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Report No. 730

ILLUMINATION CHARACTERISTICS OF PORTABLE SPOTLIGHTS

Engineer Board Project No. EB 104

Spotlights and Floodlights, Portable

December 31, 1942

Submitted to

The Engineer Board

Fort Belvoir, Virginia

Merle E. Sutton

Engineer (Electrical)

Fort Belvoir, Virginia

Report in 8 pages and 3 appendices.

Copy 1 of 9 copies

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TABLE OF CONTENTS

[redacted]

I. SYNOPSIS

1. This report covers tests made to obtain the illumination characteristics of the several types of portable spotlights now in procurement or which may be applicable for specific uses. The work involved was to determine the beam patterns, maximum beam candlepower, weights and comparative data on the following portable spotlights.

a. Burgess, Model LM 30

b. Unity, Model S-3.

c. Lamp, Rescue and Debris, Portable.

d. Four-inch Pistol-Grip Spotlight, Portable.

e. Spotlight, Damage Control No. 9992.

2. It was desired to determine whether the Burgess Model LM 30 or any one of the other spotlights would be most suitable to satisfy the requirements as outlined in Exhibit 2, Appendix "A".

3. The results indicated that, although the Burgess Spotlight produced an excellent beam, an equal degree of performance could be obtained from the Four-inch Pistol-Grip Spotlight. Inasmuch as this latter light is now being procured for military use, it is recommended in preference to the Burgess Spotlight (a commercial light) to meet the requirements outlined in Exhibit 2, Appendix "A".

II. AUTHORITY

4. Authority for the work on the Model LM 30 Burgess Spotlight is covered by the 2nd indorsement to the basic letter on the subject "Emergency Search or Floodlights" to the Chief of Procurement and Distribution, Service of Supply, dated April 2, 1942, Exhibit 1, Appendix "A".

[redacted]

III. DESCRIPTION OF SPOTLIGHTS

5. The Burgess Model LM 30 Spotlight. This spotlight, as shown in Photograph No. 1, Appendix "B", uses two 45-volt Burgess No. M30 dry cells or equivalent connected in parallel and inclosed in a sheet steel case. The batteries operating in parallel supply power to a 22-volt, 0.9-ampere lamp capped with a black metal cap. The initial operating voltage, when using new batteries, is approximately 35 volts. The reflector diameter is five and one-half inches. Complete with batteries, the spotlight weighs seven pounds.

6. The Unity Spotlight, Model S-3. This light weighs sixteen pounds complete. For the power supply, a Willard non-spillable storage battery, supplying six volts, is used. The battery case is made of a transparent plastic material and is supported in a sheet metal lamp base. Indications of the state of charge of the battery are determined by the positions of three small balls which float in the electrolyte and are confined to a slot. When fully charged, the specific gravity of the electrolyte is sufficiently high to cause all three balls to float. As the battery becomes discharged, the balls sink one at a time until, when all three have sunk, the battery should be recharged. The general features of this spotlight are shown in Photograph No. 2, Appendix "B". Illumination is obtained by a six to eight-volt, 32-candlepower lamp capped with a small black metal cap. A five and one-half-inch diameter reflector is used.

7. Lamp, Rescue and Debris, Portable. This light, referred to as the Rescue and Debris Light, is illustrated by Photograph Nos. 3 and 4, Appendix "B". The spotlight is operated by a pistol-grip trigger-type switch. Energy for the lamp is supplied from four Ray-o-Vac No. 941 dry cells or equivalent connected in parallel to give six volts. A metal box houses the spotlight and battery case when not in use. A Mazda No. 1129, six to eight-volt, 21-candlepower lamp is used as a light source. For portable use, a shoulder harness of web material is provided to carry the battery, with connections between the spotlight and the battery being made by a phone plug and jack arrangement. The weight of the unit complete is twenty and three-quarter pounds. Without the case, the weight is ten and five-eights pounds.

8. Four-inch Pistol-Grip Spotlight, Portable. This spotlight is also of the pistol-grip trigger-switch type and is illustrated by Photograph Nos. 5 and 6, Appendix "B". Energy is supplied to a Mazda No. 1129 L, six to eight-volt, 21-candlepower bulb by a nine-volt Burgess No. 4F6H multi-cell dry battery or equal. For portable use, a shoulder harness of web material is provided to carry the battery case. Connections between the spotlight and the battery

are made by a phone plug and jack arrangement. For semi-stationary use, a stanchion-rod mounting for the spotlight as illustrated by Photograph No. 6, Appendix "B" has been provided. The weight of the unit complete is sixteen and three-quarter pounds. Without the case, the weight is eleven and three-quarter pounds.

9. Spotlight, Damage Control, No. 9292. The light used on this test was a sample similar to those being purchased by the Navy, except that six No. 6 dry cells, connected in series, are used for a source of energy instead of a storage battery. In operation, the voltage drops off rapidly from an open-circuit value of nine volts to seven volts upon application of load. The dry cells are contained in the base of the unit, and the cover supports an adjustable sealed beam light having a five-inch diameter reflector. Complete with batteries, the unit weighs fourteen pounds and is illustrated by Photograph Nos. 7 and 8, Appendix "B".

IV. PRESENT INVESTIGATION

10. The Military Police Board had need for a portable spotlight of high intensity and requested the Engineer Board to investigate the possibilities of the Burgess Model LM 30 Spotlight. The requirements that such a light must meet were enumerated in detail in Colonel Leslie L. Connett's letter of July 16, 1942, to Major W. S. Everett of the Engineer Board, Exhibit 2, Appendix "A".

11. Maximum candlepower values were determined for each type of spotlight while using an independent source of power which was held constant. The distance at which these values were determined was arbitrarily chosen to be 50 feet for convenience and uniformity in comparing the results. From the results obtained, the maximum beam candlepower was determined for each light.

12. Beam patterns were also determined for each spotlight by projecting the light upon a cross-sectioned screen and photographing the result. Each square on the screen was made six inches on a side in order to make it possible to determine at a glance the beam width in any direction with fair accuracy. This device, for comparison purposes, was found to be more satisfactory than obtaining light distribution characteristics because of the inherent irregularities in the beam patterns.

13. The rate of change of light output for each spotlight was determined by obtaining the decay characteristics as a function of

III. DESCRIPTION OF SPOTLIGHTS
IV. PRESENT INVESTIGATIONS
Pars. 8-13.

time when starting with new batteries. A Model AW, 0-5 milli-ampere Esterline-Angus continuous recorder was used in making the measurements.

14. Essentially, the tests were made to determine whether the Model LM 30 Burgess Spotlight, in particular, and the other types in general, would be satisfactory to meet the following requirements:

a. To have a narrow far-reaching beam suitable for searching brush or ravines for fugitives and lost or injured persons.

b. To have enough light for night photography, such as might be needed for night police work. For this work, the spotlight must be portable.

c. To provide emergency floodlights at watch towers for prisoners-of-war and enemy alien inclosures.

d. To provide emergency floodlight during night riots or disturbances.

15. Table I, Exhibit 5, Appendix "C", contains the important characteristics of each spotlight for comparison.

V. DISCUSSION

16. Burgess Model LM 30 Spotlight. Preliminary tests on this light were covered by a letter to Colonel Leslie L. Connett, Director, Military Police Board (Exhibit 3, Appendix "A"). The maximum beam candlepower as determined then was found to be 180,000 CP. The method of making such measurements was to apply a constant voltage, by means of a voltage stabilizer, to the light during test. In this case, the open circuit voltage value of 45 volts for new batteries was used.

17. However, in the subsequent tests covered by this report, it was found that the voltage at the lamp terminals dropped to 35 volts as the light was turned on. It, therefore, seemed more logical to determine the beam patterns and maximum beam candlepower while holding the voltage at 35 volts, and the data were taken under this condition. Consequently, the useful beam diameter and illumination would be correspondingly less than would have been the case with 45 volts applied to the spotlight. The actual values are indicated in Table I, Exhibit 5, Appendix "C".

18. The Burgess Model LM 30 is a commercial spotlight of light weight and produces a satisfactory beam pattern at 50 feet and will illuminate an area six and one-quarter feet in diameter. The diameter at 100 feet would be 12½ feet and the illumination, of course, will be less than at 50 feet, as seen on Table 1, Exhibit 5, Appendix "C".

19. The Light-Decay characteristics of this light, when starting with new batteries, are shown on curve A-3509-8, Exhibit 1, Appendix "C".

20. The Unity Spotlight, Model S-3. This light also is a commercial item and operates from a storage battery which is a distinct disadvantage as it requires recharging facilities, which, in turn, are not readily available in the field. Under the conditions of the present test, the beam candlepower was only 62.5 percent of that for the Burgess spotlight although a fairly uniform beam of small diameter was produced.

21. Lamp, Rescue and Debris, Portable. This light does not produce as intense a light beam as the Burgess Spotlight or any of the other units tested, and was not originally intended for use where a high intensity beam was to be required. It should be kept in mind that the normal operating voltage for this light is six volts. However, beam candlepower and the beam patterns were determined at both six volts and at nine volts. The beam pattern made while holding the voltage constant at nine volts is illustrated by Photograph No. 10, Appendix "B". Similarly the beam pattern made while holding the voltage constant at six volts is illustrated by Photograph No. 10A, Appendix "B". When operating the spotlight at nine volts the results were better than for the Unity Spotlight but less than for the others as seen from the data on Table I, Exhibit 5, Appendix "C". The Light-Decay characteristics with a nine-volt battery are shown on Curve A-3509-11, Exhibit 3, Appendix "C", which is the same Burgess battery, No. 4F6H, Supplied as standard with the four-inch Pistol-Grip Spotlight. As both spotlights use a lamp with the same rating, the decay curves will apply to both.

22. Four-inch Pistol-Grip Spotlight, Portable. The beam pattern, Photograph No. 11, Appendix "B", for this light is equally as good as that produced by the Burgess light (Photograph No. 13, Appendix "B"). This pattern, of course, was made while holding the supply voltage constant at the normal value of nine volts. A second beam pattern was obtained using a supply voltage of six volts (Photograph No. 12, Appendix "B"). For the decay characteristics on the light when the nine-volt battery was used, refer to curve No. A-3509-11, Exhibit 3, Appendix "C".

23. Spotlight, Damage Control No. 9992. This light produced

V. DISCUSSION
Pars. 18-23.

the most intense beam of all the units, being 15 percent greater than either the Burgess or Four-inch Pistol-Grip Spotlight. However, the dispersal of the light and the irregularity of the beam pattern (Photograph No. 14, Appendix "B") produces a result less satisfactory than was obtained by either the Burgess or Four-inch Pistol-Grip Spotlights. The Light-Decay characteristics are shown on curve No. A-3509-13, Exhibit 4, Appendix "C". Other statistical data are contained in Table I, Exhibit 5, Appendix "C".

24. General Comments. In correlating the data obtained on the various spotlights, it should be borne in mind that the various beam patterns and beam intensities were determined with a value of voltage corresponding to that which would exist at the lamp terminals with new or fully charged batteries. It is seen from the decay curves that as the lights are used, a diminishing amount of illumination would be produced. Generally, however, a compromise must be made in the choice of a battery whose voltage does not drop off too rapidly as against one which might be too heavy, in order to insure the most satisfactory operation.

25. The Burgess spotlight is a good example of what might be done to improve the performance of spotlights and, at the same time, reduce the weight of the batteries. In this case, a low amperage lamp is used with a considerable amount of over-voltage applied to obtain the maximum illumination. It is true that the life of the lamp is reduced and will require frequent replacement. An overall saving in weight of replacement batteries and lamps will result if lightweight batteries providing over-voltage for the lamps are used.

26. From the data obtained, it is apparent that the Four-inch Pistol-Grip Spotlight will equal all the performance characteristics of the Burgess spotlight, except that the initial decay of the battery causes the light output to fall off more rapidly than for the Burgess spotlight. The advantage of using the Four-inch Pistol-Grip Spotlight lies in the fact that it is already being procured for military use. The ease with which it may be carried for emergency use will satisfy the requirements set up for the Burgess spotlight.

27. In noting the decay characteristics for the different types of spotlights it is apparent that the relative light output decreases rapidly as a function of time. Any of the spotlights which are suitable for taking photographs with new batteries would have their value, for such a use, decrease proportionately to the decay characteristics.

