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U. S. ARMY ARCTIC TEST BOARD
APO 733, Seattle, Washington

STEBE-IN

17 June 1963

SUBJECT: Report of USATECOM Test Project Na 8-3-8000-01-C (33-0B0),
Confirmatory Test of Mine, Antipersonnel, M18A1, Claymore (U)

TO: See Distribution

1. (U) This letter transmits final report on subject test (inclosure 1).
2. (C) Test Results: Tests of the Mine, Antipersonnel, M18A1, Claymore were conducted at ambient temperatures ranging from 10°F to -52°F, after cold-soaking the test weapon at ambient temperatures ranging from 40°F to -57°F. The test weapon met the military characteristics to an acceptable degree. Deficiencies were encountered with the test weapon aiming points at ranges of 50 and 150 feet; and with the reliability of packaging and inspection techniques for the M40 test set.
3. (U) Conclusion: It is concluded that the Mine, Antipersonnel, M18A1, Claymore should be suitable for Army use under arctic winter conditions, when the deficiencies, and as many of the shortcomings as feasible, listed in Part B, Annex B, Part III of the inclosure are corrected.
4. (U) Recommendation: It is recommended that the Mine, Antipersonnel, M18A1, Claymore be considered suitable for Army use under arctic winter conditions when the deficiencies, and as many of the shortcomings as feasible, listed in Part B, Annex B, Part III of the inclosures are corrected.

FOR THE PRESIDENT:

2 Incl
1 - as (C)
2 - Abstract Cards (U)

for William D. Grant, major, armor
CHARLES A. BROWN
Lt Col, Infantry
Assistant Adjutant

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Fort Greely, Alaska



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REPORT OF USATECOM PROJECT NO 8-3-8000-01-C

CONFIRMATORY TEST OF

MINE, ANTIPERSONNEL, M18A1, CLAYMORE (U)

17 JUNE 1963

For Information Only, Action by Higher Authority Pending

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REPORT OF USATECOM PROJECT NO 8-3-8000-01-C

CONFIRMATORY TEST OF

MINE, ANTIPERSONNEL, M18A1, CLAYMORE (U)

17 JUNE 1963

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U. S. ARMY ARCTIC TEST BOARD
APO 733, Seattle, Washington

Report of USATECOM Project No 8-3-8000-01-C

Confirmatory Test

of Mine, Antipersonnel, M18A1, Claymore (U)

21 January - 8 March 1963

Part I - (C) General

A. (U) References: See Annex A, Part III.

B. (U) Authority:

1. (U) Directive: Inclosure 6, Ltr, ATDEV-MGP 337, HQ USCONARC, 30 April 1962, subject: "Report of Arctic Test Planning Conference Held at HQ USCONARC, 4-5 April 1962."

2. (U) Purpose:

a. To determine the suitability of the Mine, Antipersonnel, M18A1, Claymore, for Army use under arctic winter conditions.

b. To determine whether the shortcomings reported in paragraph F, Annex A have been corrected.

C. (U) Description of Materiel:

1. (U) The Mine, Antipersonnel, M18A1, Claymore (test weapon) is the production engineered version of the M18 (improved T48E3) Claymore which was check tested at this Board during the 1960-1961 winter test season (para F, Annex A).

2. (U) The test weapon consists of a molded plastic body supported by hinged legs which mount under the weapon body. The molded

I.1

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plastic body contains approximately 700 spherical steel balls weighing 10.5 grains each. The steel balls are backed by 1.5 pounds of C-4 plastic explosive. Two preformed cap wells are located on the top of the test weapon which accommodate a special electric blasting cap (M4) furnished with the test weapon. The test weapon is issued in an individual M7 bandoleer which also contains a M57 magneto-type firing device, and the M4 blasting cap assembly with integral 100-foot wire extension. The test weapon is packaged six weapons to a box. One bandoleer in each box contains a M40 test set (circuit tester).

3. (U) A complete maintenance package and 54 test weapons were received by this Board on 21 January 1963.

4. (U) A photograph of the test weapon is shown as Annex III, C.1.

D. (C) Background:

1. (U) The requirement for the test weapon is stated in paragraph B, Annex A.

2. (U) The initial version of the Claymore Weapon (T48) was tested by the U. S. Marine Corps Equipment Board, the U. S. Army Infantry Board, and by this Board during the period 1952-1955. Continued development led to the Improved Claymore T48E3 and the modified T48E3 Claymore which were tested at this Board during the 1959-1960 and 1960-1961 winter test seasons, respectively. The test weapon (M18A1 Claymore) is the production engineered version of the modified improved T48E3 Claymore (para E and F, Annex A).

3. (U) This item is proposed for tripartite standardization and is included on IEL 1-1-105-2.

