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AD006064	
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SECURITY INFORMATION

U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

REPORT NO. 1108

BOMB FUZING SYSTEM;
RESEARCH, DEVELOPMENT, TESTS AND REPORTS OF
42nd Partial Report

ROCKET LAUNCHER TESTS OF
ELECTRIC BOMB FUZE EX 200 MOD 3

FINAL Report

Copy No. 6

Task

Assignment NPG-Re2b-20-1-53

Classification CONFIDENTIAL
SECURITY INFORMATION

Rocket Launcher Tests of Electric Bomb Fuze EX-200 Mod 3
-----PART ASYNOPSIS

1. The last tests of the EX-200 Mod 3 fuze on the Naval Proving Ground's 1050 ft. launcher produced the following results:

a. Fuzes with 35G trigger switches had functioned on targets as light as 1/16" mild steel.

b. The C-R-C circuits had been satisfactorily modified so that they would withstand heavy impacts.

c. Faulty pyrotechnic actuators caused five (5) arming failures out of the eleven (11) rounds fired against heavy targets.

d. One (1) fuze out of 14 tested failed to function because the S3 switch was held down by extraneous material forced into the charging plug cavity during target penetration.

2. This test was conducted to obtain additional data on the functional ability of these fuzes to arm and fire after heavy plate impact.

3. It is concluded that:

a. An appreciable percentage of arming failures may be anticipated with the EX-200 Mod 3 fuze (10% in each of the last two (2) tests) during heavy impacts if the S3 switch is not changed in design. While penetrating heavy targets, foreign material tends to lodge in the top of the fuze, holding the S3 switch closed and preventing the arming cycle from being completed.

b. Many delayed fuze actions are resulting in duds (5 out of 9 fuzes that had completed their arming cycle in the present test) because of faulty pyrotechnic elements.

c. Four (4) of the nine (9) fuzes completing their arming cycle, in the present test against 3/4" and 1" STS armor plate, fired the 11 second delay primer satisfactorily and probably would have produced high order detonations if they had been in explosive loaded bombs with live boosters.

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NPG REPORT NO. 1108

Rocket Launcher Tests of Electric Bomb Fuze EX-200 Mod 3

4. It is recommended that steps be taken to remedy the deficiencies noted in the conclusions of this report before the start of evaluation tests by providing for more reliable pyrotechnic elements and either relocating or redesigning the S3 switch. The present tests mark the end of the development tests of the EX-200 Mod 3 electric bomb fuze.

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Rocket Launcher Tests of Electric Bomb Fuze EM-200 Mod 3

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Rocket Launcher Tests of Electric Bomb Fuze EX-200 Mod 3
-----PART BINTRODUCTION

1. AUTHORITY:

This test was conducted in accordance with references (a) and (b) under Task Assignment NPG-Re2b-20-1-53, reference (c).

2. REFERENCES:

- a. NOL Conf ltr NP/NOL/X1-1(1258)WA:NCB:gbh Ser 01811 of 9 Oct 1951
- b. NOL Conf Work Request FA-43 of 8 Sep 1952
- c. BUORD Conf NP9 Re2b-DBLaP:bjn Ser 42733 of 29 Jul 1952
- d. NPG Conf Report No. 1048 of 8 Sep 1952

3. BACKGROUND:

The last tests of the EX-200 Mod 3 fuze on the Naval Proving Ground 1050 ft. launcher, reported in reference (d), had produced the following results:

- a. Fuzes with 35G trigger switches had functioned on targets as light as 1/16" mild steel.
- b. The C-R-C circuits had been satisfactorily modified so that they would withstand heavy impacts.
- c. Faulty pyrotechnic actuators caused five (5) arming failures out of the eleven (11) rounds fired against heavy targets.
- d. One (1) fuze out of 14 tested failed to function because the S3 switch was held down by extraneous material forced into the charging plug cavity during target penetration.

4. OBJECT OF TEST:

This test was conducted to obtain additional data on the functional ability of these fuzes to arm and fire after heavy plate impact.

Rocket Launcher Tests of Electric Bomb Fuze EX-200 Mod 3

5. PERIOD OF TEST:

a. Date Project Letter	8 Sep 1952
b. Date Necessary Material Received	1 Oct 1952
c. Date Commenced Test	22 Oct 1952
d. Date Test Completed	29 Oct 1952
e. Preliminary Report Submitted	25 Nov 1952

6. REPRESENTATIVES PRESENT:

Mr. N. C. Butler	Naval Ordnance Laboratory
Mr. R. V. Hall	Naval Ordnance Laboratory
Mr. D. K. Tower	Daystrom Electric Corp.