28. For photographic use the ten foot-candles of illumination produced at one hundred feet, (Table I, Exhibit 5, Appendix "C") by either the Burgess Spotlight or the Four-inch Pistol-Grip Spotlight would require an exposure time of 1/15th second when using XX film having a film speed of "64 tungsten" and when using a lens stop value of f. 1.9. However, it is estimated that if the target should be

V. DISCUSSION
Pars. 23-28.

moving across the beam one hundred feet away at a rate of 15 feet per second the exposure time, using the same film as mentioned above, would have to be 1/30th second to obtain a good photograph. Therefore, the exposure time of 1/15th second would be too long for a "stop-action" photograph where the target was moving across the beam but would be satisfactory where it was stationary or moving into the light beam or away from it.

29. It has been noted that the relative light output decreases as a function of time due to the decay characteristics of the spotlight batteries, consequently the usefulness of the spotlights for photographic purposes would diminish proportionally to the corresponding decrease in the relative light output. Therefore, the value of ten foot-candles at one hundred feet would apply only with new batteries. After a seven-minute period of use the illumination from the Burgess spotlight will be 60% of the original illumination which, of course, will produce 6 foot-candles and would require an exposure time of 1/10th second.

30. After a period of fifty minutes continuous operation the photographic usefulness of the Burgess Spotlight will have decreased to such an extent that its range for such purposes will be limited to twenty-five feet. Similarly the Four-inch Pistol-Grip Spotlight will have its photographic range reduced to thirty feet after fifty minutes of continuous operation. In general, therefore, although the spotlights may serve in an emergency to take photographs the effective ranges for such a purpose will vary greatly with the degree of active life remaining in the batteries.

VI. CONCLUSIONS

31. As a result of the tests made, it is concluded that:

a. The Burgess Model LM 30 Spotlight has an excellent high intensity beam, with a beam candlepower of 100,000 at 35 volts. At a distance of 100 feet, the illumination is 10-foot-candles with new batteries, and could be used for emergency, but not for general photographic purposes. However, as the life of the battery is consumed, the effective ranges for photographic purposes will be decreased.

b. The Four-inch Pistol-Grip Spotlight, which is already being procured for military use, is equally as satisfactory as the Burgess Model LM 30 Spotlight.

c. The Rescue and Debris Spotlight as it now exists, has

V. DISCUSSION
VI. CONCLUSIONS
Pars. 28-31.

a low intensity beam.

d. The relative light output in percent of maximum, as a function of time, for each of the spotlights falls off rapidly, therefore the time that any given spotlight might be useful for any particular service, such as photography, would be limited.

e. The Damage Control light has an excellent high intensity beam, but rather irregular, with considerable spread. The unit is too bulky and heavy for satisfactory portability.

f. Considerable improvement in existing spotlights could be made by coordinating battery and lamp ratings to obtain maximum performance for a given set of requirements.

VII. RECOMMENDATIONS

32. The following recommendations are made:

a. That the Four-inch Pistol-Grip Spotlight be used for emergency spotlighting instead of the Burgess Model LM 30 spotlight.

b. That the illumination from the Burgess Model LM 30 or the Four-inch Pistol-Grip Spotlights be considered as unsatisfactory for night photography.

Submitted by:
Merle E. Sutton
Merle E. Sutton,
Engineer (Electrical).

Approved by:
James T. Mercereau
James T. Mercereau,
Lt. Col., Corps of Engineers.

VI. CONCLUSIONS
VII. RECOMMENDATIONS
Pars. 31-32.

LIST OF APPENDICES

Exhibit 3.....Curve No. A-3509-11

Light Decay characteristics for Rescue and Debris Portable Spotlight Operating from Nine-Volt Burgess 4F6H Battery.

Exhibit 4.....Curve No. A-3509-13

Light Decay characteristics for Damage control Spotlight.

Exhibit 5.....Table I.

Comparative Data.

APPENDIX "A"

Exhibit 1

Letter from Military Police Board, South Post, Fort Myer, Virginia, to Chief of Procurement and Distribution, Service of Supply, dated April 2, 1942, with indorsements 1 to 7.

Exhibit 2

Letter from Military Police Board, South Post, Ft. Oglethorpe, Georgia, to Major W. S. Everett, dated July 18, 1942.

Exhibit 3

Letter from OCE to Colonel Leslie L. Connett, Director, Military Police Board, South Post, Fort Oglethorpe, Georgia, dated August 10, 1942.

Exhibit 1, APPENDIX "A"

WAR DEPARTMENT
MILITARY POLICE BOARD
SOUTH POST, FORT MYER, VIRGINIA

PMG 470.3 April 2, 1942

SUBJECT: Emergency Search or Flood Lights.

TO: Chief of Procurement and Distribution, Service of Supply (Thru Office of The Provost Marshal General).

1. The Burgess Battery Company, Freeport, Illinois has produced a portable search-light known as Burgess No. LM 30 which uses two of their M 30 (45 volt multu-ply) batteries wired in parallel and is claimed to produce 180,000 beam candle power for a period of approximately 35 minutes before exhaustion of batteries. Complete unit weighs 6 pounds, 14 ounces.

2. The Military Police Board is interested in the above, or similar lights, for experimental use with a view to possible development of a portable light for use in emergencies, including night photography and motion pictures where time and facilities will not permit lighting of magnesium flares or running extension wires to regular lighting circuits.

3. Information is requested as to whether the Burgess LM 30 portable search-light or similar light is available from any War Department source.

/s/ Leslie L. Connett
Leslie L. Connett,
Lieutenant Colonel, C.M. P.,
Director, Military Police Board.

PMG 070 1st Ind.

War Department, S.O.S., P.M.G.O. Temporary Building "H", 23rd and C Streets, N.W., Washington, D. C. April 6, 1942. To: The Chief of Procurement and Distribution, Services of Supply.

C.M.

C O P Y

414.51 (EB 104)

SP 470.31 (4-2-42)
Subject: Emergency Search or Flood Lights.

2nd Ind.

War Department, Headquarters, Services of Supply, Washington, D. C.
To: The Chief of Engineers.

1. The Chief of Engineers will procure one (1) of the commercial type portable search-lights, mentioned in basic communication, for test by the Engineer Board.

2. For this purpose, direct communication between the Chief of Engineers and The Provost Marshal General is authorized.

For the Commanding General:

O. H. SEARCY,
Colonel, General Staff Corps.
Chief, Requirements Division.
/s/ A. C. McAULIFFE
A. C. McAULIFFE
Colonel, G. S. C.
Chief, Development Br., Req. Div.

Incl.
Ltr fm OFc of The Provost Marshal Gen., Ft. Myer 4-2-42, to Ch/Proc & Dist. w/1 ind.

470.31A-112 SUBJECT: Emergency Search or Flood Lights.

3rd Ind. SPESD

Office, C. of E., Rm. 2116 New War Dept. Bldg. (Dev.), 21st St. & Va. Ave., N.W., April 24, 1942. - TO: The President, the Engineer Board, Fort Belvoir, Virginia.

For compliance with 2nd Indorsement.

By order of the Chief of Engineers:

F. S. Besson, Jr.,
Major, Corps of Engineers,
Chief, Development Branch, Supply Division.

C O P Y

414.51 (EB 104)

470.31A-112
EB: 414.51 (EB 104) 4th Ind.

The Engineer Board, Fort Belvoir, Virginia, May 12, 1942.
To: THE CHIEF OF ENGINEERS, U. S. ARMY.

1. 2nd Indorsement is being complied with.

2. The Engineer Board has developed a Rescue and Debris Lamp, Portable, covered by the inclosed Corps of Engineers, Tentative Specification T-1250. It is believed that this lamp may fulfill the requirements given in paragraph 2 of the basic letter. It is understood that this lamp is now in procurement by the Office, Chief of Engineers.

For the Board:

/s/ William C. Baker, Jr.
William C. Baker, Jr.,
Lt. Col., Corps of Engineers,

1 Inc.
Tent.Spec.
No. T-1250 (dupl.)

470.31A-112 SPESD SUBJECT: Emergency Search or Flood Lights.

5th Ind.

Office, C. of E., Rm. 2116, New War Dept. Bldg., (Dev.), 21st & Va. Ave., N.W., May 26, 1942. - TO: HEADQUARTERS, SERVICES OF SUPPLY.

1. Forwarded.

2. This office has purchased a small number of lights conforming to Corps of Engineers Tentative Specification No. T-1250, for the British under Defense Aid. No lights of this type are available in the Corps of Engineers. These lights were manufactured by the Falge Engineering Service, Washington, D. C.

For the Chief of Engineers:

/s/ F. S. Besson,Jr.

F. S. Besson, Jr.,
Major, Corps of Engineers,
Chief, Development Branch, Supply Division.

1 Incl. (dup.)
n/c

C O P Y
414.51 (EB 104)

SUBJECT: Emergency Search or Flood Lights.

SPRMD 470.31 (4-2-42) 6th Ind. FAK/rjh
Ext. 71795

Headquarters, Services of Supply, Washington, D. C.
To: Provost Marshal General

1. The Engineers have purchased one of the Portable Search-Lights mentioned in the basic communication. This unit is to be tested by the Engineer Board at Fort Belvoir.

2. It is suggested that possibly the Rescue and Debris Lamp, Portable, developed by the Engineer Corps, may be suitable for your requirements.

3. Your attention is directed to paragraph 2 of the 2nd Indorsement.

By command of Lieutenant General SOMERVELL:

C. H. SEARCY,
Colonel, General Staff Corps,
Director, Requirements Division.

1 Incl. n/c
(Dup. withdrawn)

SPMGM 470.3 7th Ind. JMG/cem

War Department, SOS, P.M.G.O., Military Police Division, Washington, D.C., June 4, 1942. TO: Military Police Board, South Post, Ft. Myer, Virginia.

Forwarded.

For The Provost Marshal General:

/s/ Lee Thompson
Captain, C. M. P.
Executive, Military Police Division.

1 Incl. n/c

C O P Y

414.51 (E - 104)

Exhibit 2, APPENDIX "A"

C O P Y

WAR DEPARTMENT

MILITARY POLICE BOARD

South Post, Fort Oglethorpe, Ga.

July 18, 1942

Major W. S. Everett
Director Engineer Board
Ft. Belvoir, Virginia

Dear Major Everett:

Please note attached copy of letter from this office on "Emergency Search or Flood Lights" and 7 inds. thereto. I know that you and your Board are far and away better informed on these matters than we are, so I want to write you personally the ideas I have in mind and if you think it advisable to put them in an official form that can be done. Paragraphs a to c, incl., are established needs. Paragraphs d and e are just my ideas.

a. In Military Police work we frequently need a bright light that can be taken away from the vehicle in order to search rough ground, brush and ravines for fugitives, search for injured or lost persons, search ponds or beaches for drowned persons. The brighter the better. Narrow, far reaching beam usually preferable.

b. In traffic investigations at night we frequently need, in addition to light required to search debris, enough light for photography. In this work we could usually get the police vehicle close enough to use the car's electrical supply for power but if we did, would require a long extension cord and far more light than an ordinary spot light gives.

c. In prisoner of war and enemy alien inclosures watch towers should be provided with emergency flood or search-lights for use in case of failure of regular power supply

d. In guarding areas, warehouses, industrial plants, etc., it would sometimes be advisable to put on a man equipped with a camera or motion picture camera and a light that would be of sufficient brilliancy to take a good photograph at a hundred feet or more. Flash bulbs will not do even for the "still" camera because the prowler may be running and with the

light you must first locate him then point camera and photograph. At present our fastest photographic set-up is a motion picture camera with an F 1.9 lens and X X film (Weston rating: 100 daylight 64 Tungsten), at regular speed exposure is 1/30 second. To take a photo of a running man at 100 feet clearly enough for subsequent identification will require a very bright light. If it had a medium spread when initially turned on (searching period) that could instantly, by trigger or button, be narrowed to a bright beam of say 15 feet diameter 100 feet from lamp for taking the photograph or motion picture, I should think it would be ideal. The only object in narrowing the beam is to increase light on the subject, and it must not be so narrow that the subject can not be kept in it. A dark skinned subject in dark clothes would take a very brilliant light.

e. We have had before and will have again, night riots and disturbances. If they are industrial in our own country, our Military Police Bn's., (ZI), will probably be helping to control them. If they are in occupied countries other Military Police units will be there. These things start suddenly. There is no time to hook up wires to commercial current, if there is any, nor to emplace flares and reflectors. If we can take motion pictures of riots of this nature at range of 100 feet or more, and these pictures are clear enough to show both identity and actions of individuals, we can soon gather in the gorillas, brick throwers and other key men. We can also soon pick out those individuals who make a habit of being active in riots.