E. (U) Test Objectives: Same as B2.

F. (U) Findings: Tests were conducted by Major Edward F. Sheehan, Infantry, and other personnel of Test Division 3, U. S. Army Arctic Test Board, assisted by personnel from the 4th Battle Group, 9th Infantry.

1. (U) Tests were conducted at ambient temperatures ranging from 10°F to -52°F. The test weapon was stored outdoors in tactical packaging throughout the test period. Cold-soak temperatures ranged from 49°F to -57°F.

2. (U) During the test period, personnel wore the intermediate cold-dry uniform to include the Arctic Mitten Set.

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3. (U) The test weapon was satisfactory with respect to physical characteristics, dispersion, distribution, penetration, and durability.

4. (C) The test weapon was marginally satisfactory with respect to accuracy because the aiming point instructions were inaccurate and reliability of the M40 test set.

5. (U) The test weapon met all the military characteristics to an acceptable degree (para D, Annex A).

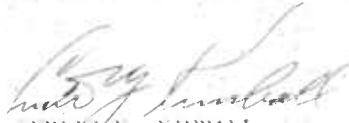
6. (U) The following shortcomings encountered in previous testing (para I, Annex A) were not corrected with the test weapon (Part A, Annex B).

- a. The test weapon sight is difficult to lay in elevation.
- b. The aiming point instructions were inaccurate.

7. (U) Safety Confirmation - Based on the firing of 54 test weapons at temperatures ranging from 10 F to -52 F, the test weapon met the safety requirement.

G. (U) Conclusion - It is concluded that the Mine Anti-personnel M18A1 should be suitable for Army use under arctic winter conditions when the deficiencies, and as many of the shortcomings as feasible listed in Part B, Annex B are corrected.

H. (U) Recommendation - It is recommended that the Mine Anti-personnel M18A1 Claymore be considered suitable for Army use under arctic winter conditions when the deficiencies, and as many of the shortcomings as feasible, listed in Part B, Annex B are corrected.


CHARLES Y. KIMBALL
Colonel, Infantry
President

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Part II -- (C) Test Data

A. (U) Test No 1 - Preoperational Inspection and Physical Characteristics:

1. (U) PURPOSE:

- a. To determine whether the test weapon was in proper condition for test.
- b. To determine the physical characteristics of the test weapon.

2. (U) METHOD

- a. The test weapons were visually inspected upon removal from packaging prior to firing. All evidence of improper assembly or damage was recorded.
- b. The test weapon was weighed, measured, photographed and examined for other pertinent characteristics and results recorded.

3. (U) RESULTS:

- a. All test weapons were found to be in proper condition for test. One box of six test weapons was missing an M40 test set (Test No 5).
- b. The physical characteristics were found to be:

(1) Weight:

- | | |
|------------------------|---------|
| (a) Complete Bandoleer | 6.12 lb |
| (b) M18A1 Weapon | 3.07 lb |
| (c) M57 firing device | 0.14 lb |

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(d) M40 test set	0.03 lb
(e) Blasting cap and wire	1.14 lb
(f) Bandoleer	0.06 lb
(2) Weapon Length	8-5 8 inches
(3) Weapon height	5-3 16 inches
(4) Weapon width	1-7 16 inches
(5) Lot number	PA-38-1

c. A photograph of the test weapon is shown in Annex III, C.1.

B. (C) Test No 2 - Accuracy

1. (U) PURPOSE: To determine the accuracy of the test weapon at various ranges.

2. (U) METHOD:

a. Six test weapons were fired singly at a range of 50 feet at a primary target consisting of a strip target 7 feet high by 180 feet wide, divided into 4 equal parts by vertical and horizontal lines through the center.

b. The aiming point for all test weapons was the center of the target at the height prescribed in the operating instructions.

c. The number of hits in each quadrant of the target, and the total number of hits for each weapon fired were recorded.

d. The above procedure was repeated at ranges of 100 and 150 feet using a target 7 feet high by 348 feet wide.

e. One test weapon was fired at each of the following ranges at the same targets that were described above: 50, 100, 150 feet. Prior to detonation, these test weapons were covered (both radius and height) with 12 inches of dry snow sift and dry.

f. Prior to any of the above firings, the test weapons were emplaced and sighted as prescribed in the operating instructions. The lay of the test weapon with respect to the target aiming point was checked by at least two personnel. In order to duplicate the laying of successive test weapons at the same range, a gunners quadrant was placed on all weapons.

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to determine the elevation, and whether the weapon was horizontal with the lay of the target.