PART CDETAILS OF TEST

7. DESCRIPTION OF ITEM UNDER TEST:

a. Drawings and a description of the modifications in and operation of the fuzes tested are found in reference (d). All fuzes in the present test had 1000 G impact switches to insure non-functioning on the launcher. The only explosives in the fuzes were the arming squibs, primers and detonators. The primers differed from those previously used in that they had a glass plug to supply a hermetic seal. All fuzes were filled with freon gas to a slight positive pressure.

Rocket Launcher Tests of Electric Bomb Fuze LX-200 Mod 3

8. DESCRIPTION OF TEST EQUIPMENT:

Test Vehicles:	250 lb. G.P. Bombs AN-M57A1 Vermiculite Cement loaded, with cross-axial fuze liner midway.
Propelling Force of Test Vehicles:	Three (3) 5"O rocket motors Mk 2 Mod 3 mounted in special carriage.
Launcher:	NPG 500 ft.
Fuze Charging Equipment:	Daystrom Electric Corp.
Targets:	3/4" and 1"O STS armor plate.
Velocity Measurements:	Counter chronograph and oscillograph.
Cameras:	35mm Mitchell and Bowen Acceleration.

9. PROCEDURE:

a. The fuzes were inserted in the fuze cavity after the bomb had been placed on the launcher in firing position. The fuze was then electrically tested and a charging potential of 200-210 volts D.C. applied to the fuze condenser immediately before the round was fired. The three (3) propulsion motors secured to the bomb were ignited simultaneously. The first two (2) rounds were fired against 1"O STS armor plate but the impact was so severe that the bombs deformed badly and broke open. The remaining rounds were fired against 3/4" STS plate. All the bombs were recovered from these impacts in good condition. The fuzes were removed from the bombs at the recovery site, given a partial examination and then returned to the Naval Ordnance Laboratory for a complete breakdown.

Rocket Launcher Tests of Electric Bomb Fuze EX-200 Mod 3

10. RESULTS OF TEST:

a. Tabulated test results are found in Table I. Detailed impact records are found in Appendix (B).

b. Following is a summary of the test results:

<u>No. of Rounds</u>	<u>STS Target</u>	<u>Striking Velocity ft./sec.</u>	<u>Fuze Action</u>	
			<u>Arming</u>	<u>Functioning</u>
2	140	1100	1 Complete 1 Incomplete	1 Complete 1 Did not fire
8	0475	1090	8 Complete	3 Complete 5 Did not fire

c. Only one (1) of the ten (10) fuzes fired failed to arm completely after target impact. In that instance the switch S3 was held down by metal broken from the top of the fuze. In the previous heavy impact test one (1) of ten (10) fuzes failed to arm because the S3 switch was held down by extraneous material. Five (5) fuzes were duds, even though they armed completely, because the 11 second primer actuated without igniting the delay column. Four (4) fuzes functioned completely, including proper firing of the 11 second delay primers.

PART D

CONCLUSIONS

11. It is concluded that:

a. An appreciable percentage of arming failures may be anticipated with the EX-200 Mod 3 fuze (10% in each of the last two (2) tests) during heavy impacts if the S3 switch is not changed in design. While penetrating heavy targets foreign material tends to lodge in the top of the fuze, holding the S3 switch closed and preventing the arming cycle from being completed.

Rocket Launcher Tests of Electric Bomb Fuze EX-200 Mod 3

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b. Following is a summary of the test results:

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			<u>Arming</u>	<u>Functioning</u>
2	140	1100	1 Complete 1 Incomplete	1 Complete 1 Did not fire
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Rocket Launcher Tests of Electric Bomb Fuze EX-200 Mod 3

b. Many delayed fuze actions are resulting in duds (5 out of 9 fuzes that had completed their arming cycle in the present test) because of faulty pyrotechnic elements.

c. Four (4) of the nine (9) fuzes completing their arming cycle, in the present test against 3/4" and 1" STS armor plate, fired the 11 second delay primer satisfactorily and probably would have produced high order detonations if they had been in explosive loaded bombs with live boosters.

PART E

RECOMMENDATIONS

12. It is recommended that steps be taken to remedy the deficiencies noted in the conclusions of this report before the start of evaluation tests by providing for more reliable pyrotechnic elements and either relocating or redesigning the S3 switch. The present tests mark the end of the development tests of the EX 200 Mod 3 electric bomb fuze.