Whether qualifications to meet all these ideas can be combined in one light with a compact energy source so that one man could carry batteries, carry and operate the light, and a camera too, I do not know. Would be glad to have opinion of your experts.

There are a number of so-called police searchlights on the market but I do not know of one that will do the work I want unless it is the Burgess L.M. 30 I spoke of. Burgess Company admits their reflector is not so good for photography. Could it be improved so as to help?

Would it be possible for me to see your Burgess lamp report and know your opinion of the Rescue and Debris Lamp, portable, for our purposes as compared to the Burgess?

Very truly yours,

/s/ Leslie L. Connett

LESLIE L. CONNETT
Colonel, C.M.P.
Director

C O P Y
414.51 (EB 104)

C
O
P
Y

Exhibit 3, APPENDIX "A"

WSE/mw

August 10, 1942

414.51 (EB 104)
323.7 (Oglethorpe)

Colonel Leslie L. Connett
Director, Military Police Board
South Post, Fort Oglethorpe, Georgia

Dear Colonel Connett:

Inasmuch as the Electrical Engineering Section of the Engineer Board has been handling all matters pertaining to searchlights and floodlights, information on which to base a reply to your letter of July 18 was obtained from that section.

Major James T. Mercereau, who is in charge of all searchlight work, has made the following comments with reference to your letter and to the correspondence on "Emergency Search and Flood Lights" attached thereto:

"1. Preliminary findings of the Engineer Board.-

a. The Burgess LM 30 Spotlight has an excellant high intensity narrow beam.

b. The beam candlepower checks the claimed value of 150,000 with new batteries.

c. The beam spread is approximately 8°. This covers a field of approximately 14 feet in diameter at a distance of 100 feet.

d. At a distance of 100 feet the illumination is 18 footcandles. Using a sensitive film with a Weston rating of 64 for tungsten and an exposure of 1/30 second, the lens stop should be set at 1.9.

e. The physical characteristics are, in general, quite good. The lamp is comparatively light in weight and readily portable. The switch is easily accessible. The main disadvantages are that it uses a special lamp and battery that are not standard military equipment.

f. A desirable feature that could be incorporated would be a two position socket for spot and flood beam.

2. Additional data to be obtained. -

a. Light distribution across the beam when lamp is operated from a constant voltage supply.

b. Decay characteristics of the batteries.

3. General Comments.-

Complete characteristics have not been previously determined on the Rescue and Debris Lamp; however, we are making complete tests on one at present. A complete report on the Burgess light will be available before long, together with comparative comments and opinion on the Rescue and Debris Lamp with respect to Military Police requirements. It is our present thought, as pointed out under 1 f. above, that a change could be made in the Burgess Light to incorporate a two position socket to provide a spot and flood beam, if necessary."

For the Board:

Warren S. Everett,
Major, Corps of Engineers,
Chief, Blackout and Traffic
Control Section.

2 Incls.
Copy of ltrs. from M.P.B.
to Engr. Bd.,date 7/18/42.
Copy of ltr. from M.P.B.
to OCE date 4/2/42 w/ind.1-7

APPENDIX "B"

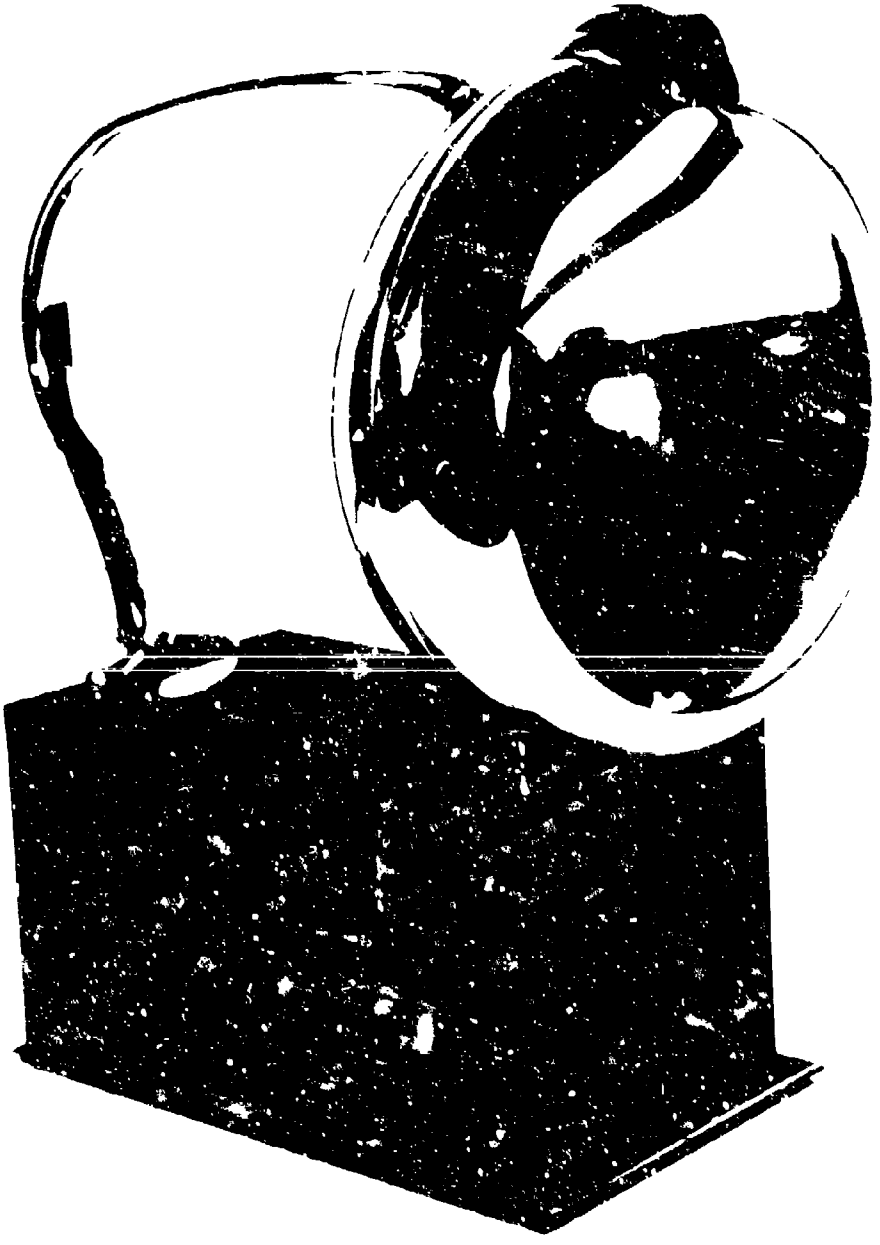
Photographs:

Equipment

Burgess Spotlight Model LM 30	No. 1
Unity Spotlight Model S-3	No. 2
Lamp, Rescue and Debris, Portable	Nos. 3 and 4
Four-inch Pistol-Grip Spotlight, Portable	Nos. 5 and 6
Spotlight, Damage Control No. 9992	Nos. 7 and 8