3. (C) RESULTS:

a. Personnel encountered difficulty sighting the test weapon in elevation and deflection because of the flat base of the sight, and lack of depth definition (para 111.1, Annex B).

b. The test weapon aiming point instructions were inaccurate at ranges of 50 and 150 feet. Using the prescribed aiming points, the fragment pattern was low and high respectively. After experimenting with aiming points from 3 to 10 feet above the ground, the aiming point heights below were found to consistently produce the most effective fragment pattern (para 1.1, Annex B):

<u>Range (Ft)</u>	<u>Prescribed Aiming Point Ht. (Ft)</u>	<u>Effective Aiming Point Ht. (Ft)</u>
50	3.0	4.5 to 4.8
100	6.0	6.0
150	10.0	8.0

c. Accuracy tests were conducted at ambient temperatures ranging from -15°F to -52°F. The average total hits for test weapon firings (less under snow firings) and the quadrant of the primary target in which they occurred were as outlined below:

<u>50 Feet</u>	<u>100 Feet</u>	<u>150 Feet</u>
<u>Average Total Hits: 541</u>	<u>Average Total Hits: 471</u>	<u>Average Total Hits: 382</u>
94 IV 1 158 145 III 11 144	84 IV 1 129 126 III 11 132	80 IV 1 101 98 III 11 103

d. Accuracy tests with the test weapon covered with 12 inches of new snow, soft and dry were conducted at ambient temperatures ranging from -29°F to -35°F. Inspection of the target after firings indicated that the snow caused an obvious increase in the vertical dispersion of the weapon, and a decrease in number of target hits (Test No 3). The total hits for these firings, and the quadrant of the primary target in which they occurred were as outlined below:

11.3.

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50 Feet
Total Hits: 419

116	IV	I	129
85	III	II	89

100 Feet
Total Hits: 269

71	IV	I	49
58	III	II	91

150 Feet
Total Hits: 157

23	IV	I	54
32	III	II	48

C. (C) Test No 3 - Dispersion and Distribution:

1. (U) PURPOSE: To determine the degree of dispersion and the principle distribution pattern of the test weapon.

2. (U) METHOD:

a. This test was conducted concurrently with Test No 2 - Accuracy.

b. The primary target was sub-divided into 1 foot wide by 7 foot high increments.

c. Secondary targets consisting of type "E" silhouette targets were placed side by side on a perpendicular line with the primary target beginning 20 feet to each flank of the firing site; and extending to intersect a 120 arc from the firing site to the primary target.

d. All targets were inspected after each test weapon was fired and the necessary data recorded to show the number, dispersion, and distribution of hits on the primary and secondary targets.

e. Degree of dispersion and the principle distribution pattern were determined by observation and analysis of test data.

3. (C) RESULTS:

a. Results of firings, other than snow firings, were as tabulated below:

Ambient Temp (°F)	No of Firings	Range (Ft)	Average No of Hits	Average Width of Pattern (Ft)
-16 to -49	6	50	541	109
-15 to -51	6	100	471	210
-15 to -52	6	150	382	290

b. Results of firings in 12 inches of new snow, soft and dry were as tabulated below:

11.4

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<u>Ambient Temp (°F)</u>	<u>No of Firings</u>	<u>Range (ft)</u>	<u>Average No of Hits</u>	<u>Average Width of Pattern (ft)</u>
-29	1	50	419	133
-32	1	100	269	218
-35	1	150	157	302

c. The percentage of 1 by 7-foot sections of the primary target within a 60° arc which were hit by at least 2 projectiles were as follows:

<u>Range</u>	<u>Average Percentage Hit</u>	<u>Percentage Hit When Weapon Placed in Snow</u>
50	99.2	99.3
100	85.0	49.2
150	59.2	21.0

d. A total of 60 fragments from the 21 test weapons fired during dispersion tests were recorded on the secondary targets. The remainder of the hits on the primary target were within the 120° arc with the densest pattern occurring within the 60° arc.

e. The principle distribution patterns were as shown in Annex D, Part III. Analysis of this annex indicates the test weapon meets the height, length of pattern, pattern density and dispersion requirements to an acceptable degree.

D. (C) Test No 4 - Penetration

1. (U) PURPOSE - To determine the penetration of the test weapon fragments at various ranges.

2. (U) METHOD

a. Five panels, 7 feet high by 3 feet wide, constructed of 5 layers of one-inch thick commercially dressed pine, spaced one inch apart, were placed vertically 50 feet from the test weapon. The center panel was used as the aiming point, and the remaining four panels were placed at angles of 15° and 30° right and left of the test weapons.

b. Five armor vests, model M1952A and fifteen steel helmets with liners were suspended on silhouette targets with one armor vest and three steel helmets set up adjacent to each wooden panel.

