning condensers.

June 4, 1941.
Harold E Edgerton

Mr. Enfield from E.E. Neka Park was here today to discuss tubes etc.

He showed us curves of light vs pressure for two types of lamps; 1 the Kodatron and 2 the portable.

At 3.5 cm. the relative values were

Kodatron.	60	Xe - Kr	112 mf.
	40	Kr - Xe	
Portable.	5.6	Xe -	28 mf.
	3.4	Kr. -	

Also some spectral data for the Xe lamps. Reading from the curves.

	Kr.	Xe.
Blue	3.5	4.5
Red.	2	2.75.
Ratio	1.75	1.65

The Green portion of the Xe lamps appears higher in ratio to the Kr lamps.

June 5, 1941

Received first Xe tubes today from Johnson. Set up C.R. tube as used before and made a series of tests.

The three short Kodalon cords were sent air express to Lafayette at Indianapolis. about noon but the weather was bad.

Several calibrated oscillograms were taken of the new tube. These will eventually be pasted in this book for record purposes.

I tried a short argon tube to see if a short flash could be obtained. With the cords and cables of the Kodalon it was possible to use a short tube without breakage. In practice, however, we used this short tube at the condenser and it would explode with 112 mf.

1	Osc.	112 mf. Kod Xe 1½ inch argon and microsecond.	1/3 mf sweep.
2	"	112 mf. Kod Xe 1½ inch argon and 10,000 ~.	1/3 mf sweep.
3	"	112 mf. Small V Kod 1½ inch 10^4 cy. ms.	0.09 mf sweep.
4	"	112 mf. Sparks. Xe 10^4 cycles.	" "
5	"	~~112 mf~~. Microsec 200,000 cycles.	.025 sweep.
6	"		

June 6 1941
Harold E Edgerton.

Worked most of day with Dr. Andrews on spectroscope tests of flash lamps. especially new Xe lamps.

Evening - put in Infra red film. No exposure with 20 flashes ?!!
112 mf Kodatron Xe lamp.

Set up camera 88 filter
Infra red film, 180 mf. 1800 v Xe lamp
5 or 6 ft from dustment board.
f 4.5 lens. over exposed.

f 16. okay white. thin others

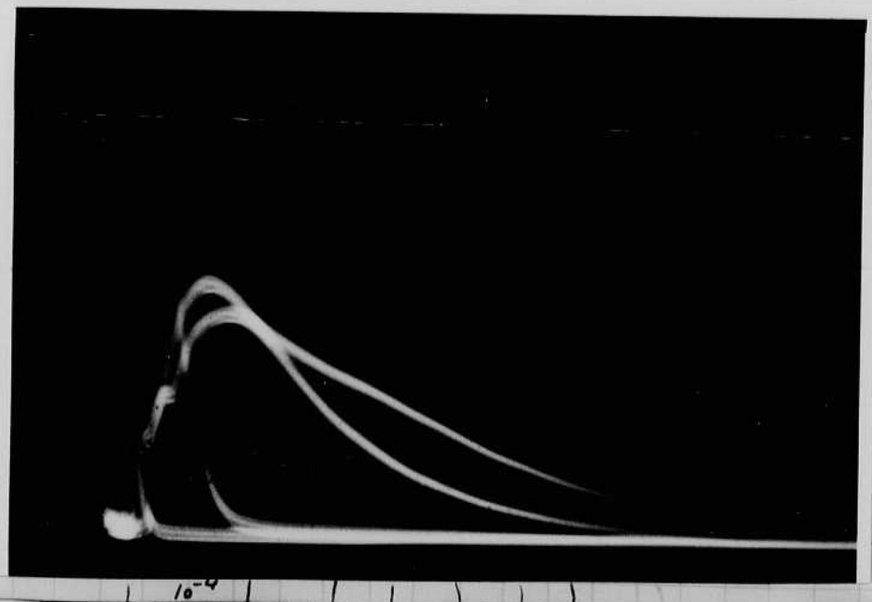
Then took close up of water at f 8
and hands pouring from bottle.

Exposure o.k.

Grating constant

$\frac{1102 \text{ ang}}{7.0 \text{ cm}} = 157 \text{ ang per cm}$

or .636 cm per 100 ang.



June 9 1941

Harold E Edgerton

Parallel Operation of
flash lamps.

With low impedance (or resistance) flash tubes or sparks, parallel operation is not possible since the volt ampere characteristics are negative.

However parallel operation is possible with the high-efficiency high pressure lamps that we have developed for high-speed photography. The volt-ampere characteristics are positive for these lamps during most of the time during discharge.

The resistance of the lamps and the leads determine how the lamps will divide the energy from the condenser. An approximate method of calculation can be based upon the resistance. The energy absorbed by each tube will be inversely proportional to its resistance.

Grier and I tried this experiment about a month ago with a large and a small lamp. See page 58. Measurements were taken but not recorded showing the way in which the light was divided. Barstow assisted with this experiment using the photocell and galvanometer arrangement that he developed for the measurement of light from lamps with large capacity for the air corps.

June 6 1941
Harold E Edgerton.

Worked most of day with Dr. Andrews on spectroscope tests of flash lamps. especially mercury lamps.

Evening - put in infra red film. No exposure - with 20 flashes of 112 mf Kodatron Xe lamp.

Set up camera 88 filter
Infra red film, 150 mf. 1800 v Xe lamp
5 or 6 ft from illuminated board.
f 4.5 lens. over exposed.

f 16 okay white. thin others ok

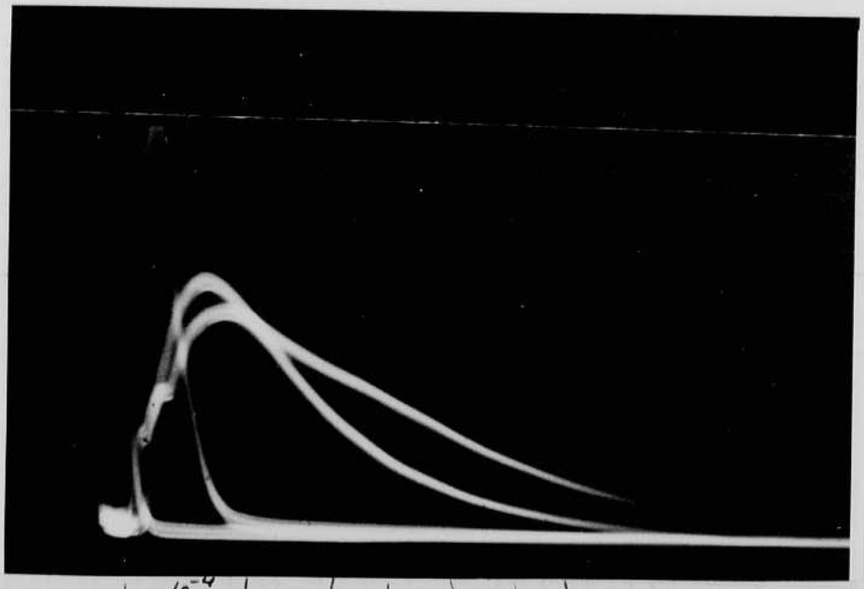
Then took close ups of water at f 8 and hand pouring from bottle.

Exposure ok.

Grating constant

$$\frac{1102 \text{ ang}}{7.0 \text{ cm}} \quad 157 \text{ ang per cm}$$

or .636 cm per 100 ang.



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Brier and I tried this experiment about a month ago with a large and a small lamp. See page 58. Measurements were taken but not recorded showing the way in which the light was divided. Barstow assisted with this experiment using the photocell and galvanometer arrangement that he developed for the measurement of light from lamps with large capacity for the air corps.

June 11, 1941
Harold E Edgerton

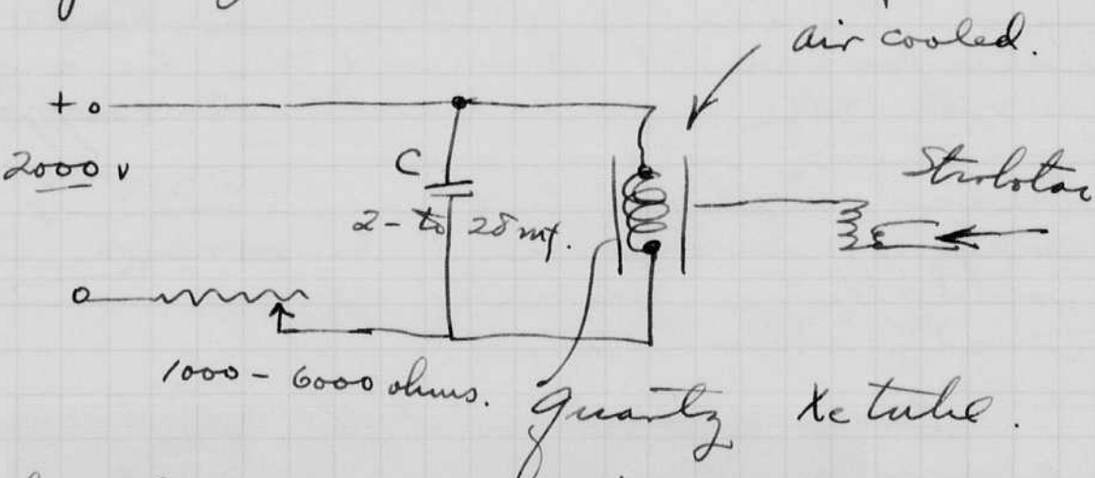
I made tests last night with the new Xe lamp sent recently by Johnson. A photograph was taken of a color and gray scale chart that was furnished by C Tuttle some time ago.

2 1/4 x 3 1/4 at f 8. Densitometer Kodatron film 7 min D19.

	← Gray scale. ——→						B	G	R	BG	M	Y
X_e	1.32	1.18	1.10	.96	.85	.79	.88	1.0	.93	.92	1.04	1.16
Kr.	1.16	1.09	.98	.89	.74	.69	.83	.9	.84	.85	.96	1.03
Δ	.16	.09	.12	.09	.11	.10	.05	.1	.09	.07	.08	.13

I also connected up the quartz lamp as follows.

See drawing in Y.E. file.



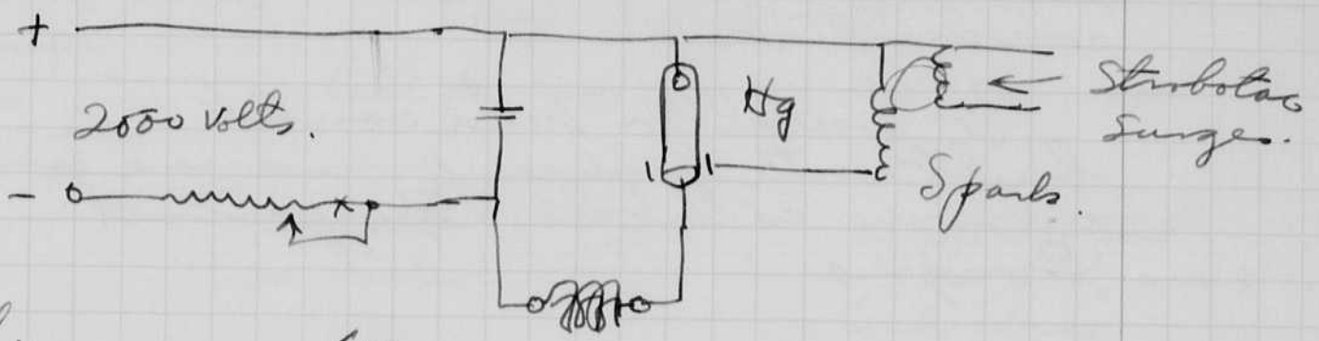
The electrodes were tungsten about the dimensions shown. After a short operation at 5 or 10 cycles the cathode and anode became red hot. Then the lamp held over into a continuous glow. This happened with 7000 ohms at 28 mf.

Evening June 11, 1941

~~H. E. Edgerton~~ talk at 8 pm to traffic group Prof. Bone.

More exp. with quartz lamp.

a Hg pool tube was connected in series for control



M.G. Set.

100 / 70 / 6 / 560.

35 / 6 / 210 per min

600 / 43 / 60 / 278.0 / 600

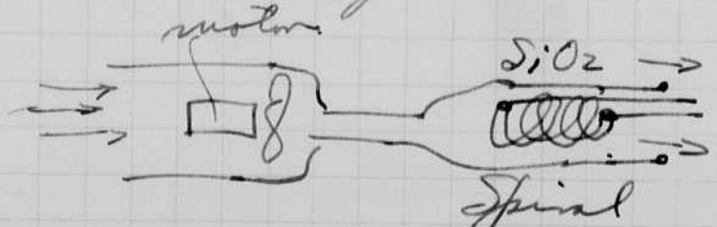
28 mf 950 ohms. 10 cycles.
tube becomes too hot in about 10 or 20 seconds. The cathode becomes red hot and the tube holds over part of the time.

25 mf 950 ohms. 5 cycles. 40 sec - hot cathode.

10 mf 950 ohms. 5 cycles. ok continuously

10 mf 950 ohms. 10 cycles cathode operates at red heat but does not hold over. Operation is satisfactory in continuous operation. Steady state or temperature is reached in about 1 minute.

Cooling of the above is accomplished by a draft of air from a Premier air vac. operated at reduced speed.

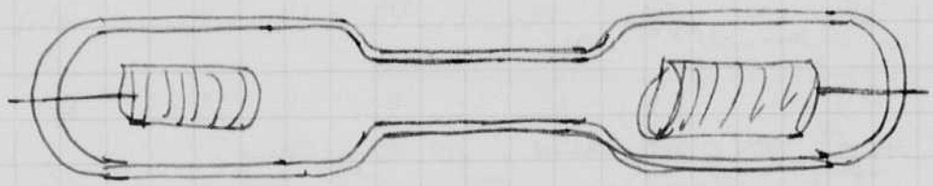


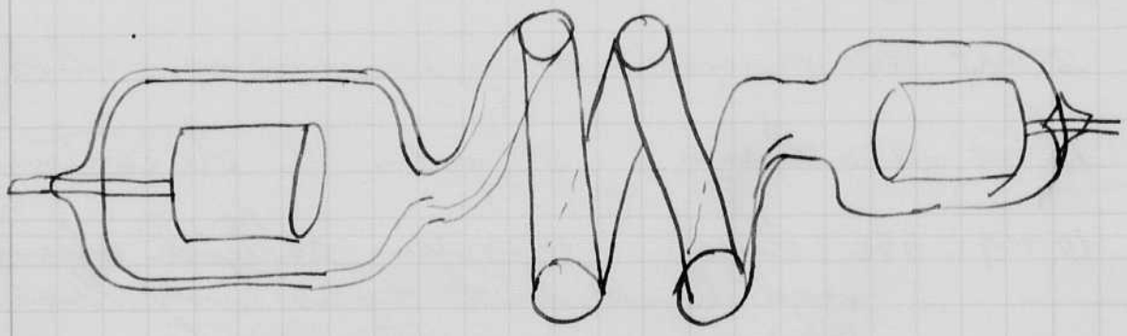
$CE^2 = 10 \times 4 \times 10^6 \times 10^6$
$= 40$ joules per pulse
$10 \times 40 = 400$ watts.
approx. calc.

Cont.

Operation with out cooling by air is ok also for 10 mt 950 ohms at 10 cycles. The limitation seems to be at the cathode and this is limited by radiation not conduction.

A smaller tube could be built with higher pressure and a larger cathode. Suggested designs.





Graduation June 10.

J.W. Dillon from Eastman here June 11 to discuss and experiment with Synchronizer.

Student's Name Gilman B. Andrews Date 6/7/41 40

Subject Harold E. Edgerton Instructor's Name

New grating obtained and set up.
Focus + alignment viewed with mercury lamp. All de[illegible] -pressed DK-50 70°

Exposure #		
1	10 sec — 20 flashes	c close to slit, 112 μfd, 2000 V [illegible] ground glass
2	1 sec — 20 flashes	re close to slit) 112 μfd 2000 V [illegible] ground glass
3	1 sec — 20 flashes	are close to slit 112 μfd 2000 V [illegible] ground glass
4	1 sec — 60 sec —	: are close to slit + ground glass, 3000°K
5	40 flashes	112 μfd 2000 V
6	" "	" " "

DK for exposure with K/T-xej Mg too dense

6629
6469
6309
6149
5989
5829
5669
5509
5461
5349
5189
5029
4869
4709
4549
4389
4229
4069
3909
3749

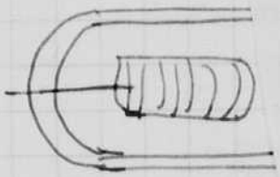
Posted in June 12 1941

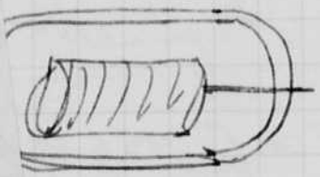
Cont.

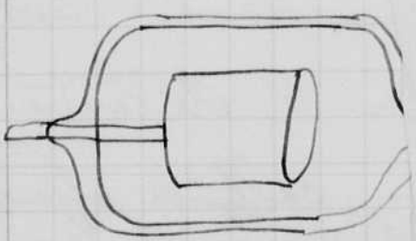
Operation with out cooling by air is ok also for 10 mt 950 ohms at 10 cycles. The limitation seems to be at the cathode and this is limited by radiation not conduction.

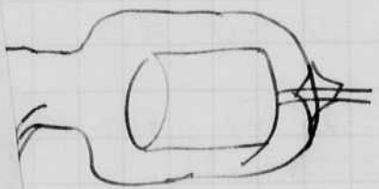
Can be built in a larger designs.

could be pressure and Suggested









Graduation

J.W. Dillon

June 11 to

Experimen

anywhere

al

Equations.

Student's Name Gilman B. Andrews Date 6/7/41 40

Subject Harold E. Edgerton Instructor's Name

[redacted]

New grating obtained + set up.
Focus + alignment checked and viewed with mercury arc high-pressure lamp.

All dev 10 min DK-50 70°

Exposure #	
1	10 sec — Hg pressure arc close to slit 20 flashes — Kr-Xe lamp, 112 μfd, 2000 V + ground glass
2	1 sec — Hg pressure arc close to slit 20 flashes — Kr-Xe lamp 112 μfd 2000 V + ground glass
3	1 sec — Hg pressure arc close to slit 20 flashes — Xe lamp 112 μfd 2000 V + ground glass
4	1 sec — Hg pressure arc close to slit 60 sec — #2 photoflood + ground glass, close to slit, 3300°K
5	40 flashes — Xe lamp 112 μfd 2000 V
6	" " — Kr-Xe " " " "

DK for exposure # Kr-Xe; Hg too dense

[redacted]

Printed in June 12 1941

Student's Name Gil Anderson H. E. Edgerton

Date June 6, 1941

Subject

Instructor's Name 3300 #2 PHOTO FLOOD. FOG .17

Fog 0.17 #2 – Kr – Xe 2000 V

	λ	Step no	Δ	E density	Δ	Xe-Kr	Fog .17	E		
.24	400	7.6	4	16.7	0.2	8.2	.18	2.6	10.8	9.6	.20
	410	7.			.19						
.315	420	7.6	4	12.7	.2	8.6	.20	2.0	6.4	9.6	.2
	430	7.			.2						
.400	440	7.6	3	7.5	.2	8.2	.18	2.0	5.0	9.2	.18
	450	7.									
.495	460	6.7	6.0	6.5	13.2	.22	7.8	0.22	2.6	5.25	9.4	.19
.594	480	6.6	8.0	13.5	.2	7.4	.19	4.6	7.75	9.6	.20
.694	500	5.2	16.0	23.0	.18	7.2	.18	4.0	5.77	9.2	.18
	510										
.80	520	5.2	18.5	23.2	.18	6.6	.2	7.0	8.75	9.4	.19
	530										
.9	540	5.2	32.0	35.6	.18	6.8	.21	10.6	11.8	10.2	.18
	550										
1.0	560	5.6	28.0	28.0	.2	7.4	.19	8.0	8.0	10.4	.19
	570										
1.1	580	6.2	16.0	14.5	.18	7.4	.19	7.0	6.4	10.2	.18
	590										
1.19	600	5.6	28.0	23.5	.2	7.2	.18	8.0	6.7	10.4	.19
	610										
1.29	620	5.4	28.0	22.0	.19	6.4	.19	14.0	11.0	10.2	.18
	630										
1.36	640	5.4	28.0	20.6	.19	6.4	.19	14.0	10.3	10.2	.18
	650										
1.43	660	no exposure.				3.2	.18	4.2	2.97	4	.19
	670										
1.49	680					No exp.					
	690										
1.55	700										

1 min Tungsten 3300

2 1.6

.17	.0
.18	.2
.19	.4
.20	.6
.21	.8
.22	.10

Notebook # 11

Filming and Separation Record

1 unmounted photograph(s)

____ negative strip(s)

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

was/were filmed where originally located between page 86 and 87.

Item(s) now housed in accompanying folder.

Student's Name Gil Cabrera / H. E. Edgerton

Date June 5, 1941

Subject

Instructor's Name

3300 #2 Photo Flood.

Fog 0.17

Fog 0.17 #2 – Kr – Xe 2000 V

	λ	Step no	Δ	Density		Xe-Kr	Δ	Fog .17	E		
.24	400	7.6	4	16.7	0.2	8.2	.18	2.6	10.8	9.6	.20
	410	7.			.19						
.315	420	7.6	4	12.7	.2	8.6	.20	2.0	6.4	9.6	.2
	430	7.			.2						
.400	440	7.6	3	7.5	.2	8.2	.18	2.0	5.0	9.2	.18
	450	7.									
.495	460	6.7	6.5	13.2	.22	7.8	.22	2.6	5.25	9.4	.19
.594	480	6.6	8.0	13.5	.2	7.4	.19	4.6	7.75	9.6	.20
.694	500	5.2	16.0	23.0	.18	7.2	.18	4.0	5.77	9.2	.18
	510										
.80	520	5.2	18.5	23.2	.18	6.6	.2	7.0	8.75	9.4	.19
	530										
.9	540	5.2	32.0	35.6	.18	6.8	.21	10.6	11.8	10.2	.18
	550										
1.0	560	5.6	28.0	28.0	.2	7.4	.19	8.0	8.0	10.4	.19
	570										
1.1	580	6.2	16.0	14.5	.18	7.4	.19	7.0	6.4	10.2	.18
	590										
1.19	600	5.6	28.0	23.5	.2	7.2	.18	8.0	6.7	10.4	.19
	610										
1.27	620	5.4	28.0	22.0	.19	6.4	.19	14.0	11.0	10.2	.18
	630										
1.36	640	5.4	28.0	20.6	.19	6.4	.19	14.0	10.3	10.2	.18
	650										
1.43	660	no exposure.				3.2	.18	4.2	2.97	4	.19
	670										
1.49	680					No exp.					
	690										
1.55	700										

1/min Tungsten 3300

2 1.6

.17	.0
.18	.2
.19	.4
.20	.6
.21	.8
.22	.10

Notebook # 11

Filming and Separation Record

1 unmounted photograph(s)

____ negative strip(s)

____ unmounted page(s)
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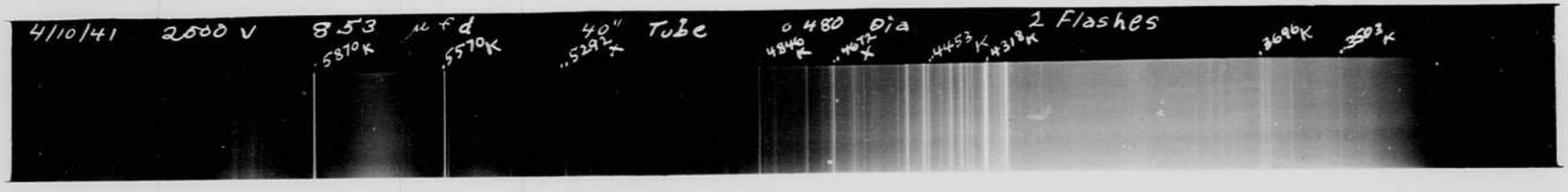
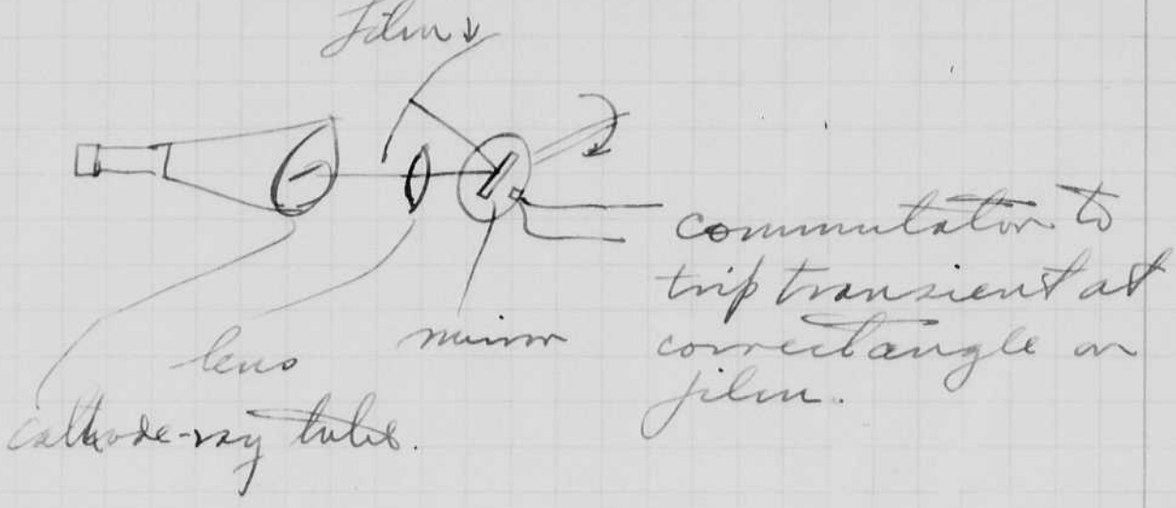
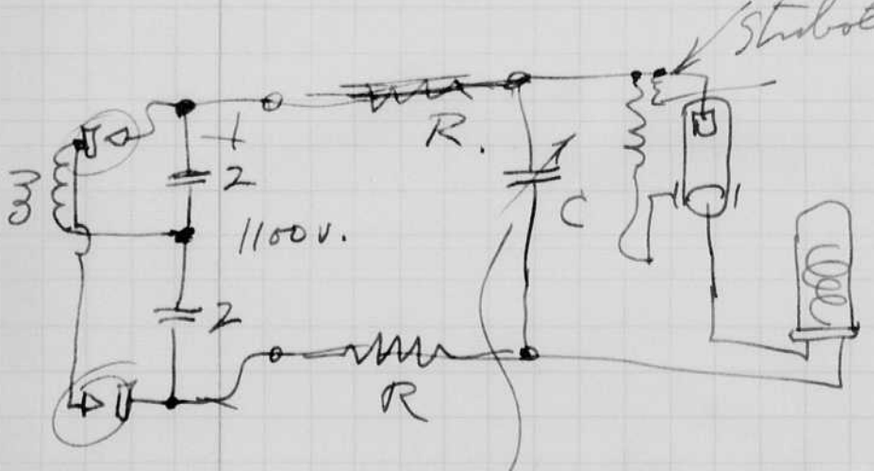

4/10/41 2000 V 8.53 μfd 40" Tube .480 Dia 2 Flashes
.5870K
.5570K
.5292K
.4840K
.4607K
.4453K
.4318K
.3696K
.3503K

Hg.
Tungsten 3300
Kr 35 mm.
Xe 70 mm

June 13, 1941.
Harold E. Edgerton

Cathode-ray Oscillograph Camera for recording.





June 14 1941
H.E. Edgerton -

Tests with Kodatron lamps on a stroboscope. Kr. 3.5 cm 20 inch spiral. in frosted bulb. Tube vertical.