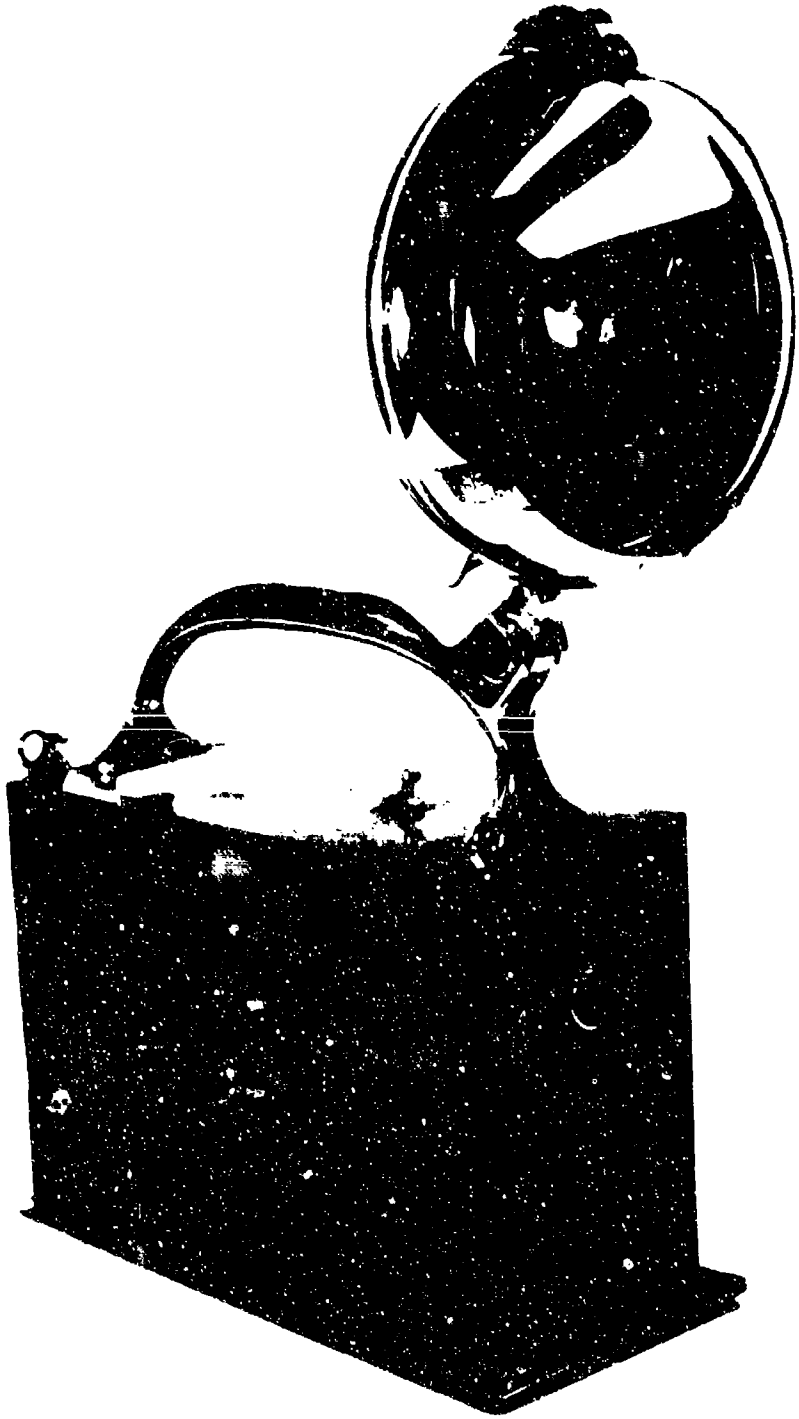
Beam Patterns

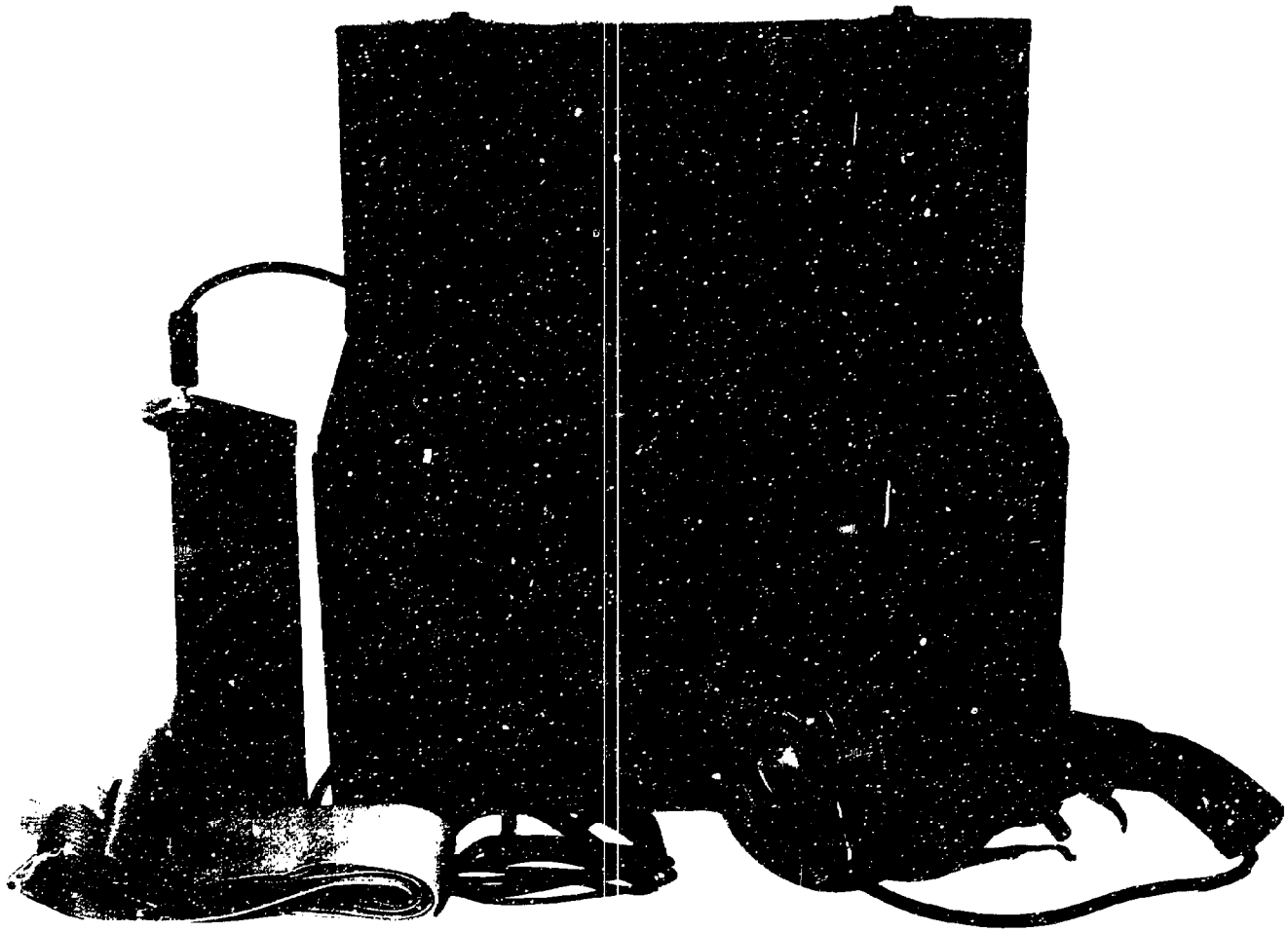
Burgess Spotlight Model LM 30	No. 13
Unity Spotlight Model S-3	No. 9
Lamp, Rescue and Debris, Portable	Nos. 10 and 10A
Four-inch Pistol-Grip Spotlight, Portable	Nos. 11 and 12
Spotlight, Damage Control No. 9992	No. 14