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c. Two test weapons were fired singly at the pine panels, armor vests, and steel helmets. The number of hits, and the degree of penetration in each target were recorded.

d. One test weapon was covered with 12 inches of new snow, soft and dry in both radius and height and then fired at the same targets as above.

e. The above procedures were repeated at ranges of 100 and 150 feet and results recorded.

3. (C) RESULTS

a. Penetration of the wooden panels occurred as outlined below:

Range (Ft)	Ambient Temperature (°F)	No Hits	No of Panel Layers Penetrated					
			1	2	3	4	5	P*
50	- 4	146	146	135	130	123	110	91
50	-36	141	141	134	129	105	81	60
50	-24 (Snow)	98	98	86	43	8	2	0
100	- 7	52	52	50	40	29	4	1
100	-34	62	62	54	47	34	3	0
100	-21 (Snow)	31	31	9	2	0	0	0
150	- 9	29	29	25	7	4	2	0
150	-38	37	37	27	8	0	0	0
150	-22 (Snow)	19	15	0	0	0	0	0

*Perforation all panels.

b. Penetration of armor vests and steel helmets with liners occurred as tabulated below:

ARMOR VESTS M1952A

Range (Ft)	Ambient Temperature (°F)	Total Hits	<u>FRONT</u>		<u>REAR</u>	
			Penetration	Perforation	Penetration	Perforation
50	- 4	29	29	29	29	29
50	-36	40	40	40	39	38
50	-24 (Snow)	17	17	14	7	2

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ARMOR VESTS M1952A (Cont'd)

Range (Ft)	Ambient Temperature	Total Hits	FRONT		REAR	
			Penetration	Perforation	Penetration	Perforation
100	- 7	6	5	5	4	0
100	-34	7	6	6	5	2
100	-21 (Snow)	3	2	1	0	0
150	- 9	4	2	0	0	0
150	-38	5	3	2	0	0
150	-22 (Snow)	0	0	0	0	0

STEEL HELMET AND LINER

Range (Ft)	Ambient Temperature	Total Hits	Helmet		Liner	
			Front	Front	Rear	Rear
50	- 4	5	5	5	1	1
50	-36	7	7	6	3	1
50	-24 (Snow)	4	3	2	1	1
100	- 7	2	2	2	2	0
100	-34	5	4	4	2	0
100	-21 (Snow)	1	0	0	0	0
150	- 9	1	1	1	1	0
150	-38	2	2	0	0	0
150	-22 (Snow)	0	0	0	0	0

c. Analysis of the above data indicates that the test weapon had excellent lethality characteristics at the required effective range (100 feet). The dampening effect of snow is shown by the fewer number of hits and penetrations recorded for snow firings.

E. (C) Test No 5 - Durability and Reliability:

1. (U) PURPOSE: To determine the durability and reliability of the test weapon.

2. (U) METHOD:

a. All test weapons in their tactical packaging were cold-soaked from the date of receipt until fired.

b. Five test weapons were emplaced in an exposed area for 36 days at ambient temperatures ranging from 49°F to -57°F, and then fired at ambient temperatures ranging from -13°F to -23°F.

II.7

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c. Any failure of the test weapon or accessories occurring during any test was recorded.

d. Overall reliability of the test weapon was determined by observation of all firings, and interrogation of test personnel.

3. (C) RESULTS:

a. The test weapon was cold-soaked for periods of from 10 to 47 days at ambient temperatures ranging from 49°F to -57°F. No difficulties were encountered as a result of cold-soak.

b. Fifty-four test weapons were fired at ambient temperatures ranging from 10°F to -52°F. In all instances high order detonations occurred.

c. No difficulties were encountered with the M57 firing device.

d. One packaging box of six test weapons did not contain an M40 test set. Of eight M40 test sets received, one would not light when functioned with any of the M57 firing devices received for test (para I.2, Annex B).

e. The cloth backed operating instructions affixed to the test weapon bandoleer were not durable. These instructions shattered like glass at ambient temperatures below -15°F (para III.2, Annex B).

f. The black tape used to secure the packaging of the test weapon blasting cap assembly and 100 feet of wire extension broke in 53 of 54 openings at ambient temperatures ranging from 10°F to -52°F. This breakage caused the packaging to be difficult to open by personnel wearing any type of standard arctic handwear (Para III.3, Annex B).

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Part III - (C) Annexes

ANNEX A

(U) REFERENCES (U)

A. (U) RDT&E Project No: 1-C-5-43312-D-342-02. RDB Technical Objective No: LC-07.

B. (U) CDOG, paragraph 238d(4) Change 3, 1 December 1960.

C. (U) Reports of Equipment Failures No 1 through 5, USATECOM Project No 8-3-8000-01-C (33-0B0), U. S. Army Arctic Test Board.

