HAROLD E. EDGERTON

PAPERS

MC 25

Series III

Laboratory Notebooks

Number 31

Dated Jan 11, 1973 to August 17, 1975

COOP COMPUTATION BOOK

152 NUMBERED PAGES / 11¾ x 9⅜

NAME

HAROLD EDGERTON

31

STROBE LAB 4-405 M.I.T.
CAMBRIDGE MASS 02139.
494-8783.

Course

Used from JAN 11 1973 Aug. 17 1975

HARVARD COOPERATIVE SOCIETY
1400 MASS. AVE., CAMBRIDGE

TECH COOP
MASS. AVE. CAMBRIDGE

Book No. 31
Jan. 11, 1973

Eye Pattern

EYE

April 14 Sat 9:15 am. 73
April 27 F 11 am.
May 9 10:30 am
July 8 1973 6:50 am.

Jan 74 4 pm during
JAN 6 '74 8 am in Bed.
Feb 74
Nov 11 74 10 am & in Washington
5 pm
Mar 12 74 Double vision at 3 pm.
AUG Twelvies. 1974
end 74

Mar 25 75 11:10 am 75
May 8 75 5.00 pm
May 8 5. am
25 12 noon
Mar 28 APR. 1:10 pm

Aug 16 7:10 am 1975 very strong.

Lectures at N.G. Society

" 1938 Feb 25 Seeing the Unseen
" 1949 Feb 11 " " "
" 1966 Mar 3,4. N.S. Photo.

Harold E. Edgerton
M.I.T. Room 4-405
STROBE LAB.
JAN. 11, 1973.

Light meter Gossen Luna-Pro
May 1973 - # 595834 about $75.
2 mallory PX 625 or PX 13 batteries

Notebook # 31

Filming and Separation Record

____ unmounted photograph(s)

____ negative strip(s)

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

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

Item(s) now housed in accompanying folder.

NOTEBOOK PROCEDURE

This laboratory notebook and its contents are the property of _____. It is specifically assigned to you, as an individual, and it is your complete responsibility while charged to you. The records contained herein are confidential. The notebook must be returned to the Librarian when completed. It must be surrendered upon request, upon transfer to another position within the company, or upon termination of employment. After this book is completed, return it to the Librarian and another notebook will be issued to you. If at a later date the completed one is needed again, it may be obtained on a loan basis.

Original entries systematically and properly made in the course of the author's work are the best record of accomplishments. It may be the only source of information for reports or future experiments. This notebook may be the deciding factor in litigation involving the question of inventorship. The date of witnessing is usually the controlling factor. Therefore, it is important that the following instructions for keeping the notebook become standard practice.

INSTRUCTIONS FOR KEEPING NOTEBOOK

1. Fill out the title page.
2. Use index to show changes in subject matter, and keep page references current as work progresses.
3. Fill in the Subject Matter (or "continued from page.....") and Date at the top of the page before any entries are made thereon. The page should be signed and dated at the bottom by the author at the end of each day.
4. If any blank space is left between the end of an entry and the signature, this space should be crossed over with a diagonal line. No blank lines or spaces should be left in the text.
5. Each page should be witnessed at the bottom by someone who is not engaged on the same project, but who understands the subject matter appearing on the page. The witnessing should be done as soon as possible after the page has been signed.
6. Make all entries consecutive, leaving no intermediate whole original pages. No pages should be torn out or defaced.
7. USE INK OR BALL POINT PEN IN MAKING ENTRIES, DO NOT USE PENCIL. Do not erase or use eradicator. If necessary corrections are being made on the day of entry, the words to be corrected should be struck over and the corrections entered above them, and the margin at the lines involved should be initialed and dated to show when the corrections were actually made. No entries should be made on a page after the page has been signed and dated, but if any corrections are needed or if some of the remarks already entered need to be amplified or explained, this should be done by a suitable entry on a subsequent page bearing its own date and appropriately cross-referenced to the prior page(s).
8. Handwritten entries should be made each day to record the actual work done and the results if available. Results which are received later should be entered on date received and referenced back to previous page(s).
9. Enter original data. DO NOT MAKE ORIGINAL NOTES ON LOOSE PAPER AND LATER COPY THEM IN THE NOTEBOOK. Plan the presentation before writing, so it can be easily read and understood.
10. Test results should be recorded in full. Make sufficiently detailed records of the exact materials and apparatus used, the precise test conditions applied, and the specific procedures followed in the conduct of experiments, to permit exact duplication of those experiments by someone else later on, should that become desirable.
11. Any tabulations, curves, or other data derived while conducting an experiment or test should be permanently secured by gluing or taping to a page in the notebook. These inserts and/or the notebook pages to which they are secured, should be dated, signed and witnessed in the usual manner. If the data or drawings are made by someone else, they should be dated and signed by the person making them and separately witnessed, before they are incorporated in the notebook.

12. Any separate drawings or data referred to which will not be fastened in the bound notebook should be cross-referenced to the pertinent page in the notebook, signed, dated and witnessed. Such original drawings and data should be identified and filed so they can be brought together with the notebook for permanent records.

13. If two or more persons are working on the same project, each should keep his own individual notebook and if anything is copied from one book into another, a notation should be made as to where such material originated.

14. Photographs of materials, apparatus, and set-ups which can conveniently be taken by a Polaroid Camera, should be marked on the face thereof as to the date the photograph was taken, by whom, the location, and the subject matter, and then fastened permanently in the notebook with appropriate written comments. Photographs which might at some time need to be transmitted to other Company Divisions or Subsidiaries must be made with a process producing a record copy.

15. If any unusual lapses in activity on a particular project will be evident from the notebook entries, or if entries relating to more than one project are interspersed, the periods of inactivity may be excused or explained by showing activity by someone else, for example a draftsman working on drawings or a model maker preparing a model, or by having to wait for test results, delivery of materials, instruments or parts, or by vacations or illness. These are all of importance from the standpoint of proving diligence.

16. When a study, investigation, or unit of work has been completed, record a brief summary of your interpretations of the results. (See Dont's below.)

17. When work is done under the direction of or at the suggestion of someone else, a notation of this should be made.

18. Whenever you conceive an idea that you think has merit, immediately effect a disclosure by recording it in your notebook and have it read, understood and witnessed by two people. If the idea occurs to you anytime you are away from the work area, record it and have it witnessed as soon as you return. Prepare a witnessed copy for your supervisor so it may receive the attention it deserves.

19. When an idea, process, etc. of any importance is finally found to be workable, demonstrate the process in the presence of witnesses, other than co-inventors, who are able to understand it. These witnesses should sign the page in the notebook, describing the demonstration carried out in their presence.

20. This notebook must be kept in a protected place. If loss occurs, notify your supervisor immediately and make a written report describing the circumstances of the loss.

Dont's

(1) Avoid unnecessary or ill-considered statements or suggestions as to impracticability or inoperativeness of proposed solutions to research problems. Unnecessary and gratuitous criticism of this sort may impair the establishment of sound legal right to those or related solutions.

(2) Wild or careless speculation and conjecture should be avoided, as should any unnecessary emphasis of failures. These may tend to discredit work which was really successful and operative from the purely scientific or patent standpoints.

(3) As a general rule, we should refrain from commenting on the products of our competitors.

Close adherence to these rules by all persons concerned will help to effectuate our policy of improved and most complete record keeping, and will also be of value in the establishment and protection of our rights to inventions, discoveries and knowledge in the areas of our scientific and technological progress.

Jan 11 1973

Harold Edgerton.

I go to St Paul today at 5 pm on N.W. for a conference on underwater archeology. Bob Wheeler is the convenior.

Chas. Wyckoff was here today at 10 am to talk about extended range exposure film. The school is now on IAP until Feb. 5. Independent Activity Period IAP.

I go on Sunday to ~~Fla~~ Washington – then to Florida for two weeks. I will leave a 259 file I can work with me. See schedule on the next page.

1-10-73

Proposed Itinerary for Harold & Esther Edgerton (Tel. # 617-494-8783)
Florida and Puerto Rico
January 15 to February 5, 1973
(Lecture with slides - Eastman carrousel holder)

DATE	ADDRESSES:	CONTACT:
1-15-Mon	Washington, D.C. - National Geo. Society (Tel. # 202-296-7500) Eastern flight 177, Lv. 12:55 Ar. 3:22	L. Carmichael K. Bentley
1-16-Tue	Coral Gables, University of Miami, Ocean Eng. (Lecture on main campus) (Tel. 305-284-2211)	361-3044 Dr. S. Daubin, Dir. Pres. H. Stanford
1-17-Wed	Virginia Key, University of Miami (305-350-7560) (Demonstration of side scan	(Campus Housing)
1-18-Thu	Boca Raton, Florida Atlantic University 12 noon - Science Museum, West Palm Beach (Olympus Hotel) (Tel. 305-395-5100) 4-5pm University Center to set up demonstration 6:30pm dinner with Pres. Williams (1st floor) 8:30pm lecture - University Center Auditorium	Pres. K. Williams Dean D. Akhurst Roger Miller, VP (University Inn)
1-19-Fri	Boca Raton, 8:30am lecture & discussion of sonar 10am - on boat for sonar demonstration	
1-20-Sat	Sarasota, Fla, 3806 Gulf of Mexico Dr. Apt. 109c Long Boat Key, 33577 (813-383-4270 or 383-1429)**	T.F. Robinson Lynn & Dick**
1-21-Sun	St. Petersburg, University of So. Florida Marine Sci. Inst., 830 1st St. So. (visit)	Prof. Tom Pyle
1-22-Mon	Ft. Pierce, 2pm (Tel. 305-465-2400) (lecture - Harbor Branch Foundation Lab) Demonstration in F.I.T. boat (Landmark at Vero Beach, Tel. 305-562-6591)	Gene Wallen Ed Link Capt. Dallemagne
1-23-Tue	Ft. Pierce, 9am (Tel. 305-461-4359 or 464-7937) (Side scan sonar experience - continued) Jensen Beach, F.I.T.'s School of Marine Tech.	Capt. Dallemagne
1-24-Wed	Melbourne, Florida Institute of Technology 9am lecture-Science Auditorium and at 7pm	Dr. J. Keuper, Pres.
1-25-Thu	Melbourne, Florida Institute of Technology (Side scan sonar experiences) (305-723-3701) (F.I.T. house boat)	J.E. Miller, VP Adm. Waters Tom Andrews
1-26-Fri	Ft. Lauderdale, Nova University (305-927-1621) (Lecture and sonar demonstration) 10am Nova Oceanographic Lab (Holiday Inn -Airport)	Dr. W. Richardson
1-27-Sat 1-28-Sun	Miami to Puerto Rico (Eastern #915-Lv. 10am ar. 1:10pm) c/o GPO Box 2256, San Juan, P.R.	Barbara & John Aaron
1-29-Mon 1-30-Tue	St. Croix (?)	Gene Klein & A. Clark
1-31-Wed	Mayaguez, Puerto Rico (URB. Bellas Lomas, km 3.6 Cond. La Gaviota 5-B)	Jack Morelock Barbara Morelock
2- 1-Thu	Mayaguez, University of Puerto Rico (Lecture - Seminar)	Dr. Maximo J. Cerame-Vivas, Dir.

2- 3-Sat Eastern Flight #944 at 4:35pm to Boston

Feb 5 1973

Harold Edgerton.

We returned from Puerto Rico on Eastern Flight 944 Feb 3 at 7 pm (scheduled 4.30) and arrived in Boston about 9.30. The trip was a big success. I saw a great many peoplee.

Registration at M.I.T. today. Chas. Miller is going to teach 6.714 with Kim Van Diver. I will take 20 freshmen in a Seminar course.

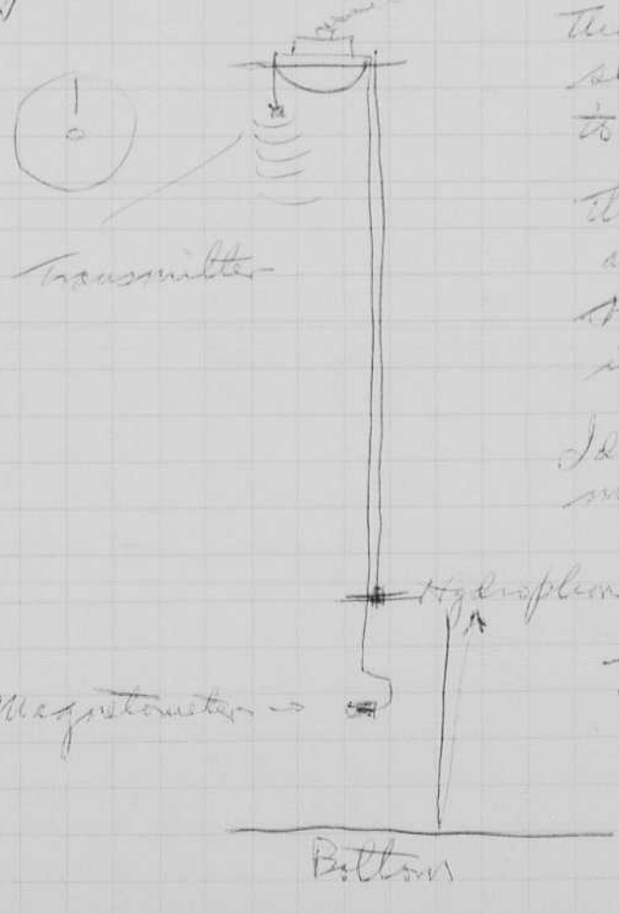
Kim and Chas. showed me some excellent color photographs taken in a schlieren set up. The photos showed heat waves from ~~bullets~~ candles with bullets going through them.

Kim uses a [color] [Fsquared] source with reflectins as shown in the sketch below.

Feb 8 '73 First class yesterday in 061 Seminar freshmen 20 people. M-W 10-11 in Building 8-419. Kim Vandiver is asst.

Chas miller has 24 in 6.714 Strobe Project Lab.

Feb 11, 1973 Heathkit Fish spotter M1-290 being assembled yesterday and today for a magnetometer-depth finder device.



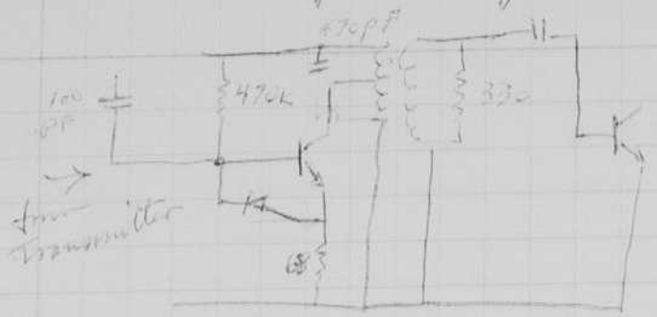
The neon display will show the Hydrophone to Bottom distance

The hydrophone is put above the magnetometer so that no interference is experienced.

I doubt if we can "see" the magnetometer on the paper but we do know the spacing dimensions!

The problem is? where do we cut into the Heathkit amplifier? Will we use both signals, one from the transmitter and one the deep hydrophone?

See Schematic of Fish Spotter MI 2900 595 1956



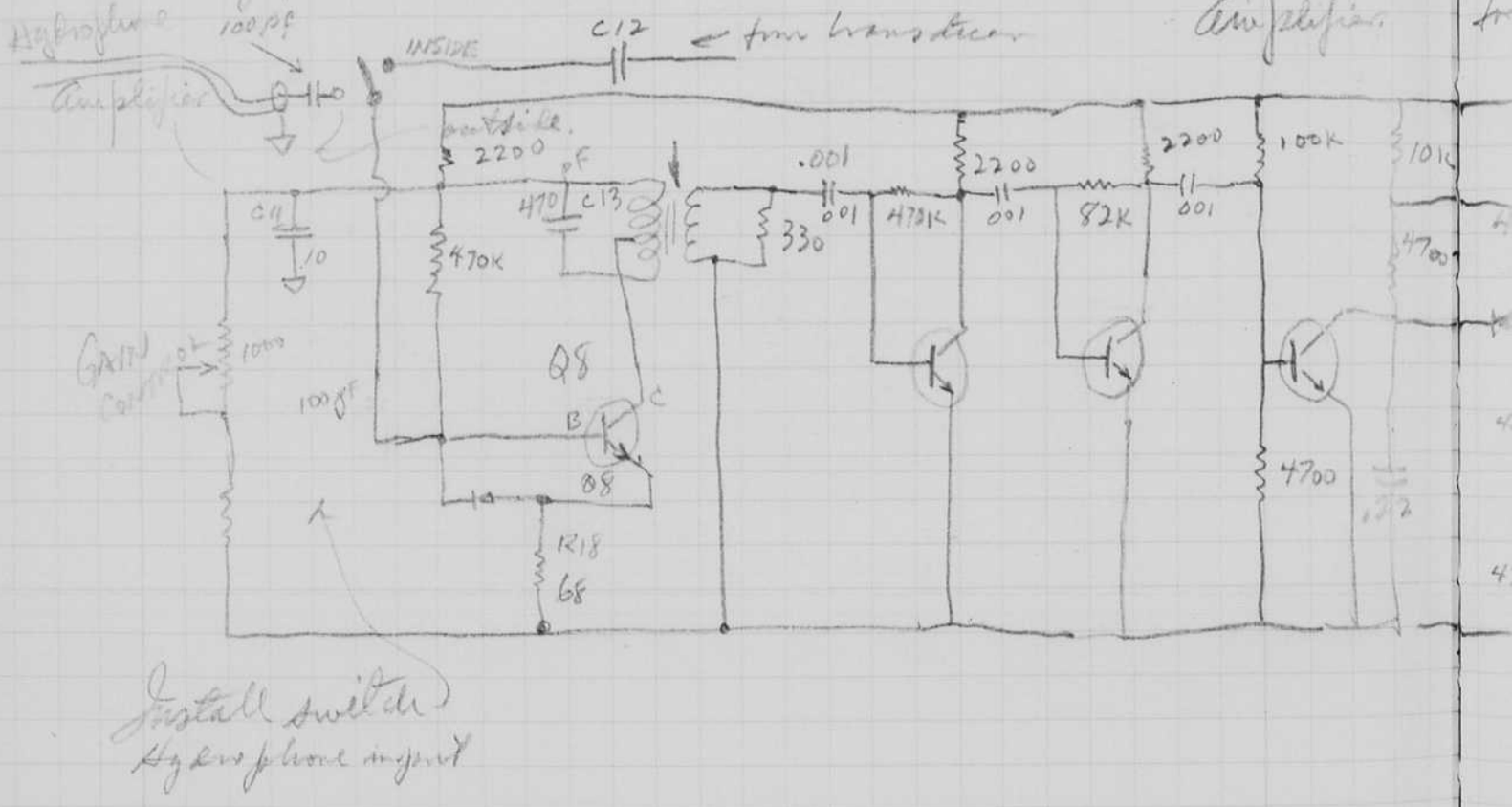
output to transducer 3 x 50 = 150 volts p-p 5 us/cycle
200,000 cycles/sec

Pulse length - 5.5cm x .2ms = 1.10 milliseconds

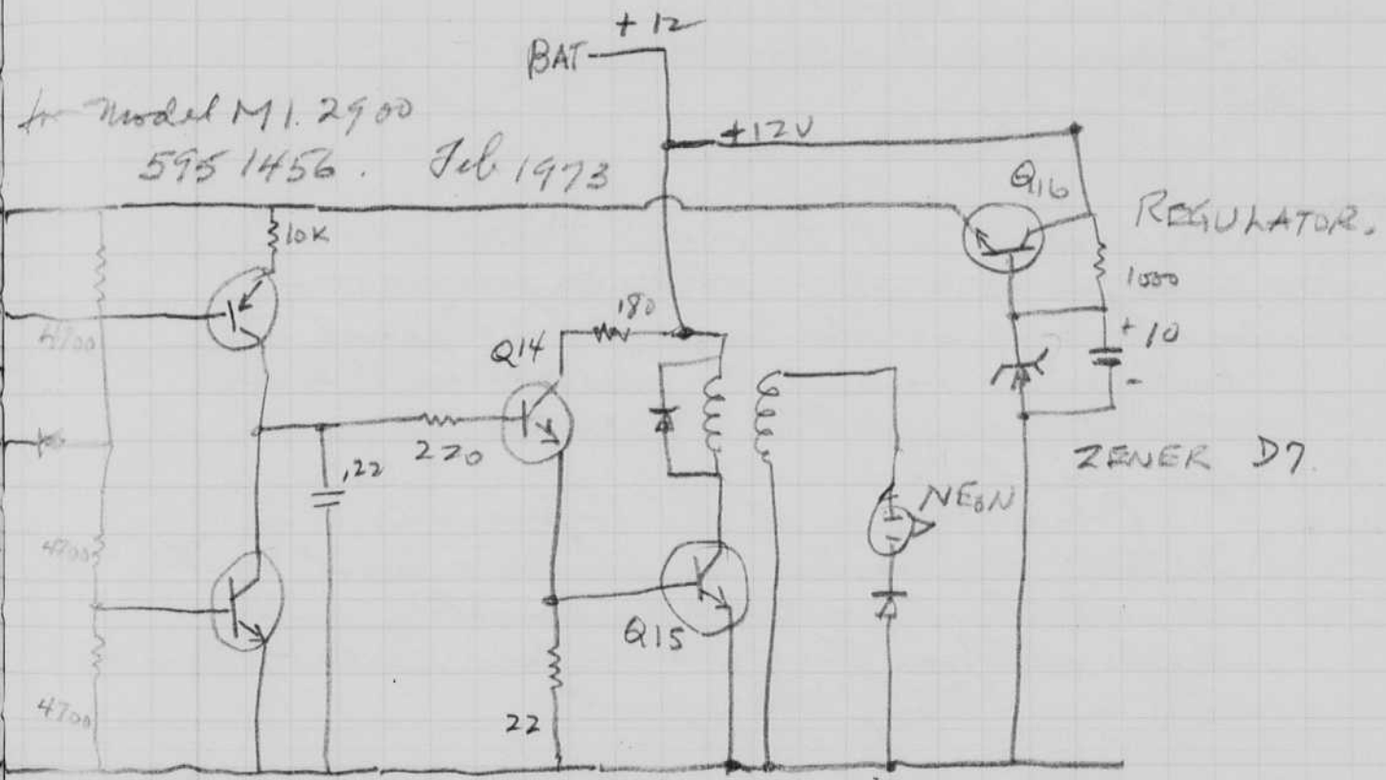
pulse rate 5.3cm x 10 ms = 53 milliseconds.

1100 ft/sec. 1.1 ft in 1 millisec.

Try for echo in air at 3 feet. 3 ms.



Install switch
Hydrophone input



for Model M1.2900
595 1456. Feb 1973

Equipment was tested in the MIT pool. Operation was satisfactory.

The input transducer has been ordered with 200 ft of coax cable. See connection at upper left hand side of p.4. This will be a passive receiver so that it will not ~~damage the~~ interfere with the magnetometer.

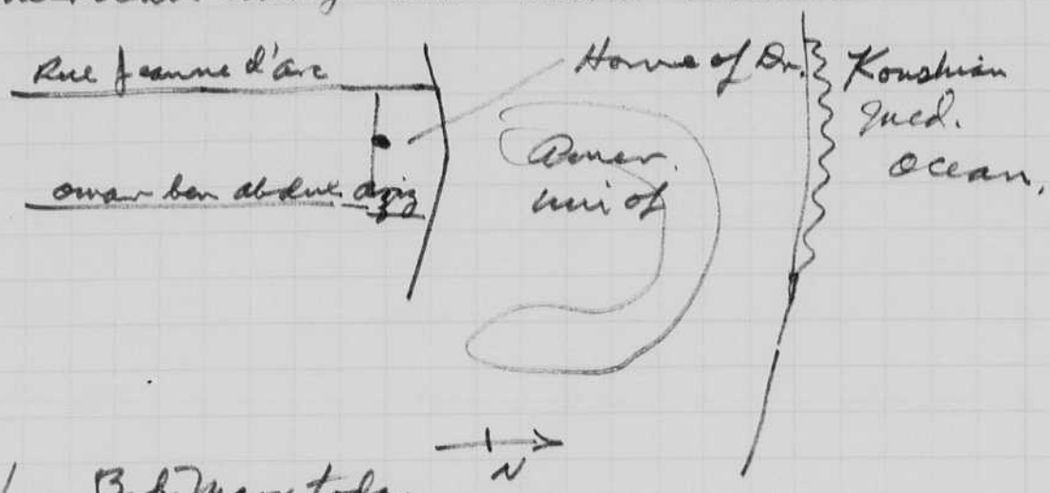
6 Feb 22 1973

H.S Egerton Mrs. Teager with her boys came in today.

Dr. H. A Jeni Konshian 34-31-57

Mail Box 236/1660

American Univ of Beirut Beirut Lebanon



Letter from Bob Marx today
He has been at Tyre (Sour)
in Lebanon. Several ships were
found.

Feb 26 1973

Bob Egerton and Mary Lou Dixon were home for our 45 wedding anniversary yesterday. We had a good time just relaxing around the apartment and talking over old times. Bob came without his beard!

Bob is teaching at the Ropers school in Detroit. He works in physics and math. Heard Liz do a lot of counseling and work shops. They are enthusiastic about the results of this effort.

Mary Lou is busy in Hickory N.C. where her husband Charlie is a dairyman. Their oldest Janice is to be married in May. She is 17 and a student at Duke Univ. Taylor Key is the boy.

March 4 1973 Dr
Sunday Harold Edgerton.

Calc of equipment for use at the Eclipse of June 30 in Africa. I will be in Mauritania with Donald Menzel. My job will be to measure the light output of the sun during the eclipse.

Data from RCA Electro Optical Handbook
PO Box 589 Burlington Mass. 01801
phone. (617) 272-4000

Page 6.5.

Sun	1.3×10^5 lumens m^{-2}	130,000 lm/meter^2
Candela (1 meter)	1. "	1.0
Full moon	2.67×10^{-1} "	.267
Venus	$0000 1.39 \times 10^{-4}$	.000139

The incident light at the earth should be about that of moonlight? I estimate that the dimes incident light should be about 10^{-5} or 10^{-6} of the full light.

I propose to use the 929 RCA photo tube which has an S-4 surface with emphasis on the blue light.

With daylight quality of light the sensitivity is about 100 ma/lumen.

Estimate the minimum light is 0.1 lumen/meter^2
The area of the photocathode is about 0.5 sq inch
area in cm^2 = $0.5 \times \frac{1}{2.54^2}$ = .0775 sq cm.

$= 0.5 \times 2.54^2 = 3.225$ sq cm.
$= 3. \times 10^{-4}$ sq meters.

Lumens = $3. \times 10^{-4} \times .1$ lm/sq meter = 3.22×10^{-5} lumens.
$= .00003$ lumens

current = $3 \times 10^{-5} \times 100 = 3 \times 10^{-3}$ ma

$e = iR = \left(\frac{3 \times 10^{-3}}{\text{amps.}} \times 10^{-6}\right) \times 10^6 = 3 \times 10^{-3}$ volt. 0.003 v

full scale is 0.1 volt.? check with spec.
or 0.01 volts.?

Loan
Dr. Ivi Iosculescu
M.I.T. from Romania.
Said Khosroshahi
Student borrowed 4 x 5
camera.

That was the last we saw the camera!!

8 March 4 1973

~~Stored 2: Algarve~~ Summer Expedition.

1. Canada Cape Breton Bob Grenier
Penetration sonar looking for wrecks
1 mile x 1/4 mile area.

2. Eclipse of Sun Africa Mauritania with
Donald Mengel. I will measure the
incident light. Also star light at
night. Sun 1.3×10^5 lm/m²
candle 1.
Page 6-5 full moon $2.67 \times 10^{-1} = 0.27$
RCA Venus 1.37×10^{-4}
Electronics Sirius 9.58×10^{-6} lumens/meter²
Handbook
from page 6-6.

full moon	0.1
Sun	$1 - 1.3 \times 10^5$
14 mm	.01
Starlight	.001
Overcast Starlight	.0001

3. Hydrometer Kathara with Niki Scuttlebutt
Side Scan and Penetration.
Judy after Africa ?

4. Westward DSL experiment Nov 24 to May
Put equipment on ship at Naussau.

5. Nereids Nancy Jervis, Penetrating sonar.

6 Le Santa - ?

7. Valiant - ?

8 Tyre, Sidon, Biblos, with Bob, May 1973 or 74

9. Monitor sea 1974 side scan.

10. Submarines in Louisiana ?

Mar. 5/73

K/S Egerton

Howie Beauchamp called - asked me to contact Otto Piene 914 225-3172 about the sun's influence on the strobe lamps for Nimbus. The heat melts the solder!

Solutions (1) cover the reflectors during the daytime. (2) move the stands so the sun does not image on the strobe tubes.

0.61 does today on photographing with a 35 mm camera!

Dave Caulfield now lives in Acton Mass. & visited me on Mar. 5. At the moment he is looking for a teaching job! I knew him at WHOI where he worked on Proteus.

March 13'73. Busy with school work. Our lab seems to have more interest every year.

Repairs are being made on the old "mud penetrator" with a 5" alder recorder. This is to be used at Nauset - Boston on the Westward sailing ship.

A slow speed motor is being installed to give a 1500' range for the D.S.L. The fish is being rebuilt with a repaired finger 12 KC as before.

Also plan to send the side scan and 5 Kc to Miami for an exposition with Weylach (?). He has a magnetometer and will use the sand to locate.

Constean phoned Sat. Mar. 10 from N.Y. and I met him at the air port at 11. Then after lunch at our home in Cambridge we went to the USLCOR meeting at Boston University. Ruth Dugan, Walter Fineberg, Goodwin, etc were there. Constean has big plans, to raise funds and do important research!

Walter Fineberg and I were presented trophies (?) by J.Y. Cousteau for NOGI the underwater Society of America. This came at the evening session at 7:30, then Cousteau took the 10 pm Eastern plane to N.Y.

I should mention that Cousteau at 2:30 pm gave a masterful presentation of the recent trip of the Calypso to the Antiartic. This was followed by a 1/2 hour of questions and answers. There was a large attendance for this session.

March 15, 1973 Directors meeting at EG&G Bedford Mass. Things are going fair. All problems were discussed at length.

March 18, 1973 Sunday

Seminar students were here Fri. and Sat. for dinner. Also John Cooper and Kim Vandiver. I have 19 students this term.

Yesterday Kim and I shot Schlieren color photos of 30 cal bullets, candle flame, Organ pipe air flow, Balloon filled with Hydrogen hit by bullet, etc. There were made on High Speed Electrodyne film. a microflash unit was used for light.

Today I went to the MIT Sailing pavillion at 8 am. + Jack Cater was there to work with me. We tested a 12KC mud penetrator that is going to Nassau to be put on the Westward sailing ship on Mar 24. Then it will be used en route to Boston to study the D.S.L.

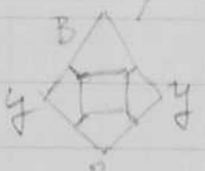
Mar. 17, 1973 Sat.
~~Harold Edgerton~~
Kim Vandiver.

Bullet photos

Notes made in lab.

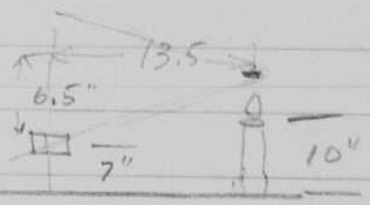
Just two shots.
B&W. Trix film for last

FT 3911260
NIKKOR MAT
ZOOM LENS
190mm f 3.5
wide open.



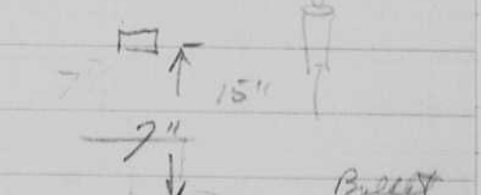
conclusion from 2 test shots.
(1) Gun aimed too high.
(2) Flash was late.
move bullet down 3" at candle for
the next shot.

3rd shot. Gun lowered to 13½" over table at loudspeaker.
mike 13½" from candle.



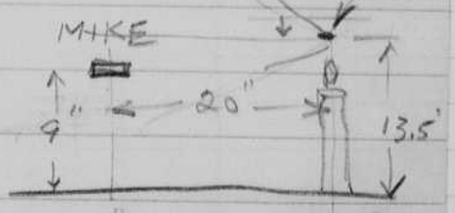
Flash
Conclusion ~~Bullet~~ still late.

To do Lower gun 1" at target.
move mike 2" toward gun.



4th Shot.

Lower gun -1"
Raise mike -2"
move ~~to~~ gun -4".
mike



Seems to be ok bullet high!

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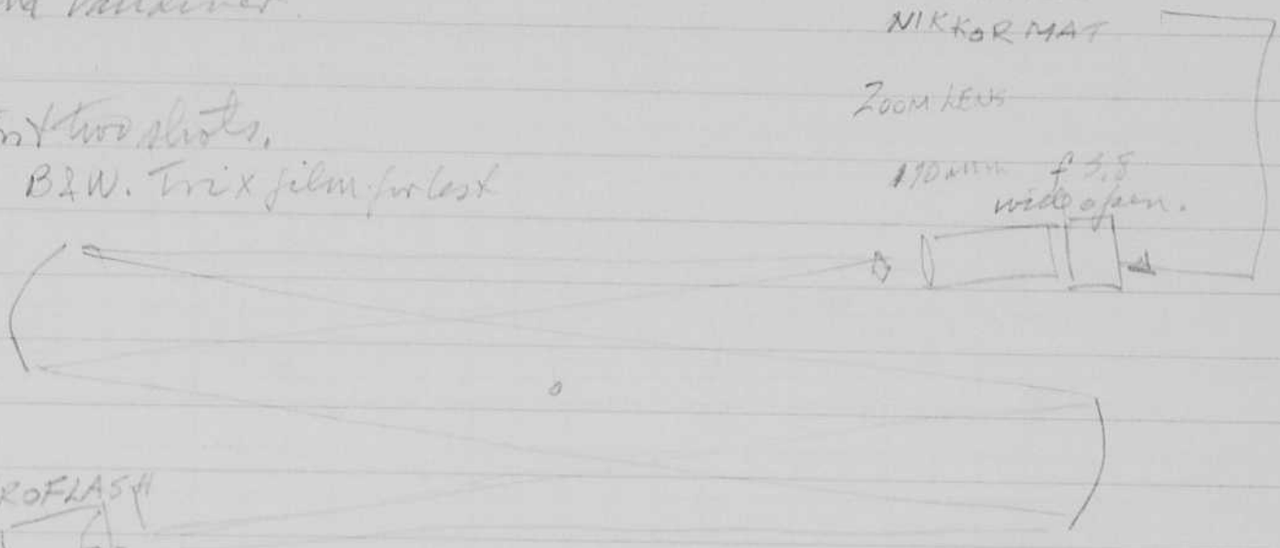
Mar. 17, 1933 Sat.
Harold Edgerton
Kira Vandiver

Bullet photos

Notes made in lab.

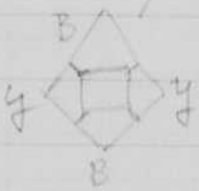
FT 3914260
NIKKORMAT
ZOOM LENS
190 mm f 3.5
wide open.



Jim + two shots,
B&W. Trix film for last

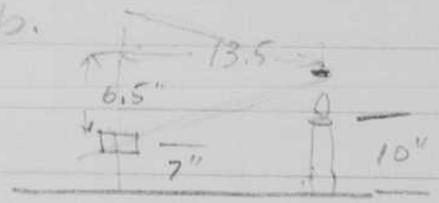
MICROFLASH

.05 mfd
16000 VOLTS.



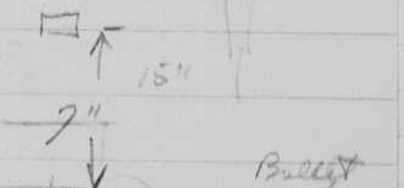
conclusion from 2 test shots.
(1) Gun aimed too high.
(2) Flash was late.
move bullet down 3" at candle for
the next shot.

3rd shot. Gun lowered to 13½" over table at loading stop.
mike 13½" from candle.



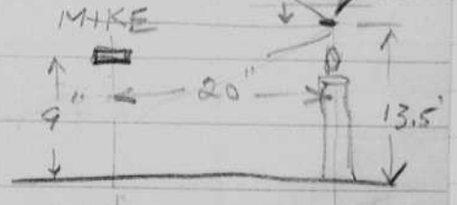
Flash
Conclusion: Bullet still late.

Toko Tower gun 1" at target.
Move mike 2" towards gun.



4th Shot.

Lower gun – 1"
Raise mike – 2"
move gun – 4"
mike



Seems to be abt bullet high!

Copy
Data for films
made on Mar 17

#1 candle no bullet
2 Bullet 30 cal Yalcow & Bly
3 Redfield
4 Red - Brown Foam
5 Negative - Brown wax
Smoke.
6 Brown 30 cal bullet
7 Cardboard 30 cal
8 Balloon - with Hydrogen gas (mixed 5" 21⅝ long Tube top)
9 match flame.
10 11 Sparkler.
12 match hitting balloon Late.
13 " " "
14 " " "
15 ½ sec 220 flat organ Pipe
16 Organ pipe } closed and open Tubes
17 "
18 Transient blast
19 (organ pipe reversed - open end up.
20 candle at bottom to show flow of air.
188 cycles/sec.
Square wooden organ pipe from Anderson at physics stock room.

These were sent to Eastman Kodak on Monday Mar 19 1973 for processing High speed Ektachrome.

These were recalled
Some have been sent to Boulder, Colorado Springs

for schedule

14 Apr. 5, 1973 Check of Diode Pickup
N. Edgerton Strobolac 1531

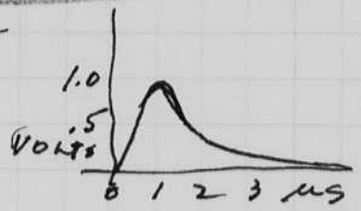
#7 Dairy CE30VC
5-1 Ensign
no filter.

#1

7 cps. 10° HCP 1 KΩ. 97"

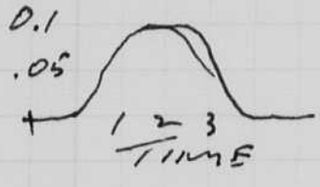
Lamp in Reflector at 97" (8 ft)

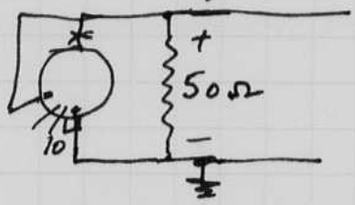
8
12/97
96.



9 volts = .9 × 10⁶ HCPS. 2 ms duration.

Then I connected that diode as a generator

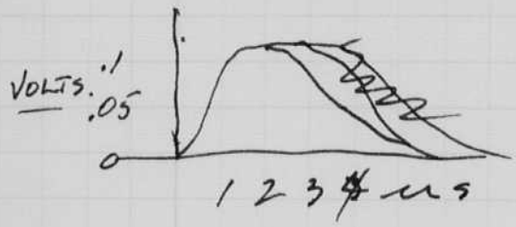




output = 0.1 volts.
Duration about 2 μf.
Peak appears slightly fast.

I then moved the lamp to about 6 feet.
The signal definitely shows overload and the discharge time ~~is~~ seems longer

50K 75 mv
500K 18 mv
1 MEG 2.8



10 f.c. = $\frac{cp}{D^2}$ D = 1 ft cp. = 10

10 fc = ~~1 lumen~~ 100 lumens / sq meter. = 10 lumens / sq ft.

$\frac{10}{1 \text{ meter}^2}$ = 10 lumens / sq meter

---

2 cp lamp. Lumens / m² = $\frac{2}{D^2}$ = .2 moonlight

Sunlight = 1.3×10^5 / m²
= .2 lumens / ft²

$D^2 = 10$ $D = \frac{3.3}{4.5}$ meters

#55

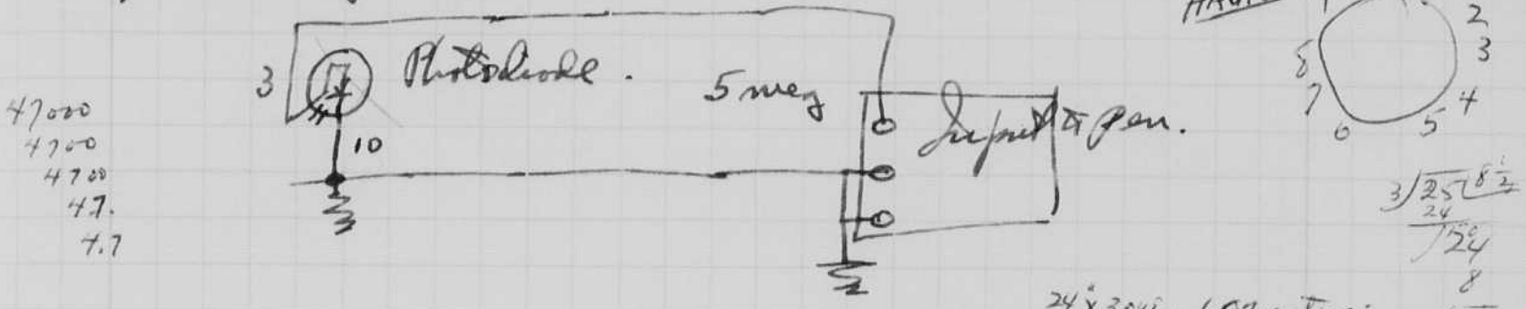
Input	~~4~~700 lumens	25 mv	2 3/4"	to 2 cp. lamp
	77,000	23	8 1/4"	"
	470,000	25.5	24 3/4"	"
	4,700,000	15.	24 3/4 + FILTER Density 1	5
470,000	~~4,700,000~~	29	24 3/4 + Filter.	Saturation
	4,700,000	32	24 3/4 + filter	

6.3 V 2 cp. on a 6 volt Bat

April 9 1973 Monday.

Harold Edgerton. Fri. Apr. 6, Party for 52 guests at 100 mem Dr in Skyroom
Sat Apr. 7. Met Lauder on AA 1217 plane 1½ hrs late
went to Polaroid to see Sheldon Buchner 730 main St.
Sgd Wignall pro England, talked to group at
Emerson Hall in Harvard yard. House guest.
Wignal and Lauder left for England and Germany
Sun. Apr. 8. Sonar expedition at Gloucester at 8 am
John, Speer, Irvin went with me to Pirate
Jane. No submarine found, but many
interesting sonar records were made.

Light meas. for Africa.



$\frac{24}{12} \times 3.048 = .607$ meters.

Sens	Input Res	Def	Distance	C.P.	#	Lens	Light	2
1.	$5. \times 10^6$	33	$24\frac{3}{4}$.		100	Sil Diode only. HAV1000	$\frac{2}{100} \frac{1}{(24.75 \times 3.048)^2} = .002 \frac{1}{.6^2} = .072$ lumens/sq m.	
1	5×10^6	3	$24\frac{3}{4}$		100	HA100		.072
Circuit is non linear! go back to testing								
1.	47,000	2.5	25"		0	1.		
1.	47,000	21.5	$8\frac{1}{4}$"		0			
5	47,000	64 (?) 320	$2\frac{3}{4}$"		0			
5	47,000	645	$2\frac{3}{4}$		0	Glass Removed.		
5	47,000	4	$8\frac{1}{4}$"		0			
2	47,000	10	"		0			
1	47,000	21	"		0			

$\frac{CP}{D^2}$.

May 10 1973

1	47,000	22	$8\frac{1}{4}$"			1/2 C.P. lamp # 47.
5	47,000	34	170 $2\frac{3}{4}$"			← overloaded.
1	100,000	45	$5\frac{1}{4}$			
1	100,000	5	$24\frac{3}{4}$			
1	300,000	14+	$24\frac{3}{4}$			
1	300,000	27.	~~20¼~~ 17.5	130 ma 5.1 v.		← Linear
1						
2	5×10^6	~~45~~	18"			929 photo cell.

$\frac{.5}{(.445)^2} = \frac{5}{.198} = \frac{x}{2.52}$

Limit 30 mv according to data sheet

moonlight = 0.1 lumens/sq meter

Meter shows $\frac{1}{\left(\frac{6}{12}\right)} = \frac{1}{4}$ C.P.

16 April 10, 1972 Harold Edgerton

$\frac{1}{7.6} = .132$ feet.

	Sens.	Res.	Def.	Lamp. Dist. I	Filter.	
929	2	5×10^6	25	$24\frac{3}{4}$"	0	c.p. $\frac{50}{.132^2} = 572$ $10 \times .132^2 = .174$
	1	5×10^6	50	"	"	

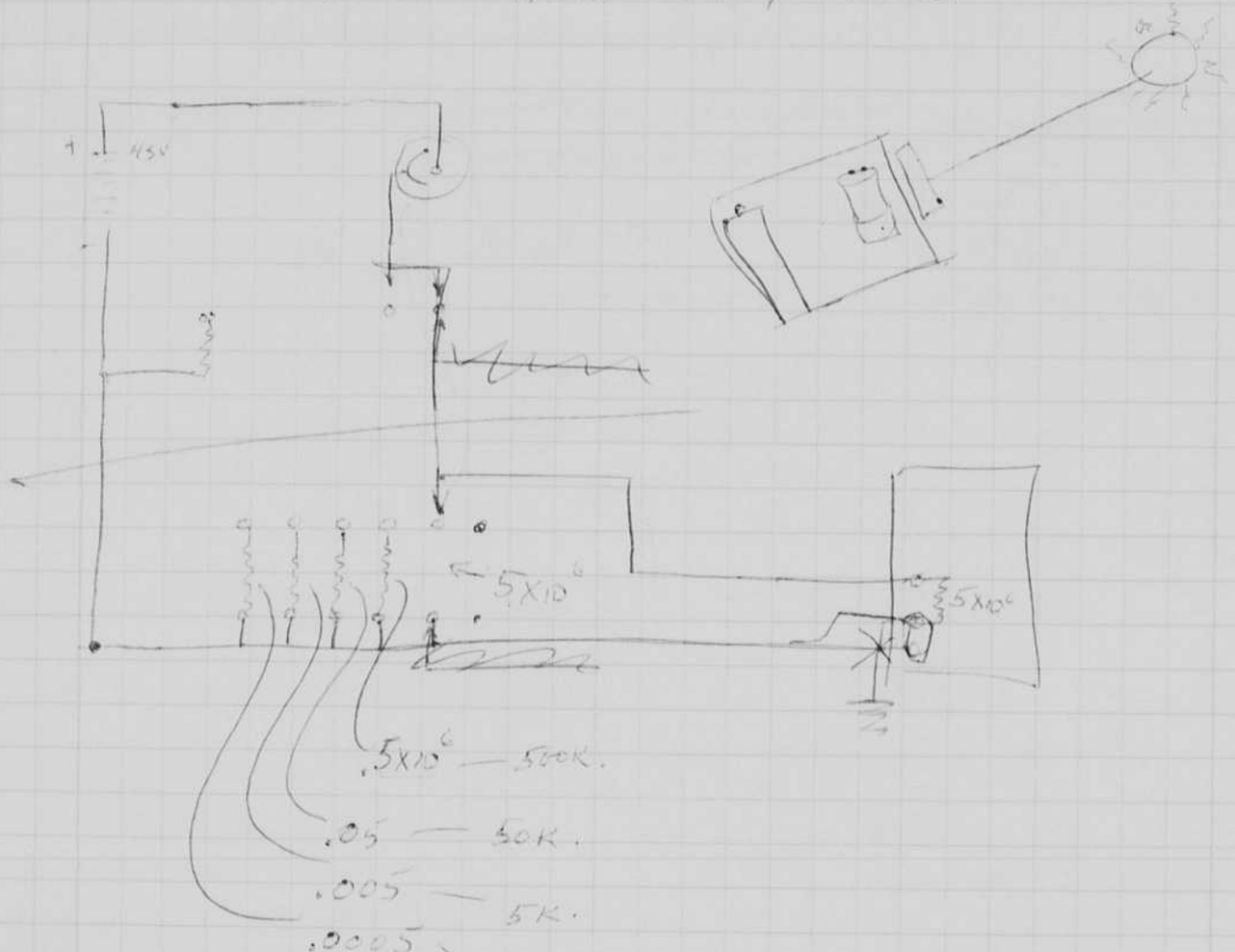
10 lumens/sq ft $\times \left(\frac{4\pi \times 2.54}{12}\right)^2$ = c.p.

929 with Daylight 80 ma/lumen 12,700 lumens/sq ft

100% lumens/sq inch

area = π sq in = 50 lumens.

$80 \times 50 = 4{,}000$ ma = .004 = 4 ma.



50.

Daylight 4ma.

1 50 mv

5.

Daylight (X10) 4ma daylight with X10 filter.

.050 = IR = .004 R

$R = \frac{50}{.4} = 125$ ohms. for full scale with 929 X10 filter.

or with 50 ohms ~~at~~ $0.4 \times 50 = 20$ mv. for start.

From RCA Electro Optics Handbook

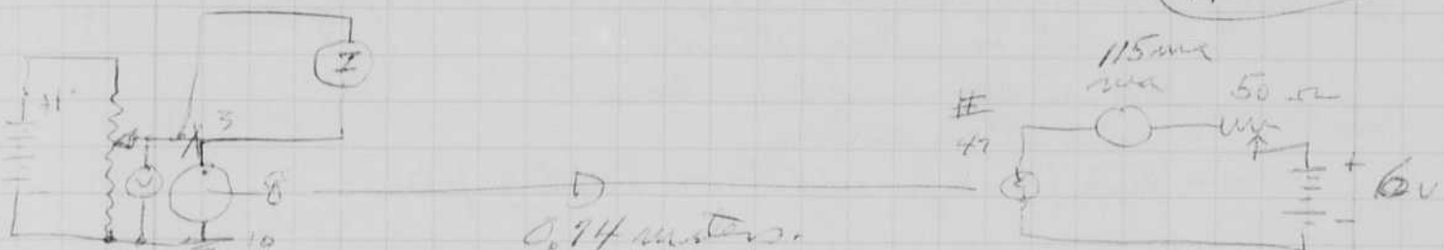
page 6-5

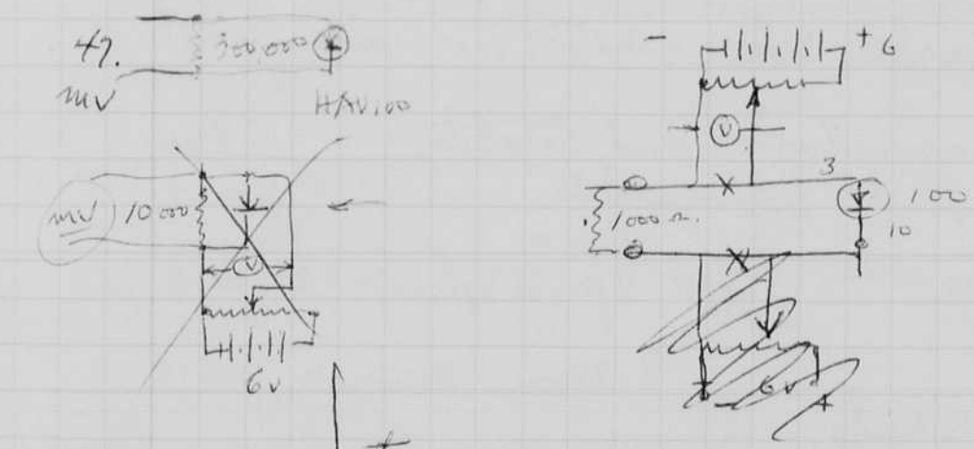
Sun 1.3×10^5 lumens/meter^2	1.3×10^5
Candela at 1 meter	1.00
Full moon	$2.67\times10^{-1} = .267$
Venus	1.39×10^{-4}

page 6-6

Direct Sunlight =	1.3×10^5 lumens/meter^2
Overcast daylight =	10^3
Dark Day	10^2
Twilight	10
Deep twilight	1
Full moon	0.1
Starlight	.001
Overcast Starlight	.0001

April 12 73





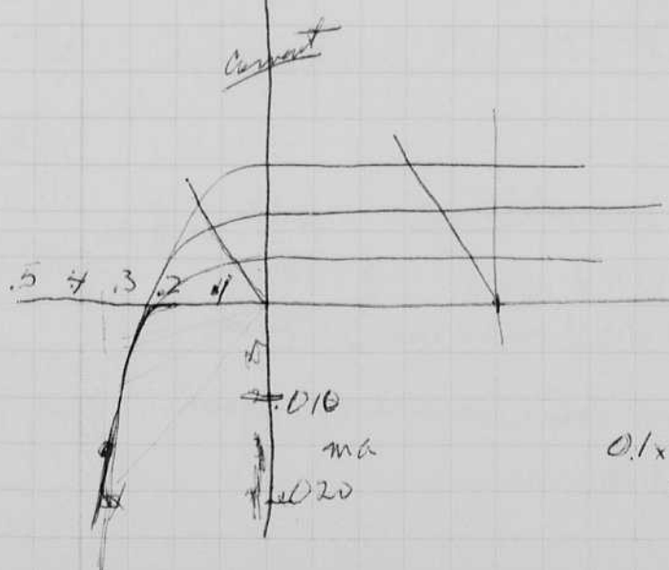
.015 mv / 1000

115 ma in Sounds,
7 ft/cm

.016 mv.
ma.

.016 ma mv / 1000

47 (115 ma)
100 cm-fc light
1.8 mv.
1000 = 1.8 μa



50 lumens/sq meter

$\frac{.5\text{cp}}{(0.1)^2} = .\cancel{05}$ lumens

$0.1 \times \frac{10^6}{5} = \frac{10^5}{5} = .2\times10^5$ for light

Sens $= \frac{3.5\text{ ma}}{50 \text{ lumens/meter}^2} = 0.1$ ma/lumen

$50 \times .05\text{cm}^2 \times .0001 \text{ meters}^2 = 250\times10^{-6}$ lumens.

18 April 11 1973 4:30 pm. conference

Howard Obs. Menzel.

Dave Cook. S.E.&.

Quest 4 expeditions

3. Land Rovers.

2 Bedford. Lorries

6.000 KW. 1500 Honda

12-15 Batteries

Dalastat.

Menzel.

Dark cloth Sateen.

Gasoline for washing.

Dust storm problem.

Methylbisulfide?

di

Brookstone Co.

Peterborough N.H.

Dr. Tawes Ionisphere effect. 2.5 meters

Face masks.

Safety Goggles.

Review of the experiments.

Review for T.V. people. 43 people signed up today. (Canada 52)

Laundry 2 times a week (Quest 4) June 1st. 27 Apr Brian back from Africa.

mark Laundry items.

Worn clothes a week and discard.

Take Cotton clothing.

—— Dark films for visitors. Dentistry S. film.

AIR Air Cond Dark Room - Being studied now.

contact prints take inside. Developed. Rapid Fix. no enlargement!

D-19 10 gal.

Flash light for night work and totality. Eclipse.

Suntan ~~Total~~ Lotion. Hats available.

June 30

Leave

Note book to come. June 7 7 pm to Dakar. - 6.30 June 8. June 11. — 250 miles by truck.

15 7 pm - Dakar. " June 15.

June 22 " " " mrs. Menzel. June 29

wire for antenna.

KB.

Lights on Recorder to see deflection.

W.W.V time signals.

Station employees.

Radio Receivers.

Europe receivers and stations.

Charles. Mr. Rainbow Travel Belmont. Mass.

H Collins. { WWV man / WWV man & Woman } 10, 15, 20, 15 mc. $130. / $400 all wave. 15 lbs. 570 postage sent.

Bob Fisher. 276-2275.

Helen (Baker appt.)

Stay brightness, photometers, eye detectors.

Hat with short wave receivers are good.

Tape recorders. -

Running 3 lbs.

Silkwood 107 packs Polaroid.

EE! People

Staff.	Phone no.	
~~Frank L.~~ Budneski		Spectrographs.
Tim Hedsman	495 3135	Photos of corona with filter.
Menzel		offaxis
Bob Fisher	276.2275	Stray light measurements. Bleeding ultraviolet radiation. 35 mm ultra red.
Sal Lariccia (Menzel)	776 8732	Flash spectrum.
Dennis DiCicco	875 4954	Polarization 3 cameras. IR image tube.
Taves		Radio.

Dave Cook. EE!

Jdhnathan Kern — Radial filter 4

Howard Edgerton. — 2

Apr 17 1973 current = 3.5 μa

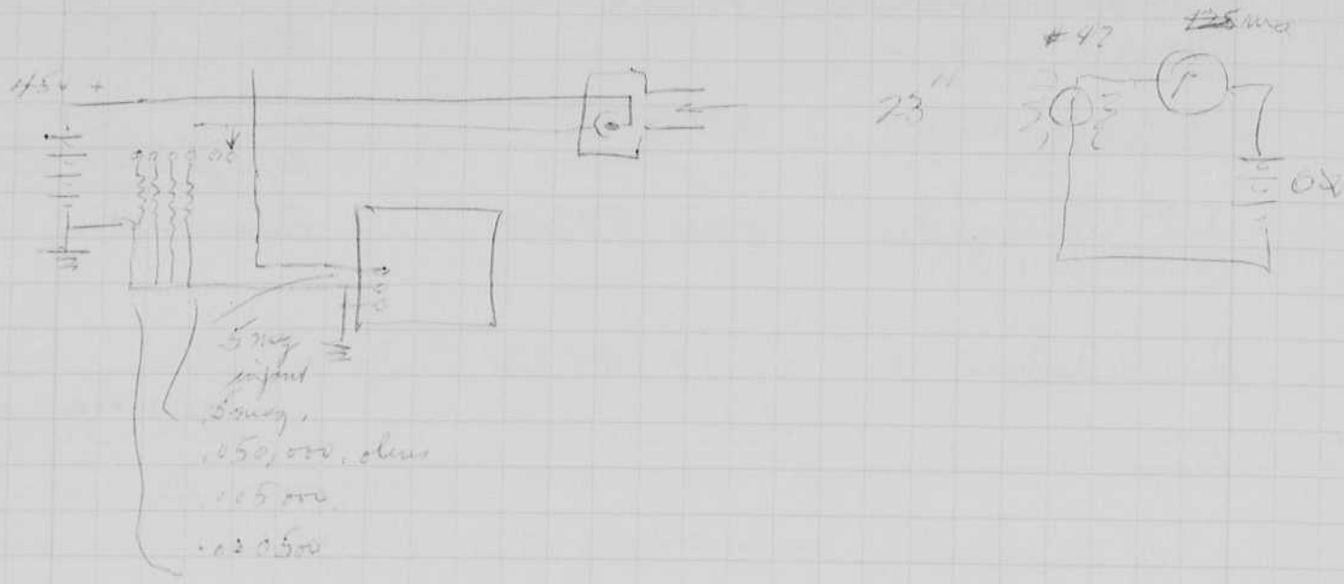
$$\text{Light} \quad \frac{0.5\,CR}{10^2\,cm} \times .051\,\frac{gram}{cm} = 2.5 \times 10^{-4}\ \text{lumens}$$

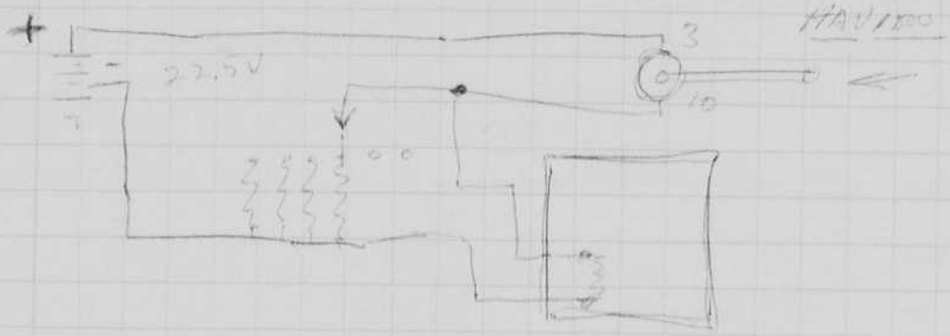
$$\text{Gain} = \frac{3.5}{2.5 \times 10^{-4}} = 1.2 \times 10^{4}\ \mu a/\text{lumen}$$

20 April 3 1973

Hand Sights

Phototube arrangement finished for Eclipse (June 30).





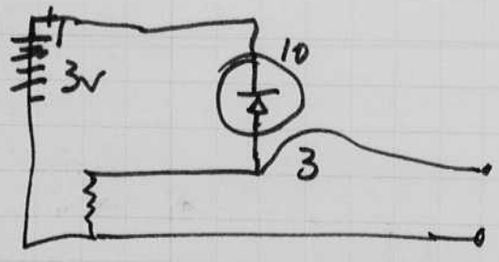
Resistor in series 1500 ohms in battery to save Diode in case of very strong light.

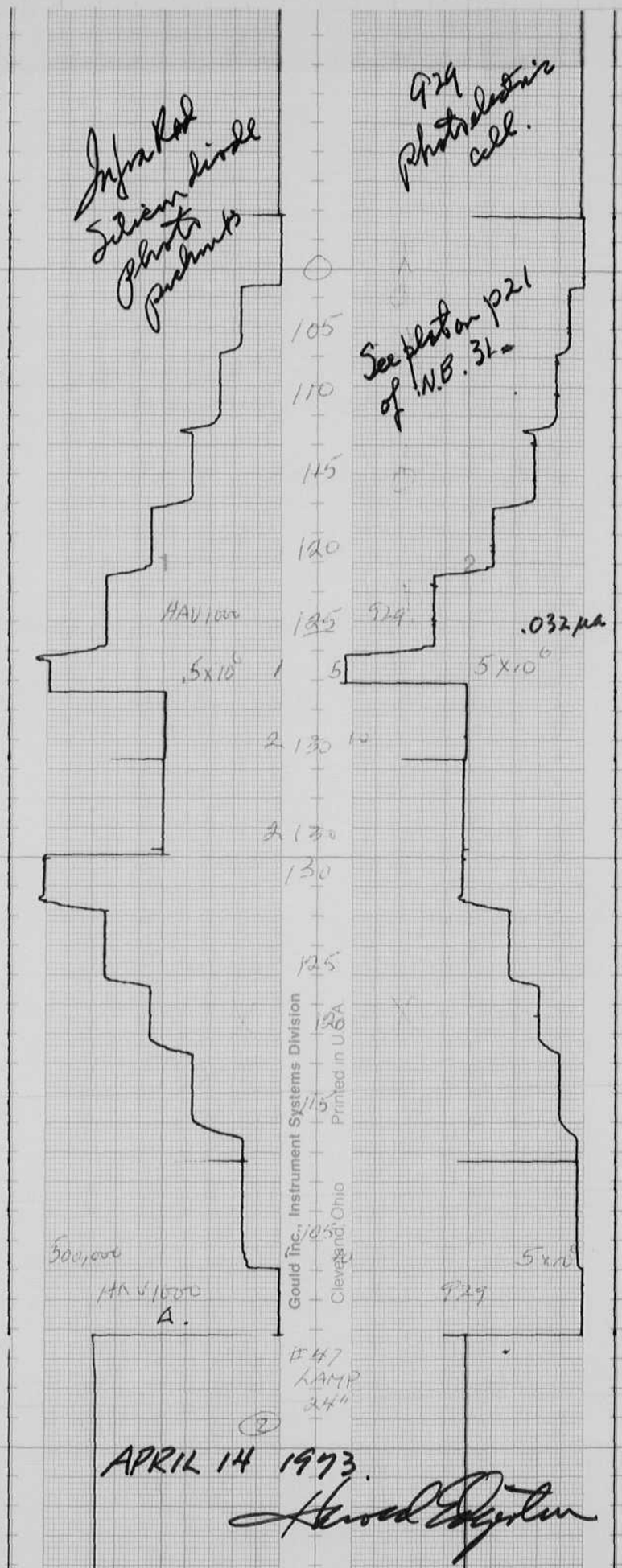
Deflection

HAV1000 26

Problem with HAV1000.

Current increases slowly! with 3 volts "B" on Base!





at 28 inches away
25 ma 5X10⁶ 10 min. 26 div.
at 28"
as 2 min. 19 div.
1 0 obs.

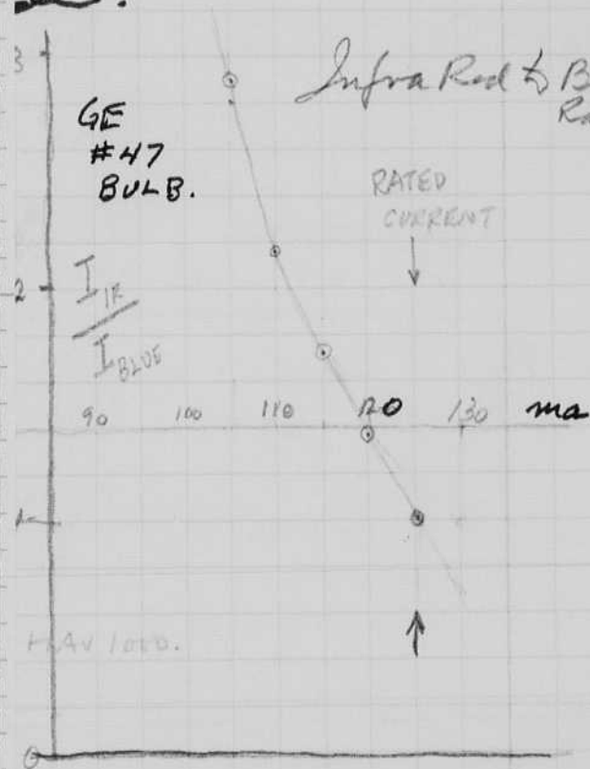
14.

125 ma. C.P. = 20 $\left(\frac{1}{6}\right)^2$ = .55 cp.

100 watt lamp. C.P. = 170 cp.

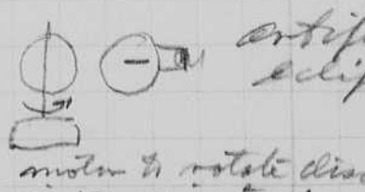
$\frac{170}{20}\ \frac{36}{}$ = 2 36.

15/17 56/18 236



$D = \sqrt{\frac{3}{10}}$ = 0.5477 meters.
= 54.8 cm to the pickup

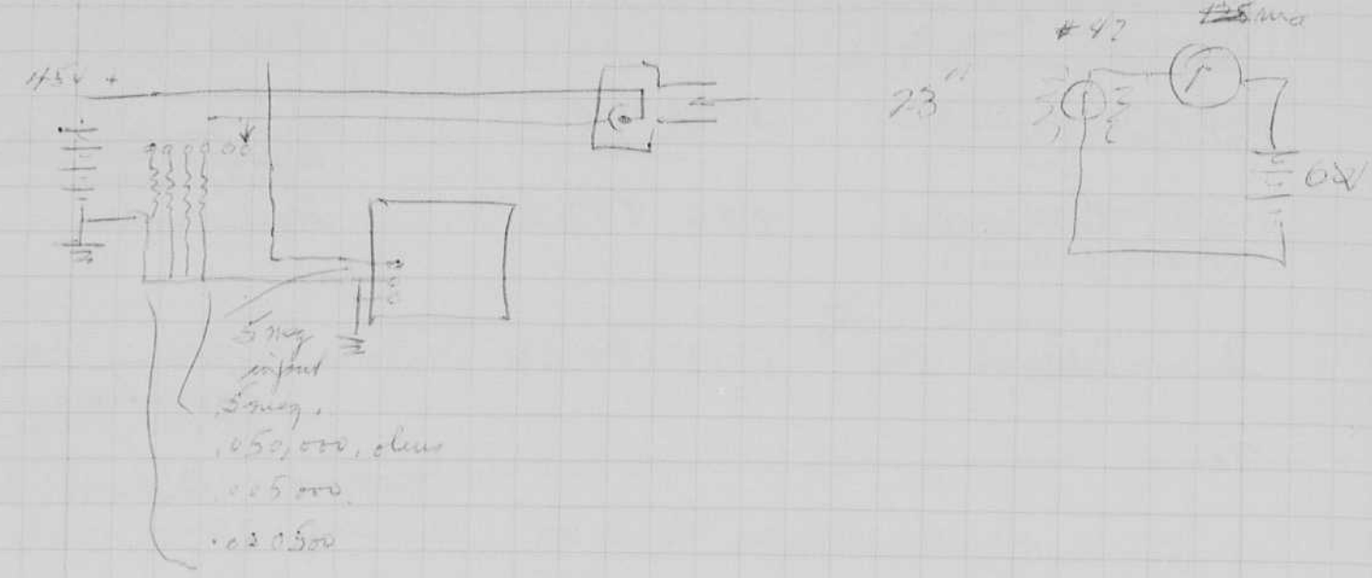
ment. to eliminate

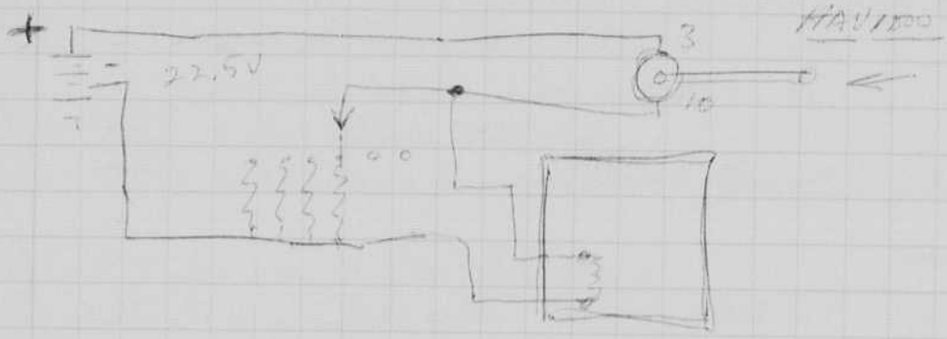


20 April 3 1973

Hand Sight

Phototube arrangement finished for Eclipse (June 30).