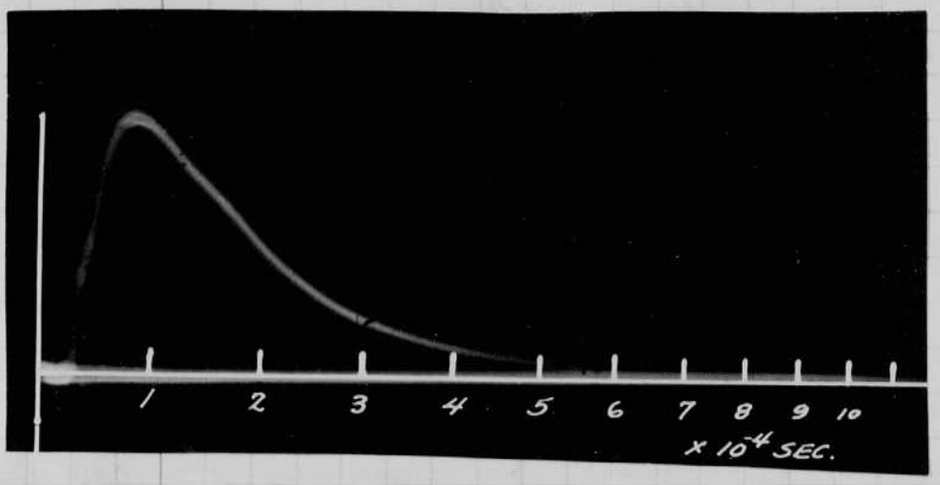
V	R. Total	C	
1100	900	10	30 cycles Started to flicker after 30 seconds. Too hot?
1100	900	4.	Runs ok continuously at 30 cycles. K = .036 sec.
1100	900	2.	Some misses.
1500	900	2.	Hold over. 60
1350	1400	2.	30 cyc. Bulb removed for cooling.
1350	1400	2.	30 cyc Bulb in - ok.
1350	1400	2.0	60 Bulb too hot. holder 20 sec
1300	1400	1.	60 cyc Bulb. ok.
1300	1400	0.5	60 cyc Bulb hold over.
1300	1400	0.5	Hg Control lamp - Operation ok. To top range 100 v +? (the strobotac is erratic.)

Changed Strobotacs

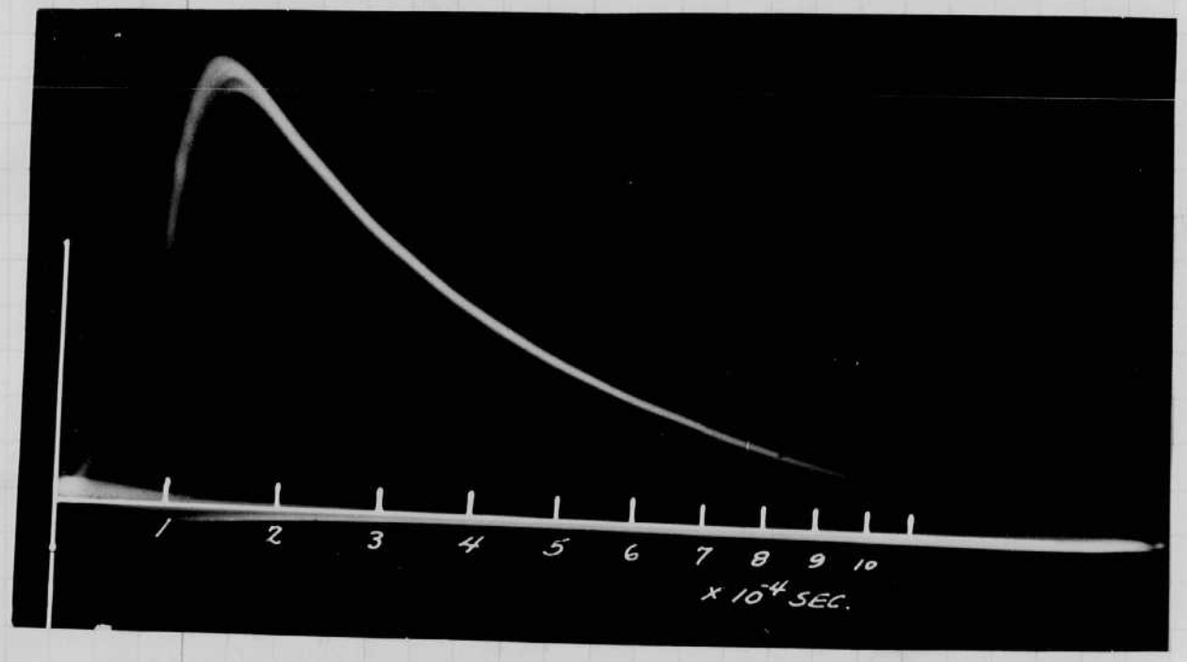
1100	1400	1.0	120 cycles Hg tube. ok.
"	"	0.5	120 + ok " "
"	"	2.0	120 ok. " Hot bulb runs ok.

1800 volts.
1/2 mf.

Kodalium performance

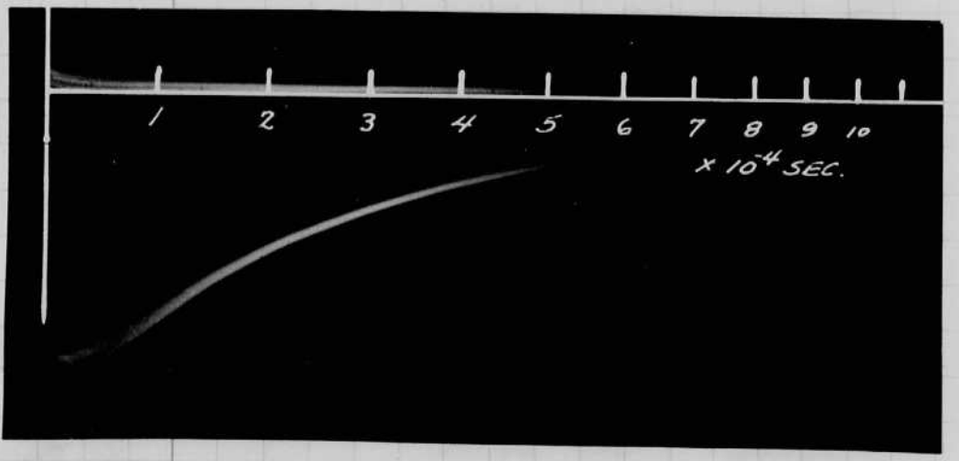


Light vs time.



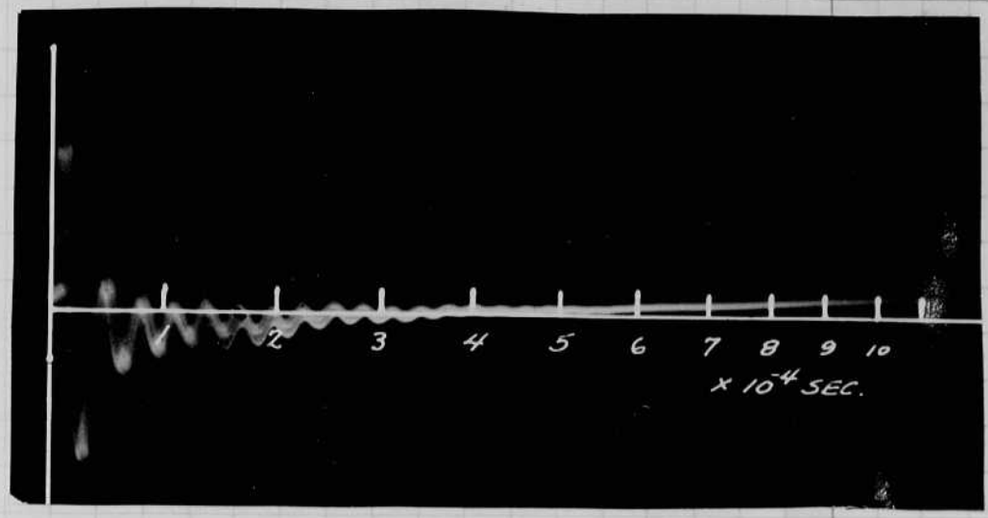
Current

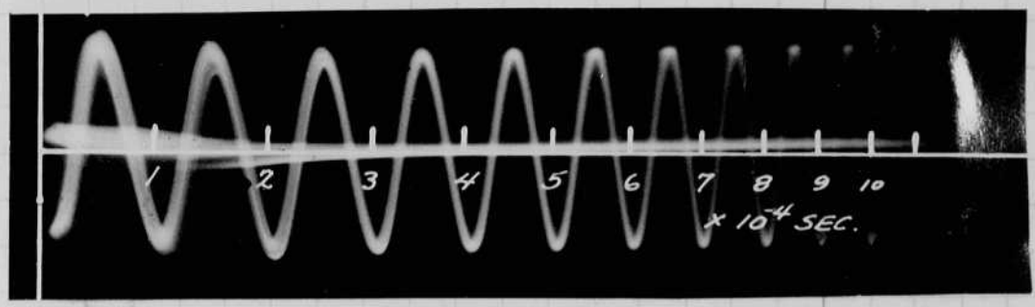
with coils
Some distortion



voltage at condenser.

Sparks voltage



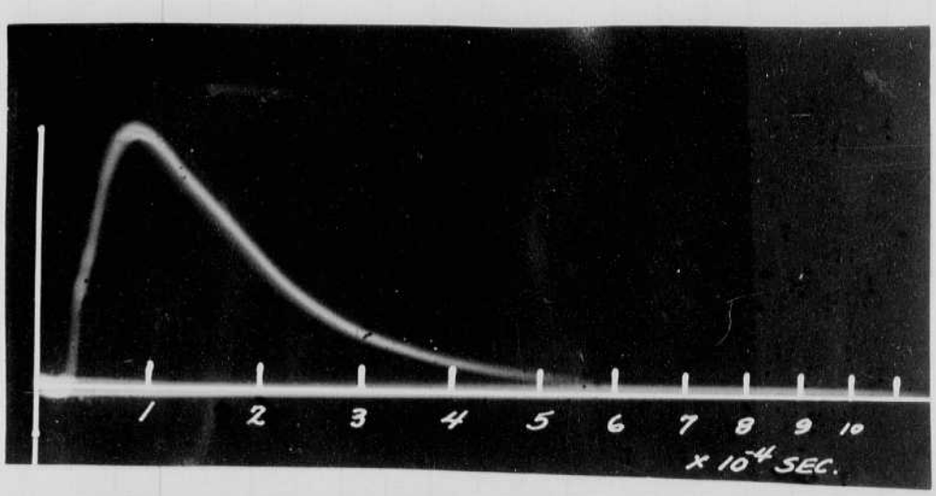


Sweep calibration.

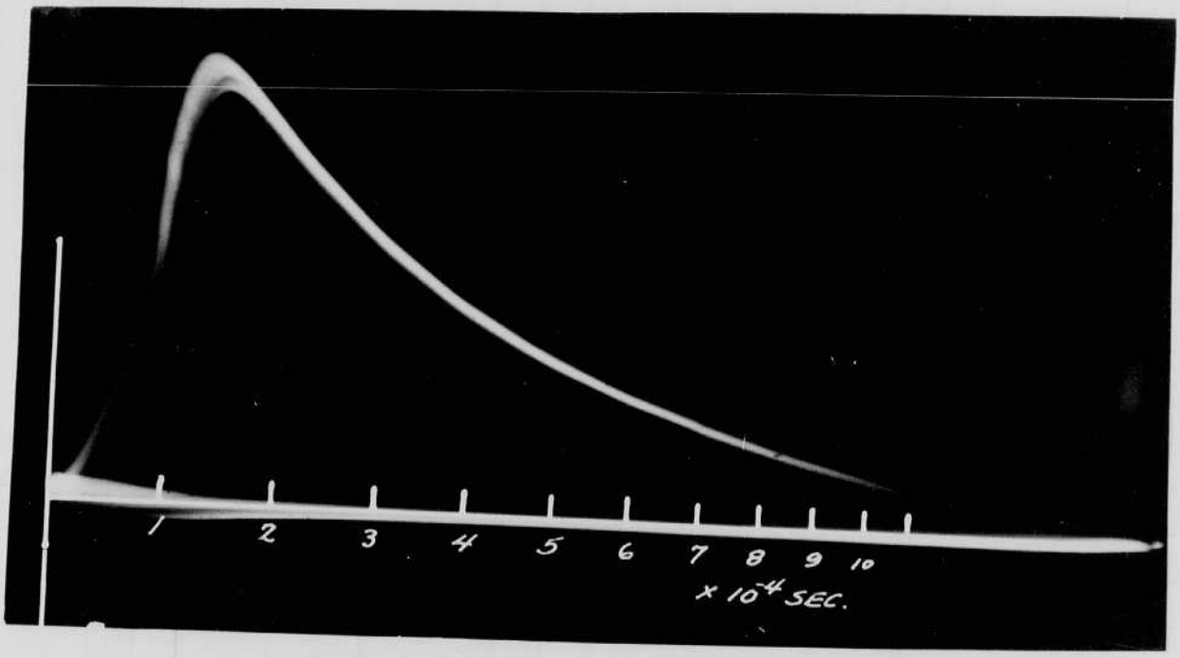
Major Geo. Goddard
Army air corps.

800 volts.
1/2 mf.

Kodatron performance

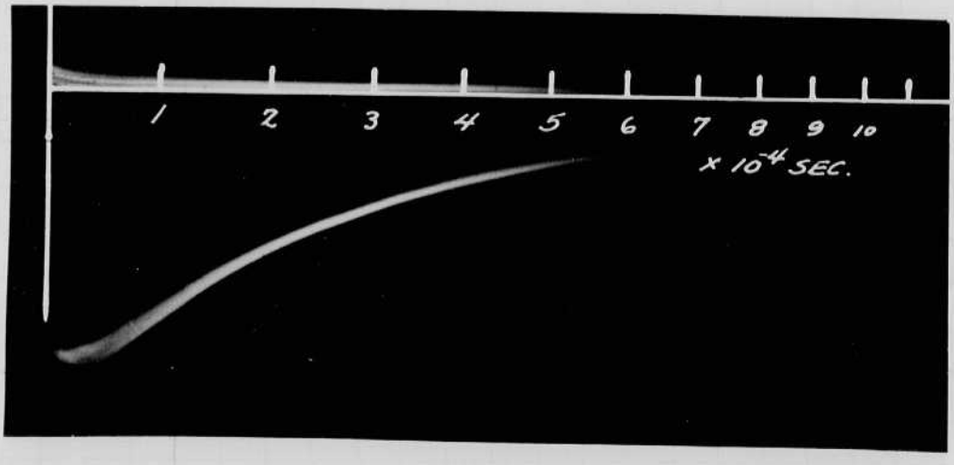


Light vs time.



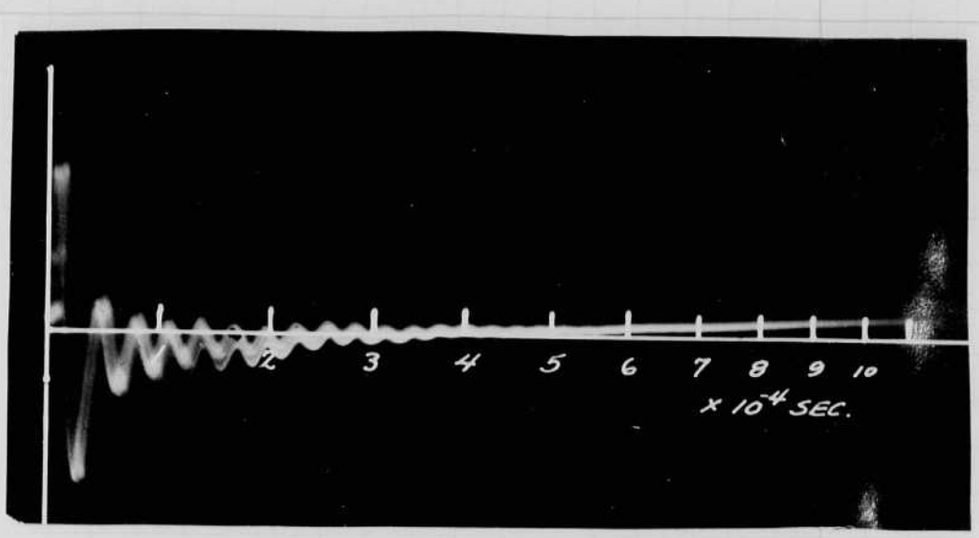
Current

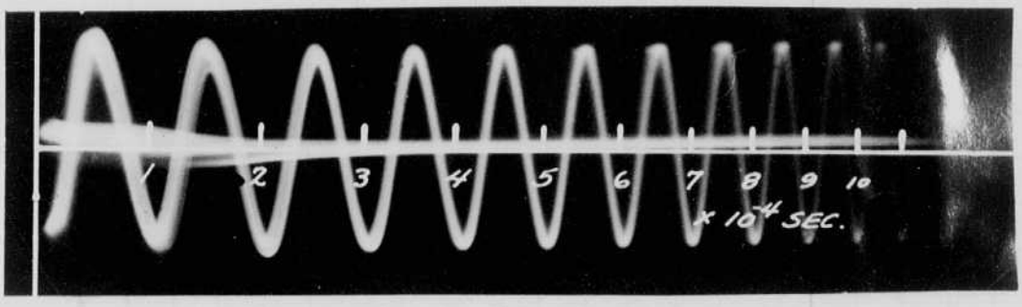
with coils
Some distortion



voltage at condenser.

Sparks voltage





Sweep calibration.

Major Gen. Doolittle
Fourth air corps.

July 4 1941

Harold E. Edgerton.

Just returned from a 10 day trip to Washington D.C. where I was on active duty with the navy at the Taylor Model Basin at Carderock, Md. I took the family in the car and we stayed with the Pogues in Chevy Chase and the Robinsons in Washington. Left about 3 pm Sat. June 21. Stopped for supper and visit with Hoopers in West Hartford Conn that night. Then continued to New Haven for the night. We reached Washington about 5 pm on the 22 nd.

I reported at Carderock in the morning to Lt Commander Roop. W. Also saw Dr. Windenburg, Lt. John Parkinson, Ensign Megger, Dr. Frankland, Dr. Bancroft, and others.

My duty was completed on July 2 and we left by auto for Boston about 4:30. Reached home at 9 pm on Thursday July 3.

July 11, 1941.

Boston is finishing up his data on lamps which was obtained during the week on the Wright field illuminator.

The results show that the resistance of long lamps approximates the normal equation for a conductor.

Example with Kr-Xe gas at 5 cm pressure. 112 watt 2000 volts. .335 bean inches inside 20" length. R = 1.5 ohms.

From equation $R = \rho \frac{l}{\text{area}}$

$$\rho = \frac{R \cdot \text{area}}{l} = 1.5 \frac{\left(\frac{.335}{2}\right)^2 \pi \, 2.54}{20} = .0168 \text{ ohms/cm cube.}$$

compare to copper

Cu. 1.72×10^{-6} ohms/cm cube.

Kr. gas. .0168 " "

$$\frac{\rho_{Kr.}}{\rho_{Cu}} = \frac{1.68 \times 10^{-2}}{1.72 \times 10^{-6}} \cong 10^4.$$

July 14 1941.

Edward E Edgerton.

Mr. Gerstang of Electrons Co. at Indianapolis called Sat on the phone concerning the aircraft flasher for the air corps. He has experienced some difficulty with breakage of the spirals when they are imbedded in plastic. Two more spirals are needed for the job.

He also mentioned the use of the lamp as a beacon for aircraft markers for night flying. I had also thought of this before and had even tried to make night tests before my last trip to Washington.

The lamp will need to flash at 5 second intervals for beacon work. 120 mf at 2000 volts is about the desired amount of energy.

July 15 1941

Harold E Edgerton.

Last night a Kodatron unit was put on the roof of M.I.T. just under the edge of the dome on the 8th floor, and arranged to flash at 30 second intervals.

At 2:30 a.m. I called the Blue Hill Observatory. They reported that the lamp could be seen flashing.

I contacted Mr Manning in the operations dept of the American Airlines office. and he in turn talked to the pilots coming from New York.

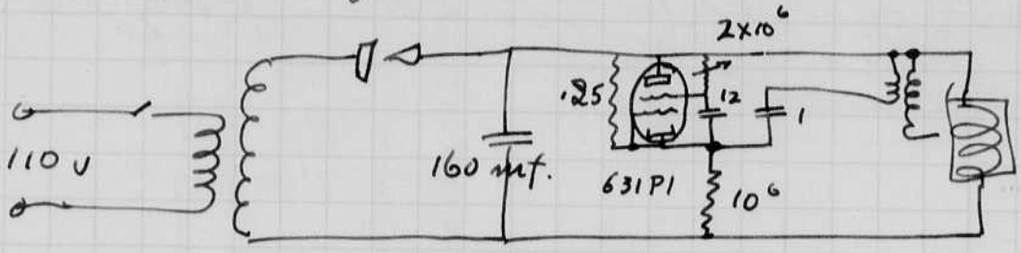
The pilot from Providence reported the lamp at Woonsocket which is about 32 miles air line.

Capacity 150 mfd 1500 volts. Lamp type 2.

Miss Joan Lee Colt of Radcliffe has been here the past few days working with mosquitos and the high speed camera.

July 16 1941
Harold Edgerton.

Connected circuit for beacon flasher last night as follows:



flashing rate 5 per second.
voltage 1800 volts.

lamp. Kodaflex Standard spiral without cover.

Chas Wyckoff and Fred Barstow helped wire this and took it to the roof at M.I.T. for trial. Fog came in over the airport and prevented us from getting reports from pilots.

July 18 1941

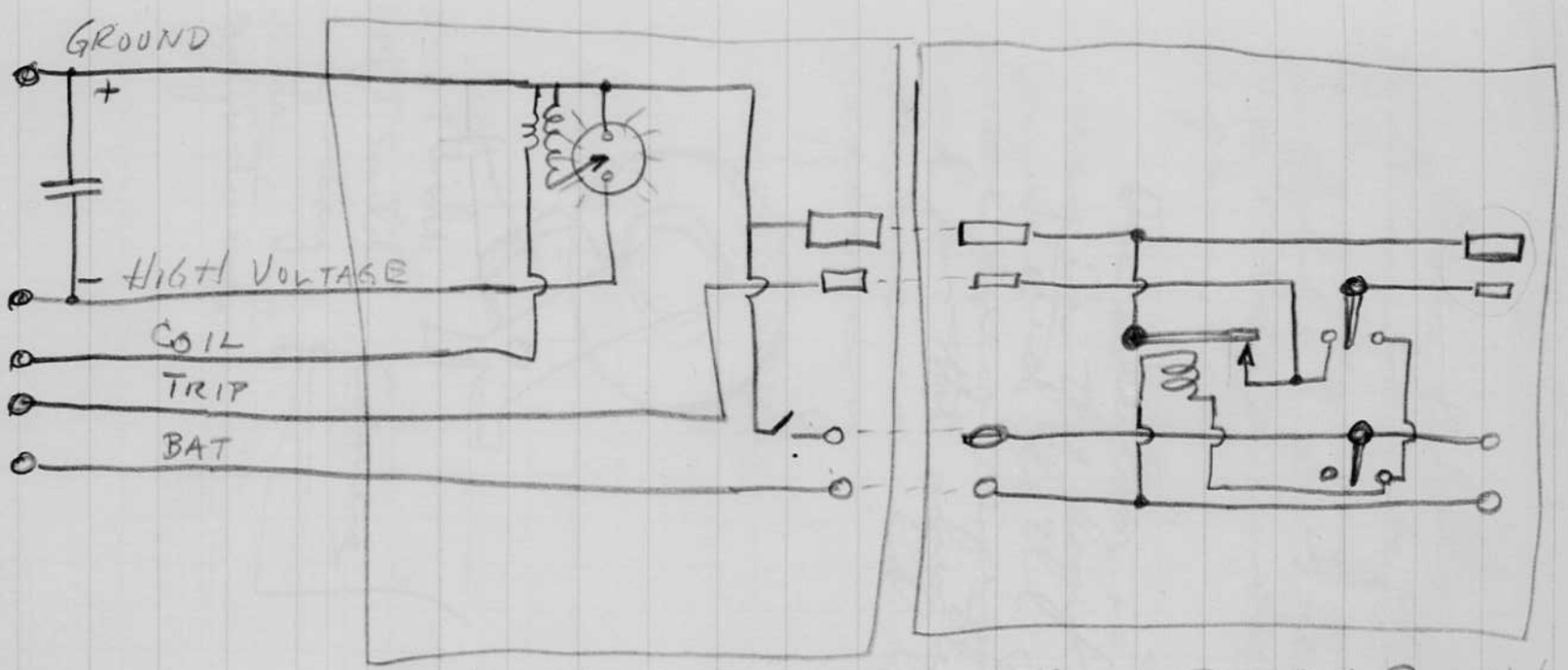
The above circuit was put on life test. The transformer heated with 160 mf so the capacity was reduced to .08. After 8000 flashes the cathode end of the lamp (tungsten seal) was covered with a white deposit.

Yesterday I gave Suits (U.S.C.G.) an Edgerton flasher lamp for trial in place of his experimental circuits.

L. Tousey was in today and we discussed Hg tubes for Arnies

cont.

for ultra-high frequency radiators. Dr Jane Hine 4-H Co tubes for breakdown experiments at 40,000 volts. He will report back on the standard type that we use on our movie apparatus.

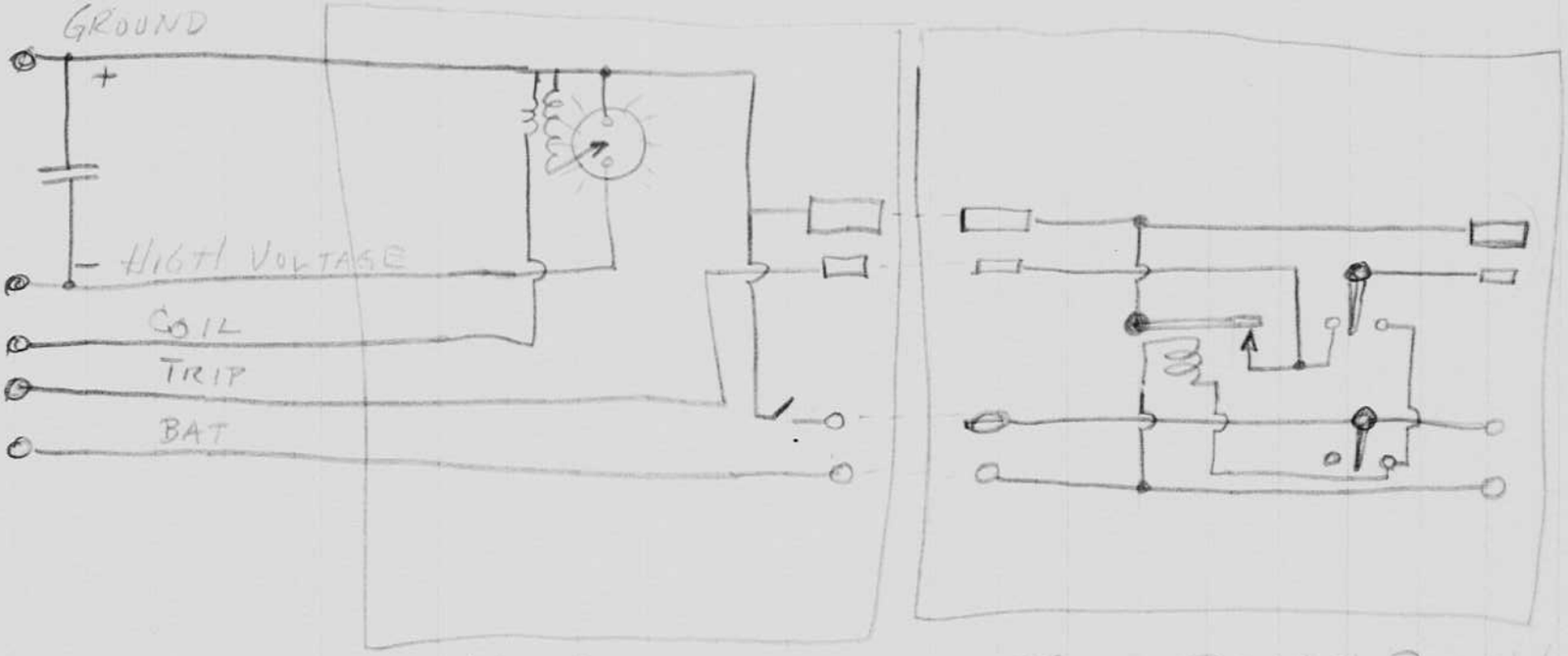


July 22 1941

7-23-41

cont.

for ultra-high frequency radiators. I gave him 4 to 5 tubes for breakdown experience at 40,000 volts. He will report back on the standard type that we use in our movie apparatus.