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NPG REPORT NO. 1108

Rocket Launcher Tests of Electric Bomb Fuze EX-200 Mod 3

The tests upon which this report is based were conducted by:

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Rocket Battery
Terminal Ballistics Department

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By direction

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NPG REPORT NO. 1108

U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

Forty Second Partial Report

on

Bomb Fuzing System;

Research, Development, Tests and Reports of

- - - - -

Final Report

on

Rocket Launcher Tests of Electric Bomb Fuze EX-200 Mod 3

Project No.: NPG-Re2b-20-1-53
Copy No.: 6
No. of Pages: 9

Date: MAR 20 1953

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MP9-62254

TABLE I
Heavy Plate Impact Test of MX-200 Mod 3 Bomb Fuse (Aiming After Impact)

Plate - 0.75 and 1.00 ST. NO. 043792 (1500 Mig. - Carnegie

250W G.F. Bombs AP-M57A1 Inert loaded with Cement

Fired from 14G 5/0 ft. Launcher

Propulsion supplied by three 570 HVAR rocket motors in a special carriage.

..... Time From

..... Charge

..... To Impact

..... Velocity

..... ft./sec.

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Condition of Recovered Bomb

Nose badly deformed.

Nose split open.

Effective intact - One motor blew out of carriage upon ignition

Effective intact

Effective intact

Effective intact

Side torn open due to impact with next round.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Effective intact.

Note: • All targets set 0° to launcher except last two which were 30° and 45° respectively.

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SECURITY INFORMATION

APPENDIX (A)

CONFIDENTIAL

CONFIDENTIAL SECURITY INFORMATION (When Filled In) Dahlgren, Virginia

REFERENCE: (a) NOL Conf ltr NP/NOL/X1-1(1258)WA:NCB:gbh Ser 01811 of 9 Oct 1951
(b) NOL Conf Work Request FA-43 of 8 Sep 1952
(c) NPG Report No. 1108

TASK ASSIGNMENT NO. NPG-Re2b-20-1-53

TEST OBJECT

Heavy Plate Test of EX-200 Mod 3 Electric Bomb Fuze in
250# G.P. Bomb

IMPACT NUMBER	40283
TEST NUMBER	T-2b20-1.5
DATE OF IMPACT	10-22-52

PLATE TARGET DATA				ROCKET HEAD			
GAUGE	CLASS	DIMENSIONS		CALIBER	TYPE	MARK	MOD
170	STS			250#	G.P. Bomb	AN-M57	
MANUFACTURER	NUMBER	GROUP		MANUFACTURER		LOT NUMBER	HEAD NUMBER
Carnegie	043792						
CONCRETE TARGET DATA				ROCKET MOTOR (3)			
NUMBER	GAUGE	DIMENSIONS	DATE POURED	FILLER TYPE	FILLER WEIGHT	EMPTY WEIGHT	WEIGHT AS FIRED
				Verm. Cement			241#
MIXTURE (Per cubic foot cement)				BOOSTERS			
SAND _____ CU. FT. GRAVEL _____ CU. FT. WATER _____ GAL.				Inert			
COMPRESSION STRENGTH (psi)				ROCKET MOTOR (3)			
REINFORCEMENT				CALIBER	MARK	MOD	TEMPERATURE
				570	10	5	90°
				COMPLETE ROUND			
				MARK	MOD	WEIGHT (As fired)	WEIGHT (Burned)
						482.30#	
				OTHER INFORMATION			
				AJN:RMDA-453-H-51			
				RMDA-453-H-9-51			
IMPACT DATA				ROCKET PERFORMANCE			
OBliquITY	PENETRATION			FLIGHT	VELOCITY		
0°	Complete			20 Yaw	STRIKING <u>Neen 1086</u>		
THICKNESS AT IMPACT	NO. OF IMPACT ON TARGET			FUZE FUNCTIONING	EXPLOSIVE ACTION		
1"	1			Complete	☐ HIGH ORDER ☐ LOW ORDER ☐ NONE		
DISTANCE FROM NEAREST IMPACT	DISTANCE FROM NEAR EDGES			DISTANCE OF BURST BEHIND FACE OF TARGET			
0	T-42" L-90"						
THROUGH OPENING	CRACKS			CONDITION OF RECOVERED ROUND			
17" X 23-1/2"	0			Bomb Nose badly deformed			
TARGET CONDITION (Spall, dish, punching, bottom, etc.)				CONDITION OF RECOVERED HEAD			
Dish 3" Spur 2"				☒ EFFECTIVE ☐ INEFFECTIVE			
Button Thrown							
Impact Dim. 18" X 24"							
LAUNCHER USED							
500' (1050) Rocket Launcher							
PHOTOGRAPH NUMBER							
NP9-51432							

REMARKS

Fuze armed OK and 11 sec. delay primer fired OK

SIGNATURE

F. W. Kasdorf
F. W. KASDORF

TITLE

Ord. Eng.