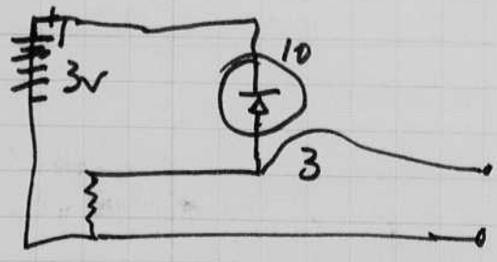


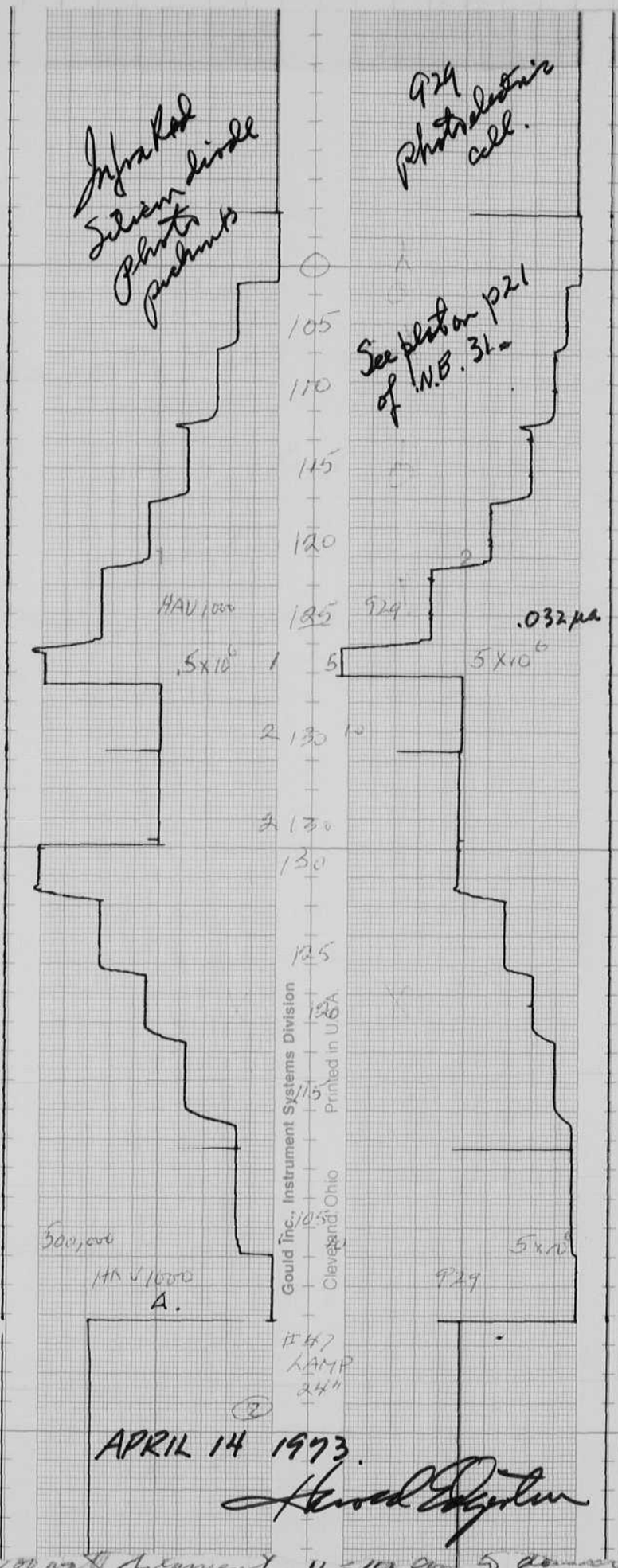


Resistor in series 1500 ohms in battery to save Diode in case of very strong light.

HAV1000	Deflection
	26

Problem with HAV1000.
Current increases slowly! with 3 volts "B" on Base!





APRIL 14 1973.

Howard Ogden

100 watt filament bench.

at 28 inches away
25 ma $5X10^{6}$ a 10 mv 26 div
at 28"
was on 2 mv. 19 div.
- 1 0 deg.

14.

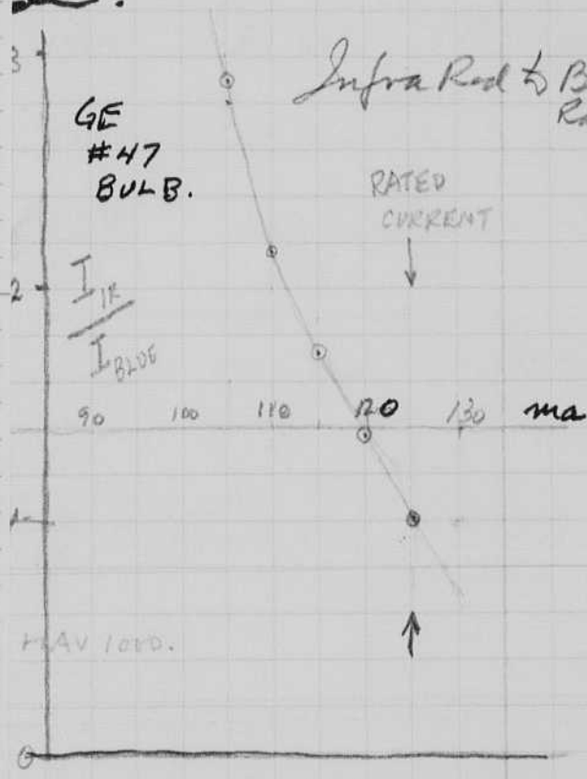
125 ma. C.P. = $20\left(\frac{1}{6}\right)^2 = .55$ cp.

50 watt lamp. C.P. = 170 cp.

$\frac{170}{20}\ \frac{36}{}$ = 2 36.

$\frac{15}{17}$
$\frac{56}{18}$
236

do.



$D = \sqrt{\frac{3}{10}} = 0.5477$ meters.
= 54.8 cm to the pickup

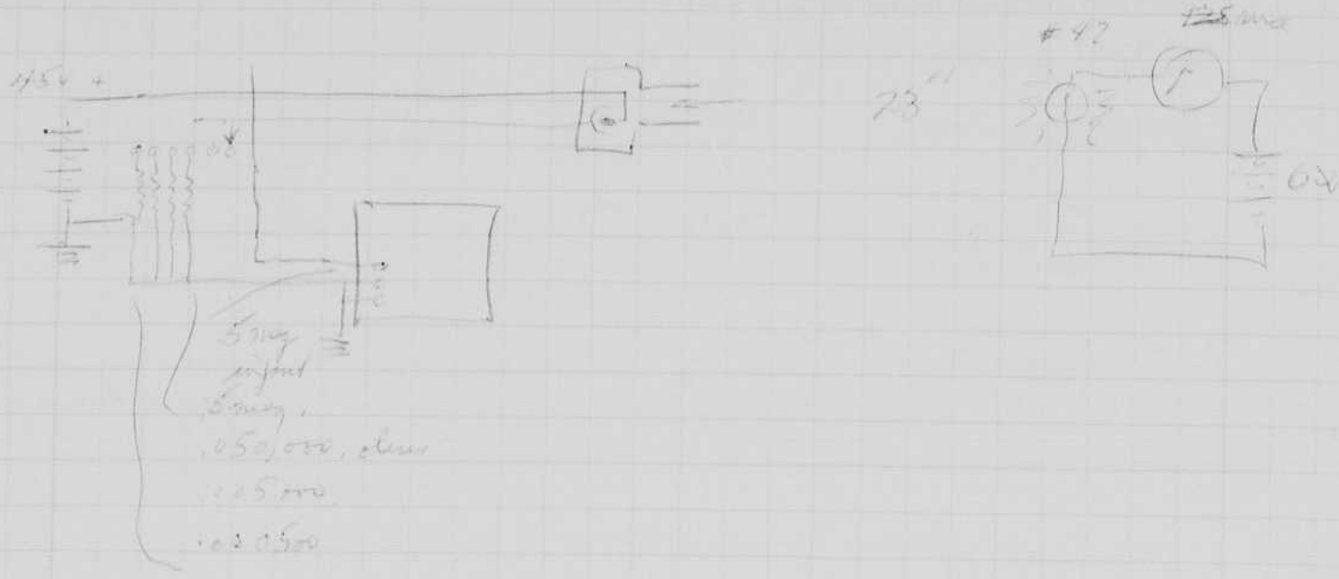
ment. to illuminate

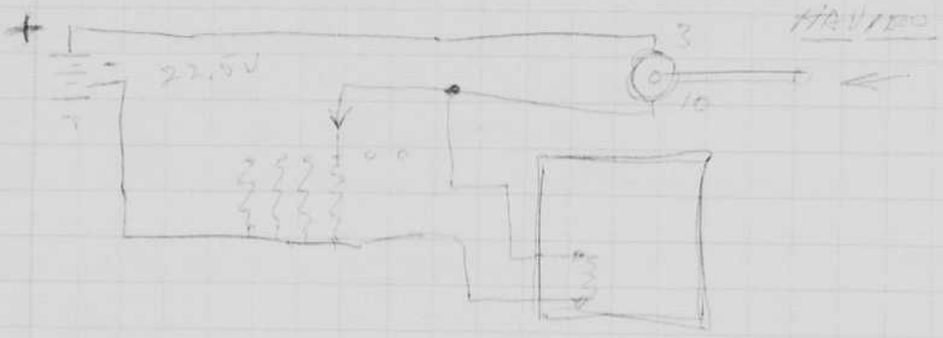
D = 10 cm 5 divisions.

20 April 1923

Hand Sight

Phototube arrangement described for Eclipse (June 30).





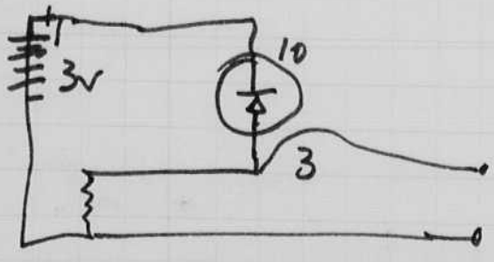
Resistor in series 1500 ohms in battery to save Diode in case of very strong light.

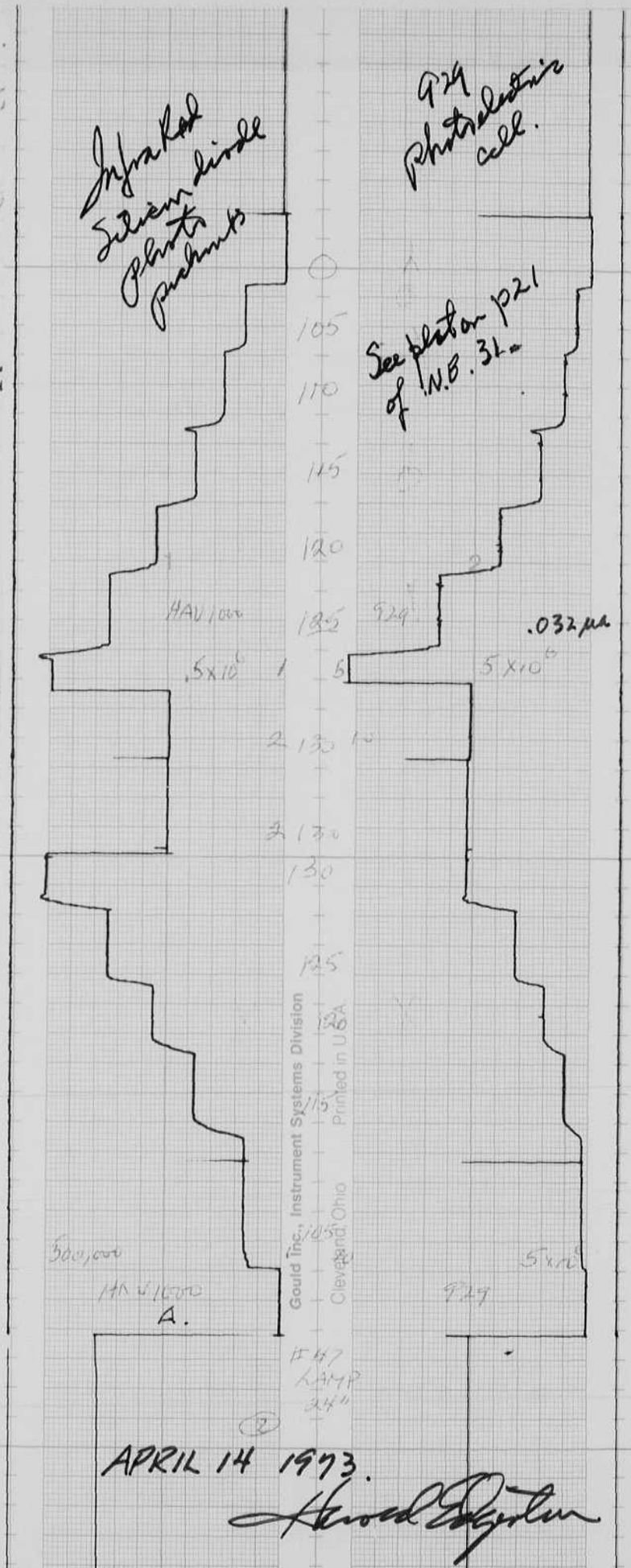
Depletion

HAV1000 .06

Problem with HAV1000.

Current increases slowly! with 3 volts "B" on Base!





APRIL 14 1973.

Harold Edgerton

100 watt filament lamp.

$D = 10$ cm to diameter.

at 28 inches away

25 ma 5×10^{-5} a 10 mm 26 div.

at 28"

as ma 2 mm 19 div.

1 0 deg.

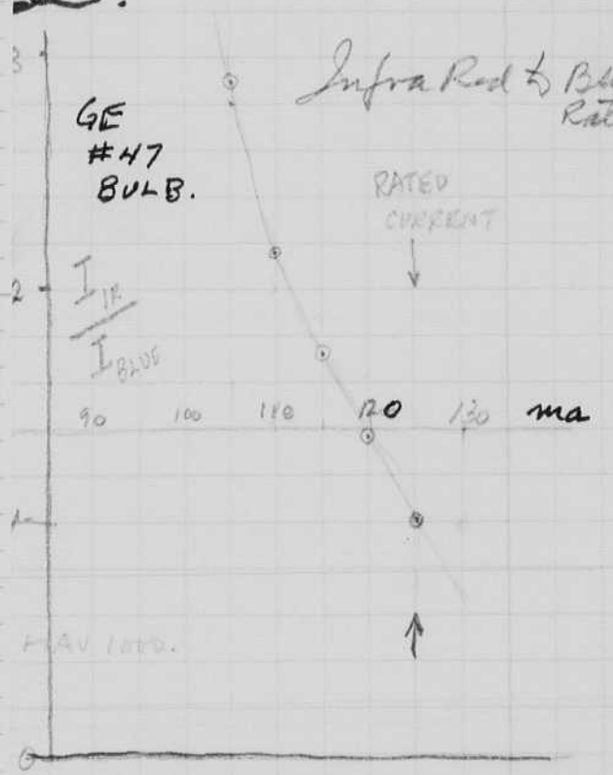
14.

125 ma. c.p. $= 20\left(\frac{1}{6}\right)^2 = .55$ cp.

60 watt lamp. c.p. = 170 cp.

$\frac{170}{20}\ \frac{36}{}$ $= 2\frac{36}{}$.

$\frac{15}{17}$ $\frac{56}{18}$ $\frac{}{236}$



$D = \sqrt{\frac{3}{10}} = 0.5477$ meters.

$= 54.8$ cm to the pickup

ment. to illuminate

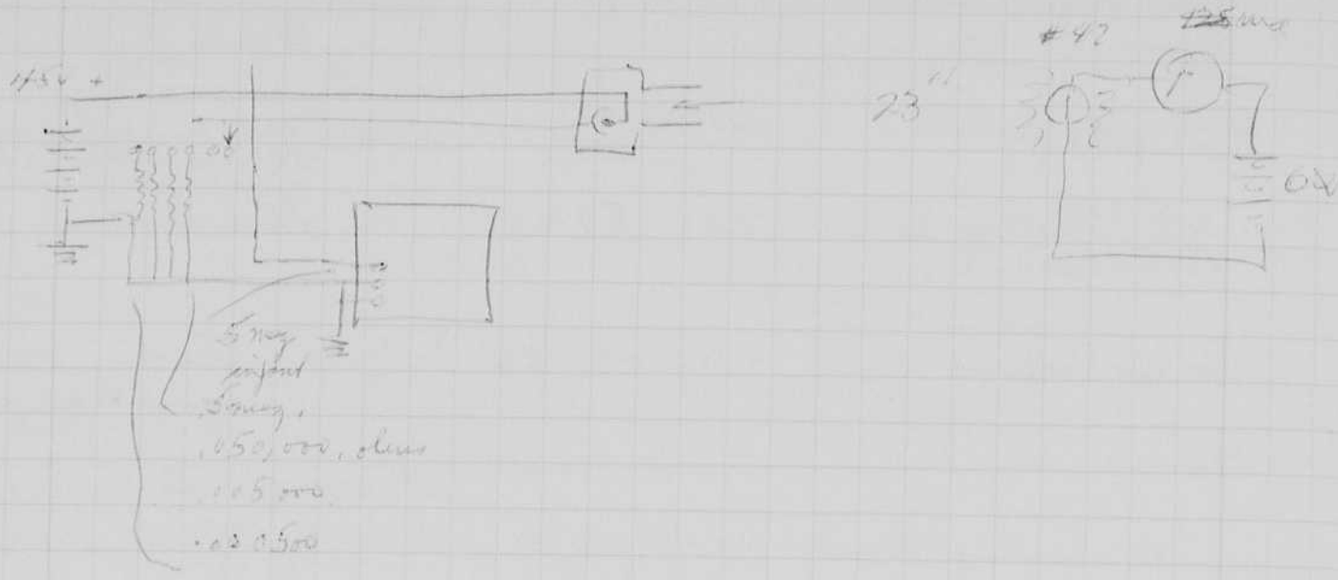
artificial eclipse.

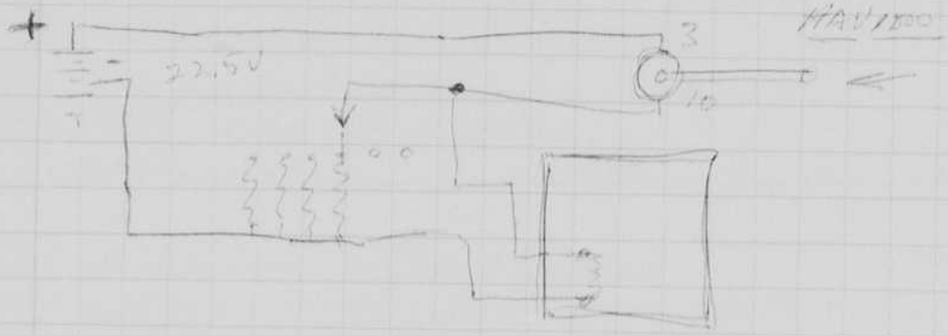
motor to rotate disc in 12 minutes/rev.

20 April 3 1923

Hand Sketch

Photo table arrangement. finished for Eclipse (June 30).

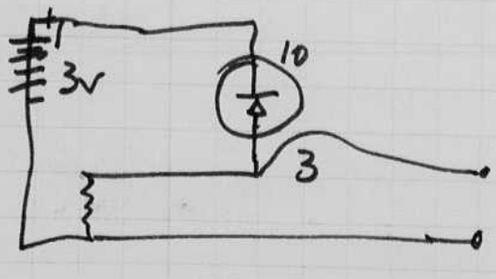




Resistors in series 1500 ohms in battery to save Diode in case of very strong light.

Depedance
HAV1000 2.6

Problem with HAV1000.
Current increases slowly! with 3 volts "B" on Base!



#47 129 1665
150 1690

929 #14 worked fine with 47 lamp at 125 ma $5\times10^6\Omega$ 10 mv 36 div at 28 inches away
then 100 watt lamp clear at 28"
100 v. Deflection ~~@~~ at 5×10^6 ohms 2 mv. 19 div.
#47 125 ma — 5×10^6 — 1 0 obs.

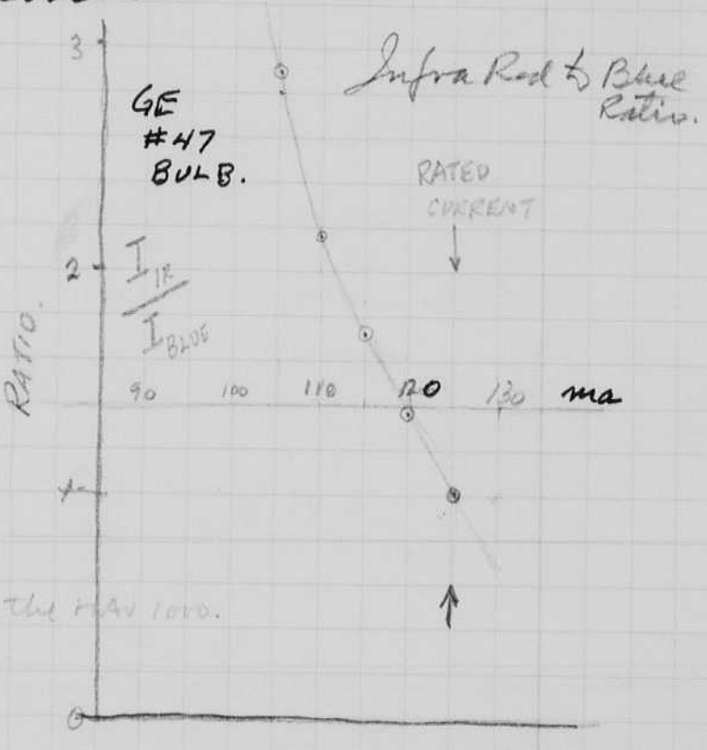
meas with Light meter. Weston 614.
20 lumens/sq ft at 2" from #47 125 ma. C.P. $= 20\left(\frac{1}{6}\right)^2 = .55$ c.p.
170 " /sq ft at 1' from 100 watt lamp. C.P. = 170 c.p.

Ratio is $\frac{170}{20}\times\left(\frac{6}{1}\right)^2 = \frac{170\ 36}{20} = 2\frac{1}{3}6.$

$\frac{18}{17}$
$\frac{56}{18}$
236

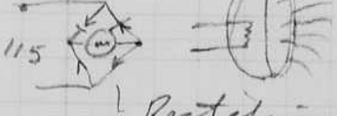
meas with HAV 1000. on recorder.

#47 Bulb.		HAV ma	929	IR/Blue.
130		~~39.2~~	~~37.2~~	
125	5×10^6	37.2	37.2	1.
120		27.2	19.6	1.38
115		19	11	1.72
110		13.	#6	2.166
105		8.7	3.	2.9



Repeat with a smaller resistor than 5×10^6 on the 929. and 56,000 on the HAV 1000.

100 watt lamp 100 C.P
Sealed beam 100 watt.

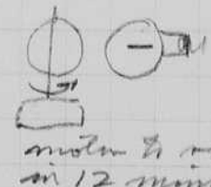


Assume 130 C.P. = 3000

$10{,}000 = \frac{3000}{D^2}$ $\quad D = \sqrt{\frac{3}{10}} = 0.5477$ meters
$= 54.8$ cm to the pickup

Rectifiers to smooth the comment. to eliminate the ripple in the light.

100 watt filament D = 10 cm to detectors.
bare.



artificial eclipse.

motor to rotate disc in 12 minutes/rev.

Notebook # 31

Filming and Separation Record

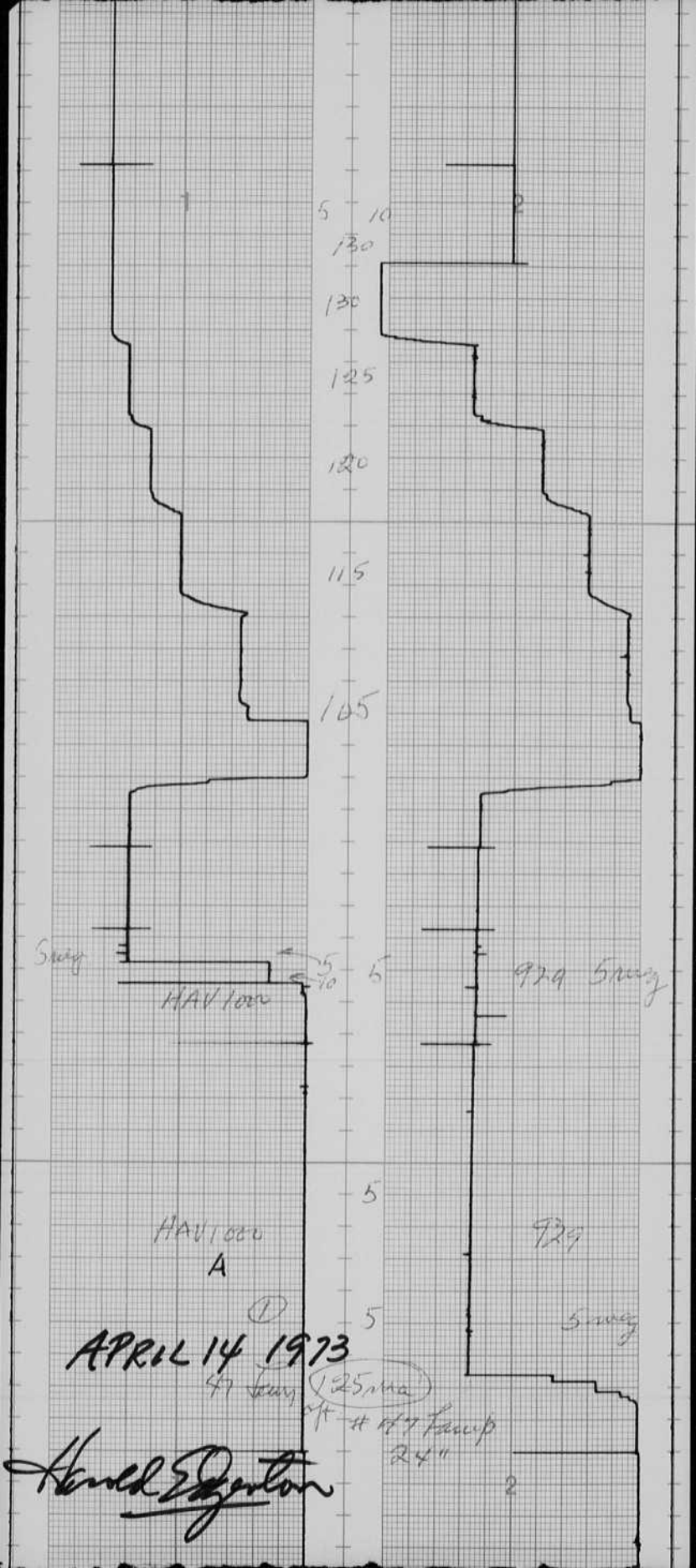
____ unmounted photograph(s)

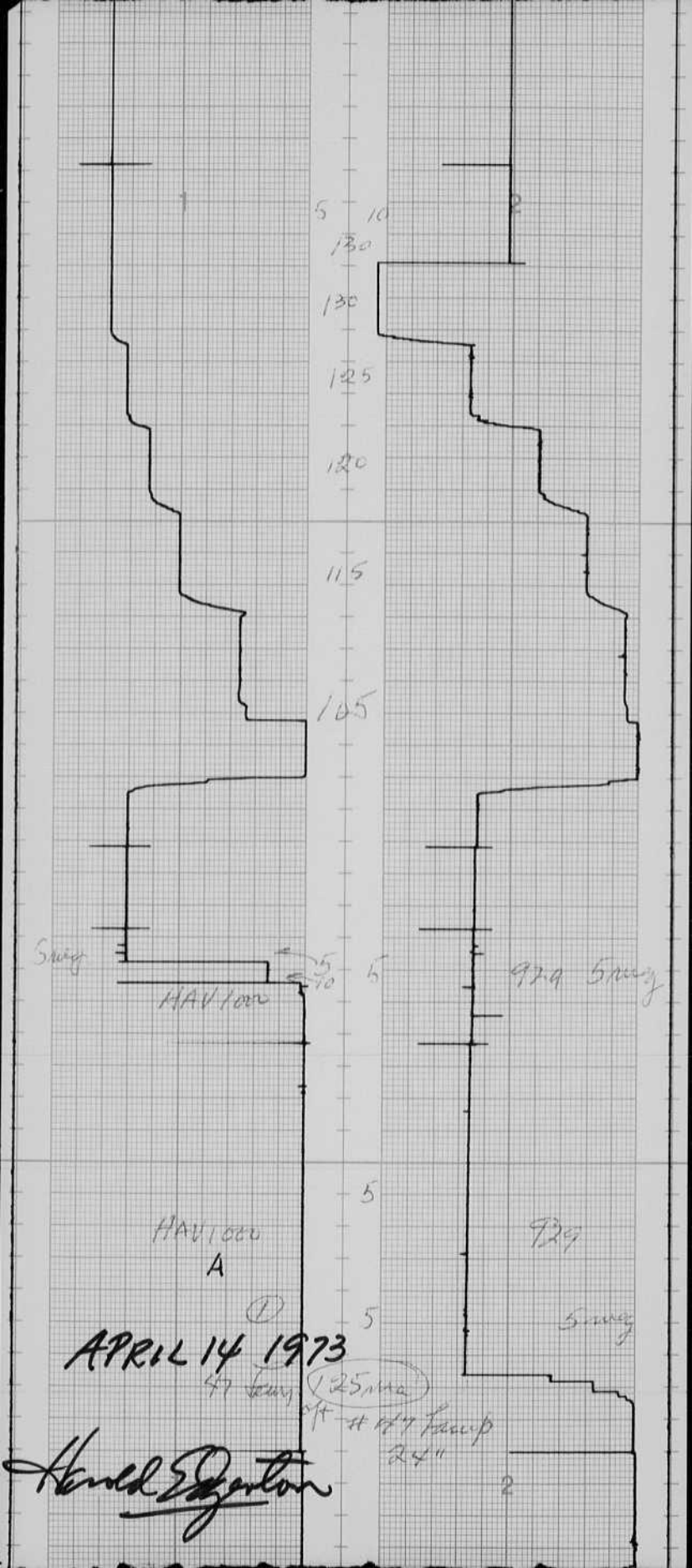
____ negative strip(s)

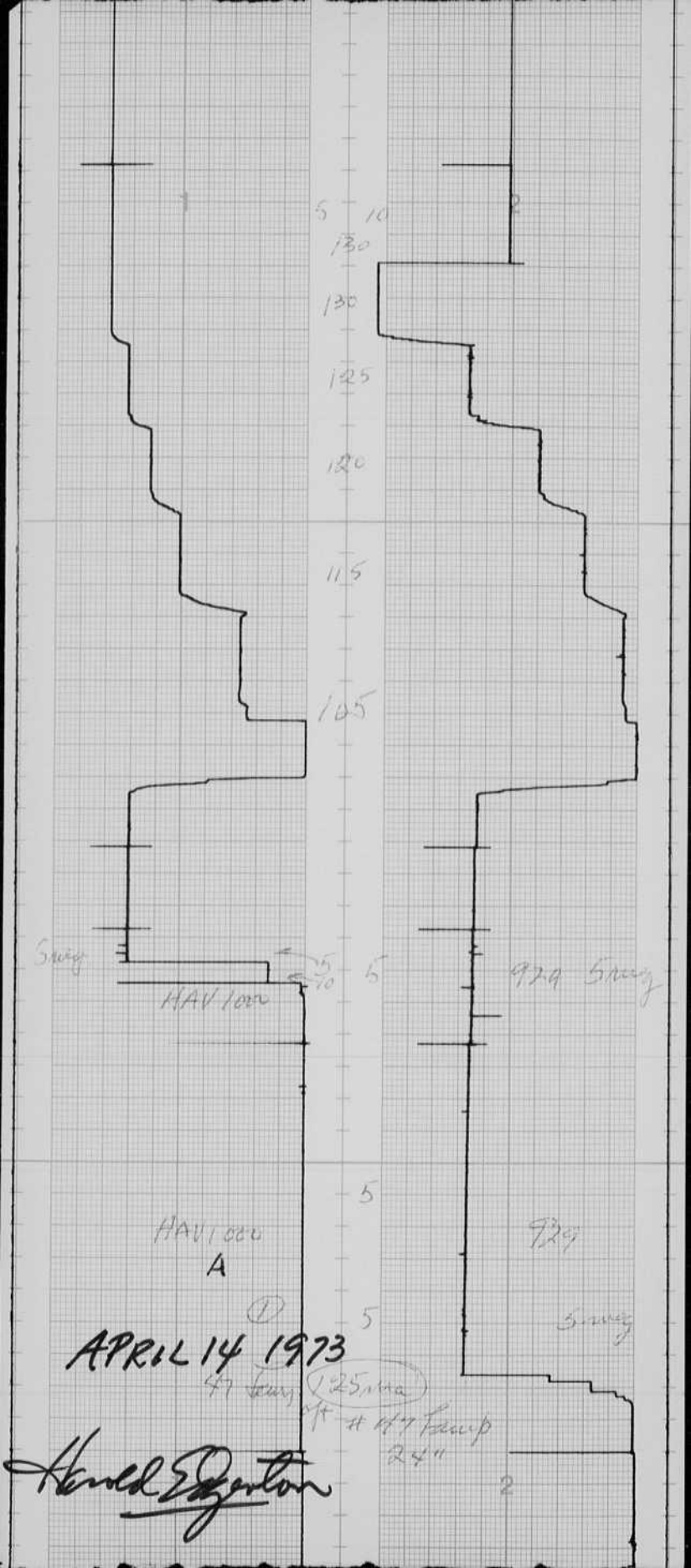
__1__ unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located between page 20 and 21.

Item(s) now housed in accompanying folder.


1
2
5
10
130
130
125
120
115
105
Swing
HAVIOUR
5
10
5
93.9 Swing
HAVIOUR
A
5
92g
1
5
APRIL 14 1973
47 Swing
125 ma
24"
2


5
10
130
135
125
120
115
105
Swing
HAVILOCK
A
APRIL 14 1973
Harold E. Edgerton


5
10
130
130
125
120
115
105
Smog
HAV 10cu
5
97.9 Smog
HAV 10cu
A
97.9
APRIL 14 1973
47 temp
125 ma
#47 temp
24"
Harold E. Edgerton

22 April 15 1973.

Further experimentation with the 929 as a light measuring device.

28" to #69 (1/2 cp) lamp with 125 ma current (6+v).

Phototube #14 RCA 929 S-4 surface in housing 45 volts.

(100 watt 14" to 929 #14 Lamp) $\frac{170 \text{ C.P.}}{14^2 \left(\frac{1}{12}\right)^2 .1304^2} = .0854 / .362$ $\quad .362^2 = .132$

14" = ~~.182 meters~~ $\quad$ ~~.182 - .032~~

$\frac{170}{.132} =$ ~~547~~ ~~530~~ ~~1600~~ 1300. lumens/sq meter.

R	Atmos	Def. Range	Volts	I
500	.1	14.5 div	.0145	2.9 ma
5000	.5	30	.150	3.0 "
5000	10	15	.15	3.
	20	7.5	.15	3.
	50	3	.15	3
50000	50	29	x.145	2.9
	100	14.5	x.145	2.9
	200	7	x.140	2.8
	500	3	x.15	3
500,000	500	2.85		
	1	14.	x.14.	2.8
	2	7.	x.14.	2.8
	5	2.6	13.0	2.6
5×10^6	5	8.7	13.5	.86

100 watt Lamp.
170 c.p. ?.

almost.

note all the voltage is across the resistor

Daylight is about ~~10,000~~ 100,000 lumens/meter^2

At what distance to my 170 cp lamp,

$10^5 = \frac{170}{D^2}$ $\quad D^2 = \frac{170. \times 10^{-5}}{} =$ ✓ $\quad D = \sqrt{.17} \times \frac{1}{10} = .0412$ meters.

$= 1.7 \times 10^{-3}$

$= 0.17 \times 10^{-2}$ $\quad 0.412$ $\quad 4.12$ cm

$\frac{170 \times}{(.0412)^2} =$ ~~10^5~~ lumens/sq meter ✓

Too close for my setup try 20cm $\frac{170}{.20^2} =$ 1250. lumens/m^2

$.5 \times 10^6$	1	37.5	37.5V	
.05	1	8	8 v	16 μa
500	.002V	24	.048	~100 ma.
5000	.01	49	.49	~100 ma.

Roof Experiment
Cont. Oct. 15 1973.

Standard Lamp 100 watt 120v clear lamp. meas 170 c.p.

RCA 929 at 20cm. for check.

5-4 Photocell
929
$25 \text{ div} \times 2^{mv} = \frac{.05 \text{ volts}}{500 \Omega} = 100 \mu a.$ for 4250 Lumens/M² = $\frac{170 \text{ c.p.}}{(@2')^2}$

North Sky. $I = \frac{4250}{100} \times \frac{48}{100} = 2040$ lumens/M²

Slight cloud cover due to jets.

DIRECT SUN $I = $ ~~4700~~ $\frac{4250 \times 1700}{100}$ 72,250 (R=500

$=$ 1400 59,500 (R=500)

$=$ 1480 62,900 " "

$=$ 1640 69,700 " "

100 watt clear lamp. 20 meters 330 lumens/sq ft on meter

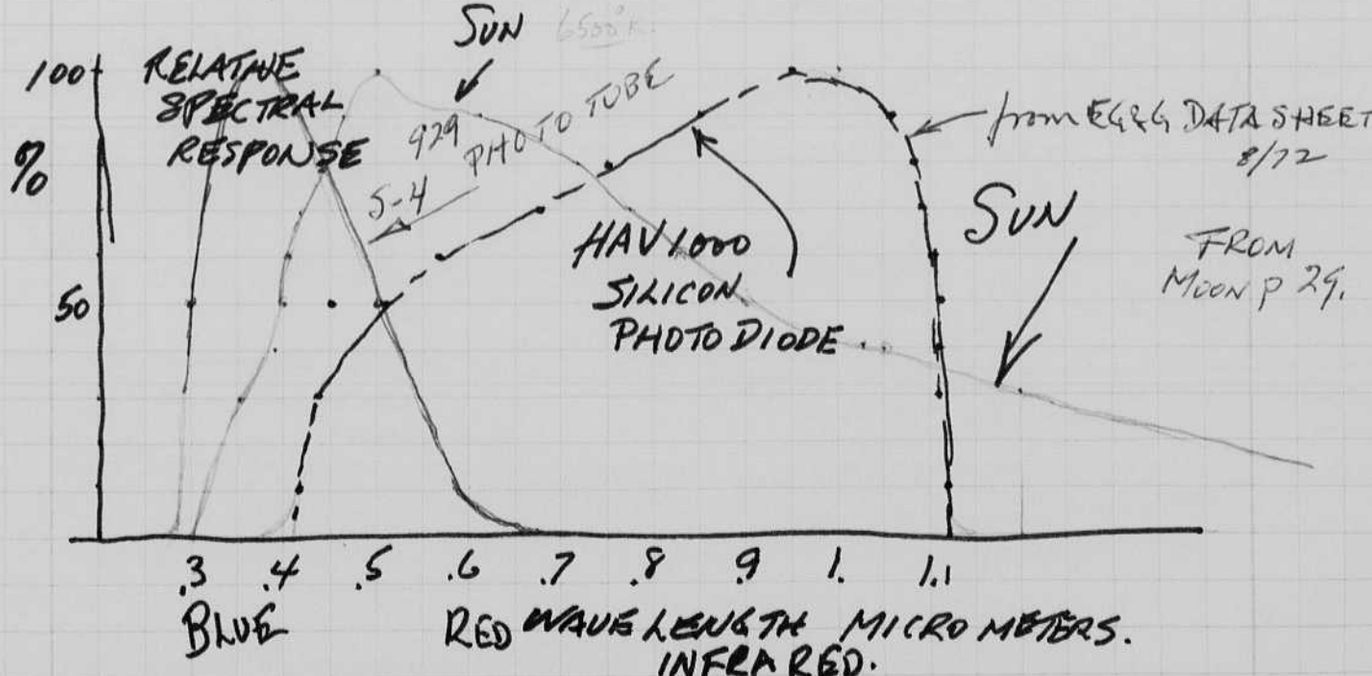
C.P. $= \frac{330 \times (\frac{20}{8})^2}{1/(\frac{12}{8})^2 \times (3)^2} = 147$ Real 170 ≈ ft lt

---

Silicon Diode. HAV 1000 $I = 820 \mu a$ $\frac{.810 \text{ volts}}{500} = .820 \text{ MA} = 820 \mu a.$

then

Daylight $I = 4250 \times \frac{820}{120} = 29,000$ ✓



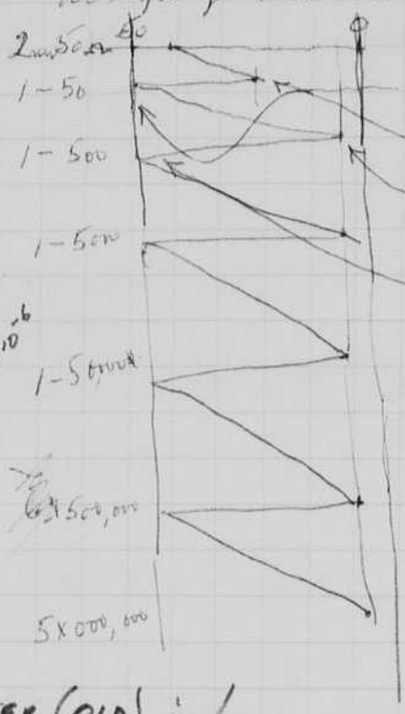
24 For Monday

1. Put in 50 ohm resistor

Sunlight 20 mv = 500 gives +1.5 div deflection.

2 mv 50 " same.

so light got dimmer go to 1 ohm equals reads 25 div.



$\frac{5 \times .001}{5 \times 10^6} = \frac{.005}{5 \times 10^6} = 1 \times 10^{-9} = .001 \times 10^{-6}$

$i = \frac{41.5 \times .002}{50} = .083$ volts Sunlight

$= .00166$ amp

$= 1660$ μa. 1.

1/2 pot. $i = \frac{50 \times .001}{50\,\Omega} = \frac{.05}{50}$ $= 1000$ μa

$i = \frac{5 \times .001}{50}$ $= 100$ μa 10^{-1}

$i = \frac{50 \times .001}{500}$ $= 100$ μa

$i = \frac{5 \times .001}{500}$ $= 10$ μa, 10^{-2}

$i = \frac{5 \times .001}{5000}$ $= 1$ μa 10^{-3}

$i = \frac{50 \times .001}{5000}$ $= 1$ μa

$i = \frac{5 \times .001}{5000}$ $= .1$ 10^{-4}

$i = \frac{50 \times .001}{50,000}$ $= .1$ ~~.01~~

$\frac{5 \times .001}{60,000}$ $= .01$ 10^{-5}

500,000 $= .01$

$= .01$

6 x 10^6 $= .001$ 10^{-6}

NOTE RED* FILTER (OLD) is from my grandmother Coe's home in Woodbine Iowa. There was also a "blue" glass filter which was tried but not used.

April 16 1973. Red* Neon Window ~~frame~~ pane in front of HAV1000 and (A)

Zero ~~Old Red~~ $I = \frac{.135 \text{ volts}}{5000\,\Omega} = 27.0$ at 40 cm from 100 watt 170 c.p. lamp 12/5

Old Red $I = \frac{.060}{5000\,\Omega} = 12.$ at 40 cm

Old Blue $I = \frac{.080}{5000} =$

Light Blue $I = \frac{.0035}{5000} =$

Old Red with HAV1000 (A) 45%

16/5

3.5

~~Old Red~~ Zero. $I = \frac{0.1V}{5000} = 20$ μa

*Old Red. → $I = \frac{.001}{5000} = 0.2$ μa

Old Blue → $I = \frac{.026}{5000} = 5.2$ μa

Light Blue $I = \frac{.054}{5000} = 10.8$ μa.

Recommendation ~~Red~~ Light Blue with 22. (54%)

Test on Roof. Light blue in color.

929 + Blue seems to work fine.

HSV 1000 does not have enough output.

Then tried a 930 photo tube S-1 Surface.
at 50 cm to 170 cp lamp.
The old Red Filter reduced the
output to 1/3 ±.

& then returned to the roof. with the 930.

Signal 1 mv 50 Ω 42 div but shows fatigue.
Filter introduced - Signal now 12.5 divs
Seems linear with filter.
$37\frac{1}{2} = .074 V / 500 = 148$ ua. full sun Red Filter.

Filter removed 930 shows
instability and decrease of sens.

$\frac{25}{50} \times = .050 V / 500 = 100$ ua. also for 5000 Ω.
drop off at 50K and 500K and 5M.
due to loss of voltage on system.

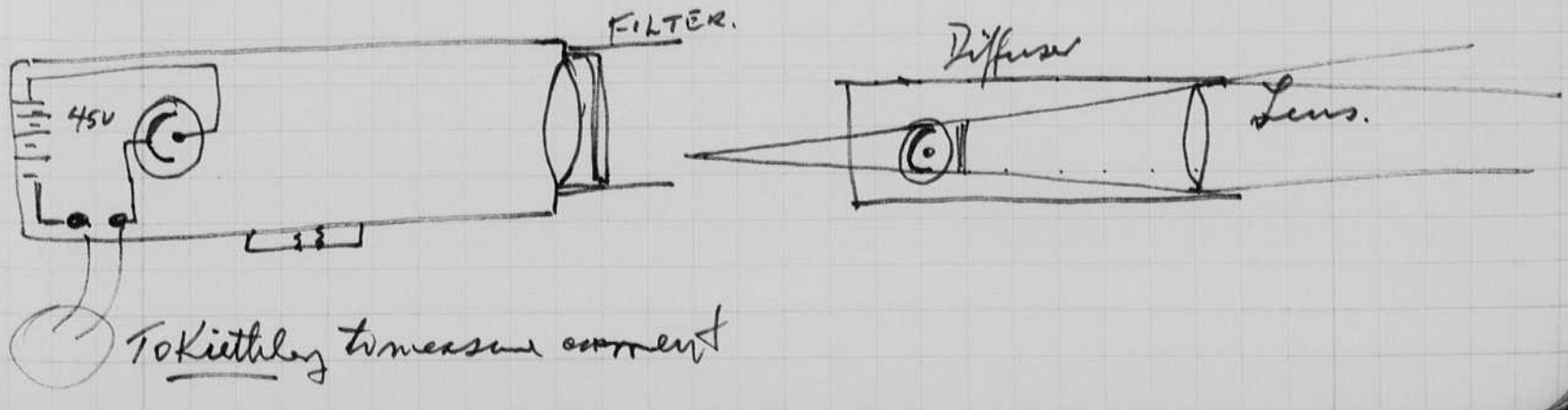
Recommend 929 with Blue filter. 50 50Ω 5K 50K 500K Open

930 with Red filter 50 " " " " "

+5 volt supply for anode.

Memo 930 is a Gas Photo tube!!! Do not use!!

(try 922) cartridge.
or. 925. Tried and it seems to be o.k. in the lab.

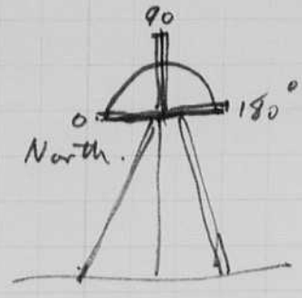


Gertson
Apr. 16, '73

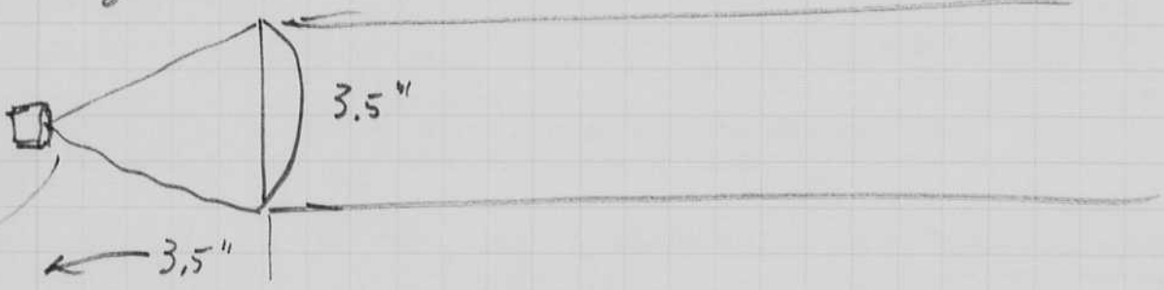
Photo electric Pickup.

Photodetector to cover 3° of sky and to be rotated from north & South

Object: To find Zodiac light in the red and the blue.



For a pick up, I plan to use the HAV1000 for observing the small light from the sky at night

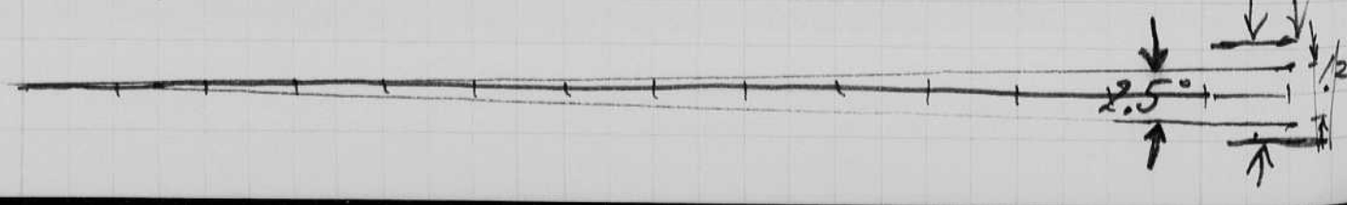


The active area is 0.051 cm²
The optics will be crude but an individual star or planet should be imaged onto the active area of the silicon photo tube.

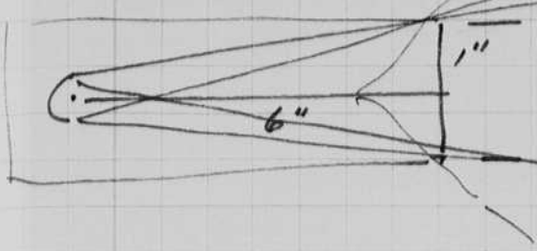
9:50 phone call from Donald Menzel about the light experiment. Sunlight = 1.
Corona = 10^{-5}
Zodiac = 10^{-6} or 10^{-7}

Eclipse at 60°

He says a 5° angle should be suitable.



Use tube of 1.75" diameter then Length = $\frac{1.75"}{.0611} * 2 = 57.28"$



Present.

$\sin^{-1} \frac{1}{6} =$ $\frac{1}{6} = .1666.$

Am 10° = .173
9 = .156
9.5 c.1650
9.6° = .1667.

20°

9.6 × 2 = 19.2°

Increase tube length to 40" 1.5" diam

$\sin \frac{\theta}{2} = \frac{.75}{40} = .01875$

$\frac{.75}{20} = .0375$

then $\theta = 2.15 \times 2 = 4.3°$

$\frac{a}{2}$ = 10 = .173
7 = 1218
5 = .087
4 = .0697
3 = .0523
2 = .034
2.7 = 047
2.3 = 040
2.1 = 0366
2.15° = 0375.

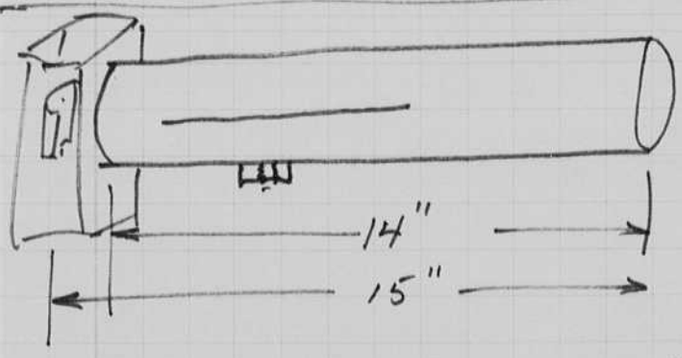
Try shorter tube say 30"

$\sin \frac{\theta}{2} = \frac{.75"}{15"} = .05$

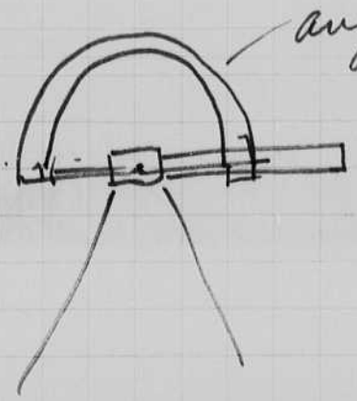
Try 15"

$\theta = 2.5 \times 2 = 5°$

5.2° .090
3° = .0523
2.9 = 0506
2.8 = 0488



Filter holder on end.
Walls lined with dark flock?
6° Beam angle.
Plot reading vs angle.



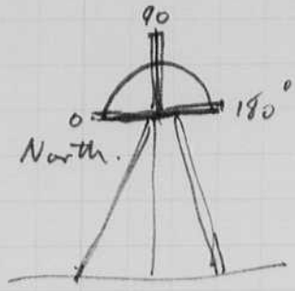
angle meas 0 to 180°

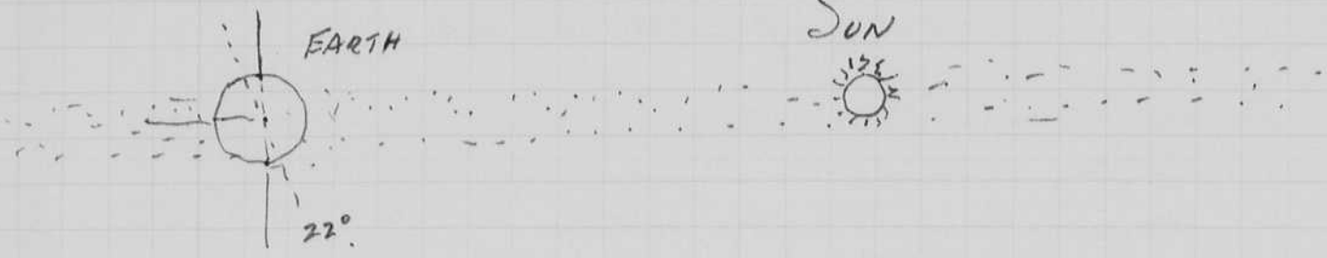
26 Overton Apr. 16, '73

Photo electric Pickup.

Photo detector to cover 3° of sky and to be rotated from north to South

Object: To find Zodiac light in the red and the blue.





For pickup, I plan to use the HAV1000 for observing the small light from the sky at night

The active area is 0.051 cm²
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Corona = 10^{-5}
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Eclipse at 60°

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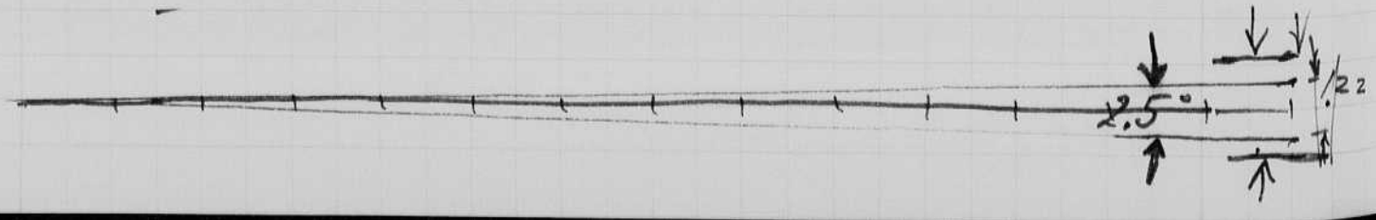
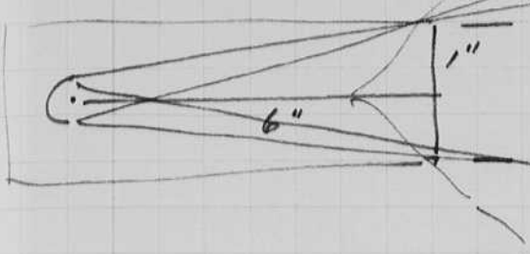


Use tube of 1.75" diameter then Length = $\frac{1.75}{.0611} \times 2 = 57.28$"



Present.

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Am 10° = .173
9 = .156
9.5 c.1650
9.6° = .1667. 9.6 × 2 = 19.2°

20°

Increase tube length to 40" 1.5" diam

$\sin \frac{\theta}{2} = \frac{.75}{40} = .01875$

$\frac{.75}{20} = .0375$

then $\theta = .215 \times 2 = 4.3°$

$\frac{\theta}{2}$ = 10 = .173
7 = 1218
5 = .087
4 = .0697
3 = .0523
2 = .034
2.7 = 047
2.3 = 040
2.1 = 0366
2.15° = 0375.

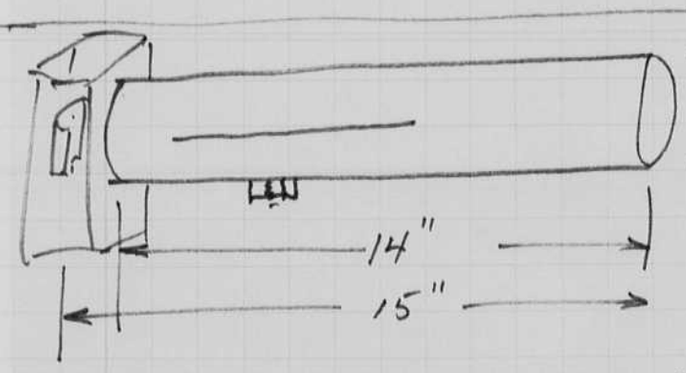
Try shorter tube say 30"

$\sin \frac{\theta}{2} = \frac{.75"}{15"} = .05$

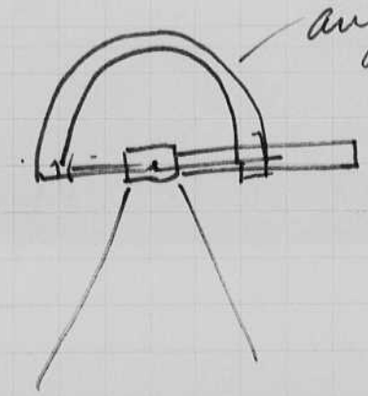
Try 15"

$\theta = 2.5 \times 2 = 5°$

5.2° .090
3° = .0523
2.9 = 0506
2.8 = 0488



Filter holder on end.
Walls lined with dark flock?
6° Beam angle.
Plot reading vs angle.



28 April 18 1923
H. Edgerton.

Low Current meas. with Keithley 610A Electrometer.

	Mult	Read		
929 covered	x1	$.39 \times 10^{-10}$	= .000039 ma.	Time const about ~~1~~ sec.
	0.1	$.05 \times 10^{-9}$	= .000050	
	.01	$.0056 \times 10^{-8}$	= .00056	fast. 1 sec ok.
	.1	$.05\ 10^{-9}$	=	fast.
	1	$.39\ 10^{-10}$	=	9 or 5 sec.

925 Phototube. — 50 cm from 170 cp Lamp.

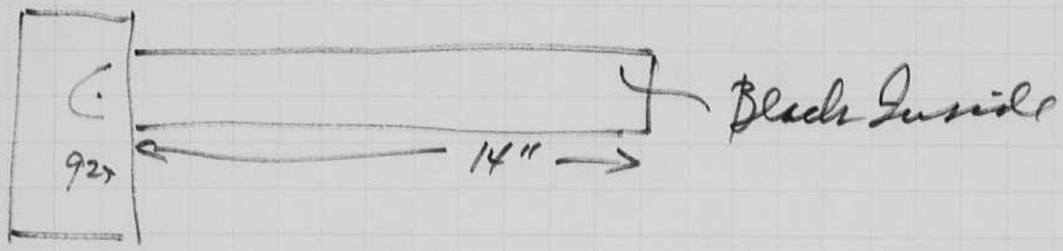
.010 m v def x 1000 Ω $I = \frac{.010}{1000} = .00001 = 10$ μa.

1/2 cp at 50 cm (128 ma current).

$.01 \times 40 = .40$ mv $= \frac{.04 \text{ volts}}{1000000} = .000000.04 = .04$ μa

$\frac{170}{.5} = 340$ estimated C.P.

$\frac{10}{.04} = 250$ Phototube Current.



1.5 15° hor. 80° 12

Beam about 7° to 10% of max. 92 - 83 9

April 20 1973. M.I.T. class 6.714 Lab. Group. Chas Miller. Lecture 29
Harold Edgerton

28 April 18 1973
N. Edgerton.

Low Current meas. with Keithley 610A Electrometer.

	mult	Read	
929 covered	x1	$.39 \times 10^{-10}$ = .000039 ma.	Time const about ~~1~~ sec.
	0.1	$.05 \times 10^{-9}$ = .000050	
	.01	$.0056 \times 10^{-8}$ = .00056	fast. ~~1~~ sec ok.
	.1	$.05 \times 10^{-9}$ =	fast.
	1	$.39 \times 10^{-10}$ =	~~1~~ sec.

925 Phototube. — 50 cm from 170 cp Lamp.

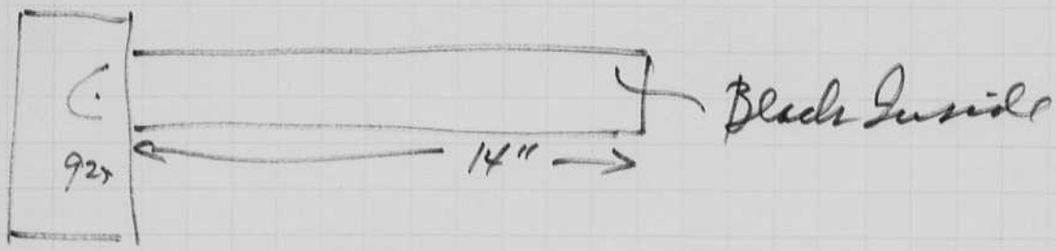
.010 mv def x 1000 Ω $I = \frac{.010}{1000} = .00001 = 10$ μa.

1/2 cp at 50 cm (125 ma current)

$.01 \times 40 = 40$ mv $= \frac{.04 \text{ volts}}{1000000} = .000000.04 = .04$ μa

$\frac{170}{.5} = 340$ estimated C.P.

$\frac{10}{.04} = 250$ Phototube current.



1.5 Beam about 7" to 10% of max. 92 - 83 93

15° low.

180°/12

April 20 1973. M.I.T. class 6.714 Lab. Transp. Chas Miller Lecture 29
Harold Edgerton

28 April 18 1923
N. Edgerton.

Low Current meas. with Keithley 610A & Electrometer.

	mult	Read	
929 covered	x1	$.39 \times 10^{-10}$ = .000039 ma.	Time const about ~~1~~ sec.
	0.1	$.05 \times 10^{-9}$ = .000050	
	.01	$.0056 \, 10^{-8}$ = .00056	fast. ~~1~~ sec ok.
	.1	$.05 \, 10^{-9}$ =	fast.
	1	$.39 \, 10^{-10}$ =	9 to 5 sec.

925 Phototube. — 50 cm from 170 cp Lamp.

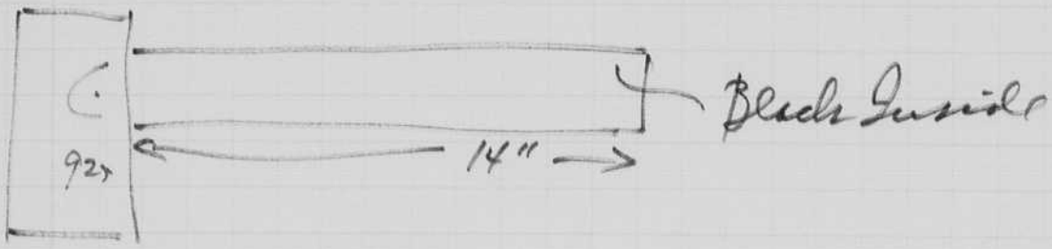
.010 mv def x 1000 Ω $I = \frac{.010}{1000} = .00001$ amp = 10 μa.

1/2 cp at 50 cm (125 ma current)

$.01 \times 40 = .40 \text{ mv} = \frac{.04 \text{ volts}}{1000000} = .000000.04 = .04$ μa

$\frac{170}{.5} = 340$ estimated C.P.

$\frac{10}{.04} = 250$ Phototube Current.



1.5 Beam about 7° to 10% of max. 92 - 83 9%

15° hor.

180°
12

April 20 1973. M.I.T. class 6.714 Lab. Instr. Chas Miller. Lecture 29
Harold Edgerton

April 20 1973

Harold Edgerton Photocell for Eclipse.

The equipment was taken to the roof this morning. It was an exceptionally clear day with a 10 knot east wind.

The 5-4 and 5-1 photocells were tried and the results tabulated on a chart.

Time	Photocell	Filter	R	Def	Sens	mv	I		
8:10	929	5-4	Blue	50	~~46~~	2 mv .092	~~1840 μa~~		1680
		c/f	50	42		.084	1680		1840
								R/B	
8:48	929	5-3	—	50	41	2	.082 v		1640
								(1.) .17	
	925	5-1	—	100	28	1	.028 v .0028		280. μa
9:05	929	5-3		50	38	2	.076 v	.164	1520 μa
	925	5-1		50	25	1	.025		250 μa
Vert Sky.	929	5-4		5000	12.5	1	.0125 v		2.5 μa
								(.56) .096	
	926	5-4		100,000	24.	1	.024 v		0.24 μa

April 21 73

Seems like the sensitivity is too low for the moonlight end of the affair. I tried to get the output of the moonlight last night from the roof at 1030 +. The moon was about 3/4. It was between the Hancock (new) and Hancock (old). It was a clear cold night. Did not see a division with 5 mgs and 1 mv/div.

See p 26 for sensitivity from Mengel

	Lumens/meter²	
Sunlight	1.	12.5
corona	10^{-5}	1
Galaxie	10^{-6} or 10^{-7}	0.1 to .01

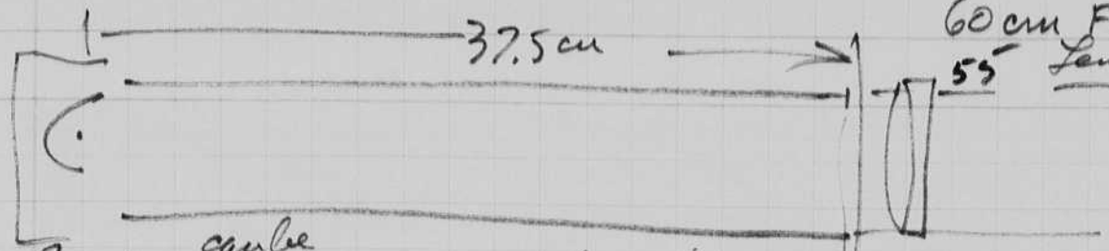
1,500 o.c. μa.
0.8 μa.
.0015 .001

38/9
342 100 watt lamps. C.P. = $I \times D^2 = 38^* \times 3^2 = 342$ cp Norgaard

!! Will this is the lamp measured at (170) ?!!