July 22 1941

7-23-41

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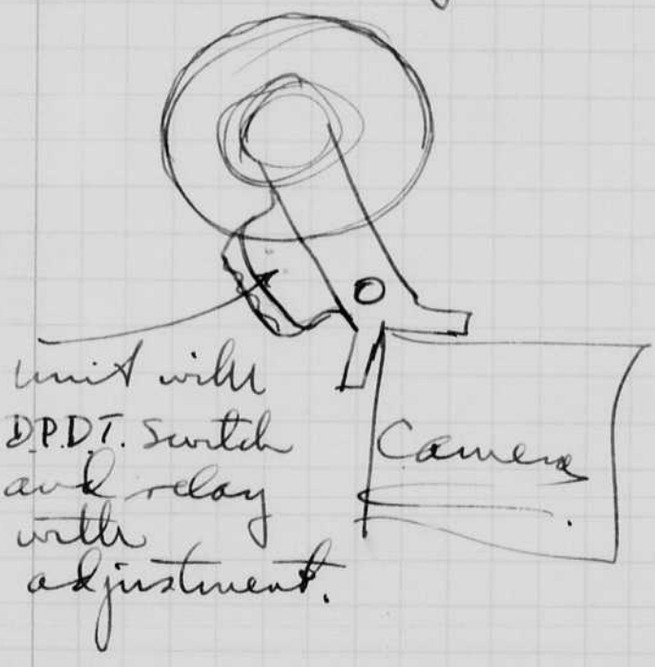
July 23 1941

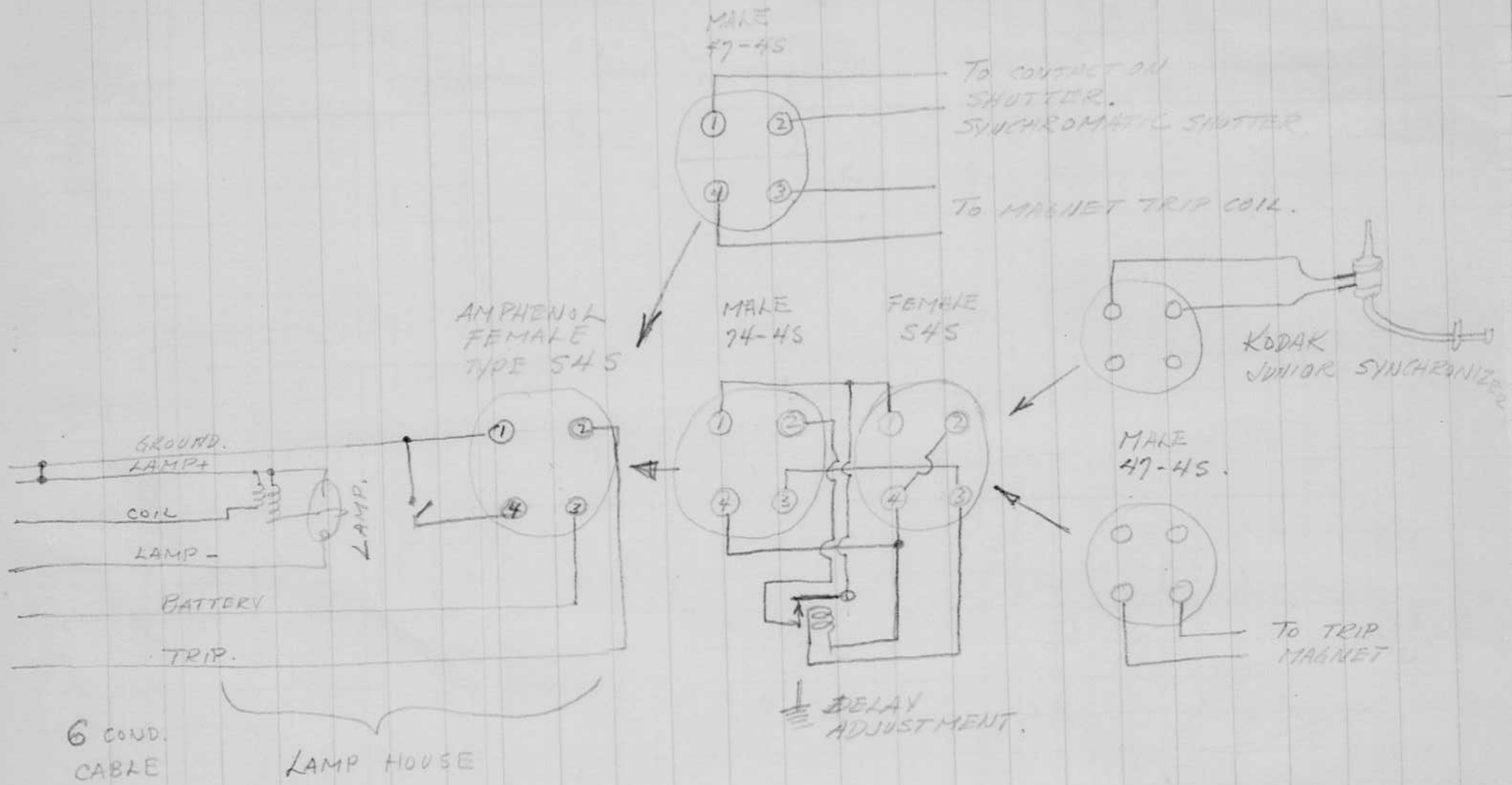
Harold E Edgerton

Received letter from Jarow, Eastman Kodak saying that time delay relay was necessary for the portable. Herb Grier and I spent yesterday discussing the problem again.

One solution is to put the time-delay relay in the lamp house. It can be connected to the four outlets that have been designed for synchronizer and for the shutter magnet. The device could be then an accessory.

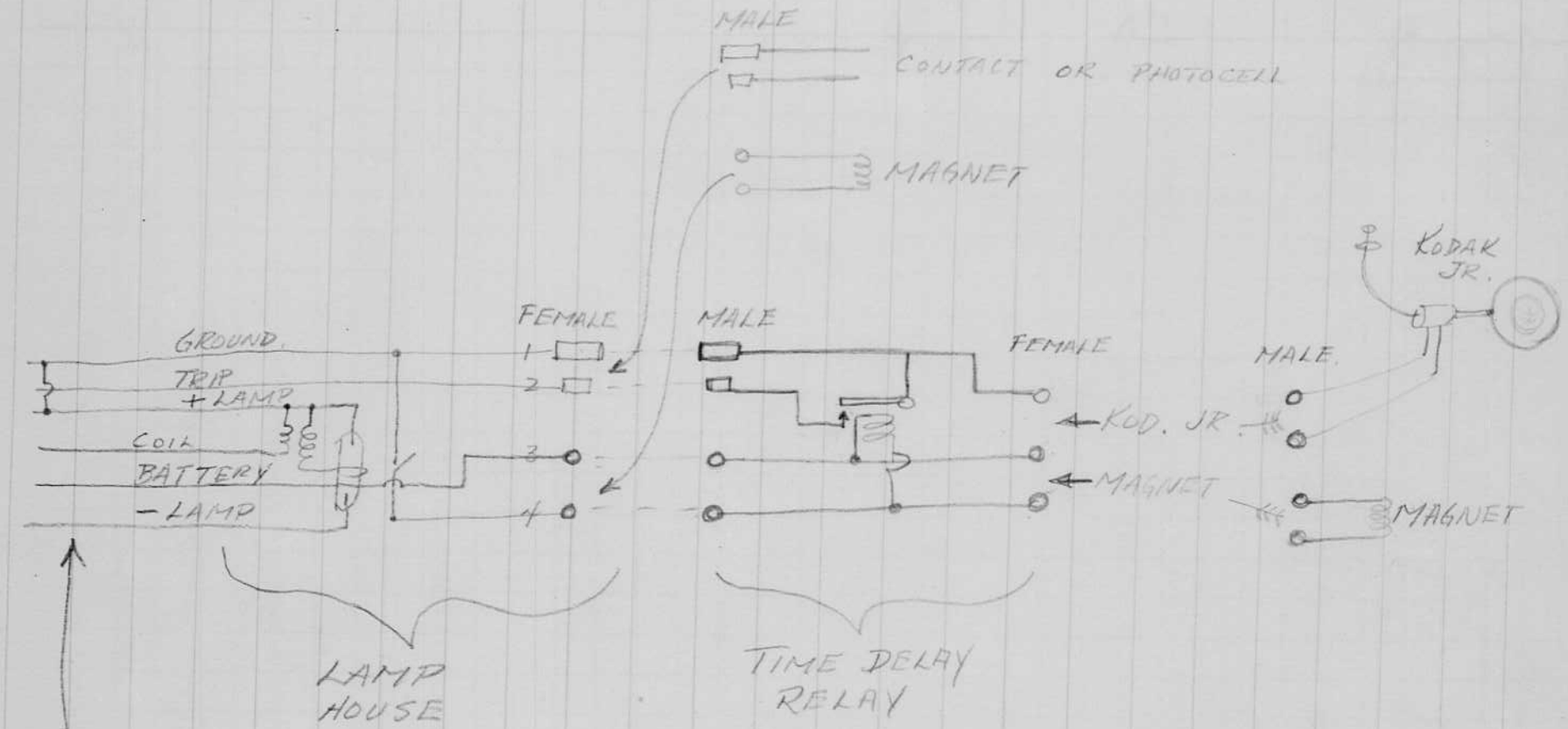


A circuit for the above connection was made yesterday and is pasted to this sheet.

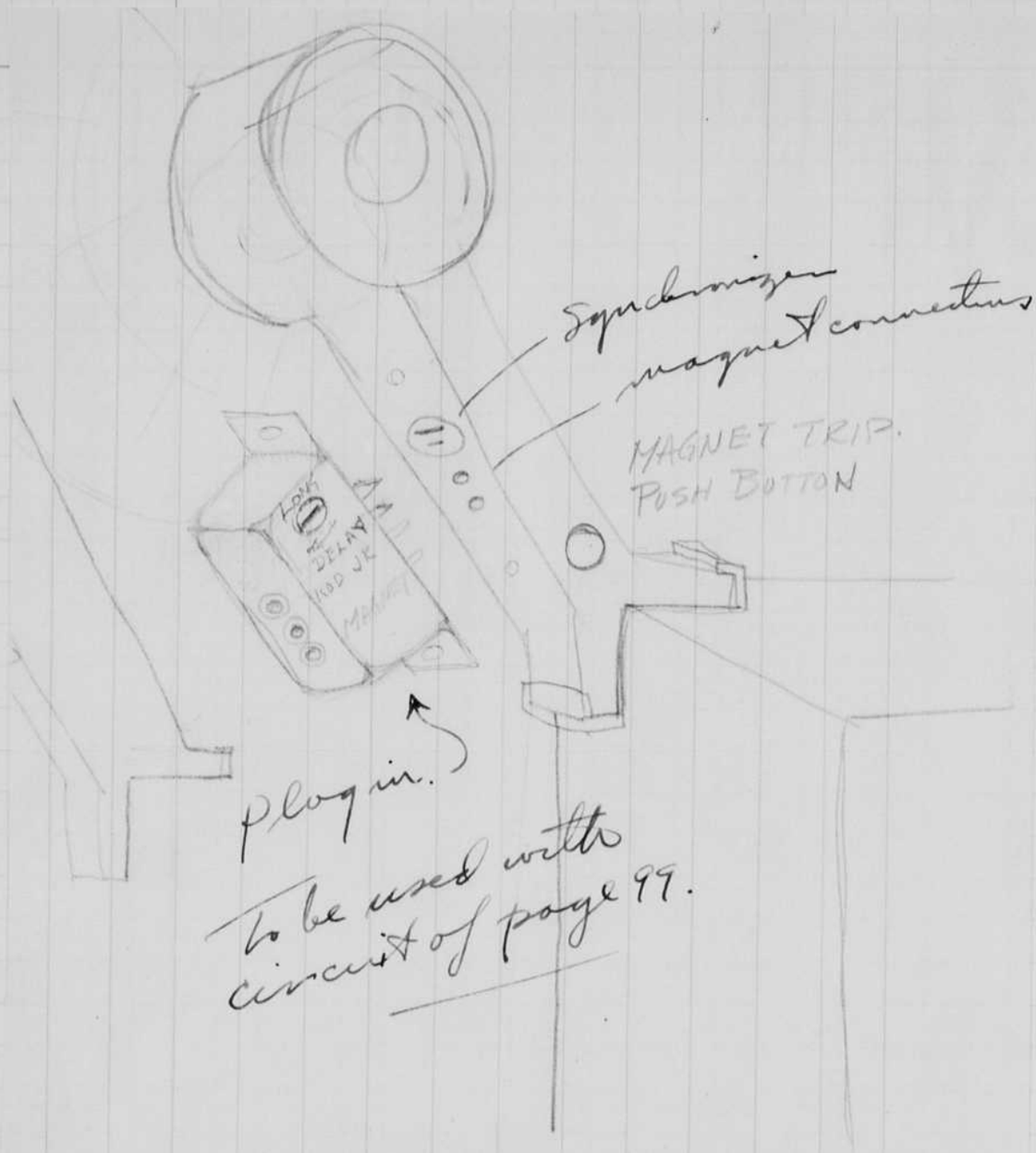


July 23 1941

Harold E Edgerton



July 23, 1941
Harold E. Edgerton



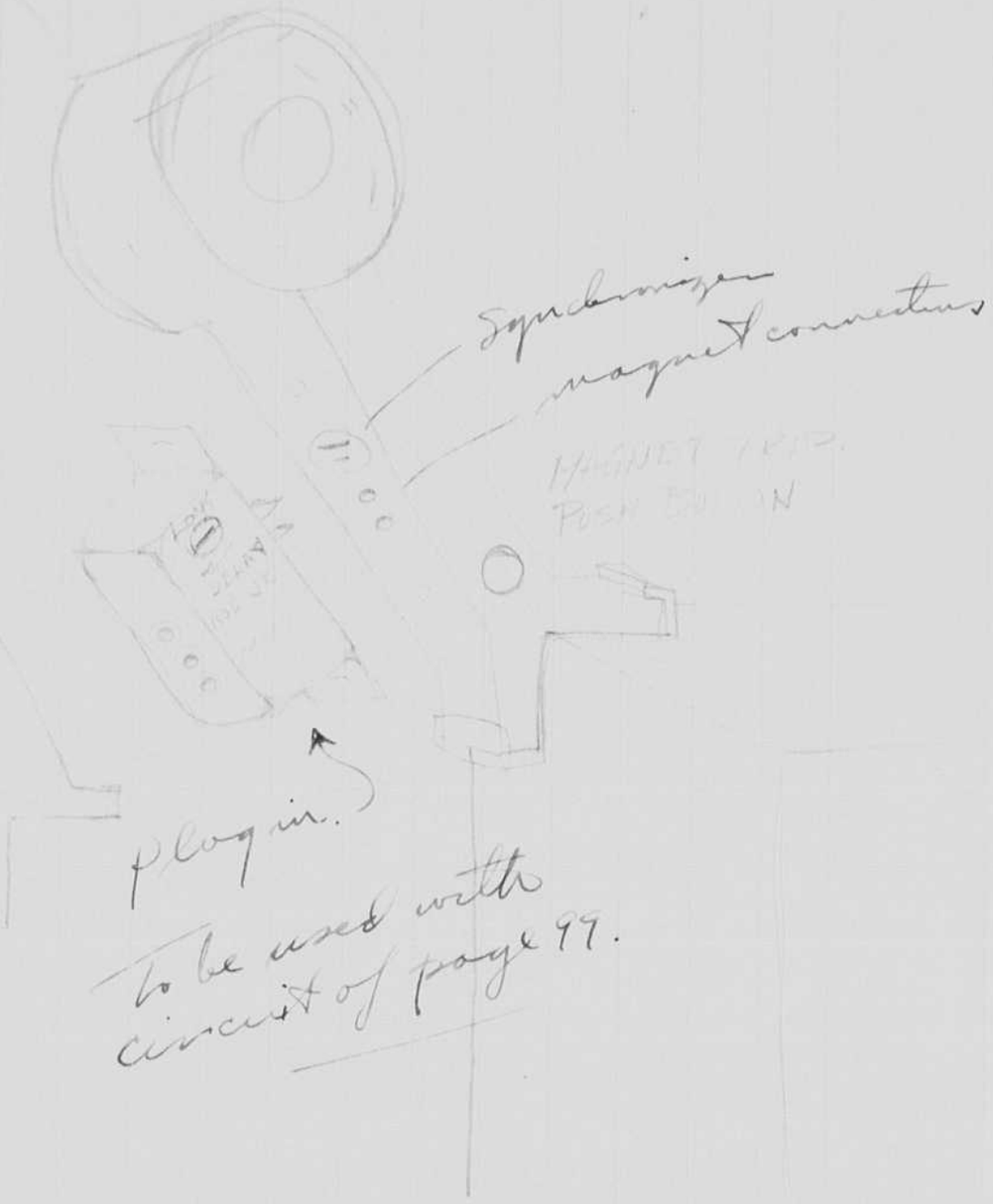
To be used with circuit of page 99.

July 28, 1941.
Harold Edgerton.

The drawings on p 98-100 inc were pasted in today after a conference with Germeshausen and Grier. The sketches and notes were made July 23. Grier suggested the elimination of the switch by the use of a plug in delay relay. We go now building a lucite shroud roof of plastic.

Joan Enfield

a print from a Kodachrome negative.
made by Chas Wycoff.
Photo of Jostman



To be used with
circuit of page 99.

July 28, 1941.
~~Harold Edgerton.~~

The drawings on p 98 - 100 inc were pasted in today after a conference with Germeshausen and Grier. The sketches and memos were made July 23. Grier suggested the elimination of the switch by the use of a plug in delay relay. We are now building a lucite shadow box of plastic.

Joan Enfield

a print from a Kodachrome negative.
made by Chas Wyckoff.
Photo of Jackman

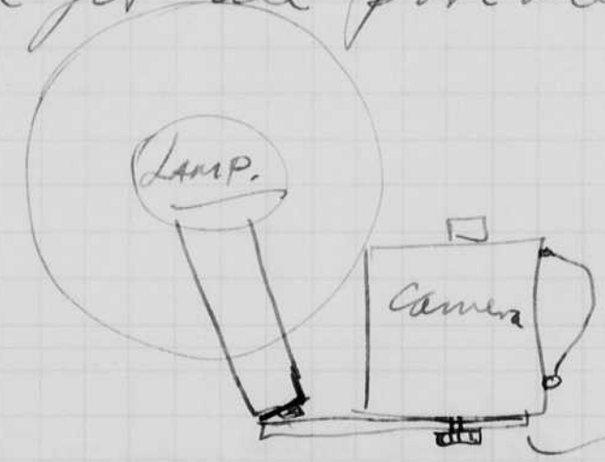
Aug. 1, 1941
Harold E Edgerton

Yesterday, Sandell and Dillon from the Eastman Kodak were here to help us settle the time-delay relay and lamp-mounting bracket situation.

It was decided that the relay would be mounted in the handle of the portable. A relay will be supplied with each portable at least for the first 500 units.

A carrying case for the lamp house is not going to be provided.

A bracket will need to be supplied so that all cameras can fit the portable



Bracket.

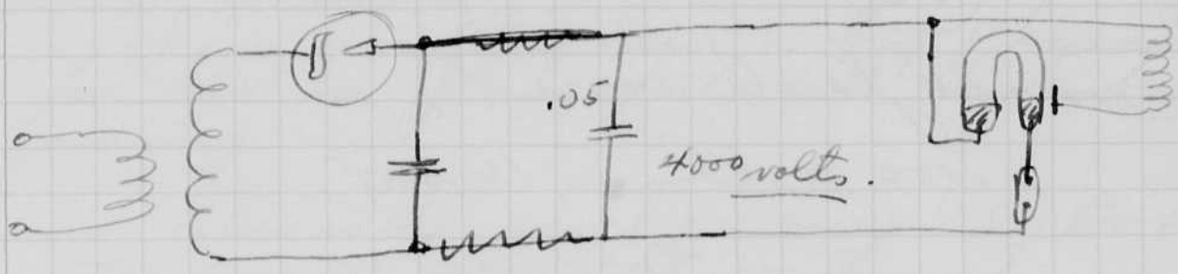
Sandell went home with me for supper and at 9.24 pm took the train to Rochester.

Joan Lee-Cole finished up her work here yesterday in the lab.

I went with her and Jack McMorran to Woods Hole on Wed July 30 to see Dr. Kerr. at the Ocean Lts. Also saw Dr. L. Mrs Clarke, who were

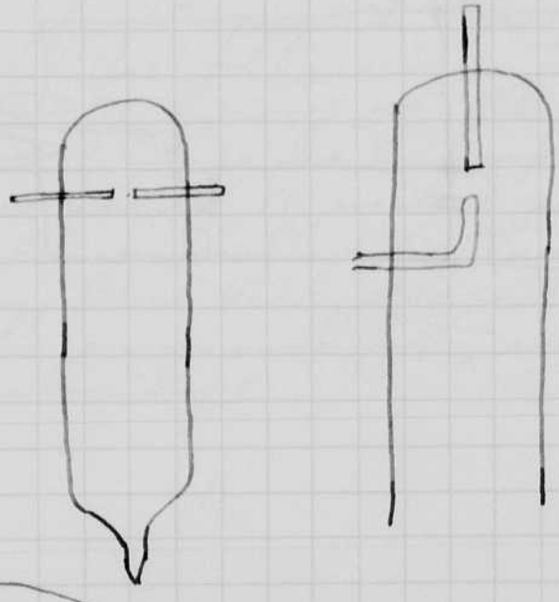
working with under water explosions.

Saw also Prof. Harvey at the [illegible] and helped him recondition his apparatus for high speed motion picture photography. The 548 was used to trigger the flashes.

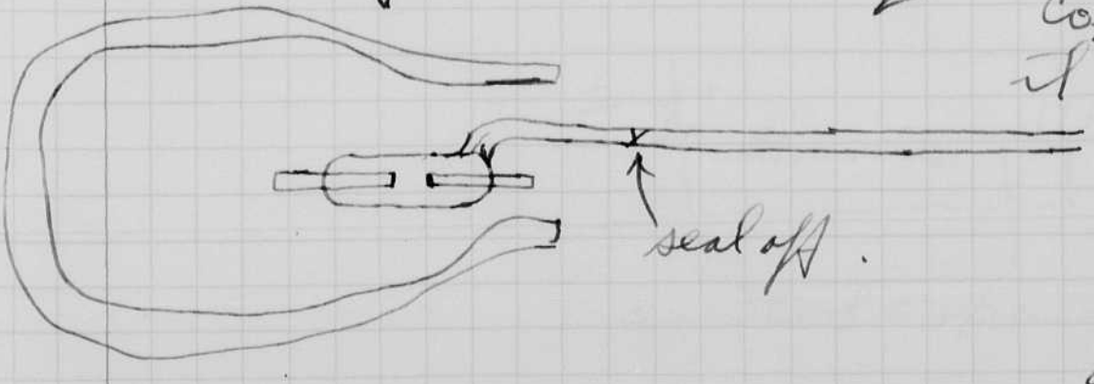


← thyratron surge from condenser in 548.

High press gaps. for point sources.:

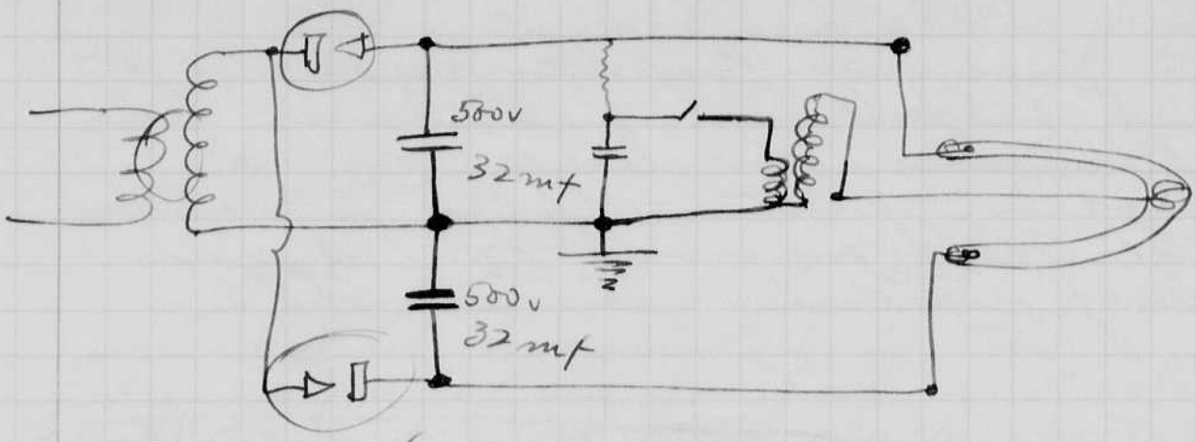


this tube is to be put in CO_2 snow so that it cools. argon gas is thereby trapped at high pressure when the tube is sealed off and the tube warmed up.

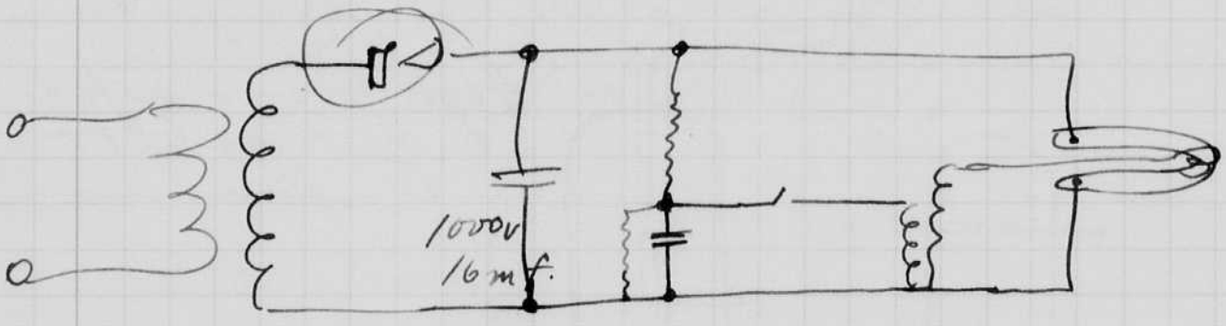


Aug 1 1941

Harold E Edgerton



Small flash unit,
1000 volts. 16 mf.



Aug 7 1941
Harold E. Edgerton

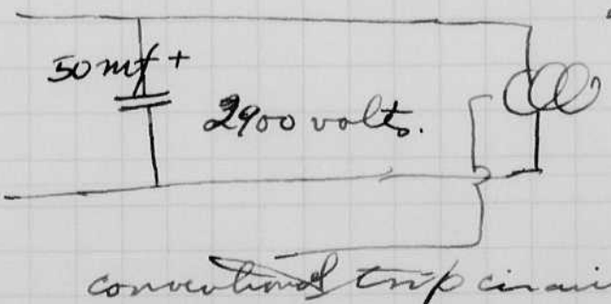
Barstow called on the phone from Indianapolis yesterday to tell me that the army were going to order 50 flash identification units. These use spiral tubes with no. 2 gas at 2000 volts (50 mf?).

He also connected on the beacon. He is using 120 mf 3000 volts at 5 second intervals. The life of the lamp should be 1500 hours.

I am sending him a big spiral for test in place of the tube he is now using.