CONFIDENTIAL SECURITY INFORMATION (When Filled In) Dahlgren, Virginia

REFERENCE: (a) NOL Conf ltr NP/NOL/X1-1(1258)WA:NCB:gbh Ser 01811 of 9 Oct 1951
(b) NOL Conf Work Request FA-43 of 8 Sep 1952
(c) NPG Report No. 1108

TASK ASSIGNMENT NO. NPG-Re2b-20-1-53

TEST OBJECT

Heavy Plate Test of EX-200 Mod 3 Electric Bomb Fuze in
250# G.P. Bomb

IMPACT NUMBER
<u>40284</u>
TEST NUMBER
<u>T-2b20-1.5</u>
DATE OF IMPACT
<u>10-22-52</u>

PLATE TARGET DATA				ROCKET HEAD			
GAUGE <u>1W</u>	CLASS <u>STS</u>	DIMENSIONS		CALIBER <u>250#</u>	TYPE <u>G.P. Bomb</u>	MARK <u>AN-M57</u>	MOD
MANUFACTURER <u>Carnegie</u>	NUMBER <u>043792</u>	GROUP		MANUFACTURER	LOT NUMBER	HEAD NUMBER	
CONCRETE TARGET DATA				FILLER TYPE <u>Verm. Cement</u>	FILLER WEIGHT	EMPTY WEIGHT	WEIGHT AS FIRED <u>246#</u>
NUMBER	GAUGE	DIMENSIONS	DATE POURED	FUZZES <u>#1635 HG</u>	BOOSTERS <u>Inert</u>		
MIXTURE (Per cubic foot cement)				ROCKET MOTOR (3)			
SAND _____ CU. FT. GRAVEL _____ CU. FT. WATER _____ GAL.				CALIBER <u>580</u>	MARK <u>10</u>	MOD <u>5</u>	TEMPERATURE <u>90°</u>
COMPRESSIVE STRENGTH (psi)				COMPLETE ROUND			
REINFORCEMENT				MARK	MOD	WEIGHT (As fired) <u>486.35#</u>	WEIGHT (Burned)
				OTHER INFORMATION <u>ALN:RMDA-453-H-51</u> <u>RMDA-453-H-9-51</u>			
IMPACT DATA				ROCKET PERFORMANCE			
OBLIQUITY <u>0°</u>	PENETRATION <u>Complete</u>			FLIGHT <u>1° Yaw</u>	VELOCITY Mean <u>1129</u> MEDIAN		
THICKNESS AT IMPACT <u>1W</u>	NO. OF IMPACT ON TARGET <u>2</u>			FUZE FUNCTIONING <u>Dud</u>	EXPLOSIVE ACTION ☐ HIGH ORDER ☐ LOW ORDER ☐ NONE		
DISTANCE FROM NEAREST IMPACT <u>40"</u>	DISTANCE FROM NEAR EDGES <u>T-34" L-54"</u>			DISTANCE OF BURST BEHIND FACE OF TARGET			
THROUGH OPENING <u>26" X 32"</u>	CRACKS <u>0</u>			CONDITION OF RECOVERED ROUND			
TARGET CONDITION (Spall, dish, punching, button, etc.) <u>Dish 4" Spur 2"</u>				CONDITION OF RECOVERED HEAD ☐ EFFECTIVE ☒ INEFFECTIVE			
<u>Button Thrown</u>				<u>Nose of bomb split open</u>			
<u>Impact Dim 27" X 34"</u>							
LAUNCHER USED <u>500' (1050) Rocket Launcher</u>							
PHOTOGRAPH NUMBER <u>NP9-51433</u>							
REMARKS <u>S₃ switch held down by foreign material during target impact and fuze therefore did not arm.</u>							

CONFIDENTIAL SECURITY INFORMATION (When Filled In) Dahlgren, Virginia

REFERENCE: (a) NOL Conf ltr NP/NOL/X1-1(1258)WA:NCB:gbh Ser 01811 of 9 Oct 1951
(b) NOL Conf Work Request FA-43 of 8 Sep 1952
(c) NPG Report No. 1108

TASK ASSIGNMENT NO. NPG-Re2b-20-1-53

TEST OBJECT

Heavy Plate Test of EX-200 Mod 3 Electric Bomb Fuze in
250# G.P. Bomb

IMPACT NUMBER

40293

TEST NUMBER

T2b20-1.5

DATE OF IMPACT

10-23-52

PLATE TARGET DATA

GAUGE <u>3/4"</u>	CLASS <u>STS</u>	DIMENSIONS
MANUFACTURER	NUMBER	GROUP

CONCRETE TARGET DATA

NUMBER	GAUGE	DIMENSIONS	DATE POURED
MIXTURE (Per cubic foot cement)			
SAND	CU. FT.	GRAVEL	CU. FT.
WATER			
COMPRESSIVE STRENGTH (psi)			
REINFORCEMENT			