* Measured on Weston meter.

$\frac{342}{D^2} = 1$ $D = \sqrt{342} = 18.5$ meters



Reading of meter caused by factor of 3 with Lens.

$\frac{.5 cp}{D^2} = 1$ $D^2 = .5$ $D = \sqrt{.5} = .707$ meters. 70.7 cm. 24/7.5 = 3+

Standard galvin. 1/2 cp Lamp 125 ma #47 at 70.7 cm = .707 meters.

	Div	Scale	mv.	R	mv/R ma.	Light	Blue/Red
5-4 (929) no F	15	1	15.	500K	.030	1 lumen/m²	
	15	10	150	5M	.030	" "	
							1.82
5-1 (925) " "	43	2	86	5M	.0172	" "	1.
	16	1	16	1M	.0160	" "	

at this rate 10^5 lumens/m² = $i = .03 \times 10^5 \times 10^{-6} = 3000 \times 10^{-6}$ amps. } 5-4 daylight
$i = .017 \times 10^5 \times 10^{-6} = 1700 \times 10^{-6}$ amps. } 5-1
Daylight.

I then took the assembly to the Roof of MIT tower Bldg & and aligned the photocells to the sun.

		Div	Scale	Volts mv	R	V/R ma	Light.		Blue/Red.
4.19 pm	Blue 5-4 929	33	2	.066	50	.00132	1320 μa		
									10.2
4:19 ~~Blue~~ Red.	5-1 925	13	1	.013	100	.00013	130 μa	5 mm	5.6
4.24	5-4	24.5	5	.122	50K		2.4	VERTICAL. TIME 4.24	6.42
	5-1	38	1	.038	100K		.38	sky	3.53
5.31	5-4	20	1	.020	5K		4.0		
	5-1	31	1	.030	100K		.3		13.3
									7.4
5.37	5-4	48	1	.048	50K		0.96	vertical TIME 5:37	12.0
	5-1	8	1	.008	100K		0.08	sky.	6.6
5.41	5-4	9	1	.009	5000		1.8		
	5-1	15	1	.015	10,000				

April 20 1973

Harold Edgerton Photocell for Eclipse.

The equipment was taken to the roof this morning. It was an exceptionally clear day with a 10 knot east wind.

The 5-4 and 5-1 photocells were tried and the results tabulated on a chart.

Time	Photocell	Filter	R	Det sens	mv	I		
8:10	929	5-4	Blue	50	~~46~~	2 mv .092 ~~.084~~	1840 μa	1680
		c/f	50	42		.084	1680	1840
8:48	929	5-3	—	50	41	2	.082 v	
	925	5-1	—	100	28	1	.028 v .00028	
9:05	929	5-3		50	38	2	.076 v	
	925	5-1		50	25	1	.025	
Vert Sky.	929	5-4		5000	12.5	1	.0125 v	
	926	5-4		100,000	24.	1	.024 v	

R/B

(1.) .17 (1640 / 280. μa)

.164 (1520 μa / 250 μa)

(.56) .096 (2.5 μa / 0.24 μa)

April 21 73

Seems like the sensitivity is too low for the moonlight end of the affair. I tried to get the output of the moon last night from the roof at 1030+. The moon was about 3/4. It was between the Hancock (new) and Hancock (old). It was a clear cold night. Did not see a diffusion with 5 mv/div and 1 mv/div.

See p 26 for sensitivity from Mengel

Lumens/meter²

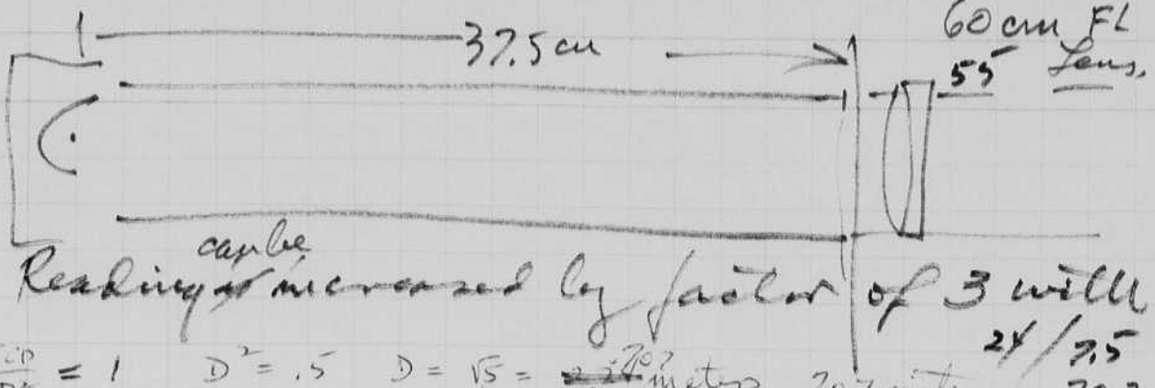
Sunlight	1.	10.5	150,000
Corona	10^{-5}	1	0.9
Galaxy	10^{-6} or 10^{-7}	0.1 to .01	.0015

3/9
3/42 100 watt lamps. C.P. = $I \times D^2 = 38^* \times 3^2 = 342$ cp Norgren

!! Will this is the lamp measured at (170) ?!!

* Measured on Weiler meter.

$\frac{342}{D^2} = 1$ $D = \sqrt{342} = 18.5$ meters



Reading can be increased by factor of 3 with Lens. 24/7.5 = 3+

$\frac{.5 CP}{D^2} = 1$ $D^2 = .5$ $D = \sqrt{.5} = .707$ meters. .707 meters. 70.7 cm.

Standard galvin. 1/2 cp Lamp 125 ma #47 at 70.7 cm = .707 meters.

	Div	Scale	mv.	R	mv/R ma.	Light	Blue/Red
S-4 (929) no F	15	1	15.	500K	.030	1 lumen/m²	
	15	10	150	5M	.030	" "	
							1.82
S-1 (925) " "	X3	2	96	5M	.0172	" "	1.
	16	1	16	1M	.0160	" "	

at this rate 10^5 lumens/m² = Daylight. $i = .03 \times 10^{5} \times 10^{-6} = 3000 \times 10^{-6}$ amps. } S-4 daylight
$i = .017 \times 10^5 \times 10^{-6} = 1700 \times 10^{-6}$ amps. } S-1

I then took the assembly to the Roof of MIT tower Bldg & and aligned the photocells to the sun.

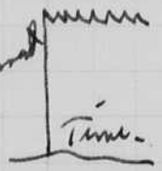
		Div	Scale	Volts mv	R	V/R ma	Light.		Blue/Red.
4.19 pm	Blue S-4 929	33	2	.066	50	.00132	1320 μa		
									10.2
4:19 ~~Blue~~ Red.	S-1 925	13	1	.013	100	.00013	130 μa	5mm	5.6
4.24	S-4	24.5	5	.122	50K		2.4	VERTICAL. TIME 4.24	6.42
	S-1	38	1	.038	100K		.38	sky	3.53
5.31	S-4	20	1	.020	5K		4.0		
	S-1	31	1	.030	100K		.3		13.3
									7.4
5.37	S-4	48	1	.048	50K		0.96	vertical TIME 5:37	12.0
	S-1	8	1	.008	100K		0.08	sky.	6.6
5.41	S-4	9	1	.009	5000		1.8		
	S-1	15	1	.015	10,000				

 Data Reduction April 21 1973 Sun dropping back of M.I.T. Dome.

TIME	Color	Scans	Div.	Volts.	R. Ω	I μa	Blue/Red.	B/R compared to Tungsten.
448	Blue	25	2	.050	50	1000	8.35	
	Red	12	1	.012	100	120		4.57
449	Blue	22	2	.044	50	880	8.8	
	Red	10	1	.010	100	100		4.84
450	Blue	23	1	.023	50	460	11.5	
	Red	40	1	.04	1000	40.		6.3
451	Blue	22	1	.022	500	44. ✓	~~20.0~~ 15.7 ✓	
	Red	28	1	.028	10K	2.8 ✓		8.6
531	Blue	20	1	.020	5000	4.	12.9	
	Red	31	1	.031	100,000	.31		7.07
541	Blue	9	1	.009	5000	1.8	12.0	
	Red	15	1	.015	100,000	.15		6.6

Apr 25 1973 I put some new 929 tubes and 925 tubes into the pickups and tested them with a my 1/2 C.P. lamp at 70.3 cm which should put 1 lumen/ft² on the cathode. The new photo tubes were numbered. Several are being packed for the trip.

One 929 was found to be more sensitive than the one I've been using. I put this in and took it to the roof of #4 to aim it at the sun on Apr 24. The current showed strange variations of 1 sec ± period at first. Eventually they stopped. Was the tube gassy? Was 45 volts and 2 ma too much power? $\frac{45}{.002} = .090$ watts.



I am taking some metal screen filters to use with full sun light.

A light meter was purchased which read 900 lumens/sq. ft. I plan to use this on the expedition.

A very interesting light time record was made when a dark cloud went over the sun. The light decreased by a factor of more than 100

A angle curve was made which shows 2° ± 1/2 points.

The equipment is in my car at the Iron Bros plant at 8 am ready to be packed for shipment to Africa, Dave Trook to drive any minute.

Peter Sweetish - Center for Adv. Studies cand in Visual Studies.

Jan Williams (Dean)

Peter Sweetish

Plans camps for seal under water in Lochness.!

Notebook # 31

Filming and Separation Record

____ unmounted photograph(s)

____ negative strip(s)

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

was/were filmed where originally located between page 32 and 33.

Item(s) now housed in accompanying folder.

Gulf 273 Quad 24,972

P.C. Reading.

7°

9 10 12 14 16 18

DEGREES

20

10

BRUSH STRIPCHART

Gould Inc., Instrument Systems Division Cleveland Ohio Printed in U.S.A.

13	16
10	2
9	0
11	10
14	16
19	0
18	2.4
17	8.5
16	14
15	15.5
14	16
13	16
12	15
11	12
10	4
13	16 dur

Dec 26 72
1973 Buick

P.S. Bearing.

7°

9 10 12 14 16 18
DEGREES

10 20

BRUSH ACTION CHART

13	16
10	2
9	0
11	10
14	16
19	0
18	2.4
17	8.5
16	14
15	15.5
14	16
13	16
12	15
11	12
10	4
13	16 dwell

Dec 26 72

1973 Purple

P.C. Raising.

7°

9 10 12 14 16 18

DEGREES

20

10

BRUSH ASCHCHART

Gould Inc., Instrument Systems Division
Cleveland Ohio Printed in U.S.A.

13	16
10	2
9	0
11	10
14	16
19	0
18	2.4
17	8.5
16	14
15	15.5
14	16
13	16
12	15
11	12
10	4
13	16 dur

	S	Dia	mv.	R	I	Input	April 22 Data	Sunset in clouds over NEBCO.	
	S-4	.005	38	.076	5.M	.013	0.5 at 70	B/K	Date of Calib. 2-7-1973
	S-1	5	21	.025			S-4 ~~(14)~~ ang/m² S-1		

	S-4	6 mv	38	.190	5×10^{6}	.038	.5 at 70.1 = 1 Lumen/m²	1. ~~1.6~~	Input = $\frac{ma}{.058}$	Tungsten
	S-1	5	21	.105	5×10^{6}	~~.105~~ .021			Red.	
	S-1	1	19.5	.0195	10^{6}	.0195	.070	"		
612	S-4	7	14	.014	$.05\ 10^{6}$	.28.	1.74	1.4 ~~1.57~~		Daylight
	S-1	2.	13	.026	$.10\times10^{6}$	.26.	~~1.3~~ 1.24			
622	S-4	1	30	~~.030~~ ~~.036~~	$.5\times10^{6}$	.06	1.58			.5/.07
	S-1	1	16	.016	1.M	.016	.8	1.97		Daylight
625½	S-4	1	23	.023	$.5\times10^{6}$	.046	1.21	.93		
	S-1	1	26	.026	1M	.026	1.3 - little moisture in Red			
633	S-4	1	12	.012	$.5\times10^{6}$	.024	.63	1.4 Sunset.		
	S-1	1	9	.009	1M	.009	.45			
643	S-4	2	26	.052	5.M	~~.0104~~	.274			
	S-1	1	7	.007	5M	.0014	.07	3.9		
656	S-4	1	7.5	.0075	5M	.0015	.0395			
	S-1	1	1+	.001+	5M	.0002	.01	3.95		
701	S-4	1	1	.001	5M	.0002 ma	.00527			
	S-1	1	.5	.0005	5M	.0001 ma.	.005	1.		Incandescent
609½	S-4	1	22	.022	$.05\times10^{6}$	~~.044~~ ma	11.6			
	S-1	2	34	.078	10K	.78	45.		0.25	

	S	Dia	mv.	R	I	Tijut	April 22 Data	Spread in clouds over NEEco. Hz
~~S-4~~	~~.005~~	~~38~~	~~.076~~	~~5.M~~	~~.013~~	~~0.5 of 70~~		B/K
~~S-1~~	~~5~~	~~21~~	~~.025~~					

Date of Obs. 27 1973 HR2

S-4	6	38	.190	5×10^{6}	.038	.5 of 70.1 = 1 Tsunami/m²	1.	Tijuana — .058 rad.	Tijuana
S-1	5	21	.105	5×10^{6}	.021				
S-1	1	19.5	.0195	10^{6}	.0195				

612 S-4	7	14	.014	$.05\,10^{6}$	.28	1.34	1.4		Daylight
S-1	2	13	.026	$.10\times10^{6}$	.26	1.24			
622 S-4	1	30	.030	$.5\times10^{6}$	.06	.58			.5/.03
S-1	1	16	.016	1.M	.016	.8	1.17		Daylight
625½ S-4	1	23	.023	$.5\times10^{6}$	.046	1.21	.93		
S-1	1	26	.026	1M	.026	1.3 note increase in Red			
638 S-4	1	12	.012	$.5\times10^{6}$	.024	.63	1.4 Dawn ref.		
S-1	1	9	.009	1M	.009	.45			
643 S-4	2	26	.052	5.M	.0104	.274			
S-1	1	7	.007	5M	.0014	.07	3.9		
656 S-4	1	7.5	.0075	5M	.0015	.0395			
S-1	1	1+	.001+	5M	.0002	.01	3.95		
701 S-4	1	1	.001	5M	.0002 ua	.00527			
S-1	1	.5	.0005	5M	.0001 ua	.005	1.	Inconclusive	
S-4	1	22	.022	$.05\times10^{6}$	.044 ua	11.6			
609½ S-1	2	39	.078	10K	.78	4/5.	0.25		

April 22 Data

34

Sun and Clouds.

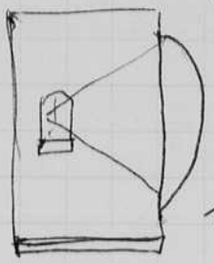
Apr 26 1873.

Noon.

Time.	Def.	Sun	volts	R	ma.	Def	Sun	Volts	R	ma	B/R.	N 3/12.
1219 ○ FULSUN	15	5	.075	50	1500	27	1	.028	100	2300	.536 ~~1.866~~	1.0
20	14	5	.070			27					.5185 ~~1.928~~	.967
(20) 10'	14	5	.070			27					.5185 ~~1.928~~	.967
15'	14	5	.070			28					.5186 ~~1.866~~	.967
20'	3.5	5	.0175			4.5					.777	1.45
25'	7	5	.035			8					.875	1.63
19'	2.9	ma 5	.0068			3					.9666	1.80
23.5	10	ma 5	.050			13					.769	1.43
28.5	5	5	.025			11.2					.434	.81
30	2	5	.010			2					1.0	1.86
40	13	5	.065			18					.7222	1.35
45	2.5	5	.0125			2					1.25	2.33
50	8.5	5	.0425			11.5					.74847	1.39
Dun. 52.5	12.5	5	.0625			20					.6275	1.17
56'	11.0					12					.9166	1.71
(21) 1.5' 7.8.1	.7					.55					1.272	2.37
6.' 40	.40					.36					1.111	2.07
min 20	.11					.105					1.048	1.95
36'	.53					.53					1.000	1.86
(22)	14					27.5						

May 11, 1923
Harold Edgerton

Equipment for Skylight.

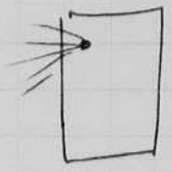


Short focus lens.

9'

45 volts on 929.
1/4 x 1/4" hole covered with diffuser.

0.5 cp at 125 ma
#47 Lamp

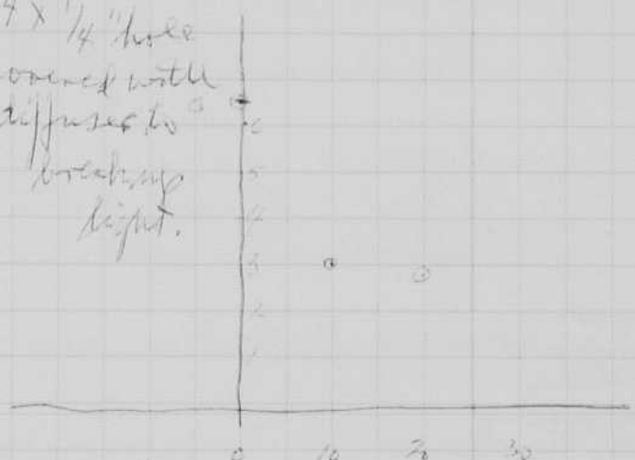


530 a/l max 10' 10^{-9} amps.

905 pm 20' $.2 \times 10^{-9}$ amp

Dark,		6.7
	10°	5.3
	0	6.6
	-5	6.3
covered with black tape	0	6.6
929	10	3.2
	20	~~3.0~~ 2.9 x
	10	5.0 x
	0	6.5
	10	2.9.

1/4 x 1/4" hole covered with diffuser to break up light.



$\frac{0.5}{9}$ = .0045 lumens/ft².

$\frac{5}{19}$ = .0011 lumens/ft²

after adjustment
0.2×10^{-8} amps. .0020 ma
6×10^{-9} amps .0006 ma

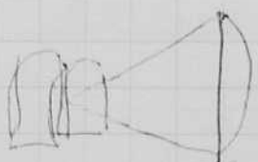
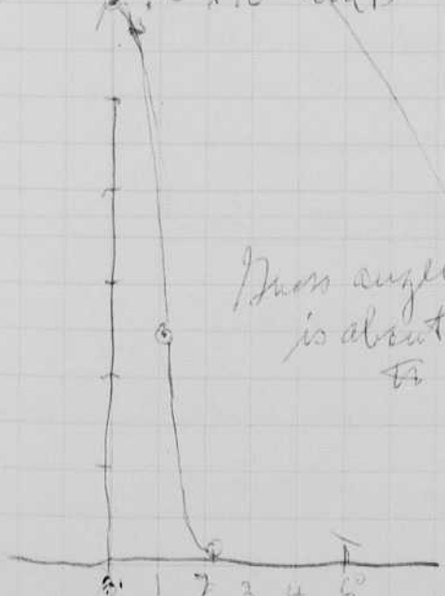


Image falls on diffuser.



Cross angle is about 2° to 1/2 light.

covered photocell back 3/4"
Lamp at 30 ft. c/l

Leakage current =

$.5 \times .3 \times 10^{-10} = .075 \times 10^{-10}$ amp. Leakage

.0000000075 ma

$\frac{25}{75}$

Angle is small.

 May 13 1973

Harold Edgerton.
100 Memorial Dr apt 11-6A. 11-7A Cambridge mass

Transcribed information taken last night on roof of Bldg x M.I.T. about 930 pm.

I have discarded some of the first readings which were influenced by the spot lights as used on the M.I.T. Dome. I turned the reflectors the other way.

A 929 photo tube #2 with an S-4 surface was used in a spot finish, a 3½" focal length lens of 3½" diam was used to concentrate the beam. I had previously made the image out of focus to cover the cathode. For last nights experiment, I moved the photo tube back so the image at ∞ came close to the front of the photo tube. Then I covered the photo tube with black tape except for a ¼" square hole. This was covered with a diffuser to break up the image in order to utilize the cathode more uniformly. See previous page.

The angle of acceptance to ½ light is about 2 degrees. as shown on the page before p35.

Argee.

Vertical	Lens covered with a Hat.	$.0002 \times 10^{-10}$ amperes.	
Vertical	Lens open	$.135 \times 10^{-10}$ amperes.	Clear blue Sky. no clouds,
3/4 Moon – near 3/4		$.780 \times 10^{-10}$ amperes.	" " clear.

The angle from horizontal to the moon was about 60°.

→ this could not be measured with the Gould Recorder! It is ok with the Keithley.

See calibration from p 35. 18 ft. ≅ 6 meters 0.5 c.p.

$$I = \frac{0.5}{\frac{6^2}{5.5^2}} = \frac{.0165}{} \text{ lumens/meter}^2 \qquad i' = .0006 \times 10^{-6} = 6 \times 10^{-10} \text{ amperes}$$

30 / .165 / .50

$$S = \frac{di'}{dI} = \frac{6 \times 10^{-10}}{1.65 \times 10^{-2}} = 3.6 \times 10^{-8} \text{ amperes/lumens/m}^2$$

$$I = \frac{di'}{S} = \frac{1}{3.6 \times 10^{-8}} di' = .28 \times 10^{8}\, di' \quad \text{with tungsten light}$$

Sky light $I = .28 \times 10^{8} \times .135 \times 10^{-10} = .038 \times 10^{-2} = .00038$ lumens/m²

Moon light $I = .78 \times 10^{-10} \cdot .28 \times 10^{8} = .218 \times 10^{-2} = .0021.8$ lumens/meter² (3/4 moon)

The color temp of the moon is about 6500° as contrasted to 2960° K of the tungsten filament.

From RCA Electro Optics Handbook (1968)?

p 6-5.

Source	Stellar mag	Calc Illuminance lux/m²
sun	-26.73	1.30×10^{5}
Candela 1m	-13.9	1.0
full Moon	-12.5	2.67×10^{-1}
Venus	-4.3	1.39×10^{-4}
SIR 105	-1.42 +	9.80×10^{-6}
0 mag star	0.	2.65×10^{-6}
1st	1	1.05×10^{-6}
6th	6	1.05×10^{-8}

??

The Sky. Direct Sunlight. 1 - 1.3×10^{5} lumens/meter²

Full Daylight	$1.-2 \times 10^{4}$ "
overcast.	10^{3}
Very Dark Day	10^{2}
Twilight	10
Deep twilight	1
full moon	10^{-1}
Quarter "	10^{-2}
Starlight	10^{-3}
Overcast starlight	10^{-4}.

My reading of 3/4 ~~moon~~ Moonlight is less than 1/4 moonlight of this table.
Part of this could be my method of calibration. I used a tungsten lamp of 2750°K (?) and accepted the rated output of 1.5 cp at rated current of 125 ma. The color temperature of the sun and reflected light from the moon is at least 6500°K. Thus the calibration may be off at least by a factor of two.

I plan to check this calibration with my Bossen Luna Pro meter.

Scale	lm/m²			
1	0.17	10 88	19 44000	Daylight max = 85,000
2	.35	11 175	20 88000	
3	.7	12 350	21 175000	
4	1.4	13 700	22 350,000	
5	2.8	14 1400		
6.	5.5	15 2800		
7	11	16 5500		
8	22	17 11,000		
9	64	18 22000		

May 13 1973 Side Scan Sonar.

I was in the Charles River this morning with the 258 sonar - single side scan 200 KC. It did not seem to make as good pictures of the bottom as it did some time ago. Why.

Tonight I have it in the lab to test.
The 200 KC transformer seems to be Ok, there is no ground on this circuit. The secondary is free. The voltage is in excess of.

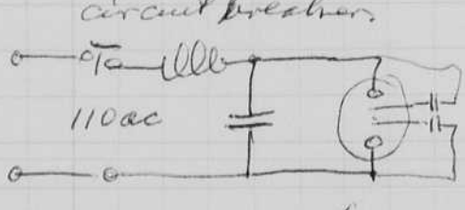
The output of the signal amplifier is clipped at ± ~~10~~ 5 volts. 10 volts peak to peak. This is also true of the main beam from the transducer into the receiver. Saturation seems to be a problem. Increasing the gain brings up the noise to about ± 2 or 3 volts

There is still a signal at min gain. This gain control does not shut off the circuit.

Ceiling now at ~~13~~ 11.6 M.S. (other target was at 3 ms).
Gain set at 4.8 for signal not to saturate at ± 5 volts.
Automatic Var. time gain reduces signal ! max output ± 3 volts and no noise in zero line.

May 15 1973 H.E.
Bill MacRobert and I have been trying to get more output from the 258 Sonar. The 200 KC or 100 KC crystals are being used for the side scan. We are also building up a 5 KC cable of 150 ft length for deep work.

Circuit for spot lamps.



Self start when voltage builds up in resonant circuit.

Xenon gap lamp.

May 17, 1973 Light from Skyand from the Moon.

Harold Edgerton

Last night at about 11 pm, the moon was full. I measured the output with a 929 photo tube in a 3½" lens system as described before. The equipment was rebuilt so the image of the moon fell on the front surface of the photo tube. Here was placed a 1/4 x 1/4" aperture which was covered by a diffuser. I made the experiment from the roof of building 4 directly over my laboratory in 4-405.

	current.			
1053	0.2×10^{-7} amperes.	.02 ma.	Full moon.	Clear cold night
	$.28 \times 10^{-10}$ "		Vertical of Sky.	Dim haze. (rare this).
	$.02 \times 10^{-10}$		Velvet over pickup.	

Angle measurements. scale set for zero at vertical

$.28 \times 10^{-10}$ amp	Vertical 0°
$.85 \times 10^{-10}$	23° N south.
$.115 \times 10^{-9}$	30° " "
$.19 \times 10^{-9}$	40° " "
$.2 \times 10^{-7}$	36° moon moon

Calibration data in Strobe Lab.

Tungsten lamp # #7 rated 5.2 c.p. at 6.3 volts.

	Leakage current			
		.02 $\times 10^{-10}$ amperes	velvet curtain	
3.17 meters	125 ma	.12 $\times 10^{-8}$ "	5.6 at 12"	5 = 2.8 f.c.
3.17 meters	140 ma	.30 $\times 10^{-8}$ "	6.3 at 12"	6 = 5.5 f.c.
3.17 meters	150 ma.	.565 $\times 10^{-8}$ "	7. at 12"	7 = 1 f.c.

Luna Pro.
59 5834

The 25 f sonar unit was used this afternoon in the Charles river with the side scan mode using one ship hull port side.

The performance seemed to be improved from previous test of May 13 1973. Bill & I have increased the voltage to the driving circuit. It is now 750 volts. (690 before?). I changed the angle some of the assembly with respect to the bottom.

Students - Tony Spear Elliot Fast
Karen Wade Mark Bodnar
Howard Messig
Peter Freund

Another group is here on Fri May 18 at 12:40 to 2:30 +

STROBE LAB: Room 4-405, ext. 3-4629, classroom 8-419 & 10-275

Second Term 1972-73
M.I.T.

LABORATORY PERSONNEL:

Edgerton, Harold, 100 Memorial Dr., Cambridge 864-4790
MacRoberts, Bill, 105 Whidden Ave., Whitman 1-447-4172
Miller, Charles, 85 Hammond Street, Acton 1-263-5438
Mooney, Jean, 27 Birch Rd., Watertown 924-7124
Vandiver, Kim, 14 Paul Revere Rd., Arlington 646-9356

SEMINAR 061

Arnett, John, Burton 433-C, Cambridge 180-8686 (dl.) or 253-3261
Bennet, Kevin, 33 Bay State Rd., Boston 266-6576
Brim, Terry, 37 Bay State Rd., Boston 247-8029
Christensen, Craig, 480 Beacon St., Boston 261-2475
Clarke, Jeff, 99 Bay State Rd., Boston 266-4796
Corkery, Joe 416 Beacon St., Boston 247-8275
Davis, Noel, 530 Beacon St., Boston 266-2968
Douros, Bryan, 403 Memorial Dr., Cambridge 494-8683
Fuchs, Martin, 518 Beacon St., Boston 536-1300
Grier, Chris, 259 St. Paul St., Brookline 734-0648
Hamburger, Wayne, 58 Manchester Rd., Brookline 232-9132
Johnsen, Rus, 416 Beacon St., Boston 247-8275
Kaden, Neil, Baker House, rm. 302, Cambridge 180-8302(dl.) or 253-3161
Luria, Scott, 58 Manchester Rd., Brookline 232-3260
Newman, Michael, Burton House, rm. 554F, Cambridge 180-8789 (dl.) or 253-3261
Speer, Gary, 99 Bay State Rd., Boston 266-4796
Sweer, Leon, MacGregor House, rm. D211, Cambridge 180-9371 (dl.) or 253-1461
Whitney, Kathy, McCormick Hall, rm. 310, Cambridge 180-8810 (dl.) or 253-5961
Wynn, Terry, Bemis, rm. 105, Cambridge 180-0165 (dl.) or 253-2871

6.714

Borden, Elliott, Baker House, rm. 5230, Cambridge 180-8373 (dl.) or 253-3161
Bryant, Charlie, 69 Chestnut St., Cambridge 492-6983
Byerly, Bob, Russian House, rm. 224C, 418 Memorial Drive, Camb. 494-8138
Celentano, Andrew, Baker House, rm. 362, Cambridge 180-8486 (dl.) or 494-8228
DeHainaut, Dan, Baker House, rm. 632, Cambridge 180-8462 (dl.) or 253-3161
Douglas, Marc, Baker House, rm. 624, Cambridge 180-8474 (dl.) or 253-3161
Feit, Elliot, Burton House, rm. 254F, Cambridge 180-8565 (dl.) or 153-3261
Freund, Peter, MacGregor, rm. E229, Cambridge 180-9340 (dl.) or 253-1461
Frick, Alex, 110 Minden St., Jamaica Plain 524-4657
Goodrich, Mark, 265 S. Main St., Cohasset 383-9056
Gottlieb, Gary, 410 Memorial Drive, Cambridge 180-8718 (dl.) or 253-3261
Kim, Jae, MacGregor, rm. H-212, Cambridge 180-9212 (dl.) or 253-1461
Lacy, Carl, 372 Memorial Drive, Cambridge 494-9820 or 253-3227
Lee, David, 179 Charles Street, Cambridge 492-3797
Lee, Eddie, 99 Moore St., Cambridge 491-1620
Lind, John, 5 Glen Terrance, Cambridge 547-3945
Messing, Howard, 5A Kendall St., Brookline 734-7642
Paster, Bob, 59 W. Cedar St., Boston 73-9475
Robinson, Richard, 108 Hemenway St., Boston
Rosenthal, Lorin, MacGregor, rm. H-223, Cambridge 180-9223 (dl.) or 253-1461
Schumm, Jim, 4 Boardman Pl., Cambridge 547-3413
Shjeflo, Walter, 110 Minden St., Jamaica Plan 524-4657
Thompson, Charles, 6 Wadsworth St., Allston 787-1197
Waal, Karen, McCormick Hall, rm. 404, Cambridge 180-8844 (dl.) or 253-5961
Walkin, Earl, 532 Beacon St., Boston 262-3192
Wilkstrom, Thomas, 467 Beacon St. Apt. #4, Boston 267-5657
Winsberg, Paul, 23 Hudson St., Cambridge 492-1569

James Mallie 588.6769 Brockton Mass.
38 Police Special pistol. Stuart

Left Boston 1225 noon on Delta June 12 1973 for Adelaide and Pda. Durban Africa

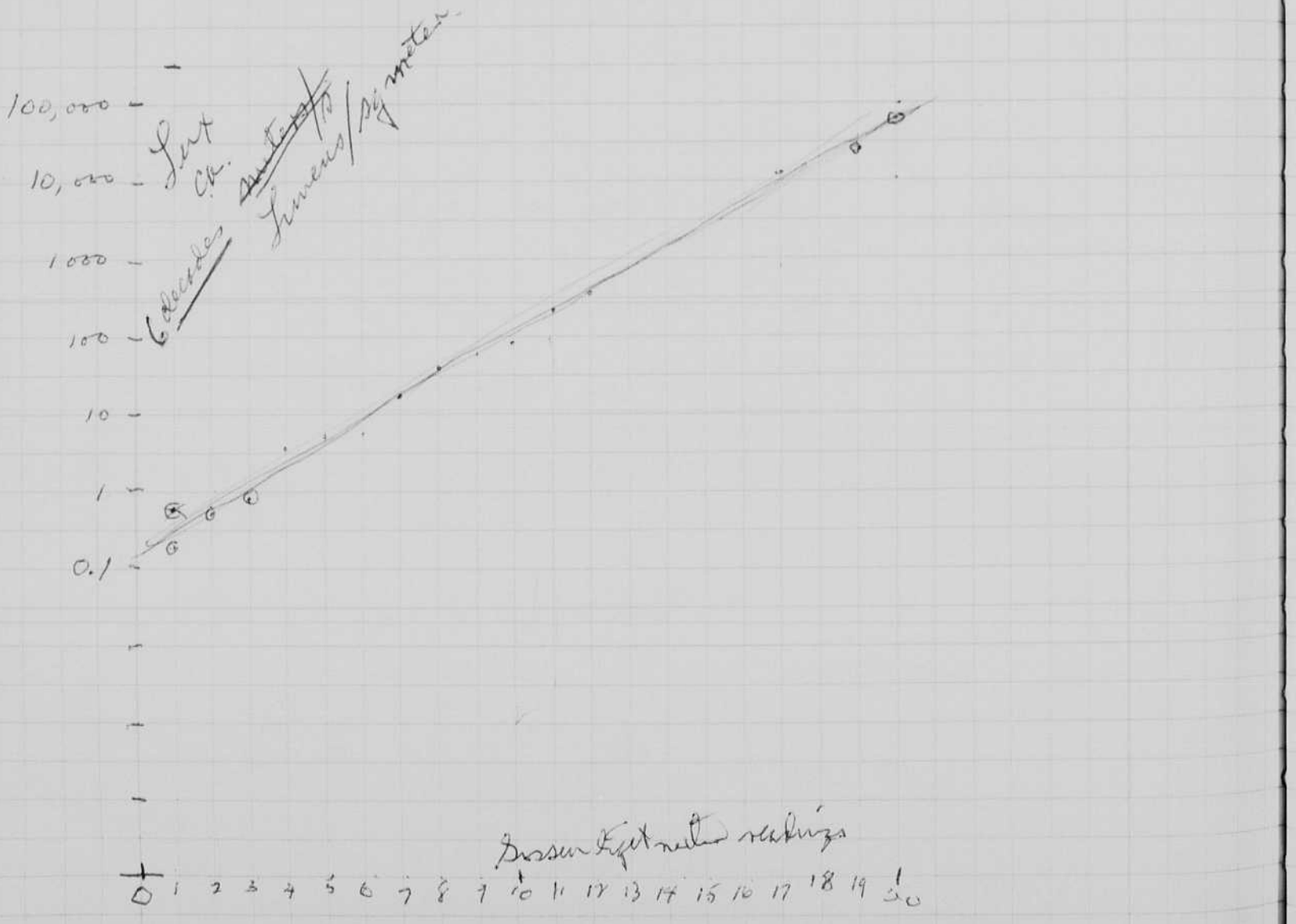
42 June 17, 1973 North of Akjoujt Mauritania. EEI Camp.
6.35 Sun up! Can't see at horizon 74° when sun. Moon set's (?) at 250° full moon almost.
Last night the moon came up at 9.30
125°

1150am. I am now in ~~Paris~~ at Dr. Donald Menzel's air conditioned hotel Room. Villa Simona. Akjoujt Mauritania.

136.~~880~~ mhz. on satellite. ~~Polarzation~~ Boulanger Trailing Recon
136.980 Teledyne Micronetics. model 6501

10:10 pm Recorder was fixed today at Donald Menzel's apartment! One wire took off the battery. There are three wires.

We Relocated the setup today at another spot to catch the sun up and setting. measurements were made of the light into the photocells. I also made some readings of the Bossen Luna Pro light meter # 5935834



June 16 1973 430am.

Moon 929 Blue 8 dia 5M max seps 001"/day Haze condition north wind 10 Kn?
46° 925 Red 1.5 5M " " " Some thin clouds.

640 Sun up in a cloud 76° Moon up 30° at 248°

	Bosson	Wind
750	17.5	Cloudy . . 10 N
8·12	19.5	Haze .10 N
845	20	Dr hunzyd Hazy.

A Geuctar drive mechanism from a battery and vibrator was installed. System goes to the north. Then the drive rotates the system on the polar axis. This is 11 or 12 degrees to the east of magnetic north. I borrowed the system from who is handling the radio connections.

Swim after lunch at the club.

3.55 pm returns camp temperature is 118° in our ~~tent~~ tent.

JAN ROSKAM Manager of the mine
% SOMIMA B.P. 275
NOUAKCHOTT
MAURETANIA (West-africa)

CLUB MOGHREIN
name of hill which is being mined for copper.

ROGER W. TUTHILL Amer Astronomical union.
11 TANGLEWOOD Arranging a trip for 250± people from U.S.A.
MOUTAINSIDE N.Y.
(201) 232-1786

Jess East for Randolph
617-963-2265
John Mullard Granville Rd
Lincoln 259-9449.

JONATHAN BLAIR (686-1430 home)
Photo Dept (202) 296-7500
NGS Washington DC 20036
% A Coriolon
Leonidas St 49
Kyrenia Cyprus.

Roger Sandoerlin
37 Rue F. KUHLMANN
COLMAR (G.P.) FRANCE.

Alban Hill Peace Corp

Analysis of June 17 Data.

Hosser meter	TIME	BLUE mv.	R	Light mv/R.	(Filter) Blue LIGHT.	normalized R	RED mv	R	LIGHT mv/R	FILTER	normalized Red Light	Hosser. LIGHT Lumens/ft²
~~4 30 6.57~~		9	5×10^6		0 ?		0	5×10^6				
	5.37	9	5×10^6		B ?		1.5	5×10^6				
	8 45	off scale	50		F		11	100		F		
		x2 .57	50		F		16	100		O		
		53	50		F							
		89	50		O							
20.66	9.12	39x2 78	50		F		12.5	100		F		
21	12 42	39x2 78	50	1.55×10^{-3}	F	1.55×10^{-3}	1.0	16	100	F	.16	1.
20	5.55 pm	14x2 36	50	$.72\times10^{-3}$	F	$.72\times10^{-3}$	11.65	8	100	F	.08	.5 88,000
	6.15 pm	10x2 20	50		F	$.4\times10^{-3}$	.2	5	100	F	.05	.31
	721 pm	46x1 46	50000		F	$.92\times10^{-6}$	5.9×10^{-3}	20	100,000	F	$26.\times10^{-5}$	$.267\times10^{-3}$ 27.5
	725 pm	32	50000		F	$.64\times10^{-6}$	4.1×10^{-3}	16.5	100000	F	18.5×10^{-5}	1.01×10^{-3} 4.
14.5	730 pm	28	50000		F	$.56\times10^{-6}$	3.62×10^{-3}	16	100000	F	16×10^{-5}	$1.\times10^{-3}$ 1650 3.2
13.6	735 pm	10	50000		F	$.2\times10^{-6}$	1.3×10^{-3}	4.5	100000	F	4.5×10^{-5}	$.283\times10^{-3}$ 950 4.6
	740 pm	6	50,000		F	$.03\times10^{-6}$	$.194\times10^{-3}$	1.7	100000	F		
								16	1M	F	16×10^{-6}	$.1\times10^{-3}$ .3 19.
12 -	745 pm	33	500,000		F	$.0066\times10^{-6}$	4.26×10^{-3}	6	1M	F	6	$.0375\times10^{-3}$ 350 10.
11.25	750 pm	15	500,000		F	$.003\times10^{-6}$	1.95×10^{-4}	17	1M	F	17×10^{-6}	$1.\times10^{-4}$ 2500 1.8
9	7.55 pm	50	5M		F	10×10^{-9}	$.64\times10^{-4}$	7.5	5M	F	1.5×10^{-6}	$.094\times10^{-3}$ 45. 7.
7.3	7.51 pm	16	5M		F	3.2×10^{-9}	$.207\times10^{-3}$	3	5M	F	$.6\times10^{-6}$	$.037\times10^{-3}$ 13. 5.
6.6	801 pm	13	5M		F	2.6×10^{-9}	$.167\times10^{-3}$	3	5M	O		8. 4.
	+	21.5	5M		O							

Ratio

Ratio

but we need a good reading at 0.2 f.c. or 2 lumens/sq m.

June 19, 1973 Hazel Ebbitt Nelson Young. Sep 26.

Sunset at 6:25 ± ? Hazy at Horizon. 2 diameters above
75° - 78° at 6:30 11° mag var west Horizon.

G.	Time	Mag	R	F				
6.5	7:46	7	500x	(F)	45	10,000	O	1730
	7:47							
	6:57	14	500x	(F)	14	1000	O	
	6:57	~~9~~	~~500~~	(F)	7	570/1000	F	
	7:30	15	50	F	5	100	F	
	8:30	45	50	F	5	1	F	
	9:00	38.5 x2	77.0	50 F	12	"	F	
20.5	9:40	33 x2	66	50 F	14	100	F	102,000
	10:02	31 x2	62	50 F	14	100	F	
	11:10	41 x2	82	50 F	66	100	F	
21.	11:15	44.5 x2	87	50 F	17.5	100	F	

June 20 1973 Harold Dexter 9:38.

The setup is almost ready to go. I am running another light time curve. The output is slightly brighter than yesterday and it is clearer. The wind is still in the north but only 10 knots ±. The sand problem is not so bad as when we came. Even so, we need to cover everything to minimize the dust problem.

I got up at 3:30 am to try the lens 925 combination on the moon, I was able to get about 15 min deflection from the moon (3/4) with 5 mag input to the Brush Recorder.

I plan to watch the plugs when the red signal gets so low it can't be seen. I may need to adjust the sensitivity. All my notes so far are made with lens #1 1 mv/div. Scales are made by changing the resistors. ±5 volts are used on the 929 and 925.

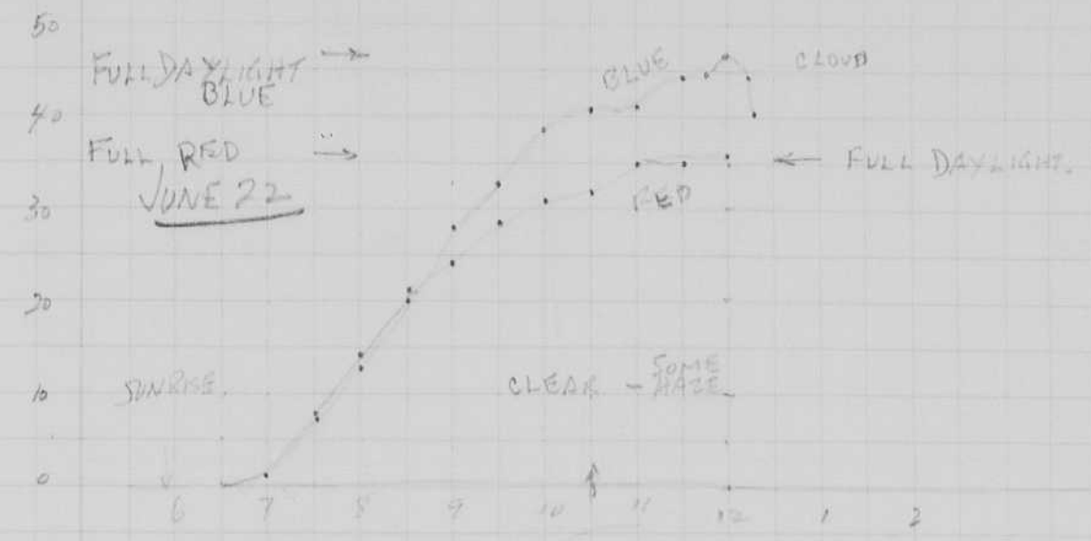
The sequence of events is recorded on the Brush Recorder papers. I put down the

hour
Day.
Scales
Gossen Luna light meter reading.
also the Jen reading is made to show Dept of Light by Edge added later.

I am using a Questar Powerglide with a 12 volt D.C. Battery supply furnished by Dr G. Davy. Tennessee. The battery is only good for 4 hours. I then converted to the 110 volt Ac connection. This ran ok.

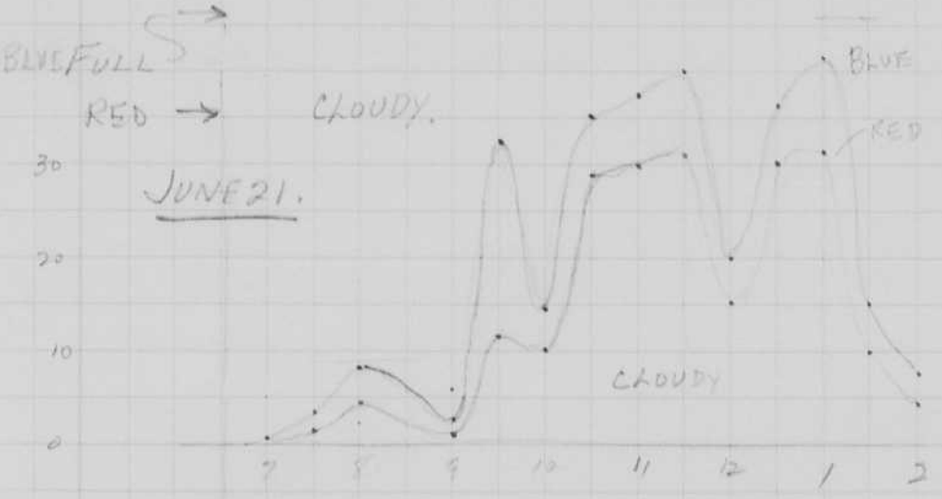
June 22. Drive got about 12 noon. Oil was used to clean and free bearings.
Plugs stopped reading but sand.
Electronics quit due to sand in switch.

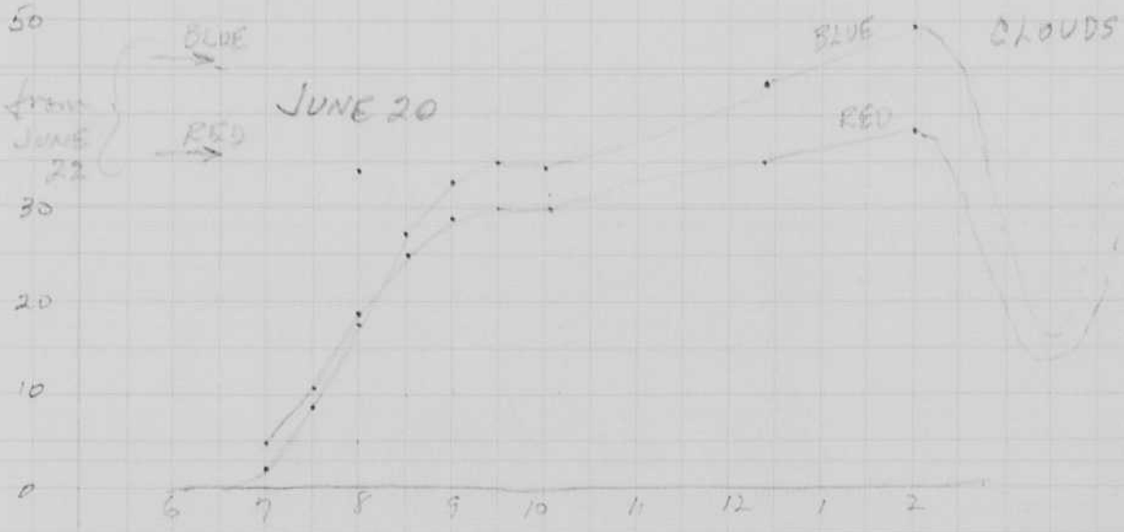
DATA OF JUNE, 22/1933 HAROLD EDGERTON
AKJOUJT MAURETANIA. africa.



1 mm/sec.
60 mm/min. = 6 cm/min
3600 mm/hr = 360 cm/hr
5 hr = 360 cm = 1800 cm
(7 to 12) = 18 M

NOTE. BLUE DEFLECTIONS PLOTTED 1:1
RED DEFLECTION DOUBLED.

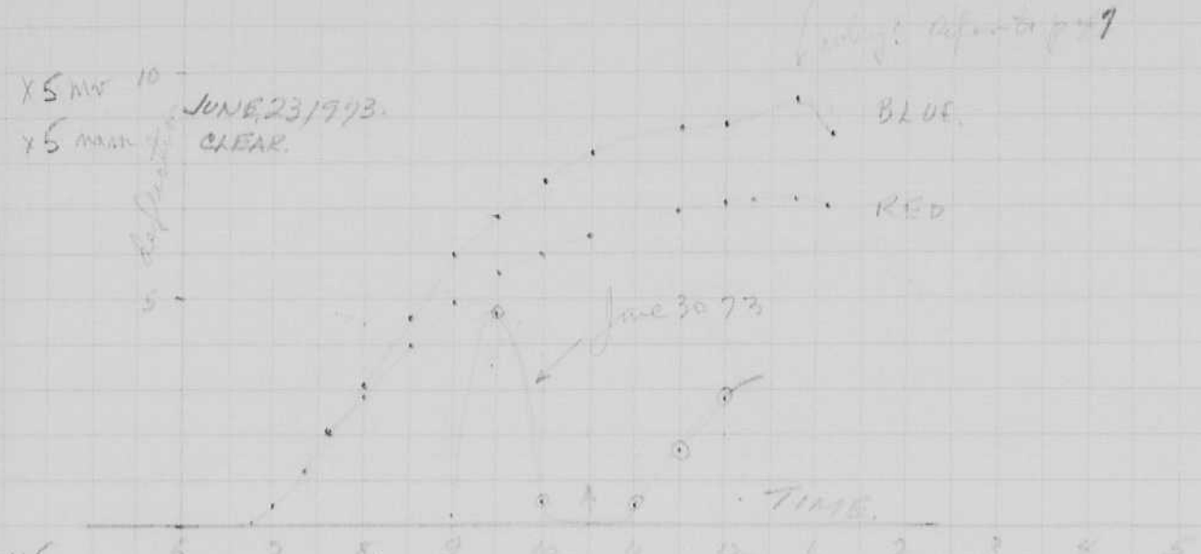


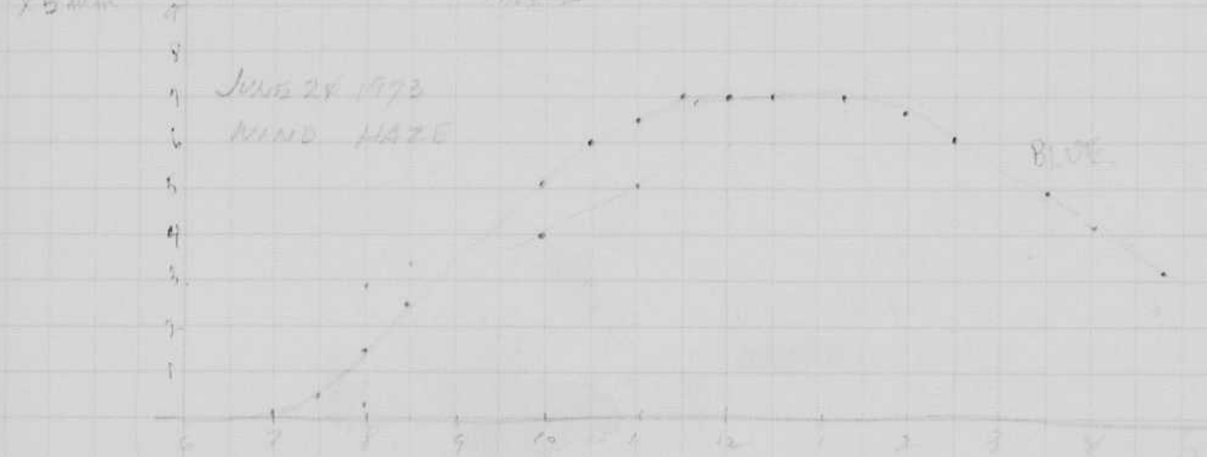


compared to June 21 22

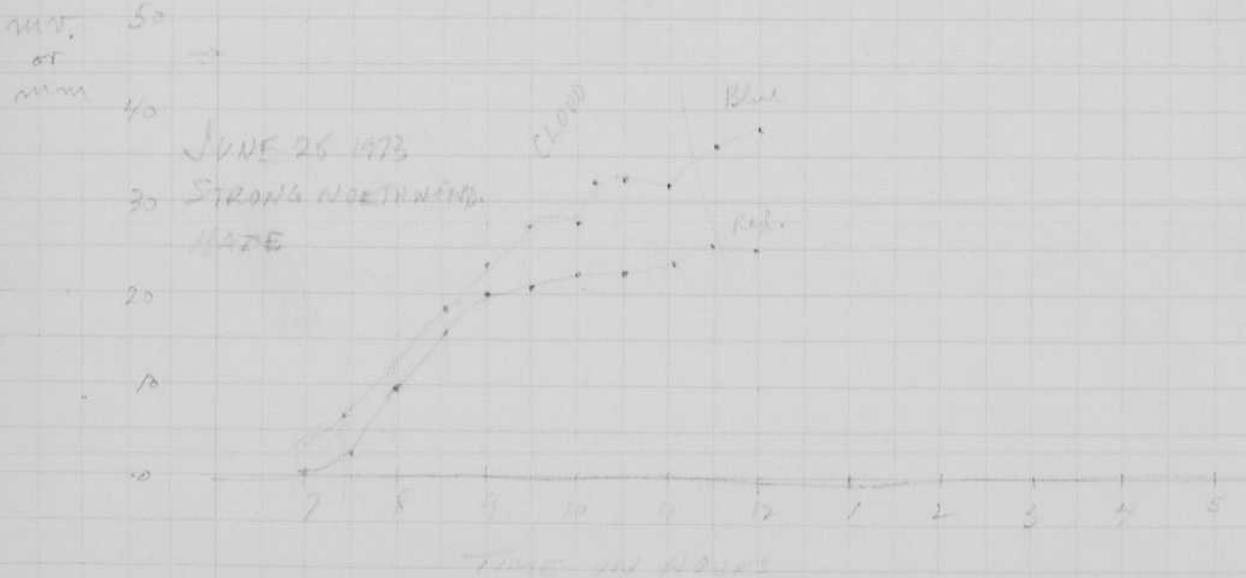
Note: max deflections slightly greater on June 20 than
before the clouds appeared.

June 23 1973
Hazy Skyline.

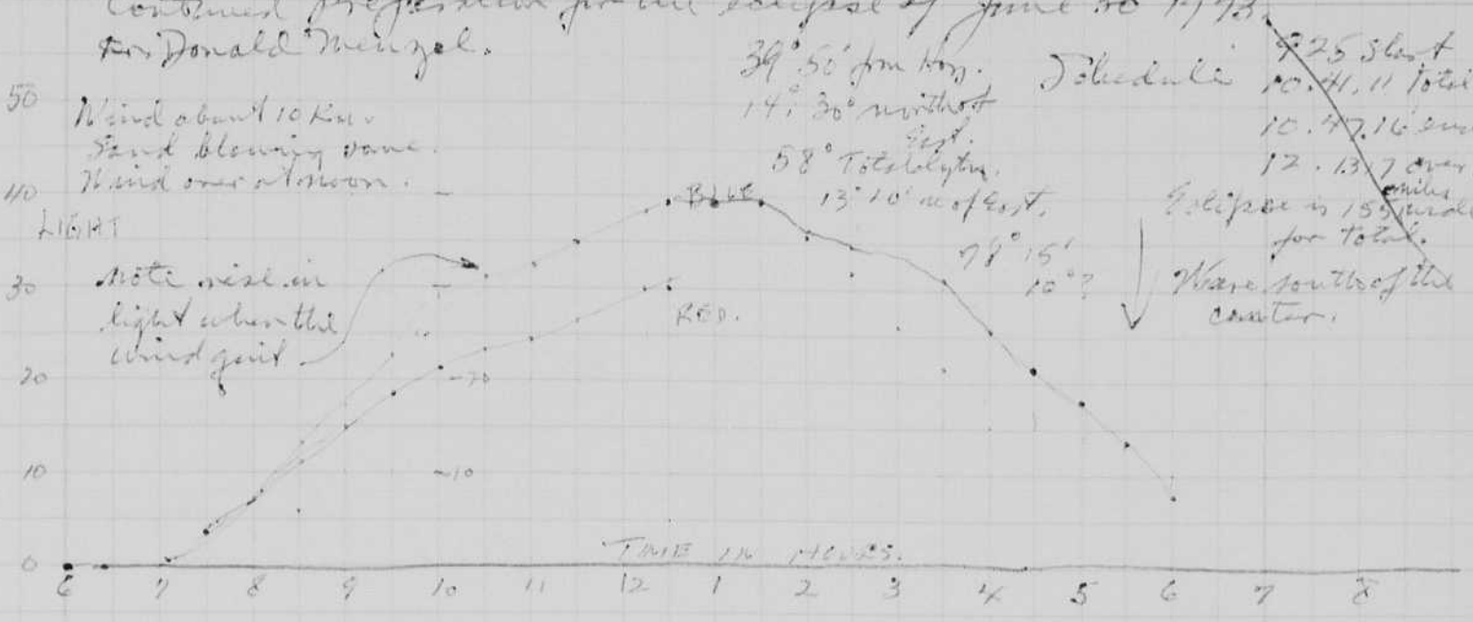




Lens factor = 13.
3.5" Lens of 3.5" focal length.



June 26, 1973 Neil Pope Dunfe arrived today, also Nancy. Howard Smith.
Howard Ogilvie. Pte. Chelin and N.B.C. Crew of T.V.
Continued preparation for the eclipse of June 30 1973.
for Donald Menzel.



925 Start
10.41.11 total.
10.47.16 end
12.13.7 over.
Eclipse is 15 seconds for total.
Stars south of the center.

June 27 1973. Left Cant. to track the sun, the equatorial motor works most of the time. It sticks about 11 am. Decided to take it apart tonight and put out wires.
Poole, wife, and son, Adam arrived this am for a visit from Akyinjt. Crisis in the Baseline is over. Now the water pipes broken. Water on ration.

Contact	9.25
2nd	10.41 22
Tot	10.44 26
3 cont	10.47 31
4 cont	12.13 30.

Dr. Donald Menzel

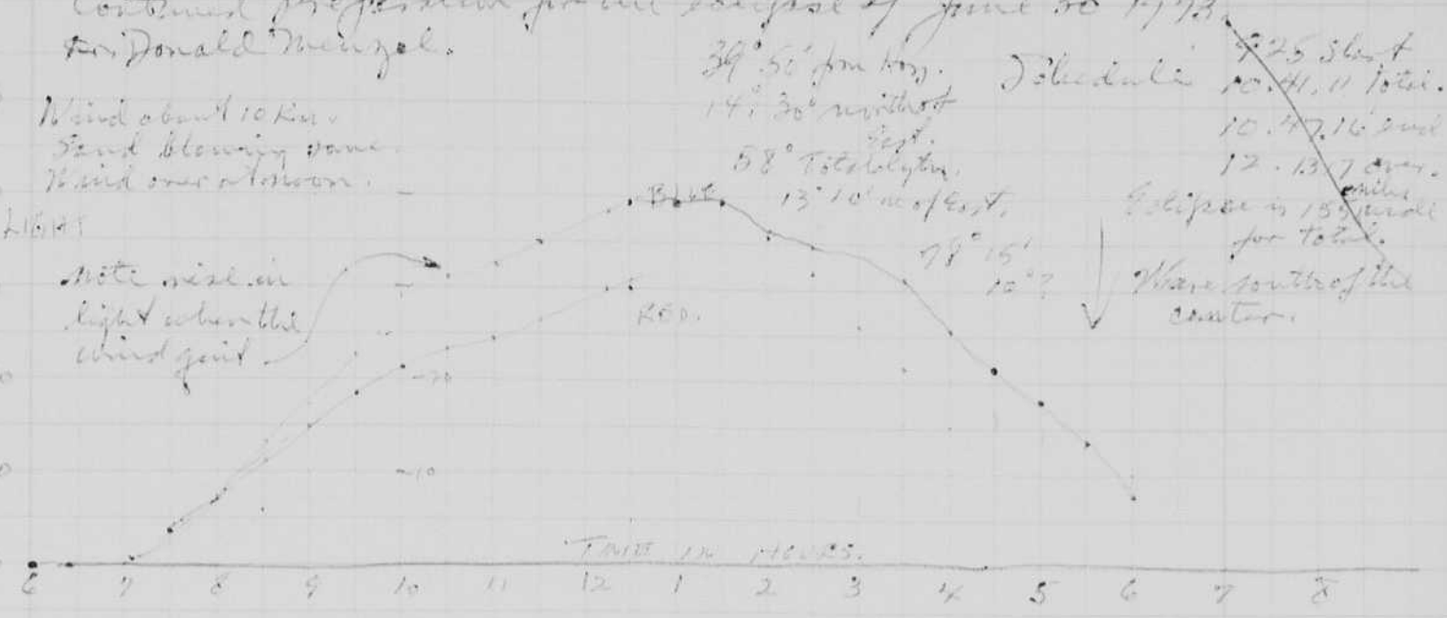
Howard Ogilvie

Polaroid color photo of my photo table pictures and Recorder at Akyinjt

Jules


JUNE 23/1973.
CLEAR.
BLUE
RED
June 30 73
TIME.
JUNE 24 1973
MIND HAZE
BLUE
JUNE 25 1973
STRONG NORTHWIND.
HAZE
BLUE

June 26, 1973 Mel Lopez brought coconut cake, Mac Mary. Harold Smith.
Herschel Lopez Pete Charlie and Mrs. C. Crew of T. V.
Continued preparation for the eclipse of June 30 1973.
for Donald Menzel.



June 27 1973 left Camp to track the sun, the equitorial motor works most of the time. It clicks about 11 am. Loaded plane to take it to Port Tonight and fuel and bring.
Poole, wife, and son, Adam arrived Kin for a visit from Okjoujt. Crisis in the Pacific is over, now the water pipes in Kin broken.
Water on return.

Contact	9.25
2nd	10.41 22
Tot	10.44 26
3 cont	10.47 31
4 cont	12.13 30.

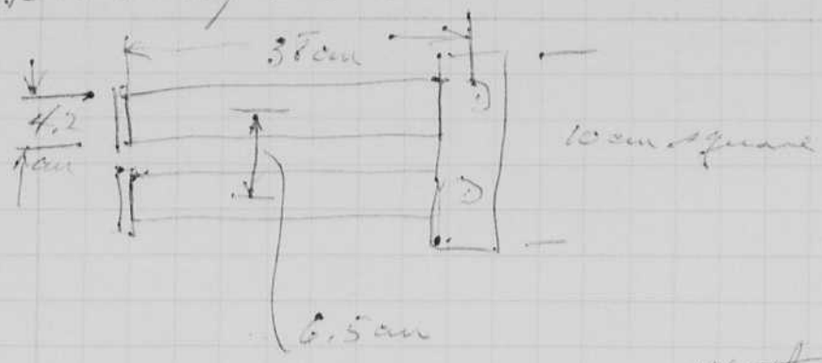
Dr Donald Menzel

Harold Dyer

Polaroid color photo of my photo table pictures and Recorder at Okjoujt

Jules

June 28 1973 Sun Photo pickup.



Wind changed to Southw. Lot of Dust in the sky We thought the wind would be bad but it was not.

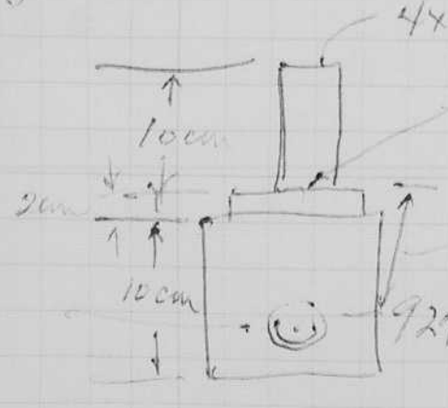
June 29, 1973.

The wind did not come up. By morning it had shifted to west and north. Very gentle. Clouds at 7 am with some openings.

630. Solid (almost) clouds Wind velocity 3-5 Km. Temperature fine.

730	275.5*	*x on scale not true vert for you?
745	279.5	
830	290°	
900	298	June 29 data only.
931	307	
10,0	313	June June 28 1973
10,30	320°	815 285
11.	326	835 291
1130	336	906 292.5
12	343	Training started.

Jules Stellar expressed



929 photocube with Diffuser and 1/4 x 1/4" mask.

930. Cloudy - with openings. Responder running first time

June 30 1973
Total Eclipse

up at 530 dark.
Cam time signals from Colorado.
655 Sun visible in haze about 20 deg up over Hornafjörður
7.02 no wind! Sun visible in haze & cast.
7.30 Sun still dim & Clouds to east.
7.40 Wind picking up North fairly cool. Clouds over sun
7.50 Sun out of clouds. Haze in bad with wind.
8.00 Hazy

Sky cleared by 10 am

RR La Count
National Science Foundation
1800 G St., N.W.
Wash D.C. 20550

Field Report #4

July 3 1973 Enroute Dakar – N.Y. on Pan Amer which left about 3.05 am today. We now are at about 9 am same time. Another hour should see us at N.Y.

There were 17± from our group on the plane. One bag was left. Should be. Too bad.

We left the site on July 2 at 8 am in 2 Bedford trucks and a land rover. There was some problem about customs on articles that were traded to a local man for truck transportation to Dakar for the freight.

I guess that 5 tons (can't be sure) went via that big truck to Dakar. Jean Insley is going to arrange the shipment. My gear was in a single crate weighing about 400± lbs.

My record is very good of the eclipse. I followed the light decay with the ~~stopwatch~~ resistor. The min on the blue was only a few sec. The min on the

red could not be detected. Then I cut in the 3½" lens detector which has a gain of about 15. I could see a lot of noise in the red channel. This was not detected before when testing.

The end of totality came with a bang. I have a good record of the blue. There was some noise on it when it rose at first. Also the red seemed to rise at a different slower rate with many small ripples.

I think these records will be significant in the study of the Echo's performance. I hope to get a chance to study the ~~other~~ records properly in Cambridge and to get out a report quickly to Prof. Donald Menzel.