This is the same as used by Barstow in the 4000 mf 2000 volt unit.

Last night Chas Wyckoff and I wired the following flasher and took it up to the roof of Bldg 10 (Nutting East Boo 2024). An a.a. pilot picked it up at Oldham at 2000 ft. This is about 15 miles away. He said it would be better to test the unit on the big Blue Hill since there are few lights around it, as there are in Cambridge.



conventional trip circuit.

Large spiral such as used in army flasher for airplane photos.

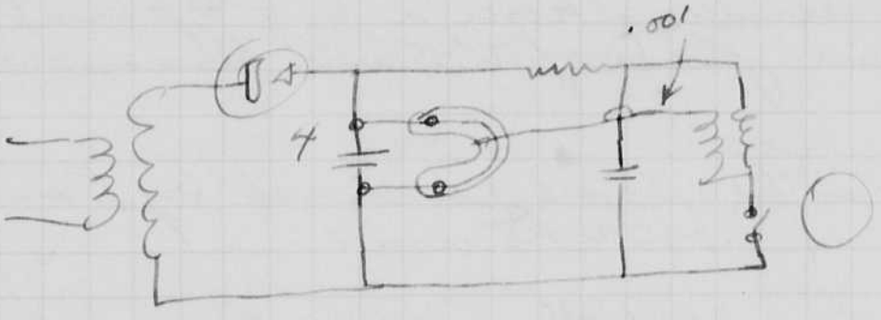
Aug 7 1941
Harold E Edgerton.

Small flash unit.

Direct contact on the shutter to handle high voltage in spark system.

No Bleeder in high voltage.

Point to plane rectifier.



Flash light Battery operated from a ~~battery~~ vibrator.
Built into camera.

Discussed with Gries and Zimmerbauer today.

H. E. Edgerton
8-7-41

Aug 16, 1941
Harold E Edgerton.

~~Left with Chas Ulo~~
took movie of dynamite caps explosion, under water, for Woods Hole Oceanographic Inst. on aug 11 and 12. J. Lamar. Worzel brought caps and an oscillograph. Commander Roop was here on Aug 11 to see the experiment. Records are in Chas Wyckoff's note book.

aug 13 left for aquarium at Battery New York with movie apparatus and Chas. Arrived about 10 am on aug. 14. Christopher Coates worked with us in setting up for the penguins and sea horses. Took several movies showing the penguins diving into the water. Also an under water view of the diver through glass. Took movies of sea horse fin in action. John P Blair.

Stopped at Winchester on aug 15 at 2:30 or 3 and took movies of 2 inches and a Browning machine gun in action.

Aug 20 1941
Harold E. Edgerton.

Experimented last night with Chas Wyckoff on Infra red photography with portable speedlamp.

Over exposure resulted from the following condition:

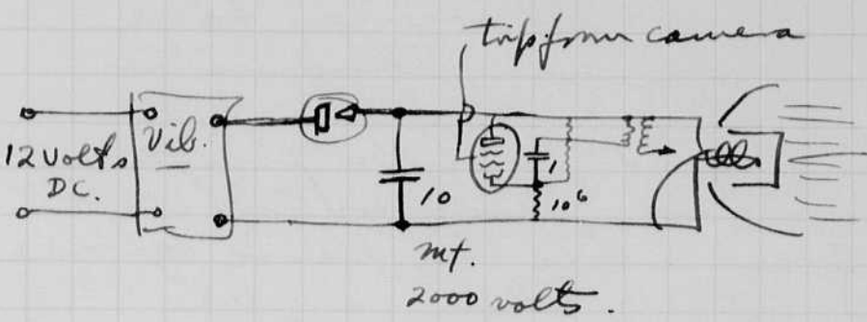
camera and light to subject	5 ft.
aperature	f 4.5
film	Eastman Infra Red.
camera and lamp filter	88A.
Capacity (Mallory)	28 mf
Voltage.	1900. volts.
Lamp.	Xe 7cm spiral GE
Reflector	9" al polished.

A second trial with a 4 mf condenser showed too little exposure. I guess that 10 mf would produce ample exposure for white objects such as instrument dials, etc.

These tests were made for the Eastman co. The apparatus is being developed for the C.A.A. to use in airplanes.

The operating interval is 60 seconds for continuous use and once per second or faster for emergency.

Infra Red power unit.



Aug 22 1941

I spent the entire day yesterday with Mr. Kaye of the Model Basin, repairing a multiflash unit No 172 BK.

A .01 mf condenser was connected from grid to ground in the ~~the~~ ignition and a 50,000 ohm resistor in series to the circuit.

Chas Wyckoff and movie apparatus.

B.K. now has diagram and list of parts for this unit.

Aug 20 1941
Harold E. Edgerton.

Experimented last night with Chas Wyckoff on Infra red photography with portable speedlamps.

Over exposure resulted from the following condition:

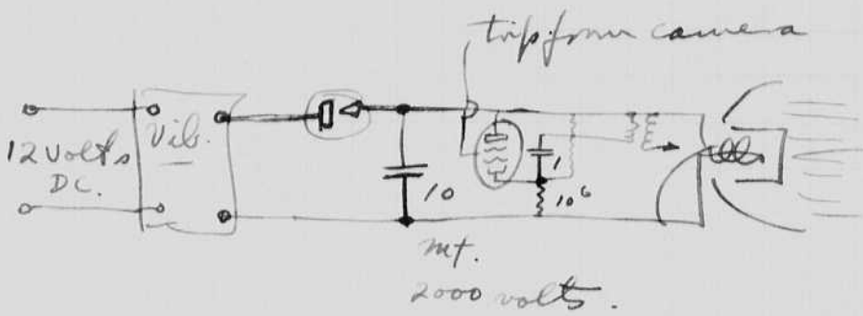
camera and light to subject	5 ft.
aperature	f 4.5
film	Eastman Infra Red.
camera and lamp filter	88A.
Capacity (Mallory)	28 mf
Voltage.	1900. volts.
Lamps.	Xe 7cm spiral 5K
Reflector	9" al polished.

A second trial with a 4 mf condenser showed too little exposure. I guess that 10 mf would produce an ideal exposure for white objects such as instrument dials, etc.

These tests were made for the Eastman Co. The apparatus is being developed for the C.A.A. to use in airplanes.

The operating interval is 60 seconds for continuous use and once per second or faster for emergency.

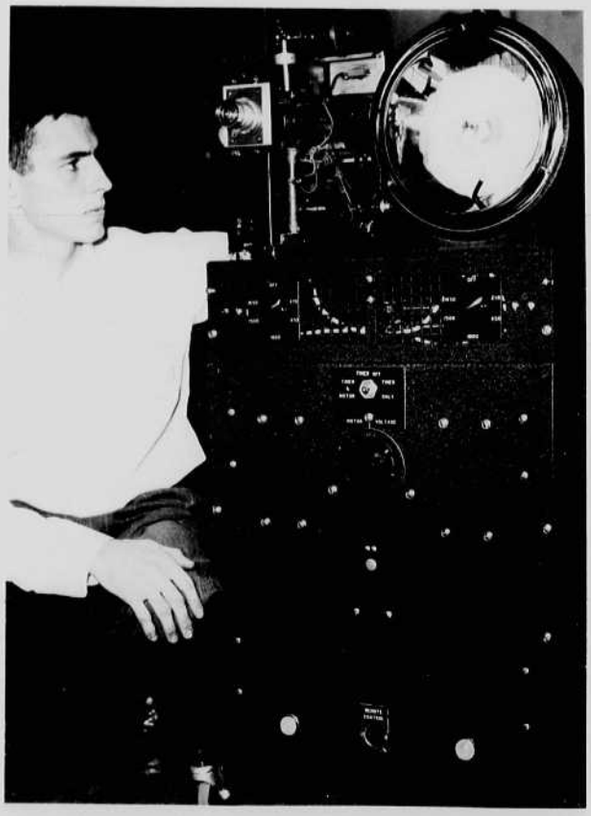
Infra Red power unit.



Aug 22 1941

I spent the entire day yesterday with Mr. Kaye of the Model Basin, repairing a multiflash unit No 172 SR.

A .01 mf condenser was connected from grid to ground in the thyratron and a 50,000 ohm resistor in series to the circuit.



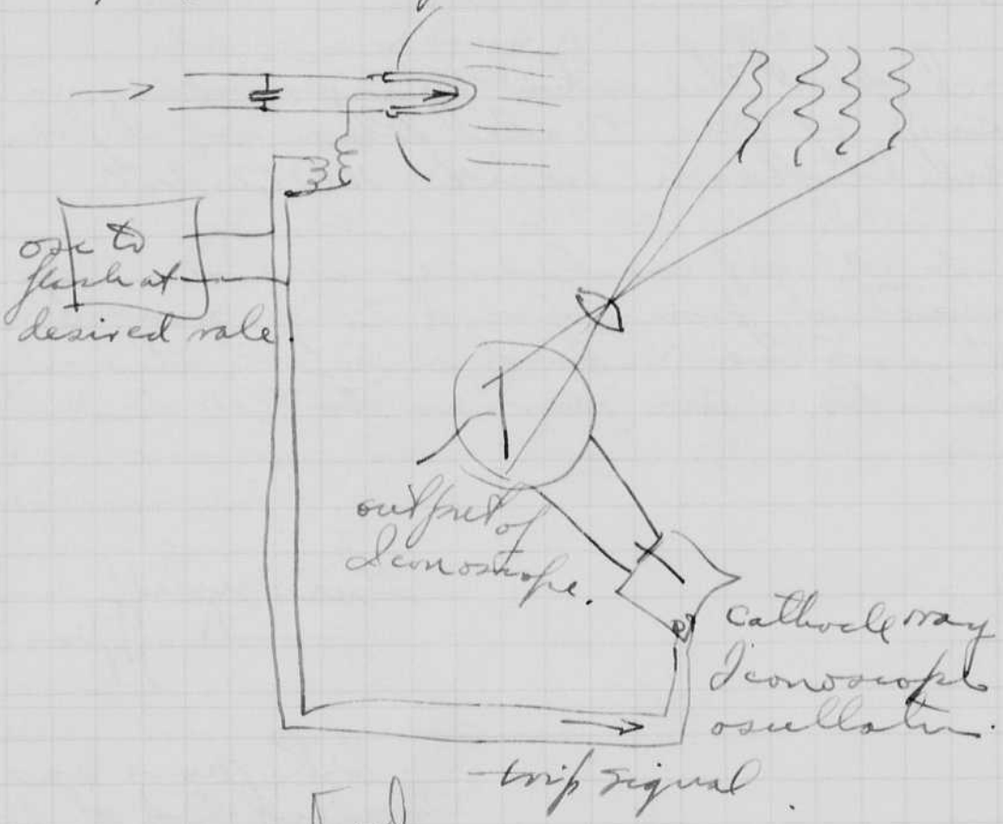
Chas Wyckoff and movie apparatus.

S.R. now has diagram and list of parts for this unit.

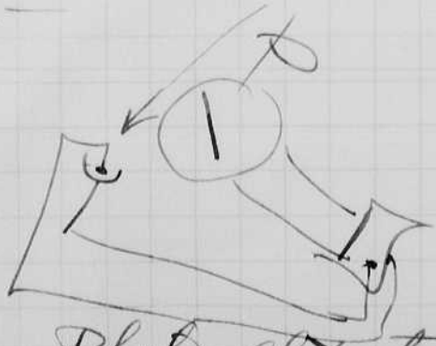
~~Harold E Edgerton~~

Sept. 2, 1941. Television Illumination

Our flashing light sources have real possibilities for illumination of scenes for television purposes. ~~A flash of light for this purpose~~ is arranged to flash in the portion of time assigned to the dark space. The synchronizing can be started by the electrical transient or light flash ~~by the~~ from the tube.



Explained ~~to~~ under load
9-2-41
Herbert E. Grier



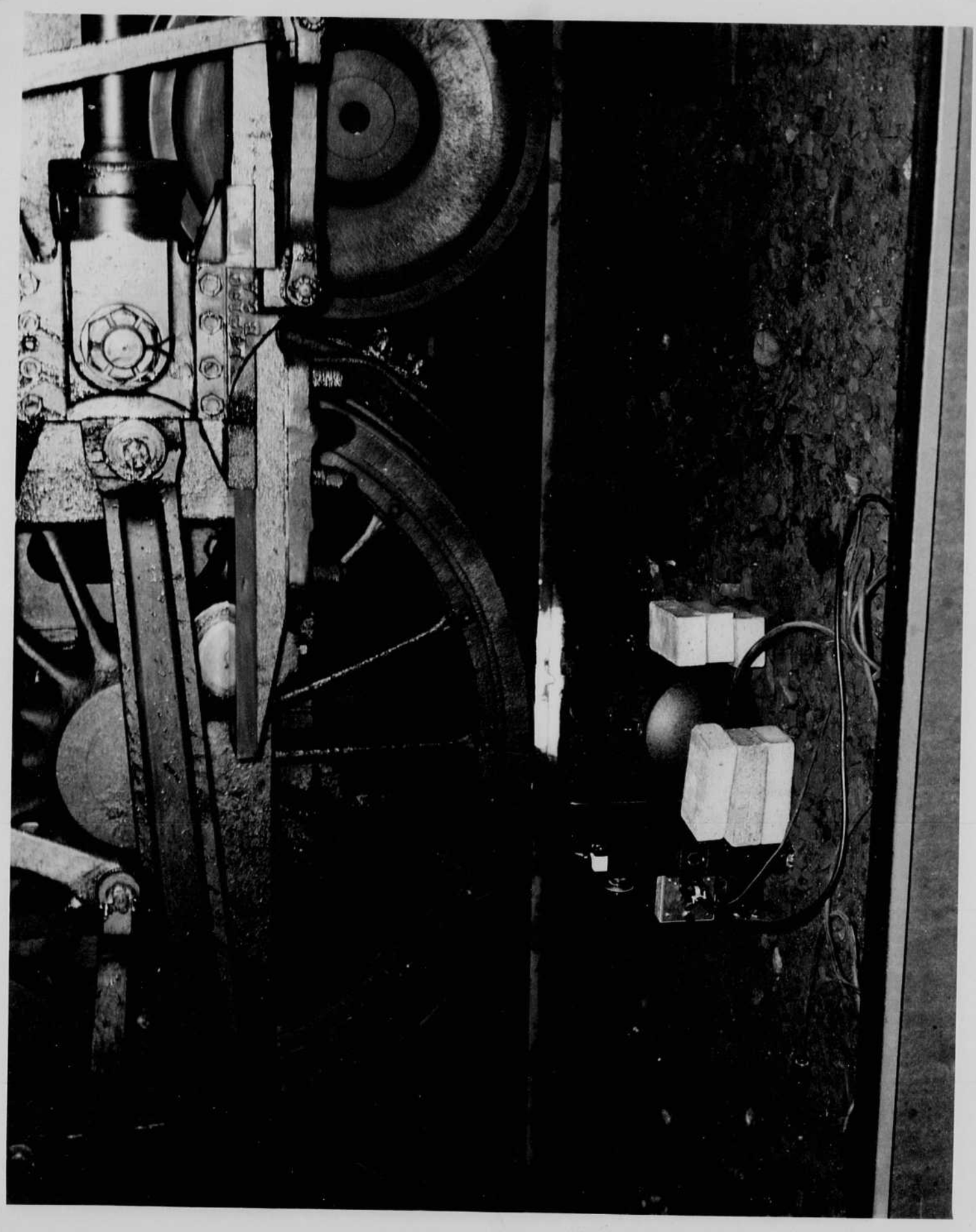
Photocell to trip Iconoscope sweep when light flashes.

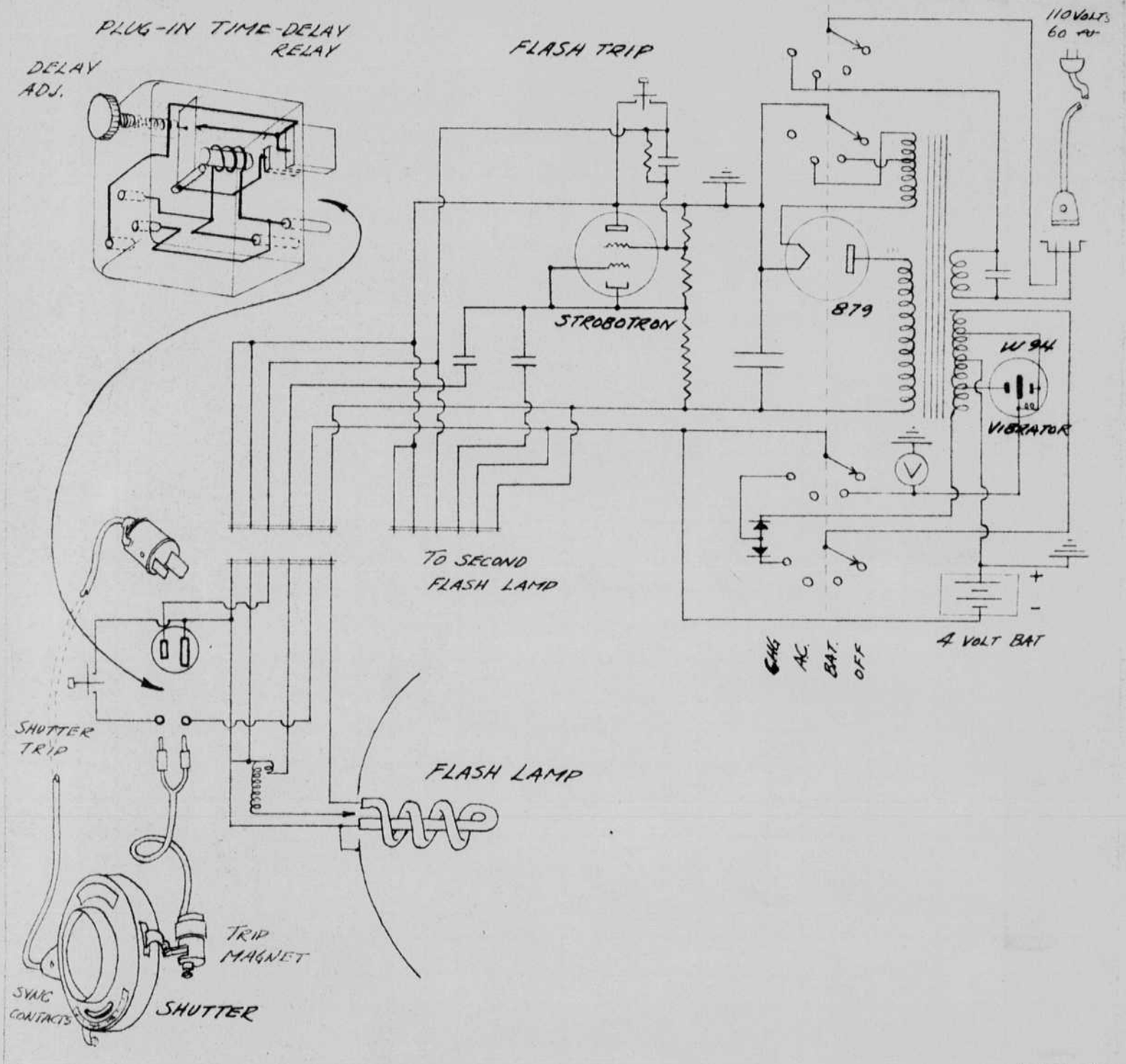
H E Edgerton.
Sept 6 1941.

Fenton and Tarbox were here this morning to look over film shot last Tuesday at Allston on the Bard a Railbrook.

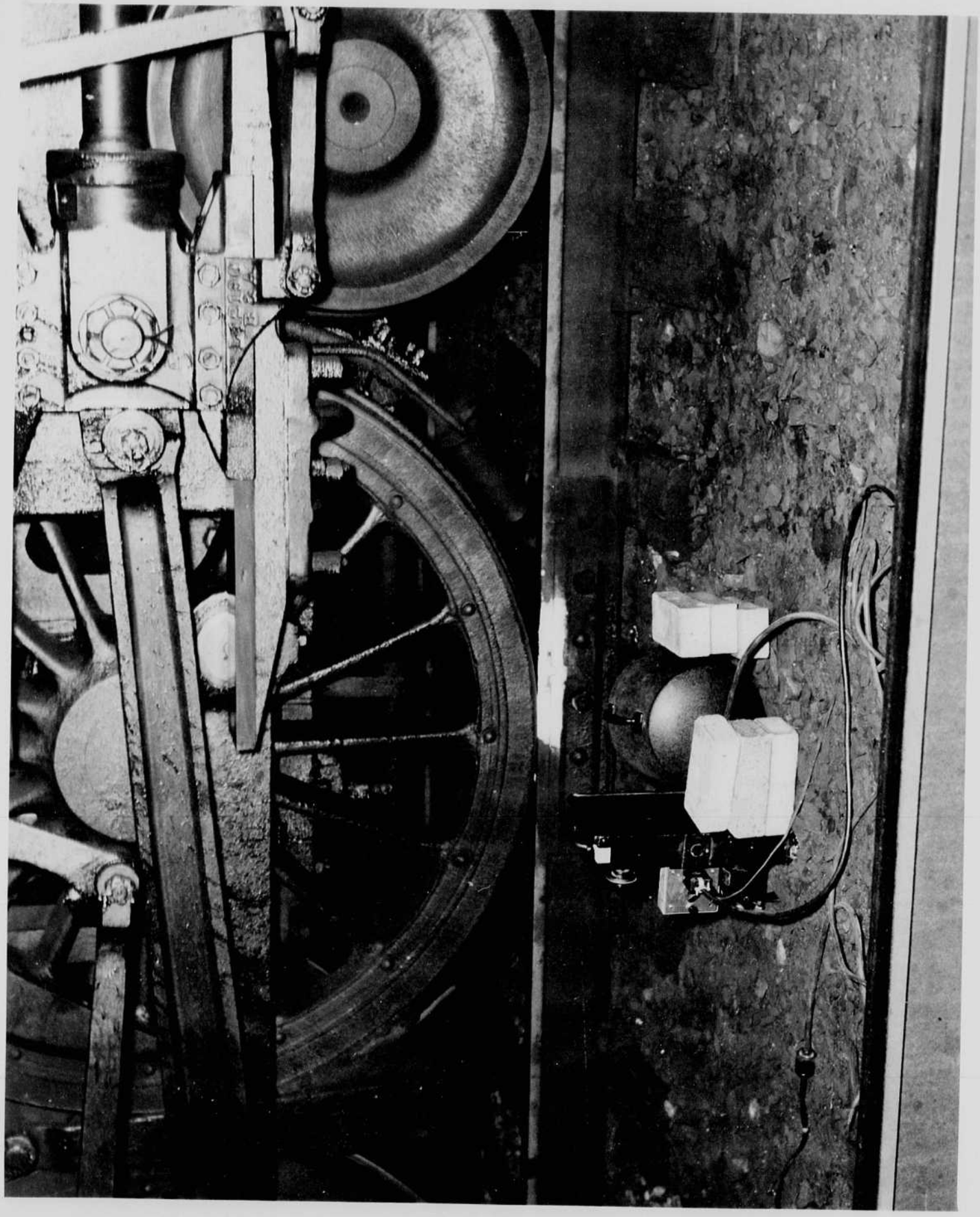
Very little motion of the rail joint or rail bond was noticed.

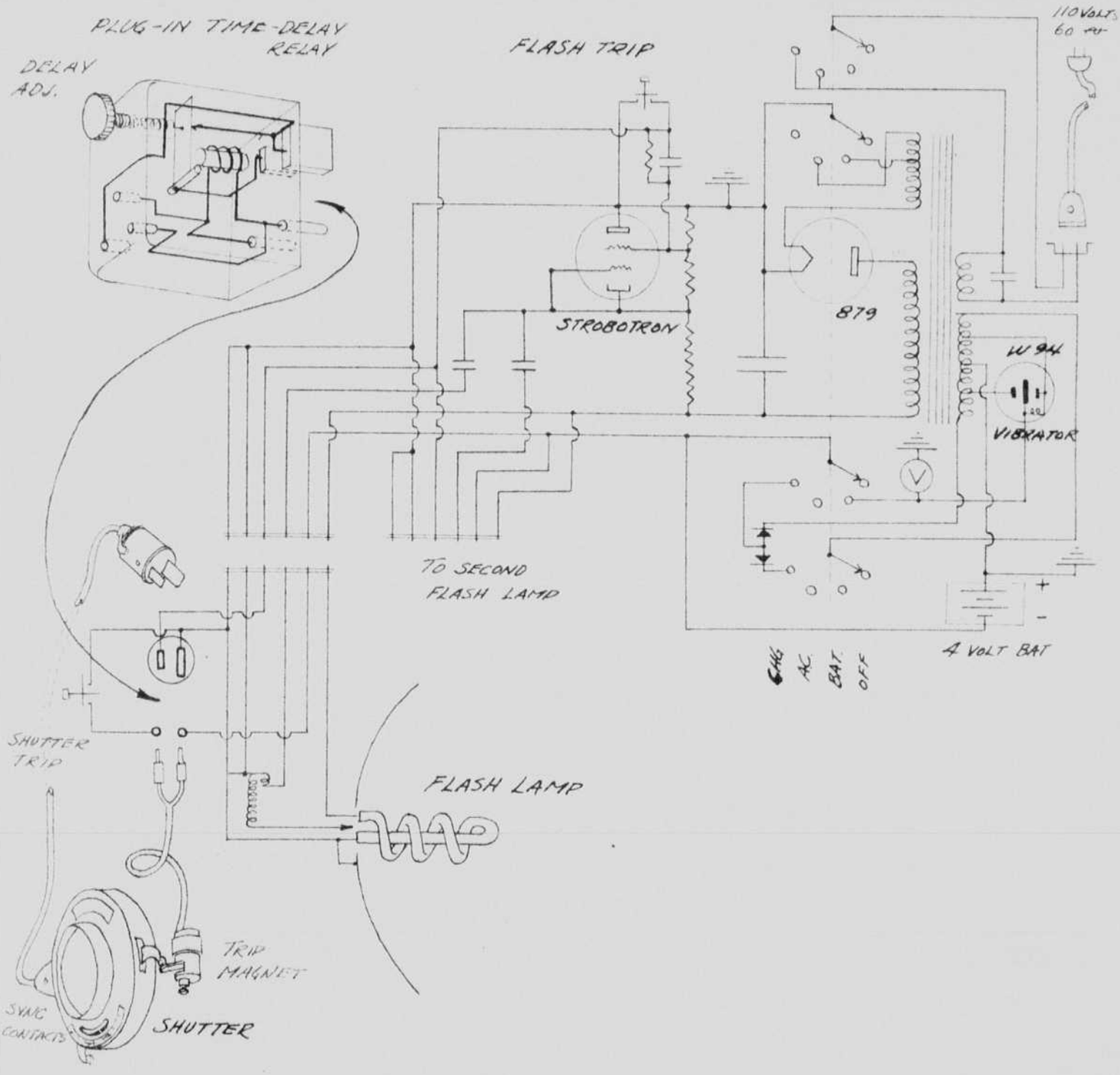
A photo on the next page shows the set up. This picture was taken at the portable of a train going 60 miles per hour.





SEPT. 8, 1941
H.E. EDGERTON.



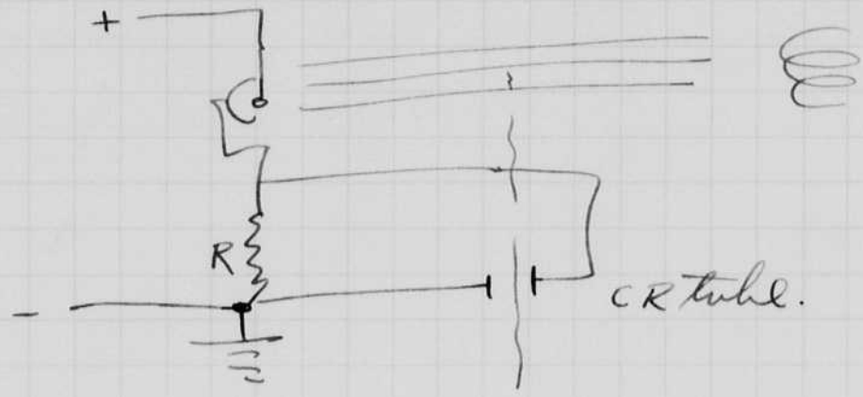


SEPT. 8, 1941
H.E. EDGERTON

Sept. 16, 1941
Pawel & Elgeton.