ROCKET HEAD

CALIBER <u>250#</u>	TYPE <u>G.P. Bomb</u>	MARK <u>AN-M57</u>	MOD
MANUFACTURER	LOT NUMBER	HEAD NUMBER <u>8</u>	WEIGHT AS FIRED <u>246#</u>
FILLER TYPE <u>Verm. Cement</u>	FILLER WEIGHT	EMPTY WEIGHT	ROOSTERS <u>Inert</u>
FUJES <u>#1631 HG</u> <u>EX-200 Mod 3</u>			

ROCKET MOTOR (3)

CALIBER <u>580</u>	MARK <u>10</u>	MOD <u>5</u>	TEMPERATURE <u>900</u>
-----------------------	-------------------	-----------------	---------------------------

COMPLETE ROUND

MARK	MOD	WEIGHT (As fired) <u>487.10#</u>	WEIGHT (Burned)
------	-----	-------------------------------------	-----------------

OTHER INFORMATION

ALN:RMDA-453-H-9-51
RMDA-453-H-51

IMPACT DATA

OBLIQUITY <u>0°</u>	PENETRATION <u>Complete</u>
THICKNESS AT IMPACT <u>#750</u>	NO. OF IMPACT ON TARGET
DISTANCE FROM NEAREST IMPACT <u>33"</u>	DISTANCE FROM NEAR EDGES <u>T-53" L-97"</u>
THROUGH OPENING <u>16-1/2" X 17"</u>	CRACKS <u>0</u>
TARGET CONDITION (Spall, dish, punching, bottom, etc.) <u>Dish 3" Spur 16"</u>	
<u>Button Thrown</u>	
<u>Impact Dim. 17" X 20"</u>	

LAUNCHER USED

500' (1050) Rocket Launcher

PHOTOGRAPH NUMBER

NP9-62153

REMARKS

Fuze armed OK and 11 sec. delay primer fired OK

ROCKET PERFORMANCE

FLIGHT <u>15° Yaw</u>	VELOCITY <u>Mean 855</u>
FLY FUNCTIONING <u>Complete</u>	EXPLOSIVE ACTION ☐ HIGH ORDER ☐ LOW ORDER ☐ NONE
DISTANCE OF BURST BEHIND FACE OF TARGET	

CONDITION OF RECOVERED ROUND

CONDITION OF RECOVERED HEAD

☒ EFFECTIVE ☐ INEFFECTIVE

Intact

One motor blew out of pusher carriage when ignited

SIGNATURE

F. W. Kasdorf

TITLE

F. W. KASDORF

Ord. Eng.

CONFIDENTIAL SECURITY INFORMATION (When Filled In)REFERENCE: (a) NOL Conf ltr NP/NOL/X1-1(1258)WA:NCB:gbh Ser 01811 of 9 Oct 1951
(b) NOL Conf Work Request FA-43 of 8 Sep 1952
(c) NPG Report No. 1108TASK ASSIGNMENT NO. NPG-Re2b-20-1-53

TEST OBJECT

Heavy Plate Test of EX-200 Mod 3 Electric Bomb Fuze in
250# G.P. Bomb

IMPACT NUMBER

L0294

TEST NUMBER

T2b20-1.5

DATE OF IMPACT

10-23-52

PLATE TARGET DATA

GAUGE	CLASS	DIMENSIONS
<u>3/4"</u>	<u>STS</u>	
MANUFACTURER	NUMBER	GROUP

ROCKET HEAD

CALIBER	TYPE	MARK	MOD
<u>250#</u>	<u>G.P. Bomb</u>	<u>AN-M57</u>	
MANUFACTURER	LOT NUMBER	HEAD NUMBER	
		<u>4</u>	
FILLER TYPE	FILLER WEIGHT	EMPTY WEIGHT	WEIGHT AS FIRED
<u>Verm. Cement</u>			<u>24.1#</u>
FUZES	BOOSTERS		
<u>#1632 HG</u>	<u>Inert</u>		
<u>EX-200 Mod 3</u>			

CONCRETE TARGET DATA

NUMBER	GAUGE	DIMENSIONS	DATE POURED
MIXTURE (Per cubic foot cement)			
SAND	CU. FT.	GRAVEL	CU. FT. WATER GAL.
COMPRESSIVE STRENGTH (psi)			
REINFORCEMENT			

ROCKET MOTOR (3)

CALIBER	MARK	MOD	TEMPERATURE
<u>580</u>	<u>10</u>	<u>5</u>	<u>900</u>

COMPLETE ROUND

MARK	MOD	WEIGHT (As fired)	WEIGHT (Burned)
		<u>487.15#</u>	
OTHER INFORMATION			
<u>AIN:RMDA-453-H-51</u>			
<u>RMDA-453-H-9-51</u>			