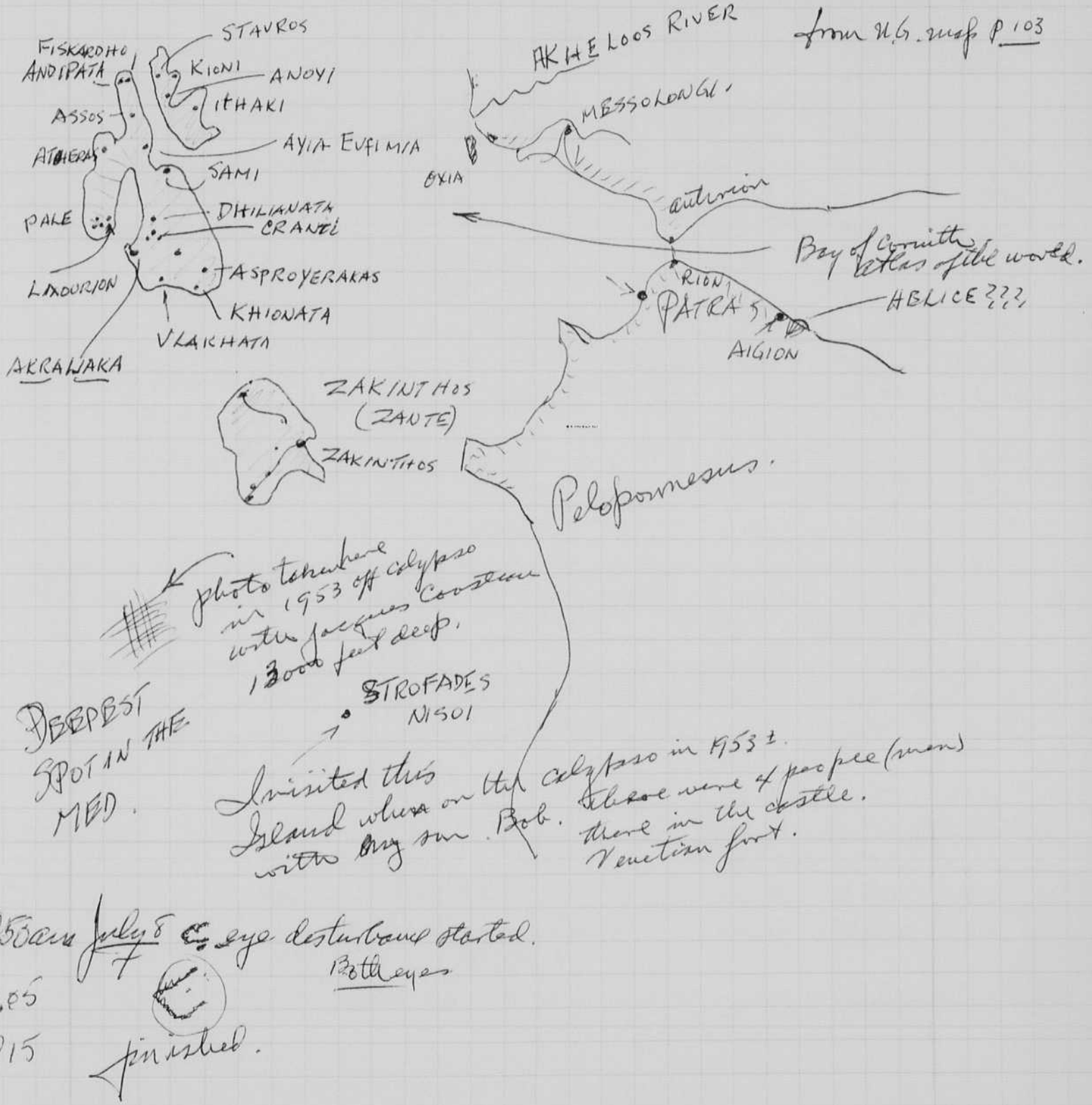
July 7, 1973 Harold Edgerton 100 Mem Drive Camb Mass.

The preliminary report was furnished yesterday. After consultation with Donald Menzel, I plan to put out a final edition.

I do hope that some one has exposure at the place right after totality where there is a pulse on the records. Could it be electrical pickup? Again there is a big ripple when the blue light is rising out of the totality.

Bill MacRoberts has been over hauling my EG&G 258 sonar for the trip to Greece. I had it out in the channel this morning from 7 to 9:30 am. All seems to be OK, so I packed it for shipment.

Esther goes with me on Monday night at 8 pm on TWA to Paris and Athens. We will help Niki Stavrolakes (Scoufopolos) and a group on a kaiki at Cephalonia Island.
Kefallinia.



9:55 am July 8 C eye disturbance started.
Both eyes

7:05

7:15 finished.

54 July 8 1973 Incident light reading
Hand Eggton. from a Gossen Lunasi Pro meter
LUNA # 595834
Akjoujt Mauretania
at camp 10 miles north.

Data of June 30 73 record.

Time	meter.	Lumens/~~sqft~~ meter.
8 am	17.6	16500
9.	17.6	16500 Sun visible clouds/fog. Haze
935	19.4	58,000
10,		
1005	18.8	38000
1015	18.2	25000
1020	17.8	19000
1025	17.4	16500
1030	16,5	7800 See clouds.
1035	15,6	4700
-5	15.1	3000
-3	14	1400
-2	13.5	980
-1	12	350
0		) readings missing on record? why. Too small to read? write to Art Harrison calif.
+6	11	175
7	12	350
8	13,5	980
9	14.5	2000
1055	16.6	8300
✓ 11	17.4	14,500
✓ 1105	18	22,000
1130	18,36	26,000
1130	19,4	58,000
1205	20.5,	110,000

$\frac{030 \text{ mo}}{50} = .6$ ma. photo tube current in the red.

July 9 73. Scheduled to leave at 8pm tonight with letter (TAT) Esther for Greece. Shone 258 Eg St. must write Telescan and SKC penetration.

Aug 6 73 Monday H. Edgerton.

Aug 4 1973 Sat.
Boston Harbor
BGG Gideon 259 Englewood

7 am
10.25 am.

Harold Edgerton	MIT 4-405	864-3783
Dave Cruzy	MIT 54-1717	262-7564
William Doody	MIT 54-1717	253-1423
Jim Watton	MIT	253-1000 ext 0408
Paul du Breuil	MIT DL 11	258-1504
Fred Tayling, CMT	MIT Lewis Wharf	742-2967

2.44 Arriving in Tucker to Boston Harbor
Water pump broken on way 3.30 pm.

The Sat expedition was to search for a vehicle (under water) off Lewis wharf that was lost. There was a range haze there so we could not spot the object, or if we did we could not distinguish it from other things.

Greek trip July 10 Arrive in Athens met by Jack McClennan.
11 Piraeus - ESPEROS 3 Sailed.
12 Delphi
13 Cephalonia island
24? Poros POROS
27. TWA 881 to N.Y. at 330 pm - National to Boston.

"Endeavor" trip Beaufort S.C. Aug 17 - Aug 31. John Newton
Fred Tayling. Ed Jaeckel. Search for the Monitor.
We found it in 220 ft water.

56 Aug 10, 1973 Harold Edgerton

Test of 259 Side scan from Geodyne EL 46 was made last night with help from Jeffery S. Infusario. We used Colleen since my boat has a broken pump.

I used a Honda and a power supply for the 24 volt dc supply. Operation seemed ok but the two sides were different. I used a 50 degree single crystal set up - the top crystal.

There was trouble with crimping of the paper. Eventually it caught in the takeups and stopped the machine by cutting the paper.

I go tomorrow to help Walter Gaudet ~~496~~ 648-9866 with some "sea rovers" to find a ship near the north river on the south shore.

Plans are set to go to New Berne on Wednesday Mary Lou will meet me there with Bill. Then we go to Beaufort to see John Newton of Duke Univ. An expedition is planned for the following week with side scan sonar. Herman and Watts will also be there.

Aug 14, 1973 Harold Edgerton

All is set for trip to New Berne tomorrow Esther goes with me. Mary Lou, Chas., and Bill will meet us there and go to Beaufort where John Newton will be ready.

I sent 650 pounds of sonar equipment to Raleigh-Durham airport on Monday morning. It was a complete Side scan 259 and my 255 system.

MONITOR FOUND ON THIS TRIP!

See page 82 for later position of MONITOR

Drilling in ELIKI.

Sept 23 1973.
Harold Edgerton.

I came in today on TWA 783 at 2 pm from London on a 707 air plane. Last night I had dinner with John Mills and his mother in Tynn near Chesey. London I left Cairo at 2.30 on the 22 after spending the 19, 20, 21 there at the Sheraton Hotel.

Naiji and Meriam Moustafa were my hosts in Cairo.

Oct. 12, 1973 Friday.

Esther went with me to WHOI on Fri Sept 28 for their annual meeting. Carol Edgerton from San Diego calif arrived for visit.

I went to Miami on Sat 29 oct to work with Meylach. with SKC finger. We worked with Jim Conway at Matlecumbe on the Florida Keys.

My equipment was left in Florida with Martin Meylach on Oct 2 after seeing Leo Keller and Bob Dietz. Bob took me to the airport.

Oct 4, 5 were the days of the dedication of the new Buildings 37 and 38. It was a big affair. The building is named ~~by~~ Sherman Fairchild. Bldg. I have a collection of color schlieren photos of a fan with hot air and bullet in action through a candle flame. This is the set up of Kirk Vandiver.

There was a D.C. Generator installed by the Edison co in about 1886. This was a gift of the Boston Edison Co. It was generator #20 as manufactured in Schenectady N.Y.. The patent date was 1882 which is the year that the E.E. dept was first mentioned. It did not get started until later.

Bob came from Pontiac Mich to attend a 20 year class party in Belmont. Belmont High School.

The Egyptians and Syrians started war on Yom Kippur Sat. Oct 6.

National Scienc Award was received Oct 10 at the White house in Washington from President Nixon. It was awarded to 11 people, including me. I had a big crowd to see the affair, 19, to see me. We stayed at the Brawnway Hotel.

Notebook # 31

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 56 and 57.

Item(s) now housed in accompanying folder.

To Prof. Edgerton

LINCOLN, NEB.
JOURNAL
D. 47,500

OCT 11 1973

Science Award

Nebraska native, **Dr. Harold E. Edgerton**, 70, was one of 11 recipients of a National Medal of Science presented Tuesday for outstanding contributions made in the fields of physical, biological, mathematical or engineering sciences. The former Aurora resident is professor emeritus of electrical engineering at the Massachusettes Institute of Technology.

To Prof. Edgerton

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Notebook # 31

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 58 and 59.

Item(s) now housed in accompanying folder.

Joan - Mail this to H E Edgerton
JOR
NOV. 21, 73.

Roger Flood,
WHOI

/ Using MPL - Sirius - Edgerton camera.

1326 14

time
HR-MIN.

Seconds

58 Tues. Nov. 6, 1973.

Harold E. Edgerton.

NO sign of ... entry, value bot
several hundred dollars.
11/9/73 – 11:50am
Larceny of a strobe light from the weather tower on roof of Building 54. Theft occurred sometime between November 6th and 9th.
"Me who wou men ject Patr...
11/9/73 – 11:255pm

A small beam co ... by at M.I.T. yesterday at 10 am. ... FX 6A lamp xenon gap fired at 600± volts. The circuit is from a 1542 strobotac modified for external resistor control. The rate was set at 1 per second + with a 2 meg resistor in place of the pot.?

See page 59.

Week end of Oct 12 with Schwartz visit and at the place of Fred Fayling in N.H.

Showp at MIT on Oct. 18 meeting at the faculty club. about ocean engineering. Heads from the Westinghouse Co.

On Fri Oct. 19. I showed last movies at 12 noon with synched sound and action.
~~on~~ at 4 pm I showed video tapes of the (monitor?) to students in 5-314 My room today.
on ~~Oct~~ 21 I went to Mexico via Chi with Esther. Carmen Real Hotel $5 per day. Left Oct 25 for Aurora Nebraska Ken's motel.
Went to Woodbine on 29 of Oct Monday & see Jessie and Erlene.
Dinner with Jim and ... at Avon in Berlin 494-8103 at 7 pm with Students.
On ~~Oct~~ Nov 1. Emeriti luncheon MacVicker Dancing class at fac. club

on Nov 2 Fri 10-250 movies at 12 noon about underwater cameras.
on Sunday ~~Nov 4~~ I went to Providence with Ed and Lois Bowles to see Betty O'Keefe. Dinner at Squantum club on the river.
on Mon Nov 5 ... of Sci. dinner in evening Bud Washburn's talk about the Grand Canyon map with Nat. Geo Soc.

Wed Nov 7 1973
Harold Edgerton & Bill MacRoberts. module.

FX-137 gap lamp from FG26 (FY6B)

Lamp connected into the P.S. in the NW part of the lab.
23 μf at 1000 volts. 30 μs duration.
2 μs slows the discharge and causes multiple peaks.

Thumpercap Sprague.
16 mfd at 1000 volts with short leads.
.23 x 10^6 C.P. 7 μs.

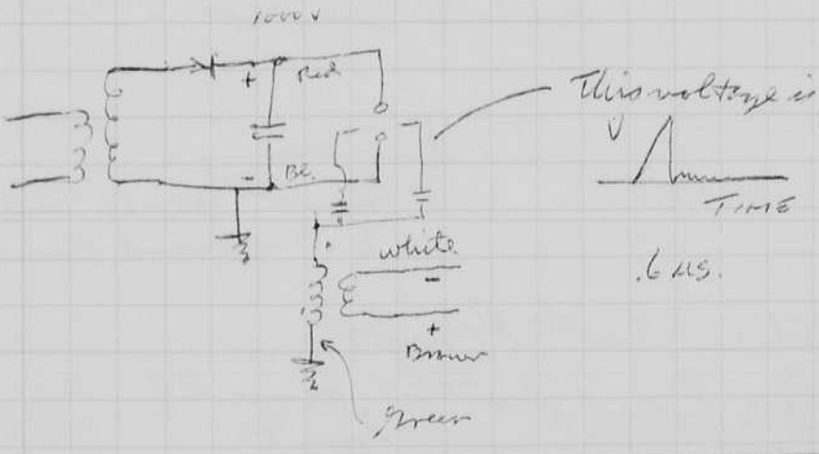
Self triggered at 1500 volts.
16 mfd at 1400 V 10 watt sec.
1.4 x 10^6 7 μs. 10 c.p.s. = 1.6 cps/watt.

Rate 20 watts. 60 ∿. $\frac{1}{3}$ watt sec. = $\frac{1000^2 C}{2}$ C = .6 mf.

0.5 mfd at ~~1000~~ 1400 volts. 0,5 watt sec.

Beam put on Nov 5.
Green Bed
Green "left" on Nov. 7 or 8
at "left" on Nov. 7 or 8

22,000 c.p. dur. 3-4 μs. 32 cps.



This voltage is positive on the spark.

.6 μs.

Nov 9 1/2 mf at 1000 ~~watt~~, 10/sec. = $\frac{CE^2}{2}$ = $\frac{.5 \times 10^{-6} \times 1000^2}{2}$ = 0.25 watt sec.

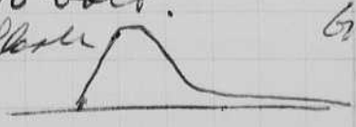
Power = 10 x .25 = 2.5 watts.

~~4 watt sec.~~
1 watt sec

cps =

Nov 10. Now at 4 Mfd 1000 v in a Tidelands Signal Lamphouse.
Increased to 16 Mfd 1000 v. for test.

Nov 12 Decreased to 4 mfd Sprague 4000 volt.
Voltage 1.2 KV. → 3.5 μs flash



GE C137PB.
K S
A1

58 Tues. Nov. 6, 1973.

Harold E. Edgerton.

See page 59.

A small beacon was put on the Green Bldg at M.I.T. yesterday at 10 am. It has a 0.4 cps output. FX 6A lamp xenon gap pwr 3 mfd at 600± volts. The circuit is pwr a 1542 Strobotac modified for external resistor control. The rate was set at 1 per second + with a 2 meg resistor in place of the pot?

Week end of Oct 12 with Schwartz mtd and at The place of Fred Fegley in N.H.

Shoup at MIT on Oct. 18 meeting at the faculty club. about ocean engineering. Herb for the Westinghouse Co.

On Fri Oct. 19. I showed bat movies at 12 noon with synched sound and action.
~~on~~ at 4 pm I showed video tapes of the (monitor?) to students in 5-314 My own ideals.
On ~~Oct~~ 21 I went to Mexico via Chi with Esther. Camino Real Hotel 25 per day. Left Oct 25 for Aurora Nebraska Ken's motel.
Went to Woodbine on 29 of Oct Monday & See Jessie and Erline.
Dines with Jim and Alvarez in Berlin 494-8103 at 7 pm with Students.
On ~~Oct~~ Nov 1. Emeritii luncheon MacVicker Dancing class at fac. club

on Nov 2 Fri 10-250 movies at 12 noon about under water cameras.
on Sunday ~~Oct~~ Nov 4. to Providence with Ed and Lois Bowles to see Betty O'Keefe. Dinner at Agamenticus club. on the river.
On Tues Nov 6 mtg. of Sci. Comm in evening Bud Washburn's talk about the Grand Canyon trip with Nat. Geo Soc.

Wed Nov 7 1973
Harold Edgerton & Bill MacRoberts. module.

FX-137 gap lamp from FG26 (FY6B)

Lamp connected into the P.S. in the NW part of the lab.

23 μf at 1000 volts : 30 ms duration.

Inch slows the discharge and causes multiple peaks.

Thumpercap Sprague.
16 mfd at 1000 volts with short leads.
.23 x 10^6 C.P. 7 μs.

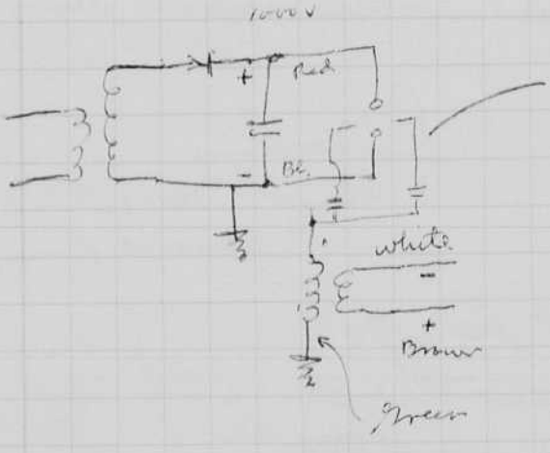
Self trigger at 1500 volts.
16 mfd at 1400 V 10 watt sec.
1.4 x 10^6 7 μs. 10 c.p.s. = 11/1.6 cps/watt.

Rate 20 watt. 1/3 watt sec. = 1000^2 C / 2 C = .6 mf.
60 W.

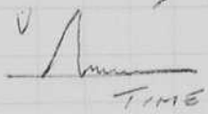
0.5 mfd at ~~1000~~ 1400 volts. 0,5 watt sec.

20,000 c.p. dur. 3.4 μs. 32 cps.

Been put on Nov 5, given Bed 4 on Nov. 7 or 8 & "left" on Nov. 7 or 8



This voltage is positive on the spark.



.6 μs.

Nov 8 1/2 mf at 1000 ~~watt~~, 10/sec. = CE^2/2 = .5 x 10^-6 x 1000^2 / 2 = 0.25 watt sec.

Power = 10 x .25 = 3.5 watts.

~~watt sec.~~
1 watt sec

cps =

Nov 10. Now at 4 Mfd 1000 v in a Tidelands Signal Lamphouse.
Increased to 16 Mfd 1000 v. for test.

Nov 12 Decreased to 4 Mfd Sprague 4000 volt.
Voltage 1.2 KV. → 3.5 ms. flash

GE C137PB.
F 1/5
A1

58 Tues. Nov. 6, 1973.

Harold E. Edgerton.

No sign of ... entry, value bot
several hundred dollars.
11/9/73 – 11:50am
Larceny of a strobe light from the weather tower on roof of Building 54. Theft occurred sometime between November 6th and 9th.
"Mc who wou men ject Patr...
11/9/73 – 11:255pm

A small beaco... by at M.I.T.
yesterday at 10 am. ... FX 6A
lamp xenon gap fm 3 mfd at 600± volts. The
circuit is fm a 1542 Stroboslac modified for
external resistor control. The rate was set at
1 per second + with a 2 meg resistor in
place of the pot.

See page 59

Week end of Oct 12 with Schwartz mit and at
the place of Fred Fayling in N.H.

Shoup at MIT on Oct. 18 meeting at the faculty club.
about ocean engineering. Here for the Westinghouse Co.

On Fri Oct. 19. I showed last movies at 12 noon with
synched sound and action.
~~on~~ at 4 pm I showed video tapes
of the (monitor?) to students in 5-314
My roundtable.
on ~~Oct~~ 21 I went to Mexico via Chi with Esther.
Carnieus Real Hotel $25 per day. Left Oct 25 for
Aurora Nebraska Ken's motel.
Went to Woodbine on 29 of Oct monday to
see Jessie and Erline.
Dinner with Jim and Altman in Berlin 494-8103
at 7 pm with Students.
On ~~Oct~~ Nov 1. Emeriti luncheon MacVicker
Dancing class at fac. club

on Nov 2 Fri 10-250 movies at 12 noon about
underwater cameras.
on Sunday ~~Oct~~ Nov 4. to Providence with
Ed and Lois Bowles to see
Betty O'Keefe. Dinner at Agamenticus
club. on the river.
on Sun Nov 4th saw fm of Sci. Dinner in evening
Bud Washburn's talk about the
Grand Canyon trip with Nat. Geo Soc.

Wed Nov 7 1973
Harold Edgerton & Bill MacRoberts.

module.

FX-137 GE flashlamp from FG26 (FY6B)

Lamp connected into the P.S. in the NW part of the lab.

23 μf at 1000 volts. 30 μs duration.

Inch shows the discharge and causes multiple flashes.

Thumpercap Sprague.
16 mfd at 1000 volts with short leads.
.23 x 10^6 C.P. 7 μs.

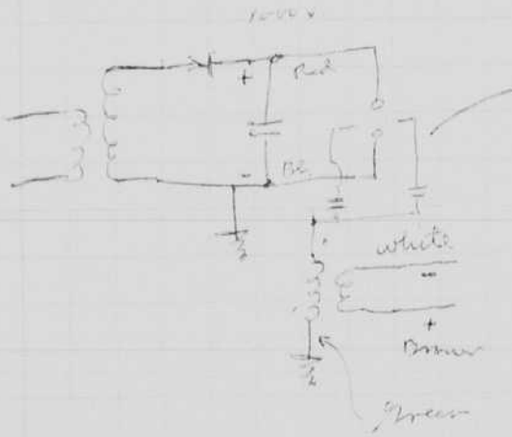
Self triggered at 1500 volts.
16 mfd at 1400 V 16 watt sec.
1.4 x 10^6 7 μs. 10 c.p.s. = 1/1.6 cps/watt.

Rate 20 watt. 1/3 watt sec. = 1000^2 C / 2 C = .6 mf.
60 W.

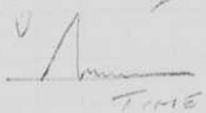
0.5 mfd at ~~1000~~ 1400 volts. 0,5 watt sec.

Brown put on Nov 5.
Green Red off Nov 7 or 8
24 "left" on Nov 7 or 8

22,000 c.p. dur 3.4 μs. 32 cps.



This voltage is positive on the spark.



.6 μs.

Nov 8 1/2 mf at 1000 volts, 10/sec. = CE^2/2 = .5 x 10^-6 x 1000^2 / 2 = 0.25 watt sec.

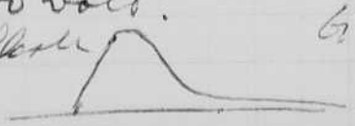
power = 10 x .25 = 2.5 watts.

~~1 watt sec.~~
1 watt sec

cps =

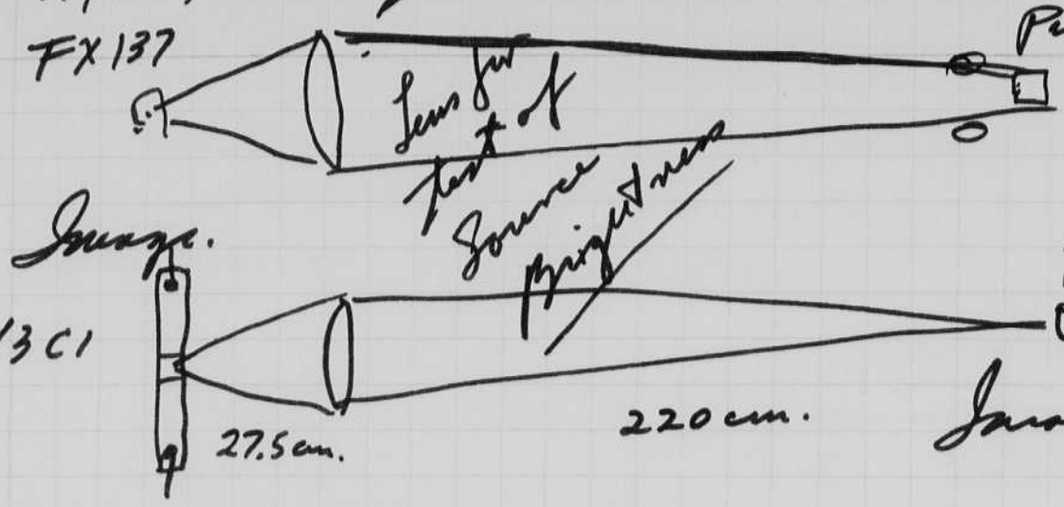
Nov 10. Now at 4 Mfd 1000 v in a Tidelands Signal Lamphouse.
Increased to 16 Mfd 1000 v. for 60.

Nov 12 Decreased to 4 Mfd Sprague 1000 volts.
Voltage 1.2 KV. → 3.5 μs flash



GE FT137PB.
FY6
A

60 Nov. 23. '73 Howard Edgerton Bill Keese Roberts Lamps for Beam.



1. Effy with no reflector. C.P.S.

2. Effy with cylindrical reflector.

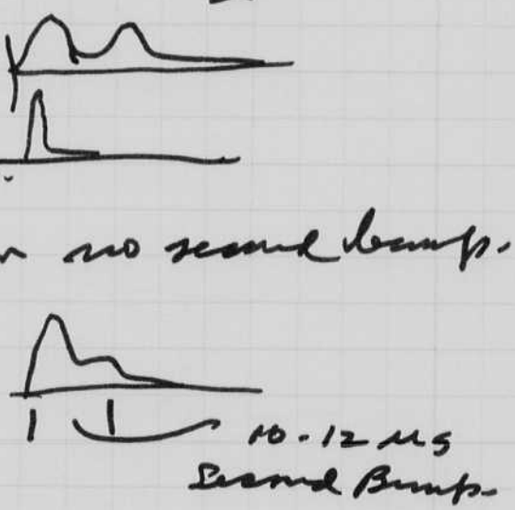
Use lens to measure the output from the center section.

FX 113 C1
1.5" 10 V peak 10 μs. effective lum.

FX 137 ∩ gap. 52 v 5 μs.

FX 21 1/2" 50 10 μs center no second bump.

FX 100 1.5" 20 10



Conclusion: The short lamps looks the best for the small area test. However the FX-113 C1 might give more output due to the larger size of lamps.

There does not seem to fill the "tube" lamps. It seems to be on the surface. However the image seems better. when viewed with a filter.

now try the Lens (Red) on the Maximum

D = 6" #2 Visual. plastitube. Marine Lantern
ML-155 Series A.
Midland Sign Corp
Houston Texas.

Lamp. C = 4 mfd 1200 v.

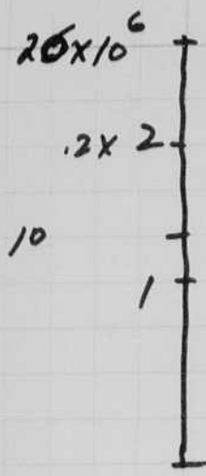
	C.P.	D	C.P.S.	
Fx-100	0.68×10^6	8 ms. (10)	5.24	Bare
Fx-100	0.16×10^6	8 ms.		Red Lens.
	0.175×10^6	8.	1.38	
FX-113	$.58 \times 10^6$	10	5.8	Bare.
∿	$.16 \times 10^6$	14	2.24	Red Lens
0.5" Lamp 4 mm.	$.8 \times 10^6$	6	4.8	Bare
Hard Starter.	$.5 \times 10^6$	6	3.0	Red Lens
FX-137	$.27 \times 10^6$	4×10^{-6}	1.08	Bare.
 max. .32	$.27 \times 10^6$	4×10^{-6}	1.08	Red Lens.
another 0.5" Lamp.	$.6 \times 10^6$	5.	3.00	Bare
	$.4 \times 10^6$	5.	2.	Red Lens.
Honeywell lamp. 1" gap.	1.0×10^6	5.5	5.5	Bare
1" + 1/8".	.34	6	2.04	Red Lens.
FT218 Xe.	.32	16	5.12	Bare
	.170	16	2.72	Red L

moved to 22 feet away.

	.022	6	.132	Red Lens
FX-137	$.02 \times 10^6$	4×10^{-6} s.	.08 .	Red Lens.
FX-218	.016	17 ms	.096 .272	
	.016	17 "	.272	

FT-218

Photo #2 Visual.



1K.

~~.05V x X = .2 x10^6 cp~~ ~~19 x10^-6~~ ~~3.4 c.p.s.~~
~~4~~ ~~20~~ ~~4.~~

~~2.2 x .2 x 4 = 88~~

$\frac{.44}{40}$ = 02 .011 x10^6 cp. $\frac{.37}{.187}$ = .187 c.p.s.

Angle varied 2 min..

x 2.4 cps
x 1.44 c.p.s.

1.8
3.

	C.P. x10^6	Time x10^-6	C.P.S
FX. 137 1/8"	.24	6 MS	1.44 c.p.s.
" 3/16" gap adjust the pt. c to max.	.152	8	1.216
	. — 8		2.36 c.p.s.
	.35 — 8	—	2.8 c.p.s.
	.35	6	2.1 c.p.s.

From Previous Page in Red Reflector. Mass with "Eye" plate tube

		no reflector
FT 218 1/3 turn Spiral	2.72 B.C.P.S	5.12
Fx-113 H. Bird lamps.	2.24	5.8
Honeywell 1+" lamps.	2.04	5.5
1/2" gap 4 mm. (Hard Start)	3.0	4.8
FX-100 1.5" gaps.	1.38	5.24
FX-137	1.08	1.08.

4 Mfd 1200 volts 1 per second rate.

Nov 28 1973 Wed Harold Edgerton

I was at Bedford on Monday Nov 26 to see Dempsey & Riley. I showed them the beacon as per the last few tests.

Then I went to Salem to see Joe Lee Bruce Newell, etc about flash lamps for high intensity small source effect.

Nov 27 1973
100 memorial Dr.
Cambridge Mass

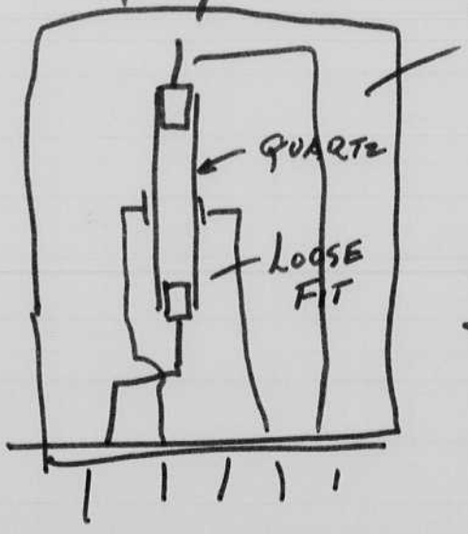
Improved
Xenon flash
Lamp!

Harold Edgerton

Attempts to obtain a large energy flash source of light of small dimensions have been limited by the spreading of the arc. This is especially true in gap tubes of the xenon types.

I propose to restrict the arc with quartz tubing but leave the ends unsealed so that the hot gas can escape during the discharge or shortly thereafter. Then the cooler gas will slowly flow back into the arc cavity.

The outward flow will tend to remove the sputtered metal from the electrodes and thus improve the life of the lamps.



Bulb filled with Xenon gas.

Electrodes

gas blows out when flash occurs. Reenters slowly between flashes.

Read and understood.
11/27/73
V. E. MacRoberts.

Read & Understood
11-27-73
C. E. Miller

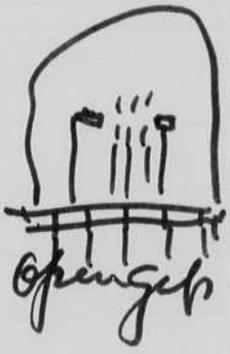
Nov. 27, 1973
120 mem Dr.
Cambridge Mass
Harold Edgerton

Improved Strobe Lamp.

Bulb type lamps are inefficient due to gas spreading from the energy of the discharge.

a contained discharge is efficient but gets too hot when operated as a strobe.

I propose to make the lamp efficient and put it in a bulb full of Hydrogen. This will transfer the heat at a rapid rate.



Spengler.

Gravity tube with sealed electrodes.

Hydrogen gas in bulb.

Xenon gas in tube.

Hydrogen cools lamp.

Read and understood,
11/27/73 V.E. MacRoberts.

Read + understood
November 27, 1973
C.E. Miller

66 Dec. 6. 1973

Harold Edgerton. Bill MacR.

Small lamp received from EG&G.

about 1:1.

							Dur	CPS
	.75 mf	500v paper.	~~.4V~~	1.8x2	.36 V	6 ms	~~2.16~~	
	= 0.19 W.S.				.36x10⁶ x.036		.216	
FT-218	"	"			.6x.05 = .03	3 ms.	~~0.9~~ .09	
FT-218	4.0	500	~~.26x10⁶~~ .026		~~30x10⁻⁶~~		~~7.8~~ 0.78	

Eff = 1.1 CP/W

Eff = 0.47 CP/W

Since 10K was used instead of 1K.

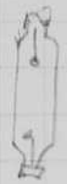
			Peak	Dur.	C.P.S.
FT-218	4.0	1200	.42x10⁶	17 ms	7.14
	4.0	500			
	.7	500	.03/10 = .003 x10⁶	30 ms.	.09
	4	500.	.200x10⁶	6.5x10⁻⁶	1.3
	4	800	.5	~~6.5~~ 7	3.5
	4	1000	.68-.7	7	4.9
	4	1200	.9	8	7.2

The small lamp looks good!

Dec 8 1973 Sat. – Sensitive integrating meter. Yellow filter 935 P.T.

Lamp.	Cmf.	V.	Dist	C.	M.	FACTOR? LIGHT CPS.?
(A)	1.95	3.91	1000	.01	3	5.1 7.25 3.7
	1.95			.1	2	1.1 3.36 3.7
	1.95			.1	1	1.95 1.9 3.7
	1.95			.1	0	3.7 3.7
		1.1 ms	750			2 2
		.477	500			.8 .8
			500	.01		.83
	4.88	3.91	1500	.01		.83 ✓
	3.90	7.84	500	.01	2	6.8 1/336 1.93
	1.95	7.84	500	.1		1.9 1.9
		7.84	750	.1		4.4 4.4
	3.9	7.84	1000	.1		6.3 6.3
	3.9	7.84	1000	.1		7.1 7.1

Lamp	Ws.	C	V	Dist	C	f	M	Light. almost eps.
D4 FT 218	3.9	7.84	1000	2M	0.1	0	5.0	5.0
	3.9	"	"	"	0.1	0	5.1	5.1
	2.2	7.84	750	"	0.1	0	2.4	2.4
	1.95	"	500		0.1	0	.8	.8
FX-33 Hi Bird		7.84	1000	"	"	"	6.2	6.2
		"	750	"	"	"	2.7 2.9 2.4	2.4
		"	500				.8	.8
FX-7			1000				2.7	2.7
			750				1.7	1.7
		7.84	500				.8	.8



Lamp (A) is the most efficient of the 4 for all conditions especially the 500 volt example (1.95 watt sec)

Suggest trial at lower energy and voltage. There is some missing at 500 volts. The spark wire is a problem to attach to the lamps.

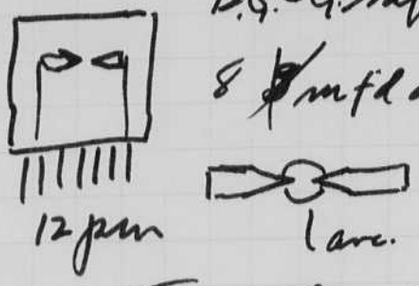
Nearly sound source for Biological use.
MIT Ted ~~By~~ Rhyne

Jason Birnholz. ME Dept 72B-3033
2 mc.

work for examination of human organs etc.

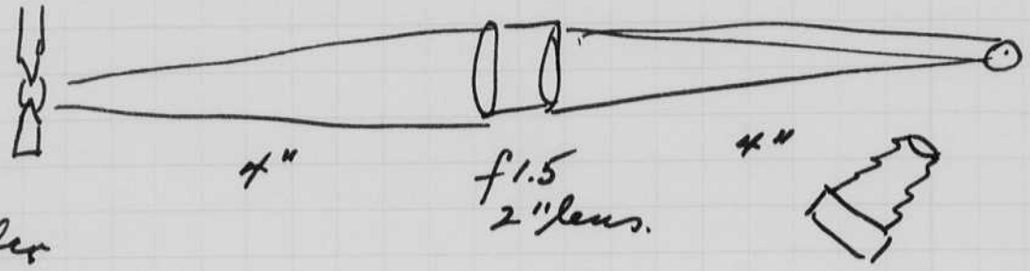
68 Dec 11 1973 Point Source Lamps. for Nat. Geo.
Harold Edgerton Bill MacRoberts. Society.

B.G.A.G. flash lamps.

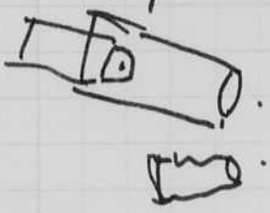


8 ~~µ~~ mfd at 1200 volts. $WS = \frac{8 \times 1200^2}{2} = 8 \text{ watt sec}$

Try 2" lens f 1.5 for a 1:1 image of the arc.



on lamp holder



	Peak light	Dur.	C.P.S.
8 mfd	$.48 \times 10^6$	65 µs.	2.5
4 mfd	.3	5.	1.5

Dec 12. Kodak II film. coffee Brainard Stop & Shop. fresh ground coffee.

Exposure tests.

Image of 1/8" gap lamp on subject from 45°.
4 mfd 1200 v.

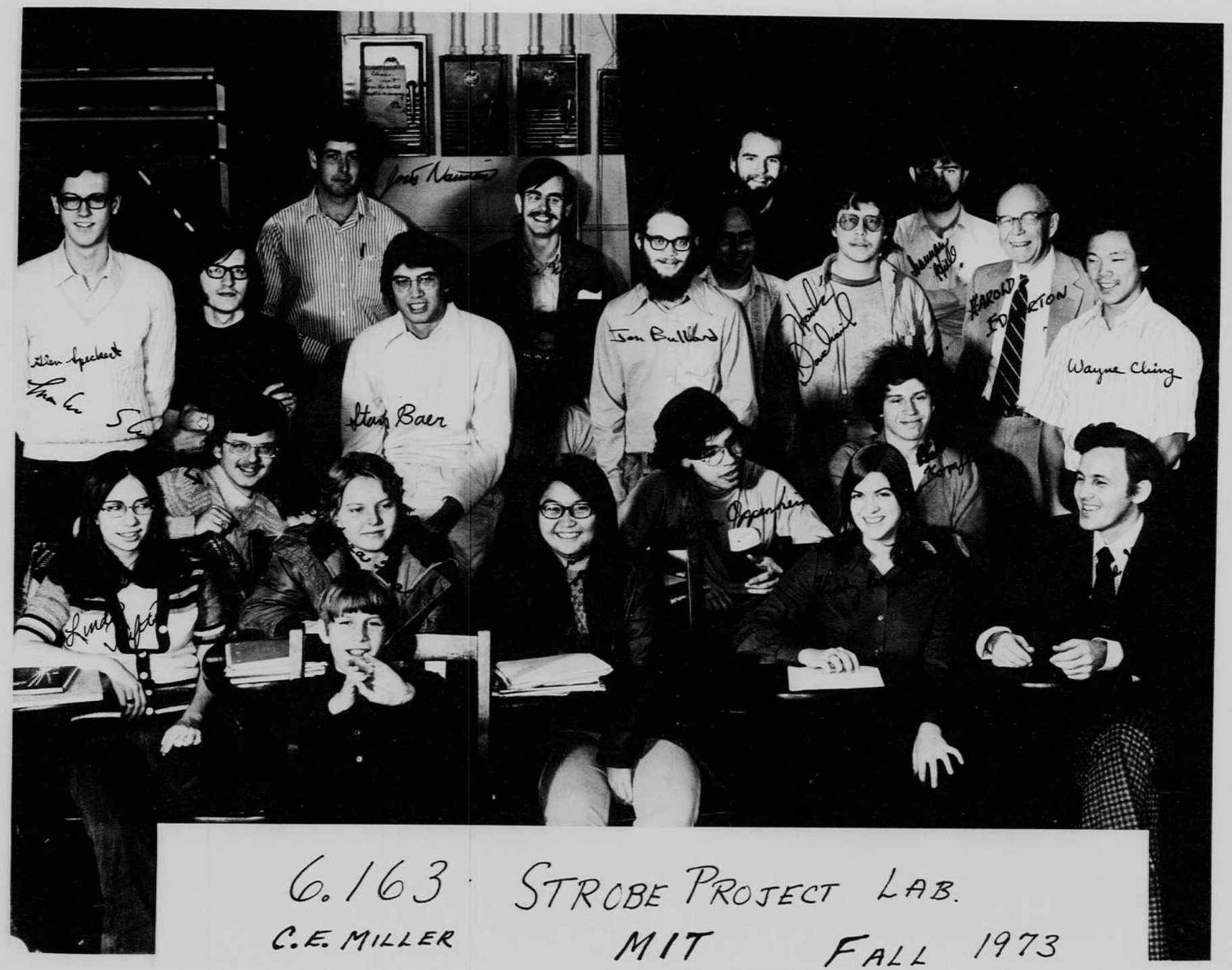
#14	f 3.5
25	f 8
26	f 11
27	16
28	22
29	32
30	5.5

Black & white
1100 ASA Polaroid
#515 Micronol x4
f 32 over exposed

changed to X1 f 32
Exposure was ok.

Micronol x4 16
Allyn 22
#515 32
Black.

Panatomic
f 32 f Kodak 400 underexp
f 22 " "



6.163 STROBE PROJECT LAB.

C.E. MILLER MIT FALL 1973

Dec 26 1973
Harold Edgerton
In further fulfillment of our Dec 12 discussion of possible
art historian consultancy. Dec 14.

68 Dec 11 1973 Point Source lamps. for Nat. Geo.
Harold Edgerton Bill MacRoberts. Society.

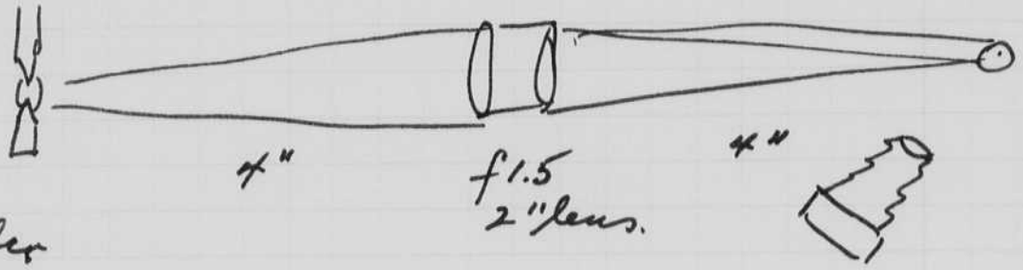
B.G.A.G. flash lamps.

8 mfd at 1200 volts. $WS = \frac{8 \times 1200^2}{2} = 8 \text{ watt sec}$

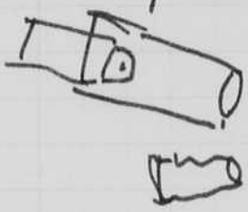
12 pin

1 arc.

Try 2" lens f 1.5 for a 1:1 image of the arc.



on lamp holder



	Peak light	Dur.	C.P.S.
8 mfd	$.48 \times 10^6$	65 μs.	2.5
4 mfd	.3	5.	1.5

Dec 17. Kod. X I film. coffee Brainard Dept. Store.
frozen food coffee.

Exposure tests.

Image of 1/8" gap lamps on subject from 45°.
Fired 1200 v.

Black & white
Mac MS Polaroid
#545 Polaroid pack
f 32 — 1 flash

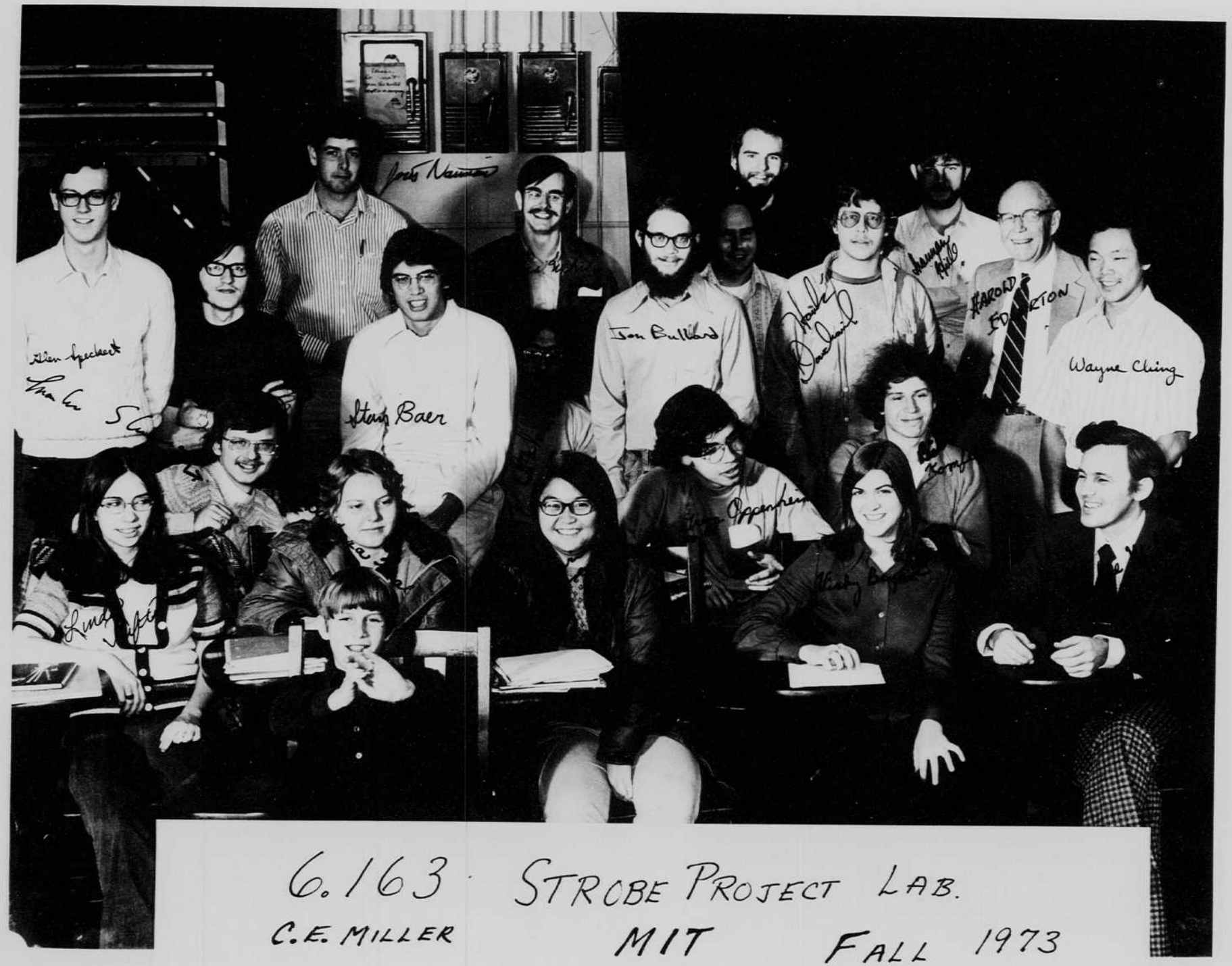
Changed to XI f 32
Exposure was OK.

#24 f 32
25 f 8
26 f 11
27 16
28 22
29 32
30 45

Microscope x4 16
objective 22
#545 32
Polaroid

Point source
f 32 f stop 4 to 5 inches apart

f 22



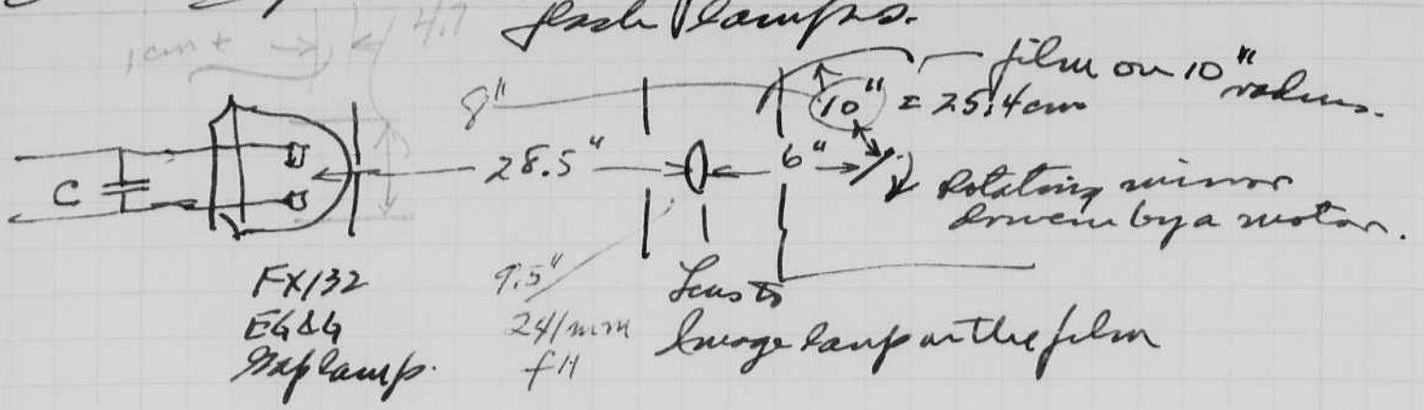
6.163 STROBE PROJECT LAB.

C.E. MILLER MIT FALL 1973

Dec 26 1973
Harold Edgerton
in further fulfillment since Dec 1/2 due to illness of previous
at Northeastern University. Dec 14

70 Jan. 2, 1974
Harold Edgerton

Arc expansion in Xenon flash lamps.



mag factor = $\frac{16}{28.5}$ on film from life. N = speed in Rev/sec.

10" = 25.4 cm

Speed of image = $2 \frac{2\pi 25.4}{1/N} = 2\pi 25.4 N \times 2$
$= 2 \times 50.8\pi N$ cm/sec.

Let N = 60/sec.
Speed $2 \times 3000\pi$ = 20,000 cm/sec
Then 1 cm = $\frac{1}{3000} \cong 50.0$ μs.

Jan. 3, 1974 Correction for 5" diam
$r = 4\pi d N$ where d is mirror to film dist
N is rev. per. second.
Let d = 8" × 1.54 = 20.32 cm.
N = 60 rps.
$\dot{r}_n$ = 15350 cm/sec.

in 100 μs → 1.53 cm at 60 rps.
→ 3.06 cm at 120 rps

153 | 1.000 (.0064)
918
820
612

41. 4mfd 3000 volts Double flash – 2 flashes. f11 Slow film. 120 RPS
Shows oscillation of current.
Shows expansion of gas.
Exposure ok

#2. 4mfd 3000 f22 guess. 120 RPS. (3X.7 μs/cm)
Exp ok

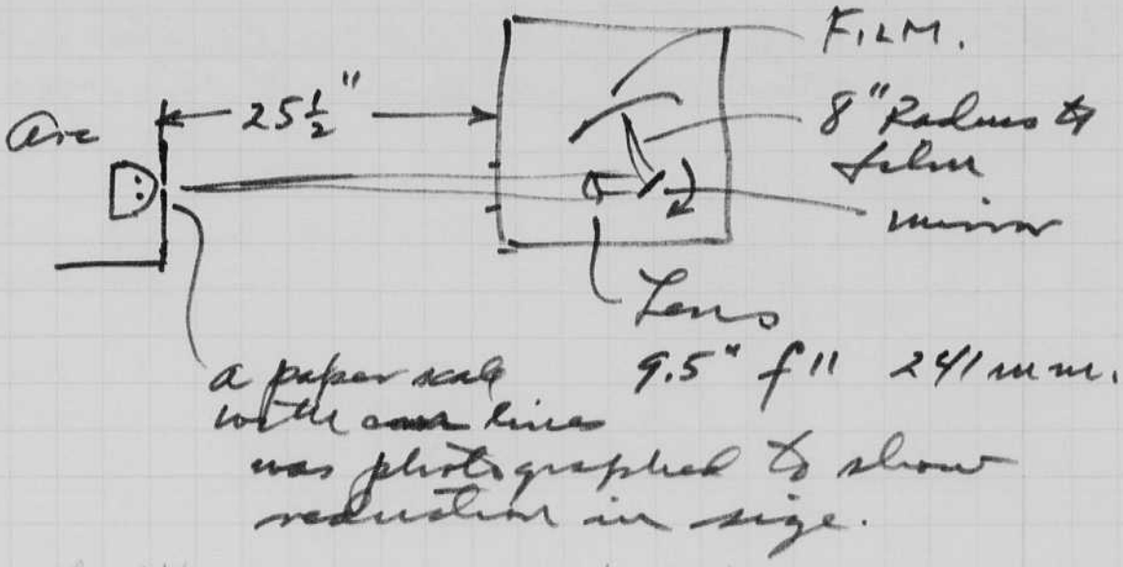
On Bore 8" radius.

Rps	μ/min	μs/cm
30	362	139
60	176	69
120	88	34.7

1.6"

Jan 7. 1974
#52

Photo taken to show scale on the Rotating Mirror camera.



1 cm at slit = 0.385 cm at film } photo mag.
2.58 cm " = 1 cm at film.

#3 4mfd 3500V f 22 120RPS.
#4 4000
#5 4500
} film old toggel sw.

Jan 10 1974

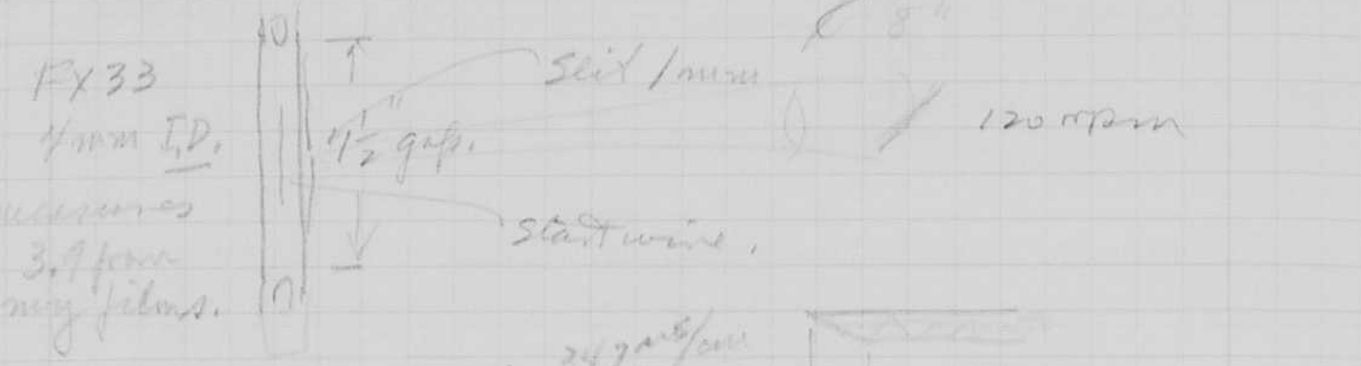
1	4mf	3500	f 22	all on FX132 gafs.
2	"	4000	22	
3	"	4500 ×	Double 22	
4	"	3000 ×	Double 22	
5	32	2000	22	
6	32	(4500) ? ×	22	
	40	2000	22	
	40	2500	22	
	40	3000	22	
	40	3000	f 11	

72 Jan 12 1974

Harold Edgerton

Streak Studies of Xenon gaps.

Yesterday FX 33 and FX 113C lamps were studied. all tests at 120 r.p.s. 34.7 μs/cm.



C μf	V voltage	t mm on film	t μs
8	1000	3.3	11.5
	2000	2.3	8.0
40	1000	3.2	11.1
	2000	2.2	7.65

Time for arc to cross the diam of the 4 mm flash lamp

Note light at 2.2 x 34.7 = 81.5 μs across the diam for the 40 μf 2000 volt film. Could this be from the shock wave from the end. Actually there are two lines which may be due to non-uniformity of the slit. Neither was in earlier flashes.

FX-113 was tried on this experiment. The starting connection was a 3/4" long wire along the side of the lamps. See chart for data from t measurements below.

8	1000	.54	18.7
	2000	.38	13.2
40	1000	.45	15.6
	2000	.32	11.1
4+4 x16	500	.59	20.5
	1000	.33	11.5
	1500	.22	7.65
	2000	.15	5.2

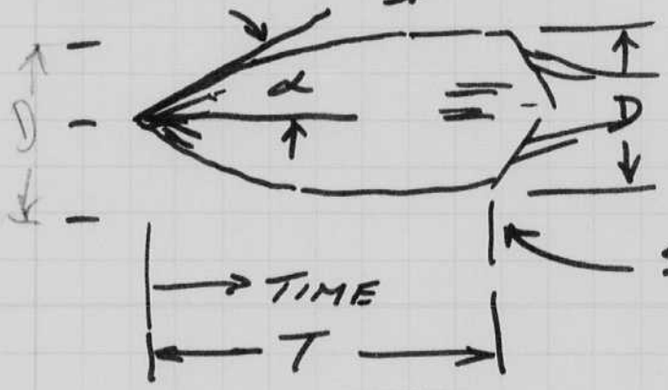
* Two end caps

These 8 μf & 40 μf caps were on the switch adjusted for equal current sharing

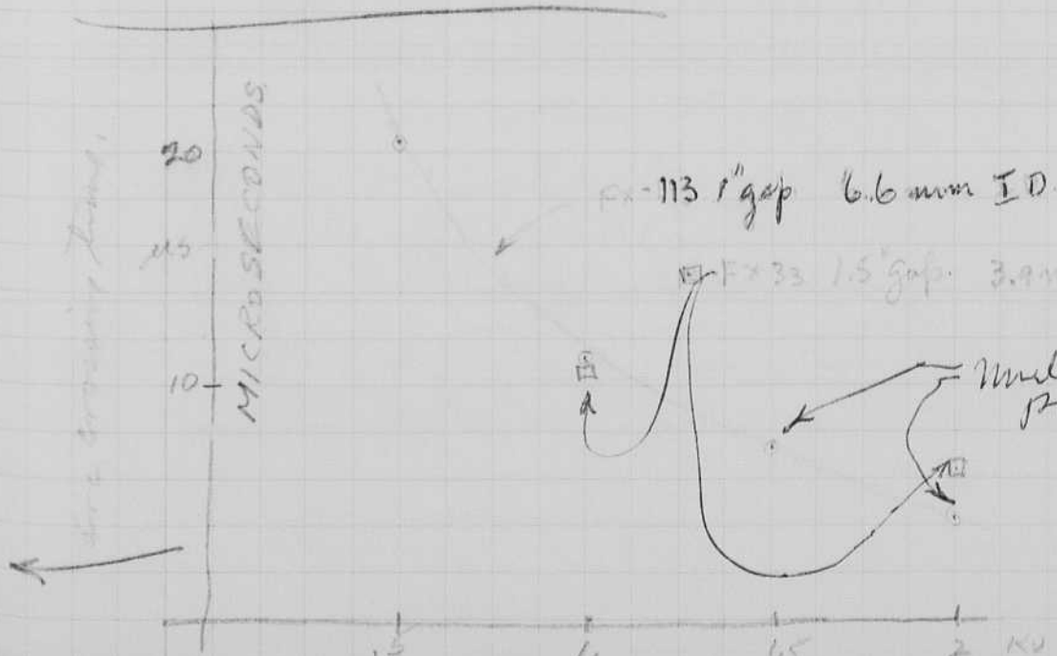
FX 133c DATA Cross slit 1 mm center 120 RPM 34.7 μs/cm
Films taken Jan 10 and 11 — 1 cm on film = 1/2.56 on life.

C	f	V	α	tan α	tan α 2.56/34.7	Vel. cm/sec. V .0738	are may D on film.	cm D.	T cm on film	X 34.7 T μs.
4	111000	3000	34	.6745	49800					
		3500	41.5	.9163	67500		.5	1.28	3.-	105
		4000	47.3	1.08			.5	1.28	2.8	98
f22	40	11500	2000	13	.2304	17000	.85	2.18		
	40		2500	21	.3834	28300	.9	2.3		
	40		3000	23	.4245	31400	1	2.56		
fll	40		3000	32	.6249	46000	1	2.56	3.6	125
	100		2000	22	.404	29800	1.05	2.7	3.4	118
	100		2500	25	.4663	34200	1.1	2.82	3.1	108
	100		3000	27	.5059	37400	1.2	3.07	2.9	100
	100		3500	Self flam	—		—			

V = Initial (?) velocity as determined by the slope of the advancing arc.



Shock wave strikes arc



1" gap = 2.54 cm.
2000 V / 2.54 cm = 788 V/cm.

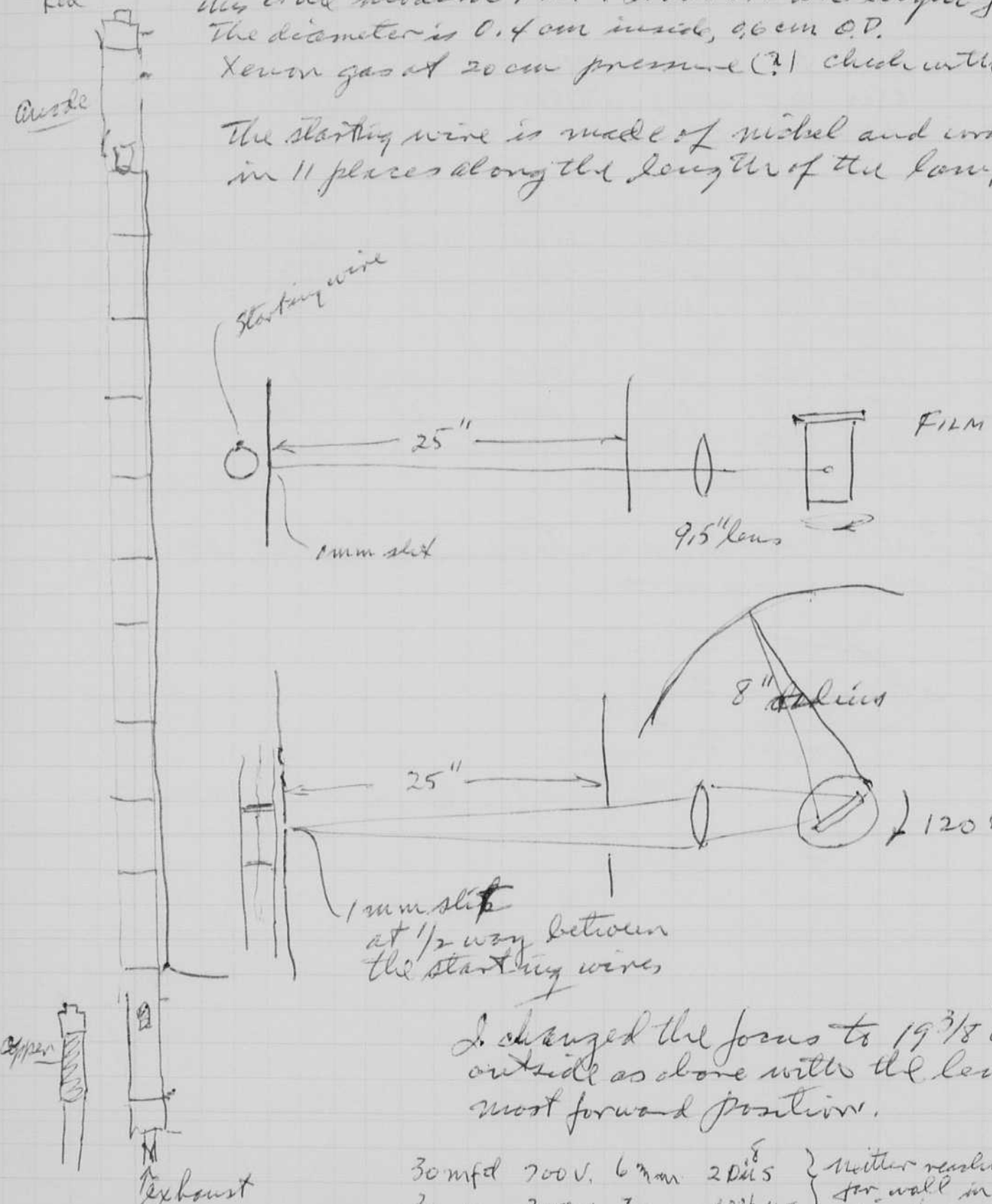
Try FX-1 6" = 15.2 cm.
2000 / 15.2 = 132 V/cm.

74 Jan 13 1974
Dave Dayton

Continued measurements of the arc diameter growth in Xenon Flash Lamps.

Lamp FX 1C-6 (QC-5) made Sept 18 1973 at Salem EG&G, this is the modern FX-1. It has an arc length of 6" The diameter is 0.4 cm inside, 0.6 cm O.D. Xenon gas at 20 cm pressure (?) check with Salem

The starting wire is made of nickel and wrapped in 11 places along the length of the lamp.



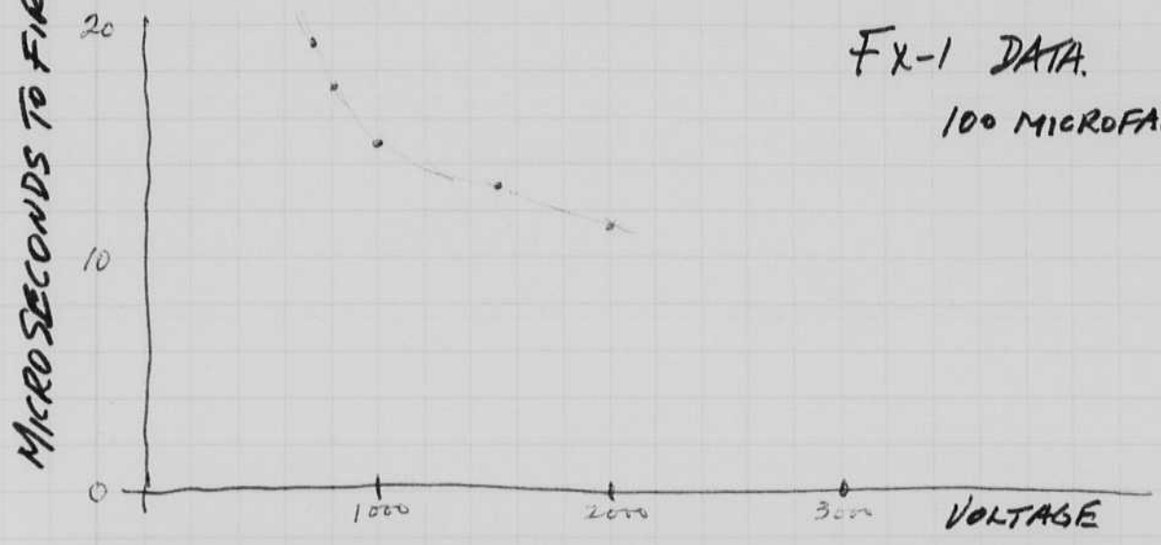
I changed the focus to 19 3/8" on the outside as above with the lens in its most forward position.

30 mfd 700 V. 6 mm 20 μs } neither reaches for wall in first surge. Equipment week
30 " 2000 V. 3 mm 10.7 μs.
2 " 2000 "

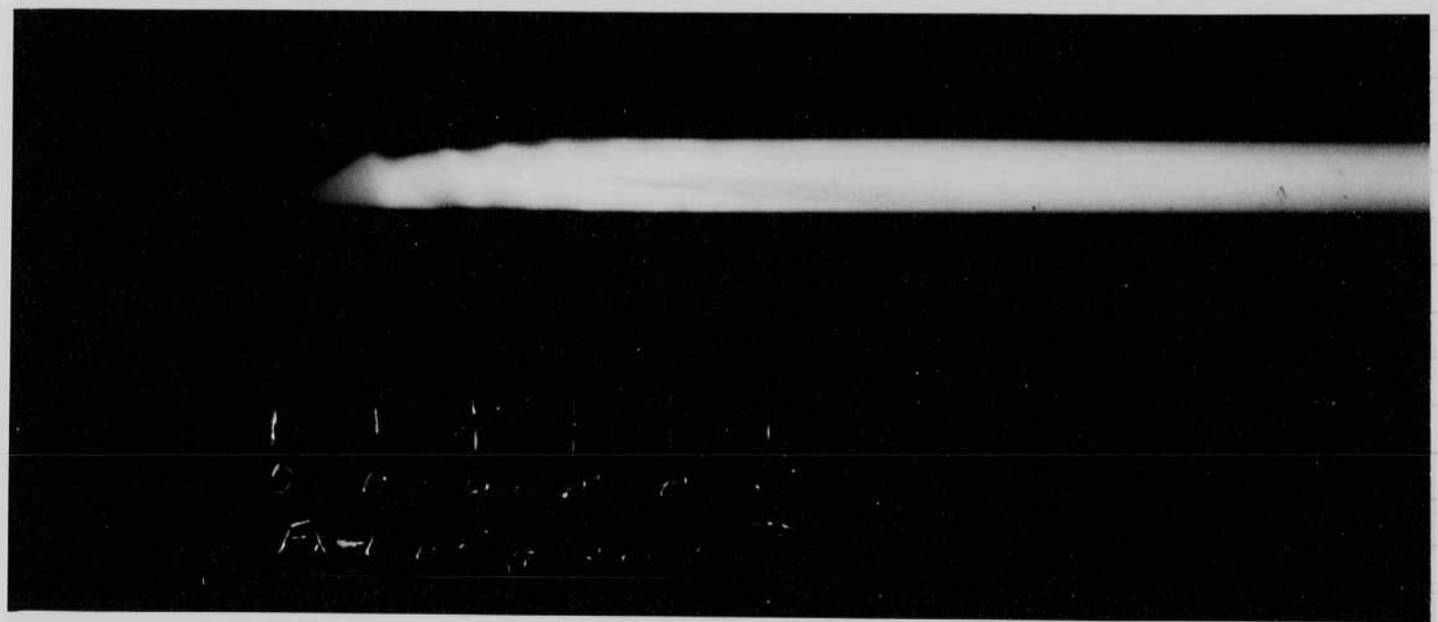
Photo of film scale on same neg.