Mr. Black from Michigan was here yesterday. Barstow and I tested tubes for infra red radiation with him, a cathode ray oscillograph was used to record the peak current through a resistor.

Flash lamps.



Oct 2 1941
Harold E. Edgerton.

Chas Wyckoff went with me on a trip south leaving Sept 17. We made the following stops.

New York	Dr. Goldsmith.
Camden	" Ivorykin.
Aberdeen Md	McClelland & Swift.
Carderock	Roop Bancroft.
Dahlgren	Parsons Thompson.

We returned on Sept 23 rd.

On sept. 25 we went to North Berwick Maine and took high-speed movies at 700 ± per second of rail bonds in action on the East branch of the B. & M.

Fenton and Tarbox came in yesterday and we went over the movies of the trains.

Oct. 4, 1941.

Harold E Edgerton

Lyman Johnson of the G. E. Co at Nela Park was here today and a lengthy conference was held with Bernhausen, Brier, and Barstow. Subjects discussed.

1. Identification lamps for army planes. ~~cost~~ Xe. #2 gas

2. #2 lamps. Xe gas to be made at Hoboken. N.J. Same price as #1 lamps.

3. Portable. Connection between the base and bulb ~~was~~ was had. Finally a suggestion of using a sealed-in reflector and bulb resulted from Brier. We went across the street and looked at several samples in the auto mutual supply house. The spacing of the ~~wires~~ in the base seem ok. to us. Three wire are lead through in a triangular form. A silver plate is mounted to the three posts.

I also suggested that we make our studio system with the sealed reflectors, incorporating the Johnson lamps.

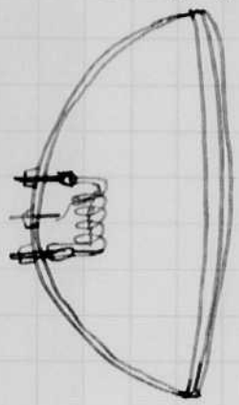
Johnson is going to make a lamps study with the sealed-beam reflector and advise us immediately.

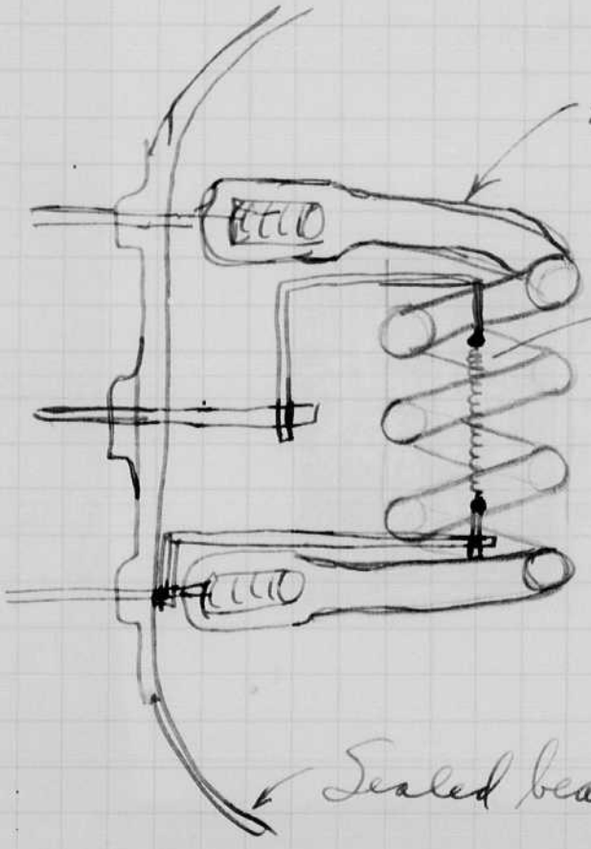
Quartz lamps a spiral similar to our portable lamps, but of quartz with tungsten electrodes, was brought by Johnson. It is exactly similar to the one which

was tested before for Major Nyman, see p82.

The large quartz tube requested for D.I.C. project 6016 has not been constructed.

Flash lamps in the sealed beam should be perfect for the movie apparatus. An incandescent lamp could be put on the third post for focus and alignment, since a third electrical lighter is not needed with a series control tube.





SHUBERT THEATRE

SEPTEMBER 25 TO OCTOBER 4, 1941

HICKEY, HALE AND ROBINSON
PRESENT
A NOVEL MUSICAL COMEDY

VIVA O'BRIEN

BOOK BY WILLIAM K. WELLS AND ELEANOR WELLS

MUSIC BY MARIA GREVER

LYRICS BY RAYMOND LEVEEN

DIRECTED BY ROBERT MILTON

DESIGNED BY CLARK ROBINSON

DANCES BY CHESTER HALE

COSTUME DESIGNS BY JOHN N. BOOTH JR.

COMEDY SCENES STAGED BY WILLIAM K. WELLS

ORCHESTRA UNDER DIRECTION OF RAY KAVANAUGH

CAST OF CHARACTERS
(AS THEY SPEAK)

JEEVES	CYRIL SMITH
EMILIO MORALES	MILTON WATSON
BETTY DAYTON	RUTH CLAYTON
MANUEL ESTRADA	ROBERTO BERNARDI
LUPITA ESTRADA	VICTORIA CORDOVA
TOM	HAROLD DIAMOND
DICK	HUGH DIAMOND
HARRY	TOM DIAMOND
J. FOSTER ADAMS	EDGAR MASON
PROFESSOR SHERWOOD	JOHN CHERRY
MRS. SHERWOOD	ANN DERE
SENORA ESTRADA	ADELINA ROATINA
PEDRO GONZALEZ	GIL GALVAN
DON JOSE O'BRIEN	RUSS BROWN
CAROL SHERWOOD	MARIE NASH
GATEMAN	HUGH DIAMOND
MARIA	MARA LOPEZ
DOLORES	TANYA KNIGHT
RAMON	RUDY WILLIAMS
JUAN	JOE FREDERIC
NATIVE CARRIER	PETE DESJARDINS
ZAMBRANO	JAMES PHILLIPS
BOATMAN	JOE FREDERIC
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RANI	TONY (OSWALD) LABRIOLA
SHIPS FIRST OFFICER	CYRIL SMITH
SECRETARY OF MEXICAN CONSULATE	TERRY LA FRANCONI
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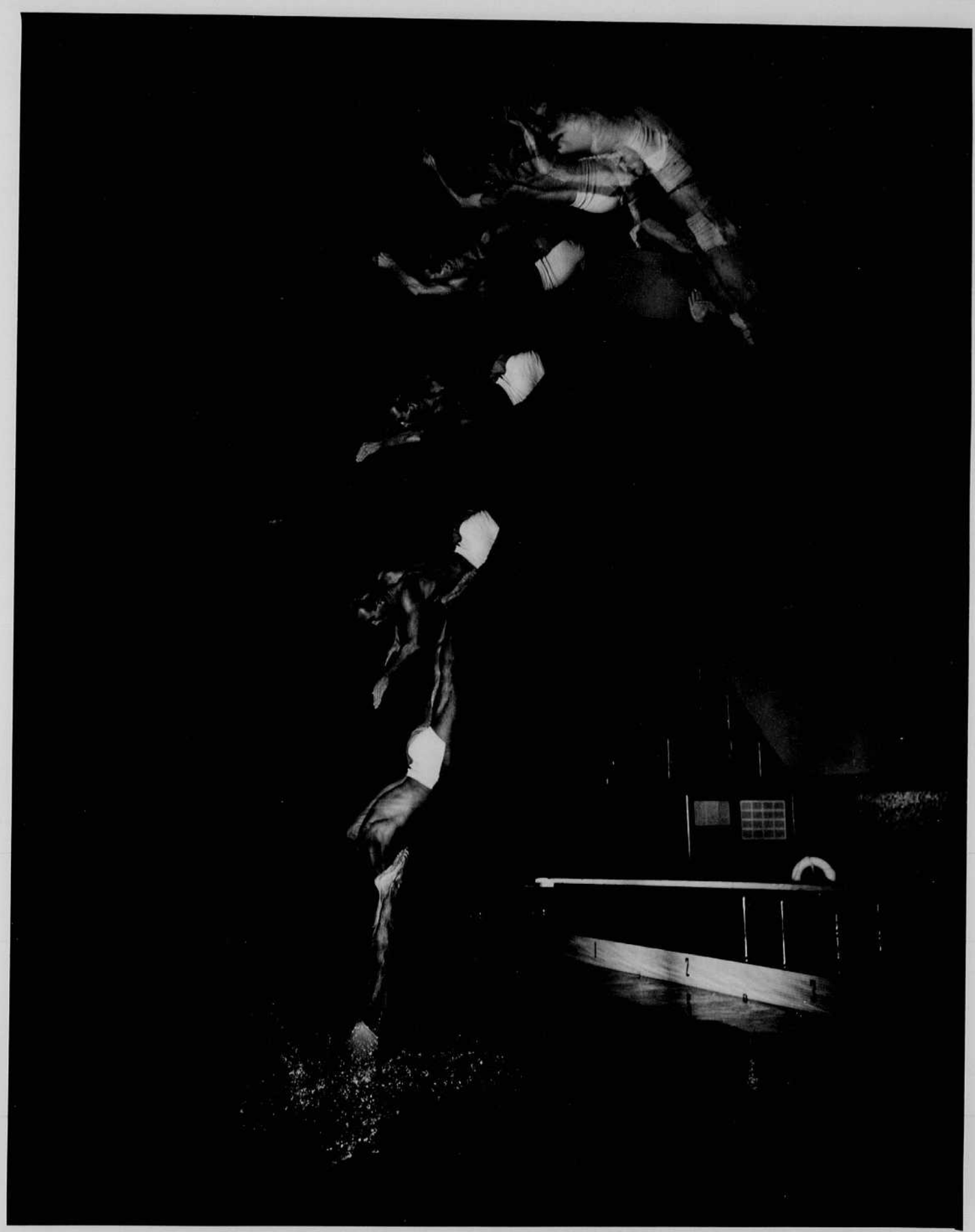
SYNOPSIS OF SCENES

ACT ONE

SCENE 1 — SWIMMING POOL ON THE J. FOSTER ADAMS ESTATE, MIAMI.
SCENE 2 — AIRPORT, PAN-AMERICAN AIRWAYS, MIAMI, FLORIDA.
SCENE 3 — INTERIOR OF AIRLINER.
SCENE 4 — SOUTH OF THE BORDER.
SCENE 5 — LA CASA DE ESTRADA, MERIDA, MEXICO.
SCENE 6 — EDGE OF THE FOREST, YUCATAN.
SCENE 7 — THE SACRED POOL.

Pete Desjardins



ACT TWO

SCENE 1 — A STREET IN MERIDA, MEXICO.
SCENE 2 — EDGE OF THE FOREST, YUCATAN.
SCENE 3 — THE FLOATING GARDENS OF XOCHIMILCO, MEXICO.
SCENE 4 — PLAZA DEL TOROS, MEXICO CITY.
SCENE 5 — DECK OF A CRUISE SHIP.
SCENE 6 — "WALKING THE PLANK".
SCENE 7 — SWIMMING POOL ON THE ADAMS ESTATE, MIAMI.

MUSICAL NUMBERS

ACT ONE

1 — "MOZAMBAMBA" ..... PROFESSOR, BETTY AND GIRLS
2 — "DON JOSE O'BRIEN" ..... JOSE
3 — "MOOD OF THE MOMENT" CAROL, EMILIO, GIRLS & FOUR GRAND QUARTETTE
4 — REPRISE "MOOD OF THE MOMENT" ..... CAROL AND EMILIO
5 — "MEXICAN BAD MEN" ..... TOM, DICK AND HARRY
6 — "CARINITO" ..... LUPITA AND ENSEMBLE
DANCE ..... GONZALEZ, MARIA AND DOLORES
ACCORDIONIST
7 — "BROKEN HEARTED ROMEO" ..... RANI
8 — "WRAP ME IN YOUR SARAPE" ..... JOSE
9 — REPRISE "MOOD OF THE MOMENT" ..... CAROL, EMILIO AND ENSEMBLE
10 — "YUCATAN" ..... EMILIO
11 — RITUAL DANCE ..... BETTY AND FOUR GRAND QUARTETTE
12 — THE RAIN BALLET ..... GONZALEZ, MARIA AND DOLORES
ENSEMBLE

ACT TWO

1 — "SLEEPY MEXICAN" ..... "VANQUEROS"
2 — "OUR SONG" ..... BOATMAN, SENORITAS AND BALLET
3 — "HOW LONG" ..... CAROL AND EMILIO
4 — "EL MATADOR TERRIFICO" ..... LUPITA
5 — MATADOR DANCE ..... VINCENTE AND ENSEMBLE
6 — "TO PROVE MY LOVE" ..... JOSE AND LUPITA
7 — REPRISE "TO PROVE MY LOVE" ..... LUPITA AND JOSE
8 — THE SAILORS ..... TOM, DICK AND HARRY
9 — FINALE ..... ENSEMBLE

ASSISTANTS TO MR. HALE: MEDA CORDOVA, NINA WHITNEY

PRODUCTION OF "VIVA O'BRIEN" OWNED AND OPERATED BY AVOCET PRODUCING CORPORATION

Peter Desjardins

118

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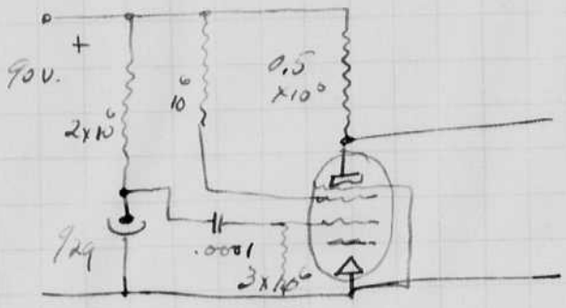
Pete Desjardins

Oct 8 1941.

Harold E. Edgerton

I have been experimenting with a photocell pickup for a stroboscope flash. The following circuit was tried.



(6N7 (one triode) constructed)

also an 1852 (6SJ7) was used for the amplifier.

The light from a discharge in a stroboscope was picked up by reflection at a distance of 4 or 5 ft with this on a dark suit.

Oct 12 1944

Harold E Edgerton. Reflector tests.

Sealed beam reflector with (4 7/8") portable spiral #2 gas. Received from Johnson on saturday.

28 Mf portable with 115 volts ac.
18 ft from wall with square.
f 16 aperture Kodatron film.
D19 5 min. 70° temp.

1 Sealed beam reflector.

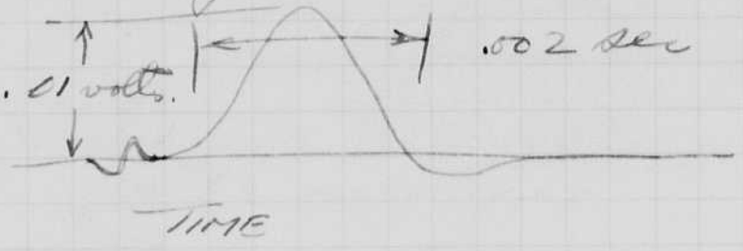
2. 10" al reflector with tube in frosted case. Diffuse position. — this unit has a tube cover door knob.

								R Door					
#1	74	71	75	.8	.82	.82	.82	76	.7	.64	57	51	.46
#2.	79	.8	.82	.87	.85	.88	.86	84	.7	.67	.62	57	.54

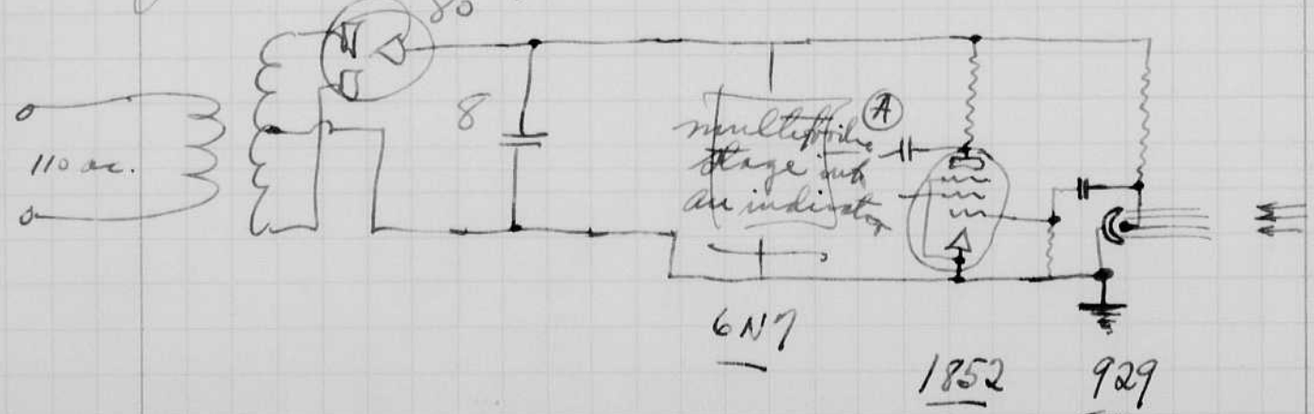
Oct 16 1941
Harold E Edgerton.

Two engineers from ~~Dept.~~ project were here today talking to Bruno and Herb about a tube for a sub. signal device.

Lecture by Prof. Schmidt at the Physics coll. after the session he suggested photography of single nerve fibers with a time delay after stimulus — using polarized light. Time of nerve pulse about .002 sec.



Cont. wiring up photocell pickup amplifier.



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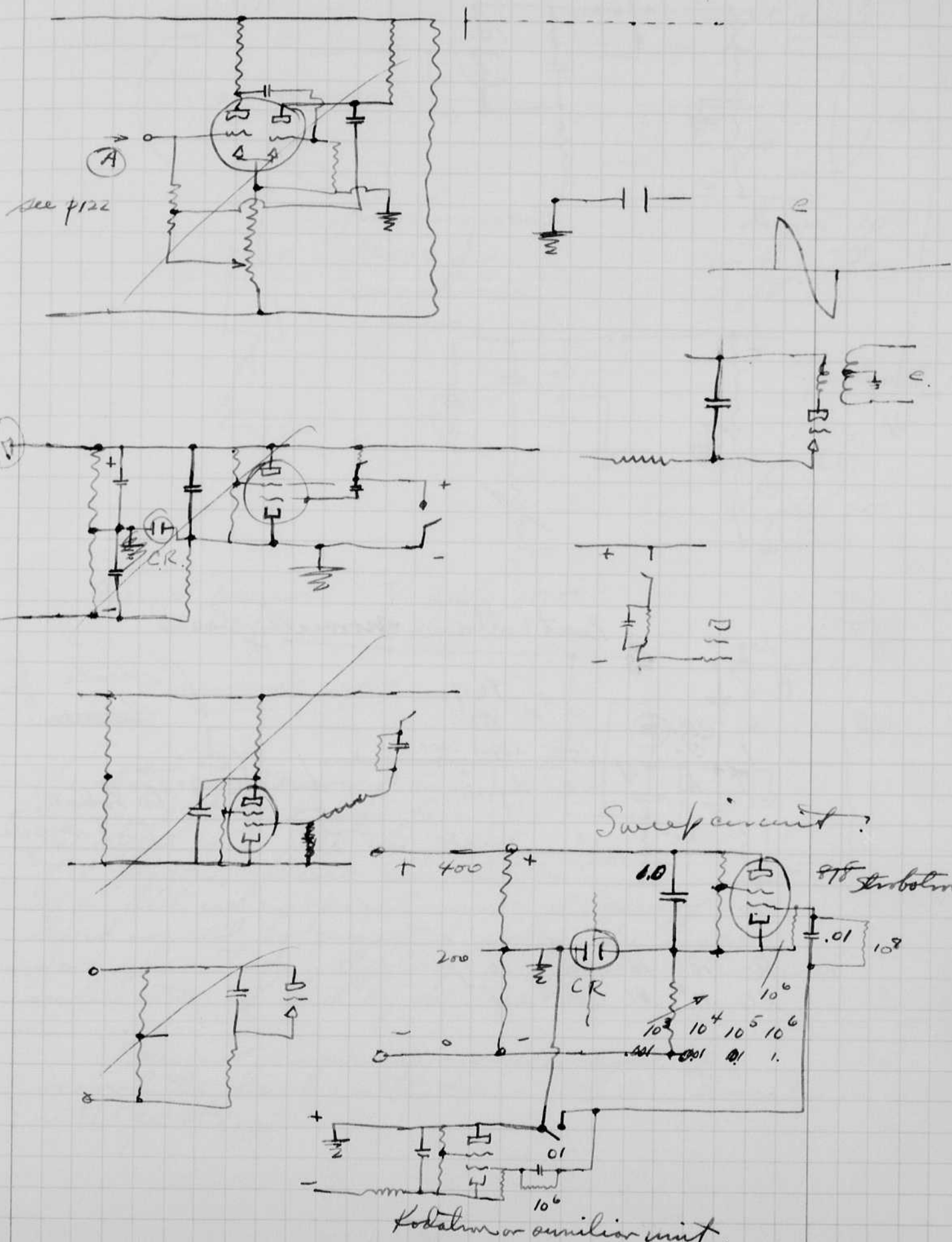
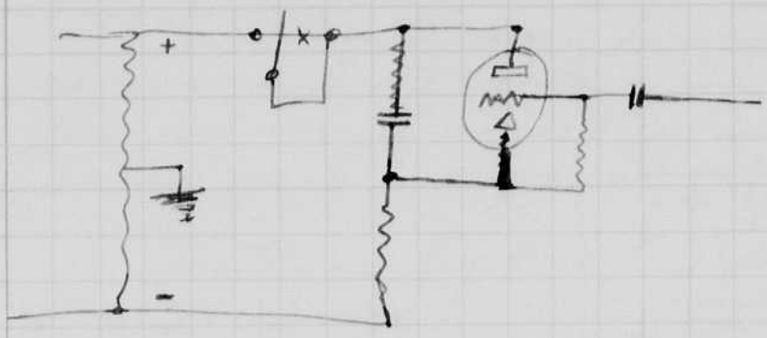


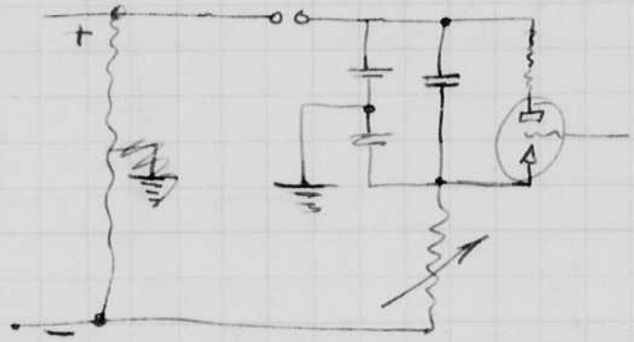
Sweep circuit?

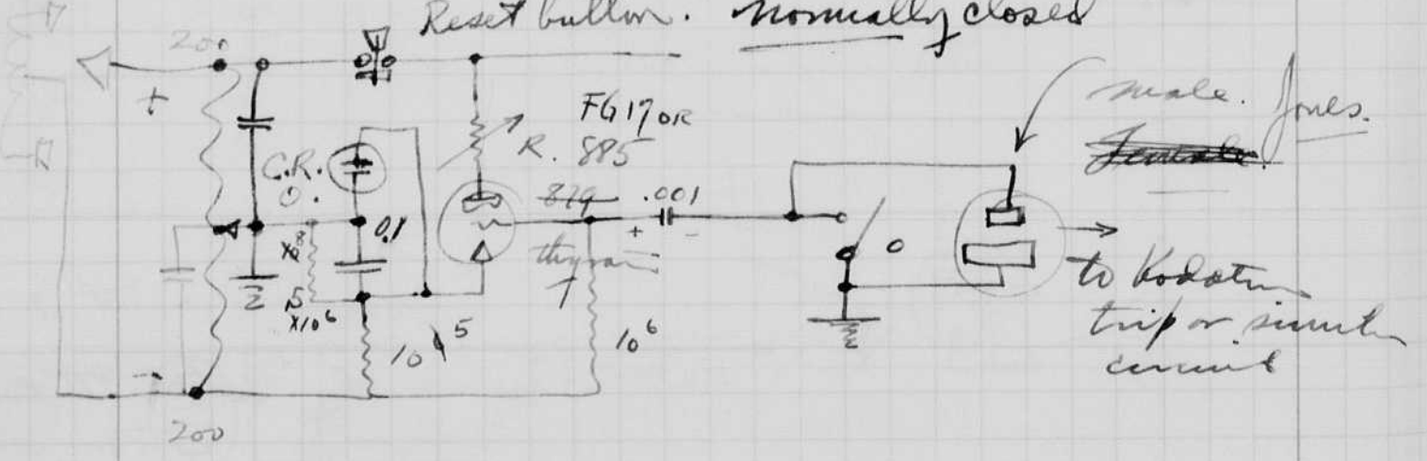
~~To Strobotron.~~

Kodatron or auxiliar unit.

Cont'd Sweep circuits.

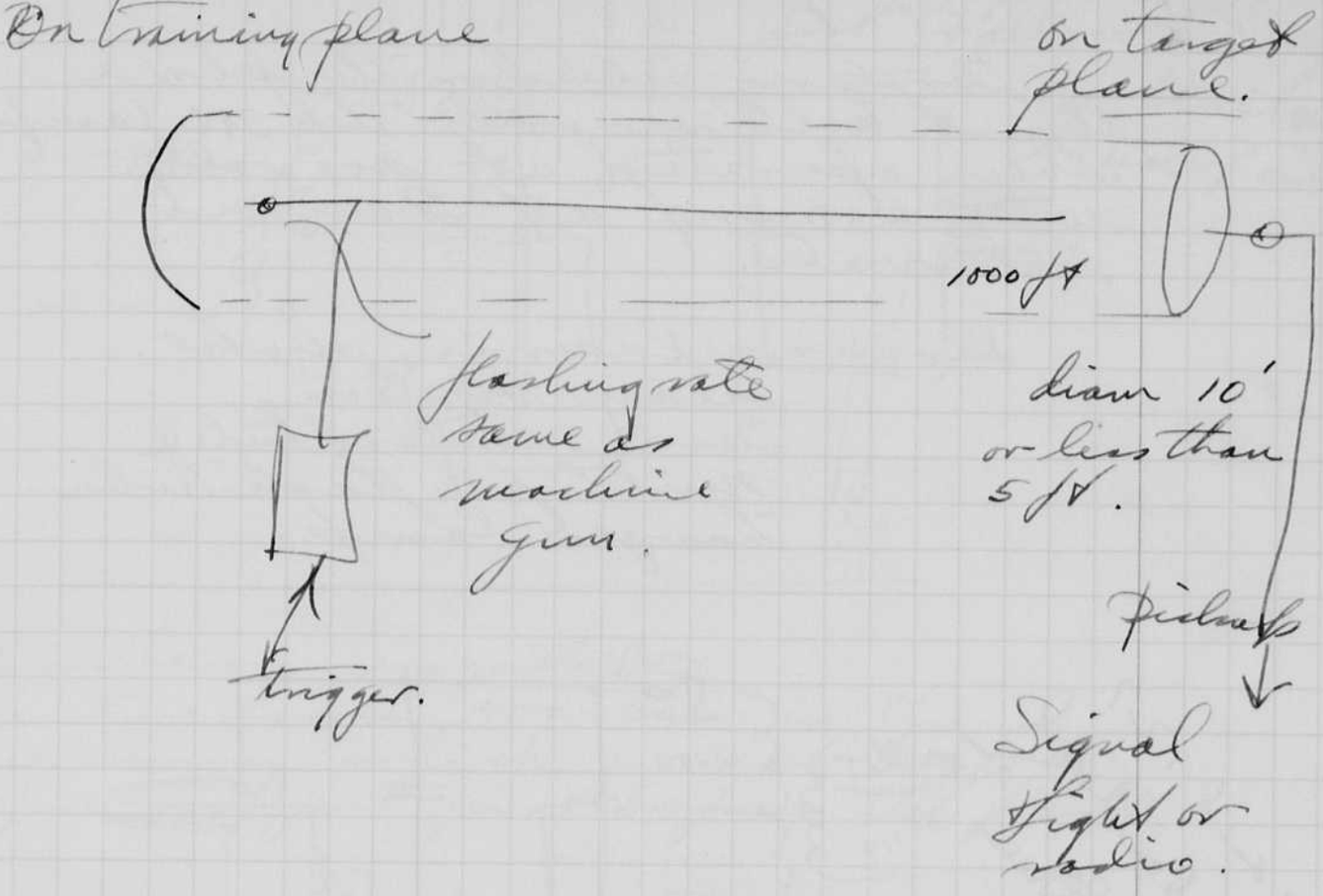






R	10^6	10^5	10^4	10^3
RC	.1	.01	.001	10^{-4}

Selmea Alabama.