D. (U) OTCM 36528, 3 May 1957, subject : "Mine, Antipersonnel, Fixed Fragmentation - Initiation of Development (U)."

E. (U) Report of Test, Project No ATB 3-200, (C) U. S. Army Arctic Test Board, 3 June 1960, "Service Test of Improved Claymore T48E3(U)."

F. (U) Report of Test, Project No ATB 3-51, (C) U. S. Army Arctic Test Board, 14 March 1961, "Check Test of Improved Claymore T48E3 (Modified) (U)."

G. (U) Technical Report No 4-61, Picatinny Arsenal, Dover, New Jersey, December 1961, "Production Engineering of Mine Apers M18A1 (T48E3) with Accessories."

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ANNEX B

(U) LIST OF EQUIPMENT FAILURES (U)

PART A

DEFICIENCY/SHORTCOMING - PREVIOUS TEST

FINDINGS THIS TEST

A.1 (U)	Detonator well cap not deep enough to seat blasting cap far enough to permit engagement of well plug threads.	Corrected.
A.2 (U)	Sight was difficult to lay in elevation.	Not corrected. Sight was still difficult to lay in elevation and deflection (para III.1, Part B, Annex B).
A.3 (U)	Spring washer falls out of leg assembly.	Corrected.
A.4 (U)	Legs difficult to position while wearing handwear.	Corrected.
A.5 (U)	Aiming point indicated to be three feet high on instruction sheet.	Not entirely corrected. Aiming points indicated in the operating instructions for 50 and 150 feet were inaccurate (para I.1, Part B, Annex B).

PART B

SECTION I

This section contains deficiencies requiring elimination in order to make the item acceptable for use on a minimum basis.

DEFICIENCY

I.1 (U) The test weapon aiming point instructions were inaccurate at ranges of 50 and 150 feet.

I.2 (U) One box of six test weapons did not contain a M40 test set. One test set out of eight would not light when functioned with the M57 firing device.

SUGGESTED CORRECTIVE ACTION

Amend the operating instructions to show aiming points of from 4.5 to 4.8 feet and 8 feet for ranges of 50 to 150 feet, respectively.

Provide reliable packaging and improved inspection technique for test weapon components.

REMARKS

Test No 2, Report of Equipment Failure No 1.

Test No 5, Report of Equipment Failure No 2.

SECTION II

This section lists those deficiencies and shortcomings in the item which were discovered during test and satisfactorily corrected prior to completion of the test. They no longer represent a defect in the item tested. The correction must be applied to the production model of this item.

DEFICIENCY/SHORTCOMING

SUGGESTED CORRECTIVE ACTION

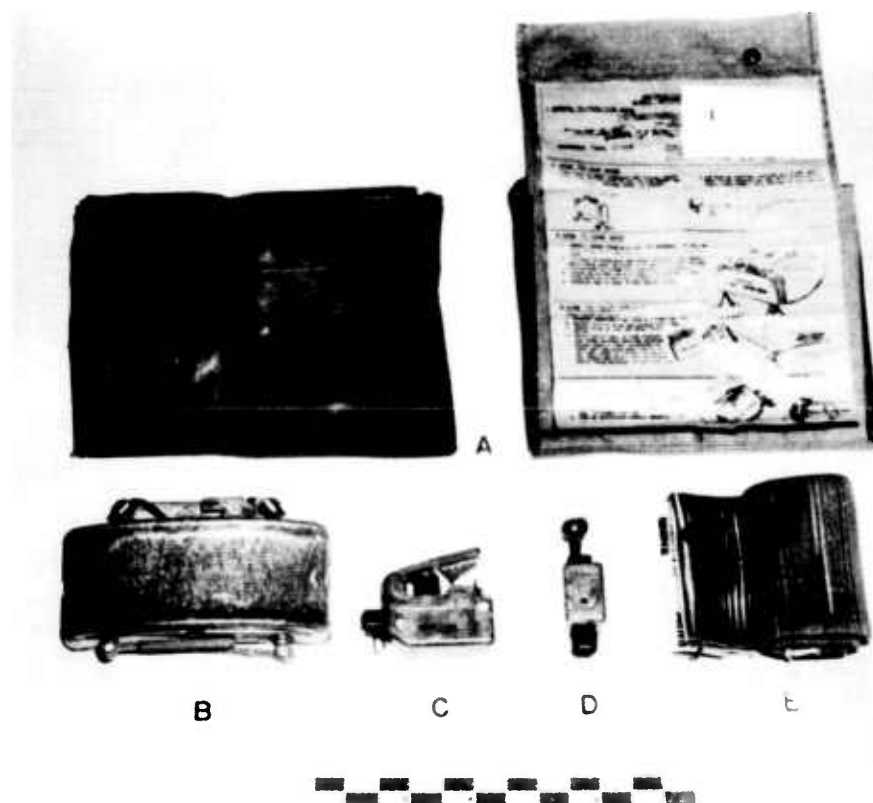
REMARKS

NONE

SECTION III

This section contains shortcomings which should be corrected, if it can be done without unduly complicating the item or inducing another undesirable characteristic, either concurrent with elimination of the deficiencies in Section I, or in production engineering, or by product improvement.