Burgess Spotlight
Model LM 30

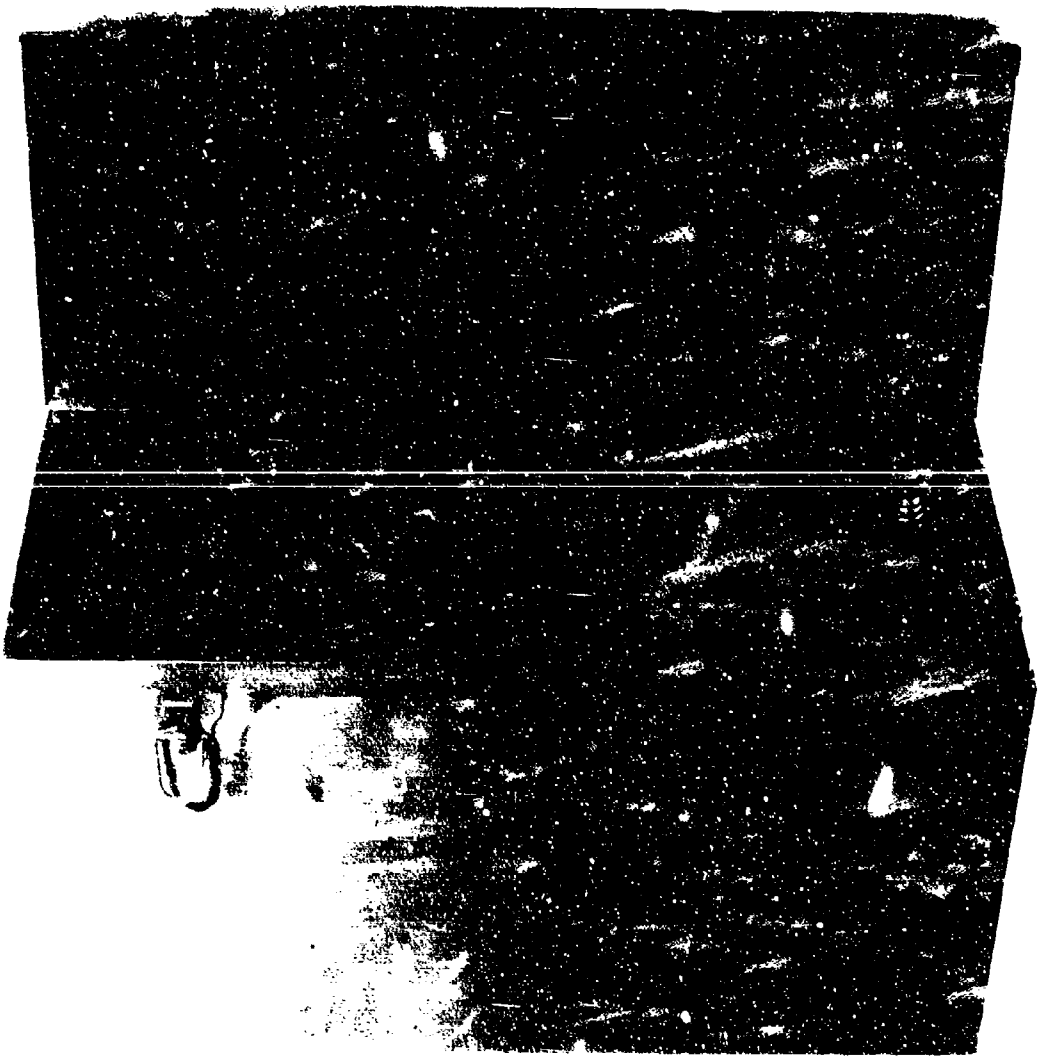
Photograph 1 Appendix B





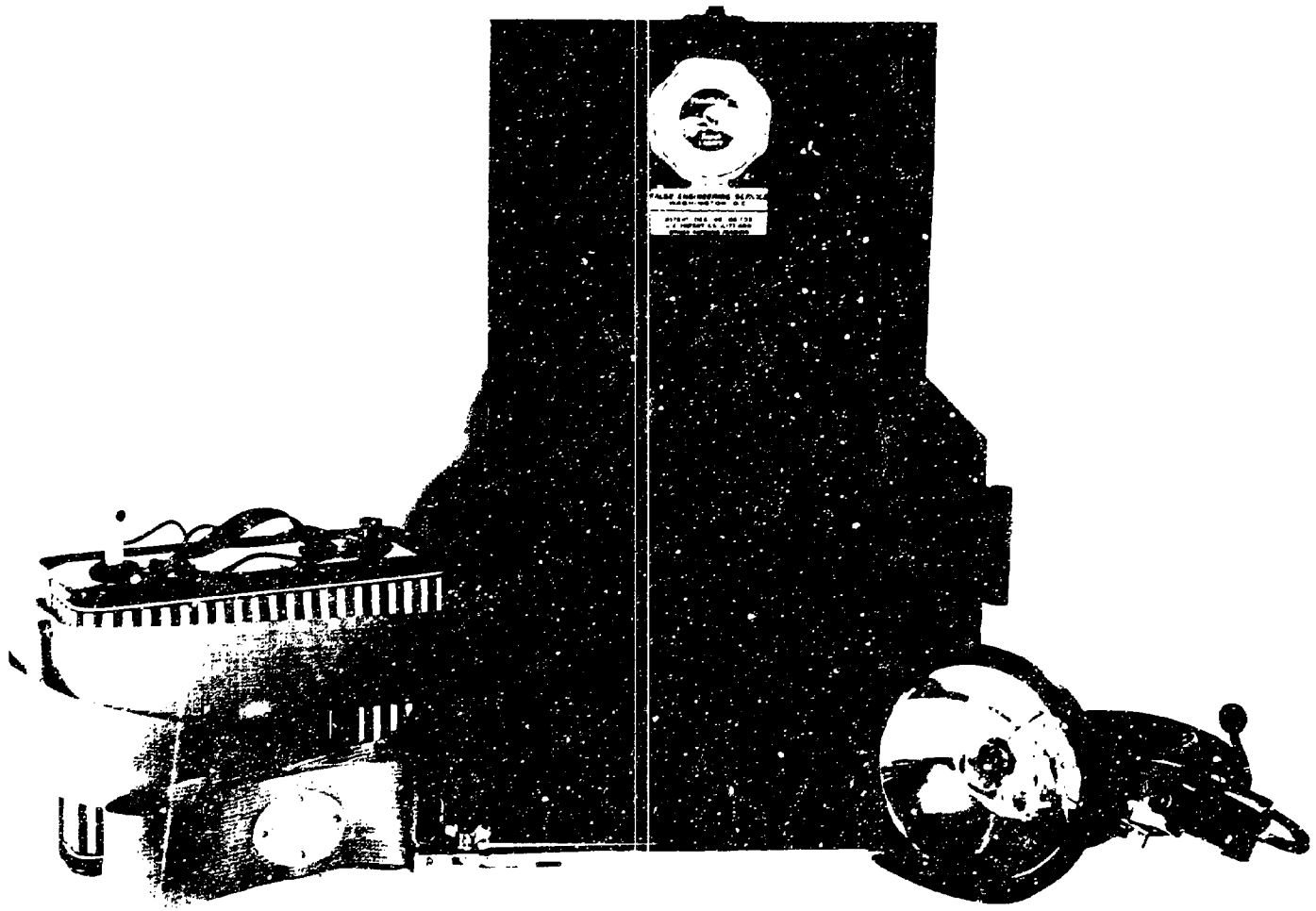
Lamp, Rescue and Debris, Portable

Photograph 3 Appendix B



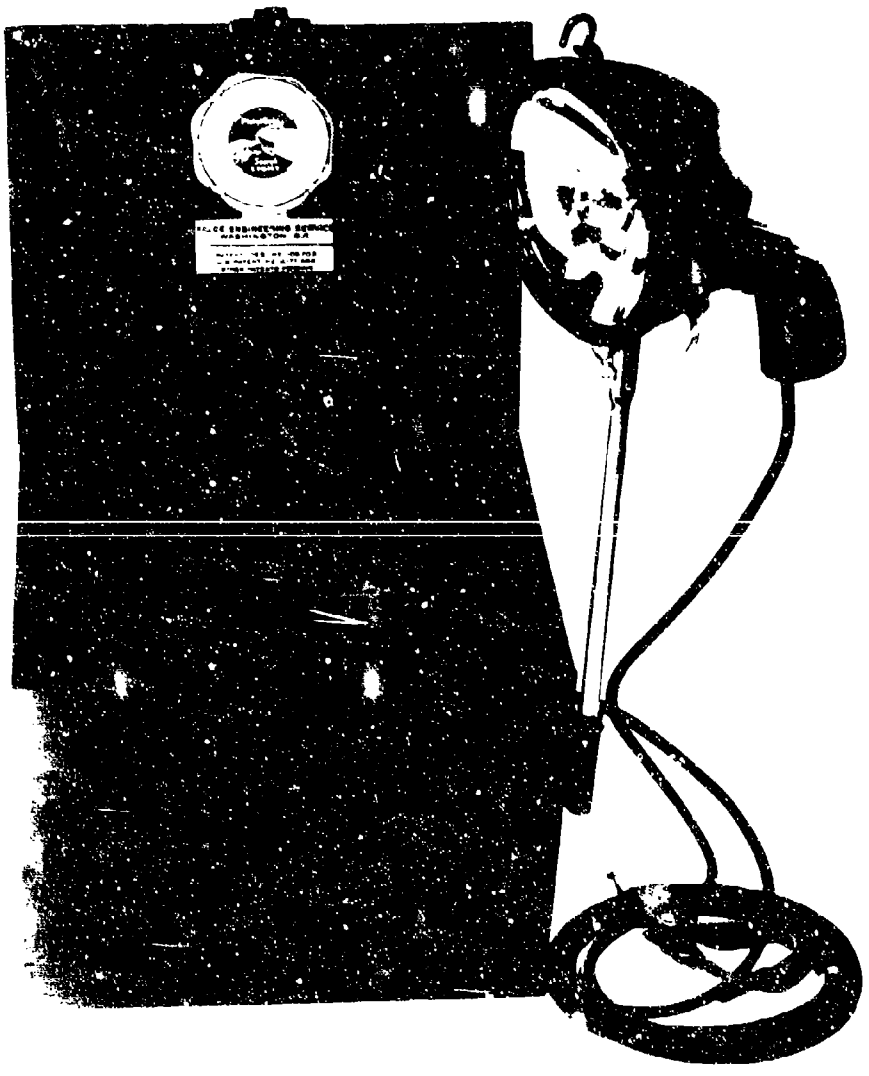
Lamp, Rescue and Debris, Portable

Photograph 4 Appendix E



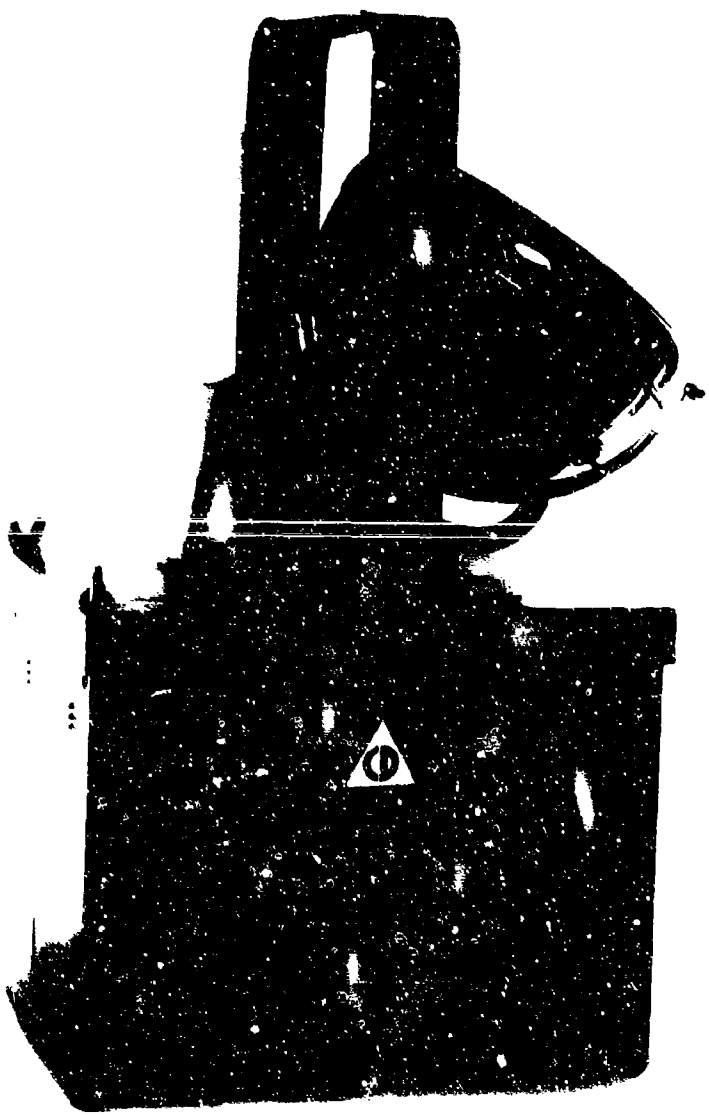
[illegible] Hand-Held Spotlight, Portable