Wm. H. Unger 8-314 M.I.T.
498

Riverside apt.

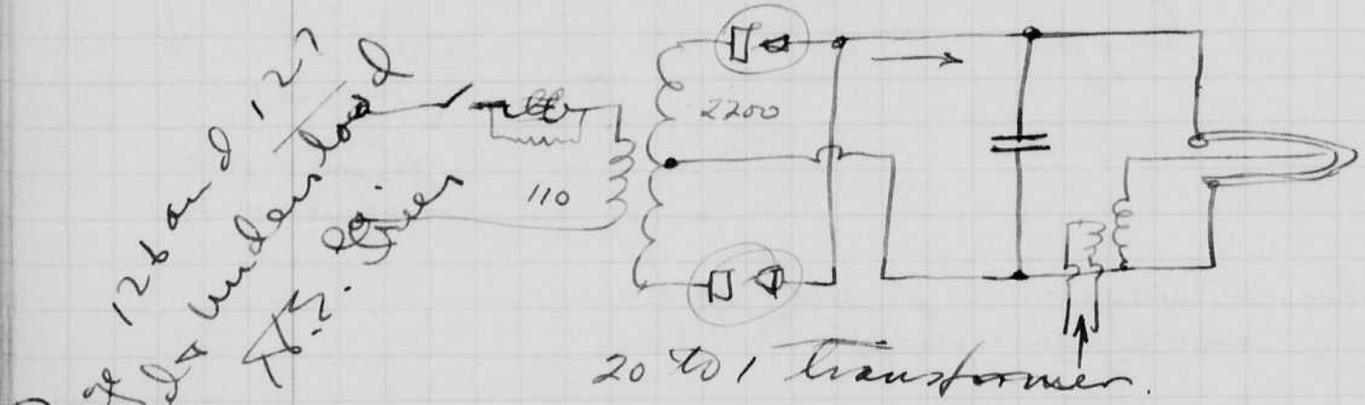
The above was discussed on Oct. 16, 1941. H. E. Edgerton. the object is to give the pilot of a fighting plane an indication of a hit when practicing. A beam of light would be projected when the trigger was operated. a photo cell pilots would indicate if hit by the light.

I suggest a counter on the light to record the flashes that are used. Similarly on the photo cell.

Oct 17 1941
Harold E Edgerton

Darsdang called on the phone about 4 oclock over with the new lamp when operated at 3000 volts with 200 mf at 2 second intervals.

Diamond - series choke.
relay system.
Series control tube.
multiple flash tubes.
Larger lamps.



20 to 1 transformer.

Page 126 and 127 read and understood
10-18-41 H.E.

200 mf. 3000 volts 2 sec.

$i' = C \frac{dv}{dt} = 200 \times 10^{-6} \frac{3000\ V}{1.\ sec} = 6 \times 10^{5} \times 10^{-6} = 0.6$ amp.

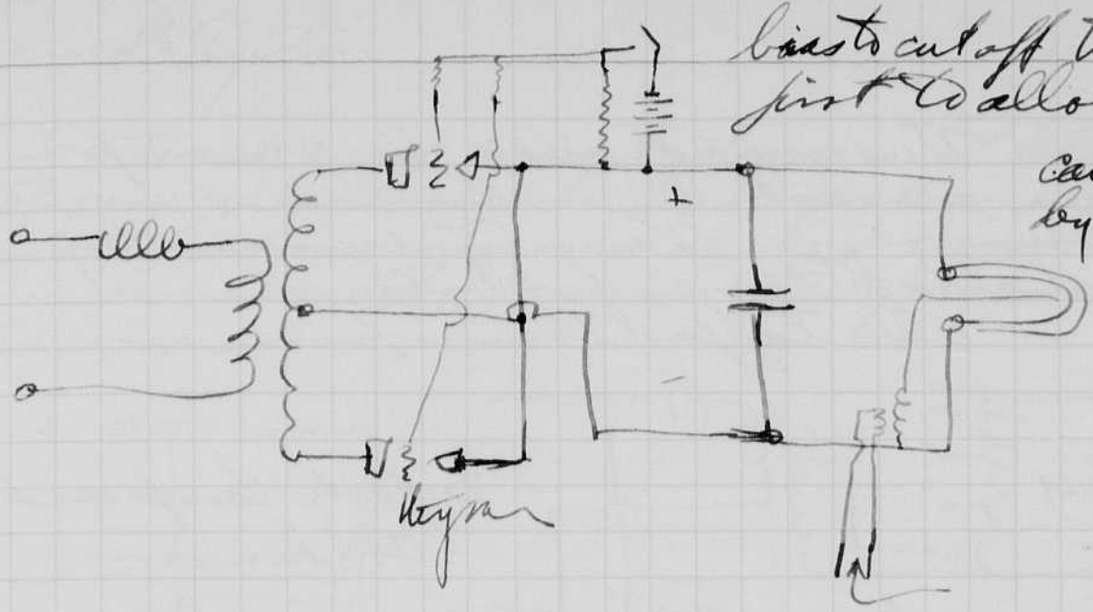
$20 \times .6 = 12.$ amp in primary.

$\frac{110}{12} = 10$ ohm reactor at 60 cycles.

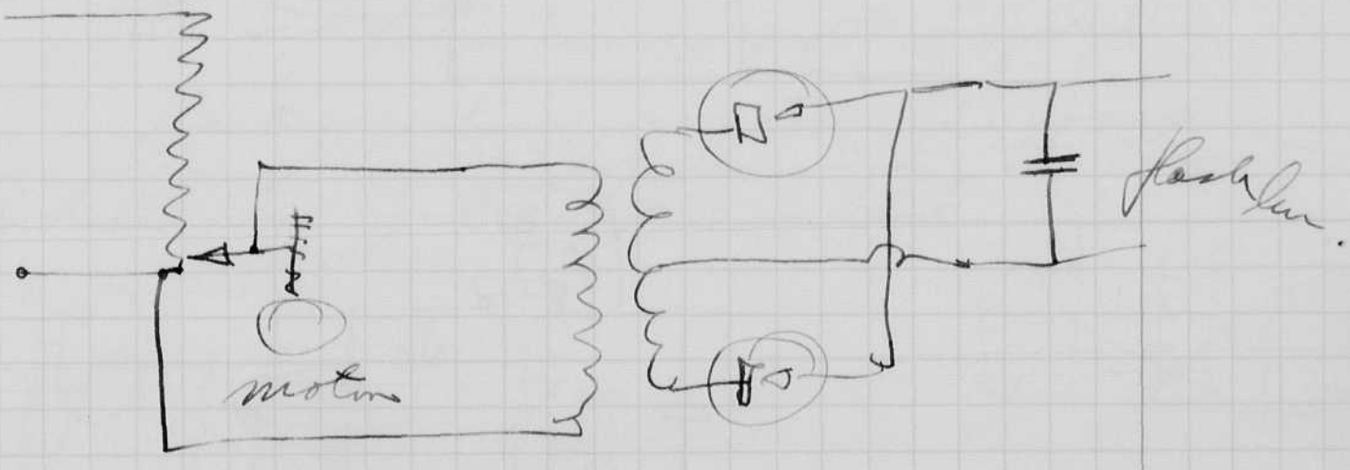
$X = 2\pi fL. = 377L.$

$L = \frac{10}{377} = \frac{1}{40}$ henry

$VI = 12 \times 110 = 1440$ volt amps.



Gernsback suggested a motor driven variac in the primary which would drop to zero and just before the flash.

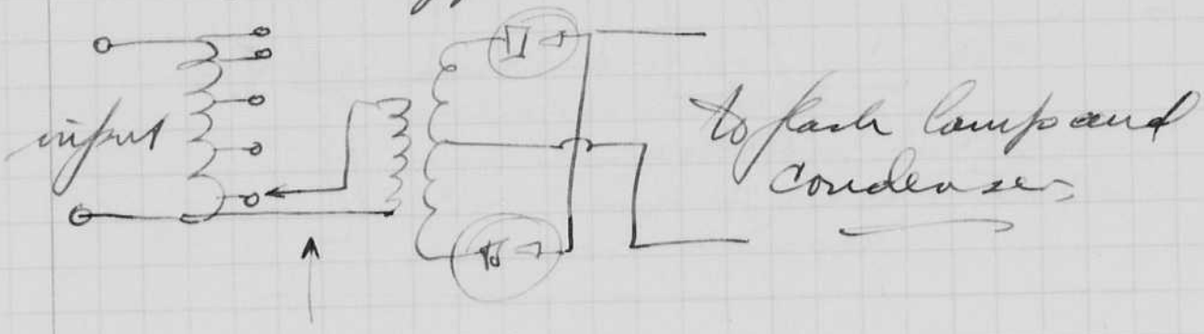


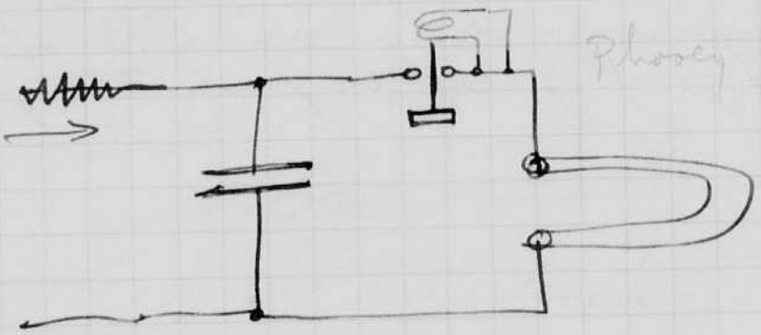
This is an efficient method of changing the condenser since there is no loss in a resistor.

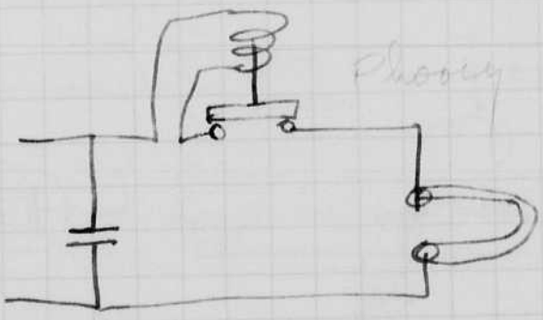
cont'd.

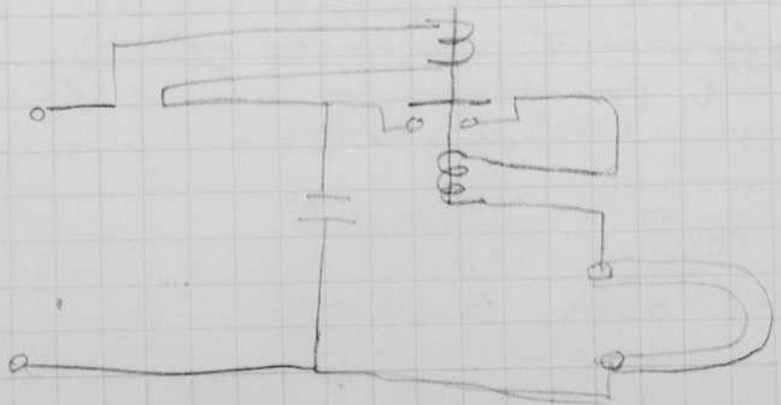
This could also be accomplished by a variable inductance in the primary. Vary by tips or by shorted turns or both.

Also tapped transformer.





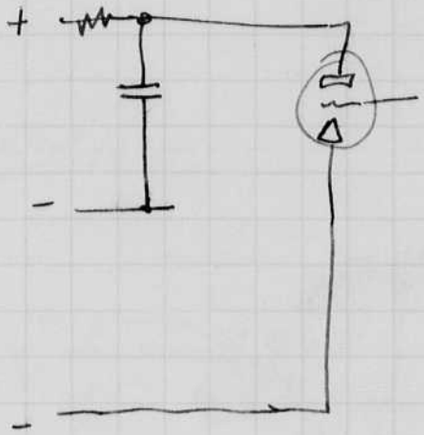




Oct 18 1941

Harold E. Edgerton

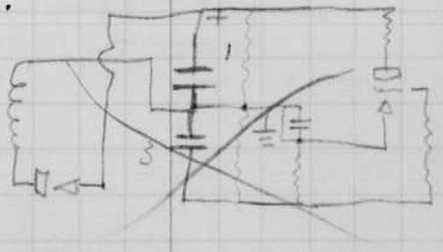
tried sweep circuit shown at bottom of page 124 last night. The thyratron held over for some reason which I do not understand. Possibly the grid connection is loose.

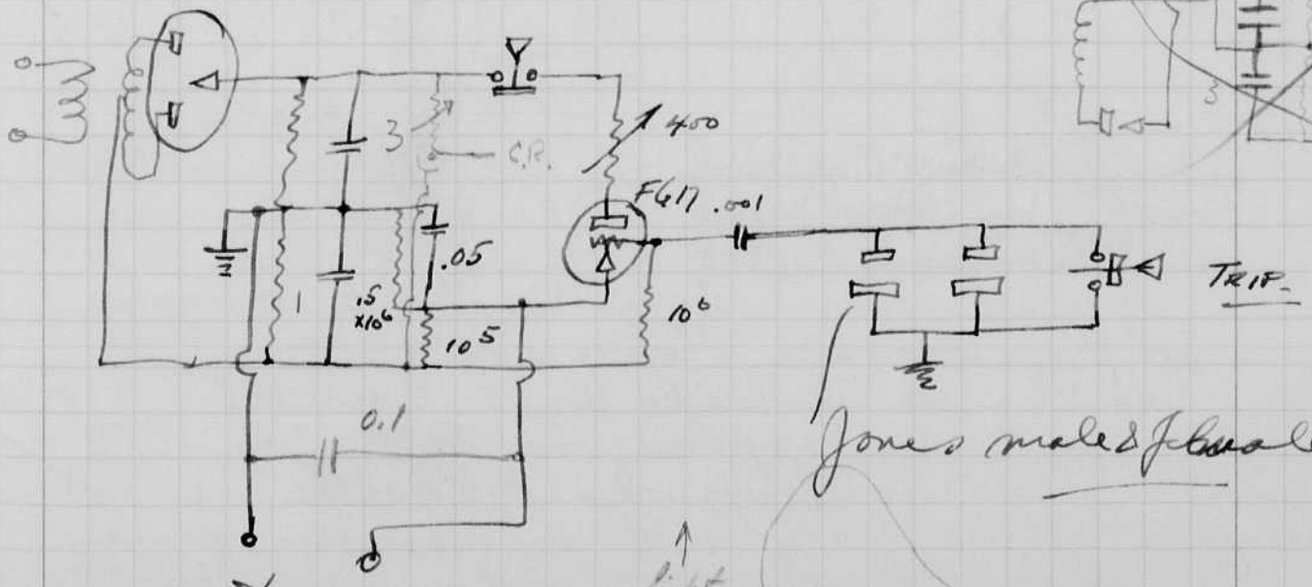


Two other thyratrons (FG17) were tried and they both worked ok.

The reset button is not needed

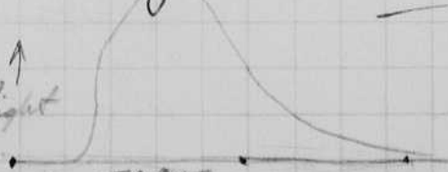
If a 10,000 ohm resistor is used in place of the 10^5 for charging, the thyratron holds over and misfires is bad.





Jones male & female.

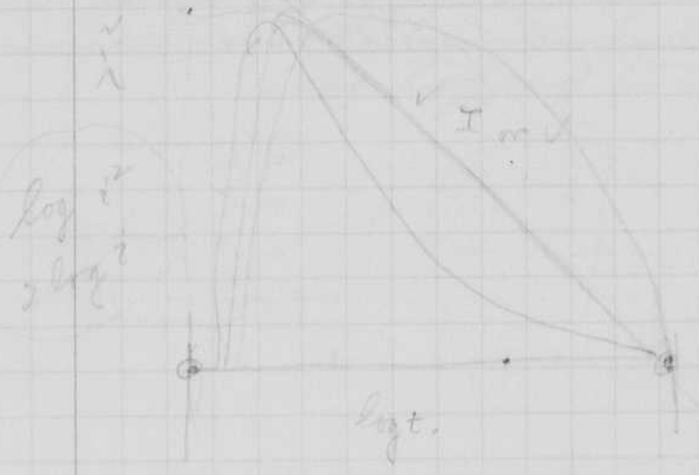
to CR tube.

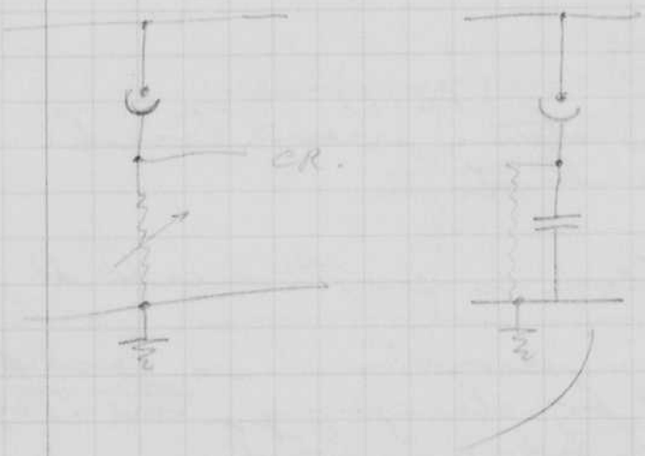


Cont.

6000 ohms put in series, with 400 in ckt

Portable $RC = .05 \times 10^{-6} \times 6 \times 10^{3} = .3 \times 10^{-3} = .0003$ sec.





To vary quantity of light.

$\frac{1000}{10^4 \text{ ohms}} = 10^{-2} = \frac{1}{100} = 10$ ma.

$i = C\frac{de}{dt}$.

$de = \frac{i\,dt}{C} = \frac{.010 \; 10^{-4}}{C}$ sec

let $de = 100$

$C = \frac{10^{-6}}{100} = 10^{-8}$ farads.

$= .01$ mf.

Resistance slowly returns to initial position.

$CR = 1$ sec.

$R = \frac{1}{10^{-8}} = 100$ megohms.

test shows Portable lamp 2 or 4 mf? 200 V. 15 A in reflector directly toward 192 cell 100 mf condenser fires about 1" dec. sen. plate at full voltage.

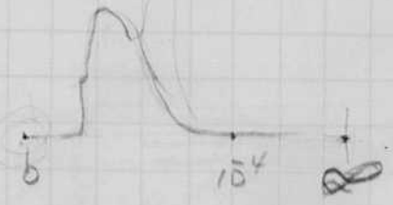
$\frac{1}{250}$ sec.

Data for plates.

$R = 2000\ \Omega$

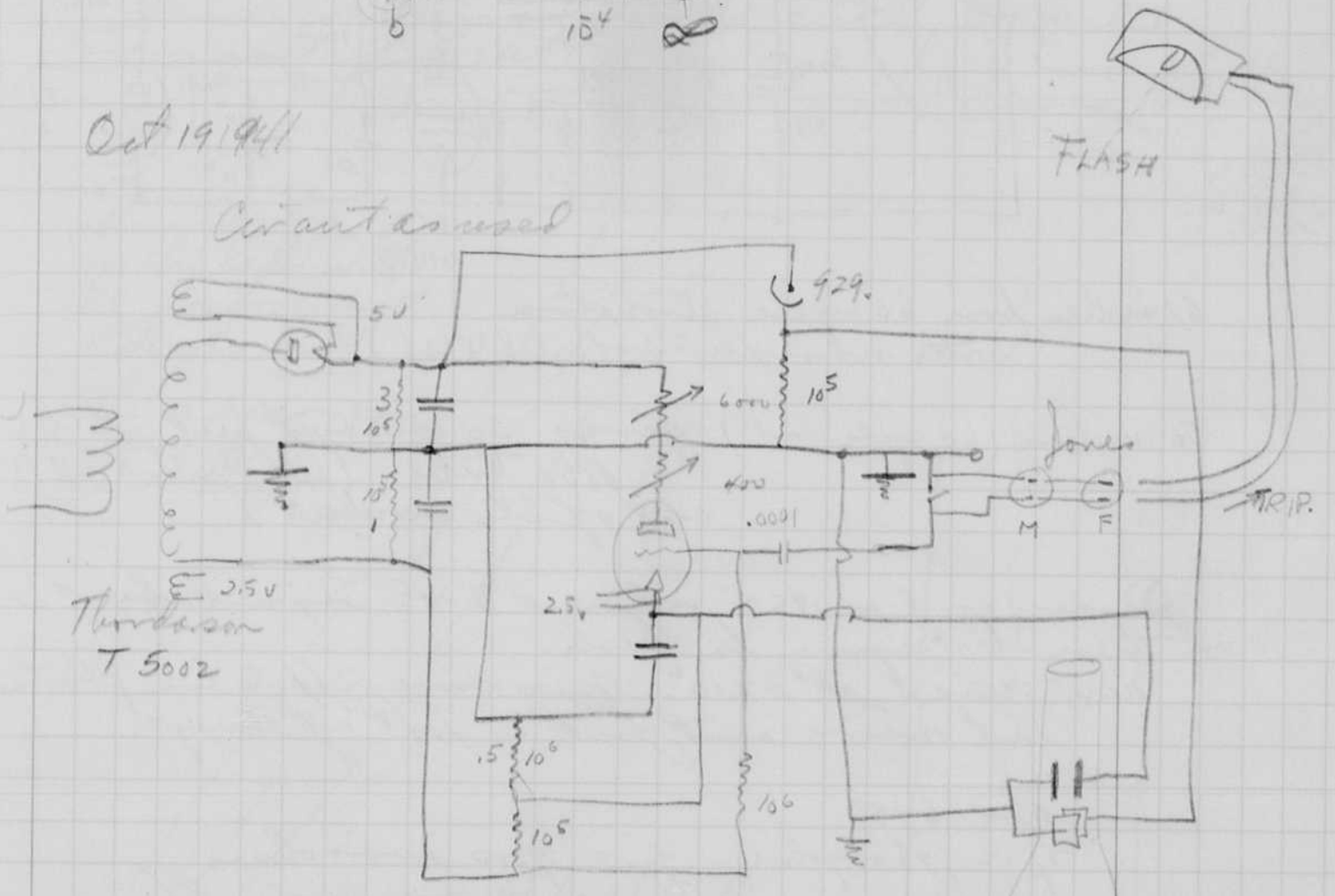
$C = 0.05 \times 10^{-6}$ $\quad RC = 2 \times 3 \ .05 \times 10^{-6} = 10 \times 10^{-5}$

$= 10^{-4}$



Oct 19 1941

Circuit as used



Kodatron lamp tests

No reflector.

7ft coil to lamp

$R = 10{,}500$ ohms.

Sweep $RC = 6400 \times .05 \times 10^{-6} = .320 \times 10^{-6} = .00032$ sec.

← Kodatron #3"/3 which has just been rewound further under exposure tests.

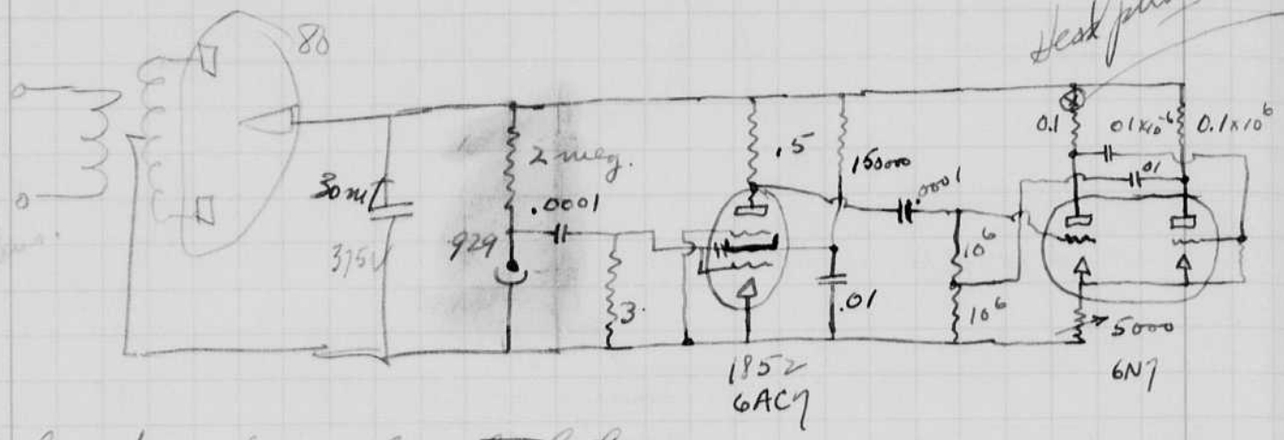
Kodatron sweep.

Oct 20 1944
Harold E Edgerton.

Amplifier to pick up ~~flash~~ strobe flashes for cloud height meas. etc.

cont from page 122

Heat plant.



375 / 150 = 2.5 V. / 7.5x10^-3 = 5 / 1000 ohms.

6' inches from 60 cycle strobotron with no reflector (on table top)

30 inches (60 cycle ..) gives 20 volt output on the 1852 tube. (with the 6N7 out of its socket).

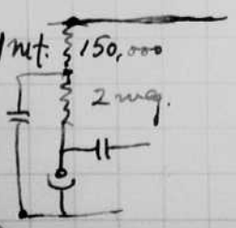
Screen grid on 1852 reduced to 10^5. Signal about 1/2 then 10^6 again to check.
next tried 3x10^6. Have some ripple in plate but more output. Left at 3 megs.

$\mu = 6750$
$r_p = .75$ megohm $\quad g_m = 9000$ micromhos.

μ output $= \frac{6750 \cdot .15}{.75 + .15} \doteq 3000$

Probably is much lower than this since low part of characteristic is used.
Scope on oscillograph.
2.5 volts on grid gives off scale deflection greater than 250 ± volts.

$\frac{1}{2\pi fC} = \frac{10^6}{377 \cdot .001} \doteq 3 \times 10^6$.



Put filter on photocell circuit. This cut down the hum and made distances greater as shown below.

8' 9" to open tank.