<u>SHORTCOMING</u>	<u>SUGGESTED CORRECTIVE ACTION</u>	<u>REMARKS</u>
III.1 (U) Personnel encountered difficulty sighting the test weapon in elevation and deflection because of the flat base of the sight and lack of depth definition.	Unknown.	Test No 2, Report of Equipment Failure No 5.
III.2 (U) The cloth-backed paper operating instructions affixed to the test weapon bandoiler were not durable at low ambient temperatures.	Provide operating instructions capable of withstanding ambient temperatures as low as -65°F without failure.	Test No 5, Report of Equipment Failure No 3.
III.3 (U) The black tape used to secure the packaging of the test weapon blasting cap assembly and 100 feet of wire extension was not durable at low ambient temperatures.	Provide a durable tape with a two-inch tab so the tape may be grasped by personnel wearing standard arctic handwear.	Test No 5, Report of Equipment Failure No 4.



US ARMY ARCTIC TEST BOARD

FORT GREELY, ALASKA

PROJECT NO 8C-3800-01

29 JAN 63

NEGATIVE NO 339-1

(U) CONFIRMATORY TEST OF MINE, ANTIPERSONNEL, M18A1, CLAYMORE (U)

A - BANDOLEER AND OPERATING INSTRUCTIONS D - TEST SET, M40

B - MINE, AP, M18A1 CLAYMORE

E - 100 FEET OF FIRING
WIRE AND ELECTRICAL
BLASTING CAP, M4

C - FIRING DEVICE, ELECTRICAL, M57

III.C.1

1

TOTAL HITS

1	535
2	512
3	553
4	551
5	523
6	549

120°

1	424
2	455
3	521
4	481
5	475
6	469

1	381
2	371
3	374
4	395
5	383
6	386

SCALE

HORIZONTAL ONE SQUARE = ONE FOOT
VERTICALLY NOT TO SCALE

■ = TWO HITS PER 1' X 7' PANEL
/ = ONE HIT PER 1' X 7' PANEL

1	419
2	269
3	157

120°

EFFE

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EFFECTIVE DISTRIBUTION OF MIBAI CLAYMORE AT

120°

60°

50 FEET



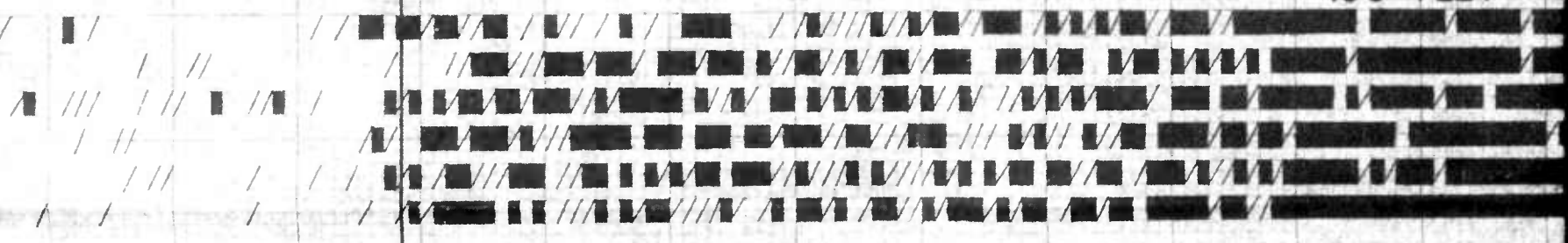
60°

100 FEET



60°

150 FEET



EFFECTIVE DISTRIBUTION OF MIBAI CLAYMORE AT 50', 100', AND 150' RANGE

120°

60°

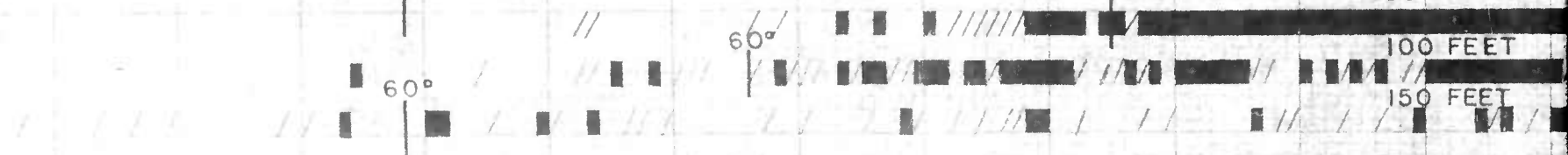
50 FEET

60°

100 FEET

60°

150 FEET

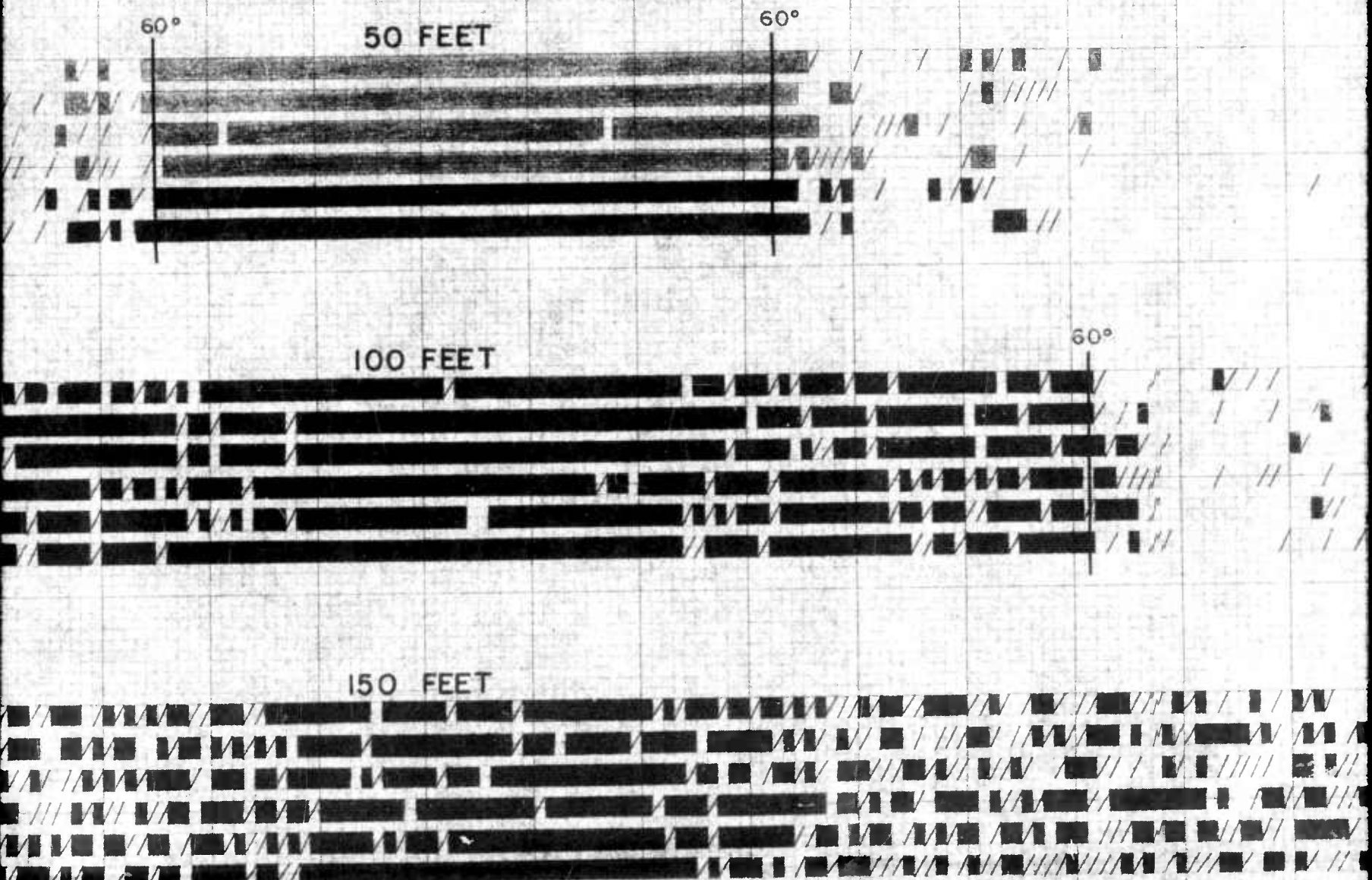


2

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WEAPON DISTRIBUTION OF MIBAI CLAYMORE AT 50', 100', AND 150' RANGES