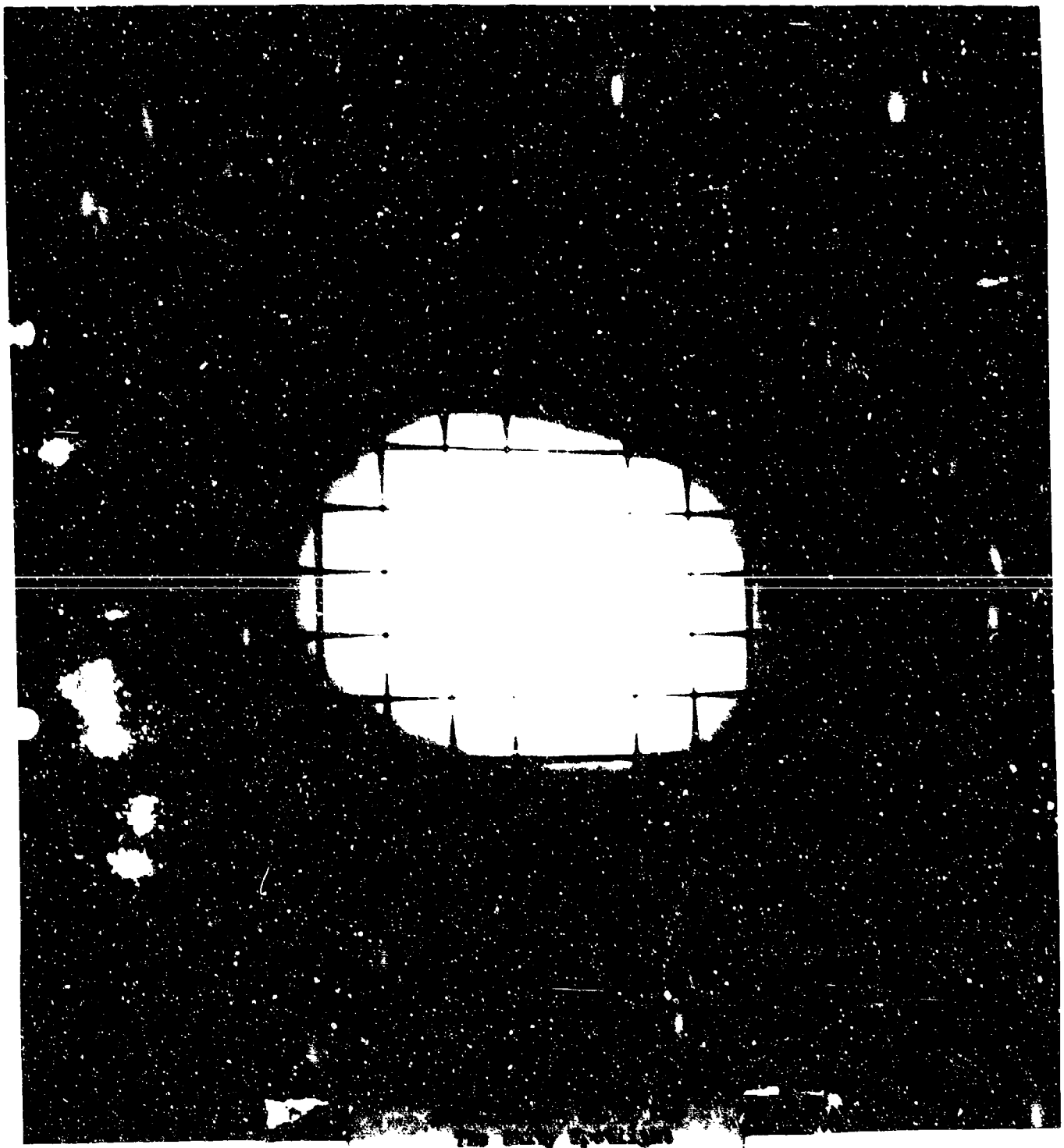
Photograph



Spotlight, Damage Control
No. 9992

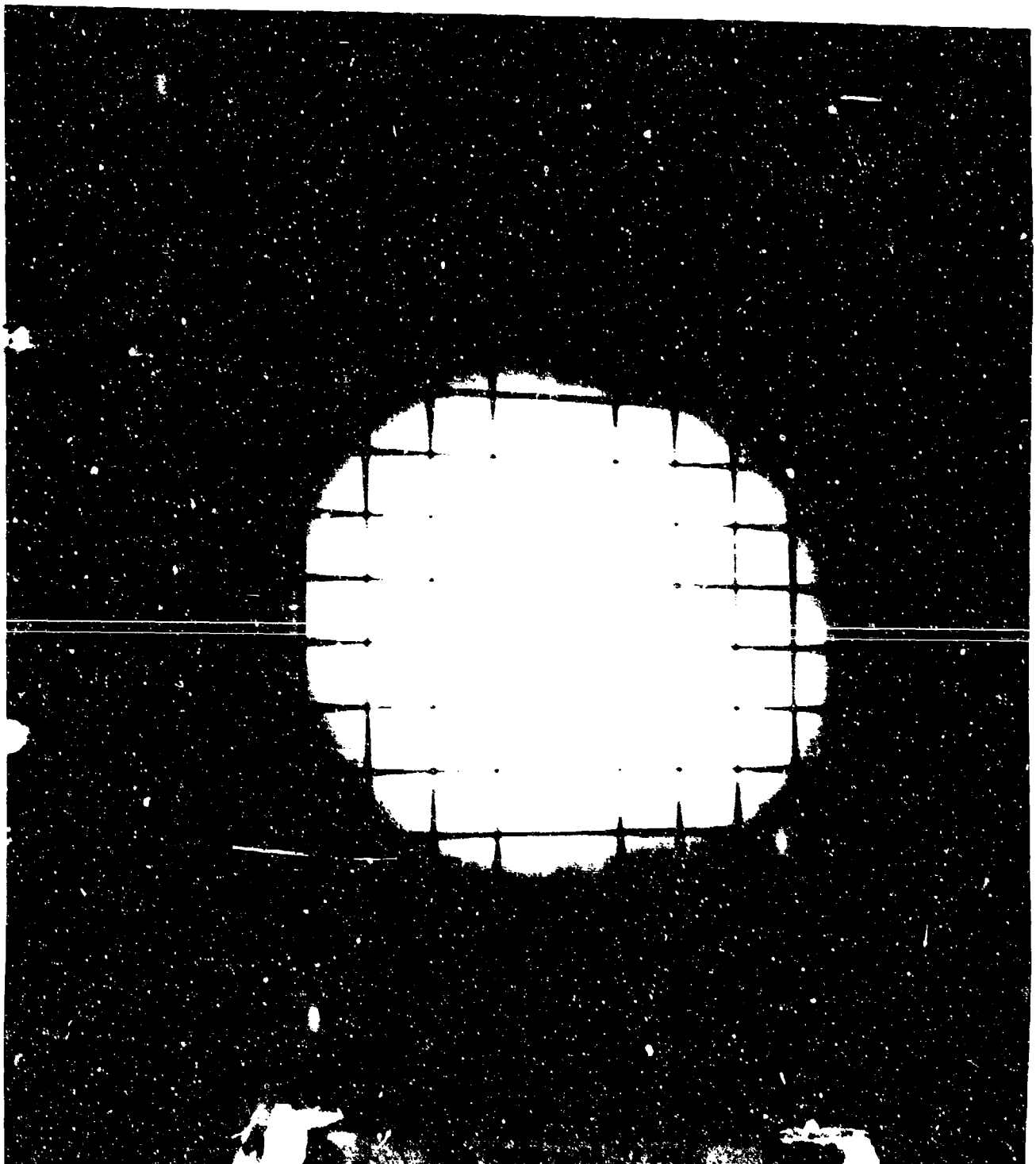
Photograph 7 Appendix B





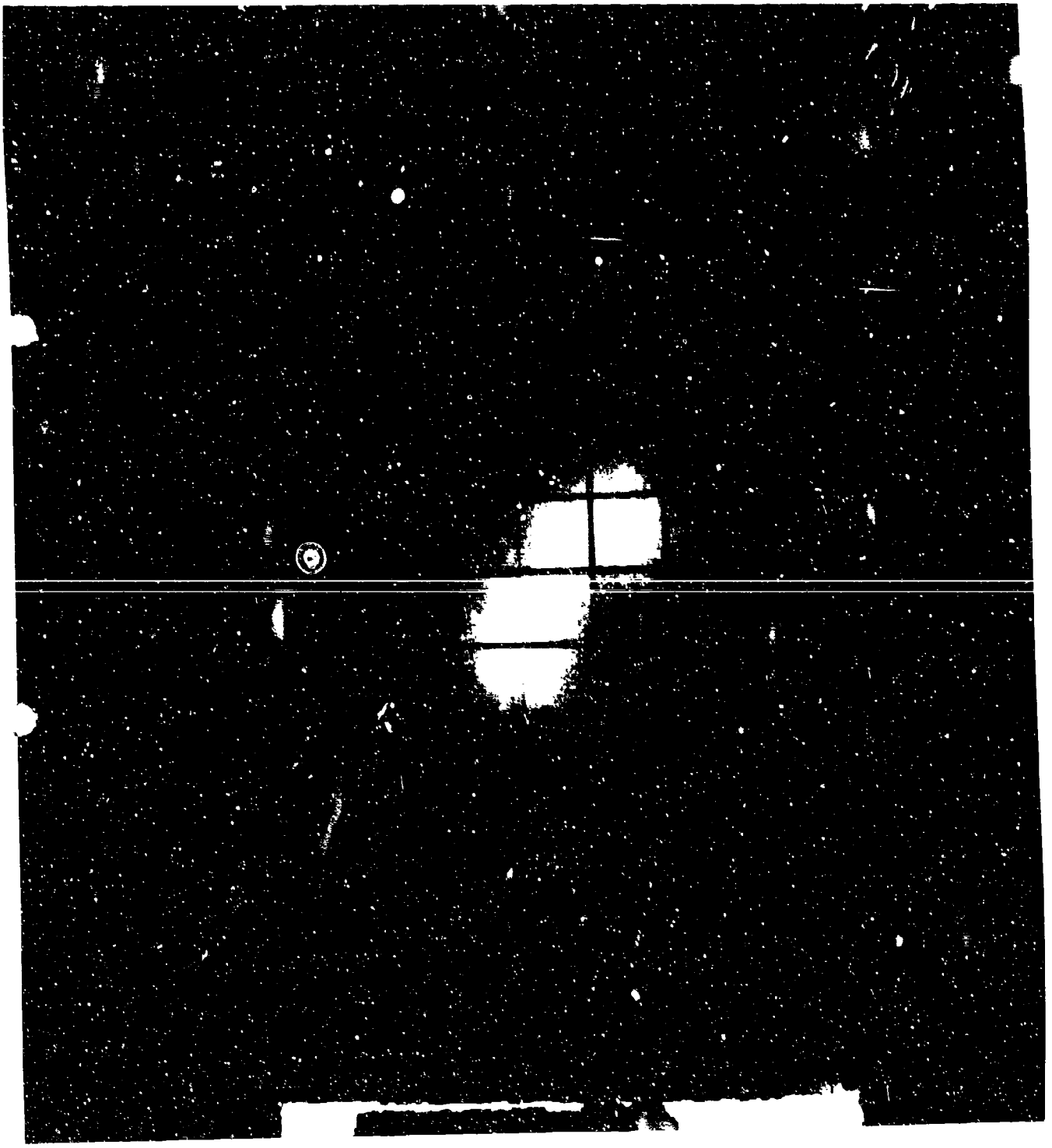
Model A-3

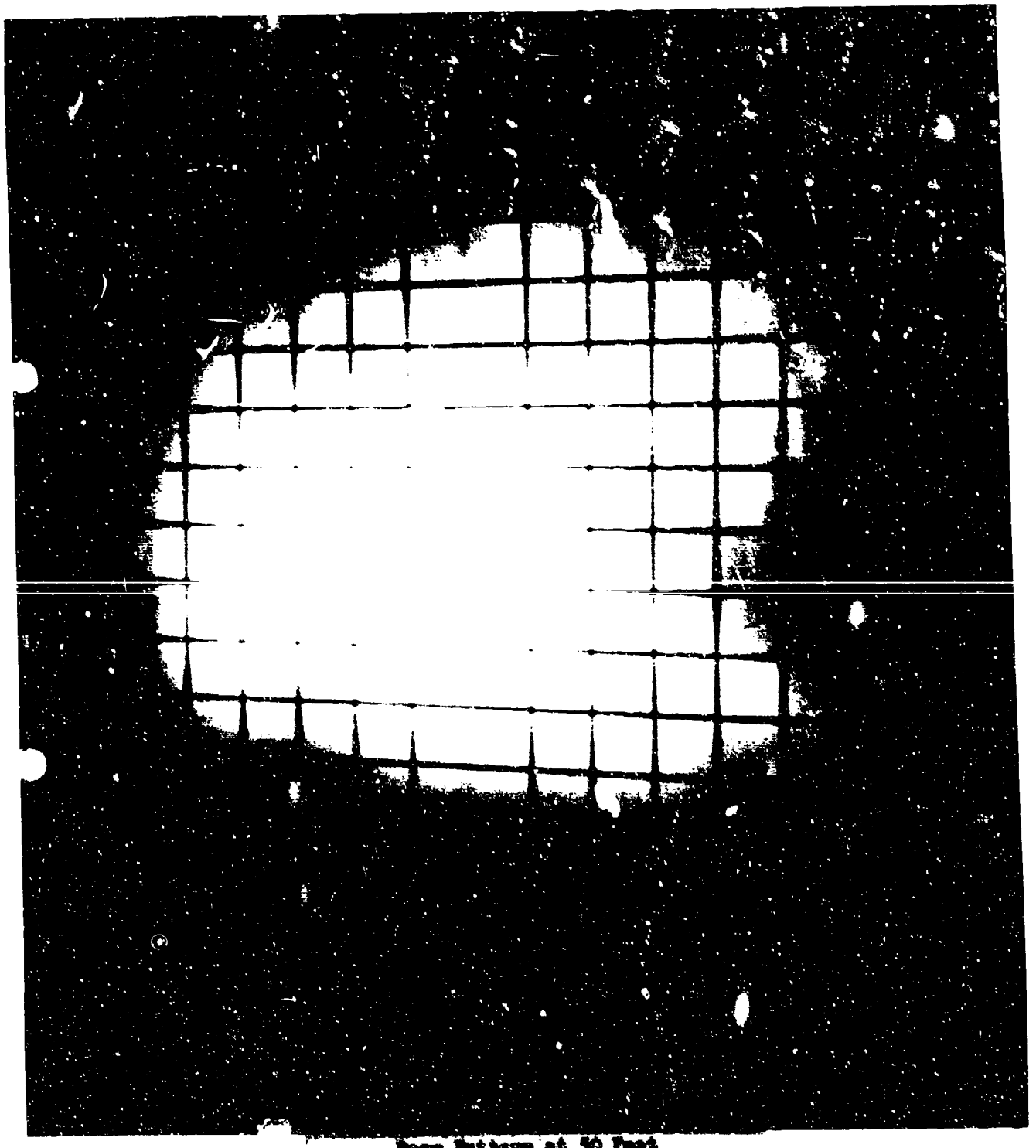
Photograph 9 Appendix B



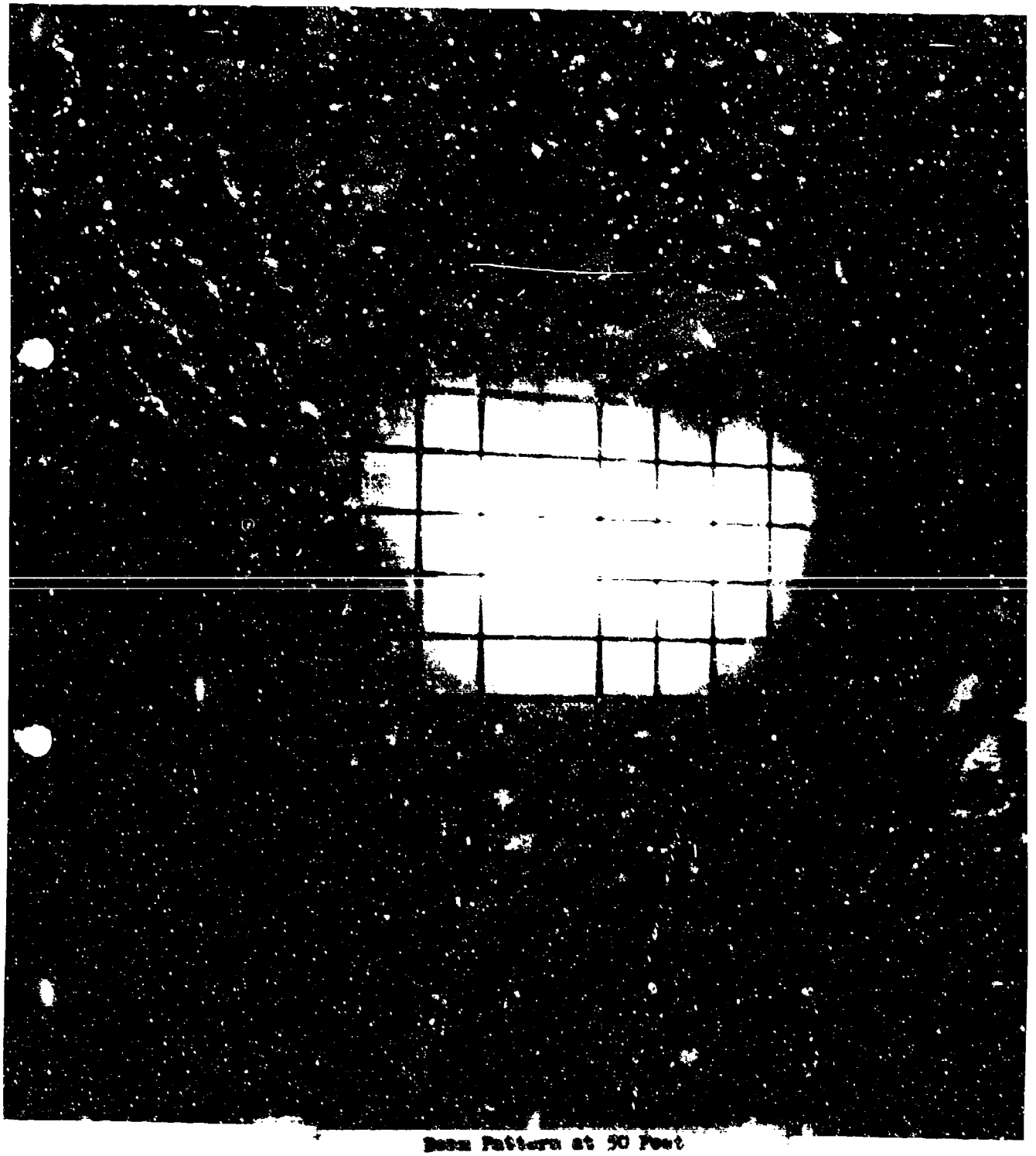
Lawn, Shrubs and Debris, Portable
(With [illegible]-Volt Battery)