100mfd	1000 v	4,3 mm	14.9 μs
100	1500	3,8	13,2 μs
100	2000	3,3 m	11.4 μs
100	700	5,5	19.1
100	800	5.0	17.3

Difficult to read!



FX-1 DATA.
100 MICROFARADS.



FX-1 100Mf 2000 VOLTS.

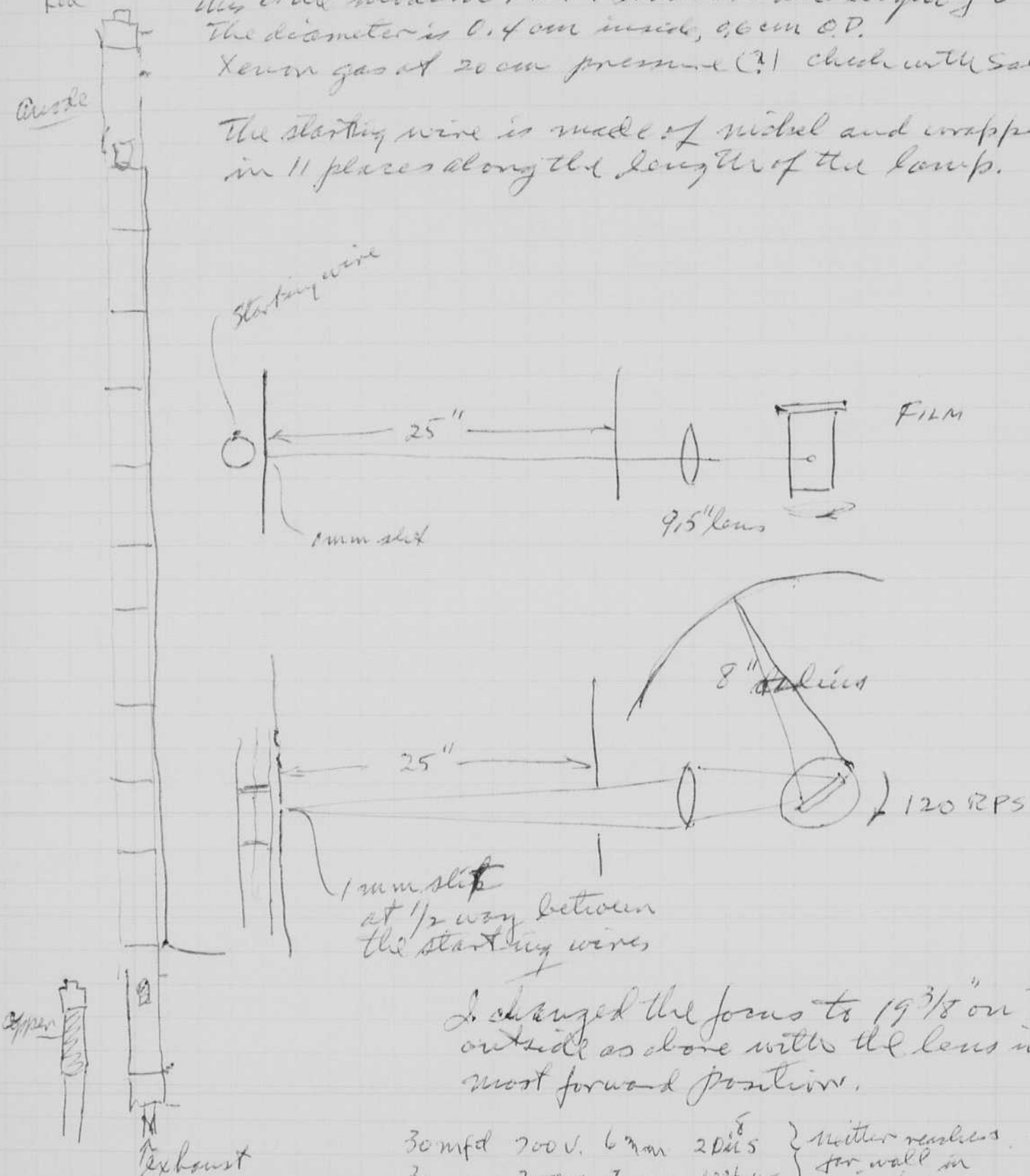
Note that the first pulse of the arc does not go to the far side of the tube, but on each surge it does go closer to the edge. about 30 microseconds are required for the arc to fully fill the lamp. Also note at 70 microsecond - there is a dim streak in the light

74 Jan 13 1974
David Dayton

Continued measurements of the arc diameter growth in Xenon Flash Lamps.

Lamp FX 10-6 (QC-5) made Sept 18 1973 at Salem ECC, this is the modern FX-1. Glass arc length of 6" The diameter is 0.4 cm inside, 0.6 cm O.D. Xenon gas at 20 cm pressure (?) check with Salem

The starting wire is made of nickel and wrapped in 11 places along the length of the lamp.



I changed the focus to 19 3/8" on the outside as above with the lens in its most forward position.

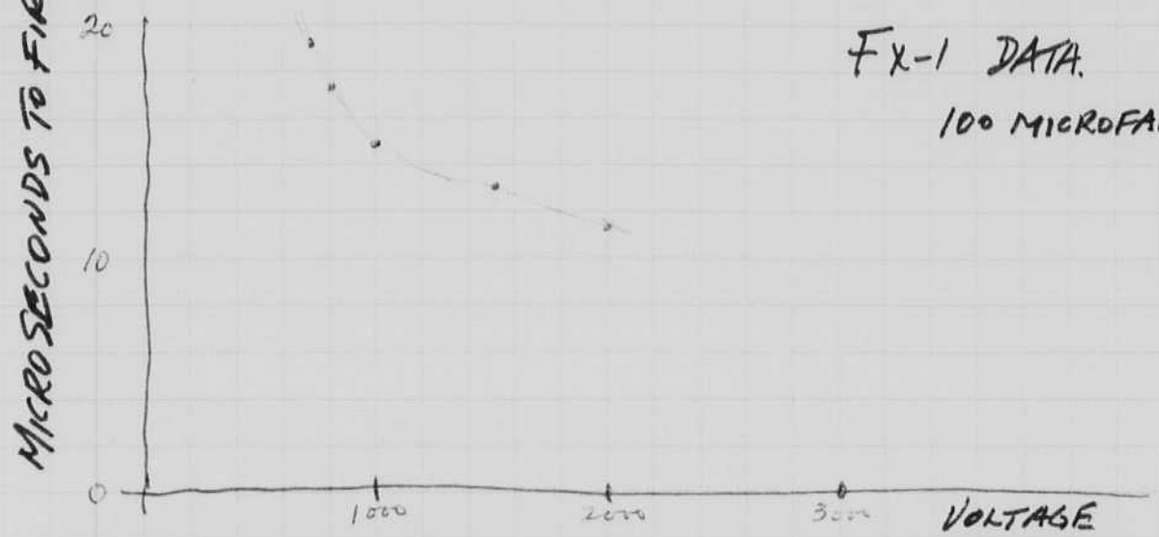
30 mfd 700 V. 6 mm 20 1/8 µs } neither reaches Eg for wall in first surge.
30 " 2000 V. 3 mm 10.7 µs }
2 " 2000 "

Eg worst week

Photo of cm scale on same neg.

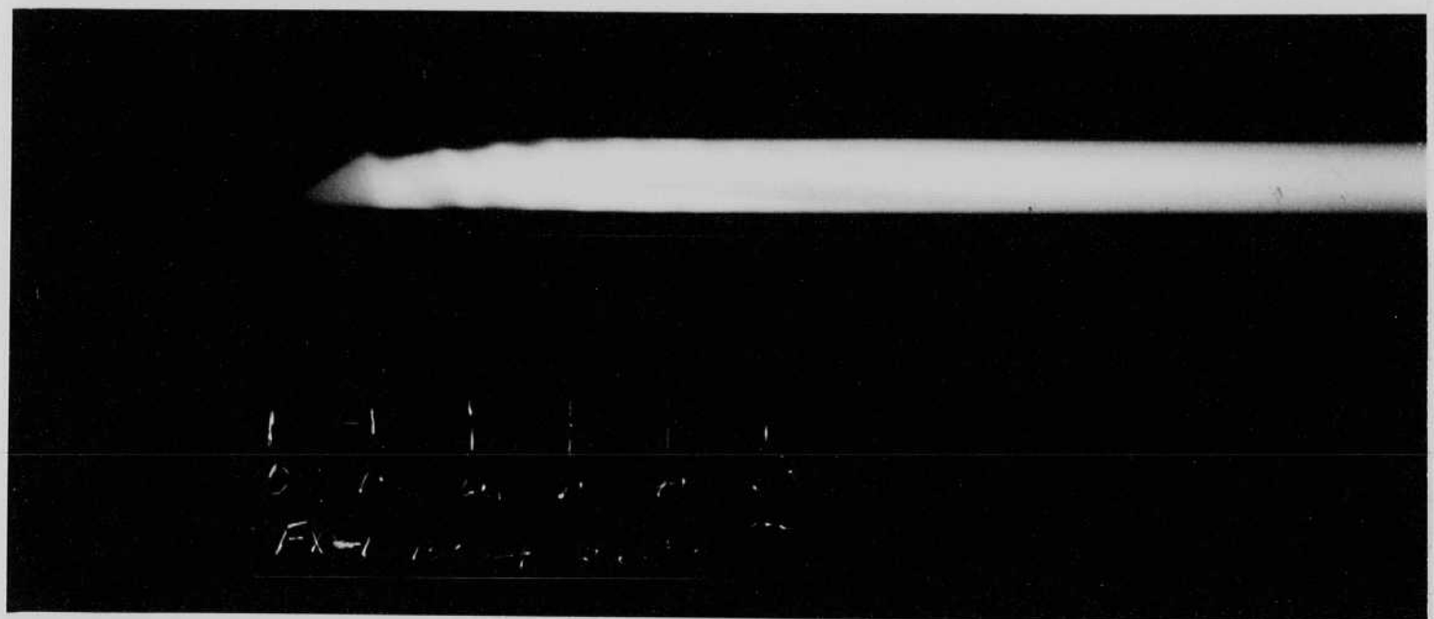
100mfd	1000 v	4,3 mm	14.9 μs
100	1500	3,8	13,2 μs
100	2000	3,3 m	11.4 μs
100	700	5,5	19.1
100	800	5.0	173.

Difficult to read!



FX-1 DATA.

100 MICROFARADS.



FX-1 100mf 2000 VOLTS.

Note that the first pulse of the arc does not go to the far side of the tube, but on each surge it does go closer to the edge. about 30 microseconds are required for the arc to fully fill the lamp. Also note at 70 microsecond - there is a dim streak in the light

1974

California

Mr. & Mrs. Harold E. Edgerton
(Tentative as of January 4, 1974)

Jan. 16 (Wed.) Lv. Bos. 6:50 - Ar. Omaha 10:41 (UL #457)
Airport Inn, tel. 402-348-0222
Plane delayed due to snow storm in Boston overnite in Chicago

Jan. 17 (Thu.) Hertz car - drive to Woodbine, Iowa, Jessie DeCou 712-647-2369
" 18 (Fri.) Ken's Motel, Aurora, Nebraska

Jan. 19 (Sat.) Aurora, Nebraska - lecture ("The Strobe Is Quicker Than The Eye" 200

Jan. 20 (Sun.) Lv. Omaha 11:10am - Ar. Los Angeles 12:15 (UL #535)
Hertz car - drive to Long Beach (City Center Motel,
200 Atlantic Ave., Tel. 213-435-2483)
Jan & Tom Binkus, 4202 Racquet Cir. Dr., Huntington Beach, Ca.

Jan. 21 (Mon.) Visit Fay Garrett, 225 W.5th St.,Long Beach. 213-432-9775
" 22 (Tue.) (City Center Motel) 213 435 2483
Dinner with Bascom & wife

Jan. 23 (Wed.) Visit Willard Bascom, 1500 E. Imperial Hgw. El Segundo, Ca.
(Tel. 213-322-3080, Home: 213-432-4747) 30
Lecture at SCCWRS

Lecture - Litton Ind. - Sportsman's Lodge Restaurant
6pm cocktails Ventura Blvd at Coldwater Canyon
7pm dinner North Hollywood 350
8pm program Mrs. Toni Schumann 781-8211, ext 2884

Hotel Hyatt Regency, 711 South Hope St 800. 228.9000 3/4
(~~Los Angeles Hilton, 930 Wilshire Blvd. Tel. 213- 629-4321~~)

Jan. 24 (Thu.) Lecture - MIT Club of So. Ca. - Mobil Oil Co. Auditorium 200
pm reception and/or 612 S. Flower Street
dinner Los Angeles, Ca.
pm meeting Dr. Phil Bates 213-394-3935

Jan. 25 (Fri.) Lecture for MIT Club of San Diego 200
Carol Edgerton and Jim M

Jan. 26 (Sat.) Visit Mary Koriagin, 636 Q Avenida, Sevilla, Laguna Hills
Tel. 714-830-3615 72
Lecture & 23 of Mary K's friends Sunday nite

Jan. 27 (Sun.) Visit Carol Edgerton, Apt. 223, 4750 Noyes St., San Diego
Tel. 714-274-0294

Jan. 28 (Mon.) Scripps Institute, departmental seminar lecture 3:30pm 100
(Dr. Gerald L. Wick, Dir. Center for Marine Affairs,
University of California, San Diego,P.O.Box 1529, LaJolla)

Jan. 29 (Tue.) Prof. John Isaacs's class on submarine archaeology 150
(Evening lecture) 7-8 pm

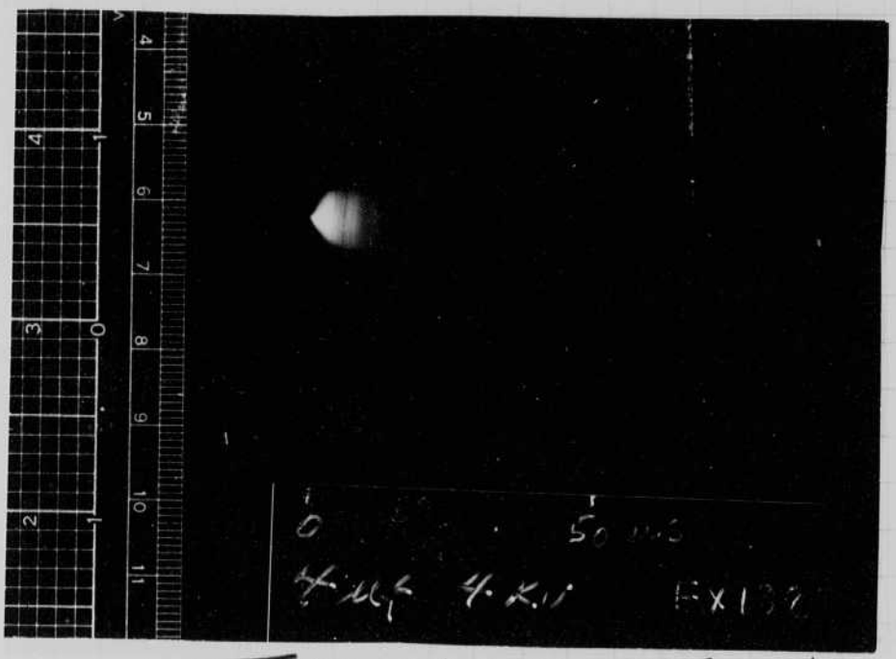
Jan. 30 (Wed.) Lv. San Diego 10:30am(UL #200)- Ar. Chi. 4:10, Lv. Chi. 4:59 -
Ar. Boston 8:04pm (UL #776)

1272
Lectures

100 μf
3000 V FX 132

ARC DIAM IN CM.

TIME IN MICROSECONDS.



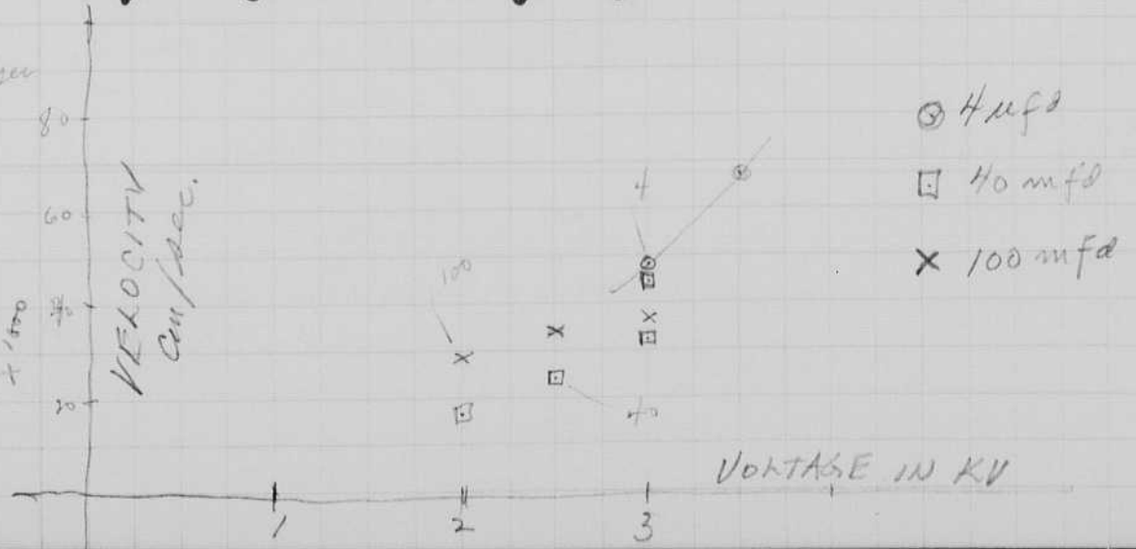
FX-132
Gap lamp.
45 μs.

ARC DIAM IN CM.

8 μs

TIME IN MICROSECONDS.

Feb. 1, 1924. Returned on Schedules as per previous page.



Plotted Feb. 2 1924 XX from data on page 73.

1974

California

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(Tentative as of January 4, 1974)

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Lecture - Litton Ind. - Sportsman's Lodge Restaurant
6pm cocktails Ventura Blvd at Coldwater Canyon
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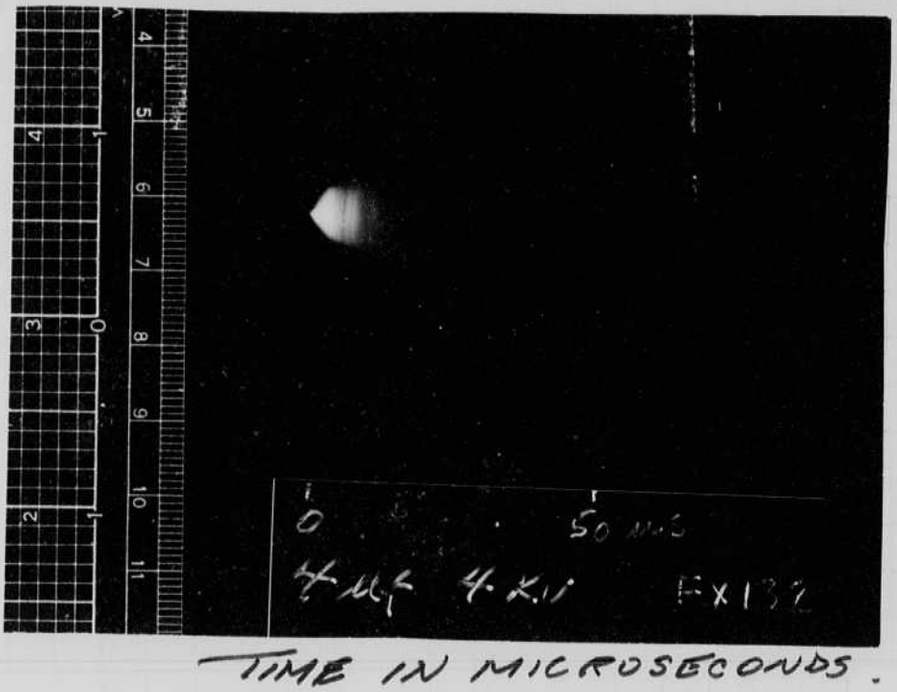
# of Lectures 1272

100 μf
3000 V FX 132

ARC DIAM IN CM.

TIME IN MICROSECONDS.



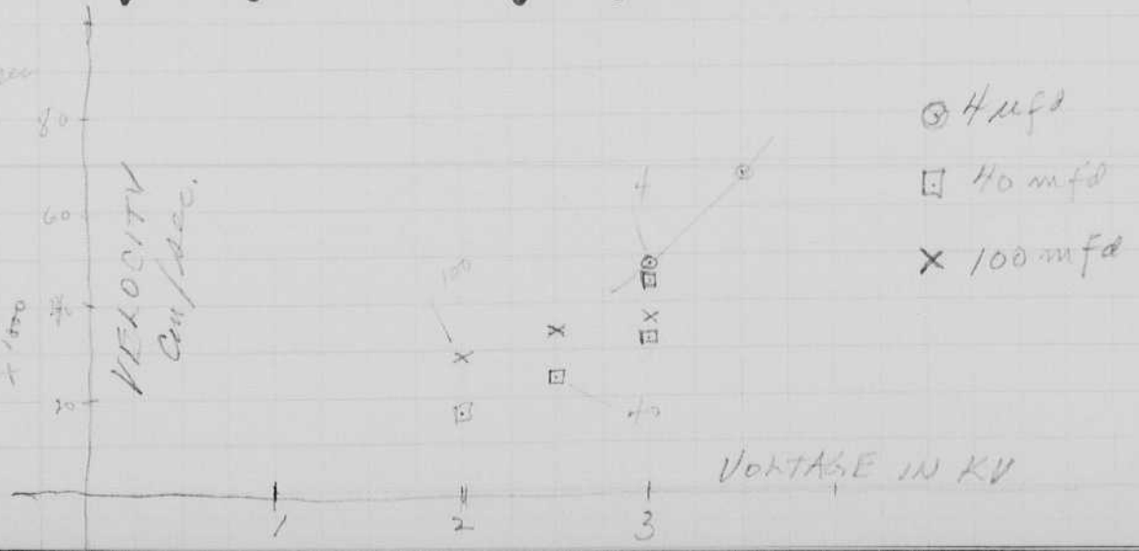
ARC DIAM IN CM.

FX-132
Zap Lamp.
45 WS.

SWS

TIME IN MICROSECONDS.

Feb. 1, 1924. Returned on Schedule as per previous page.



Plotted Feb 2 1924 data from page 173

78 Feb. 2, 1974 Design of Underwater Lamp for high power output.

Harold Edgerton

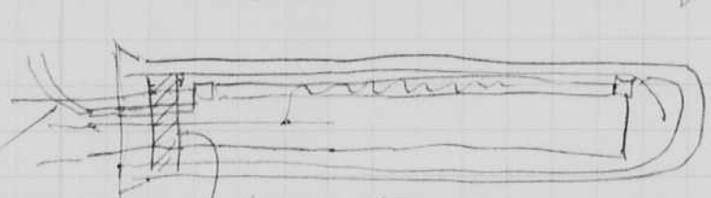
The cooling of the lamp is a serious problem for long sustained runs. As the lamp heats up, the spark is shorted by the conduction of the glass or quartz. Glass usually breaks down with a small hole which destroys the vacuum and lets air into the lamp.

We have tried liquid cooling several times but have given it up because a suitable liquid has not been found. Also the assembly is a problem.

I continue to think that hydrogen will be a big step forward.

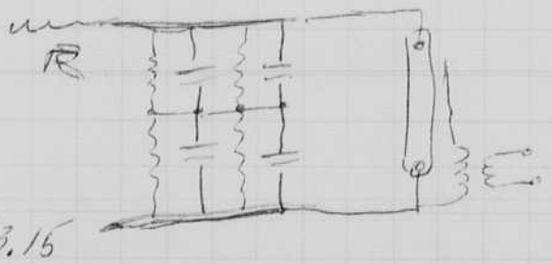
There is an explosion hazard if oxygen gets into the chamber. A sealed off lamp should be excellent.

Consider the following design for an under water lamp.



Visited Tues Jan 30 1973
Tony Boegeman
Oriental Cal
marine phys. lab.
Scripps Inst. Oceanography
San Diego Cal 92132
714-453-2000 6281
F.N. Spiess

200 watt sec



$$\frac{525\ \text{mfd}\ 450\text{V}^2}{2} = 53.15$$

Capacitance = 525 at 900 volts with series parallel

Let RC = 3 seconds $\quad 3 = 525 \times 10^{-6} R$

$$R = \frac{3}{525 \times 10^{-6}} = 5714\ \Omega$$

Power = 200 WS $\times \frac{1}{10}$ cycles/sec

= 20 watts

or 40 including resistance loss

$$\frac{900}{5714} = 0.157 \text{ amps.}$$

Feb 15/16 1974 Friday Deep Sea Elapsed time Equipment

Harold Edgerton & Bill Mac Roberts

Kodachrome II film
f11 NIKON at 6 ft.
Strobe 700 B.C.P.S. or less

Delay at Slow -1 #1 } slow 91 Diamond Delay
Charge at 4 50 }

12 noon started run. Clock in field.
camera looks out the window

Sky is blue when started. 12:11 53603

Sat Feb. 16 74 Further Streak tests.
A bakelite slit instead of metal has now been made.
1 mm thickness in opening with 1 cm nicks
Motor speed 60/sec (equivalent of 120 RPS of mirror of a drum.

	5 mfd of capacity.	Time for a the film.
#1	1000 volts	
#2	2000 volts.	

Mar. 6. 1974 M.I.T. 4-405. Mary Lou, Chas, Bill Mary Anne Ellen and Ellen (Turkey) were visitors at 100 mem. Dr. Then on Friday at noon we went to New York. Ogave a talk at the N.Y. ~~Lun~~ Limnologs meeting for June Keisler sat night Hanks 2.

Mar. 9, 10. 74. Boston Sea Rovers. Niki Stavrobakes with husband ~~Bill~~ Paul, visiting Fifi and mother Dora Scouppoulos.

Mar 11 74 I went to Washington with Fred Fayling to visit Colin Jones at Naval Research lab about the Monitor sinking site search. We saw
Peterkin, Miller Audahazy
Normark Newton, Watts.
then we went to the N.G. Society to see Payne, Fisher, Mary Smith, etc etc. Fletcher Jones. (photo).

80 Mar 19 1974 Tuesday. Harold Edgerton.

Yesterday I picked up the 400 pound bell (bronze) from in front of A Bldg in Bedford. Papas helped me. It loaded down the compact Buick. The electrical controls are due to morrow. I could not wait for them since the 110 volt wiring had to be re routed.

10 Students were out for dinner on Sat night. Mar 16. Jill Hynes freshman Steve? Mordah Senior. plus 8 from my seminar. Esther had roast beef and all that goes with it.

Tomorrow I pick up a side scan sonar from EG&G at Waltham. It will be used at Cape Hatteras to refind the monitor. John Norton at Duke is setting up another expedition.

I am working on several papers to be presented in London at the convention in ~~Oct~~ Sept. 16-21. Bruce Howell - Chas. Miller Kim Vandiver.

April 12 1974

Harold Dexter.

Directors meeting Mar 21 at Hotel Colleton.

MONITOR SEARCH. Mar 26 – Beaufort N.C.

Nathan Benn N.G. Society photographer.

met in Slonn by John Newton. Ed Jackel also

Trip to Cape Hatteras to install a

radio beacon on the light house.

another was put on the Texas tower Diamond Shoal.

Then we went out on the LCU 1488

but a storm drove us back.

I had a problem with the side scan

due to waves with 10° down and 20° Beam

the operation was better with

20° down and 50° Beam.

The Alcoa Sea Probe arrived April 1 at site

of the monitor. She came there immediately and found

the target. Then the del Norte helped.

Open House at MIT is due on Apr 13 1974

Jim II on Apr 6 ~~Saturday~~ on the LCU 1488.

I came home on Sat noon on Piedmont from

New Berne at 3:15 pm.

Apr 16 1974 Ed & Bill Jim

Morrison Lee Alumn 600 W.S. with 660 c

Min 100 WS.	1 ft	28 x 4 x 1/4 = 28 1' =		28 BCPS.
	2	31 x 1 1/4 = 91	=	31
Max 100	2	28 x 2 1/4 = 56	=	56
min 200	2	17 x 4 1/4 = 17	=	68
max 200	2	31 x 4 1/4 =	=	124
min 300	2	26 x 4 1/4		104

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April 12 1914

Harold Dyer Jr.

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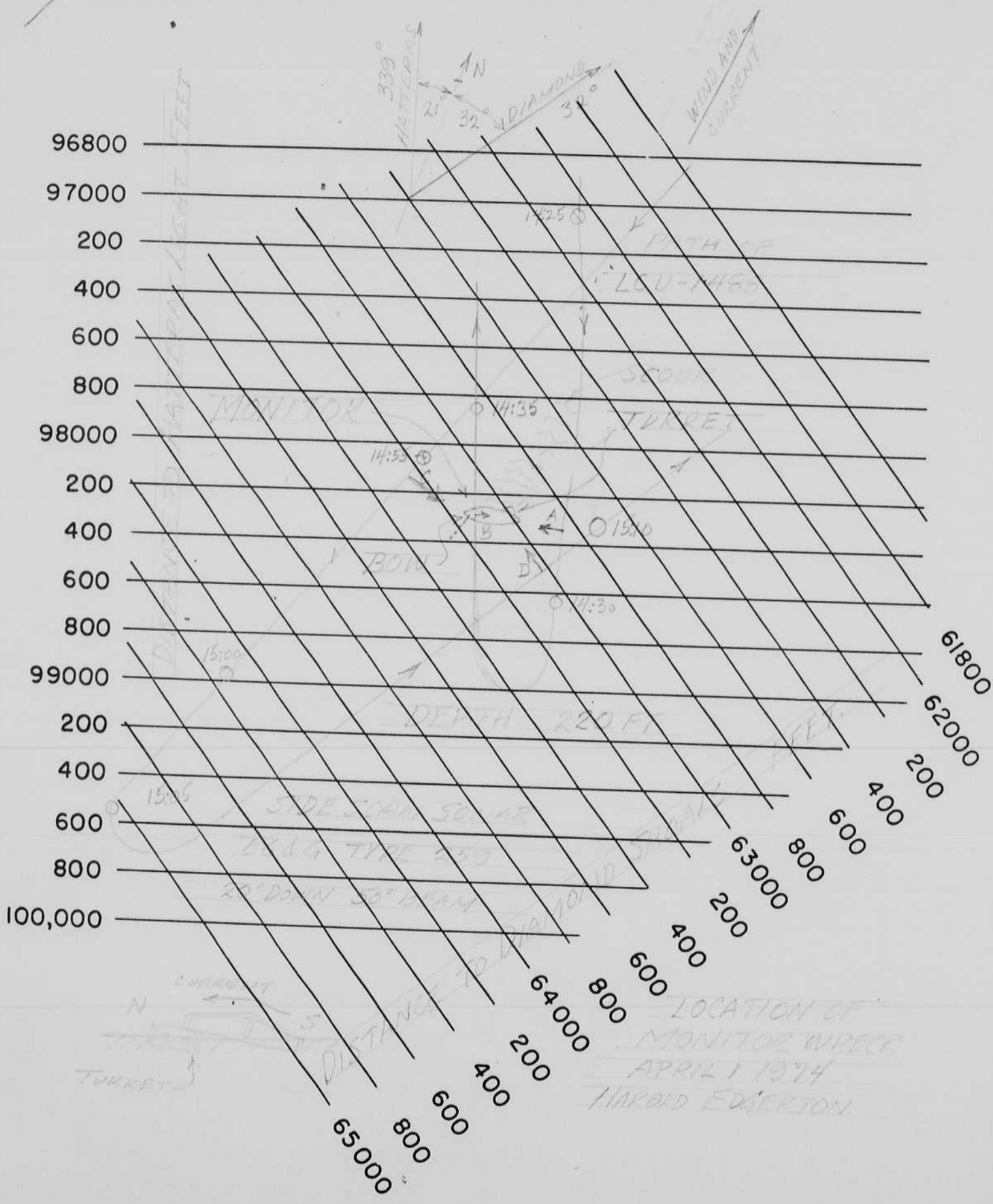
April 23 1974

This was copied for report to Lee N.C. Soil Co.



May 9, 1974

Harold Edgerton.

Apr 23 WHOI meeting of Mines of Science. talk about Alvins summer dives to Mid riff valley. Ballard.

Apr 24 Bob Esther B.C. brought over his films of northern lights — displaced time.

25 Elect Eng Stockfry in Bldg 13, Bigcrowd.

26. Science fair 6 pm Banquet by M.I.T. Jgave a talk and showed movies of Calypso expeditions, with Cousteau 1953 —

27. To Sturgeon bay Wisc to see launching of the Sat DISCOVERY Bargeat the Peterson Ship Yards.

28 Dinner at MIT Dorm with students. Sunday evening.

29. Bob Mann gave talk at M.I.T. Lecture series

30.

May 1 William Jackson Royal Melbourne Inst of Tech 124 La Trobe St Melbourne 3000 australia arrived for England

Luncheon of MIT Alumni

May 2 SPSE Luncheon at Sheraton Hotel. I showed slide and a movie.

May 3. Bell Park photography — poor place to work.

4 Dinner at Vinny Sanders's home in —

5. Nancy Rennebaum married Dick Klavans 2pm

5 & 6 John Newton arrived with wife Tommy at 7 pm " " gave talks at MIT at 4 pm and at New England Aquarium at 5 pm about our Monitor search.

7 Exam and oral of Serge Mordoh. Semin. on vibration of plates. Chkadni.

6.163 STROBE PROJECT LAB.
C.E. MILLER M.I.T. SPRING 1974

Sonar Record of the class Taken with a side-scan.

May 27 1974
Harold Edgerton

Janice and Lyndon Kay left for Chappel Hill N. C. at 2:30 today after a 4 day visit. They are both in carolina state.

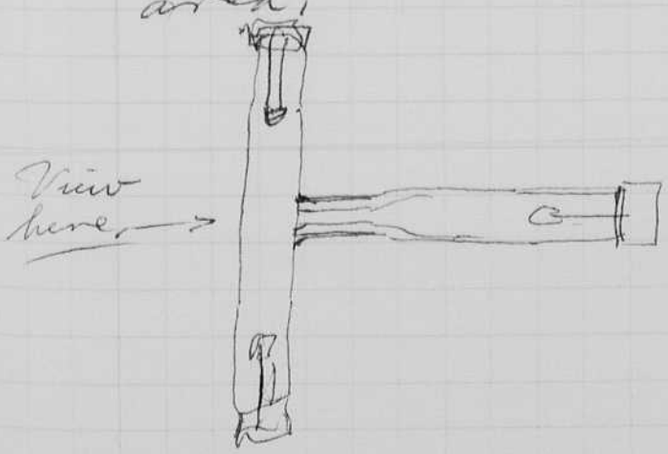
I was in Washington at the N.G. Society on Tues May 22 to discuss the Monitor Don Keach was there with me to see Mrs. Mary Smith. The color photos of the monitor were great. We saw the deep sea camera in the wreckage very clearly.

an effort may be made to put a TV-grab system with the wreck to pickup the camera and strobe, also there is a pinger there.

I had a conference with Josh Fletcher (N.G. Soc) about closeup photography. I have since written to him about several ideas.

Bill and I put a lens on an old type unit and prepared it for trial. This unit has a 60 cycle steady light plus a flash of 100, 200 or 300 W.S. The lamp is a π shaped lamp of 4 m-m I.D. Quartz. The 60 cycle arc does not fill the lamp.

Ideas - (1) operate at 30/sec with double energy per flash. (2) reduce the pressure in the lamp so the arc fills the tube. (3) use a small area section to give full operation of the area.



Bob Sisson of N.G. Soc has a very good exhibit of unusual photographs of small subjects.

6.163 STROBE PROJECT LAB.
C.E. MILLER M.I.T. SPRING 1974

Some record of the class taken with a side-scan.

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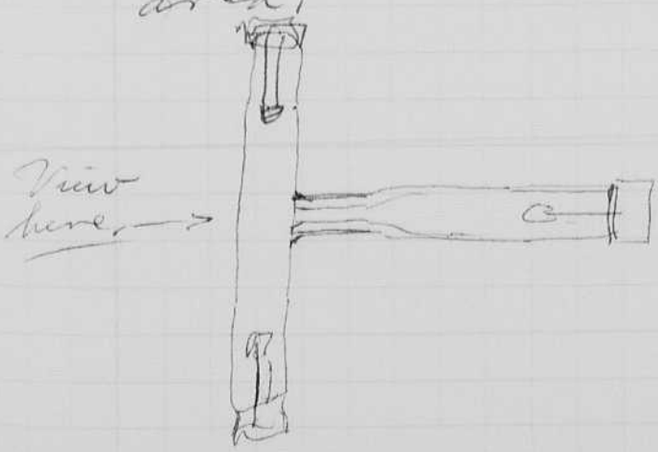


Bob Sisson of N.G. Soc has a very good exhibit of unusual photographs of small subjects.

86 May 28 1974 Tues.

Exposure tests of 2333 type flashes

Film no.	condition.	WS	Kod II	
1.	1 ft to Focal Plane.	100	f16	no lens on lamp
2	1 ft " " "	200	f16	"
3	1 ft " " "	300	f16.	"
4	6" to Lens-Plane.	100	f16	Lens in unit at closest to lamps
5	"	200	f16	
6	"	300	f16.	

Strobe Office: Room 4-405, ext. 4629, Classroom 4-402
Labs, 4-406, 4-409, 4-410 & 10-481

LABORATORY PERSONNEL:

Second Term
1973-74
MIT

Edgerton, Harold, 100 Memorial Drive, Cambridge 864-4790
Mooney, Jean, 27 Birch Road, Watertown 924-7124
Miller, Charles, 85 Hammond Street, Action 1-263-5438
MacRoberts, Bill, 105 Whidden Ave., Whitman 1-447-4172
Breuer, David, MacGregor, Room 316G, 450 Mem. Dr. 494-8623, Dorm 180-9336

6.163 STUDENTS

Calhoun, Charlies, 119 Bay State Rd., Boston, 247-7717 or 262-6929
Cheng, Kwong, J414 MacGregor, Dorm line 180-9404 or 253-1461
Chow, Mark, 609 Baker House, Dorm line 180-8459 or 253-3161
Cole, Paul, Apt. 4, 467 Beacon St., Boston 267-5657
Danis, Alison, 466 Commonwealth Ave., Boston 536-9530
Deanin, Alice, 106 Pearl St., Cambridge 547-5374
Haag, Peter, East Campus, Wal. 102 Dorm Line 180-0147 or 253-2871
Isaacson, C115 MacGregor House 494-9180 or 253-1461
Komaromy, Mike, 439 Baker House 494-8360 or dorm line 180-8439
Laub, Gustav, 97 Bay State Road, Boston, 247-8691
Mackintosh, Mike, 438 Baker House 494-8360 & Dorm Line 180-8438
Malagon-Fajar, Manuel, Apt. 7, 897 Main St. Cambridge, 868-8331
Montante, Bob, 72 Partridge Ave., Somerville 628-1116
Murphy, Kenton, 428 Memorial Drive 494-9833, ext. 3213 or 253-3213
Padys, Danny, 21½ Inman St., Cambridge 661-0449
Peskin, Gary, 535 Baker House Dorm line 180-8385 or 253-3161
Rizzi, Bill, 28 The Fenway, Boston 247-8048 or 266-0478
Rosenberg, Neil, 181 Parson St., Brighton 254-6669
Rubinstein, Peter, 451B Burton House Dorm line 180-8702 or 8669 or 253-3261
Sanchez, Paul, 155 Bay State Road, Boston 247-2986 or 267-8574
Sasaki, Marty, 32 Hereford St., Boston 247-8355
Sjoblom, Todd, 106 Pearl St., Cambridge 547-5374
Slesinger, Steve, 253-B Burton House 494-0289 or Dorm line 180-8560
Teichman, Kevin, Apt. 3, 109 Windsor St., Cambridge 661-0080
Wong, Kai, H318 MacGregor Hall, 450 Mem. Dr. Dorm line 180-9318
Wray, David, 60 Eustis St., Cambridge 876-5038

FRESHMAN STUDENTS

Eisen, James J212 MacGregor House Dorm line 180-9202 or 253-1461
~~Evenchik, Leonard, 141-D, Burton House~~ Dorm line 180-8154 or 253-3261
Frey, Kirk, 58 Manchester Rd. Brookline 232-3258
~~Haas, Lawrence, 58 Manchester Rd., Brookline~~ 232-3258
Iannucci, Bob, 121 Baker house, 494-0349 or dorm line 180-8271
Lach, Elliott, 352D2 Burton House, 253-3261 or dorm line 180-8630
Madigan, Mark, 646 Baker House Dorm line 180-8496 or 253-3161
~~Noto, James, 58 Manchester~~ Rd., Brookline 232-3257
Ottusch, John, 407 Baker House Dorm line 180-8407 or 253-3161
Parkinson, Bill, 362 Mem. Dr. Baker House, Dorm line 180-8255 or 253-3161
Pollock, Jim, 416 Beacon St., Boston 247-8275 or 536-2106
Spiro, Steve, 99 Bay State Rd., Boston 261-1391 or 262-3521
~~Willinski, Tobey, 460 Beacon St.,~~ Boston 247-8764

THESIS STUDENTS

Mordoh, Serge, 187 Bay State Rd., Boston 266-0275
White, Doug, 311 East Campus, 494-8364

Jill Baynes freshman from Texas

17

 May 25 1974 Tues.

Film

1.

2

3

4

5

6

Mutual Television

RG-313

53.4175

247.322 Hans

Coffee. Blues

Harvard

Pinchot Expedition

June 4 1974

Harold Edgerton.

Note made June 2 (Sunday) afternoon.

The 259 EG&G Edgerton with a
Mic. pre amplifier and
110 ac psi 5 KC xmsn
Driver

Lipstick on card.

To Do. June 2 1974

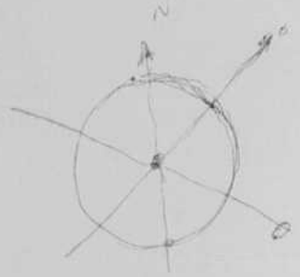
1. Paper wrinkles - Put blade holder.

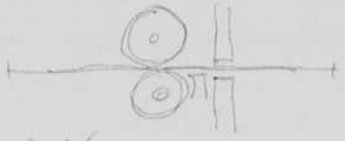
2. Paper takeups birds and sticks why?

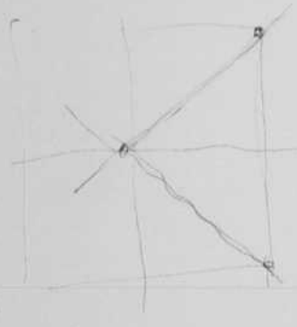
3. Interchange on other half of record. Such as distance to a bottom signal

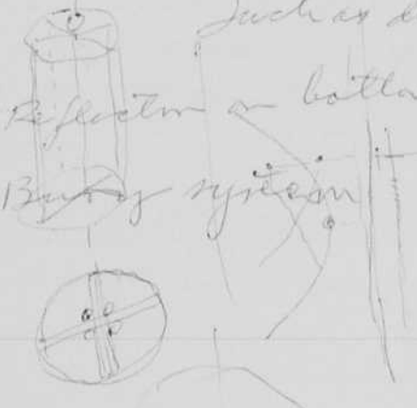
4. Reflector - bottom

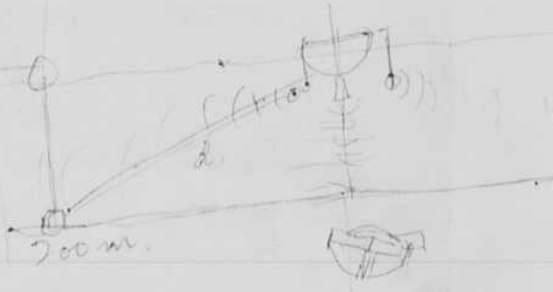
5. Buoy system

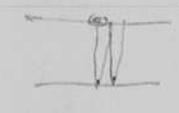


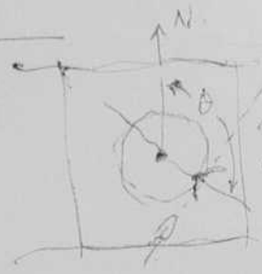












meas distance (1) with optical means
(2) angle with compass

Plot distance and angle.
Repeat for finer detail.

June 5 1970
Harold Edgerton.

The sonar has been apart in the strobe for three days. Bill has finished the it.

initial blur seemed too long
d everything we could do to cut it down.
iller suggested that we clamp at
or null point of the transducer. This
day and it seems to reduce the
val from 10 ms to about 5 and with
sity.
der system had brass rods that
ssa transducers from their front.
g these impart vibration to the
frame.
ll see how the unit works in
before long.
present design has the two
ers ~~about~~ 12" on centers. Before
closer to 2 feet apart.

Square plate
fish line
sand bag.
anchor.

leg came for lunch today. He says that
h E.P.C. Lab is finishing a very
nd year of more than 10⁶.

from WHOI came into Dorg to
mucus core photography of
deposits on the bottom of the sea.
do do a three month project.

posed the use of silhouette
aphy of the particles on a glass (thin)
n film directly below.
used him the point source as
bullet shadow waves.
P of GR. Strobes and Strobe
e shown to him for trial in
then this design could be
ed. Honjo plans to write
ject along the silhouette style.

100 M.
200 M.

June 4 1974

Harold Edgerton.

Note made June 2 (Sunday) after testing.

The 259 EG&G Side scan with a modified amplifier and 110 ac fish 5KC mono Driver.

This conversion makes the 259 with a 5KC penetrator using one side of the Recorder.

The driver is now being built to operate from the 750 volts that is in the 259 machine. It should be ready to test in a few days.

I am preparing for a trip to Poros Greece to help Nikki Stavrolakes and her group to do some archeological prospecting.

Bill and I worked yesterday on the blade driving mechanism. It has been causing the paper to come out with a fold. We think we have now solved the problem by supporting the back part of the blade which has been dragging on the cover.

We also are trying to solve the folding problem so that the paper does not come through the out put but bunches just behind the pull through rollers.

June 5 1970

Harold Edgerton.

The sonar has been apart in the strobe Lab 4-405 for three days. Bill has finished the driver unit.

The initial blur seemed too long so we tried everything we could do to cut it down.

Chas Miller suggested that we clamp at the center or null point of the transducer. This we did today and it seems to reduce the initial signal from 10 ms to about 5 and with less intensity.

The older system had brass rods that held the Massa transducers from their front. Apparently these impart vibration to the plywood frame.

We will see how the unit works in the water before long.

The present design has the two transducers 12" on centers. Before they were closer to 2 feet apart.

Ed Curley came for lunch today. He says that his company E.P.C. Lab is finishing a very successful year of more than 10%.

Honjo from WHOI came in today to discuss micro cape photography of small deposits on the bottom of the sea. He wants to do a three month project.

I proposed the use of silhouette photography of the particles on a glass (thin) plate with film directly below.

I showed him the point source as used for bullet shadow waves.

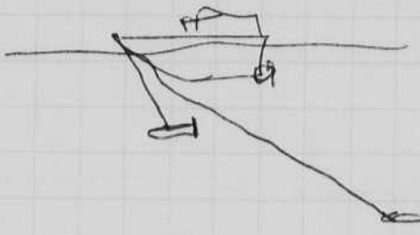
Catalogs of E.G. Strobes and Strobe Tubes were shown to him for trial in the lab. Then this design could be completed. Honjo plans to write up a project along the silhouette style.

July 21 1974

Harold E. Edgerton

Left June 21 for Frankfort and Athens with an EG&G 234 sonar with a 5 KC penetrator.

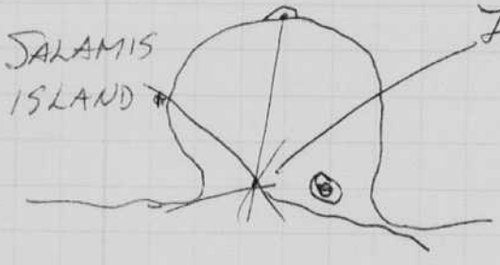
June July 24 conference with Adm Skoudopoulos and Kountalcon about uses of sonar. Program started with Tom Hopkins on June 27. Lost fish on 1Σ47



I had the fish in front. Then I let out a lot of cable for a look for Tom's current meter.

The ship was reversed quickly and it's propeller cut the cable. The fish was lost in 55 meters in a cove off Salamis Island.

We tried to hook it (the fish) on June 29, also on Friday July 5 for 3 more days.



Lost fish.

More important I worked with Tom Hopkins on the pollution problem.

We surveyed the sewer outlet west of Piraeus Harbor. 60% of Athens sewage comes out of this one output pipe.

The side scan showed the outfall, also it showed a wreck near the pipe, about 100 meters west.

The gas-bubble field is shown by the 5 KC - clearly. A second bottom comes in clearly ~~where~~ due to the bubbles which echo the sound. Off the bubble field - the 5 KC shows the thickness of the sludge field.

I returned on Thursday the 18 of July from Athens via Zurich. Left Athens 10:05 - Zurich

" Zurich 3:05 - Boston. on a DC10

July 29 1974
Harold Edgerton

An expedition is being organized to pick up a deepsea camera that was lost in August 1973 at Cape Hatteras. The camera - strobe system belonged to Duke University. It was an EG&G type 505 and 506? combination.

We do have an excellent photograph of it taken by the Alcoa Sea Probe in April at the monitor site.

The MONITOR is located at 220 ft deep at 98,300 feet from the Hatteras light and 63,100 feet from the Diamond head light. We used the del norte system to measure these distances.

See page 82

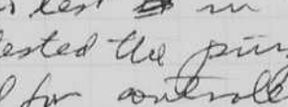
Lloyd Bresdan of the Coast Guard Development Group at New London is to furnish a ship out of Moorehead city N.C. John Norton is going. He has been on both previous ~~conditions~~ expeditions. Arrangements have been made for the del Norte distance measuring units.

Lloyd asked me to bring a camera - strobe. This I am doing. I have been tuning up the camera used in 1969 on the Russian Ship Kurchatov in the Rift Valley.

Today Bill Mackoberts helped me to test the gear in the Charles River. More accurately - we only tested the pinger and the microphones that are to be used for controlling the height.

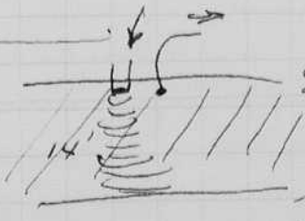
Microphone tests in Lab.

Air
- .03 volts 1 ft in air
- .003 " " " "
- 8 Ball .04



We will use a T.V. system of the navy thanks to capt Don Keach. Snoopy is the name.

Water
- clevite .4 pp from bottom 5 ms
- massa .3 " " " "
- Atlantic .05
- 8 ball .07



front/back = 20 x

Horizontal tests front 3' 4 volts
10' 2 volts
3' 5 volts
10' 2 volts.

massa
back 10' 0.1 v
5' 0.1 v ?

I will take clevite & massa.

92 Sept. 2, 1974 Monday Labor Day. at Home
Harold Edgerton 70 Memorial Dr.
Cambridge Mass.

I got back from N.C. on Aug 30. at 9 pm. The trip was unsuccessful since we did not bring up the camera which was lost in Aug 1973, a year ago. It seems that we were not only stopped by technical difficulties but by restrictions.

For example Lloyd Breslau's orders ~~were~~ were to "not bring up the camera." Steve Glueckman of N.C. may have been the one to get this order.

Lloyd is writing a report of our tests of the 259 Side Scan, Snoopy, and the deep sea camera - T.V. combination. He is the Coast Guard Res. & Dev. dept at Groton Conn.

John Newton and I went on the Beveridge to the site with a 259 and with a camera and a T.V.

We were called in on the 23 by Duke. A conference was held with Eaglow, Barber, Newton of Duke Webb, Schmidt, Glueckman of N.C. about the damage problem if any. I convinced them that the Grapnel - T.V. System would not cause any substantial damage. At the last moment Eaglow said "No."

However Newton and I had two days with the camera and T.V. with permission for Eaglow. We informed Glueckman.

The camera 150# and T.V. reached the bottom in a 2 knot current with a 10-20 degree wire angle.

The T.V. at 220 ft did not require the lamps to be on. Daylight was marginal.

I had plenty of trouble with the strobe systems. There was a damaged cable to the bottom switch. I used a photoresistor to turn on the camera when the Tungsten lamp was

Framed 4

I made a specification of a camera T.V. system in my note book. & plan to transfer some of this material to this book. The new system calls for an angle changing device such as a small prism to swing the camera.

The main pointing device will be the ship with multiple anchors and winches.

We arrived in Beaufort at the Duke Lab about 2 pm by car from Hatteras. The ship came in about 7 pm. It was parked by 11:30 pm. The equipment was to come via McLeod truck on Sept 13 tomorrow.

Sept. 10, 1974

Hand Edgerton

Bill Henderson of Cable came in yesterday. He worked in the Chas. River with the 259 Side Scan using a new amplifier with a 3 sec gain automatic control. I had trouble in Sunday Sept 8 and had a problem with the final return.

Registration day at 0917 yesterday. Chas Miller will come 6.163.

Left England on Sept 15 with Esther to the N. S. Congress at Lyn College. We stay at the Onslow Court Motel. Kim & Pam Pardiner go with us to give a program.

Camera Design notes made in N.C.

54

Design of camera for wreck photography.
Aug. 28. 1974. -H. Edgerton Ocracoke N.C.
Features and: with help Newton.
in cabin for Hatteras.

(1). Streamline so chances of catching on a wreck are remote.

(2) Design so current will not cause motion.

(3) T.V. Visual monitor system. Compass for orientation.

(4.) Push button for camera.

(5) Method of turning camera such as jet or Propeller.

(6) Reel of 300'. with motor up and down from control.?

(7) - Braided. ? or cable

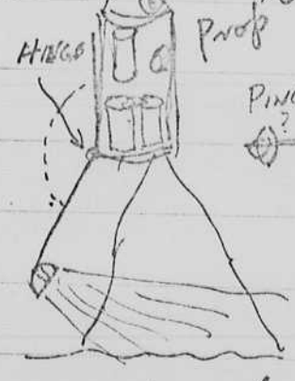
or. (OR)

(7) Figure 8 wire in Box.

8. Pinger for subject detection

9. Wire out Variable angle.

10. Tension.



PINGER or CAMERA (Stereo).
T.V. or Pinger.
?
CAMERA
TOP.

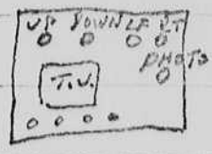
Vertical. Stereo.
photos.

Roy Funderstood
John D. Newton
8/29/74

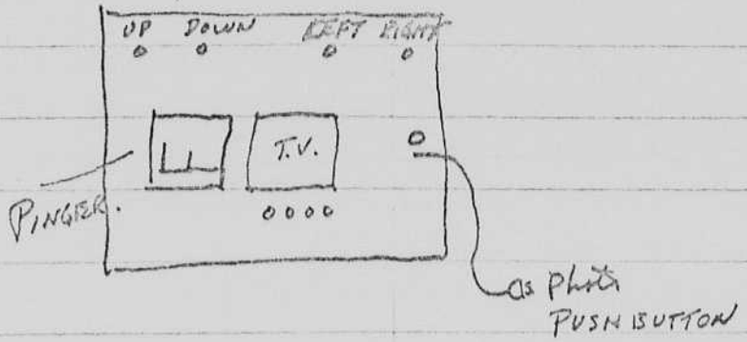
for X-y displacement.
Use with Ship having Navig. Schneider
or andrumed?
Prof. Dayton

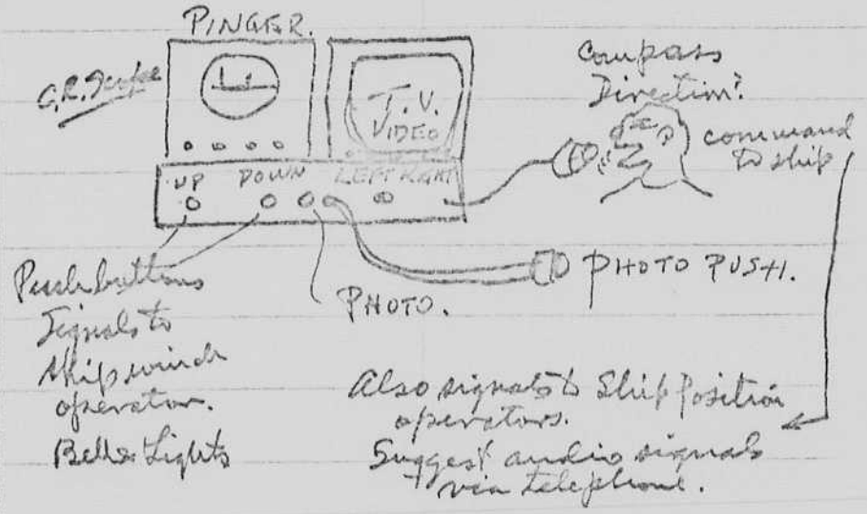
from my notebook. Sept 10, 1974 Harold Edgerton

Control Box for camera. (65)



Read & understood
John G. Newton
8/29/74





Camera make it easy to remove and substitute a loaded model.

Strobe. Battery operated unit?
50 watt sec 1000 B.C.P.S.
or larger?

Pinger Beacon Responder type to be placed in wrecks.

Notebook # 31

Filming and Separation Record

____ unmounted photograph(s)

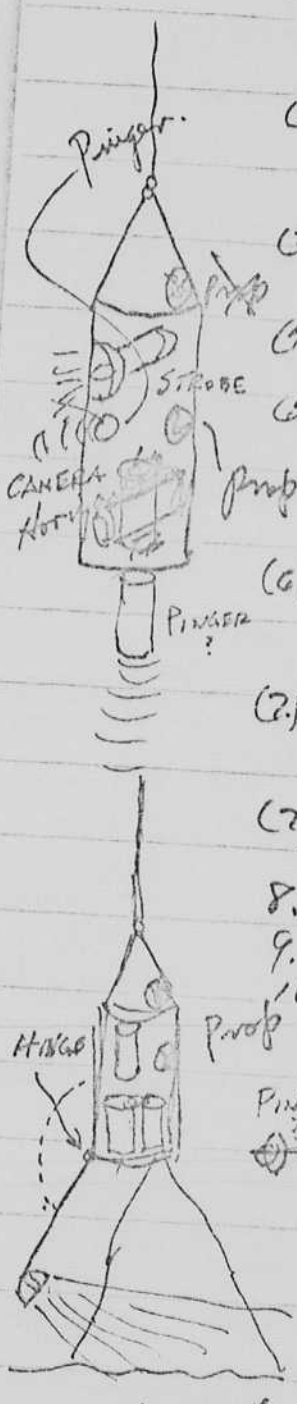
____ negative strip(s)

__2__ unmounted page(s)
(notes, drawings, letters, etc.)

was/were filmed where originally located between page 94 and 95.

Item(s) now housed in accompanying folder.

Design of camera for wreck photography. 54
Aug. 28. 1974. H. Edgerton Ocracoke N.C.
Features are: with Jacques Cousteau.
(1). Streamline so chances of catching on a wreck are remote. in Cape Hatteras.



(2) Design so cement will not cause motion.
(3) T.V. Visual monitor system. Compass for orientation.
(4.) Push button for camera.
(5) Method of turning camera Such as jet or Propeller.
(6) Reel of 300'. with motion up and down from control.?
(7.) - Brushes. ? or cable or. (OR)
(7) Figure 8 wire in Box.
8. Pinger for subject detection
9. Wire out Variable angle.
10. Tension.

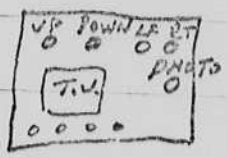
PINGER OR CAMERA (Stereo).
? T.V. or Pinger.
CAMERA
TOP.

Read & understood
John D. Vaughan
8/29/74

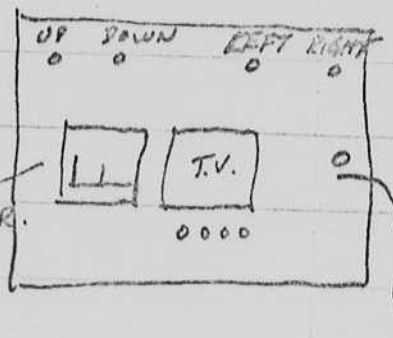
Vertical. Stereo.
photos.

for x-y displacement.
Use with Ship having Prof. Spiess
or anchored! Voig. Schroeder

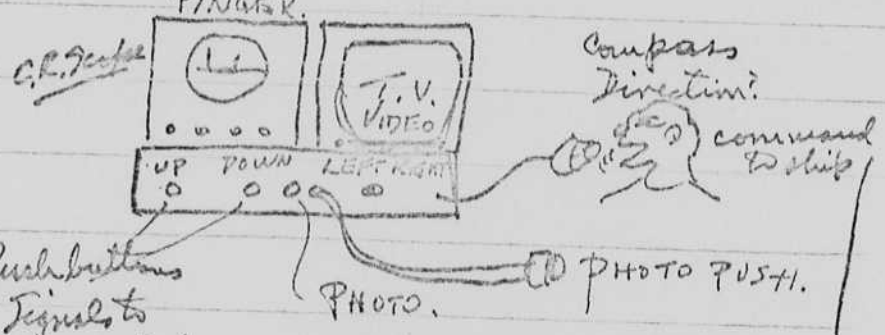
Control Box for camera. (65)



Read & understood
John G. Newton
8/29/74



to Photo
PUSH BUTTON



Push buttons signals to ship's wind operator. Bells & lights

Also signals to Ship Position operators. Suggest audio signals via telephone.

Camera make it easy to remove and substitute a loaded model.

Strobe. Battery operated unit? 50 watt sec 1000 B.C.P.S. or larger?

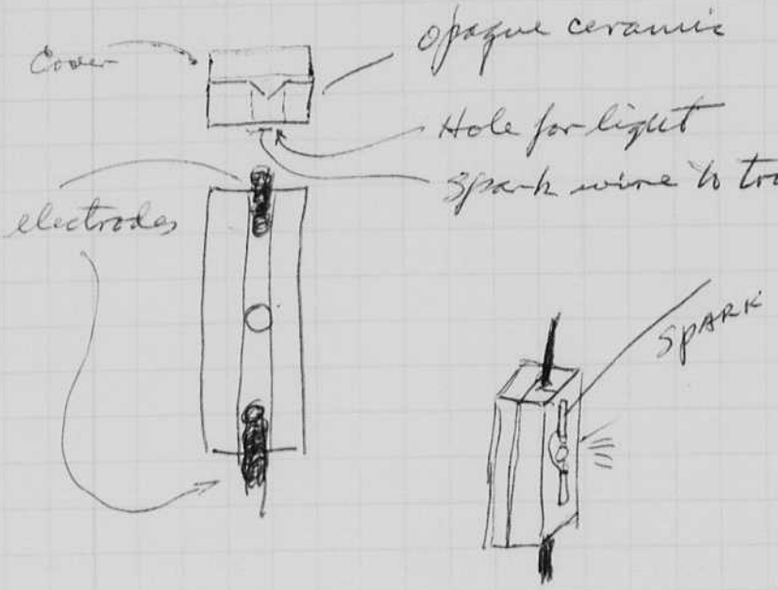
Pinger Beacon Responder to feel & place in wrecks.

96 Sept 11 1974 4-405 M.I.T. Cambridge Mass. Strobe Lab.
Harold Edgerton Small Beacon for Green Building.

Mfd C 3 mfd FX-6A
peak light 1.4×10^5 P.C.P. | 0.39 lic.p.s.
25 μs duration

49 3/98 This was started on Sept 10 by Mac Roberts. 98 flashes/min.

Spot lamp design



~~Instelled~~
Installed
about 5pm
Sept 12 1974 on tower.
Harold Edgerton

1974, Sept. 11 (Wed.) Faculty Meeting, 3:15pm, room 10-250
" Prof. David Epstein, E.E. Area meeting, 4pm, room 10-105
" New England Aquarium, Commonwealth Pier, 4:30pm
" 12 (Thu.) E.E. Dept. Faculty meeting, 3pm, room 10-250
" 13 (Fri.) Pres. Wiesner's House, Alumni meeting, 5pm
" 14 (Sat.) Kresge Aud. & Student Center - Alumni meeting, Beaver Award at 12 noon luncheon, 5pm cocktail party-Sala
" 14 Leave for London - 11th International Congress on High-Speed Photography (Imperial College)
" 21 (Sat.) Return from London
" 24 (Mon.) MTS meeting - Sheraton Park Hotel(Bates Littlehales)
" 26 (Thur) Strobe Lab - OPEN HOUSE - 4:30pm, rm. 4-402
" 30 (Mon.) MIT, School of Engineering - Center for Advanced Eng. Study (CAES), 9am welcome by J. B. Wiesner, room 9-150
7pm dinner at the Faculty Club, Deal A. Keil,
Address by E. E. Morison
Oct. 1 (Tue.) CAES, Room 9-150, Dean Jim Bruce
12:30pm luncheon, Student Center
" 1 Lecutre for Prof. M. Dresselhaus, room 37-212, 3pm
"Meaning of Engineering"
" 2 (Wed.) Lecture for Charlie Miller, room 4-402, 12noon (6.163) (V.W.)
" 3 (Thu.) University of Pennsylvania (Nancy Ferriss), 6pm cocktails lecture at 8pm
" 4 (Fri.) Science Teacher's Conference, Fredericksburg, Va. Lecture
Lecture - Mr. Franklin Kizer
" 5 (Sat.) Mary Lou Dixon & Family Raleigh
" 6 (Sun.) " " " "
" "
" " 12 (Sat.) MIT Class of 1918 - Endicott House, Max Seltzer Talk about noon.
" " 14 (Mon.) COLUMBUS DAY
" " 16 (Wed.) New England Aquarium, Bd. of Gov. meeting, 12:30pm
" " MIT Club, Newark, N.J. Mr. John Spencer, 17 Dayton Rd. Talk
Denville, N.J. 07834 (201-625-1546)

Prof. Harold E. Edgerton, MIT

Sept 23 1974 monday.
Harold Edgerton

Test of Beattie Camera #5 type 371.
Strobe 005 380

Mounted on Steel frame. by Mack.
camera - Strobe distance = 10"
Loaded with Eastman Film fast type. f11 at 2 meters.
T.V. on with Push button control.