IMPACT DATA

OBLIQUITY	PENETRATION
<u>0°</u>	<u>Complete</u>
THICKNESS AT IMPACT	NO. OF IMPACT ON TARGET
<u>.750</u>	
DISTANCE FROM NEAREST IMPACT	DISTANCE FROM NEAR EDGES
<u>23"</u>	<u>T-48" L-143"</u>
THROUGH OPENING	CRACKS
<u>12" X 18"</u>	<u>0</u>
TARGET CONDITION (Spall, dish, punching, button, etc.)	
<u>Dish 4" Spur 5"</u>	
<u>Button Thrown</u>	
<u>Impact Dia. 13" X 22"</u>	

ROCKET PERFORMANCE

FLIGHT	VELOCITY
<u>70° Yaw</u>	<u>Mean 1096</u>
FUZE FUNCTIONING	EXPLOSIVE ACTION
<u>Complete</u>	☐ HIGH ORDER ☐ LOW ORDER ☐ NONE
DISTANCE OF BURST BEHIND FACE OF TARGET	
CONDITION OF RECOVERED ROUND	
CONDITION OF RECOVERED HEAD	
☒ EFFECTIVE ☐ INEFFECTIVE	
<u>Intact</u>	

LAUNCHER USED

500'(1050 Rocket Launcher

PHOTOGRAPH NUMBER

NP9-62152

REMARKS

Fuze armed OK and 11 sec. delay primer fired OK

SIGNATURE

F. W. Kasdorf

TITLE

F. W. KASDORFOrd. Eng.

CONFIDENTIAL SECURITY INFORMATION (When filled in)

REFERENCE: (a) NOL Conf ltr NP/NOL/X1-1(1258)WA:NCB:gbh Ser 01811 of 9 Oct 1951
(b) NOL Conf Work Request FA-43 of 8 Sep 1952
(c) NPG Report No. 1108

TASK ASSIGNMENT NO. NPG-Re2b-20-1-53

TEST OBJECT

Heavy Plate Test of EX-200 Electric Bomb Fuze in
250# G.P. Bomb

IMPACT NUMBER
40303
TEST NUMBER
T2b20-1
DATE OF IMPACT
10-28-52

FLATE TARGET DATA

GAUGE	CLASS	DIMENSIONS
3/4"	STS	105" X 220"
MANUFACTURER	NUMBER	GROUP

CONCRETE TARGET DATA

NUMBER	GAUGE	DIMENSIONS	DATE POURED
MIXTURE (Per cubic foot cement)			
SAND	CU. FT.	GRAVEL	CU. FT. WATER GAL.
COMPRESSIVE STRENGTH (psi)			
REINFORCEMENT			

ROCKET HEAD

CALIBER	TYPE	MARK	MOD
250#	G.P. Bomb	AN-M57	
MANUFACTURER	LOT NUMBER	HEAD NUMBER	
		3	
FILLER TYPE	FILLER WEIGHT	EMPTY WEIGHT	WEIGHT AS FIRED
Cement			244#
FUZZ	BOOSTERS		
#1636 HG	Inert		
EX-200 Mod 3			

ROCKET MOTOR (3)

CALIBER	MARK	MOD	TEMPERATURE
5"0	10	5	90°
COMPLETE ROUND Wt. 80.15#			
MARK	MOD	WEIGHT (As fired)	WEIGHT (Burned)
		484.45#	

OTHER INFORMATION

AIN:RMDA-453-H-9-51

IMPACT DATA

OBLIQUITY	PENETRATION
0°	Complete
THICKNESS AT IMPACT	NO. OF IMPACT ON TARGET
750	
DISTANCE FROM NEAREST IMPACT	DISTANCE FROM NEAR EDGES
38"	T-56" R-44"
THROUGH OPENING	CRACKS
10" X 29-1/2"	0
TARGET CONDITION (Spall, dish, punching, button, etc.)	
Dish 3" Spur 4"	

ROCKET PERFORMANCE

FLIGHT	VELOCITY
90° Yaw	Mean 1072
FUZE FUNCTIONING	EXPLOSIVE ACTION
Armed	☐ HIGH ORDER ☐ LOW ORDER ☒ NONE
DISTANCE OF BURST BEHIND FACE OF TARGET	

CONDITION OF RECOVERED ROUND

CONDITION OF RECOVERED HEAD

☒ EFFECTIVE	☐ INEFFECTIVE
Intact	

LAUNCHER USED

1050' Rocket Launcher

PHOTOGRAPH NUMBER

NP9-62154

REMARKS

Fuze Armed but 11 sec. primer did not fire

SIGNATURE

F. W. Kasdorf

TITLE

F. W. KASDORF Ord. Eng.

CONFIDENTIAL SECURITY INFORMATION (When Filled In) Dahlgren, Virginia

REFERENCE: (a) NOL Conf Ltr NP/NOL/X1-1(1258)WA:NCR:gbh Ser 01811 of 9 Oct 1951
(b) NOL Conf Work Request FA-43 of 8 Sep 1952
(c) NPG Report No. 1108