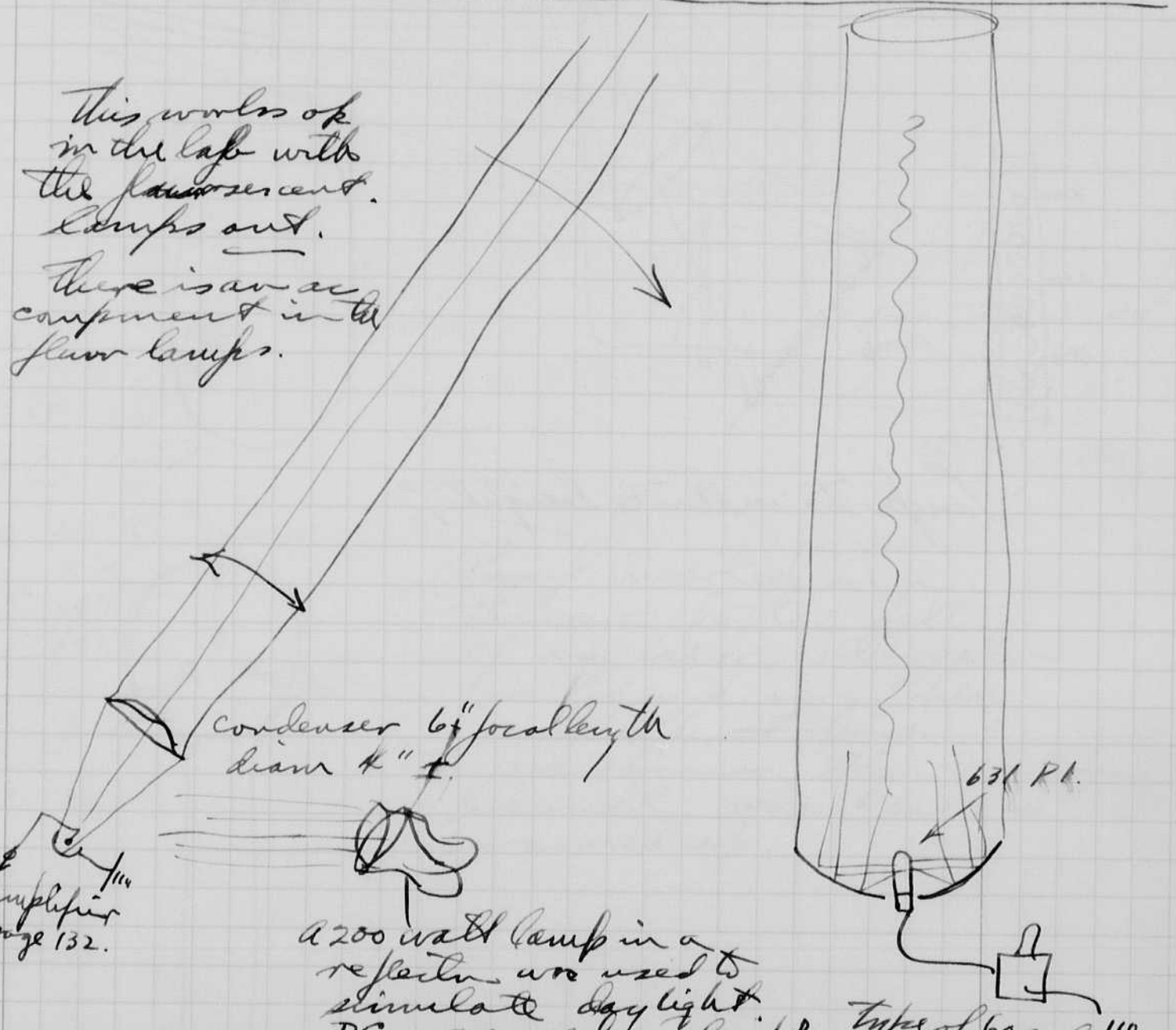
Cont

Head phone connected in series with plate of tube 1 of 6N7 at ⊗ for detector. The clicks are easily heard. Oscillograph CR. was used before on plate voltage..

Neon Strobe put in 18" Beam reflector which was aimed at the ceiling to make a spot of light

This works ok in the lab with the fluorescent lamps out.

There is an component in the fluor lamps.

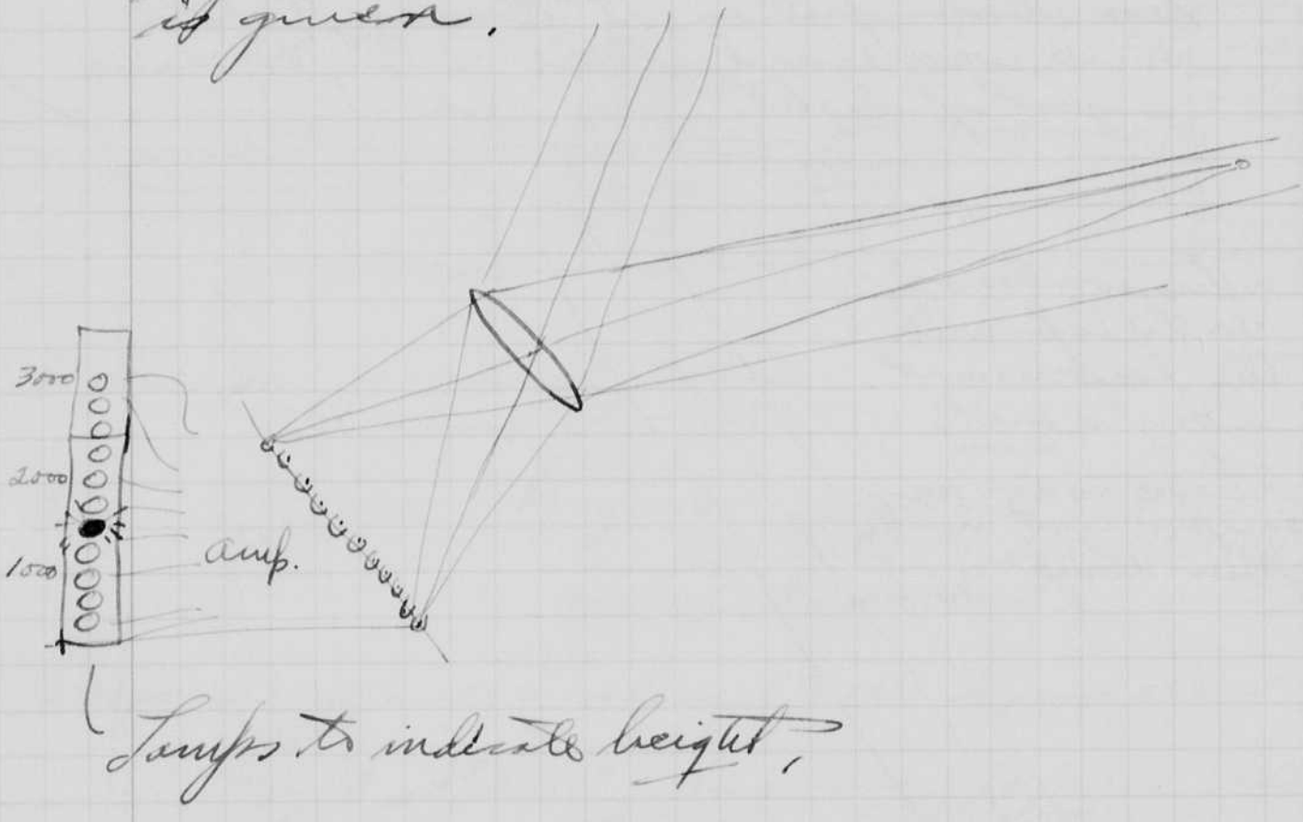


this was shown in operation to Ernie Ascoli at 2 p.m.

Cont.

Ceiling detector.

Since there is relatively little apparatus in the pickup part of the circuit, it is proposed to use a series of fuses and pickups with a recording system so that a continuous indication is given.

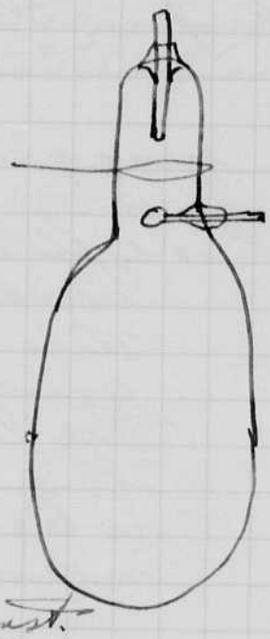


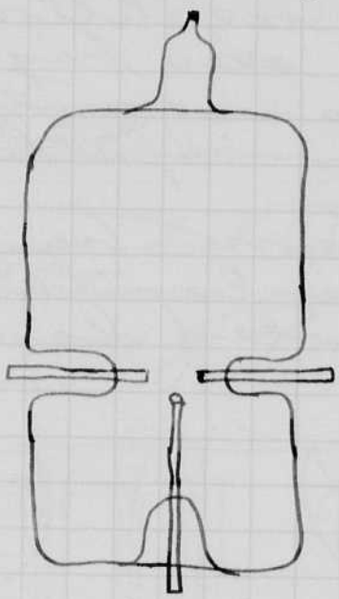
Lamps to indicate height.

High Pressure Lamps.

Oct 21 1941
Harold E Edgerton

High pressure lamps with short gaps have a high intrinsic brilliancy. However we have had difficulty with explosions when the amount of energy is increased. Possible designs are sketched below.





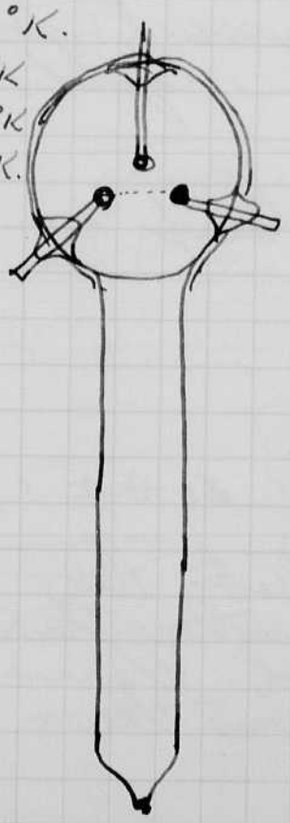
1 atm. 273°. K. 20°
20
1 293°. 20°

$p = 1 \frac{293}{273} = 1.1$ atm.

$PV = RT$

$\frac{P}{T} = \left(\frac{R}{V}\right) = \text{const.}$

2 atm 136° K.
3 " 91° K
4 " 68° K
5 " 54° K.



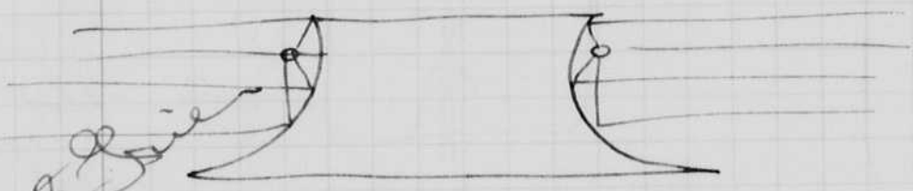
Pump inverted in a thermos bottle full of dry ice or cold water or liquid air. Then seal off. ~~at high pressure~~. High pressure results when tube is warmed up.

Arrows date.

Oct. 22, 1941
Harold E Edgerton

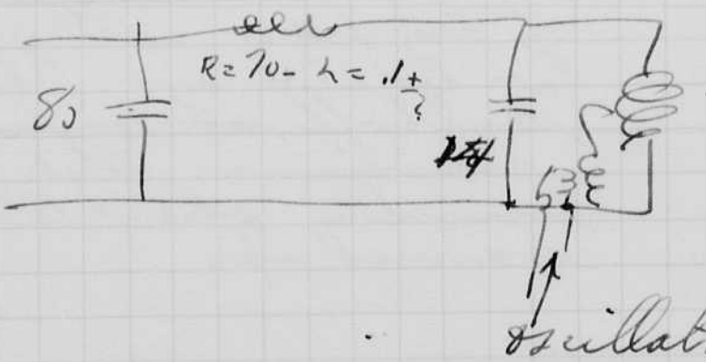
Barstow called by phone yesterday to inform us of experiments with the stroboscope beacon. He said the strobo beacon was lost to view at 40 miles while the regular beam was still visible. However the strobo was brighter when close, a memo was written today in the file concerning other observations.

Bemis Hansen suggested a circular tube in an inverted doughnut reflector as sketched. this should concentrate the light to a beam where needed.



Herbert E
10-23-41

Herb and I tried a multiple jack method last night.



It seemed to me that the flash was brighter with the inductance shorted. However Herb's observation was the opposite.

Oct 22 1941

Explained + Understood

Harold Edgerton.

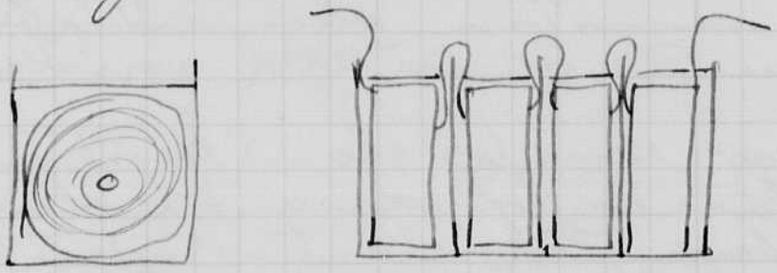
Herbert L. Grier

Frank Dunleavy was here most of the afternoon discussing electrolytic condensers.

He wired Magnavox for 10 sample condensers 80 mf 500 volt, so that we could experiment with them.

Weight 4 oz.
Capacity 80 mf
Voltage 500 — run at 450.

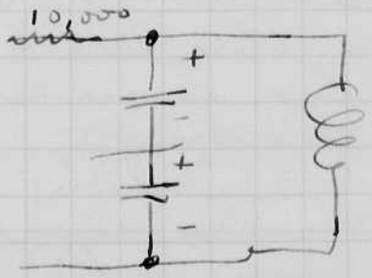
Hemmshaeuer suggested large rolls of material put into cases similar to a battery case, for this way 4 or 5 sections could be put in series.



Richardson
Melrose Park Ill
Cincinatti.
Bot. mfg.

Dunleavy is going to check into this design and let us know about limits.

Tests were made with a 200 ~~mf~~ mf Cornell Dubilier condenser 450 volts as follows.



= photocell. light recorder of Barstow.

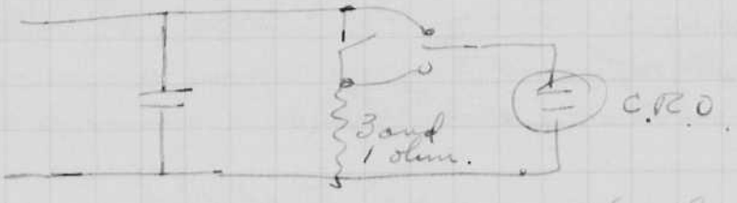
(2 - 200 mf 450 V in series) 70 units light

80 mf. Mallory plastic. 55 " "

Same voltage on each of the above units.

cont.

I also used the following test to measure the shunt circuit current and resistance of the condenser.



with 3 ohms the spot of the C.R. tube went to the open circuit voltage when the switch was shunted. One ~~ohm~~ resistor showed about .05 ohm to be in the condenser.

Our lamps now have a resistance of several ohms, therefore the electrolytic condenser can be from a series resistance standpoint.

The leakage may be another thing. According to Dunleavy the 180 mf 500 volt condenser has a leakage of 1 ma. at 320 V.

3200 of these condensers would be ample for the DIC 60 & Ammeter cup flasher would require 1.5 kw for leakage.

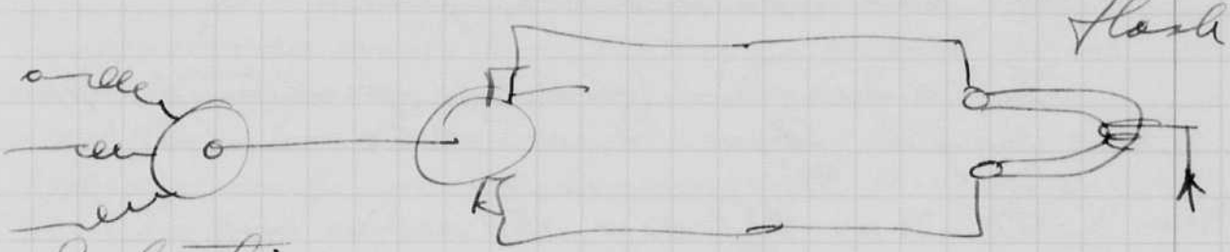
Leakage in the condenser for the portable unit may be a serious ~~problem~~. It can be reduced with design.

Oct 23 1941
Harold E. Edgerton.

Flash lamps.

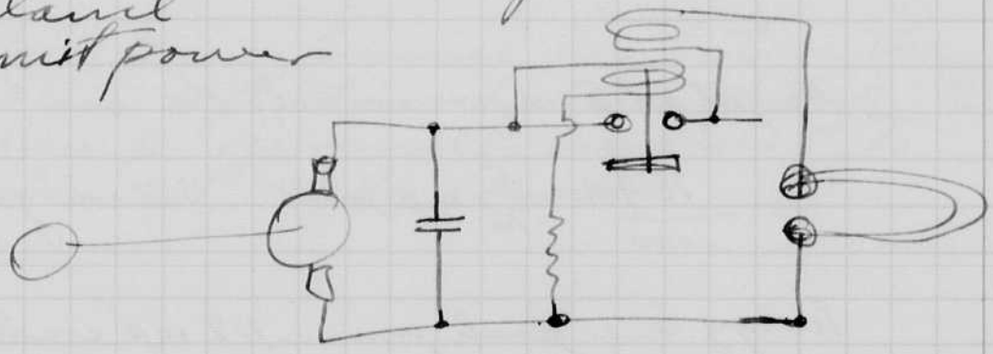
The beacon (airplane) needs more light and a longer duration. The condensers begin to be expensive and large for the application.

~~Stored~~ energy in a rotating machine should begin to solve both problems.



Induction motor with reactance to limit power

D.C. generator.



Relay to put lamp out on fast rates

the generator will slow down when the flash comes. It will speed up in the dead period.

Oct 24 1941
Harold E Edgerton

Talked to Lyman Johnson on the telephone this morning about the quartz tube requested for DIC 6016 - Deming dimp contract. He said it would be shipped on Monday.

Oct 26 1941

Several days ago I made the following calculation upon the temperature of gas in a discharge tube when a condenser was discharged.

Tube dimensions (Kodatron speedlamp) approx length 50 cm. (20") diam 0.63 cm (¼")

Volume = $\frac{.63^2 \pi}{4} 51 = 15.9$ cubic cm.

Mass of 1 liter at 76. cm pressure and 0°c = Kr = 3.708 gr.
Xe = 5.851 ..

Weight at 5 cm pressure. Kr.

$$\frac{15.9}{1000} \times \frac{5}{76} \times 3.708 = 3.88 \times 10^{-3} g = .00388 g.$$

Energy in a flash from a 112 mf condenser at 2000 v.

$$CE^2/2 = \frac{112 \times 10^{-6} \times 4 \times 10^6}{2} = 224 \text{ joules.}$$

$224 \times .2389 = 51.2$ gram calories per gram per C°

$$t_2 - t_1 = \frac{N}{mS} = \frac{51.2}{3.88 \times 10^{-3} \times .24} < 55 \times 10^3 = 55{,}000.$$

S = specific heat
= .24 (estimated)

This calculation is too high since it assumes that all the energy goes into raising the temperature of the gas. Energy is also used for (1) radiation, (2) heating the walls (3) heating the electrodes, and (4) moving the gas (sound).

In an actual tube at the pressure

mentioned (5 cm) the arc does not fill the entire tube. The arc is small in dimension in comparison to the tube diameter. Experiments also show that the arc path wanders back and forth in the tube in a periodic fashion.

In looking for the specific heat of Kr in the (p 1118) Handbook of Chemistry and Physics, I noted that the S of I, Br, and Cl were

.034 .055 0.1149 while air was 0.24.

the values of S for Kr and Xe were not given.

Thus these vapors should reach high temperatures with less energy input than with other gases having a higher S. This was discussed with Dennis and Herb. and experiment were discussed. An Iodine tube has already been made but it did not appear promising when tried some time ago.

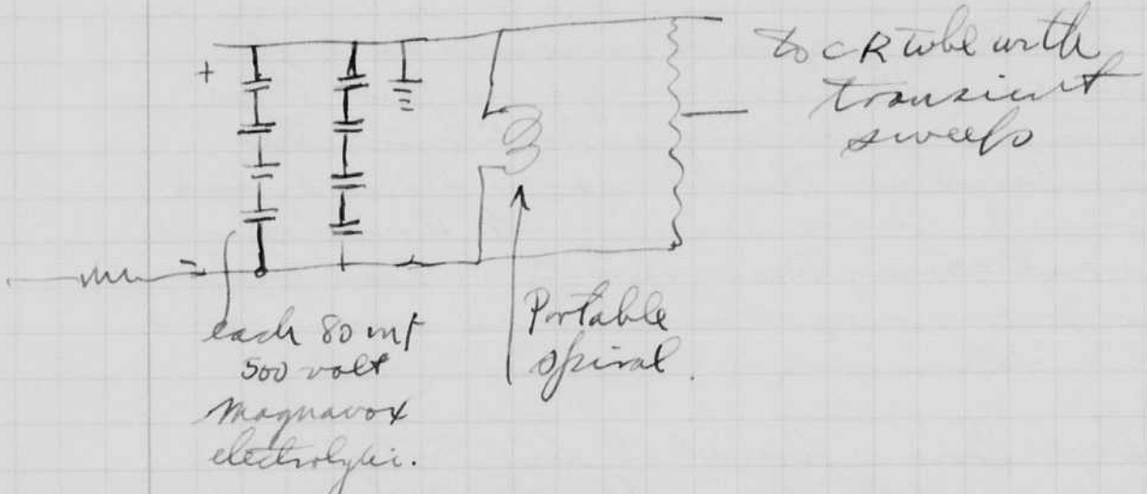
Herb Grier finished his tests on the sealed beam reflector with the spiral flash lamps. His results were sent to Johnson at Nela park.

Oct 29 1941

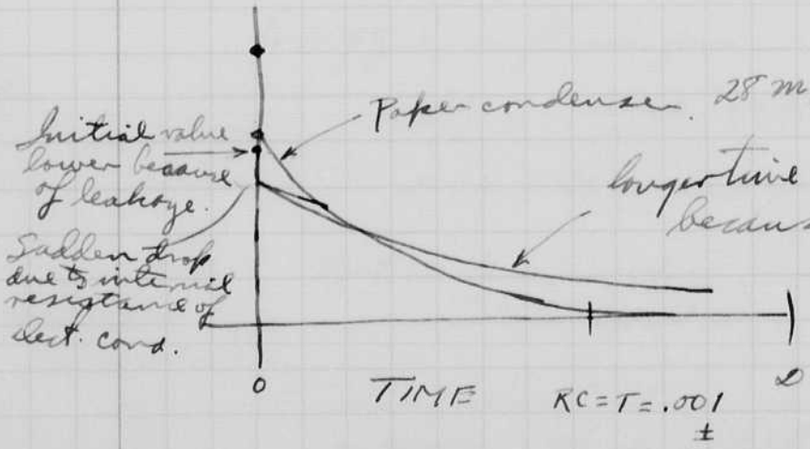
Harold E Edgerton.

The electrolytic condensers (page 131) were received and have been tested. They are not as efficient as paper condensers per microfarad but are more efficient per pound. They are best with ~~the~~ tubes of high resistance.

A cathode ray oscillograph was connected as shown below.



The oscillograph of voltage time is shown below (sketched)



I spent most of yesterday preparing for a trip to Dahlgren Va ~~for~~ the Navy Dept. Chas Wyckoff is going with me, taking both movies and multi-flash high speed photographs.

Nov 13 1941
Harold E Edgerton

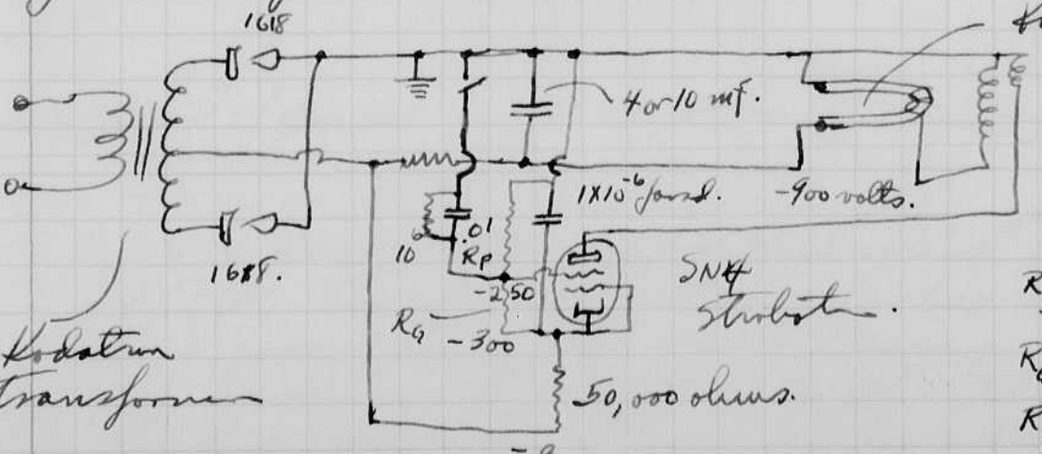
Chas Wyckoff went with me to Dahlgren Va to photo assembly "G" for the Bur of Ships. We went in my Ford wagon on Oct 30 at 10 am. Saw mill at 6 arrived at Dahlgren at 11 am on Oct 31. Our movie apparatus was set up and tested on Oct 31 nov 1 and 2 in preparation for tests on Nov. 3. Details are in Charlies note book. 300 frames per second movies were taken on positive film with 1 mf at 1600 volts. f 4.5 A cover was put over the object so that the ~~light~~ would not be influenced by day light. Nov 4 a last shot was made at 1030 am. Left for work at 12. arrived at Phil at 730 pm. where we met Lemen at the Ben Franklin Hotel.

Next morning at New York at 10:30 at Mili studio. Then at 130 met Land & the North Carolina U.S.S. at Brooklyn. Mr. Copenhaver was our guide.

Nov 10 and 11 took high speed photos of the Rides in the Boston Sargent, Jim Harbert. Fred Russell helped ~~also~~ Charlie.

Nov. 17, 1941. Studio pictures of Mary Starks, dancer Mr. Goldberg is her accompanist.
with the Orch.

Decided to 10 flash per second strobe scope for flood of Princeton mi.



$R_B = \frac{50000}{4} = 12,500$ ohms.

$R_G = \frac{12,500}{6} = 2,090$ ohms.