1-6 no strobe.
7 Border
8-9 meter at 3 ft. 110 x 1 x 4 = 990 x 4 clamped reflector. 3969 B.C.P.C.
10 " 117 x 4 x 9. = 4212
11 Another meter. 110 x 4 x 9 = 7% low.
12 44 x 9 396. Bare lamp end on.
13 no strobe no top light.
14 " top light
15 another side view of lab no strobes
~~16~~ " " " lamp out put no reflector 26 x 9 = (234 H.C.P.S)
camera not operated
Reflector factor = 18
16. no light strobe f11 at 3 ft
17

Problem with camera
It does not operate with push button DK50 6 min.
The problem seems to be in the camera

1. Room f11 2454 30° from Horizontal
2. Room + Tungsten white card with Lab jars
3 " "
4. Tung + strobe.
5 Room + strobe
6 Strobe only, 3 ft
7. " 4 ft
8 " 6 ft
3 Blanks.
Cut film DK50 7 minutes. ok.

Sept. 27, 1974
9 Strobe f11
10 " " ✓
11 " " ✓
12 NO " " all ok but this one on leader
13 No " "
14 Strobe " ✓
15 Strobe " ✓
16) No Strobe "
17)

Test made in M.I.T.
Pool. f11? 2M.
6 min DK50.
ok but
contrast low
#4
paper

98 Oct 1 1974

~~Harold Edgerton 4-4105~~

Experiment made by Bill MacRoberts and Fine Pratt's lab yesterday on a 2" gap over a xenon lamp on the microflash unit. A ring was put half way between the anode and the cathode. The lamps started in a reliable fashion.

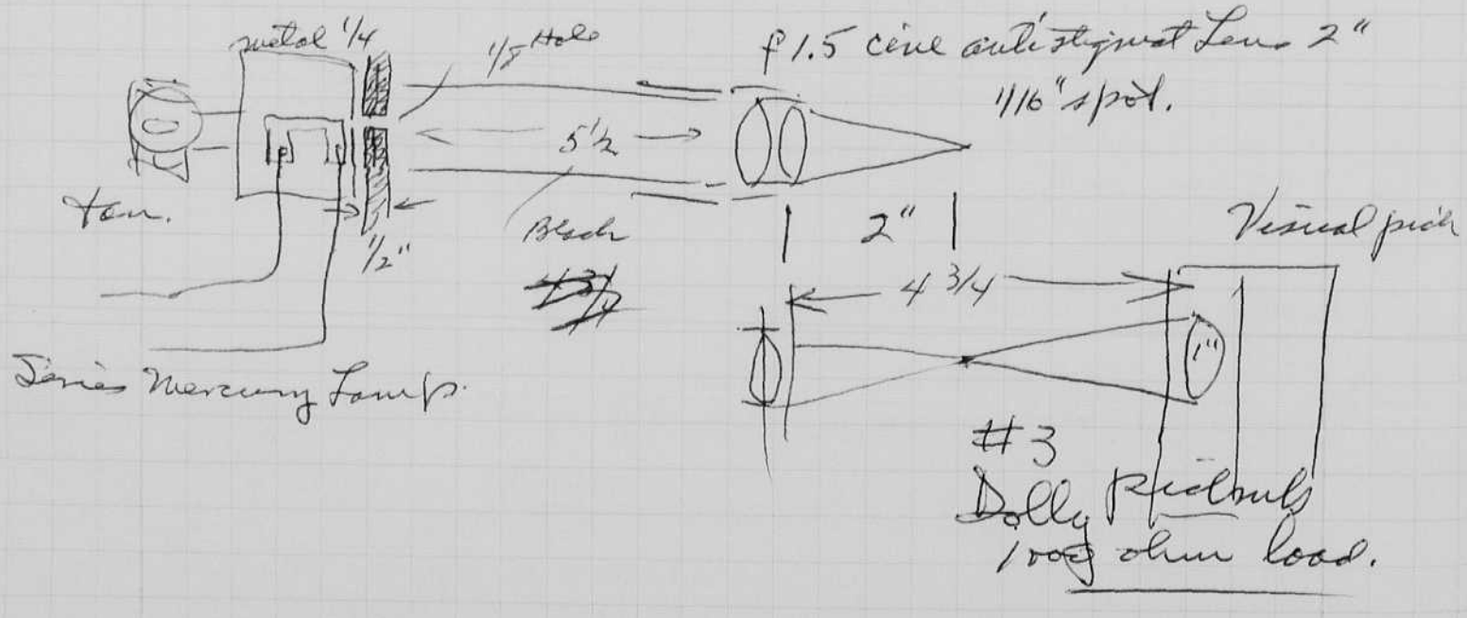
Later in the afternoon I moved the wire ring to one end. Action was same. Then I removed the ring completely and found that the lamp continued to fire satisfactorily. Why does this lamp go so well now, whereas in the past we had difficulties of gaps greater than about 1 inch? Bill says our spark is now greater.

Oct 2 1974 Hz. Tests of Point light Source for Bill Mac Jack Fletcher for Nat. Geo. Soc Wash D.C.

As returned 160, 200, 150 measured,

Eh&G. microscope unit 2333 illuminator

100 Ws	setting	1000.
200	"	4000
700	"	8000.



Oct 11 1974 Camera tests U.W. with T.V.

Test in lab or floor.

Film 2484. one wound in light

Lens. f16. 1 meter.

2-3 without strobe in lab. or T.V. light. fogged

4. - with T.V. Light — Some sky + Drift

5. - " T.V. Light — "

6. no light in lab. — 0

7. all lights in lab on — 0

8 Strobe (all lights on) — ok

9 " all lab lights off. — "

10 focus & Strobe. — "

11 Strobe only (Dark). — "

12 Strobe & focus. — "

30 6 (36) 3 27.

13 Strobe covered with paper — Redgleam 0

14 " " " " — 0

15 " " cloth — 0

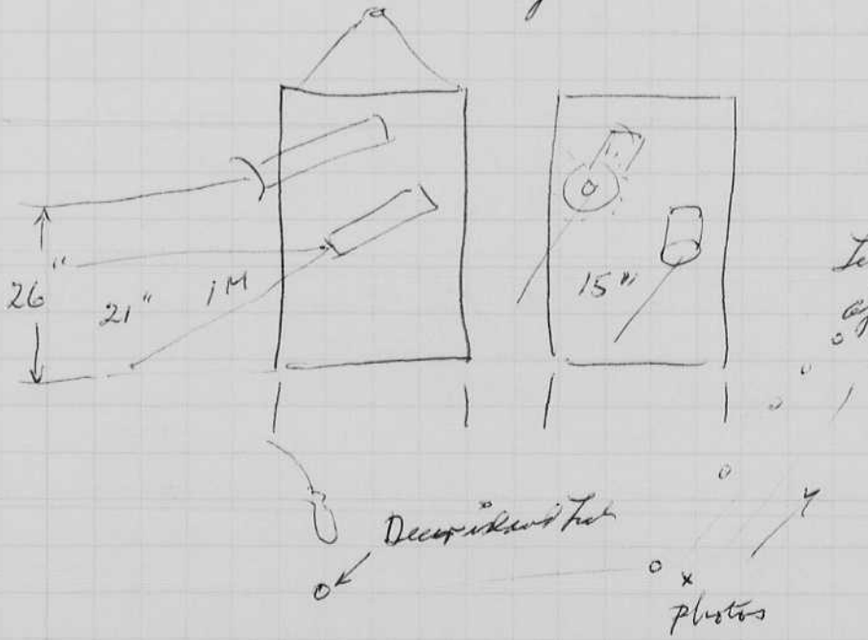
16 " " " — Fogged 0

17 " " " — Fogged 0

Transcribed data from tests in Boston Harbor yesterday Oct 10 off SHROCK. at Barber Aquarium

Chris Neefus
Chas. Miller
Marion Boggert
+ Art Clifton
+ Harold Edgerton.

Benthos camera
model 37 Serial 005
Temp model 381 # 005
Lens. U.W. Nikkor
f 28 1:3.5
no 1162.11
Set at f 4 - 1.2 meters,
all photos badly overexp
on 2484 film
10 min in DK.50



Left dock about 1245 returned off Nahant 1 - Dock about 4 pm

Wind about 20 25 KN
Waves
Ship Drifted some
T.V. image good.

Comments on activities

Oct 10 1974.

London High Speed Photo Congress

Sept 14 – 21, Three papers were presented.
with Newell, Vandiver, Miller.
Open House MIT Sept 26.
Lecture on "engineering measurements" for freshmen 37-211 Oct 1.
" on Underwaterphoto Oct 2 – 12 4-402
Oct 3 " " Arch & Swar Mus. Pa. 8 pm Philadelphia.
Oct 4 " " Stroke Science Symposium Fredericksburg, Va.
Franklin Kiser.
Oct 5 ~~Raleigh~~ Chapel Hill at Jan Dixon Keys house for picnic with the Esthers who met me in Phil on Oct 4. We went by car to Fredericksburg & Raleigh.
Today Oct 6 Lecture at Chapel Hill for Conrad Neumann's geology students. Chas & Mary Jane Dixon were there.

Mon Oct 7. Hickory N.C. with Mr Mary Jane

8. Returned to Camb with stopover in Washington D.C. at the Nat Geo Soc. Nelson Brown helped me make some trial exposures with the microscope illuminator type.

This was considerably brighter than the model used about a month ago. *

All trial exposures were over for tests made on Oct 3 when I delivered the equipment to the N.G. Society.

* Small unit as used for first tests

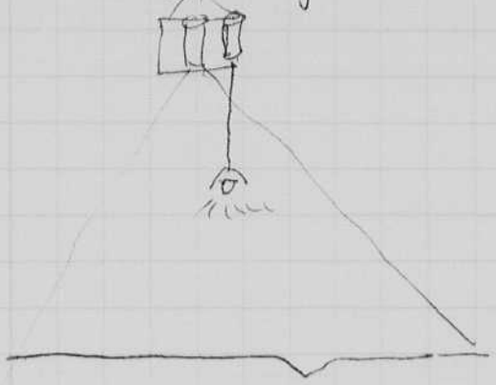
type				
2333	0.35 ms.		160 units	
	Bright	100 w.	1050 "	all overexposed at f 22 on Kodachrome 25 film.
	0.9	200	3960 "	
	1.5 ms.	300	7700 "	

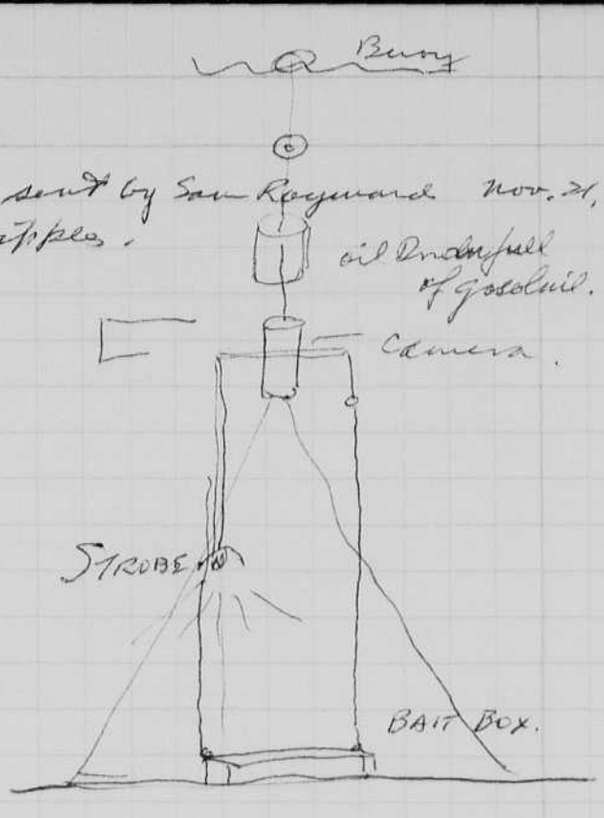
Rephotographed with more bellows - enlargement also stopped down on the lens on the lamps. Nelson Brown N.G.S. has the data.

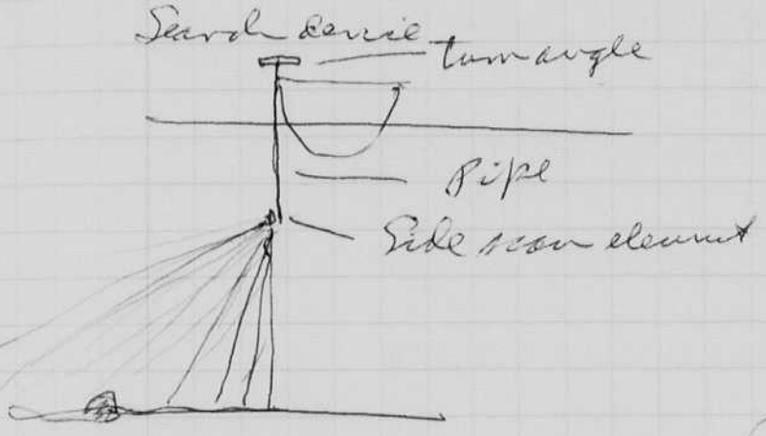
Oct. 12, 1974
David Edgerton

Bottom Photography.

See Photo by Roger Flood W.H.O.I. sent by Sam Raymond Nov. 21, 73.
Shows groove on bottom and ripples.
Lamps in the picture.

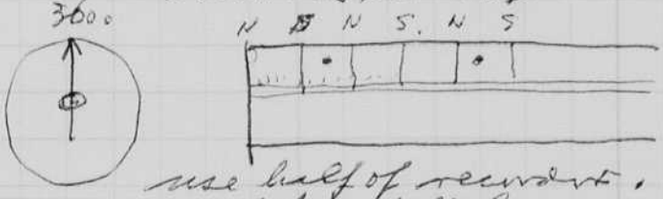






To fit 25ft unit on a stationary ship.

Hand turn angle, through 360° until north at bob.



use half of record. Spot target distance and angle from the anchored sled.

Sat Oct 19 1974 Sat.

I tested the new sonar element with the adapter made by Bill and Robert. It seems to work fine so now we can try the angle measuring scheme.

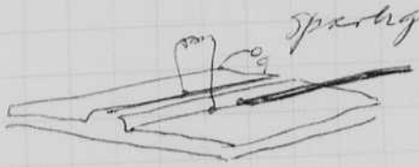
I suggest a 20° down beam to start with.

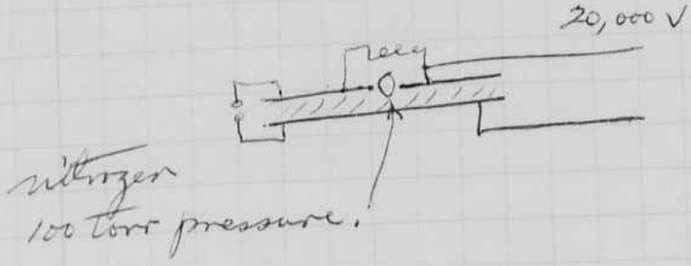
This would have been tremendous for our work in U.C. at the MONITOR site. We only guessed where the wreck was actually located after we dredged.

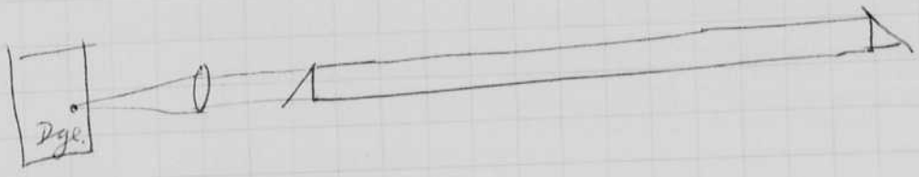
 Oct. 21, 1974 Harold Edgerton.

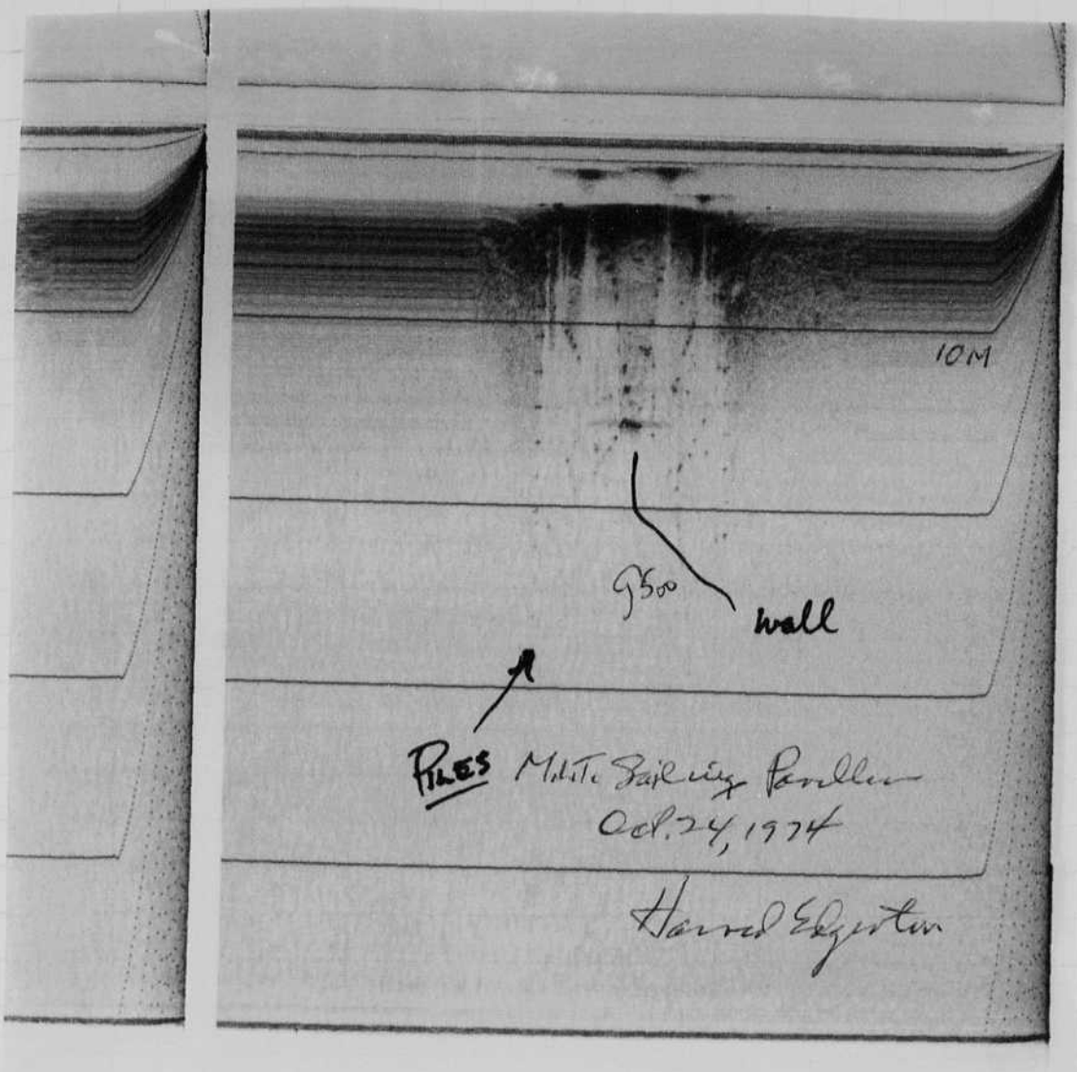
I took Sherry Robstein over to the phy dept 6,001 to see & who showed us a dye laser.

First a nitrogen laser was used to get radiation. this was imaged into a dye holder. Still coherent radiation was produced.









Oct. 23, 1974.

Tower off
MIT
Sail Pavilion

Side view
depth
3 1/2 ft.

360° moving storm
from sea wall
and edge of
dock.

Tested at
M.I.T.
Sailing Dock.

Nov. 1, 1974 Harold Edgerton

SHROCK at 8 am. to Graves light

Camera set at 1.5 meters f 14 2# 84 film

Rod Swift,
Jay McLean
Marion ~~Baggett~~ Baggett.
Tom Gilbert
Alice Clay.

Photos delivered Nov 8.
to MacLeod
by Marion Baggett.

Tags on film numbers.

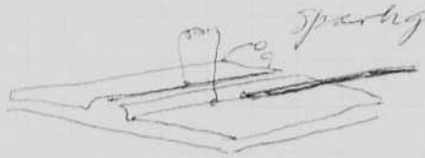
1. Dunlab.
2, 3, 4. Long Island
5- Deck
6, 7, 8, Buoy #10
9 Deck
10, 11, 12, 13 Entrance to channel
14 Blank.
15-20- Whitlll
21 Blank
22-25- Deer Island N. W., inside.

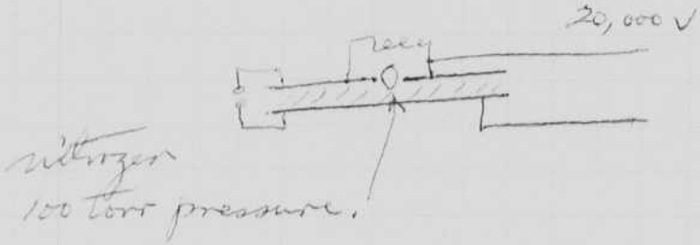
3. Long Island. 31'
1 Blank on Deck
3 #10 200' West 4 1/2 61
1 Blank with foot.
4 B&W sunrise 66'
1 watch.
6 Whitlll 86'
1 Deck 2 ft.
end 4. near Deer Island.

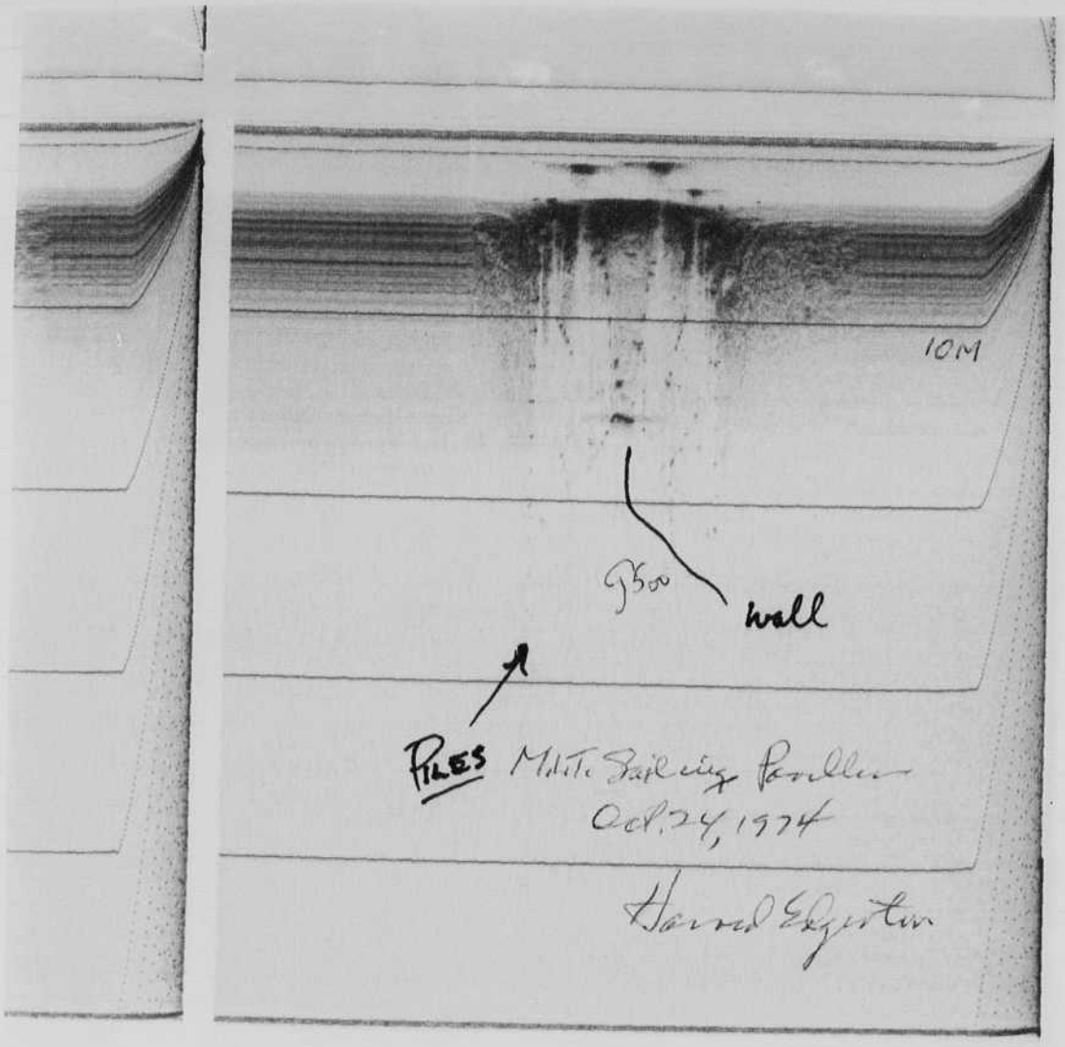
 Oct. 21, 1974 Harold Edgerton.

I took Henry Erbstein over to the physdept 6.001 to see [illegible] & who showed us a dye laser.

First a nitrogen laser was used to get radiation. This was imaged into a dye holder. Side coherent radiation was produced.







Oct. 23, 1974.

Tower off
MIT
Sail Pavilion

Side view
depth
3 1/2 ft.

360° swing distance
from sea wall
and edge of
dock.

Tested at
M.I.T.
Sailing Dock.

Nov. 1, 1974 Harold Edgerton
STROCK at 8 am. to Buoy light
Camera set at 1.5 meters f 14 2888 4 film
Rob Swift,
Jay McLean
Marion ~~Baggett~~ Baggett.
Tom Gilbert
Alice Clay.

Photos delivered nov 8.
to mac Leod
by Marion Baggett.

Tags on film numbers.
1. Dunlab.
2, 3, 4. Long Island
5- Deck
6, 7, 8, Buoy #10
9 Deck
10, 11, 12, 13 Entrance to channel
14 Blank.
15-20- Whitlll
21 Blown
22-25 - Dec. Island N. W., inside.

3. Long Island. 31'
1 Blank on Deck
3 #10 200' West 42/61
1 Blank with foot.
4 B&W entrance 66'
1 watch.
6 Whitlll 56'
1 Deck 2 ft.
and 4. near Dock Island.

Notebook # 31

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 102 and 103.

Item(s) now housed in accompanying folder.

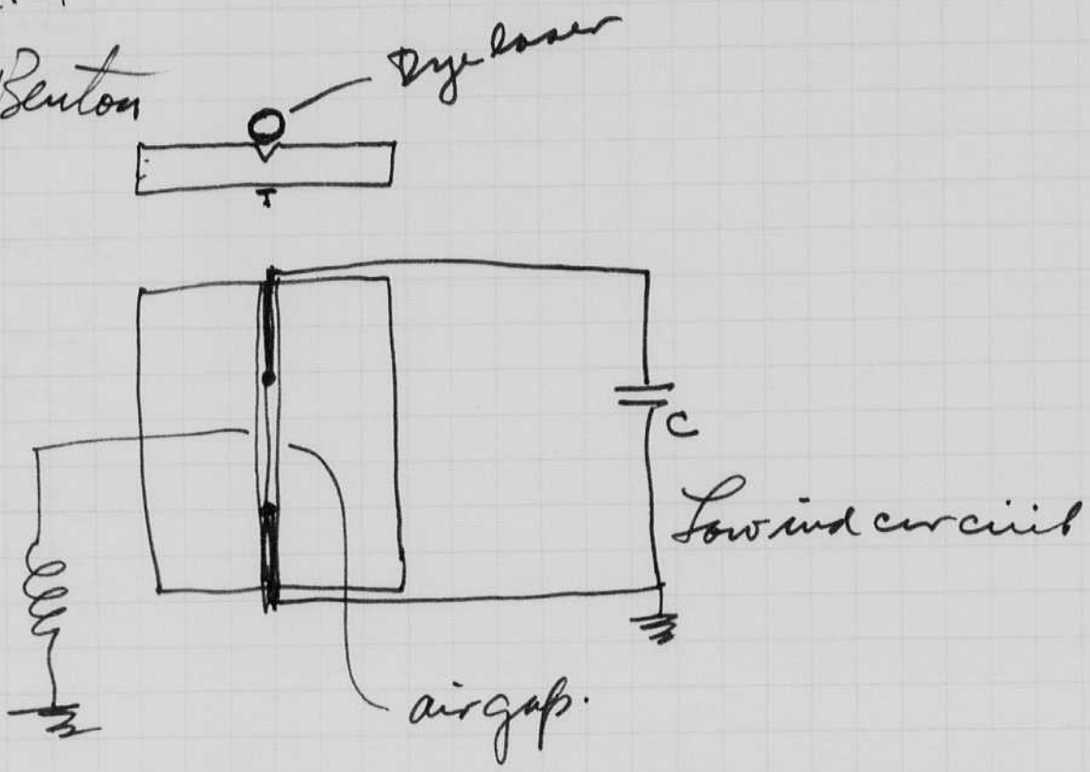
Dec 17 1974

Harold Edgerton

104 Nov. 11, 1974

H. Edgerton Tests made of side-angle views
Devil on Nov. 9. with help of John Thomas
Susan Thomas in Charles river. Reports records
made off Rowing Pavillion and bridges in Charles River.

Nov 11 74
under St Benton



Nov 12 1974. Shapiro test time movies of Boston to show reflections in windows. Camera was placed 100 ft east of M.I.T. Sailing Pavillion

Start about 4pm f 4 Kodak II at 16/minute. meter for 1/30 sec.
and 7.30 ± f 1.5 " " 1/30 sec

Note bright light on the capital ~~Dome~~ Dome Top.
when the angle was just right.

Comments after processing —

Dec 1974 MIT 4-405

Harold Edgerton

Yesterday I worked at WHOI with the side scan sonar with Scott Briggs
Jim Austin
Dennis C Edwards.
on the asterias. Capt. Ernest (Dick) Colburn.
Left Boston by car (Lewis) at 7 am
" Dock at WHOI about 9. for
Vineyard sound.
arr. at 7/+ at WHOI. The day was cold clear and no wind so the equipment worked fine.
Many interesting features were seen on the surface of the bottom. Scott showed these to Dave Johnson in the evening.

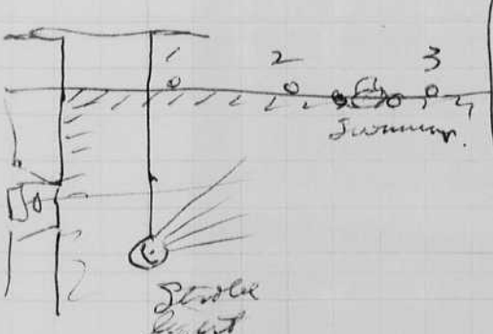
Bill MacRoberts has been putting a lens on a 35 mm camera - also a motor for 17 f.p.s. there is a strobe contactor on the shaft.
our goal is to take good photos of swimmers in the M.I.T. pool.
Mark Piccitto 494-5291 D.L. 9530. Swimmer freshman

Tests in 4-405 10 ft Strobotune at f4 in dark room
Dev 5 min in DK 50. Looked good to me.

Pool test on Swimmer

#1	Lighting Norm	f4	15 ft to Subject	
#2	Lights on Norm	"	"	"
3	put by ft	"	"	"
4	"	"	"	"

Places x felin.



Dennis Edwards. M.S.
U.S.G.S. Woods Hole MO

These came out badly. I had the DK 50 1 to 1 but it was cold. then I developed 30 f in a pan for 6 min which was not enough & contrast. of course their picture is also very thin.

I plan to take the negs & find out why the shots.

 Dec 10 1974

Harvard Egyptian Nubian Expedition

Swimming pool photos.

9:30 am Chas Bittenman 2.5 mfd - on 4 KV.
Plus x film f 2.8 ft candles

1930. Chas Bittenman 6 mfd modified circuit
Plus x film f 2.8 ft candles
after re alignment by Chemp.
Exposure ok but weak.

Conference with Chas Miller
Recommend (DK 19 full strength 4 min.
Plus x film at f 5.6.

4.30 Student 6 mfd no clip res.
Developed 4 min in DK 19
Plus x film at f 5.6 at 8 ft. Lens.
note negatives look ok but thin!

one Ben (Aquanna) called for.

Harvard Swimming pools color for Chas Bittenman Dec 18 1974


HAROLD EDGERTON
Bill MacKeever
Charlie Miller
Mavis Baggett
Mrs Frydman

Dec. 1974

106 Dec 10 1974

Harold Edgerton Marion Bagnall

Swimming pool photos.

9:30 am Chas Batterman 2.5 mfd - on 4 KV.
Plus x film f 2. 8 ft on bar

1930. Chas Batterman 6 mfd modified circuit
Plus x film f 2 8 ft on bar
after re alignment by Bemp.
Exposure ok but weak.

Conference with Chas Miller
Recommend (DK 19 full strength 4 min.
Plus x film at f 5,6.)

4.20 Student 6 mfd no delay Res.
Developed 4 min in DK 19
Plus x film at f 5,6 dist 8 ft. Low
Mile negatives look ok but thin!

Another (Aquanna) called for.

Harold Edgerton pictures taken for Chas Batterman Dec 18 1974


Kim Vandi
Sherry
Bill MacRobert
Charlie Miller
HAROLD EDGERTON
Brackenridge
Victor
Mario Boggett
Urs Frydman
Rita Kaehmann

Dec. 1974

Notebook # 31

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 106 and 107.

Item(s) now housed in accompanying folder.

Dec 10 1974 Alumni Pool

B/US X repositioned comp.
Total Capacitor = 6 μf.
f 2 at 8 ft no charging resistor
DK-50 1.1 7 min

Dec 10 1974 Alumni Pool

P/us X repositioned comp2
f2 at 8 ft 2 uf Capacitor = 6 uf; no charging resistor
DK-50 1.1 7 min

108 Dec 21 1924

Hydrographic Station

A trip was made in the Shoal to the FOUL area some 3 miles east of Boston light ship.

Capt Rod Swift.

Jay McLeod A.C.E. Engineer

Alice Clay.

Marion Baggett.

Eric. Nelson? } Eqs. they planted a wave height device in the foul area.

Dutch Larson

We tried a sleeve system consisting of two Benthos cameras in parallel with a strobe. Very few photos were made on the bottom. Problems with battery? of cameras.

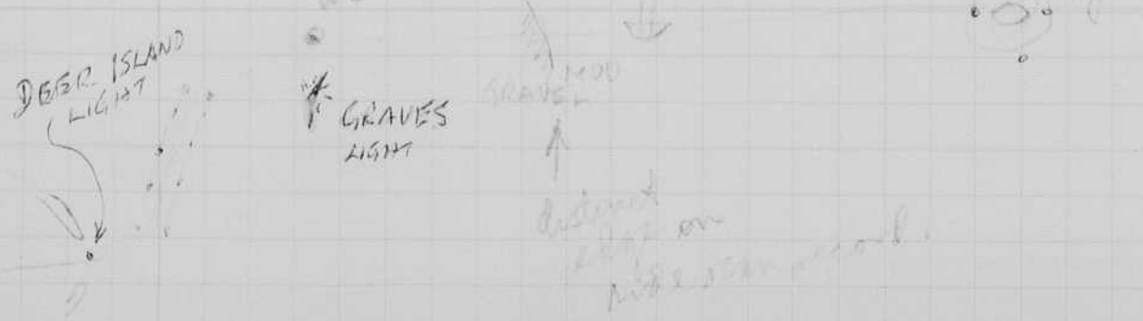
Rocks were photographed at Sta 4 some miles west of the Boston light ship. the negs were very thin, why?

Sidarson showed a strong signal at this place.

Other photos at the foul area showed nuts also the photos were full of forms. The weight went in the mud.

Rocks at Sta 4

Portion of photo from Rock 4 Another neg? 1. Sand with 2. Sand + some 3. Mixed with water



Dec. 28, 1974 H. Edgerton.
Sent 8 atomos Mexico 440 lbs at $1.99.54 cost
007-0781-9184 Box 6 Cozumel Mex.
I plan to go from Los Angeles Jan 7 on Aeromex 233 at 12.45 - 8.45pm
To work with Nancy Jarvis of Pan Am Int of.
Lecture Jan 6 in calif at Mary Kerrigan's PEO club.

October 18 (Fri.) Martin Kaplan at Hale & Dorr at 10:30am
" 22 (Tues) Joe Sanroma to visit with at friend at 2pm
" 23 (Wed.) Bob Magee of Draper Lab to visit at 11am
" 24 (Thu.) Bill MacLeish of W.H.O.I. to visit at 2pm
" 28 (Mon.) Visit with Ed Link in Ft. Pierce, Fla.
" 29 (Tue.) " " " " " "
Visit over night with The Pogues in Maryland
" 30 (Wed.) Visit with Jack Fletcher, Mel Payne at National Geographic Society, 8:30am
" " " Warren Moon to visit at 4:30pm
" " " Marine Technology Society lecture at the M.I.T. Student Center, West Lounger (Search for the Monitor) 7pm
November 1 (Fri.) Guy McLeod & Marion Baggett - aboard R/V SHROCK in Boston Harbor, 8:15am
" " " HEE to show slides at 12noon, room 4-402, also Ken Read and Stuart McKay of B.U. to show
" 2 (Sat.) The Philadelphia Seahorses 9th Annual Underwater Film show for Ruth Dugan (Jean-Michel Cousteau, Geo. Benjamin, Paul Tzimoulis, Eugenie Clark) Univ. of Pa. 8pm
" 4 (Mon.) Ed Curley (EPC Labs) Beverly, Ma. 2pm
" 5 (Tues) Leave for Conn. - dinner with Fifi & Lloyd Breslau
" 6 (Wed.) Visit with Niki & Paul Stavrolakes (baby 1 mo.) 20 Harbor Hills Dr., Port Jefferson, N.Y.
" " " Lecture at the Stamford Yacht Club for Jim Danvers, 6pm
" 7 (Thur) Fall Meeting of the MIT Professors Emeriti, 12 noon in the Maclaurin rm. (10-300)
" " " Dancing class & Council for the Arts "gala" at Walker, 9pm
" 8 (Fri.) Council for the Arts - Exec. Com. meeting Kresge, 9am
" " " " " " " - Business Meeting, Kresge, 10am
" " " HEE to show slides at 12noon, room 4-402 (Monitor wreck)
" " " David Stone & Son, lunch at the Faculty Club, 1:15pm

" 12 (Tue.) New England Aquarium Auditorium lecture by John Devanney, 8pm
" 14 (Thur) Hamilton Trust meeting at the Algonquin Club, 5:30pm
" " " New England Aquarium Members night, 5:30pm
" 16 (Sat.) Dance - Barbara Wilson, 8:30pm (McCormick)
" 18 (Mon.) L.S.C. - Ens. Ed Miller, U.S. Naval Academy, dinner, 5pm, meet at LSC Office, lecture 8pm, room 10-250
" 19 (Tue.) New England Aquarium Auditorium, lecture by Tom Fulham Pres, Suffolk Univ. 8pm
" 21 (Thur) Bush Building Lobby - Stu-Fac Steak Fry, 6pm
" " " HEE to lecture at the National Magnet Lab (IEEE), 8pm Mr. D. Andrews 861-8960 of Hewlett Packard Co.)
" 28 (Thur) THANKSGIVING DAY - Holiday
" 29 (Fri.) School holiday
December 3 (Tue.) A Scientific Symposium and the Dedication of the Ida Green
" 4 (Wed.) Room - 10th Anniversary of the Green Building
"
"
" 11 (Wed.) EG&G, Inc., Bd. of Dir. meeting, 9am
" 12 (Thur) ASME Meeting - HEE lecture at the Faculty Club, 5:30pm Ira Stubbard at the Pru 262-3200, ext. 689 & Chas. Stewart at Avco, Everett
" New England Aquarium Bd. of Gov. meeting
" 25 (Wed.) CHRISTMAS DAY - DIXONS HICKORY N.C.

108 Dec 21 1914
Henry D Thompson

A trip was made in the Shoal to the Four Area some 3 miles east of Boston Light Ship.

Capt Rod Swift.

Percy McLeod U.S. Aquarium
Alice Clay.
Marion Baggett.
Eric. Nelson?
Thompson } Eng. they planted a wave height device in the Four Area. Dutch Cove

We tried a stereo system consisting of two Benthos cameras in parallel with a Strobe. Very few photos were made on the bottom. Problems with battery? of cameras.

Rocks were photographed at Sta 4 some miles west of the Boston light ship. The negs were very thin, why?

Sila Nan showed a strong signal at this place.

Other photos at the Four Area showed mud also the photos were out of focus. The weight went into the mud.

Rocks at Sta 4

DEER ISLAND LIGHT

GRAVES LIGHT

H.D. Thompson

Dec. 28, 1994 H. Edgerton.
Sent 8 atomic to Mexico 440 lbs at $199.54 cost
007-0781-9184 Box to Cozumel Mex.
I plan to go from Lexington Jan 7 on American 233 at 12.45 - 6.45 pm
To work with Nancy Jannise of Pan Am of.
Lecture Jan 6 in calif at Mary Kinzigs PEO club.

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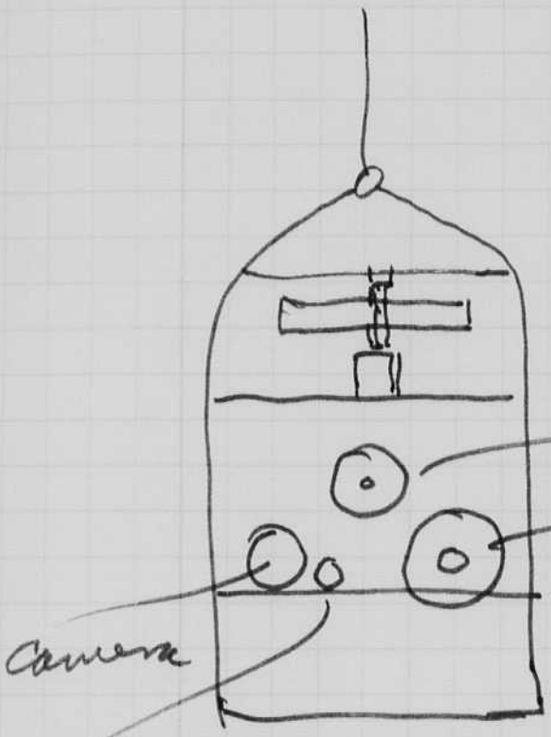
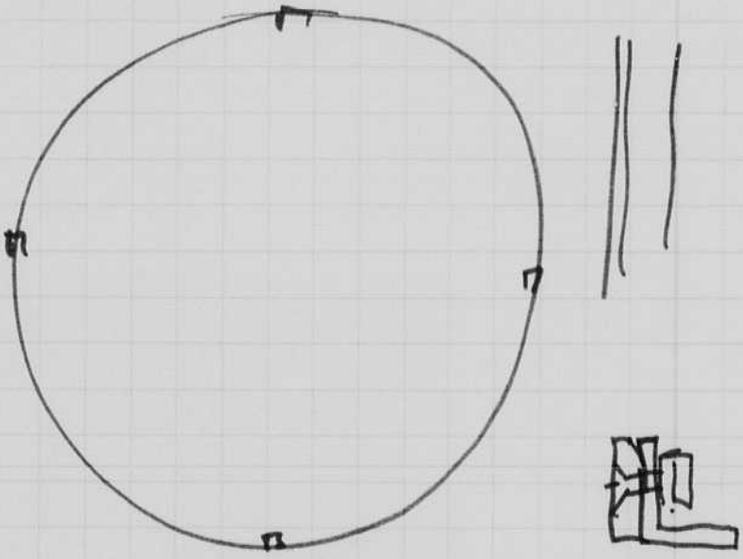
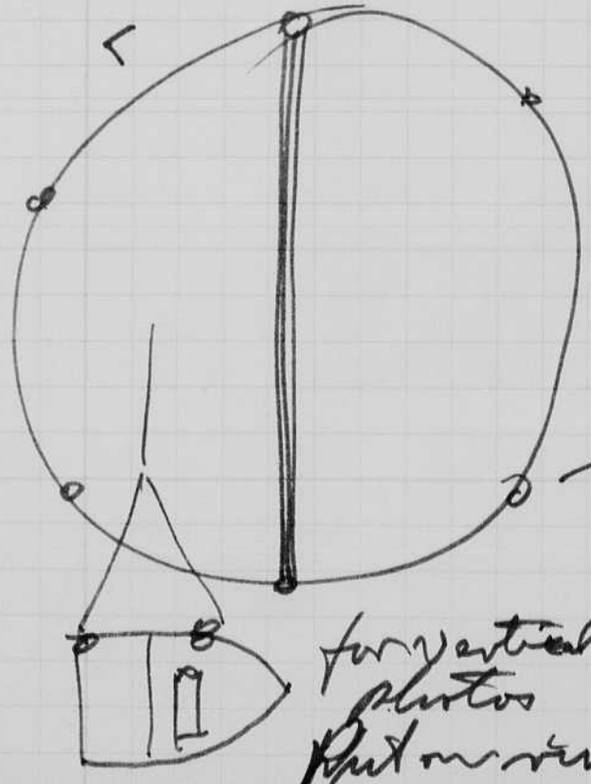
" New England Aquarium Bd. of Gov. meeting
" 25 (Wed.) CHRISTMAS DAY - DIXONS HICKORY N.C.

Jan. 23, 1975 // Harold Edgerton Bill MacRobert

Camera design for Horizontal photography of monitor.

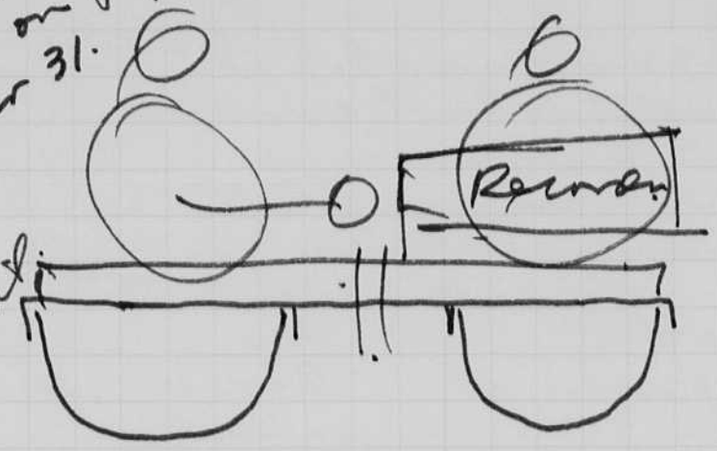




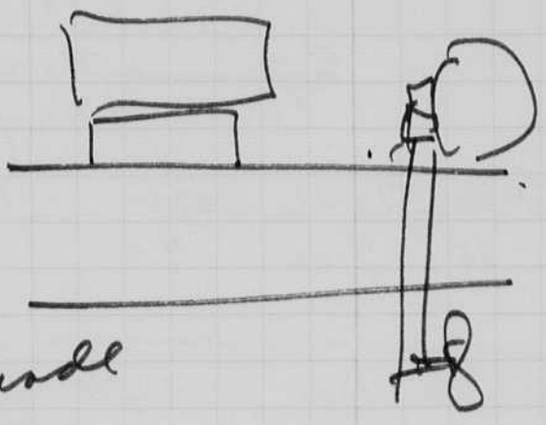


Dijon
Mili Exhibit at
Museum of Science 5-7pm
opened on Jan 22
until mar 31. 1975.

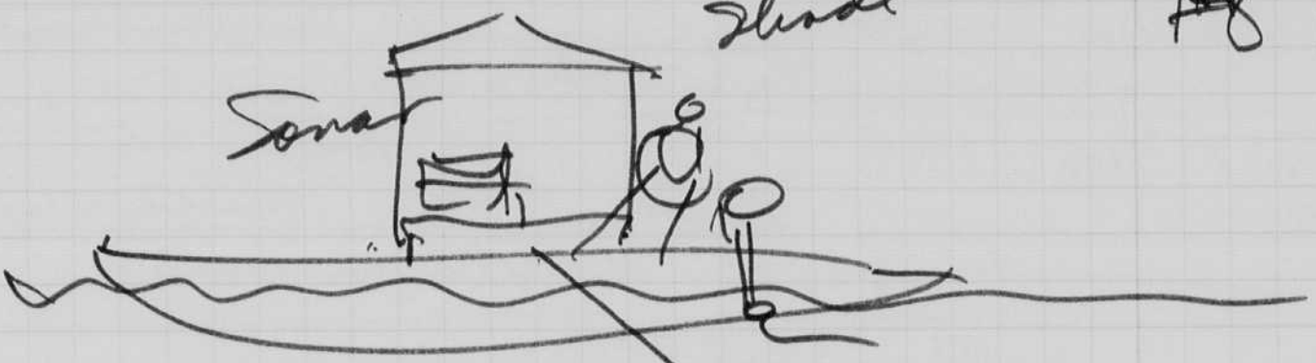
Two canoe assembly
for survey
work.

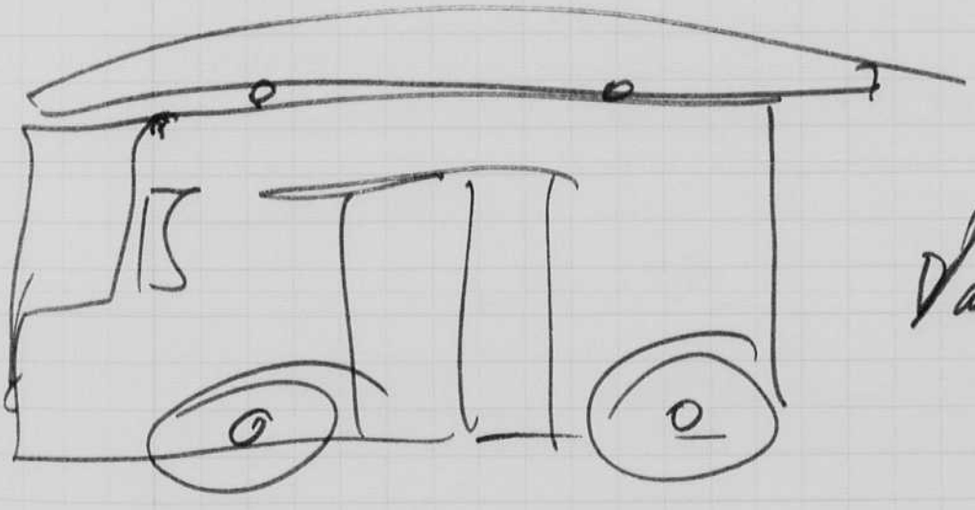


Mail &
movement



Shade





Van with 2 canoes

Search
all town canoe
Raiman.

Jan 25 1975 Sat
H. Edgerton Test of Camera. Boxtype
to be used for aerial.

4X5" Wollensak 127 mm lens f4.5 # 560251
from experimental Kalart camera.

Experiments were made with #55 Polaroid
film yesterday Cloudy. ASA 50

Film	Time	aper	Remark
55	1/100	4.5	exposure ok. Resolution not good on print or on film.
Plus x	1/100	4.5	Very Cloudy Rain 8 min in DK50. Very thin negative! Resolution excellent.
Tri X	1/100	f4.5	" Holder #1. Very Very thin. Resolution excellent.

→ changed focus "in" 3/4 turn on camera.

Threw out DK50.
Replaced

Tri X	1/100	f4.5.	Cloudy Rain! 8 min in DK50 from Supply.	Expo better but still thin.!

Jan 27 1/100 f11 plus X Sun. 8.33 am.
meter says 1/100 f11 ASA 160

	1/100	f8	Polaroid 55	Sun	50 ASA ok, or on
2 10 pm	1/200	f8	" "	clear Sun Boston	ok, contrast low new Dand DK50 8 min
2 30 pm	1/200	f16	Plus X	clear Sun Boston	

Jan 27 1975 Monday
Harold Edgerton

I returned from Nassau on Jan 13 to Miami. My equipment 440 lbs in 8 packages was supposed to be there, instead it had been sent to Cozumel. I did not know this. I stayed in Miami for 2 days waiting for the return since I had hoped to use the gear for Mayaguana in the Keys. He has been looking for a wreck for a long time.

I went to Boston on the 14? 666 board meeting on the 15 Wed at the Colonnade Hotel. I have only one more. 666 Party on the 17 at the Chateau De Ville in ~~Melrose~~ Wakefield? (Sanguss) on Route 1.

Floyd Dutton on Jan 20 at the IAP party in Bldg 13 Mile Strobe Photo display was opened on Tues the 21 at the Museum of Science. 5-7 pm. He has an excellent show of his 40 years of photography.

Dentist Cox 8 am Jan 24 one filling.

Al Vine WHOI phoned on Jan 24 about a lost fishing ship at Westport Mass. This did not return on Monday or Sunday Jan 19 as scheduled. One of the crew of three was found in a lobster storage box at noon on Sunday in the harbor. Other wreckage was found on the beaches. See my field book (same as ~~next trip~~) for further details. I packed my sonar side scan after obtaining it from the Eastern Airlines and customs in Esther Volvo. I went to Horseneck beach on Jan 26 Sunday and stayed at the home of John Doyle. Vine was there too.

Morning of the 27 was very windy. The Asterias came from WHOI with Dick Collom and Hartley Hotchins with a magnetometer. Too windy to work.

Vine and I left at 2 pm. We are on call in case the weather breaks.

I had a phone call last night from John Doyle. Fishermen have spotted the wreck about 2 miles off shore. A plane will be used to search for it this morning.

Jan 31 1975 I left Cambridge on Tues 28 ~~June~~ on Jan 27 at the Trapp Boat yard by 7 am. Went aboard the Asterias for an all day effort in close to the entrance rocks. No target except for a rock that was about the right size and

which showed a magnetic signal on the Varian magnetometer operated by Hartley Hoskins of WHOI

We went out again on Jan 28 from 7 to 10 am to work over the west side of the rocks with a local fisherman at the wheel.

Yesterday Jan 30 I went to Washington to see Payne and then to watch the ceremonys of the first Sanctuary at the Commerce Department. This covered the site of the monitor.

Dr. White NOAA. ? chairman
Mr. Knecht Rolf NOAA
Mrs. Rohmer N.C. Cultural.
Fred. Dept. Secy of Dept of Commerce.
Admiral Hooper.
John Newton.
all gave short talks.

Duke Univ to receive artifacts.
Robt Knecht NOAA administrator of Sanctuary?
Interior Dept Fisher?
Smith sonian Robt ~~Fisher~~ FURAD?
Coast Guard J.A. Albert. to protect Sanctuary.

Feb 4 75

Westfront Mass - Search for the Atlantic Sword.
last with 3 men about 2 weeks ago.
Alvin and Harkly Hoskins where there on the Oceanus last week.

I returned on Feb 2 Sat in the evening. Then we spent Sunday with Bearded Fahy with the side scan sonar. A target near the spindle turned out to be rocks.

John (Jack) Dolan was my main contact.

Feb. 4, 1975.

Harold S. Edgerton. Test of Sunlight 3350.01 2A Flash Lamps

3 lamps from Nat Geo lab. Fading? that are used in the Morgan Baker type setting machine.

Lamp No.	C.	Voltage	V	C.P. peak	Duration	Remarks. C.P.	C.P.S.
			volts	$\times 10^6$ C.P.	μs		
1 anglow	1 mfd.	1000	1.07 x .05 x 1/4	~~.26~~ .34	20	.0134	.268
			1. .05 x 4	.20			
1	5	1000	3.3 .2 x 4	2.64	27.	.16 ~~.223~~	4.32
			2.8 .2 x 4	2.20	27		
2	1	1000	1.7 x .05 x 4		22		
			1.2 x .05 x 4		22		
2.	5	1000	3.7 .2 4		27		
	5	1000	3.6 .2 4		27.	.165	4.45
3.	1	1000	1.2 x .05 x 1/4		19		
	5		3.2 x .05 x 4		24		
FX33C2	1	1000	3.2 x .2 x 4	25.6	8	.16 ~~.2048~~	1.28
2" ~~FX~~ "arc							
Chemsdisin	5	1000	5.5 x 1. x 4	~~7.875~~	16	14. ~~.224~~	Integration not accurate.?
	5	1000	3.2 x 1. x 4		16.		

BB 550 FX33C2

				C.P.S.
"	1	1000	.245 f.d.sec x 1 x 2²	.98
"	5	1000	.203 x 10 x 2²	8.12
			.206	
			.198	
			.188 .208 .207 .212 .196 .214 .205 .210 .202 .209 .202 .203	

2ff

- 7.45 with reasonable precision

#1 Anglow 5 1000 1.04 x 2² 4.16

1.07

.99

1.12

#2 anglow 5 1000 .99

.99

1.02

1.04

#3. 5 1000 .97

.99

.99

.96

this meter (EG&G 550) read 10% higher than our old meters

				Ft candles		D^2	C.P.S.
				WS			
FX33	1.5"	2 ft.	5 mf 1000 v	2.5	1.45 1.50 1.49 1.43	1.44	4	6.80
F33	1"	2 ft.	5 mf 1000		1.46 1.62 1.49 1.52	1.46 1.49 1.50 1.52		
F33	2"	2 ft	5 mfd	1000	2.5	2.20 2.22 2.25 2.12 2.21	2.26 2.25 2.28 2.24 2.24 2.27 2.29 2.16 2.26 2.21		

Feb. 6, 1975 Harold Edgerton Bill Mc. as read with EG&G 550. Visual. Test of beacon 1170 v 4 mfd. 2" gap FX33C-2

Ft candles

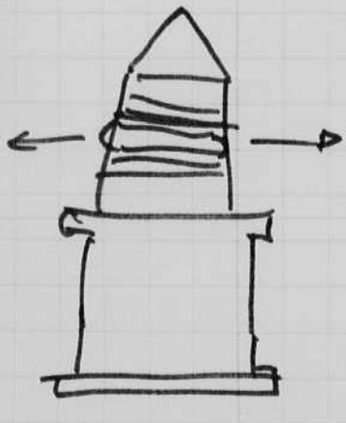
~~Red Plastic Cover. 270 x .1 at 7' 27x49 x3.5~~

~~No cover. 140 x 1 at 7' 140x49 70~~

Ft candle sec. Red Plastic .0370 $7'^2$ = 1.75 cps

(clear) No Cover. .140 $7'^2$ = 7.0 cps

This will be put on the East Campus Dorm for Grad. Students by. This building is very high and has a radio tower on the roof. At Present there is a red light (tungsten) on this tower for a warning light for airplanes.



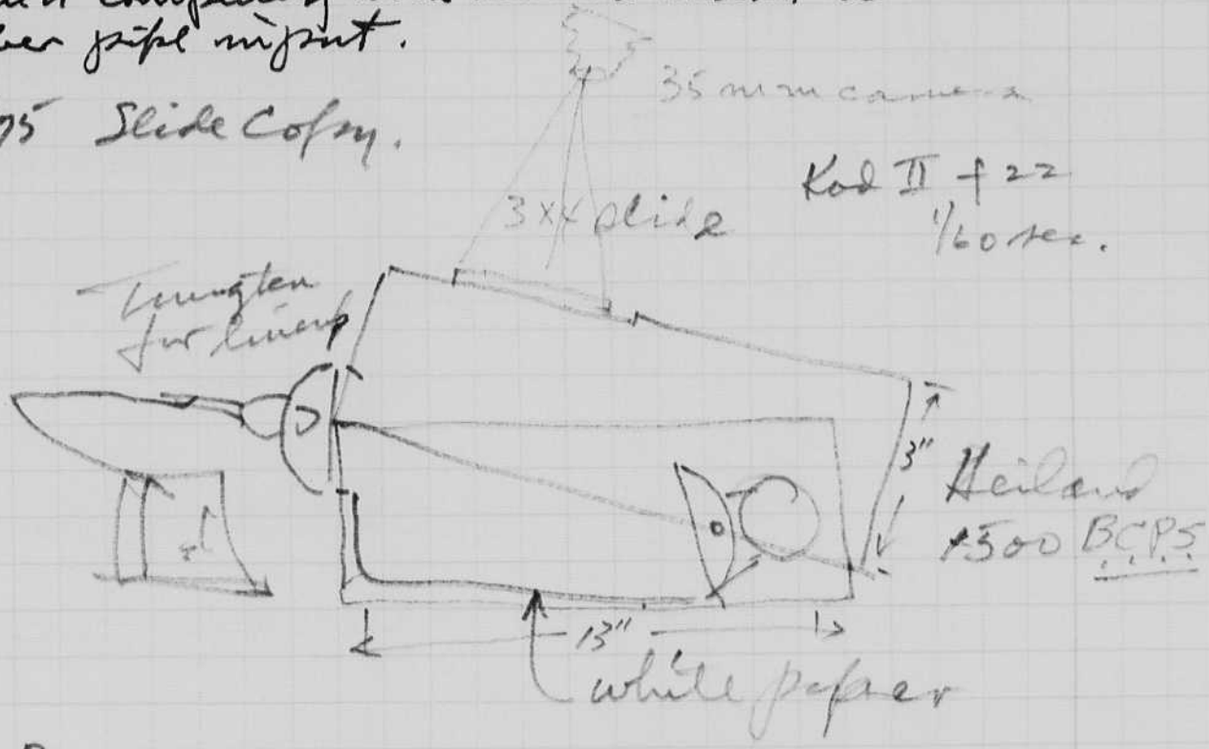
Maxlum mia
Marine Lantern
Model ML 155 Series A
Tideland Signal Corp Houston Texas USA

Friday Feb 7 1975
Jerred Dykstra.

Ship on 5th West port mess
Last write 3 mes.
2 messages.

Report ready to send out on Atlantic Sword search.
Bill is working on the camera - strobe cage. Learned
Little Giant Co in Oklahoma City McAllister about
pressure use on their submersible pump. We plan
to fill it completely with oil and install a
rubber pipe nipple.

Sat Feb 8 1975 Slide Copy.



Red. Beacon DIANA. S-4 2mm 16cm 1 roentx = 10^6
1000 lumen.

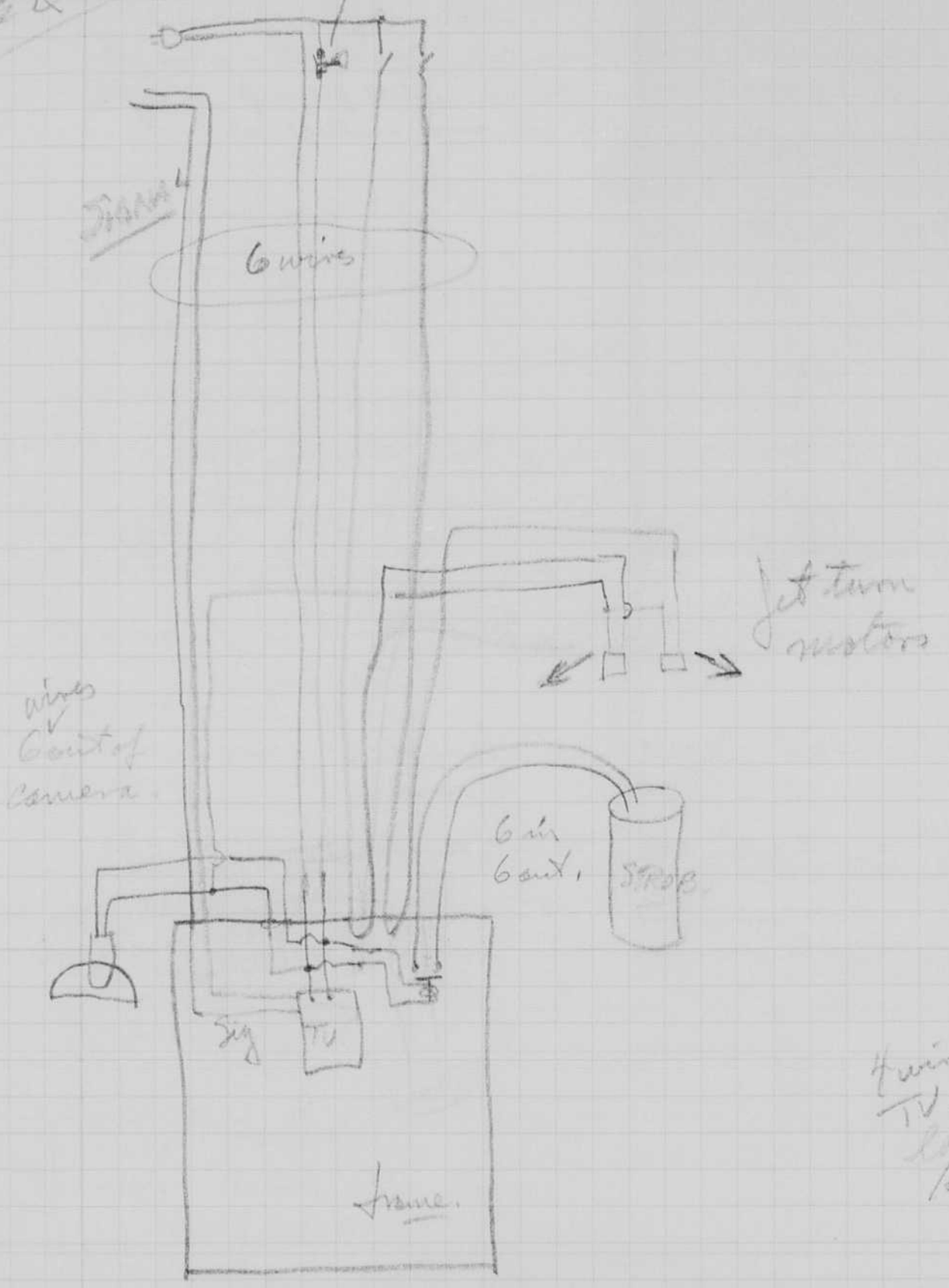
$\frac{.4 \text{ VOLT}}{10.} = .04 \times 10^6$ C.P. 16 ms duration .64 C.P.S.

Note: I measured 1.75 C.P.S. with the EG&G 555 meter
which uses a Silicon diode pickup.

Feb. 17. 1975

Al & Bill conference on

Underwater Camera and T.V. control.



4 wire for TV and lamps and signal.

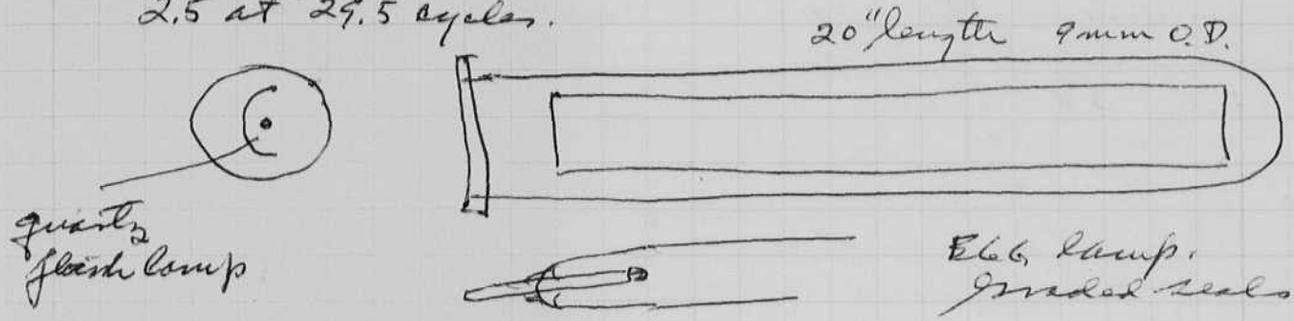
Feb 25 1975 4-405

30/sec 1/100 Nov 21 74 Mac R notebook.

Harold Edgerton Swimming Pool Experiment.

35 μs. duration 2.5 mfd 3500 v in Suitcase Powerunit #1

Speed of camera. 29.5 cycles/second.
3 at single flash
2.5 at 29.5 cycles.



$T = \frac{A^2 C}{SI}$

I = Incident light
A = aperture
S = film speed
C = ~~k~~ const 15-25 - when set is used.