TASK ASSIGNMENT NO. NPG-Ra2b-20-1-53

TEST OBJECT

Heavy Plate Test of EX-200 Electric Bomb Fuze in
250# G.P. Bomb

IMPACT NUMBER

40304

TEST NUMBER

T2b20-1

DATE OF IMPACT

10-28-52

PLATE TARGET DATA

GAUGE <u>3/4"</u>	CLASS <u>STS</u>	DIMENSIONS <u>105" X 220"</u>
MANUFACTURER	NUMBER	GROUP

CONCRETE TARGET DATA

NUMBER	GAUGE	DIMENSIONS	DATE POURED
MIXTURE (Per cubic foot cement)			
SAND	CU. FT.	GRAVEL	CU. FT. WATER GAL.
COMPRESSIVE STRENGTH (psi)			
REINFORCEMENT			

ROCKET HEAD

CALIBER <u>250#</u>	TYPE <u>G.P. Bomb</u>	MARK <u>AN-M57A-1</u>	MOD
MANUFACTURER	LOT NUMBER	HEAD NUMBER	
FILLER TYPE <u>Cement</u>	FILLER WEIGHT	EMPTY WEIGHT	WEIGHT AS FIRED <u>21.1#</u>
FUZES <u>#1630 HG</u> <u>EX-200 Mod 3</u>	BOOSTERS <u>Inert</u>		

ROCKET MOTOR (3)

CALIBER <u>5#0</u>	MARK <u>10</u>	MOD <u>5</u>	TEMPERATURE <u>90°</u>
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COMPLETE ROUND

MARK	MOD	WEIGHT (As fired) <u>1485.35#</u>	WEIGHT (Burned)
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OTHER INFORMATION

ALN:RMDA-453-H-9-51

IMPACT DATA

OBLIQUITY <u>0°</u>	PENETRATION <u>Complete</u>
THICKNESS AT IMPACT <u>8750</u>	NO. OF IMPACT ON TARGET
DISTANCE FROM NEAREST IMPACT	DISTANCE FROM NEAR EDGES <u>T-56" R-63"</u>
THROUGH OPENING <u>12" X 31"</u>	CRACKS
TARGET CONDITION (Spall, dish, punching, button, etc.) <u>Dish 4" Spur 23"</u> <u>Button Thrown</u> <u>Impact Dim. 14" X 34"</u>	
LAUNCHER USED <u>1050' Rocket Launcher</u>	
PHOTOGRAPH NUMBER <u>NP9-62155</u>	

ROCKET PERFORMANCE

FLIGHT <u>14° Yaw</u>	VELOCITY Mean <u>1074</u>
FUZE FUNCTIONING <u>Armed</u>	EXPLOSIVE ACTION ☐ HIGH ORDER ☐ LOW ORDER ☒ NONE
DISTANCE OF BURST BEHIND FACE OF TARGET	
CONDITION OF RECOVERED ROUND	
CONDITION OF RECOVERED HEAD ☒ EFFECTIVE ☐ INEFFECTIVE <u>Intact</u>	

REMARKS

Fuze armed but 11 sec. primer did not fire

SIGNATURE

F. W. Kasdorf

F. W. KASDORF

TITLE

Ord. Eng.

CONFIDENTIAL SECURITY INFORMATION (When Filled In) Dahlgren, Virginia

REFERENCE: (a) NOL Conf ltr NP/NOL/X1-1(1258)WA:NCB:gbh Ser 01811 of 9 Oct 1951
(b) NOL Conf Work Request FA-43 of 8 Sep 1952
(c) NPG Report No. 1108

TASK ASSIGNMENT NO. NPG-Re2b-20-1-53

TEST OBJECT

Heavy Plate Test of EX-200 Electric Bomb Fuze in
250# G.P. Bomb

IMPACT NUMBER

40305

TEST NUMBER

T2b20-1

DATE OF IMPACT

10-28-52

PLATE TARGET DATA

GAUGE <u>3/4"</u>	CLASS <u>STS</u>	DIMENSIONS <u>105" X 220"</u>
MANUFACTURER	NUMBER	GROUP

CONCRETE TARGET DATA

NUMBER	GAUGE	DIMENSIONS	DATE POURED
MIXTURE (Per cubic foot cement)			
SAND	CU. FT.	GRAVEL	CU. FT. WATER
COMPRESSIVE STRENGTH (psi)			
REINFORCEMENT			