Photograph 10 Appendix B



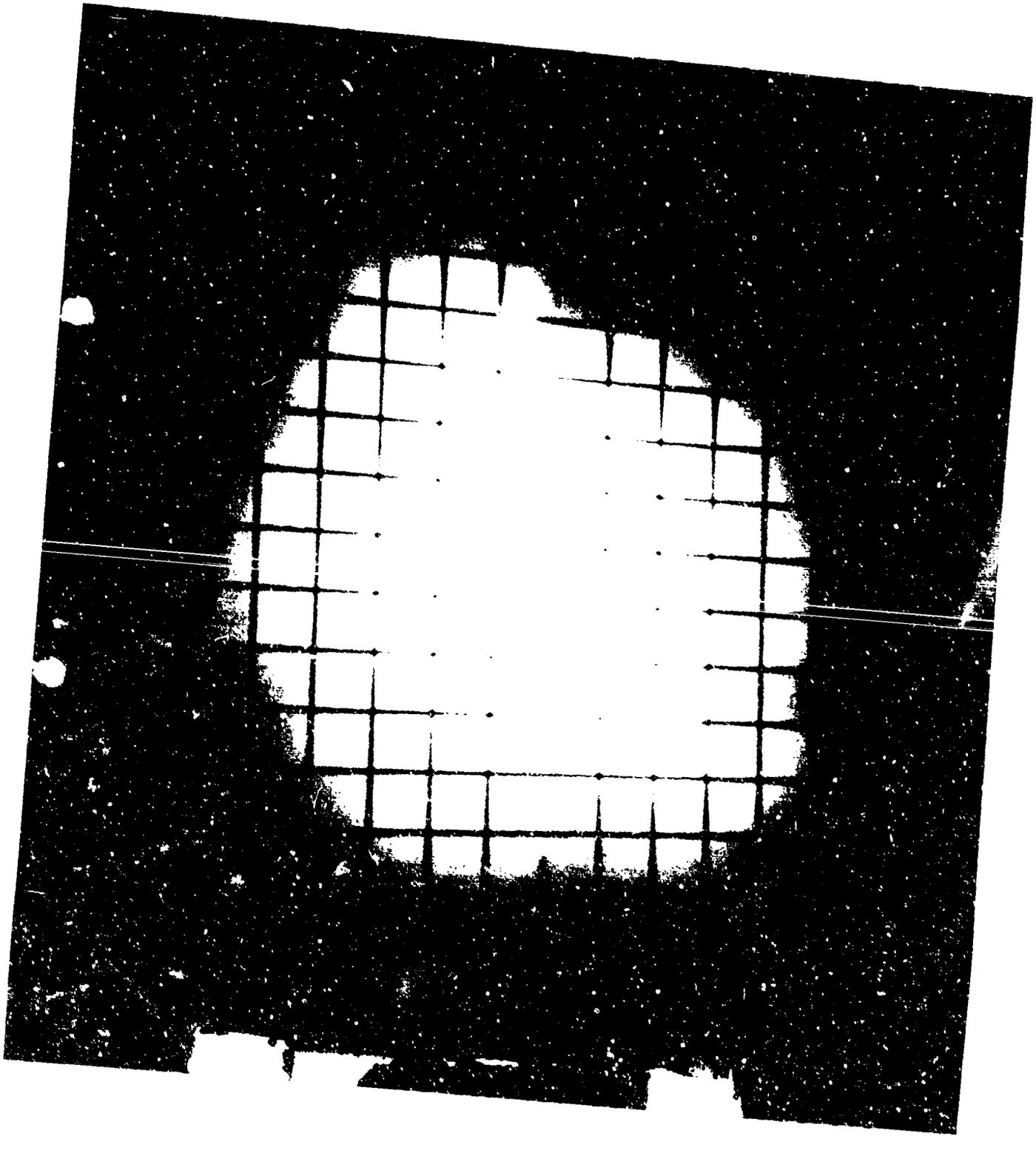


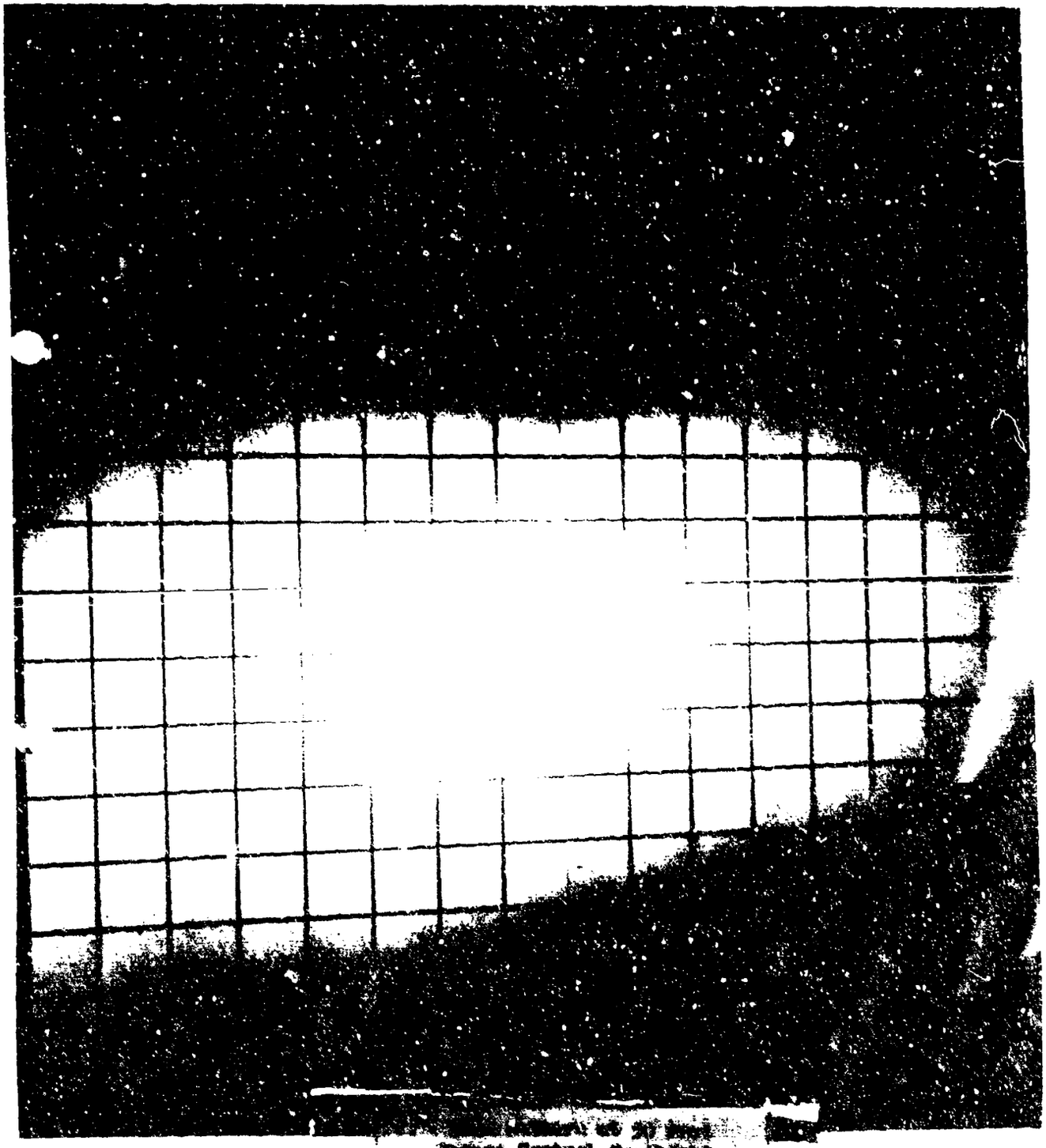
Beam Pattern at 50 Feet
4-Inch Pistol-Grip Spotlight, Portable
(With 9-Volt Battery)
Photograph 11 Appendix B



Beam Pattern at 50 Feet
4-Inch Pistol-Grip Spotlight, Portable
(With 6-Volt Battery)

Photograph 12 Appendix B





Damage Control Specialist
No. 9992

Photograph 16 Appendix B

APPENDIX "C"

Exhibit 1

Curve No. A-3509-8.

Light Decay Characteristics for Burgess Portable Spotlight Model LM 30.

Exhibit 2

Curve No. A-3509-10.

Light Decay Characteristics for Unity Portable Spotlight Model S-3.

Exhibit 3

Curve No. A-3509-11.

Light Decay Characteristics for Rescue and Debris Portable Spotlight Operating from Nine-Volt Burgess 4F6H Battery.

Exhibit 4

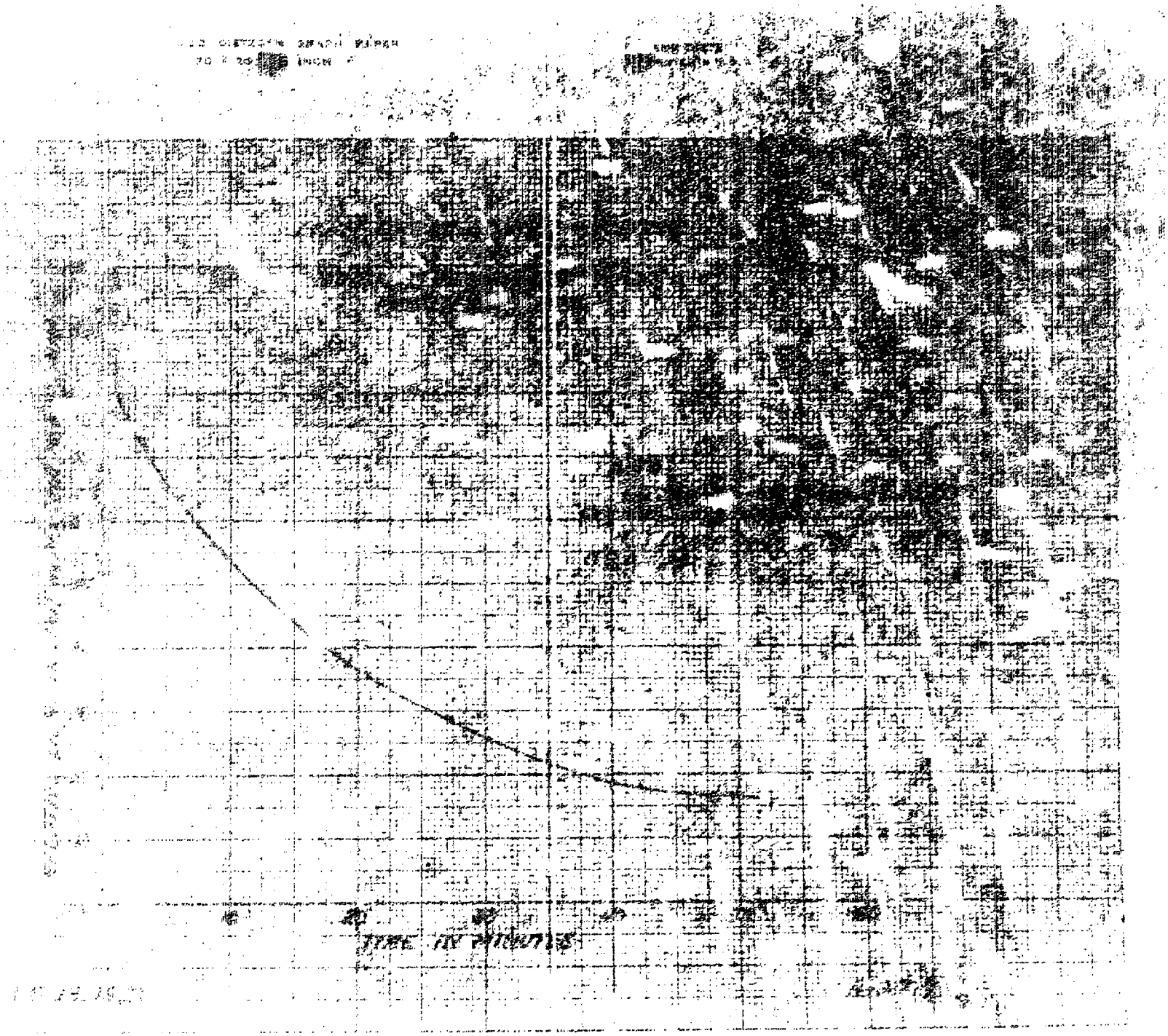
Curve No. A-3509-13.