$\frac{12}{4} = 3$ lumens/sq ft $\times 7^2 = 147$ BCPS. $DA = \sqrt{\frac{BCPS\ C}{S}} =$

$DA = \sqrt{\frac{147}{5}} = \sqrt{30} = 5.$

---

6 mfd + 1.5 mfd. on lamp. $\frac{38}{4} = 9.5 \times 7^2 =$

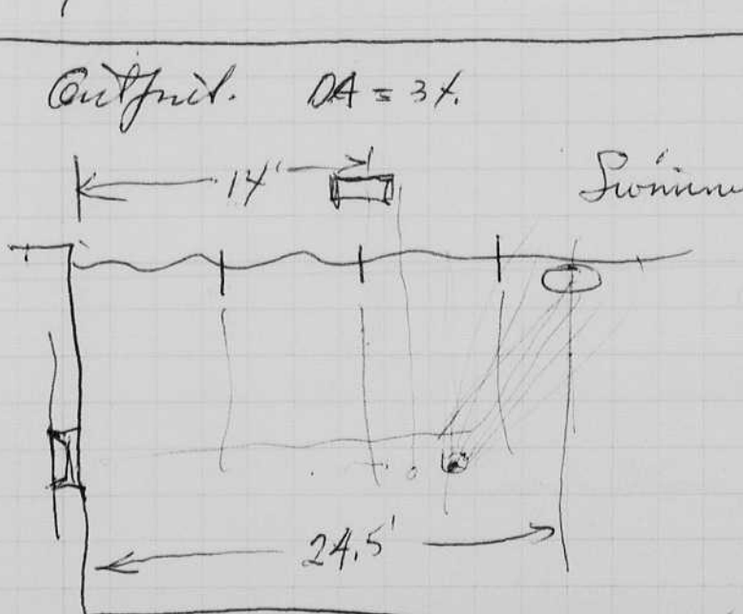
Peak. 3 volts 35 ms. 2.5 mfd. Down to 2.5 V at 21./sec.

Peak. 3.6 x 2 = 7.2 V 44 ms. 7 mfd.

30/sec 3 V x 44 7 mfd.

BCPS output 500 - ?

Output. DA = 3.



I = 35.

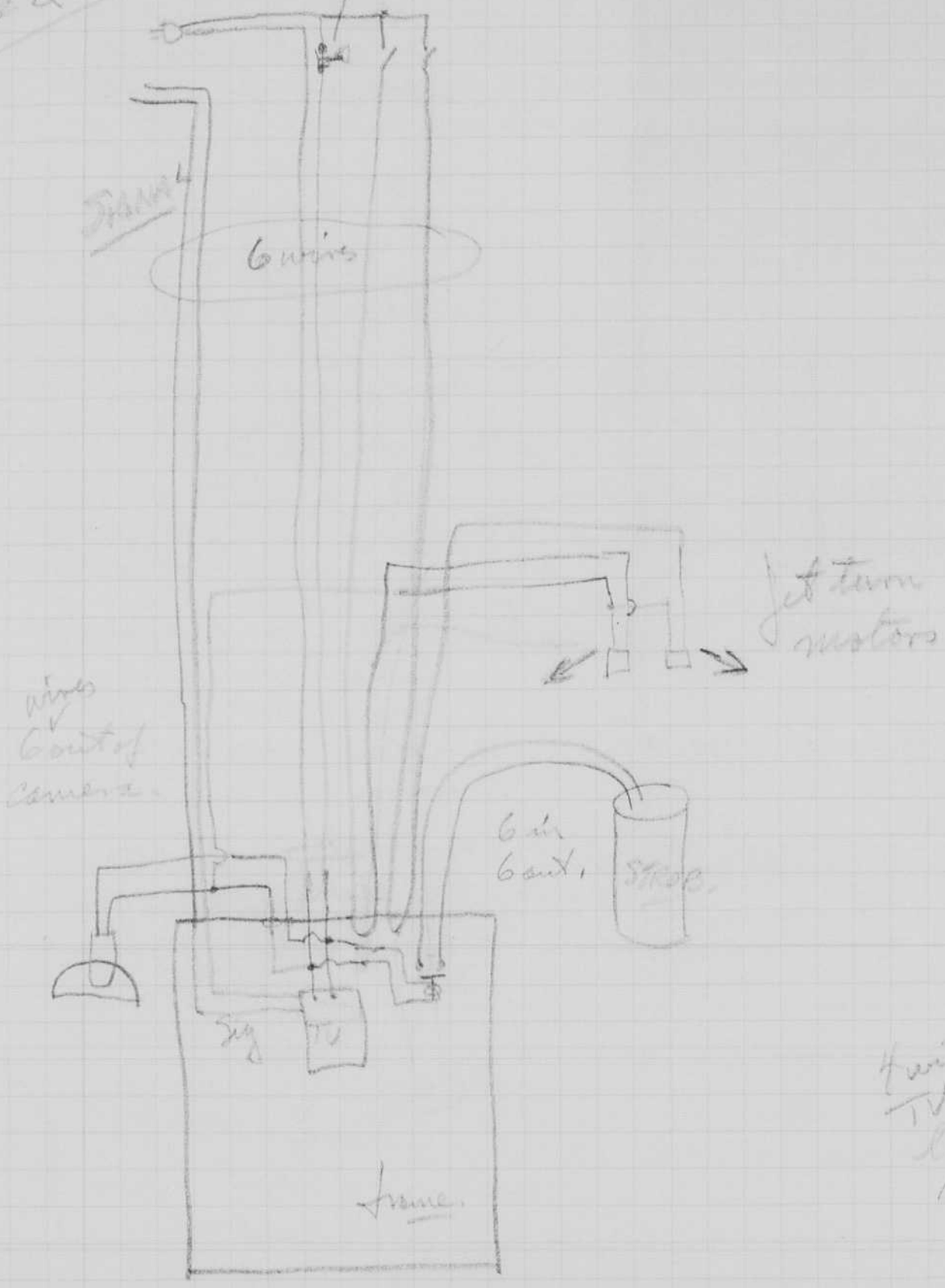
on Scale	
4	8'
8'	15
10	17

Trial Air Exposure
Plus X f 4. 10 ft while pointer rotating at 1500 RPM
DK50 at 5 min.
Density is 0.2 on film
I guess 1.5 on white film

Feb. 17. 1975

Al & Bill conference about

Underwater Camera and T.V. control.



4 wire for TV and lamp and signal.

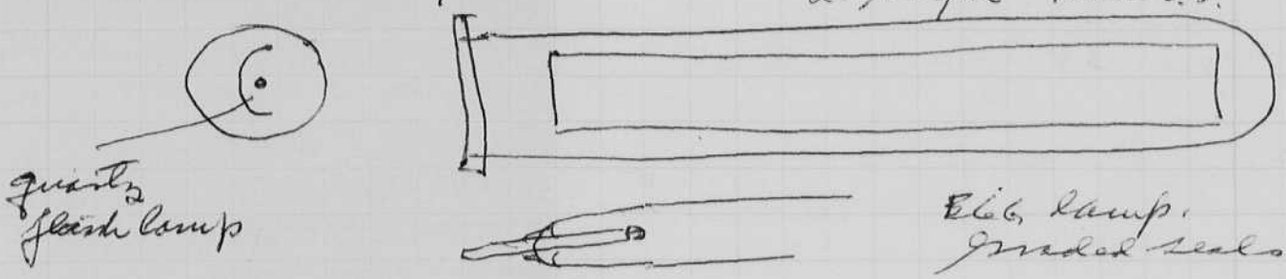
Feb 25 1975 4-405

30/sec 1/100 Nov 21 74 Mac R note book.

Sound Ejector Swimming Pool Experiment.

35 μs. duration 2.5 mfd 3500 V in Suitcase Power unit #1

Speed of camera. 29.5 cycles/second.
3 at single flash
2.5 at 29.5 cycles.



$T = \frac{A^2 C}{SI}$

I = Incident Light
A = aperture
S = film Speed
C = ~~k~~ const 15-25 - when feet is used.

$\frac{49}{3}$ $\frac{12}{4} = 3$ lumens/sq ft $\times 7^2 = 147$ BCPS. $DA = \sqrt{\frac{BCPS \cdot C}{S}} = \frac{35}{7}$

$\frac{147}{}$ $DA = \sqrt{\frac{147}{5}} = \sqrt{30} = 5.$

---

6 mfd + 1.5 mfd. on Lamp. $\frac{38}{4} = 9.5 \times 7^2 =$

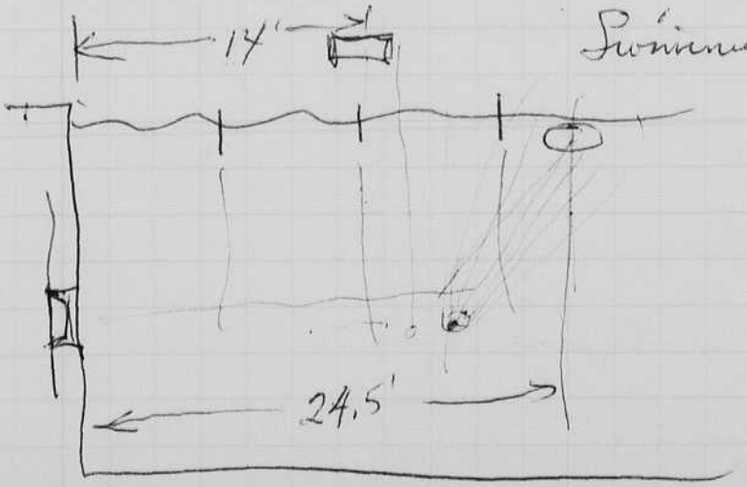
Peak. 3 volts 35 ms. 2.5 mfd. Down to 2.5 V at 21/sec.

Peak. 3.6 x 2 = 7.2 V 44 ms. 7 mfd.

30/sec 3 V x 44 7 mfd.

BCPS output 500 ?

Output. DA = 3.



I = 35.

on Scale	
4	8'
8'	15
10	17

Trial Air Exposure
Plus X f 4. 10 ft while
pointer rotating at
1500 RPM
DK50 at 5 min.
Density is ok on film
I guess 1.5 on white film

Notebook # 31

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 118 and 119.

Item(s) now housed in accompanying folder.

Cont.

120

934 photos

$e = 8$ volts $= 8 \times 10^6$ BCPS 50 ms BCPS = 400.

Two Power Supplies

at 29.5 cycles/sec

1. $e = 6 \times 10^5$ 50 ms. BCPS = 300.

Movies made on 35mm film Plus x at f 4 at 7ft focus.

PR105 FILM f8 1/100 sec Daylight. overexposed.

" " 1/200 sec " O.K. Exposure fine focus ok.

The negative is very sharp! 150 lines/mm. The print is not showing fuzz. 20 lines/mm.

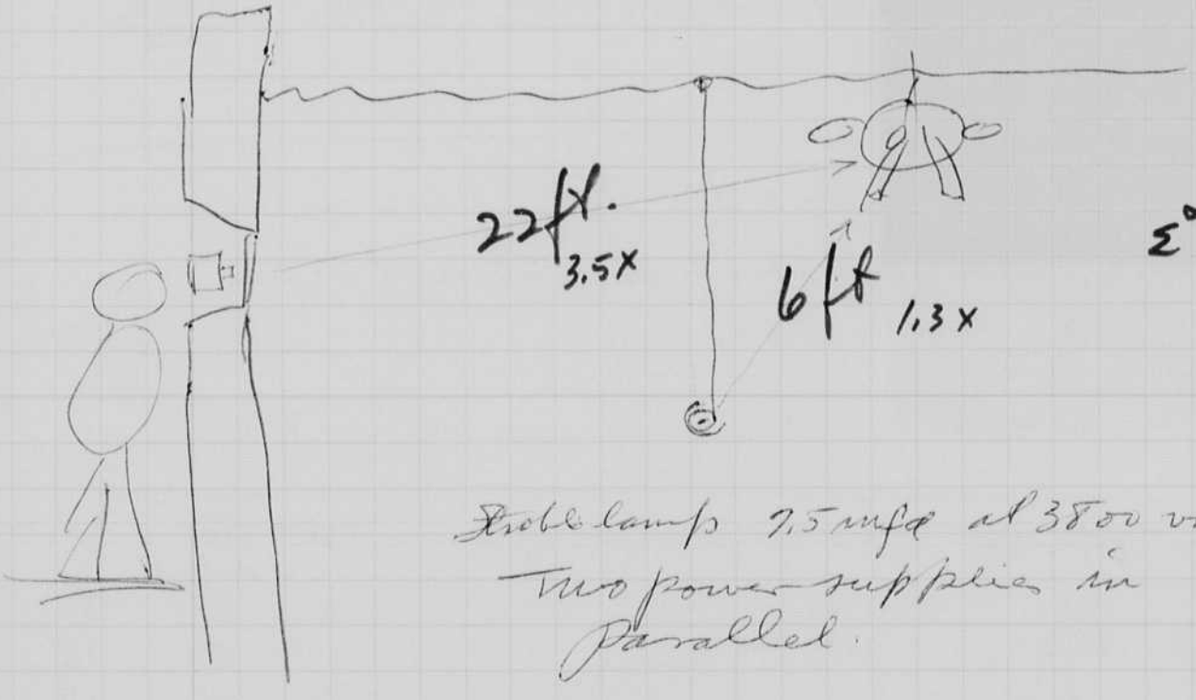
'75

First Mar 1 photos were made at MIT for Class Patterson

29.5 frames/second

f'4.

7 ft on focus scale



Strobe lamps 7.5 mfd at 3800 volts.
Two power supplies in parallel.

Developed 9 min in DK 50.

3

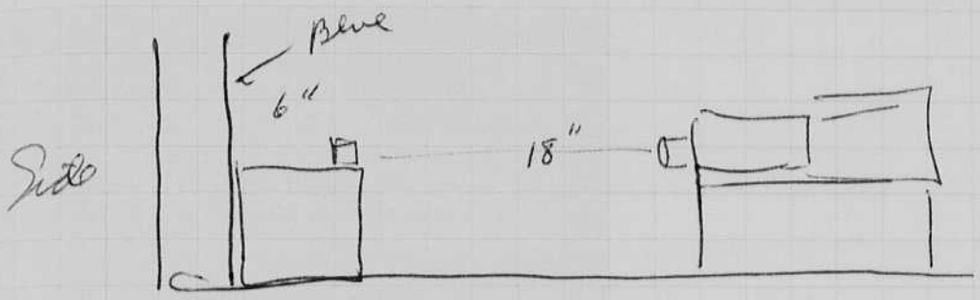
$\frac{3800^2 7.5}{2} = 35$ watt sec.

$35 \times 29.5 = 1080$ watts from Line.

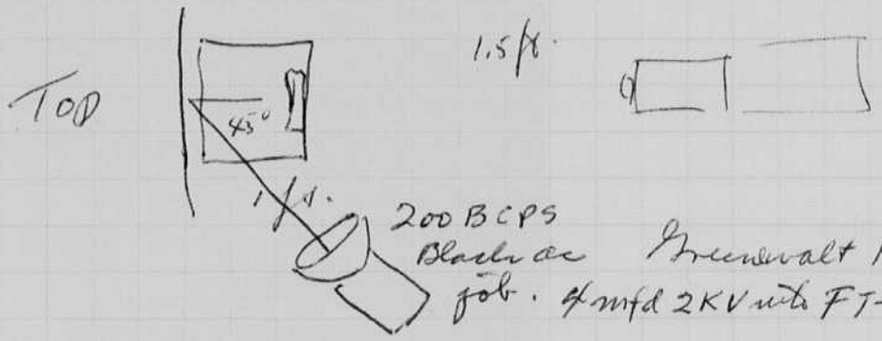
March 17 1975

Harold Dexter. Elapsed time of crystal growth for Maria Telkes Univ of Delaware Newark. 19711
(302) 738 8481 (8482)

Sodium sulfate decahydrate
+ nucleating agent.



Elapsed time
5 sec interval.



Greenwalt H Bird Unit.

6/min.
~~3000~~
50 ft x
12
6) 2000) 333. 2mm
18 5 hours.
20) 338
300

$DA = \sqrt{BCPS \frac{S}{C}}$ $D^2A^2 = \sqrt{BCPS}\,S/c$ $BCPS = 200$
$S = 25$
$D = 1'$

$A^2 = \frac{200}{12} \frac{25}{25} = 20$

$A = \sqrt{20} = 14.$

Suggest 11, 16?

at 10 sec interval
50 ft lasts 5.5 hours.

time	Temp.	Rate.	comment.
9.00.	986.	5 sec	f 16.
9.02	095.	5	f 16 ~~Start~~.
9.04	96	12 sec	f 16.
9.06	96	10	f 16 closed window shade
9.08	95.	10	f 16 Rearranged background.
9.10	92.	10	Al Bar from Refrig.
9.12	90.	10	Shutter bar on Sample.
9.30	84	10	f 16
9.45	79.	10	f 16 Alum replaced by Brass
10 00	72	10	f 16 Crystals start, Remove Brass
10 22	76	10	f 16
11 15	77	10	f 16
11 50	76.2	10	f 16 Brass Screw at center (cool.
2 10	76,0-	10	crystals not forming Took off Brass
2 11	77	20	f 16 Octagon Black Brass very cold older
2 19	71	20	f 16 crystalites, John not there.

74°

0.35 ft

Cont.

924 plots

$e = 8$ volts $= 8 \times 10^6$ BCPS 50 ms BCPS = 400.

Two power supplies in parallel. at 29.5 cycles/sec

$e = 6 \times 10^5$ 50 ms. BCPS = 300.

movies made on 35mm film Plus x at f 4 at 7ft focus.

PE105 FILM f8 1/100 sec Daylight. overexposed.

" 11 1/200 sec " 1/2. Exposure fine focus ok.

The negative is very sharp: 150 lines/mm. The print is not showing fog. 20 lines/mm.

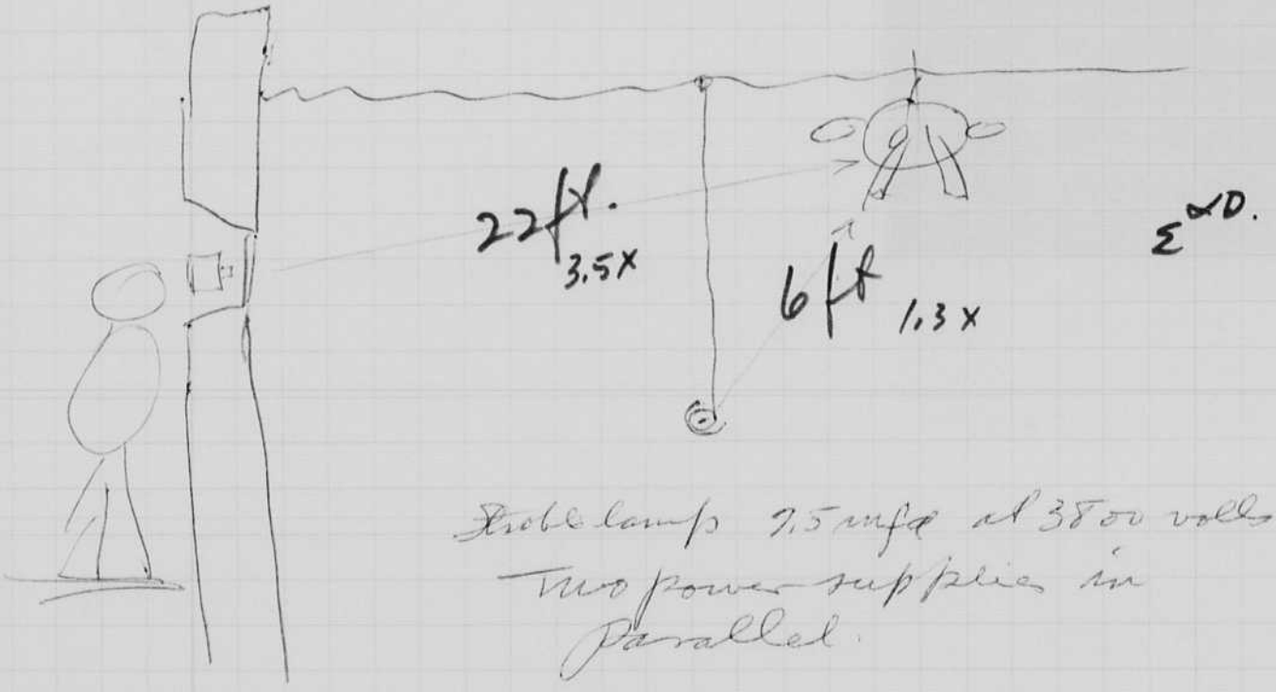
'75

First Mark I photos were made at MIT for Chas Bitterman

29.5 frames/second

f'4.

7ft on focus scale



Strobe lamps 7.5 mfd at 3800 volts

Two power supplies in parallel.

Developed 9 min in DK 50.

3

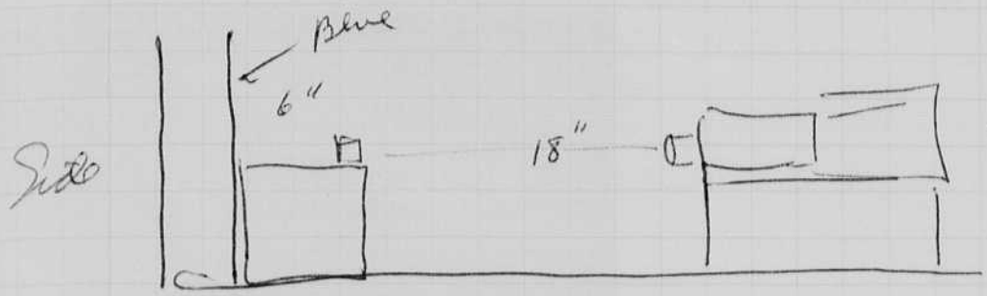
$\frac{3800^2 7.5}{2} = 35$ watt sec.

$35 \times 29.5 = 1080$ watts from line.

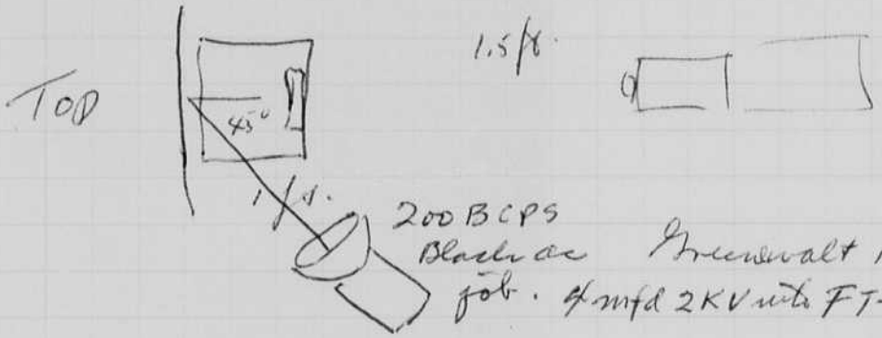
March 17, 1975

Harold Boyter. Elapsed time of crystal growth for Maria Telkes Univ of Delaware Newark. 19711
(302) 738 8481 (8482)

Sodium sulfate decahydrate
+ nucleating agent.



Elapsed time
5 sec interval.



Brendwalt H Bird Unit.

6/min.
50 ft x
6 | 2000 | 333. min
18 | 5 hours
20 | 338
300

$DA = \sqrt{BCPS \frac{S}{C}}$ $D^2A^2 = BCPS\,S/c$ BCPS = 200
S = 25
D = 1'

$A^2 = \frac{200}{1^2} \frac{25}{25} = 200$

$A = \sqrt{200} = 14.$

Suggest 11, 16 ?

at 10 sec interval
50 ft lasts 5.5 hours.

time	Temp.	Rate.		
9.00.	186.	5 sec	f16.	
9.02	095.	5	f16	Start.
9.04	96	12 sec	f16.	
9.06	96	10	f16	closed window shade
9.08	95.	10	f16	Rearranged background.
9.10	92.	10		Al Bar from Refrig
9.12	90.	10		Shorter bar on Sample.
9.30	84	10	f16	
9.45	79.	10	f16	Alum replaced by Brass
10 00	72	10	f16	Crystals start, Remove Brass
10 22	76	10	f16	
11 15	77	10	f16	
11 50	76,2	10	f16	Brass Remove at center (cool.
2 10	75,0-	10		crystals not forming. Took off Brass
2 11	74	10	f16	Octagon Black Brass very cold older
2 19	71	10	f16	crystals, Alum not there.

74°

0.35 ft

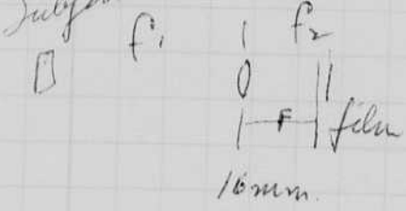
122 Mar. 17, 1975.

After boost film: 3 ft left ? ±

	2:37 pm	73.	10 sec.
	2.40.	73	10 sec.
	2,50±	74	10
OFF	3:05 pm	74.	10 sec.

Removed Black Brass Bar.
Water 55° under on Blotter

Subject



$\frac{1}{f_1} + \frac{1}{f_2} = \frac{1}{16}$

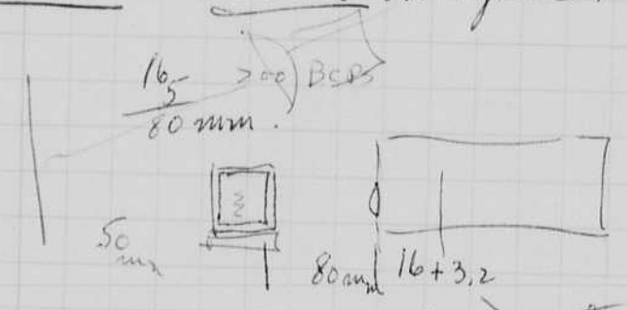
Let $\frac{f_1}{f_2} = 5$ $\qquad \frac{1}{\left(\frac{f_1}{f_2}\right)} + 1 = \frac{1}{\left(\frac{16}{f_2}\right)}$

$\frac{1}{5} + 1 = \frac{f_2}{16}$ $\qquad f_2 = 16 \times 1.20 = 19.2\text{mm}$

$\left(1+\frac{1}{5}\right)^2 = 1.5$ $\qquad$ Lens extension needed = $\frac{16.0}{3.2\text{ mm}}$

16
12
32
16
192

Mar. 18, 1975. Combined on crystals.



Exposure increase
$(1+m)^2 = \left(1+\frac{1}{5}\right)^2 = \left(\frac{6}{5}\right)^2 = \frac{36}{25}$

Cooling from Co2 problem

Paper under with water and air jet on left side (1 3/minute)

948	Temp.	Rate		Comments.
950	74 room	5 sec	f11	Start. Lamp at 1 ft from white card no crystals yet.
1032		5 sec	f11	
1032	74 "	5	f11	Thermometer put on top.
1037	76	5	f11	
1045	78	5	f11	Crystals start.
11.09	76.5			
1112	76.5	5 sec	f11	Air blower taken off
1134	77?	5	f11	crystals growing ?
12.15	76			
1.00 P.M.	75.5			
1 12	76.5	5	f11	

Mar. 19, 1975 Shrocks, Rod Sweet, Baggett, Gilbert & Alice Caroline Kurtz 269 Swan St Deer Island Light

Jan. 1 (Wed) Leave Nebraska for California
" 6 (Mon) Lecture for P.E.O. in Laguna Hills, Ca. (Mildred Davis)
" 8 (Wed) Leave California for Mexico to work with Dr. Nancy Farriss & Paul Bush Romero (Cozumel, Mexico)
" 14 (Tue) Return from Mexico, via Miami, Florida
" 15 (Wed) 10:30am, WHOI Bd. of Trustee's meeting, Amer. Meteorological Society, Beacon St., Boston
" 18 (Sat) 6pm Chateau, Sagus, Ma. - EG&G Winter Dance
" 20 (Mon) 9am, New England Aquarium (G. McLeod & M. Baggett)
3-4pm, Wiesner & Gray's I.A.P. Party, Bush Bldg. Lobby
" 21 (Tue) Dr. Wiesner's office. 4:15pm
5-7pm, Museum of Science, Gjon Mili's "Man and Movement" photo exhibit
7:30pm, MIT Faculty Club, David Stone, Sr., David, Jr. Eleanor & Jean Mooney
" 22 (Wed) 9am, EG&G Board of Dir. meeting, Colonnade Motel, Boston
12:30am, New England Aquarium, Bd. of Gov. meeting
" 28 (Tue) Westport, Ma, John Dolan 1-636-5029 (sonar search)
" 29 (Wed) 12noon lecture - IAP, rm. 4-402 (Miss P. Mead)
" 30 (Thu) 11am, Designation of the Monitor Marine Sanctuary (Nation's 1st Marine Sanctuary) Commerce Dept. (lobby), Washington, D.C.
" 31 (Fri) Harold Wallace and Harold Stewart of EGG - visiting Prof. Flemming
Feb. 3 (Mon) Registration
" 4 (Tue) 8am, EG&G, Waltham, Ma.
12noon, 1st class
" 6 (Thu) 3-4:30pm lecture for Prof. Millie Dresselhaus, rm. 37-212
" 11 (Tue) Ocean Engineering seminar, lunch in rm. 1-236
4pm George Bass to lecture in rm. 1-134
" 12 (Wed) 12 noon, Mr. Peterson - Ice Chips
" 13 (Thu) 12 noon - special lecture "The Stroboscope" rm. 4-402
" " 7:30pm, Itek, Lexington, Ma. Dr. Hans J. Wetzstein to lecture
" 17 (Mon) WASHINGTON's BIRTHDAY - vacation
→" 19 (Wed) 10am Council for the Arts meeting, Faculty Club, room 3
" " 12:30pm, New England Aquarium, Bd. of Gov. meeting
" " 3:15, Faculty meeting, rm. 10-250
" 20 (Thu) 7pm, New England Aquarium - Lowell Institute lecture (G. McLeod)
9pm - Bob Rines' apartment (new baby - J. Christopher) Carol Rines, J. Mooney & Dr. Frungel Justice.
" 24 (Mon) James Culliton to visit H. E. Edgerton & J. Mooney
8pm, John Dean to lecture on Watergate, Kresge Aud.
" 25 (Tue) 4:15pm, Tom Dyett - Ice Chips
" 26 (Wed) 12 noon, Dr. Bruce Magnell (EG&G) to lecture in rm. 54-311
5:30pm, Max Byer's retirement party, MIT Faculty Club
" 27 (Thu) 1pm, Brian Rosborough, EEI, Belmont
3pm, Mr. I. P. Kaminow, Bell Labs, lecture in rm. 39-400
" 28 (Fri) 4pm, Seminar R. Taylor, Physics Department, rm. 36-261
Mar. 3 (Mon) 1:30pm, Prof. Otto Piene to visit
" 5 (Wed) 3:45pm, Jim Feeney, Sippican, Marion, Ma. to discuss search for bronze cannon's near Bird Island
" 6 (Thu) 12 noon - special lecture "Underwater Photography" rm. 4-402
3pm, Mr. H. Melchoir, Bell Labs to lecture in rm. 39-400
" 7 (Fri) 3pm, lecture in rm. 3-446 for Prof. Ed Kern (Oceano. Dept.)
4pm, Ray Peabody to visit
7pm, Boston Sea Rover's party at the Castle, BU, Boston
" 8 (Sat) 21st Annual Boston Sea Rovers' underwater clinic (Ruth Dugan)
" 9 (Sun) 100 Memorial Drive, Apt. 11-7A party for Freshman Seminar Students
" 11 (Tue) 5:30-7pm, Penthouse, MIT Faculty Club, Course 6A Social
" 16 (Sun) 6pm, Ana Rosa and Donald Krotser for dinner
" 19 (Wed) 8am, R/V SHROCK - Boston Harbor (M. Baggett, T. Gilbert)
12:30 New England Aquarium, Bd. of Gov. meeting
3:15pm, Faculty Meeting, 10-250

March 20 1975

124 Harold Edgerton.

Test of 60 cycle unit with Hg lamps & Syncronizer.

	Peak	Dur	BEPS.
Low	10x10	7 us	70
Mid	16	15	

Simpson next two values. Suggest flash pictures at f 4.5 at 4 ft at 60 ~~50~~

for student at Springfield College.
He wants to measure ball speed over the plate for three trials

May 21, 1975 4-406 4-409.

Harold Edgerton.
Jeff Watson.

Test of shadow unit.

Microflash power source 2 unit power pigs.

about 6' ~~from~~ to Polaroid film #105.
Shadow of a pencil. (ball Point).
microflash gap as source with cardboard deflector to cut out side and back light

P05 105.

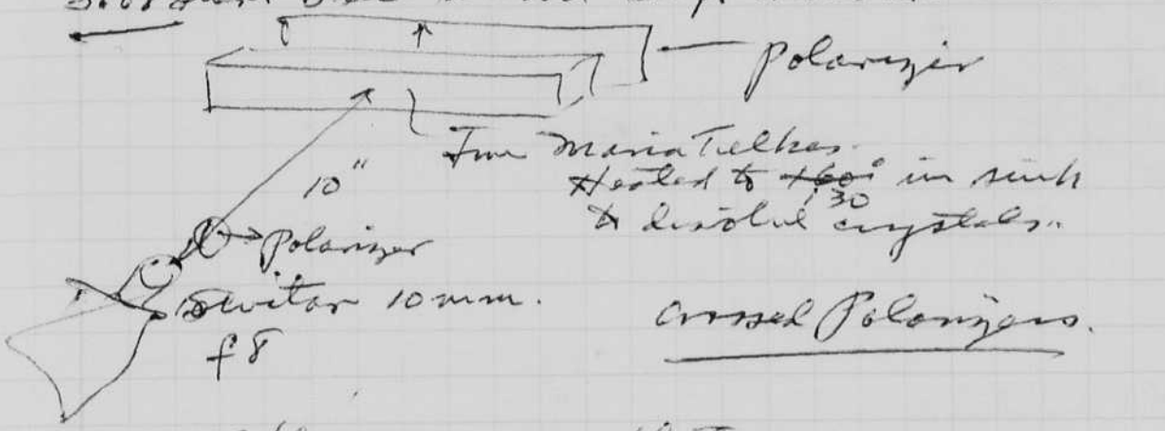
$\frac{54.5}{1.6}$ enlargement. = 34.

Mar 25 1975 Harold Edgerton.

Isso in Marion Mass. at the invitation of Jim Feeney to look for the cannons at Bird Island. We obtained many 5KH and side scan records - but no cannons.

I talked to Ogilvy about chemiluminescence. Cyanes Porter asked to learn of this technique. Also I gave him a film from Jeff Wilson showing brine shrimp. Ogilvy will put on a conducting slyer and try to get an electron micrograph enlargement.

5:08 start 5 sec interval 50 ft Kodachrome 25



50 ft x 40 = 2000 photos.

5 sec
60 | 10,000 | sec. 166. minutes 2.7
63
400
360
4

60 | 1660
120
460
420
16.
40

5:15 off until crystals start.

5:50. Start again. crystals starting.
Polaroid crossed filters added.

5:53 50 watt tungsten lamps off. 0

10:15 off. seems to be oh. ASA 25 Kodachrome.

April 1. Results oh. Apparently the filter rotated under vibration!

Order 20975

124 Harold Edgerton.

Test of 60 cycle unit with Hy lamps in Sylvania.

	Peak	Dur	BCPS.
Low	10x10⁶	7 μs	70
Med	16	15	

Shapson next two values. Suggest flux x time at f 4.5 at 4 ft at 60 ~

for student at Springfield College.
He wants to measure ball speed over the plate for three trials

May 21, 1975 4-406 4-409.
Harold Edgerton.
Jeff Walker.

Test of shadow unit.

microflash point source 2 mm source size.

about 6' Polaroid film #105.
Shadow of a pencil. (ball point).
microflash gap as source with cardboard deflector to cut out side and back light

Pos 105.

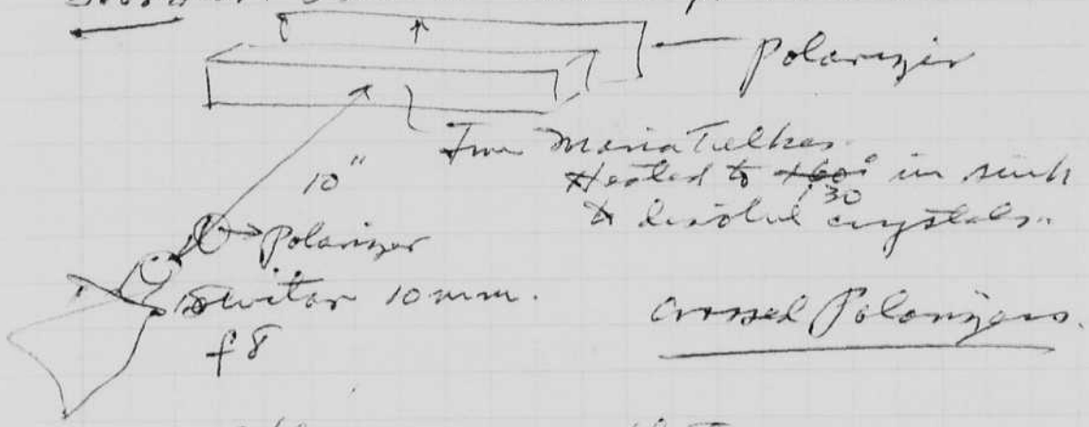
$\frac{54.5}{1.6}$ enlargement. = 34.

Mar 25 1975 Harold Edgerton.

Jason in Marion Mass. at the invitation of Jim Feeney to look for the cannons at Bird Island. We obtained many 5 KH and side scan records - but no cannons.

Talked to Ogilvy about chemiluminescence. Cyanes Farber visited to learn of his techniques. Also I gave him a film from Jeff Wilson showing brine shrimp. Ogilvy will put on a conducting layer and try to get an electron microscope enlargement.

5:08 start 5 sec interval 50 ft Kodachrome 25



50 ft x 40 = 2000 photos.

5 sec
60 | 10000 | sec. 166. minutes 2.8 2.7
60 | 1660
120
460
420
16.
40

5:15 off until crystal start.

5:50. Start again crystals starting.
Polaroid crossed filters added.

5:53 50 watt tungsten lamps off. 0

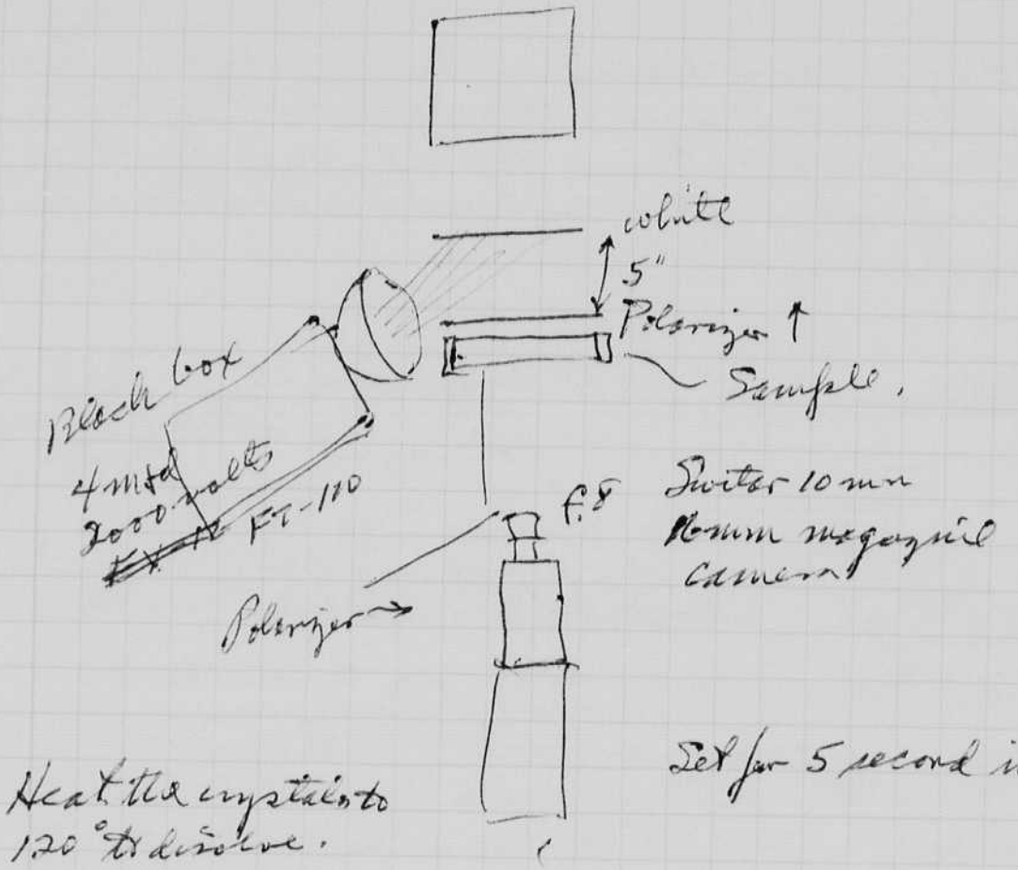
10:15 off. seems to be oh. ASA 25 Kodachrome.

April 1. Results oh. Apparently the filter rotated under vibration!

126 April 1975

Harold Edgerton - MacRoberts.

Filter (Polarizer) now stabelized by tape so it will not turn Room Temp 74.



Time. f8 ASA 25 film Kodachrome II 16 mm movie 1973

3.30. Crystal set in front of camera 120° Ft. Small crystals. No camera. Camera set with 5 second interval. unit for ½ hour.

~~4.00~~ Start

~~4.46~~ No crystals yet.

~~5.00~~ P.M. Crystals started at right hand end.

5.15 P.M. " " " left " end.

6.28. off for night.

2.20

9.20 A.M. Turned on. Temp. 74°F. Some small crystals coming down from liquid surface.

2.25 4-2-75

9.25 off.

10.15 Filter 15" at f 11 Did not record

Lamp 200 Bcps at Ft DA = $\sqrt{200 \frac{5}{50}}$ = 14

Lamp at 2 ft f 11 while Subject.

10.49 off film indicator 0

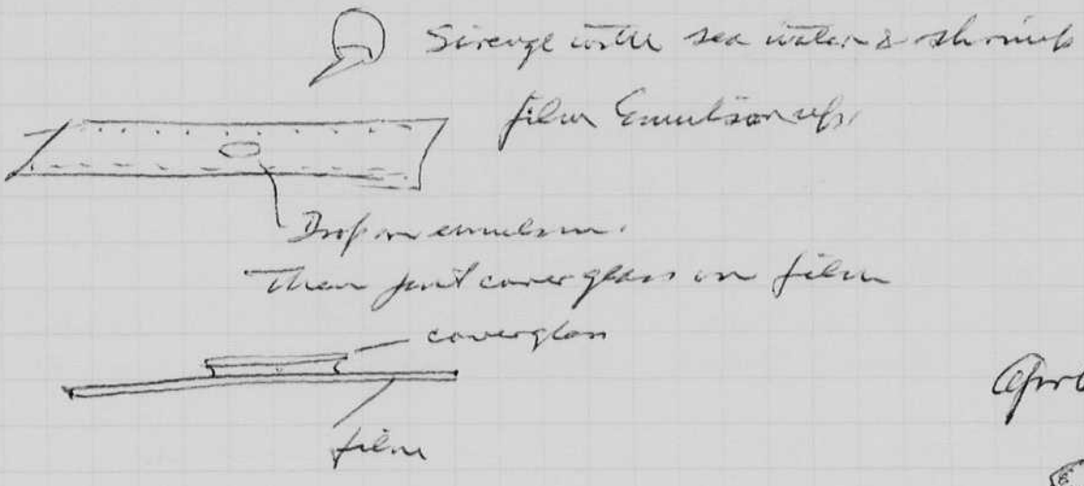
Sent to EK for processing.

Results great

April 2 1975 Harold Edgerton

Ogilvie said the brine shrimps plastics had some blur due to refraction.

I talked to Jeff today about putting the subject directly on the film in water with a cover glass



April 6 1975 - Birthday

72 today.

April 8 1975 The movie make on April 6 is fine. The crystals show strong and white with the polarizers - One crystal broke loose and floated to the left.

April 9 1975 Left Lewis Wharf at 9 am with
Elapsed time Camera 30 sec
New T.V. monitored camera
Polar side scan 259

HE Edgerton on Shroud. Divers in 9.45 - 9.55 to find area
Chas Miller south of Buoy 5
Frank Bonanno 10.38 - 10.53 to set camera
Geo M. Wally Reported water.
Rob Swift 11 - 11.12 camera
Albert Barber. buoy line released.

12 45 at dock for Riley

Now drying out camera and strobe after leak.

Buoy on #10 8 x 8 x 8 ft large concrete Bell Buoy.

Notebook # 31

Filming and Separation Record

2 unmounted photograph(s)

1 negative strip(s) (inside loose envelope)

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

was/were filmed where originally located between page 126 and 127.

Item(s) now housed in accompanying folder.

FLASH (p. 110)

Test of camera Polaroid film

EDGERTON, GERMESHAUSEN & GRIER, INC.
160 BROOKLINE AVENUE, BOSTON, MASSACHUSETTS 02215

Dr H.E. EDGERTON
M.I.T.
CAMBRIDGE - MASS.

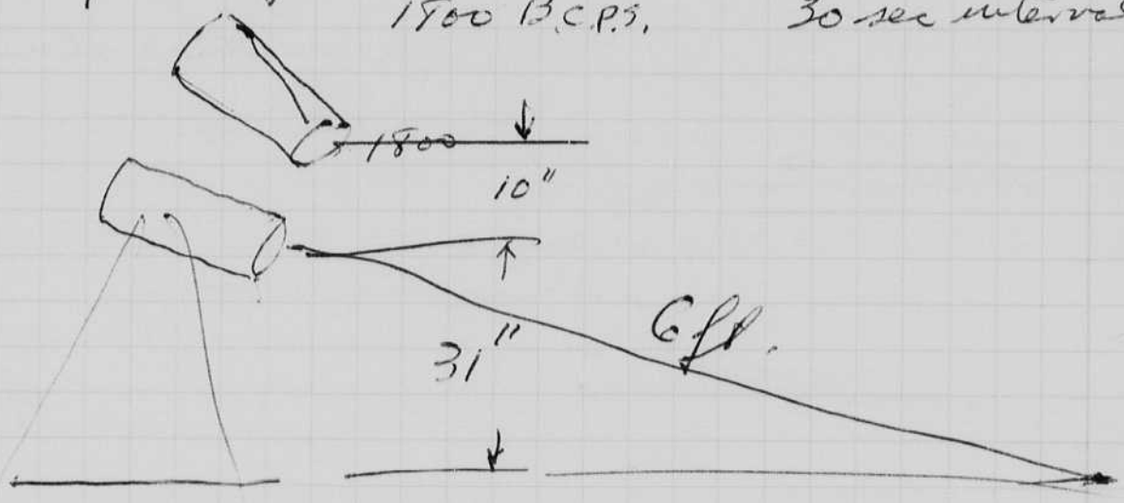
$6\overline{)40}$ $4_2 = \sqrt{1800\frac{25}{27}}$

4.2
4.2
54
168
1764.

128 April 14 1975 Harold Edgerton.

Elapsed time camera ready to be put in today at 2 pm High Tide at Barbers. It was tried last week and soaked again in camera only. The previous time both strobe and camera leaked.

f 5.6 5 ft. Lens 10 m.m. 30 sec intervals.
1800 B.C.P.S.



4 30 pm I went out on the Shroeder today with the above.

12.20 at dock. 10 minute test at dock OK.
Rod Swift
Tom Gilbert
Al Baker.
Geo Nally. Harold Edgerton

1.10 Divers into water
1.15 " out of water Camera's too hot
1.20 Moved ship closer.
1.30 Divers pull buoys to large buoy.

1.40 + Leak - in Strobe
2. camera up.
Strobe dry front plate.
3 M.I.T. Small amt water in camera
lot of water in Strobe.

Esther and I returned from a trip to Nebraska on Monday night at 10 pm on AAL from Chicago and Lincoln on UAL.

We dedicated a grandstand marker at the athletic field at Mitchel Field. Mary Ellen, Wesla Payne, (Cherry Channel) Margaret & Bob Robinson (Sarasota Fla.) were there for the affair. Ken Wortman was the master of ceremony. Mayor Jensen gave the acceptance. The dedication was presented in 1947 by Frank and Mary Edgerton.

Jeff Wilson is completing his thesis on the small light source for taking enlarged photos

Marion Baggett put in his thesis today. I read it yesterday with some comments. He used sonar side scan and photography, under water.

A proposal will be given to NASA for the the further photographing of the MONITOR. The meeting is scheduled for Wed May 27 1975 in Washington.

Harold Edgerton

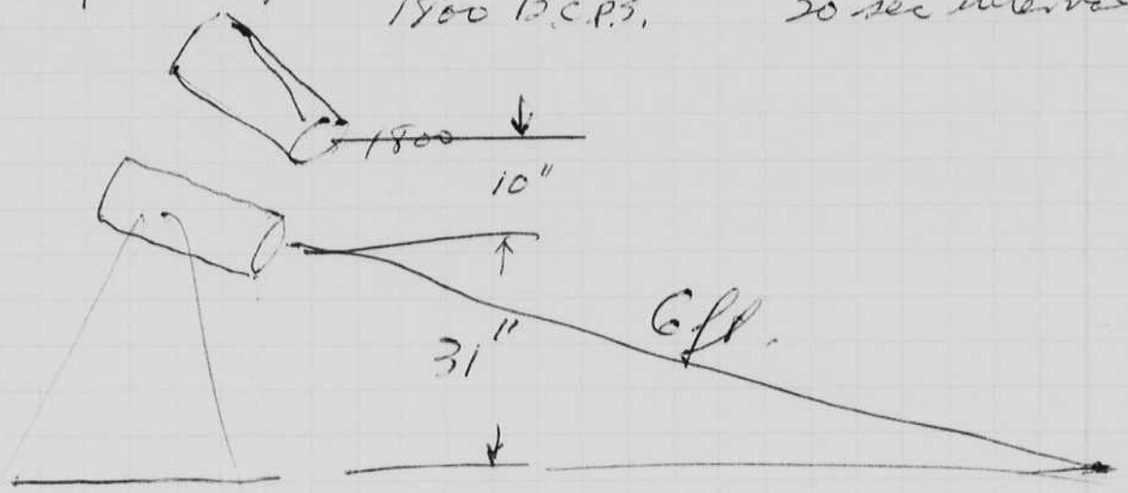
Jean Mooney

Esther Edgerton

128 April 14 1975 Harold Edgerton.

Eleps Still camera ready to be put in today at 2 pm High Tide Al Baker.
Strobe tried last week and soaked again in camera only. The previous time both strobe and camera leaked.

f 5.6 5 ft. Lens 10 mm. 30 sec intervals.
1500 B.C.P.S.



4.30 pm Lowered out on the Strobe today with the above.

12.20 at Dock. 10 minute test at Dock OK.
Rod Swift
Tom Gibert
Al Baker.
Geo Nally. Harold Edgerton

1.10 Divers into water
1.15 " out of water Camera's too hot
1.20 Moved ship closer.
1.30 Divers pull buoys to large buoy.
1.40 + Leak - in Strobe
2. Camera up.
Strobe less front plate.
3 M.I.T. Small amt water in camera
lot of water in Strobe.

May 7, 1975

Harold Edgerton

Esther and I returned from a trip to Nebraska on Monday night at 10 pm on AAL from Chicago and Lincoln on UAL.

We dedicated a granite marker at the athletic field at Mitchel Field. Mary Ellen, Wilda Payne, (Cherry Channel) Margaret & Bob Robinson (Sarasota Fla.) were there for the affair. Ken Wortman was the master of ceremony. Mayor Jensen gave the acceptance. The deed was executed in 1947 by Frank and Mary Edgerton.

Jeff Wilson is completing his thesis on the small light source for taking enlarged photos.

Marion Baggett put in his thesis today. I read it yesterday with some comments. He used sonar side scan and photography, under water.

A proposal will be given to NASA for the the further photography of the MONITOR. The meeting is scheduled for Wed May 21 1975 in Washington.

Harold Edgerton

Jean Sweeney

Esther Edgerton

May 8, 1975

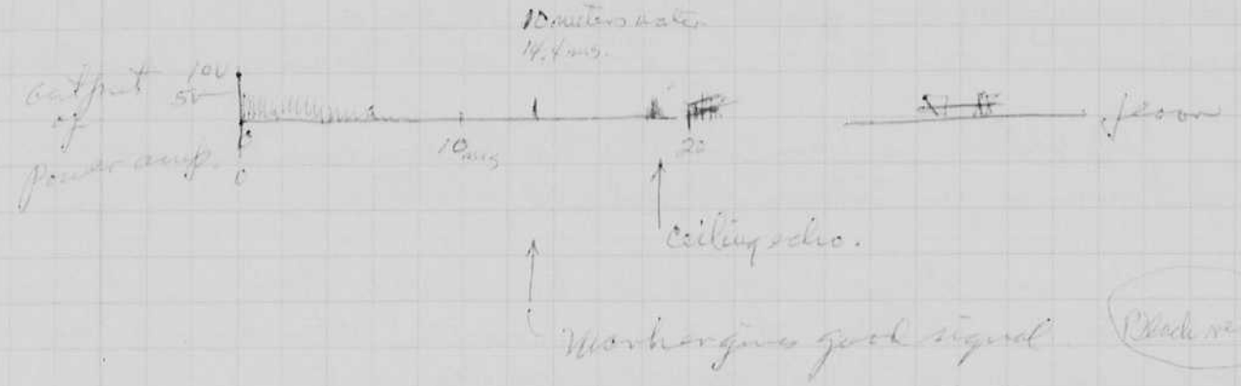
Harold E Edgerton

Sonar tests for trip on May 9 in Harbor

Side Scan ok. New ACT board inserted in Starboard side

6KC tried with Massa transducers.

one gives output from amp. The other input, neither has a transformer in the head.



May 11 '75 Shallow side scan in Boston Harbor yesterday with the 13.5 KC Class Dyer and Strickland (?) The 5 KC was tried too, it gives too weak a response.

Check up in lab. on amplifier 15 ms loop signal from floor

Gain High at Hospital

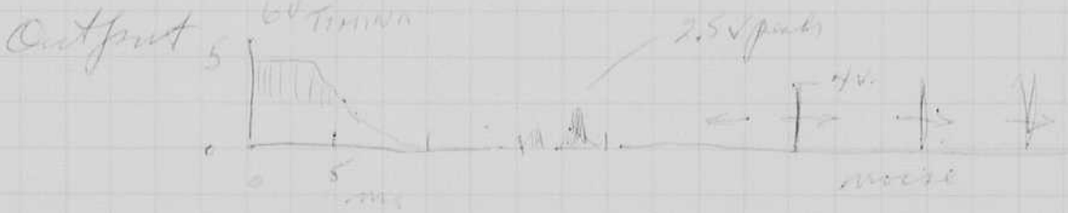
5 KC with 100 ft cable. 2 ms signal

20 volts peak to peak. ceiling.

Saturation 22 volts on initial pulse of 4 ms duration.

noise comes in fairly at 7 ms apart 2 makes horizontal line.

Low gain 1000 2 volts p-p but does not write ?



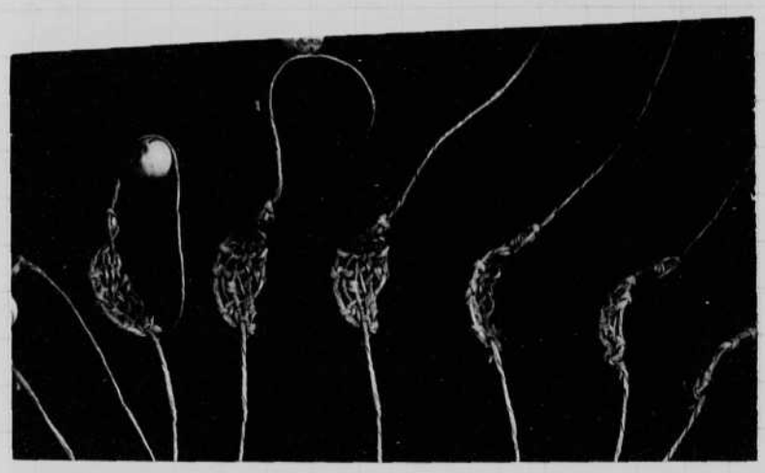
Mar 13 1975 Tests yesterday showed that the input circuit to the printing amplifier had too short a time constant.

We changed the input capacitor from .001 to 0.01 (plus .01) mfd.

Now the 5 kc pulses print darker.

May 21 1975 Harold Edgerton.

on May 18 sunday.
Went with Bradford Marshall to the Rockport breakwater to look for some lost hydroplanes. He has the records at his home. EE Dept tea at Endicott
I gave a talk May 19 at the Journal Club at W.H.O.I. Guests at Herb Uligs home with K.O. Emery, Burns, ——?, etc.
May 20 yesterday was at Blue to overhaul 259 sonar which showed some slipping on May 19 at Rockport. We think the problem was sparkover in the starboard transducer. It now has 50° beam and 10° down. Seems to be ok. More experiments to be made before the Yucatan (Dr. Ferris) and Panama (Sydney Wignall) expeditions June 6 to July 1st.
Eric Edgerton 13 is to go with me. He will take a plane from Detroit to Miami on the 6 June to meet me there for a Cozumel flight.



May 29, 1975.
Harold Edgerton

Marian Baggett and Chas Miller went to Westport in my new Ford Wagon with the sonar fish and the T.V. for another look for the lost fishing ship.

no result!

FORD. Bus # Wagon 557053 Made 1975
E11 BHW 260 60 M 11

May 4 1975

Aboard S. Egerton

Sonar tests for trip in May in Harbor
Side Branch. New ACT board inserted in Starboard side
5KC tried with Massa transducers.
engine output for sup. the other input, neither
has a transformer in the head.

ceiling.

Datawell
14 Kms.

output of post amp. 10V 5V

10 ms. 20

from

ceiling echo.

Marker gives good signal (Back wall)

May 11 '75 Shuttle site seen in Boston Harbor
Yesterday with the 13.5 KC class Dyer and
Haviland (?) The 5 KC was tried too,
it gives not such a response.

Back up in Del. on amplifier 15 Mc Roof signal from floor
gain High 5 KC with 100 ft cable. 2 MS signal
at Hospital 20 volts peak to peak. ceiling.
Saturation 22 volts on both pulses
of 4 MS duration.
Noise comes in faintly at 7 MS apart 2
makes horizontal line.

2 MS

Foreign 1000 2 volts p-p but
does not excite ?

Output 5 6V Thumb 2.5V p-p 4V

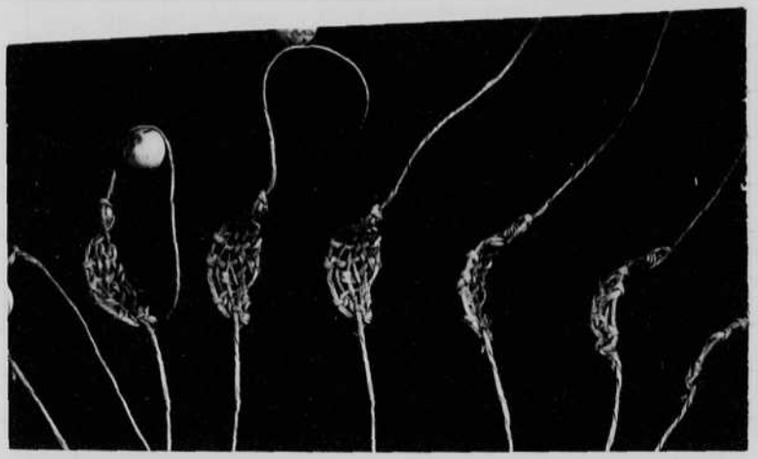
5 ms

noise

May 13 1975 Tests yesterday showed that the
input circuit to the pumping amplifier
had too short a time constant.
We changed the input
capacitor from .001 to 0.01 (10 ms. ckt)
Now the 5 KC pulses pump down.

May 21 1975 Harold Edgerton.

on May 18 sunday.
Went with Bradford Marshall to the Rockport breakwater to look for some lost hydroplanes. He has the records at his home. EE Dept Tea at Endicott
I gave a talk May 19 at the Journal Club at W.H.O.I. Guests at Herb Uligs home under K.O. Emery, Burns, ——?, etc.
May 20 yesterday tues - at Elk, to overhaul 259 sonar which showed some slipping on May 19 at Rockport. We think the problem was sparkover in the starboard transducer. I now have 50° beam and 10° down. Seems to be ok. More experiments to be made before the Yucatan (Dr. Farrin) and Panama (Sydney Wignall) expeditions June 6 to July 1 ±.
Eric Edgerton 13 is to go with me. He will take a plane from Detroit to Miami or they to Jamaica to meet me there for a Caymanal flight.



May. 29, 1975.
Harold Edgerton

Marian Baggett and Chas Miller went to Westport in my new Ford Wagon with the sonar (side scan) and the T.V. for another look for the lost fishing ships.

no result!

FORD. Bus # Wagon 557053 Made 1975
E11 BHW P60 60 M 11

May 31 1975

Harold Edgerton.

Packed EG&G Side Scan Sonar 259 for trip to Yucatan and Panama.

Dr. Nancy Jarvis Included 5 KH Massa (no transformer) penetrator with special amplifier for starboard side of Recorder.

Sylvia Wojciak also Rotary side scan for Seasle. It gives a picture of the bridge at 50 & 100 meters. all to be shipped June 2 1975

Photo trial. 1 sec f 5.6 10 min in DK 50 Overexposed

1/10 f 11 " Exp is ok

4X5 photo out of north window. $T = \frac{A^2C}{5I}$ $S = \frac{A^2C}{IT} = \frac{121 \times 15}{500 \times \frac{1}{10}}$

7302 Kodak fine grain positive film ASA Speed of 3

$= \frac{121 \times 15}{500}$

$= 3$

The shutt in the box says 125 for speed!

3 min in 1:2 Dektol.

July 12 1975
Harold Edgerton called up.
I returned July 4 from Panama where I have been working with Sydney Wignall's group at Puerto Bello.

Mar. 21 (Fri) 8:30am, MIT Swimming Pool, Charlie Batterman
" 22 (Sat) 12noon - 5pm, MIT Open House
" 23 (Sun) 3-5:30pm, MITT - Strobe Lab Open House for EG&G employees
" 24 - 28 SPRING VACATION
" 24 Marion, Ma. (Sippican with Jim Feeney) search for bronze cannons
" 26 (Wed) 9am, EG&G Bd. of Dir. meeting, Bedford
" 30 (Sun) EASTER SUNDAY
Apr 1 (Tue) 3:30pm, Tea in room 54-923
" 1 4:00pm, lecture by Prof. John Adams "Evolution of Impact-Produced Regoliths in the Solar System" in room 54-100
" 2 (Wed) 7:30pm, lecture/demonstration for Joe Balonis, Stud. Center or 4-291
" 5 (Sat) 11am Harvard Univ. symposium, Fred Calhoun
8pm, John Hancock Hall, Fred Calhoun
" 8pm at N.E. Aquarium (Priscilla Henckley 3688) Wildlife group (Dinner at the Webbs)
" 7 (Mon) 12noon luncheon at the Aquarium
" 2:30pm, "Discovery" dedication - speech by H. Edgerton very short welcome only!
" 8:30pm, Woods Hole, Jim Dexter and Jim Mavor, 355 Redfield (?)
" 8 (Tue) 3:30pm, Tea in room 54-923 lecture on "finding things in the sea"
" 4:00pm, lecture Prof. Alfred Ziegler "Pre-Pangaean Plate Tectonics and Paleogeography" in room 54-100 missed this!
" 8pm Kresge Auditorium, Sen. Sam Ervin - Watergate break-in
" 12 (Sat) Southeastern University - Inner Space Society Symposium (Chris Gledhill) no follow up, so I did not go. No time/place information.
" 14 (Mon) 9am, Medical Department for exam by Dr. Point
" 15 (Tue) 9:30am, Copley Plaza Hotel, Copley Sq. EG&G Stockholders meeting
" 16 (Wed) 12:30pm, New England Aquarium, Bd. of Gov. meeting He resigns from Board.
" 17 (Thu) Leave for Tennessee
" 18 (Fri) 8:15pm lecture "The World of Strobe and Sonar" Appalachian Inventors Fair, Am. Mus. of Atomic Energy, Oak Ridge, G.S. Hurst
" 19 (Sat) DIXONs - Hickory, N. C.
" 21 (Mon) PATRIOTS DAY - Vacation
" 22 (Tue) No class - return to Boston missed this
" 29 (Tue) 3-4:30pm, ~~Prof. Ezekiel's lecture~~ "What is Engineering" laser ~~presentation for Millie Dresselhaus's class~~, room 37-212
May 1 (Thu) 6:30-8:30pm lecture/dinner at the Sheraton-Lincoln Motor Inn, Worcester (8th annual meeting of the Mass. Assoc. of Sci. Supervisors, Mr. Harry Syrenne, Southwick High, Southwick, Ma.
" 15 (Thu) 12noon - LAST CLASS FOR H.E.E.
6:30pm, MIT Faculty Club, Susan Schur (227-8581) lecture for the MIT Alumni - Boston
" 17 (Sat) 4:00pm, Sanford Brown's house (Jean McGadden ext. 3-2396) Guitar song fest
" 21 (Wed) 12:30pm, New England Aquarium, Bd. of Gov. meeting
" 26 (Mon) MEMORIAL DAY - Vacation
" 28 (Wed) ~~EG&G Bd. of Dir. meeting, 9am, Bedford~~ I am retired due to age, 72! as of April 6 1975.
Jun 4 (Wed) MIT - 45th Class reunion, Chatham Country Club, stay at the Chatham Bars Inn, Greg Smith, ext 3-5049
" 18 (Wed) 12:30, New England Aquarium, Bd. of Gov. meeting

132 May 31 1975

Harold Edgerton.

Packed EG&G Side Scan Sonar 259 for trip to Yucatan and Panama.

Dr. Nancy Jarvis ... Included 5 KH Wasa (not transd.....)

Sydney W.

Photo

4 X 5

July 12 1975

Harold Edgerton catch up.

I returned July 4 from Panama where I have been working with Sydney Wignall's group at Puerto Bello.

Left 9am July 6 with Esther to Miami on Eastern. We met Eric at the airport when he came in from Detroit (Madison Byrood)

Landed at Cozumel Mex - met by Nancy Ferris and Arthur Miller. Jerry to Montreal.
Left Mon July 16 by microbus for Merida
July 17 took plane to Guatemala city with 550 lbs excess baggage.
July 18 PAA to Panama city. Air freight.
" 19 ~~Dear~~ Dear Edwin Webster took Eric and are to Puerto ~~Bello~~ with our gear. Esther went to Boston from Merida. See Nat Geo file for reprint of sonar studies in Mexico at Mayil south of Tulum.

Took Eric to Miami. He was ill with Strep. Throat and Trench mouth. I returned on the next plane to Panama.

Left Panama city July 4 at 9:15 am for Miami and Boston. See report sent to Sydney Wignall of sonar measurements

~~June 30 to July~~
July 7 to July 11 High Speed Seminar at M.I.T. 44 students. organized by Chas Miller

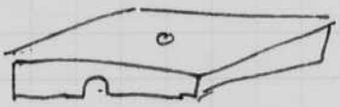
Jeff Courtney Pratt gave lecture on July 11. Dan Guest for dinner. I took Ilsa to meet the 9 pm plane to Newark.

July 12 1975 Point light source for
Harold Edgerton. nature photography.

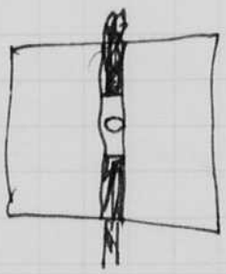
Efforts to date have used the point light source of Krossen which is a grooved discharge from .05 mfd at 16 KV. the output is through a 1.6 mm hole aperture. the peak light is 0.5×10^6 candle power, the duration is about 1 microsecond (or 1/2). output = 0.5 lucps.

I propose a smaller unit based upon 3000 volts and 1/4 mfd into a glass or quartz groove lamp with a 1/4" gap. The above is a 1" gap for 16000 volts.

A side view of the arc will be used in stead of the end view. Also the aperture may be on the groove side to give a smaller source.



metal starter cemented on to quartz with a 1 mm hole



a series capacitor is required to prevent a discharge between the spark circuit and the main circuit.

July 15 1975 Hawk Report

July 27, 1975 Back yesterday from a trip to Castine Maine to work with sonar. The Rotary Side Scan was used on July 22 with 3 Divers. Chas Finkelstein ? and 2 others. We put them down on a 20 ft x 1 ft log by sonar. The divers were at the surface. We signalled them left and right came and go. until they were over the sonar target, then they went directly down to the target.

Also made 5 KH records at Sandy point - I saw a double layer 1.5m spacing at 23 meters below the bottom! Also in one place it showed a fold over! There was also a target about 1 ship size!