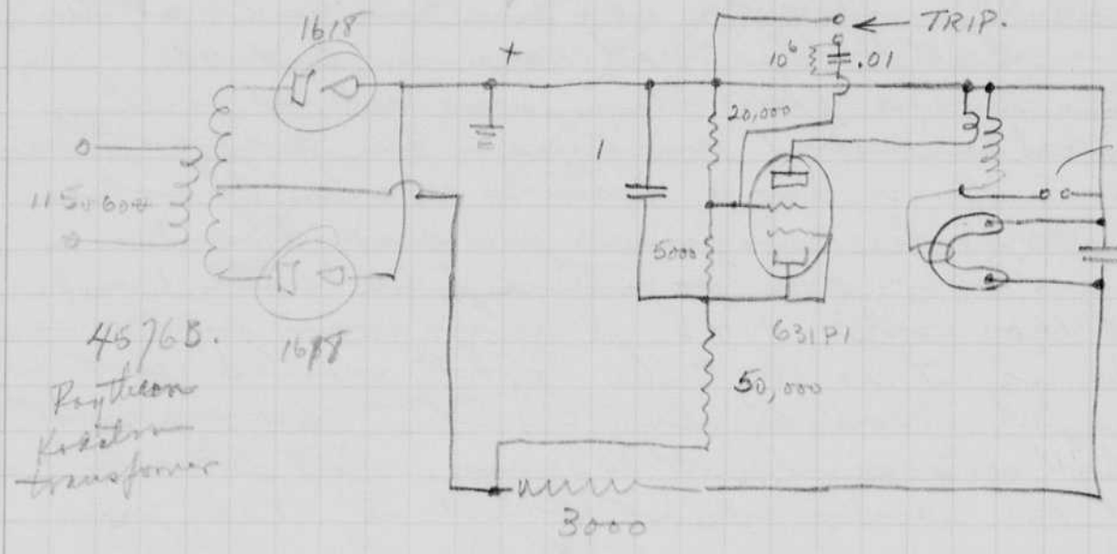
$R_P = 10,000$

19

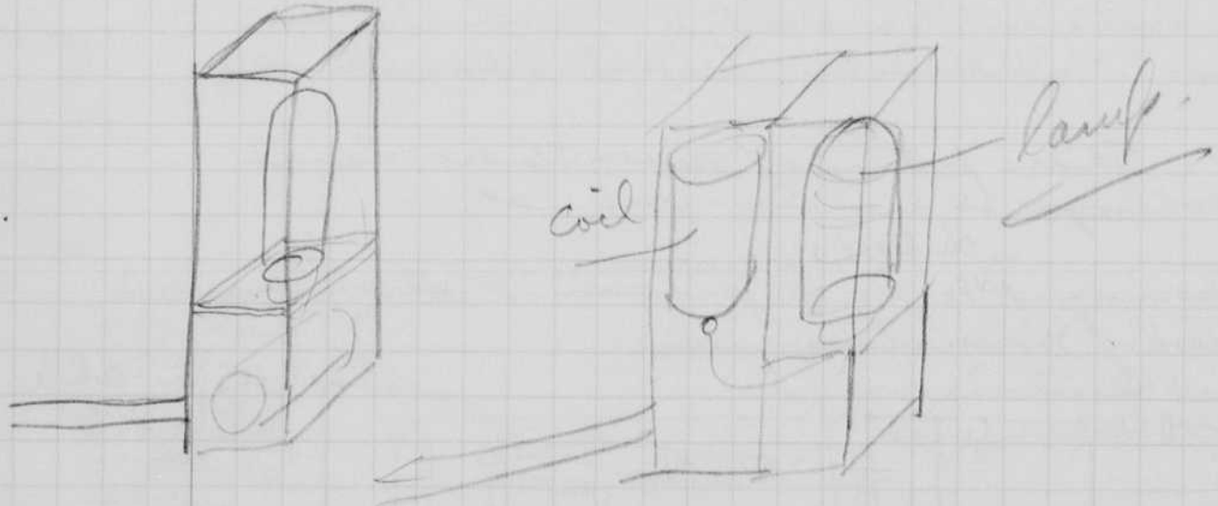
Nov 18 1941

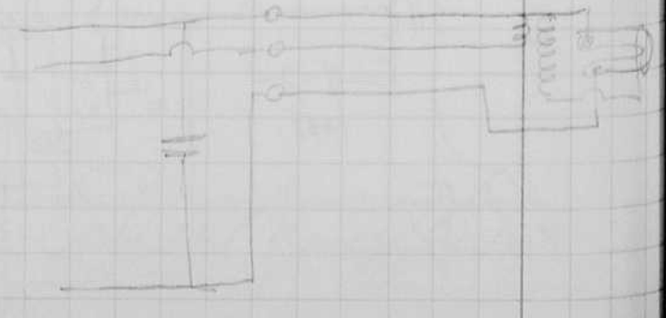
Shield Ejector

Chas Wyckoff and I wired up 10 cycle feeder as per schedule of page 143. Exact constants are given below.



Photos were taken of a white subject at f 3.5 on Sound recording movie film with 2 mf at 10 per second. Temp 6" (45°). from subject. Cardboard reflector.





Notebook # 11

Filming and Separation Record

____ unmounted photograph(s)

__1__ negative strip(s)

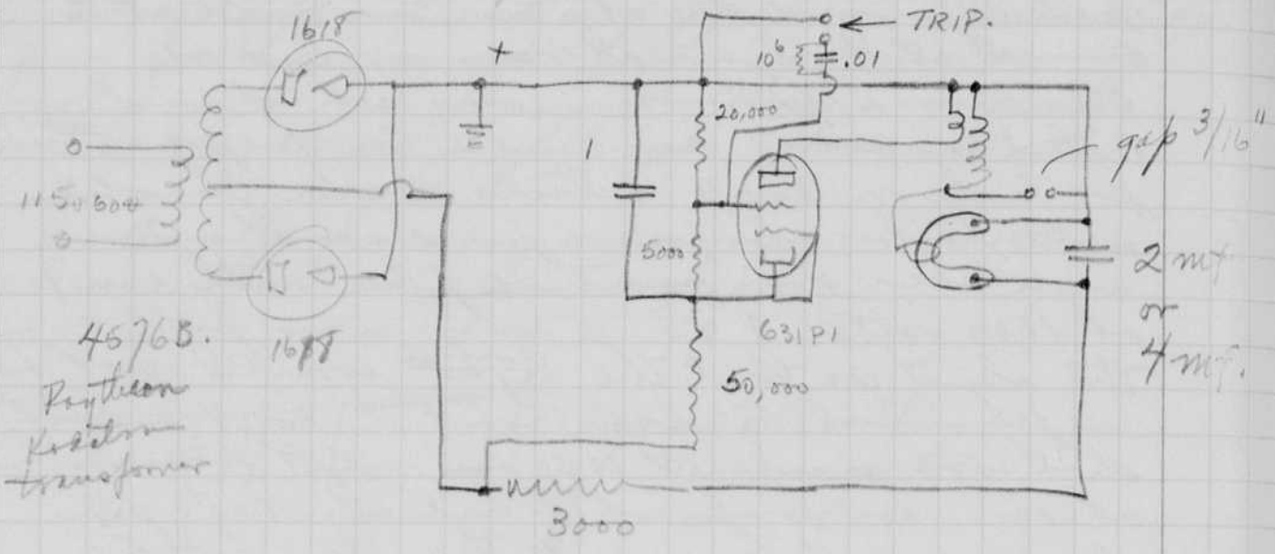
____ unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located between page 144 and 145.

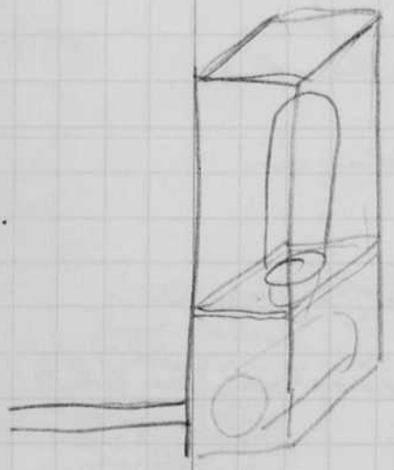
Item(s) now housed in accompanying folder.

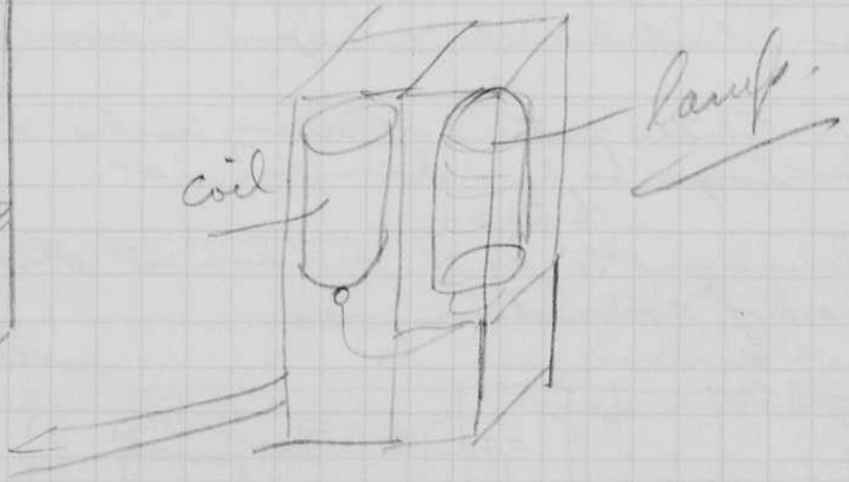
19
Nov 13 1941
Shield Ejector

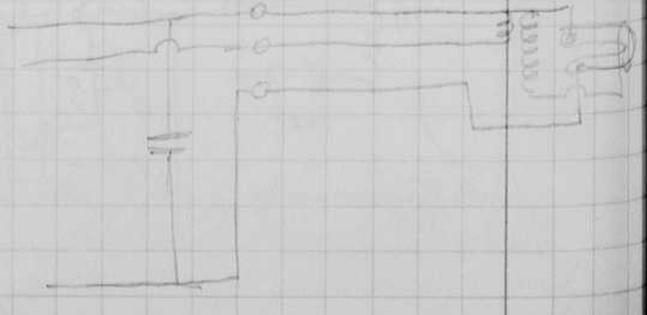
Chas Wyckoff and I wired up 10 cycle tester as per sketch of page 143. Exact constants are given below.



Photos were taken of a white subject at f 3.5 on Sound recording movie film with 2 mf at 10 per second. Lamp 6" (45°) from subject. Cardboard reflector.







Notebook # 11

Filming and Separation Record

____ unmounted photograph(s)

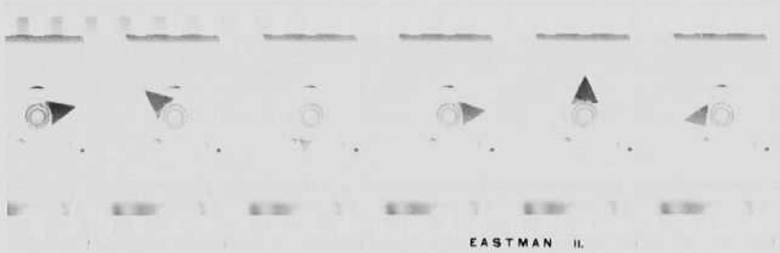
__1__ negative strip(s)

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

was/were filmed where originally located between page 144 and 145.

Item(s) now housed in accompanying folder.

Brian's data.


EASTMAN II.

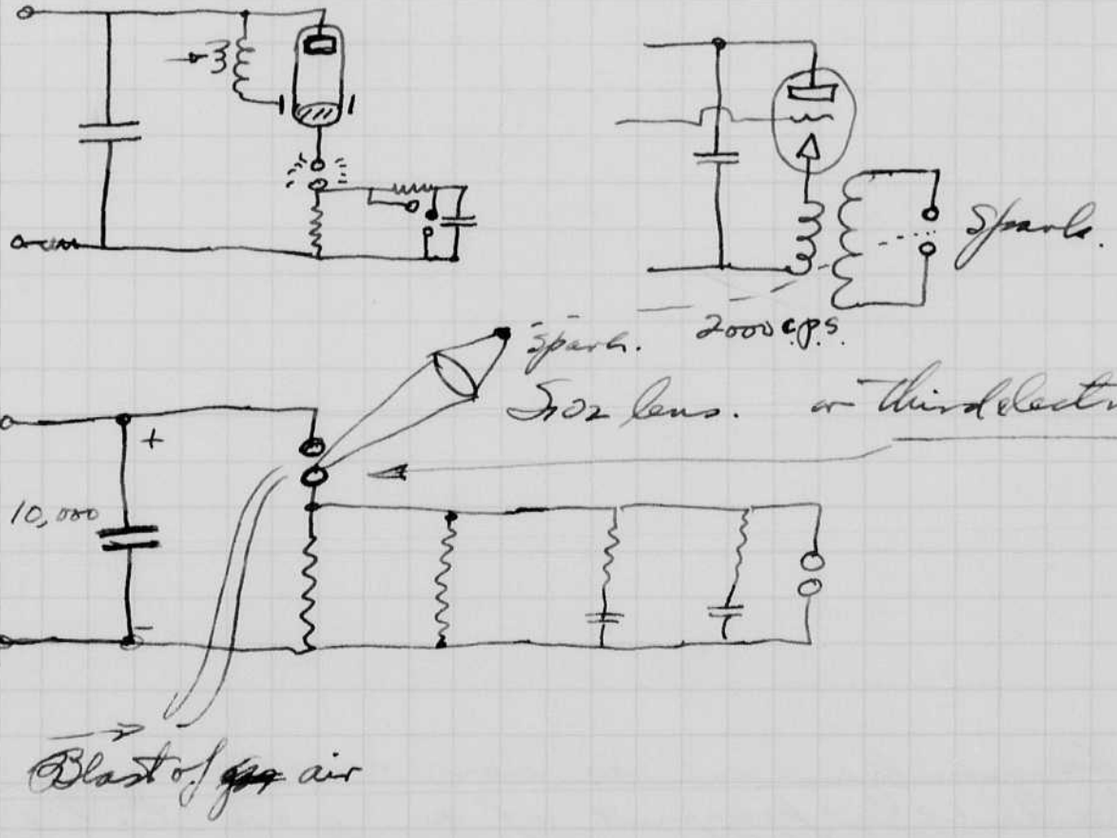

KODAK

Nov 25 1941

Harold E Edgerton

John Trump and White came in Wednesday Nov 19th to discuss our possible help on the power problem of the radiation lab. apparatus. It was proposed that Germeshausen work part time on the project. He would be given assistance and an assistant to make tubes and experiments.

Bill Tucker was here this morning. He is now in New York at the Praire with the navy Department, training men about diesel engines.

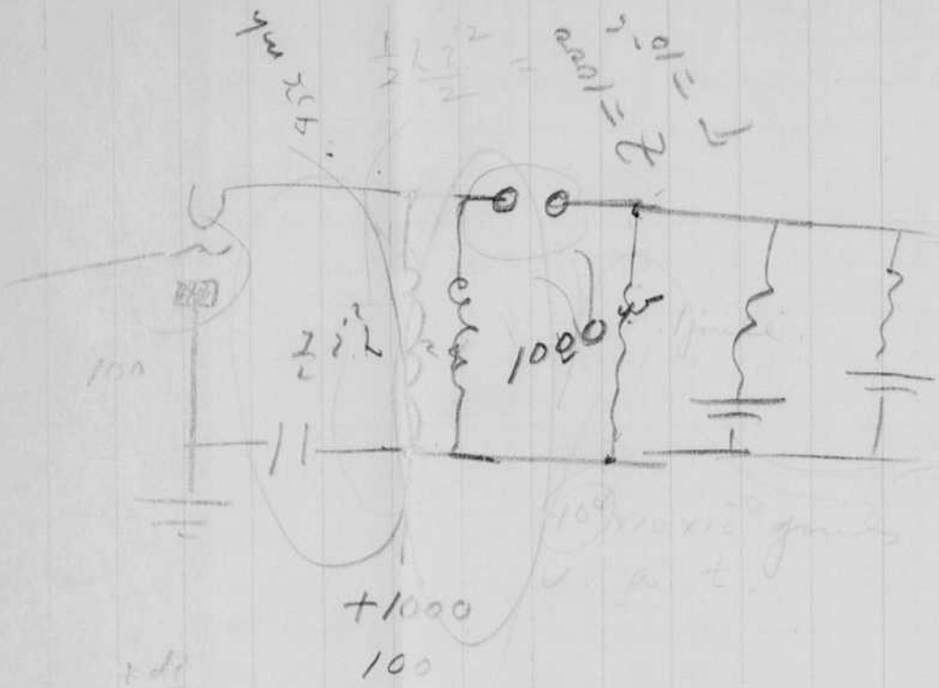


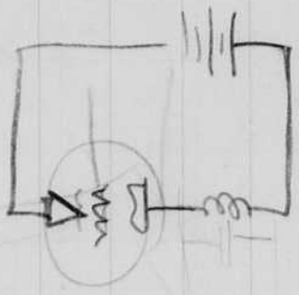
I sent the Infra Red unit to Joe Boone at the Eastman Kodak Co Rochester. this was built by Herb Grier and tested by him and Dr Wyckoff. the unit had a sealed beam lamp with internal Infra red filter # 8871. (over page)

← Send drawings file and Erwin's data.

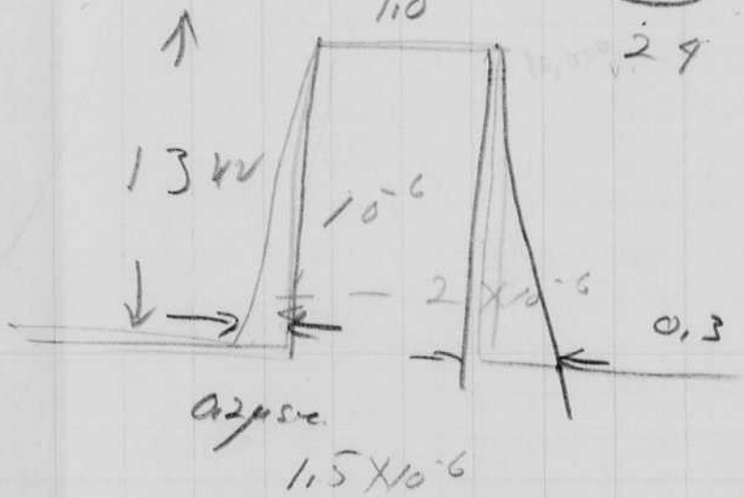
Nov 24 1941 Washington.

Notes made by White in explaining problem about Nov
of pulse excitation to Dennhausen & Ney





+1000
100



(12) — 12

29

Dennhausen is now working on the development of a gas tube to cut off the current, or some other method of producing a square pulse of the desired form.

Nov 29, 1941.
Harold E. Edgerton

Erie and I went to the Raytheon Plant in the morning. I checked the voltage on the Kodatron speed lamps which were being tested.

Input 113 ac. (our meter) 1920 volts dc.

" 125 (124) 2095 " "

Today Fred Barton and I examined the B24 airplane at the Boston airport for installation of our multiflasher for night photography. Finch with Scott and Conant at airport. Dan Hagler.

Bert and Zimmo are testing reflectors and flash tubes today.

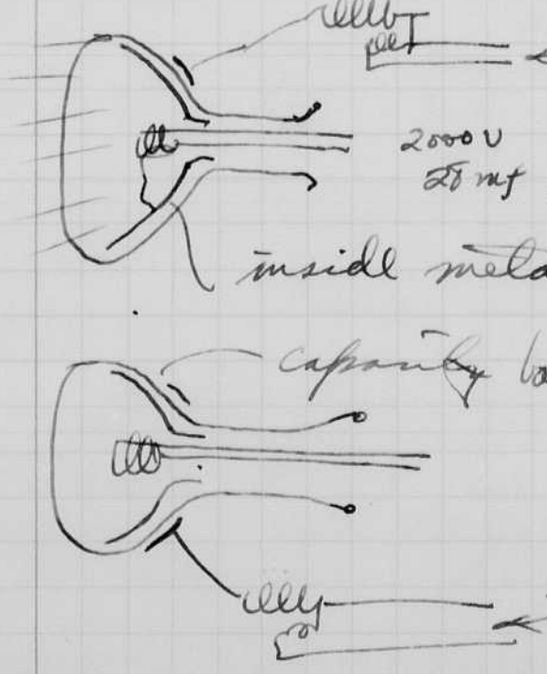
Dec 1, 1941
Harold E Edgerton.

Ignition method.

Use the inside metal coating of a glass lamp as the starting electrode with capacity to complete the circuit. This simplifies the socket problem since the high voltage spark then does not need to be ~~insulated~~ brought in through the base and socket.

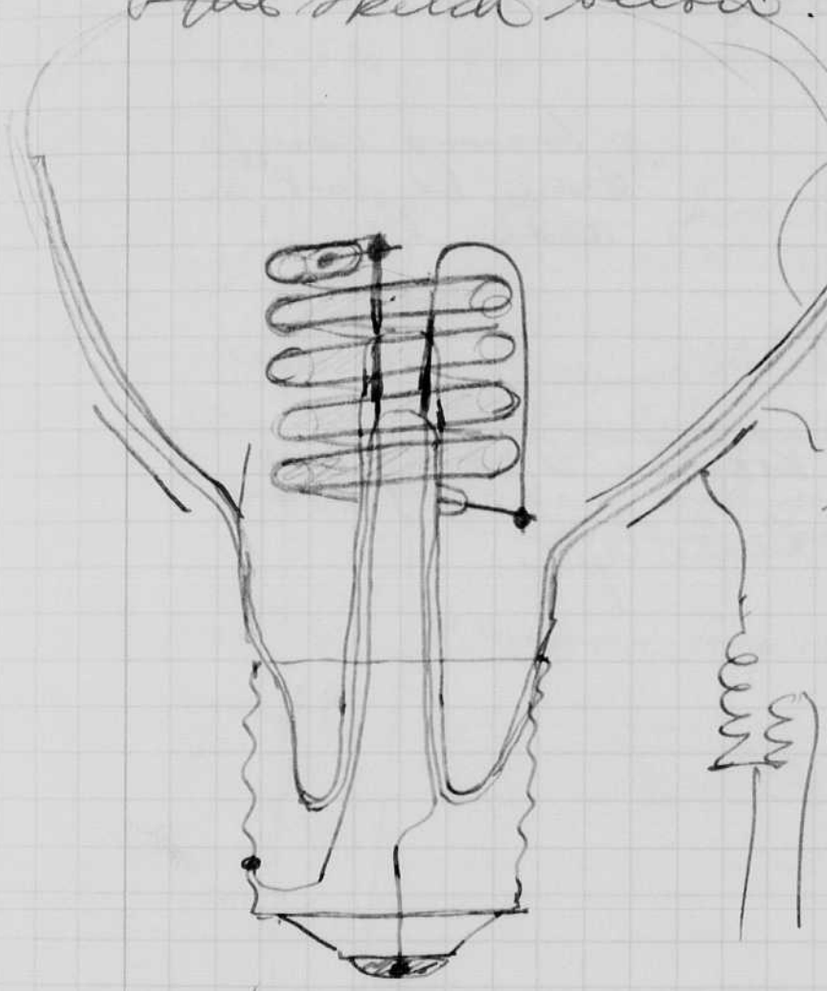
Herb and I tried this and it works out fine. We used an R40 bulb that R.E. put recently with an. portable spiral lamp.

It worked ok with a wire from the starting reflector to the lamp starting band. Also it worked with out a wire but with a capacity of a clip lead clip (part of the lamp). A 4 sq cm contact made starting certain.



Cont'd

We tried a mogul base as a terminal for the 2000 volts wires. this will give sufficient spacing plus rigidity. also the stem construction of a regular base will give strength from the outside as shown in the sketch below.



Internal mirror reflector and starter electrode.

external starter elements.

the tube is filled with air or with nitrogen at about pressure.

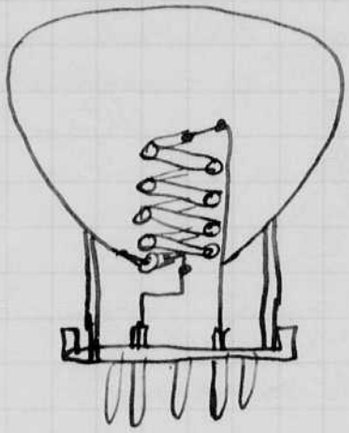
12-1-41
Herbert E. Ives

An air mail letter was sent to Lyman Johnson at G.E.Co. Nela Park Cleveland today with a description of this lamp, a request for comments and, a request for samples.

Dec. 2, 1941
Harold E Edgerton.

Germeshausen and Grier continued the discussion of the basing problem this morning and decided to use the 5 prong radio base that is now used on the Kodatron. a sealed reflector P40 Bulb will be used.

at 2 half angle 32.6° with 127 mm lens and 4x5 film.



a focusing lamp can be put in also.

Kodatron 5 prong base.
Radio type.

(Kodatron lamp)

Steel Spiral life test.

Posted in Dec 3 1941

H E Edgerton

160 mf 1800 volts

5 flashes per second.

	START	STOP	HRS.	
July 16 41	9.30 am	12 am	2.5	transformer too hot. Tungsten cathode
	1.00	5	5.0	changed to ~~to~~ 80 mf.
July 16	830 am	530	9.0	~~continued~~ 80 mf.
17	830 am.	—		
18	—	430 pm.	44.	first turn - discolored black & Blue
19	o/f	o/f.		
20	1130 am	5.15	6	93 hours total. @ 720 = 66,960 flashes.
T. 22	8.45 am	11:45 PM	27	Stopped flashing - ~~Hyatron pitted~~ Condenser shorted.
23	850 am	9.55	—	new condenser. Reversed leads to lamp. Condenser shorted. 15 min.
29	230	6		#3 condenser. Lamp reversed. 2.5
Aug 1	1050 am	5.30		7
2	8	10.30	— 3 1/2	11 1/2
4	11	530		6 1/2
5	915	530		27 1/2
				720
				flashes. 19,700.

12x60
720
93
2160
6480
66960

anode cathode.

147

~~anode~~

Notebook # 11

Filming and Separation Record

1 unmounted photograph(s)

____ negative strip(s)

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

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

Item(s) now housed in accompanying folder.

anode cathode.

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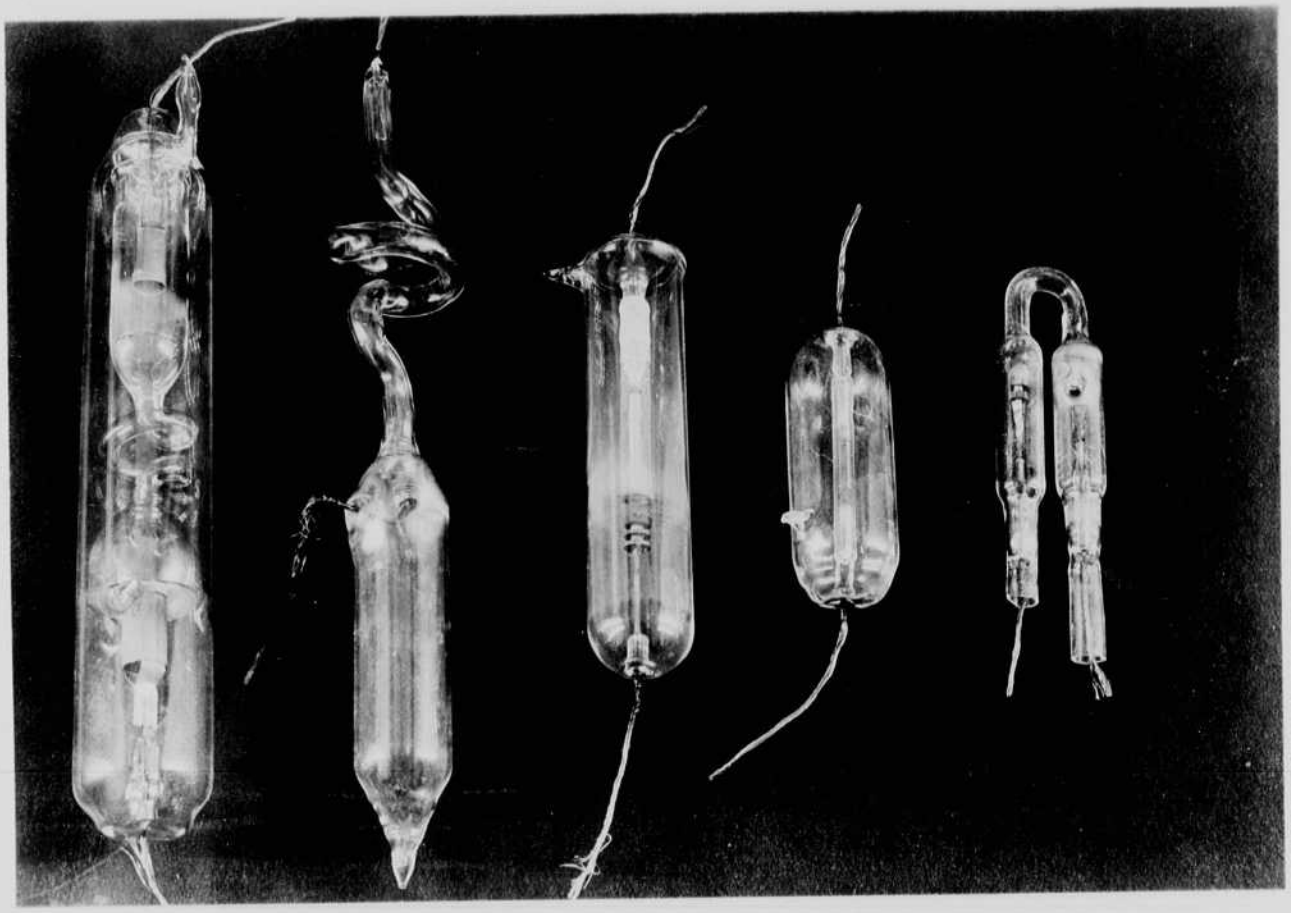

CONTINUED
ON
NEXT REEL