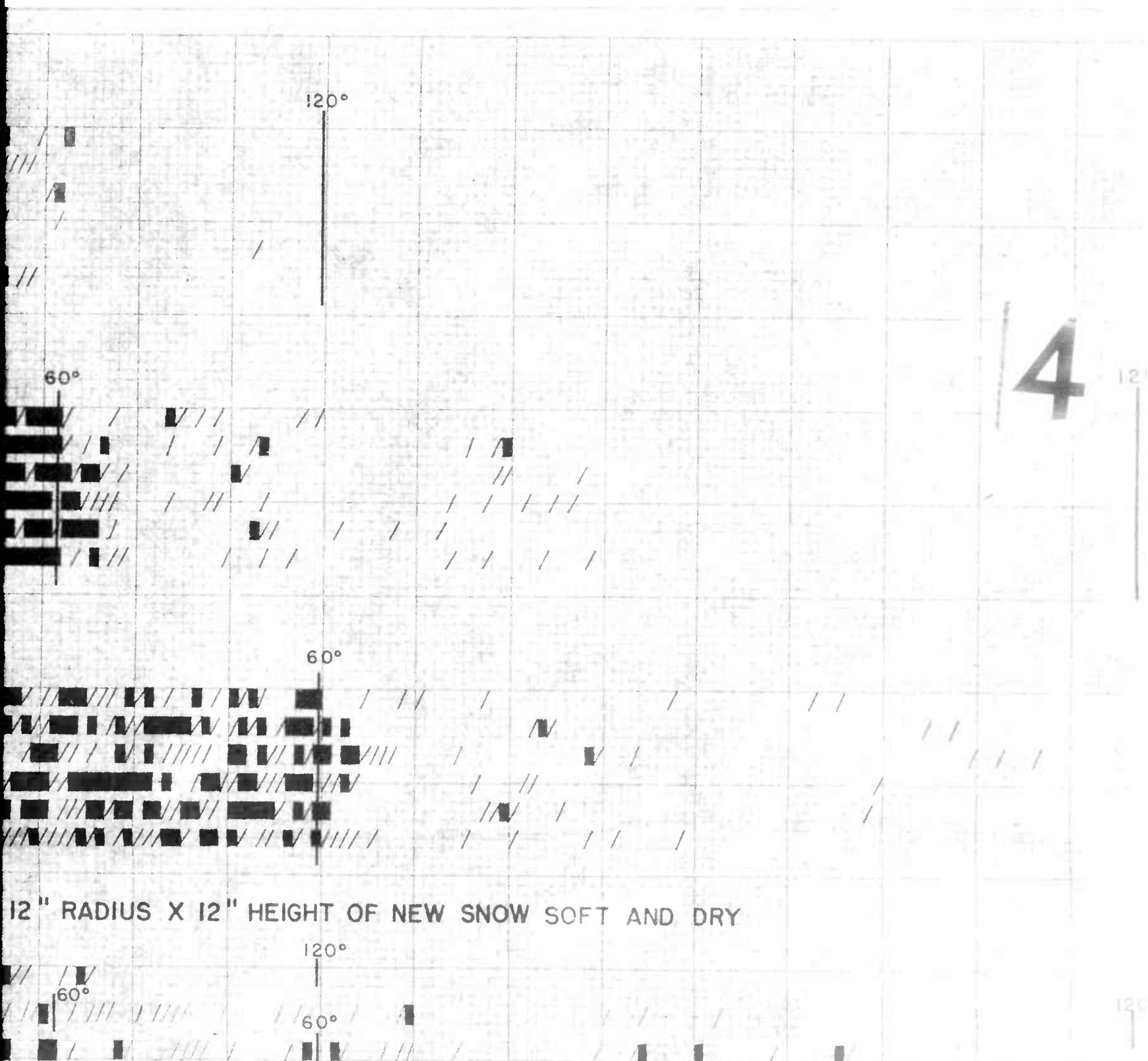
WEAPON DISTRIBUTION OF MIBAI CLAYMORE AT 50', 100', AND 150' RANGES WHEN WEAPON BURIED IN 12" RADIUS X 12" HEIGHT



CONFIDENTIAL

DOWNGRADE AT 3 YEAR INTERVALS
DECLASSIFIED AFTER 12 YEARS
DOD DIR 5200-10

3



12" RADIUS X 12" HEIGHT OF NEW SNOW SOFT AND DRY

PROJECT NR 8C - 3800 - 01
CONFIRMATORY TEST OF MINE, AP, MIBAI CLAYMORE

YEAR INTERVALS
R 12 YEARS
O

ANNEX D

Part IV - (U) Recommended Distribution

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CONFIRMATORY TEST OF MINE, ANTIPERSONNEL, M18A1, CLAYMORE,
Final Report of USATECOM Project No 8-3-8000-01-C (33-080)
(U). 17 June 1963
RDTE Project No: 1-C-5-43312-D-414-18 RDB Technical
Objective No: LC-07. Classified Report. (U) Tests were
conducted to determine if the production M18A1 Claymore
was suitable for Army use under arctic winter conditions
and to determine if the deficiencies noted during previous
arctic check test were corrected.

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