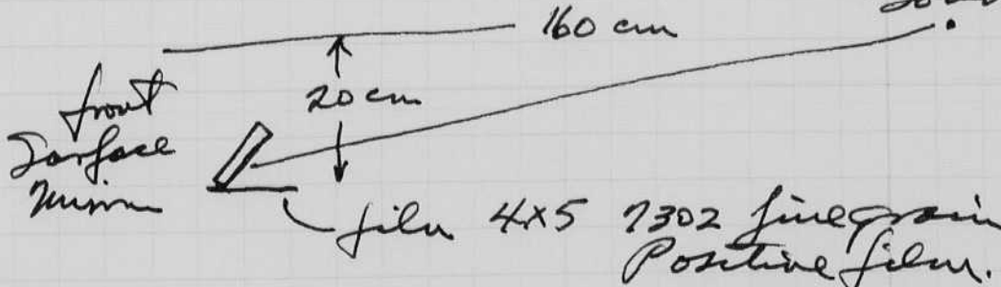
Dave Wyman has most of the records. Dan Small helped on a search for the SCHIELD sailboat which was lost with 4 cadets some 5-7 years ago.

Martin Meyjack was there with a Magnetometer (Varian) that found a target 1/4 mile above Weather. Winter Port on the west side in 8 ft of water. Kiva Vandiver & Pam, Prof Carmichael and family were in Castine.

Kazwisher WHOI was in Castine with current meters.

Experimenting today with point light source. other pictures of pins and a cactus needle were made before I went to Maine.

Point Source,



Film #1 2 needles
1 Pin
1 cactus spine
assembly.

Dev 1.5 min in Dektol 1:2
Film Toggled on one edge

Note that the film is exposed by direct light at a small angle throwing long shadows!! See print on the next page of needles, a pin and a cactus needle! More photos taken. Also the mirror now has several smears where I touched it accidently.

Note diffraction on some points when away from film.

See page 135 for the Double lighting.

needle.

Pin Cushion Cactus

PIN

July 28 1975

Harold Edgerton. Buoy design.

6"x5"x2.5" Styrafoam float.

Sinks at 2.75 pound weight.

30 pound nylon cable to weight.

Aug 2 1975

These were tested Aug 1 in the harbor at 40 ft depth of the 2# weight took it down in 15 seconds 30 # string the float unwound completely. The rigl should be longer. Data is needed on the turn force vs current so the design can be as vertical as possible.

The 4 pound weight took the float under even if it was unrolling fast. The drop time to 40 ft was about 12 seconds.

Silhouette photography. I got another foront surface mirror for the strobe. It also showed a pattern - similar to that shown on the previous page 136. ←

So I put the point light up on the east shelf in the dark room. The film was put 180 cm below on a stool. Exposures were ok with 7302 Eastman film developed 3 minutes in 1:2 Dektol.

I made an exposure of Charles River water from a sample made at 4:30 pm from in front of the MIT Sailing Pavillion. The photos were made in a film box by pouring the water onto the film in the box. I looked at the film. I could see a lot of small spheres. These may be the cause of the green scum that collects at this time of year in the Charles River.

Two exposures were made of a 1" thick glass window for an underwater camera. This disk had some interesting cracks caused by strain while testing. One was thin at 1.5 m the other was 1.40 meters. It was a biller exposure. The glass absorbes ~~also~~ a lot of energy. I guess the U.V. is doing a lot of the exposure.

A photo of a razor blade at 1.8 meters was made at 10 cm above the film. To show diffraction.

See result on p. 139

Note diffraction on some points when away from film.

See page 135 for the Double lighting. needle.

Pin Cushion Cactus

PIN

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The 4 pound weight took the float under even if it was unrolling fast. The drop time to 40 ft was about 12 seconds.

Silhouette photography. I got another front surface mirror for the setup. It also showed a pattern - similar to that shown on the previous page 136.

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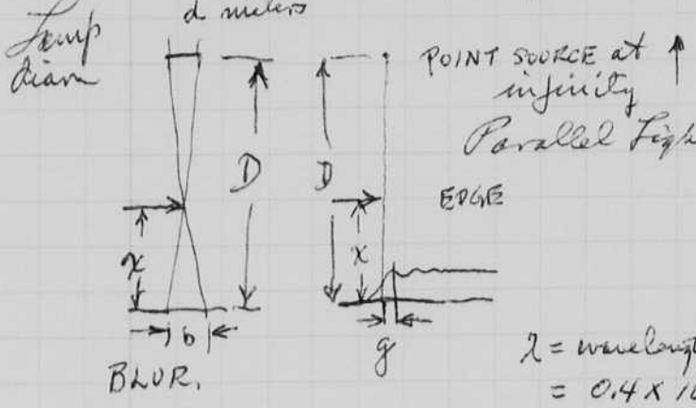
A photo of a razor blade at 1.8 meters was made at 10 cm above the film. To show diffraction.

See result on p. 139

138 Aug 2, 1975 Silhouette Photography.

Harold Edgerton.

I am working on a paper with Jeff Wilson about the shadow photography using a point source of light.



λ = wavelength of light
$= 0.4 \times 10^{-6}$ meters for Blue Light.

$b \cong \frac{x}{D} d$ meters $\quad g \cong \sqrt{2\lambda x}$ meters.

if x is small

Shadow Diffraction

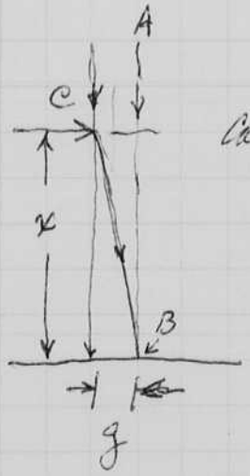
Example Let $d = .002$ meters
$D = 2$ meters

Blur $b = x \frac{.002}{2} = x \times 10^{-3}$ the very small if x is small - subject close to the film.
if $x = .001$ meters $b = 10^{-6}$ meters.

How about Diffraction.

$g = \sqrt{2\lambda x} = \sqrt{2 \times .4 \times 10^{-6} x} = \sqrt{.8 \times 10^{-6} x}$

Let $x = .001$ meters then $g = \sqrt{.8 \times 10^{-6} \times 10^{-3}} = \sqrt{.8 \times 10^{-9}} = \sqrt{8. \times 10^{-10}}$
$= 2.8 \times 10^{-5} = 27.0 \times 10^{-6}$ meters.
$= 0.0280 \times 10^{-3}$ meters $= .028$ mm
.028.



Calc of Diffraction, approx.
Suppose the ray A is reinforced at B by the emitted rays from the ~~parallel~~ edge C. For this condition the distance from C to B must be one wavelength, λ.

Then $g^2 + x^2 = (x + \lambda)^2 = x^2 + 2x\lambda + \lambda^2$

$g^2 = 2x\lambda + \lambda^2 \cong 2x\lambda$

$g = \sqrt{2x\lambda}$ meters.

Diffraction example

$x = .01$ meter

$D =$ 2 meters (must needed in case) since parallel light is assumed.

$g = \sqrt{2x \cdot .01 \cdot .4 \times 10^{-6}} = \sqrt{.8 \times 10^{-8}} = \sqrt{80 \times 10^{-10}} = 9 \times 10^{-5} = 90 \times 10^{-6}$ meters

$.9 \times 10^{-4}$

$.894$

$= .09 \times 10^{-3}$ meters

$= .09$ mm

$= .0894$ mm.

The source could be much larger

$b = 10^{-3}$ mm → Increase d to 28. mm = 2.8 cm

$g = 28 \times 10^{-3}$ mm

Or more closer — Let $D = \frac{2}{28} = .07m = ?$ cm.

check $b = \frac{10^{-3}}{.07}, 002 = 2.8 \times 10^{-5} = 28. \times 10^{-6}$ meters.

Diffraction = $b = 28 \times 10^{-6}$ meters.

Razor blade.

→ 11 ←
g'
2.5 mm

enlargement = 33 x

Diffraction max = $\frac{2.5}{33} = .08$ mm. in life

33/8
269

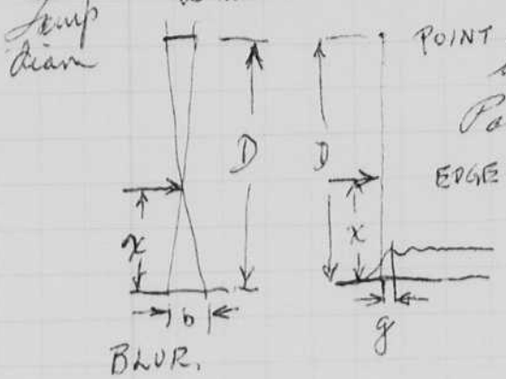
for. $x = 10$ cm.

checks very well!

138 Aug 2, 1975 Silhouette Photography.

Harold Edgerton.

I am working on a paper with Jeff Wilson about the shadow photography using a point source of light.



λ = wavelength of light
$= 0.4 \times 10^{-6}$ meters for Blue Light.

$b \cong \frac{x}{D} d$ meters $\quad g \cong \sqrt{2\lambda x}$ meters.

if x is small

Shadow $\quad$ Diffraction

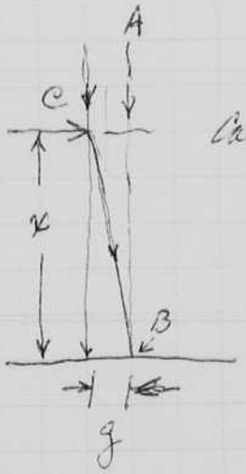
Example Let $d = .002$ meters
$D = 2$ meters

Blur $b = x \frac{.002}{2} = x \times 10^{-3}$ the wing small if x is small - subject close to the film.
if $x = .001$ meters $b = 10^{-6}$ meters.

How about Diffraction.

$$g = \sqrt{2\lambda x} = \sqrt{2 \times .4 \times 10^{-6} x} = \sqrt{.8 \times 10^{-6} x}$$

Let $x = .001$ meters then $g = \sqrt{.8 \times 10^{-6} \times 10^{-3}} = \sqrt{8 \times 10^{-9}} = \sqrt{8.} \times 10^{-4.5}$
$= 2.8 \times 10^{-4.5} = 2.8 \times 10^{-6}$ meters.
$= .0280 \times 10^{-3}$ meters $= .028$ mm
.028.



Calc of Diffraction, approx.
Suppose the ray A is reinforced at B by the emitted rays from the ~~parallel~~ edge C. For this condition the distance from C to B must be one wavelength, λ.

Then $g^2 + x^2 = (x + \lambda)^2 = x^2 + 2x\lambda + \lambda^2$

$$g^2 = 2x\lambda + \lambda^2 \cong 2x\lambda$$

$$g = \sqrt{2x\lambda} \text{ meters.}$$

Diffraction example

$x = .01$ meter

$D = 2$ meters (must marked in code)
since parallel light is assumed.

$$g = \sqrt{2 \times .01 \times .4 \times 10^{-6}} = \sqrt{.8 \times 10^{-8}} = \sqrt{80 \times 10^{-10}} = 9 \times 10^{-5} = 90 \times 10^{-6} \text{ meters}$$

$.9 \times 10^{-4}$

$.894$

$= .09 \times 10^{-3}$ meters

$= .09$ mm

$= .0894$ mm.

The source could be much larger

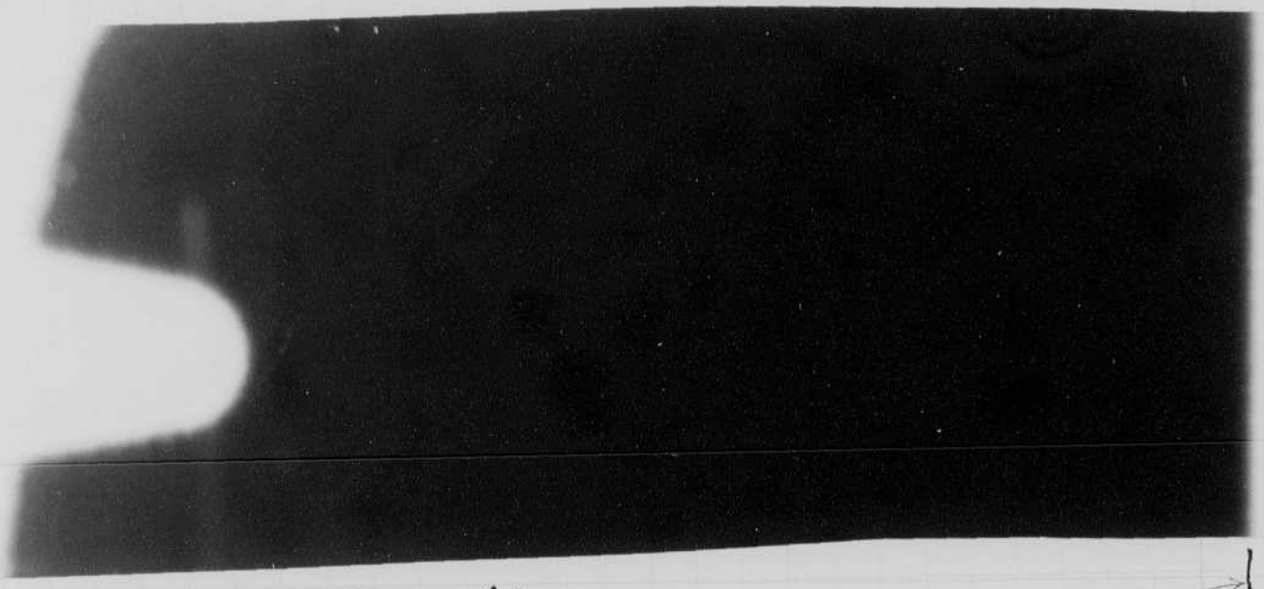
$b = 10^{-3}$ mm → Increase d to 28. mm = 2.8 cm

$g = 28 \times 10^{-3}$ mm

Or more closer — Let $D = \frac{2}{29} = .07\text{m} = 7\text{cm}$.

check $b = \frac{10^{-3}}{.07}, 002 = 2.8 \times 10^{-5} = 28. \times 10^{-6}$ meters.

Diffraction = $b = 29 \times 10^{-6}$ meters.



Razor blade.

2.5 mm

enlargement = 33 x

Diffraction max = $\frac{2.5}{33} = .08$-mm. in life

for. $x = 10$ cm.

checks very well!

Aug 5 1975 Tues.

Harold Edgerton

Sonar tests at the Tunnels were made on Friday last with Mr Roberts. We used

12 KH Edo in mount.

6 KH Massa double Input output

5 KH Edo in 30" cone.

These results have been submitted for publication. The effects of pulse length and beam angle are shown.

Photos

Prints made of copepods and other animals in the water from a pond and from the Charles river.

Enlargement 33 times is the maximum that can be done in the last man enlarger.

It is difficult to focus accurately.

3:30 pm Discussion with Bob Ogilvie

1. Fine grain film desirable
2. Thinner emulsion
3. Glass plate instead of film.
4. Greater enlargement
5. Hologram methods.

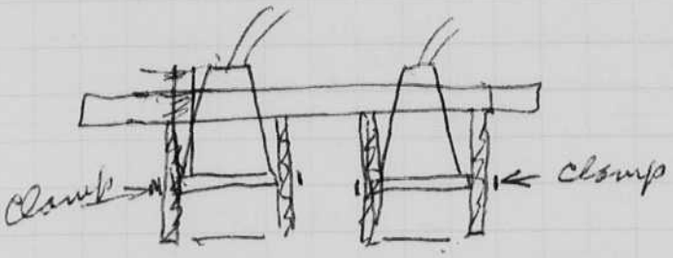
Intends to use X rays and I suggested electrons. Field Emission, Mr. Autobees? has this kind of equipment available in Lexington?

I also want to go back to the dark field method of photography as used many years ago when a concentrated light comes into the target from the rear. As I recall I used a 30 - possibly 15 degree beam from the camera axis.

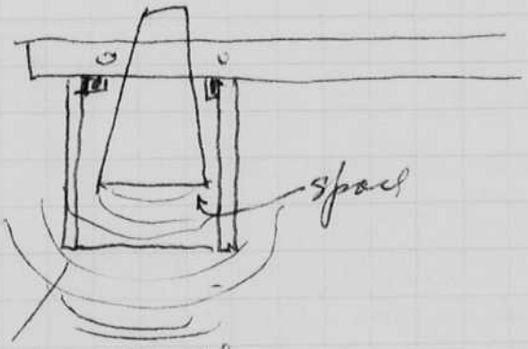
Hand Egytlw.

Sonar experiment to limit beam angle.

On last Friday, Bill and I tested the 5 kH mono transducer and receiver with a wooden plywood shielding. Pieces were clamped onto the transducers at the front wide part. The results were not good. Lots of noise was picked up. I assume the wood was coupled too closely to the crystal.

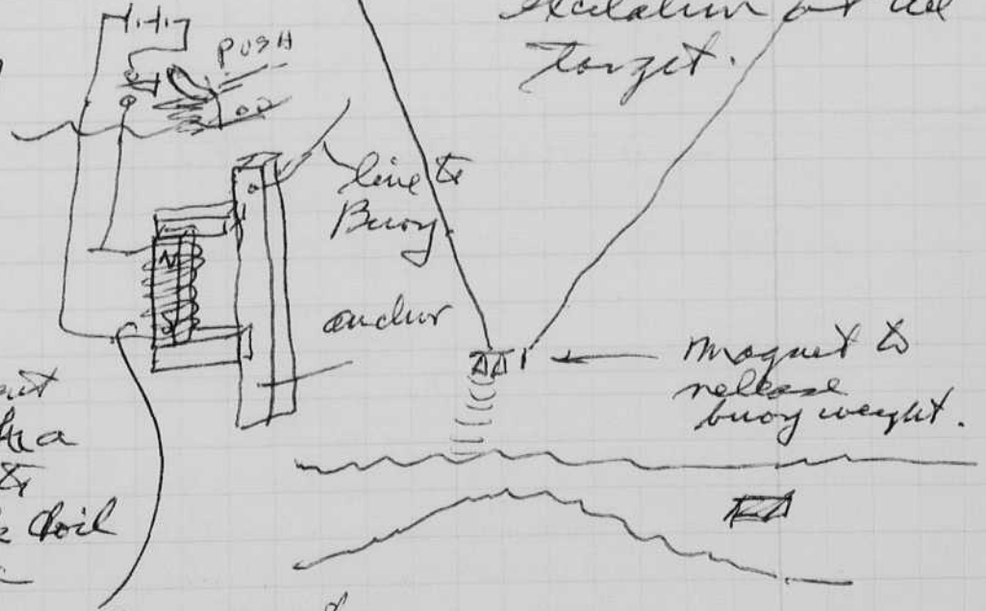


I need to repeat this experiment with the wood pairs clamped to the base. a space needs to be between the transducer and the wood.



Baffle should reduce the energy to the side and increase the Beam energy

The other way to get a small beam angle is to lower the transducer not beam angle but - small area excitation of the target.



Buoy dropper.

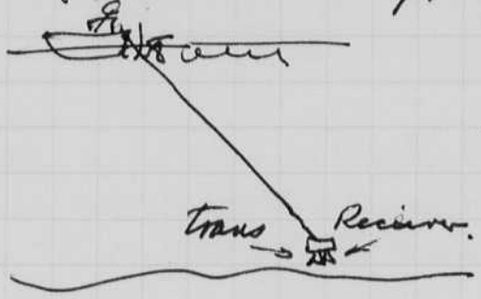
magnetic attachment of the anchor with a permanent magnet to hold. then a buck coil to release when a target is sited.

permanent magnet with coil to neutralize field and drop anchor.

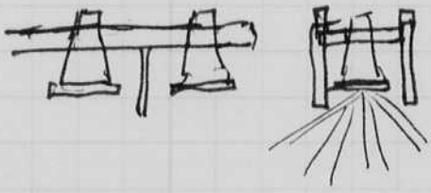
Aug 7 1975
Harold Edgerton.

I cancelled a trip on the aquarium boat to Deer Island light. We planned to put the elapsed time camera down for a 24 hour run. Low tide came today about noon. There was rain and a strong NE wind today.

The experiments with sonar of three types made last Friday need another test. this will be made with a 100 ft cable to the 5 KH Massa transducers. I hope to make another run at the tunnels and also at the test area off Long Island.



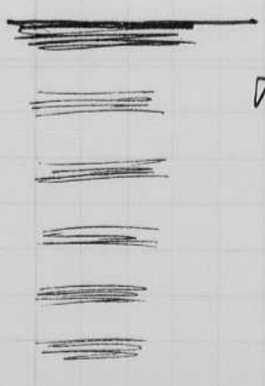
The area covered on the bottom is small because the sonar is close to the bottom.



Put side boards on transducer. and spacers between. Also will act as a skipping box.

Introduce styrofoam in the spare places around the transmitter and receiver, To absorb the side sound.

I am mystified by the 6 KH cone system. There are bands of noise that are coherent with the sweep of the recorder.



finely spaced group of lines.

These are easily seen in the unit on the 40 ft scale use in salt water

I did not notice these in the 40 ft depths in the Charles River.

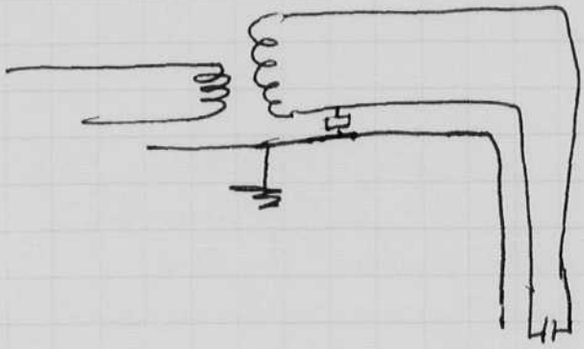
Aug 9 1975
Howard Edgerton.

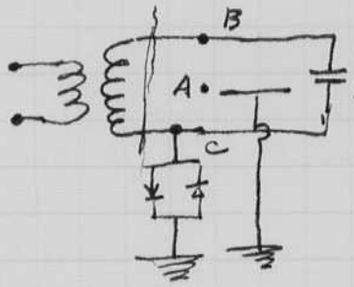
Permanent U shaped magnet.

Soft iron Coils to create neutralizing MMF bar. to that of the magnet. Then the weight will drop right on the target.

The above will be attached to the sonar transducer that is near the bottom. A push button on the surface will cause the weight to drop - when the operator sees a target on the sonar.

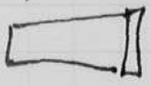
Circuit for 12 KH





open transformer.
measure
Cap. from
A to B
A to C.
C to B.

.02 to B - Ground
Regular fires at 8 meter intervals ±.
signal somewhat reduced?



.02 mf to C - Ground.
Less signal

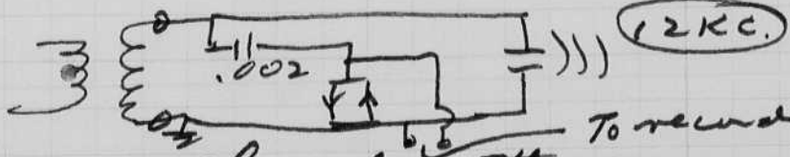
Where is the source of the coherent noise of P 142?

Try increasing the capacitance or resistance of A to B. Will this effect the output voltage.

Try with 12 KH and 6 KH.

also the 5 KH Massa

Blade - Shield = .0075 mfd
White - Shield .0105 mfd



This new connection does not work on the Massa! Tried to increase the series C to .02. The massa seems to oscillate for a long time. since there is a voltage signal for a long time. Comment - try loading with Resistance!

Aug 10

Aug. 10, 1975
Harold Edgerton

Silhouette photo made Aug 2 ± of water from a fresh water pond in the Mt Auburn Cemetry.

Note the line growths. The bug was the largest creature in the water sample.

The enlargement over life is about 20 to 30 times.

Note hairs on the beak of the animal. There are less than 0.1 mm in the print

1 mm

$\frac{0.1}{30 \text{ mag}} = 0.0033$ mm or 3.3 μm

30 / 0.100 → .0033

30 / .003 / .090 ✓

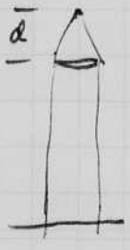
The subject was in a drop of water on the emulsion. There was a lot of motion which is entirely stopped by the exposure of less than a microsecond.

The system shown above wastes a tremendous amount of light and the source size is entirely too small.

Optics can solve the exposure problem, such as the use of a lens to produce parallel light, or a more efficient lamp of larger dimensions can be used with optics.

The exposure will be about $(HCPS)_2 d^2$

The present exposure is from the lamp at 2 meters! $\frac{(HCPS)_1}{2^2}$ lumens/sq meter



$\frac{HCPS_2}{d^2} = \frac{(HCPS)_1}{2^2}$ $(HCPS)_2 = (HCPS)_1 \left(\frac{d}{2}\right)^2$

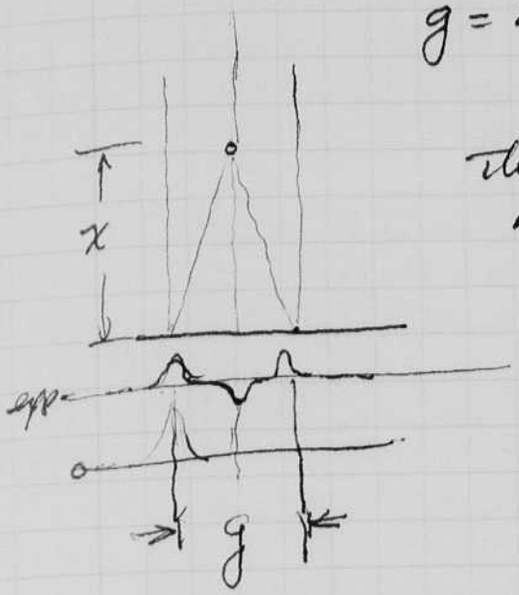
Let D = 0.1 meters = 10 cm about 4"

Then $(HCPS)_2 = \left(\frac{0.1}{2}\right)^2 = .0025$

.05 / .05 / .0025

Thus the light needed is .0025 or $\frac{1}{400}$!!

Diffraction of a line subject by a parallel beam of coherent light.



g = distance between two maximum on either side of the line subject

λ = one wave length of light of freq f.

then from geometry further wave fronts to add.

$$\left(\frac{g}{2}\right)^2 + x^2 = \left(x + \lambda\right)^2$$

$$\left(\frac{g}{2}\right)^2 + x^2 = x^2 + 2\lambda x + \lambda^2$$

$$\frac{g}{2} = \sqrt{2\lambda x + \lambda^2}$$

$$g_1 \doteq 2\sqrt{2\lambda x} \quad \text{if } \lambda^2 \ll 2\lambda x.$$

This is double the diffraction of an edge.

The second maxima $g_2 = \sqrt{2}\, g_1$

$g_3 = 2 g_1$

$g_3 = \sqrt{3}\, g_1$

$g_4 =$

$$\left(\frac{g_2}{2}\right)^2 + x^2 = (x + 2\lambda)^2$$

$$\left(\frac{g_2}{2}\right)^2 = 4\lambda x + 4\lambda^2$$

$$g_2 = 2\sqrt{4\lambda x} \quad \text{if } 4\lambda^2 \ll 4\lambda x$$

$$= \left(2\sqrt{2\lambda x}\right)\sqrt{2}$$

$$= g_1 \sqrt{2} \quad \checkmark$$

$\sqrt{4} = 2 = \sqrt{2}\sqrt{2}$

The first max g_1 is the only one to cause trouble when blue light is used. I have only seen go very faintly in any of my experiments, See for example the razor blade, p 134.

Aug. 10, 1975
Harold Edgerton

Silhouette photo made Aug 2 ± of water from a fresh water pond in the Mt Auburn Cemetry.

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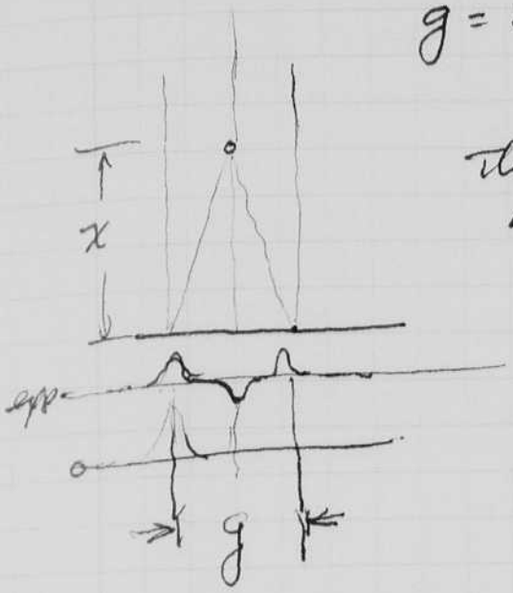

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$$\left(\frac{g}{2}\right)^2 + x^2 = x^2 + 2\lambda x + \lambda^2$$

$$\frac{g}{2} = \sqrt{2\lambda x + \lambda^2}$$

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$g_3 = \sqrt{3}\, g_1$

$g_4 =$

$$\left(\frac{g_2}{2}\right)^2 + x^2 = (x + 2\lambda)^2$$

$$\left(\frac{g_2}{2}\right)^2 = 4\lambda x + 4\lambda^2$$

$$g_2 = 2\sqrt{4\lambda x} \quad \text{if } 4\lambda^2 \ll 4\lambda x$$

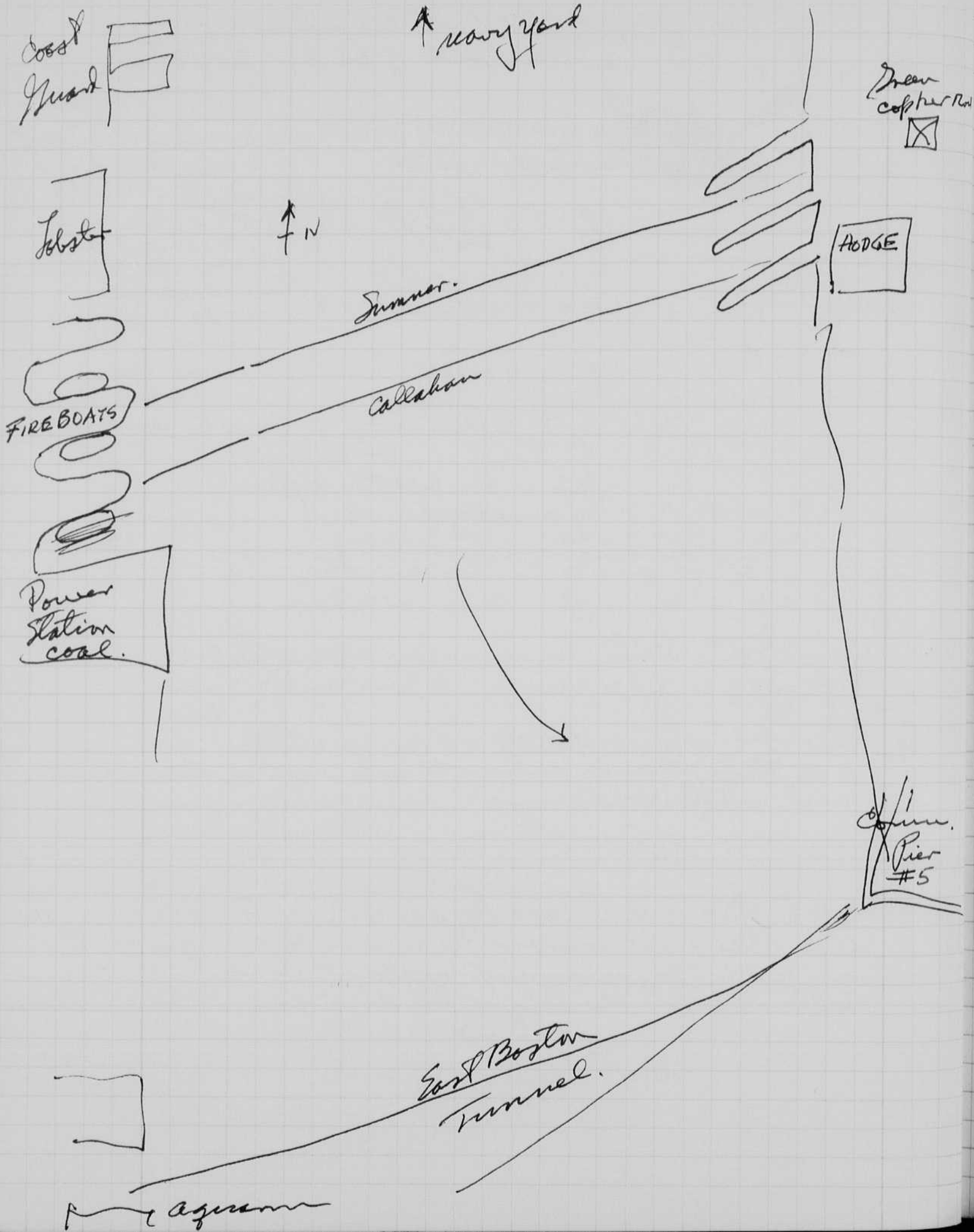
$$= \left(2\sqrt{2\lambda x}\right)\sqrt{2}$$

$$= g_1 \sqrt{2} \quad \checkmark$$

$\sqrt{4} = 2 = \sqrt{2}\sqrt{2}$

The first max g_1 is the only one to cause trouble when blue light is used. I have only seen ~~a~~ very faint fuzziness in any of my experiments, See for example the razor blade, p 139.

Aug 10. 1975 Sun. Tunnel Landmarks on Shore from Aug 1. Friday Tests in Navy with Mackerels.



Aug 12 75.

Al Barber took the elapsed-time 16mm movie camera and strobe 1800 BCPS to Buoy 10 outside of Jurisland light. It was started at 2.45 or 2.30pm at high (?) tide. It will be rewound today. Rate was 1 minute between pictures. f8 at 5 ft. on Kodachrome 25 film 16mm.

I went to West Port at 7am yesterday with Sonar (side scan 259) and T.V. to search again for the Atlantic sword. We made many passes with out seeing a boat. Ships. Cherry Lynn. was used Sonar navigation.

Last week (? Friday) I went to the magnet lab to see Bill Loubsky and Vadimar Hruby with their MAD. gun stuff. An ionized wave of argon and caesium is pulsed through a magnetic field by a transient wave.

I gave advice on slit, mirror, and prism camera. They plan to use a prism camera which John West already has in use. He showed me a movie of a gas discharge.

Aug 16 75. The elapsed time movie was screened yesterday. Al Barber said the camera was dragged with kelp seaweeds. He was right.

The movie started ok with starfish and crabs on the bottom. The 1 minute rate was a bit too slow. The the action was too fast. The tide brought kelp which covered the lens some of the time. There were glimpses now and then of the bottom. The film has information on the clearity of the water too.

f 5.6 at 5 ft focus Kodachrome 25 film.
10 mm lens 16 mm film.

Transit at 77 was are at 3 second intervals to finish film.

I went to Lake Money with Esther and Ellen Dixon on Wed Aug 13 to search for the Aunt Sally of Capt Samuel Money. A report is being organized of the side scan and the penetration sonar observations. Mrs. Genevieve Perry and Dan & the Tapphil arranged the expedition. Melbourne Beach Fla.

148 Aug 16 '75

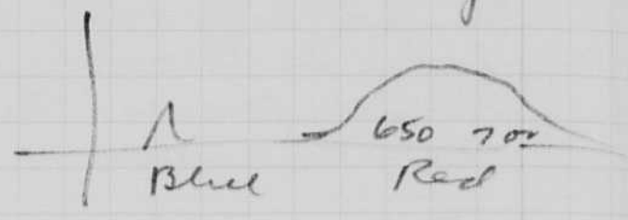
Howard Edgerton Richard Pogue Pat & Tommy were here last night
They are from Cleveland Clinic. Left this am for N.H. to pick up
David for a camp and will return.

Aug 16 Chlorophyll
A B C D

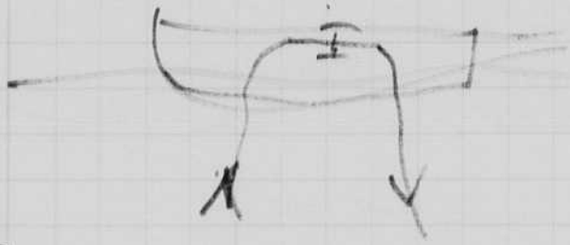
Blue Violet from Alcohol.

Red - orange.

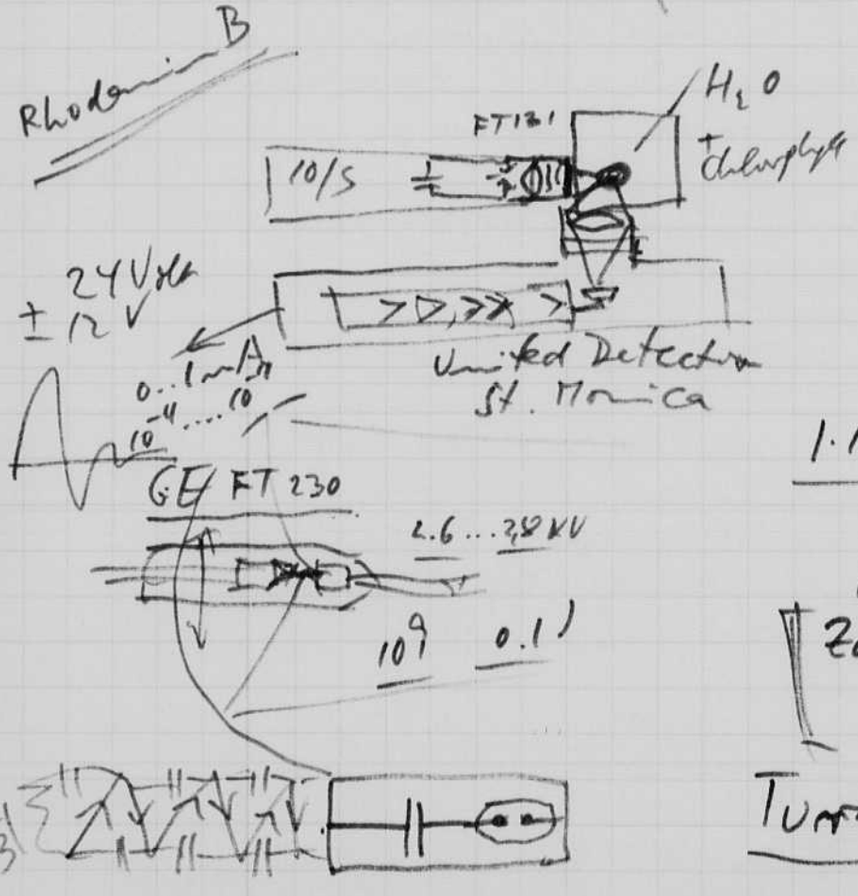
Dr. Trumpel, Frank. visited in Camb from 10 am to 1.30 pm Sat. Aug 16



Fluorometer.



Time delay.
Continuous mercury lamp
Green or blue
Photomultiplier in the red.
Water has some fluor.
(1000 miles west of Hawaii
300 meters deep
most ideal water.)



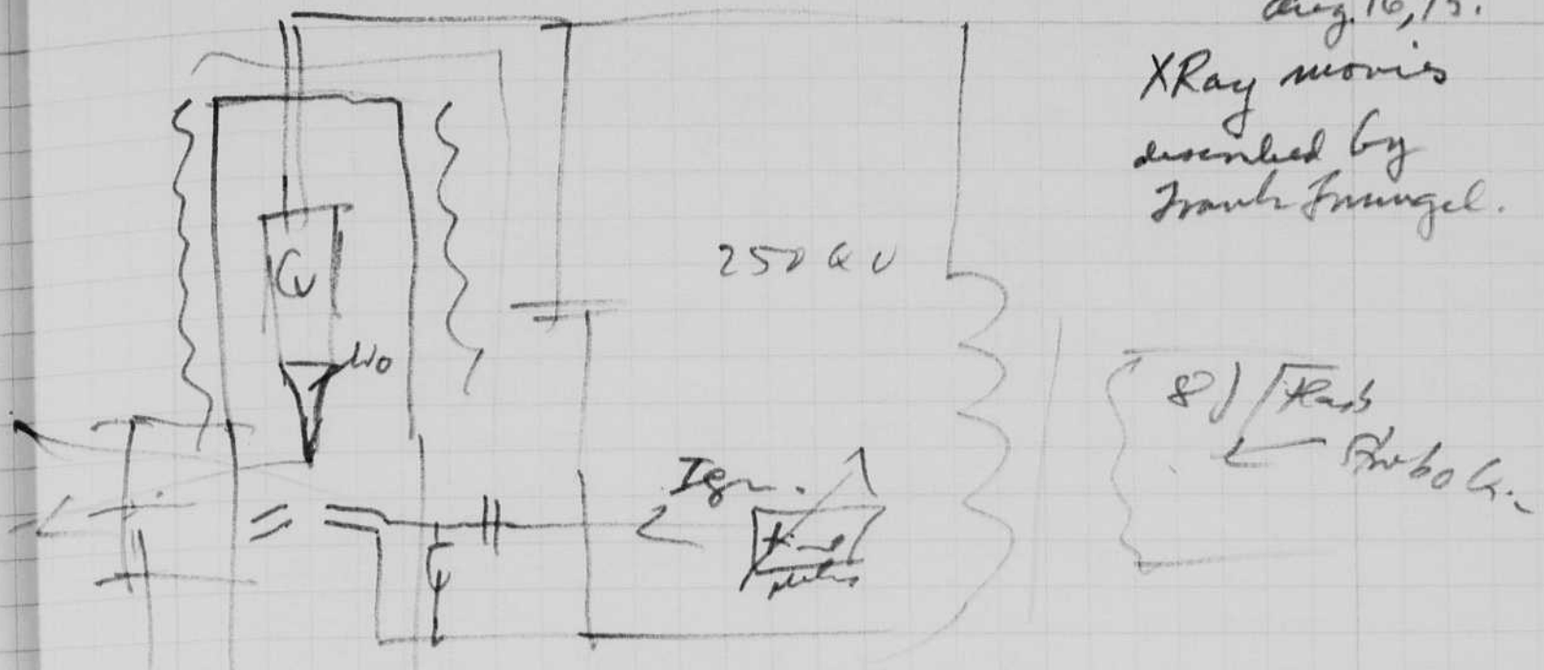
$1 \cdot 10^{-11}$ Rhodamine 1500$
± 20%

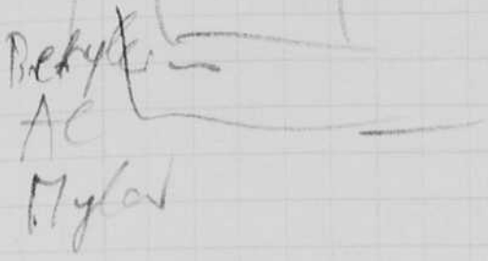
10^{-10} - 3500$
Zoom Res. Inc.
Washington

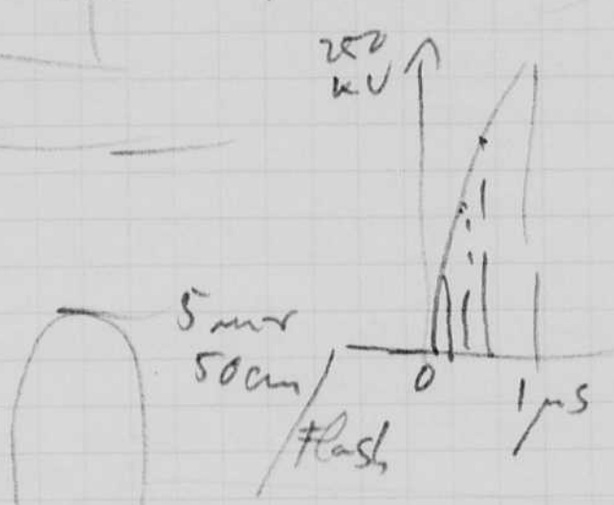
Turner Fluorometer

Aug. 16, 75.

XRay movies
described by
Frank Fruengel.

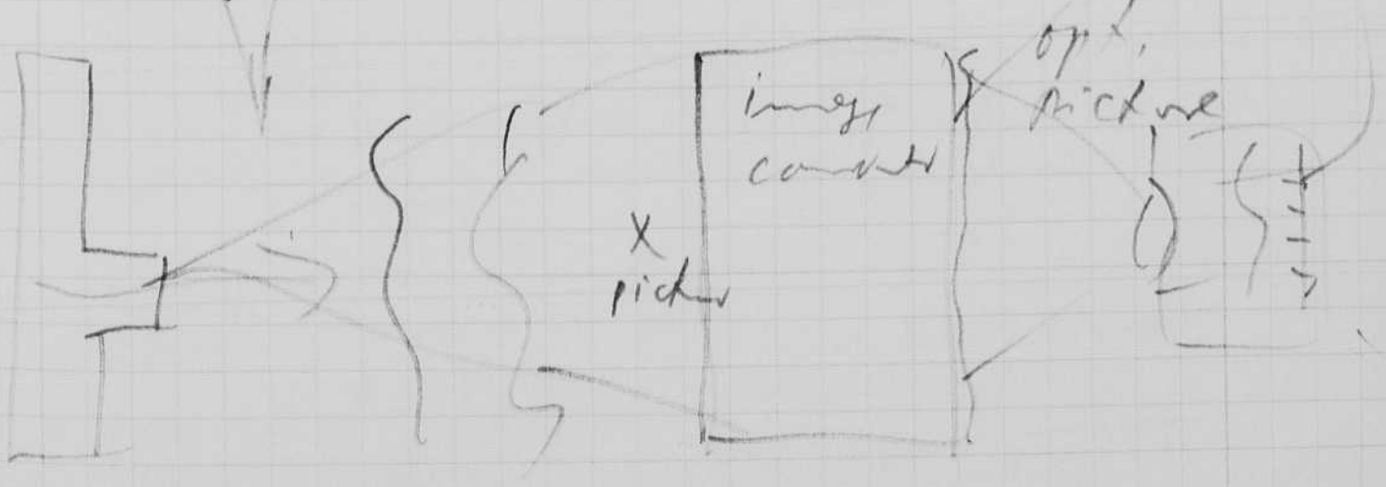






700 R
5 mr × 3000
15 R

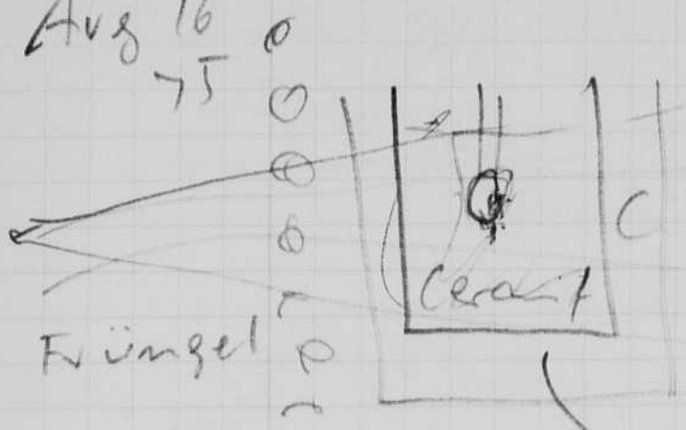
16



X-ray flashes 30 . . . 250 kV ≤ 3000/s

Aug 16

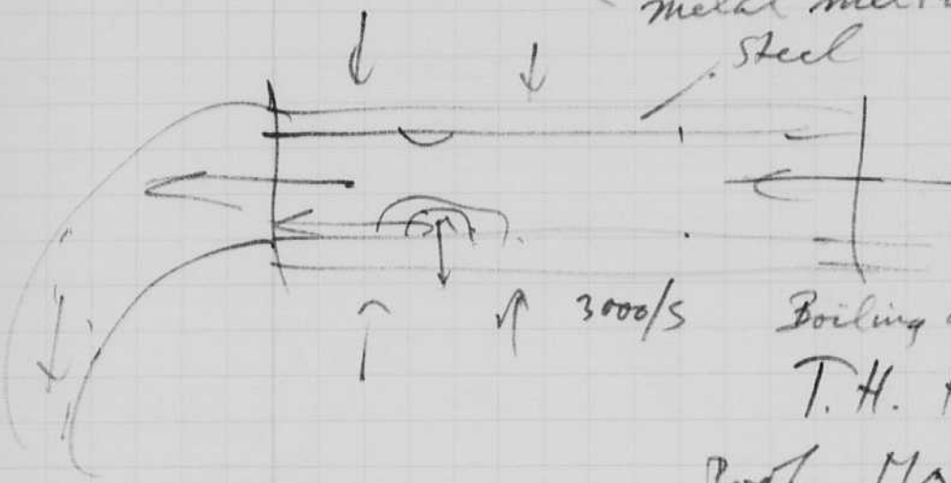
75



20 kV

15000 $

metal melting problem.
Steel too dense for x rays to show subject.

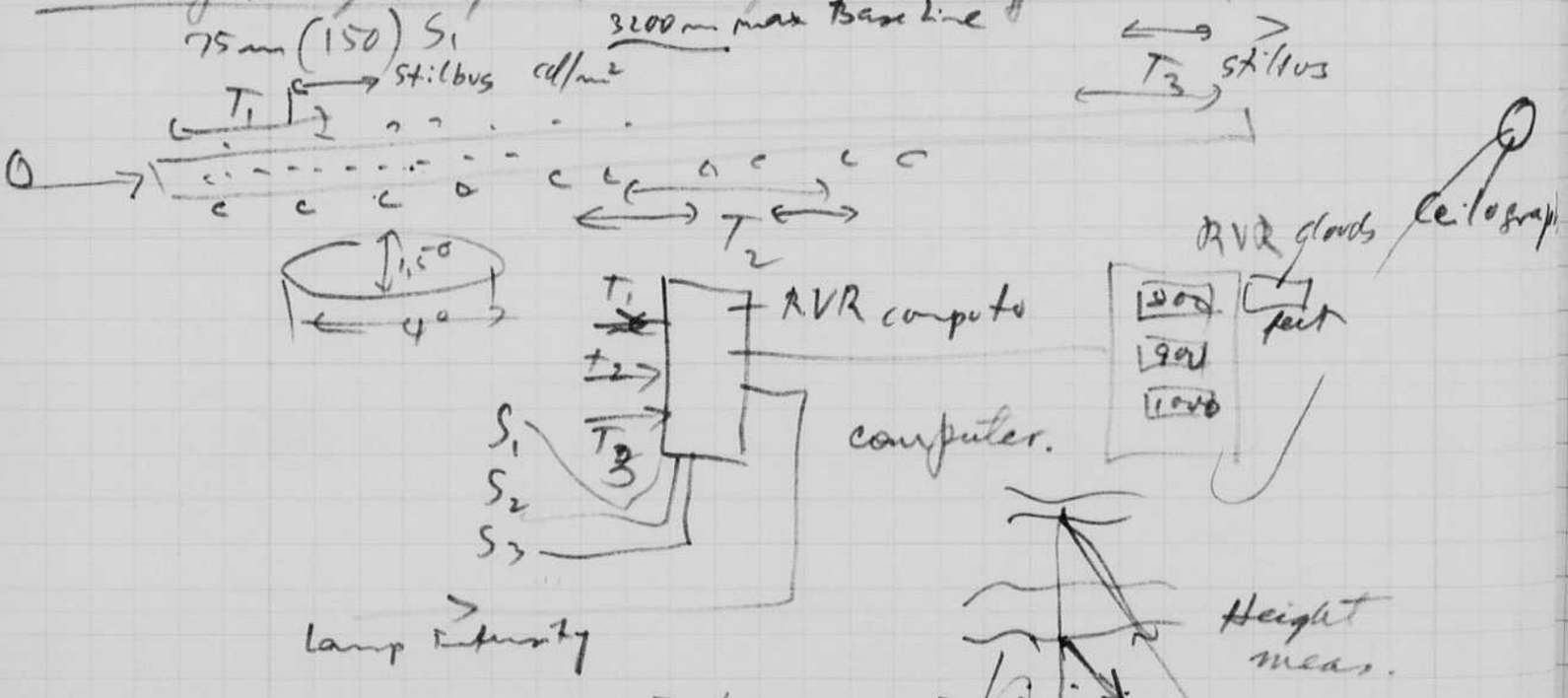


Boiling of water in reactor.

T. H. HANNOVER

Prof. MAYINGER

Distant lightning and measure of visibility.



afternoon.
Aug 16. 75

Ellen Dixon helped me to operate the 259 EGG Recorder in the charles river.

The equipment had been overboard since the Aug 13, 14 expedition to ~~Lake~~ Morey Vt. to look for remains of Sam Morey's steam boat, Aunt Sally. The drive for the blade had been slipping. I scratched the large rubber wheel with abrasive, also I disassembled the motor drive ~~pinion~~ Pinion to look for slippage. Today all ran well.

Shadow photos.

It now appears that glass plates are a must! Perhaps lantern plates will be good for the job. Check up on color sensitivity, grain, etc for trial.

Analysis of blur and diffraction indicates that are ~~have~~ over designed for small source size.

Redesign for ~~AAA~~ strobotron lamp in PK. ~~Strobosrope~~ which is 1/2" long.

1. Calculate the exposure on the film.

$$IT = \frac{CPS.}{D^2} \quad \text{Let } D = 30 \text{ cm.}$$

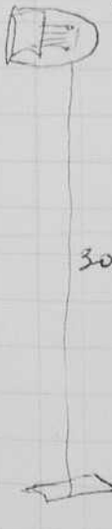
$$\frac{.5}{2^2} = IT \cong .1 \quad \frac{\text{lumen}}{\text{sq meter}}$$

$$IT = 0.1 = \frac{CPS}{(3)^2} =$$

$$CPS = \frac{0.1}{.09} = .009 \cong .01 \text{ CPS}$$

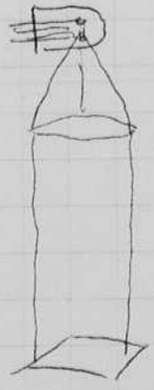
2. Design ~~Strobotron~~ circuit in PK. Strobotac with .01 c.p.s.

Edge on



Set at 30 cm from film or plate. Focate lamp with tube vertical.

3. Design lens system with parallel Light.



3. Test Mirrors, with spark source for patterns?

4 Test optical flats with Spark source. see page 136.

Aug 17 1975

Harold Edgerton

The sonar side scan records made yesterday showed a long lasting wake effect. It was a day with and wind. The water in the Charles was warm green and stagnent. It was the first time that I had noticed bubbles from a wake causing almost complete masking. Of course large boats in the ocean do this, but not small motor boats.

I went from the MIT Sail pavilion to the basking on the Boston side. My own wake from many was strong and clear on the return trip, all the way across. I have never seen this wake trail persist so long in time.

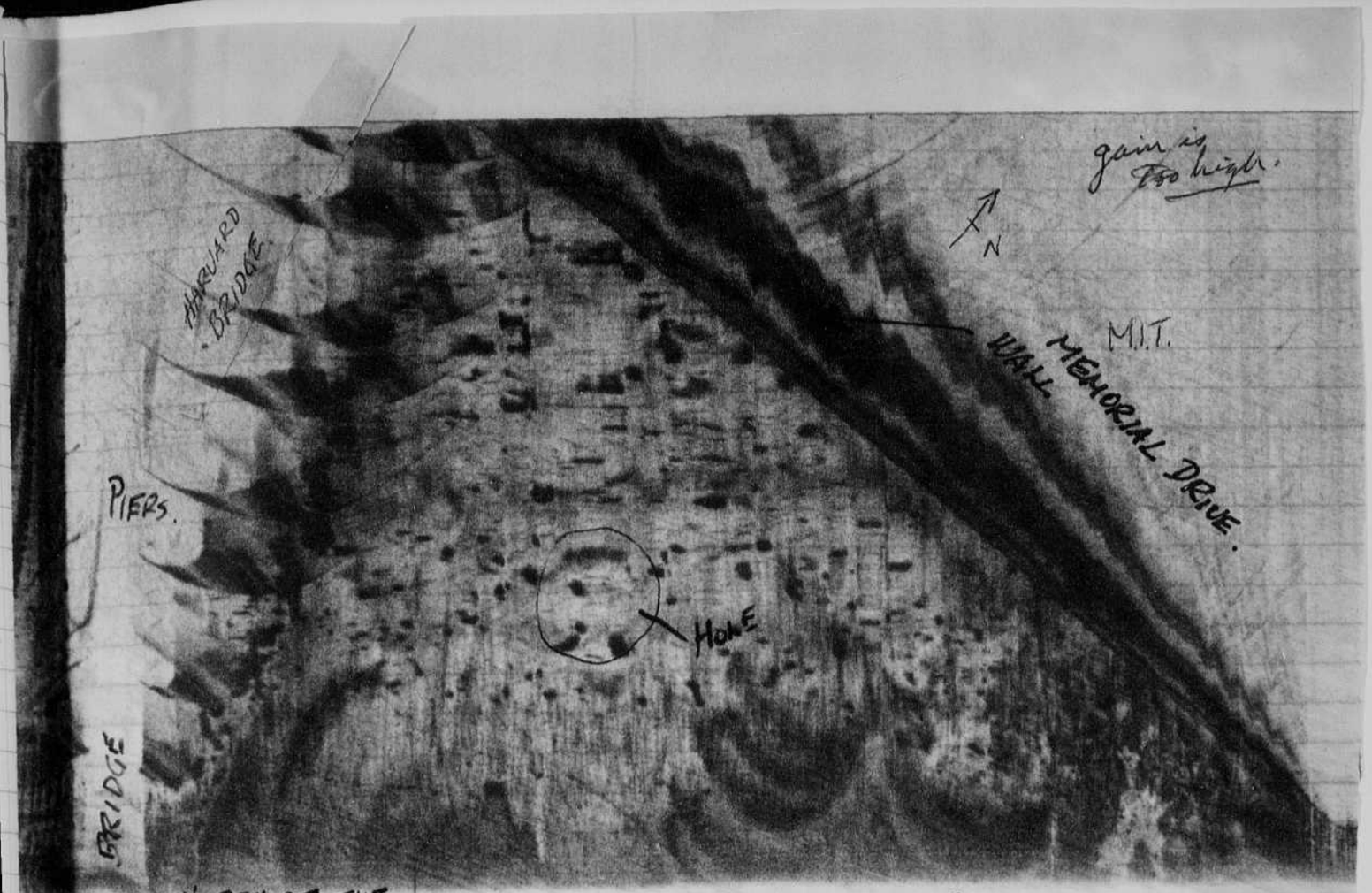
I also noted that there are very strong patch reflections from the bottom surface. At last I think they are on the surface. I tried to survey the same area twice to see if they were coherent. I could not decide. Possibly they are due to fish or pollution of some kind.

The 259 644 side scan sonar was operated from two 12 volt batteries in series. The voltmeter reads 24 volts when the equipment has operated at 200 meter range for a half hour or so. We ran the equipment about 1½ hours in the Charles.

The batteries are 50 amp hour. They should operate for 10 hours at a 5 amp rate, but the voltage may go down to less than 24 volts.

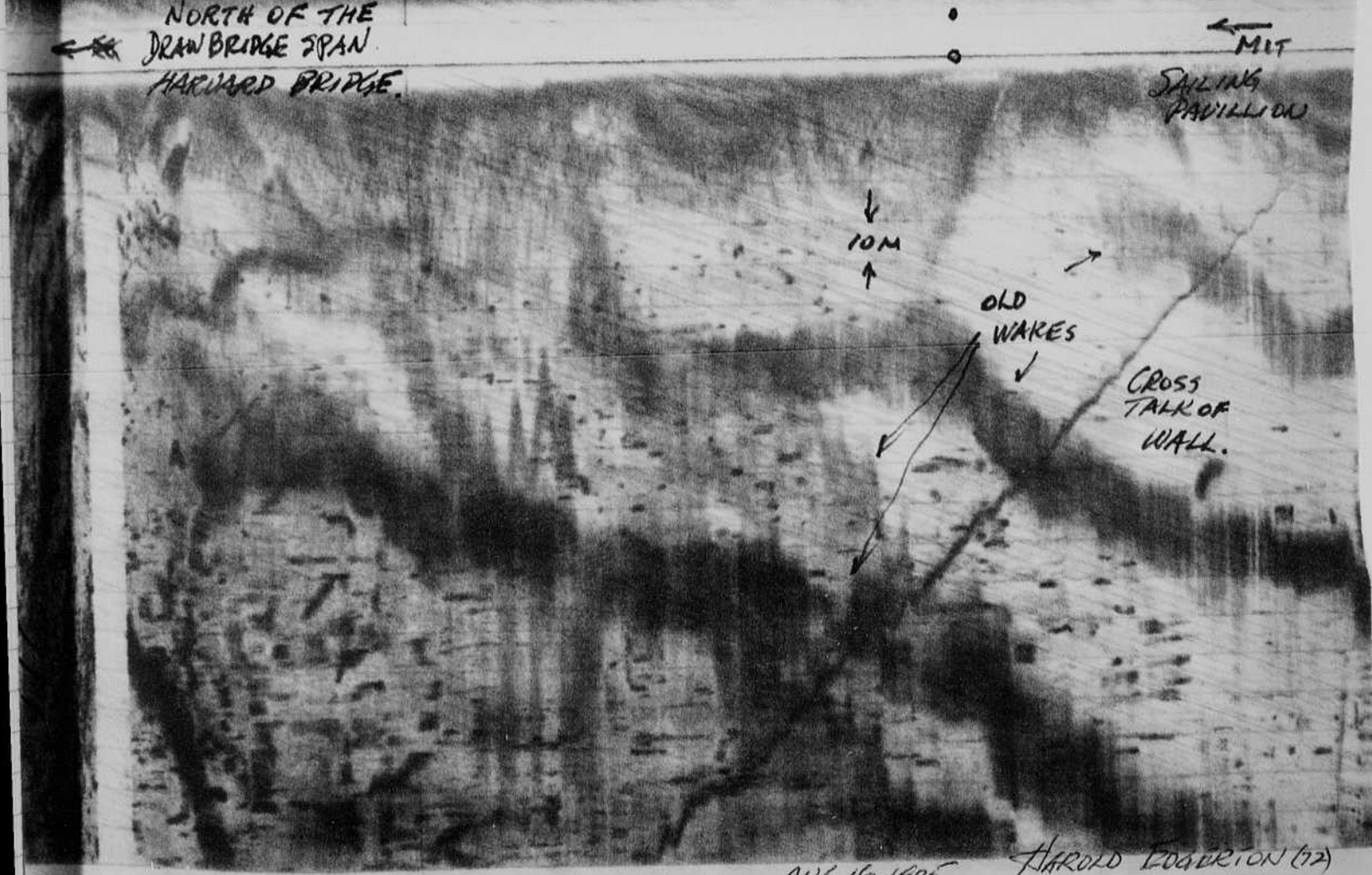
It is my impression that the operation at 25 to 24 volts is the same because of regulation of the power supplies.

The fish was opened last week after my return from West Port, mass where I had flooding with salt water. I drained the fish then by opening, reset the O ring. Blew off the excess salt water and sprayed with D-40 silacone spray. The problem was with the O ring. It was not in the groove. Operation was OK. On Aug 15, the fish was opened again. Some salt water was removed. The crevices were blown off with an air jet. The O ring was removed and inspected. Regreased and assembled. Everything seemed to work well today in the Charles.



NORTH OF THE DRAWBRIDGE SPAN HARVARD BRIDGE.

MIT SAILING PAVILLION



AUG 16 1975
CHAS RIVER
CAMBRIDGE MASS.

HAROLD EDGERTON (62)
ELLEN DIXON (11)

Aug 17 1975

Harold Edgerton

The sonar side scan records made yesterday showed a long lasting wake effect. It was a day with no wind. The water in the Charles was warm green and stagnent. It was the first time that I had noticed bubbles from a wake causing almost complete masking. Of course large boats in the ocean do this, but not small motor boats.

I went from the MIT Sailing pavilion to the landing on the Boston side. My own wake from many was strong and clear on the return trip, all the way across. I have never seen this wake trail persist so long in time.

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The 259 EG&G side scan sonar was operated from two 12 volt batteries in series. The voltmeter reads 24 volts when the equipment has operated at 200 meter range for a half hour or so. We ran the equipment about 1½ hours in the Charles.

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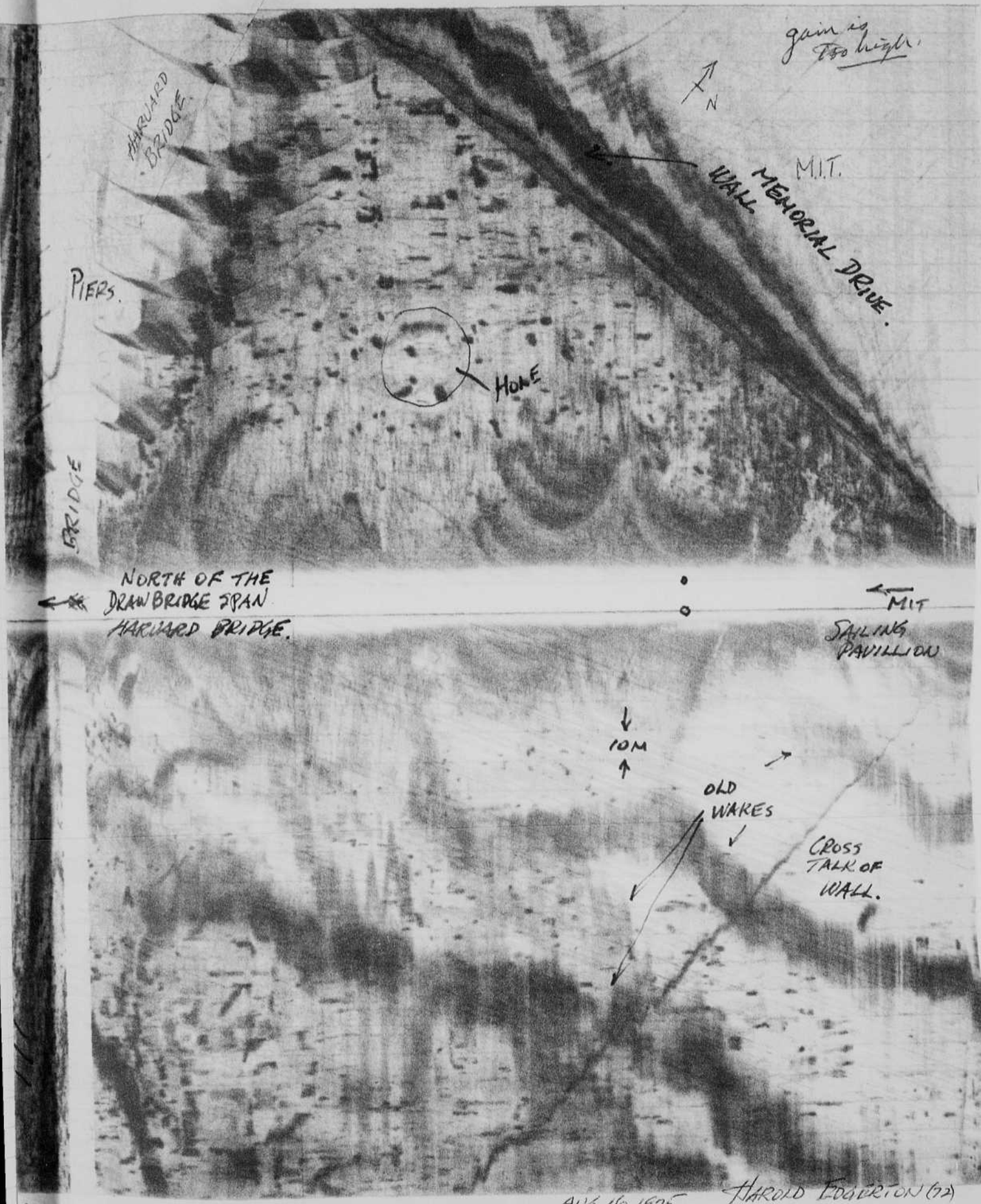

AUG 16 1995
CHAS RIVER
CAMBRIDGE MASS.

HAROLD EDGERTON (72)
ELLEN DIXON (11)

Don Miller P.O. Box 5476 Beverly Hills Calif 90210 Objoin 1, 1973 Jan
He worked with Grant & at the Eclipse. He is a photographer
I traded him an E.F. Stahl book for an african wood sculpture.