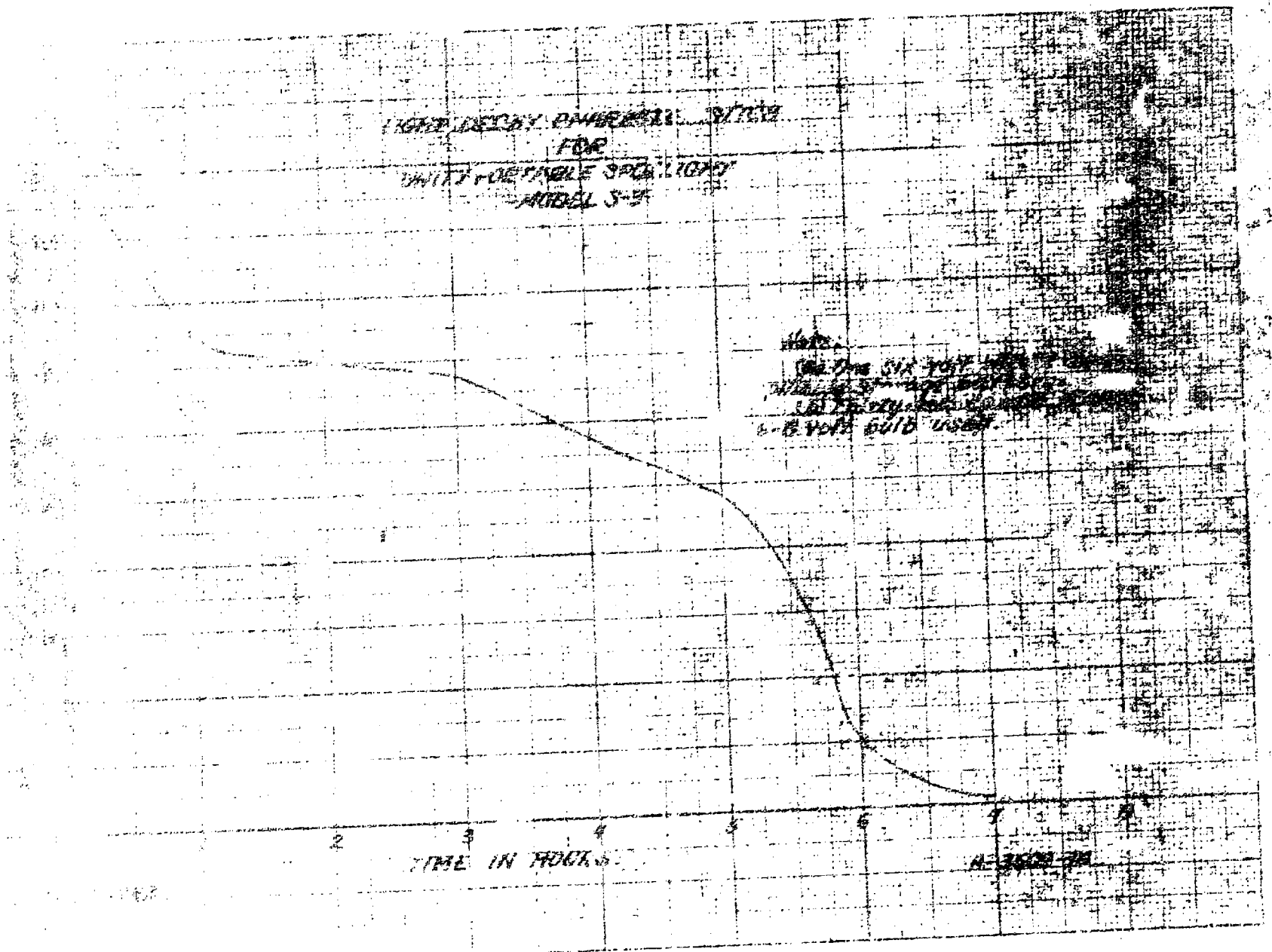
Light Decay Characteristics for Damage Control Spotlight.

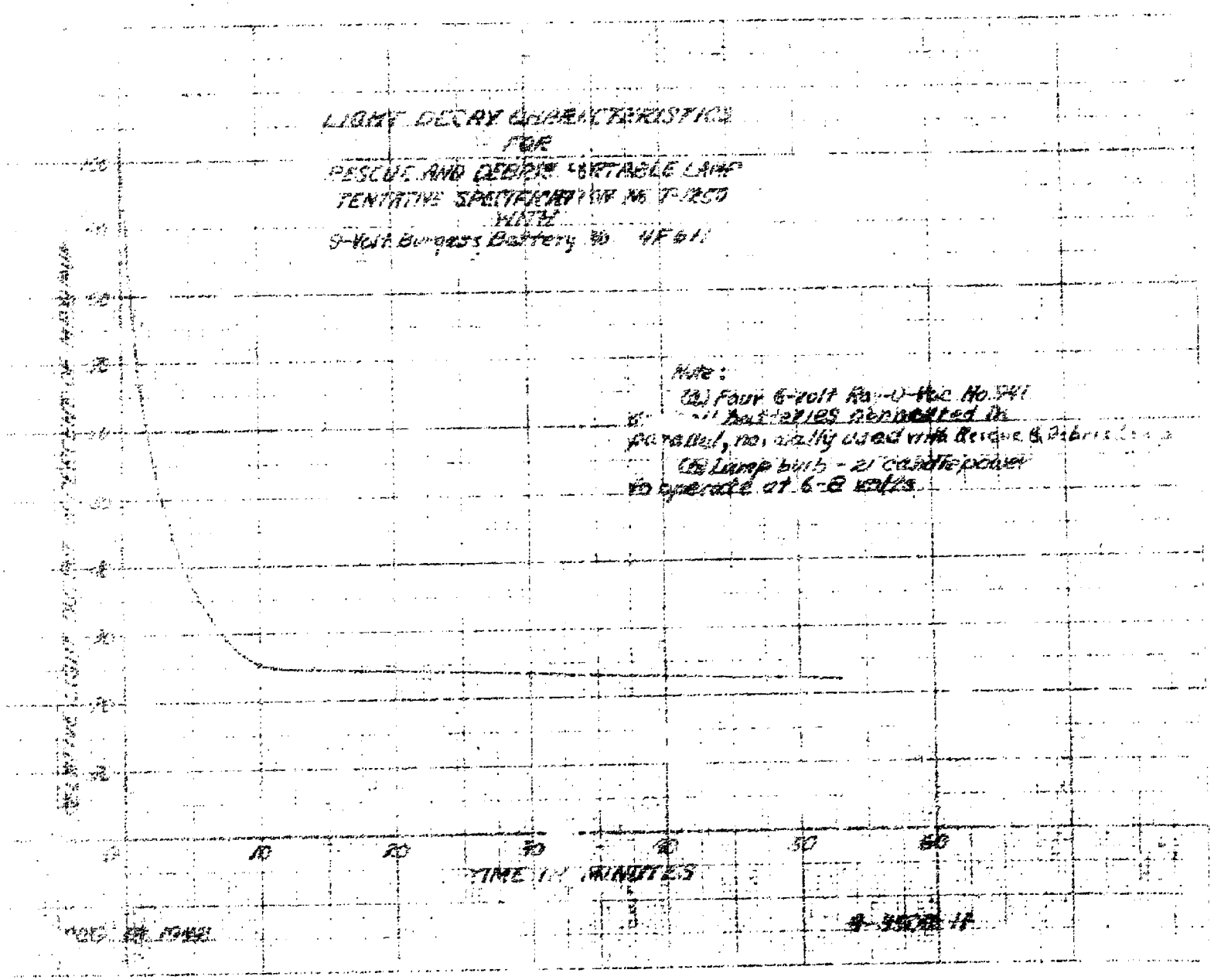
Exhibit 5

Table I.

Comparative Data.




FOR
MODEL S-5
TIME IN HOURS



SHEET 2, APPENDIX "B"

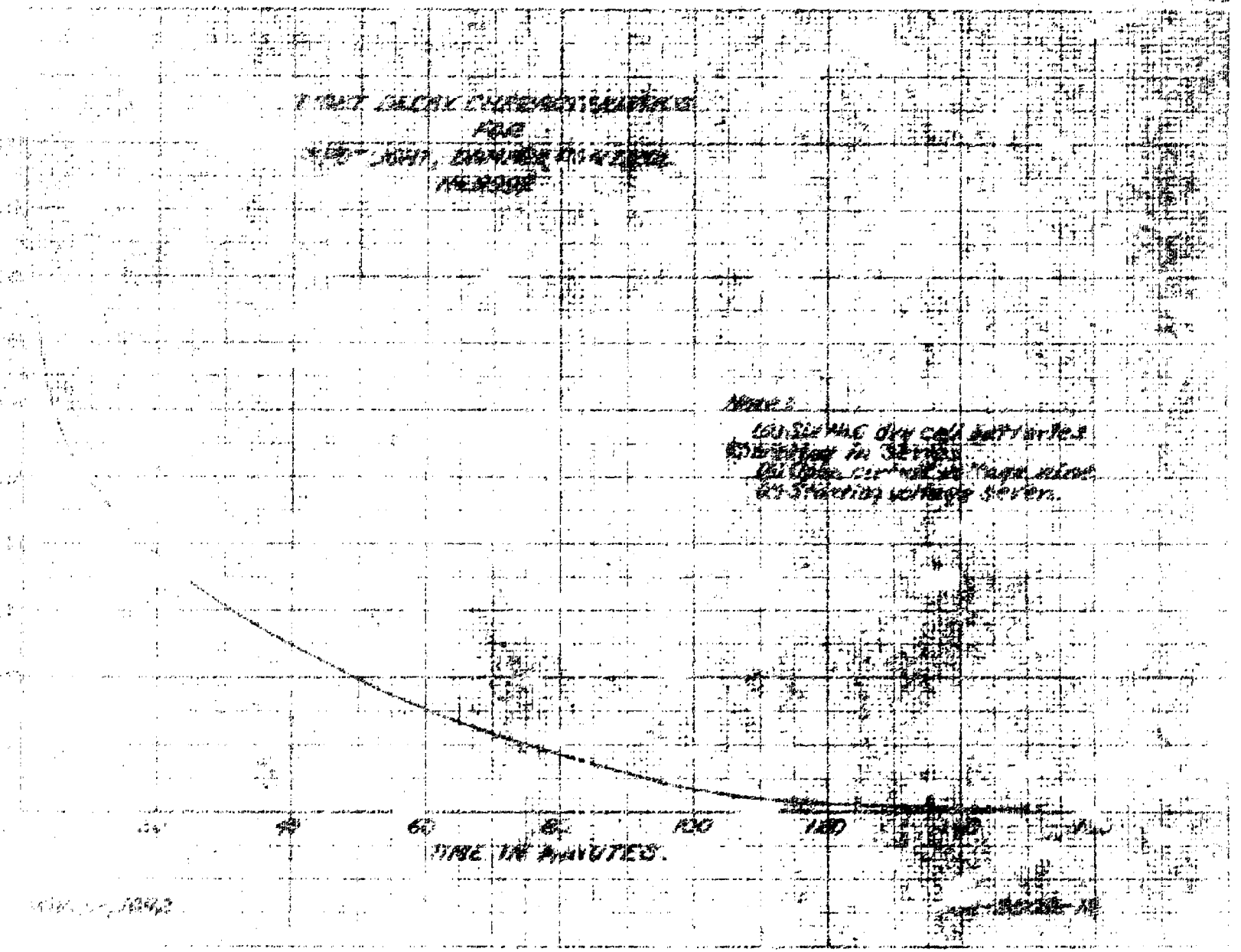

TIME IN MINUTES.

TABLE I

Comparative Values

Type of Spotlight	Burgess Model LM30 at 45-V (1)	Unity Model S-3 at 6-V (1)	Rescue and Debris (2)		Four-inch Pistol-Grip (2)		Damage Control (3) at 7-V
			at 9-V	at 6-V	at 9-V	at 6-V	
Max. illumination in ft. candles							
at 25 ft.	160	100	116	42.8	160	48	184
at 50 ft.	40	25	29	10.7	40	12	46.1
at 75 ft.	17.8	11.1	12.9	4.75	17.8	5.35	20.5
at 100 ft.	10	6.25	7.25	2.68	10	3.0	11.5
Beam cp - thousands	100	62.5	72.5	26.8	100	30	115
Reflector diameter - inches	5½	5½	5		4-1/4		5
Total weight - pounds	7	16	20-3/4		16-3/4		14
Portable weight - pounds	7	16	10-5/8		11-3/8		14
Beam pattern							
Photograph No., Appendix "B"	13	9	10	10A	11	12	14
Beam diameter - ft.							
at 50 ft.	6.25	3.5	4.5	2.3	6.0	3.8	5
at 100 ft.	12.50	7.0	9.0	4.6	12.0	7.6	10
Light Output after 50 minutes operation with new batteries	16%	70%	23%	—	23%	—	20%

(1) Commercial Light
(2) Procurement Item
(3) Similar to a Light Being Procured by the Navy Exhibit 5, Appendix "C".