ROCKET HEAD

CALIBER <u>250#</u>	TYPE <u>G.P. Bomb</u>	MARK <u>AN-M57A-1</u>	MOD
MANUFACTURER	LOT NUMBER	HEAD NUMBER	
FILLER TYPE <u>Cement</u>	FILLER WEIGHT	EMPTY WEIGHT	WEIGHT AS FIRED <u>244#</u>
FUZES <u>#1639 HG</u> <u>EX-200 Mod 3</u>	BOOSTERS <u>Inert</u>		

ROCKET MOTOR (3)

CALIBER <u>580</u>	MARK <u>10</u>	MOD <u>5</u>	TEMPERATURE <u>90°</u>
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COMPLETE ROUND Wt. 80.00#

MARK	MOD	WEIGHT (As fired)	WEIGHT (Burned)
		<u>484.00#</u>	

OTHER INFORMATION

ALN:RMDA-453-H-9-51

IMPACT DATA

OBLIQUITY <u>0°</u>	PENETRATION <u>Complete</u>
THICKNESS AT IMPACT <u>8750</u>	NO. OF IMPACT ON TARGET
DISTANCE FROM NEAREST IMPACT <u>50"</u>	DISTANCE FROM NEAR EDGES <u>T-49" R-113"</u>
THROUGH OPENING <u>17" X 44"</u>	CRACKS <u>0</u>

TARGET CONDITION (Spall, dish, punching, button, etc.)

Dish 4" Spur 38"

Button Thrown

Impact Dim. 19" X 47"

LAUNCHER USED

1050' Rocket Launcher

PHOTOGRAPH NUMBER

NP9-62156

REMARKS

Fuze armed but 11 sec. primer did not fire

ROCKET PERFORMANCE

FLIGHT <u>17° Yaw</u>	VELOCITY Mean <u>1098</u>
FUZE FUNCTIONING <u>Armed</u>	STRIKING RESIDUAL
EXPLOSIVE ACTION ☐ HIGH ORDER ☐ LOW ORDER ☒ NONE	
DISTANCE OF BURST BEHIND FACE OF TARGET	

CONDITION OF RECOVERED ROUND

CONDITION OF RECOVERED HEAD

☐ EFFECTIVE ☒ INEFFECTIVE

Side torn open by succeeding round in sand butt

SIGNATURE

F. W. Kasdorf

TITLE

F. W. KASDORF

Ord. Eng.

ROCKET IMPACT RECORD

NAVORD FORM 1882 (Rev. 8-52)

ACTIVITY U. S. Naval Proving Ground**CONFIDENTIAL SECURITY INFORMATION** (When filled in) Dahlgren, Virginia

REFERENCE: (a) NOL Conf ltr NP/NOL/X1-1(1258)WA:NCB:gbh Ser 01811 of 9 Oct 1951
 (b) NOL Conf Work Request FA-43 of 8 Sep 1952
 (c) NPG Report No. 1108

TASK ASSIGNMENT NO. NPG-Re2b-20-1-53

TEST OBJECT

Heavy Plate Test of EX-200 Electric Bomb Fuze in
 250# G.P. Bomb

IMPACT NUMBER

40308

TEST NUMBER

T2b20-1

DATE OF IMPACT

10-29-52

PLATE TARGET DATA

GAUGE	CLASS	DIMENSIONS
<u>3/4"</u>	<u>STS</u>	<u>105" X 220"</u>
MANUFACTURER	NUMBER	GROUP

CONCRETE TARGET DATA

NUMBER	GAUGE	DIMENSIONS	DATE POURED
MIXTURE (Per cubic foot cement)			
SAND	CU. FT.	GRAVEL	CU. FT. WATER GAL.
COMPRESSIVE STRENGTH (psi)			
REINFORCEMENT			

IMPACT DATA

OBLIQUITY	PENETRATION
<u>0°</u>	<u>Complete</u>
THICKNESS AT IMPACT	NO. OF IMPACT ON TARGET
<u>8750</u>	
DISTANCE FROM NEAREST IMPACT	DISTANCE FROM NEAR EDGES
<u>49</u>	<u>T-44" L-56"</u>
THROUGH OPENING	CRACKS
<u>13-1/2" X 19"</u>	<u>0</u>
TARGET CONDITION (Spall, dish, punching, button, etc.)	
<u>Dish 4" Spur 7"</u>	
<u>Button Thrown</u>	
<u>Impact Dim. 15" X 22"</u>	

LAUNCHER USED

1050' Rocket Launcher

PHOTOGRAPH NUMBER

NP9-62157

REMARKS

Fuze armed but 11 sec. primer did not fire

ROCKET HEAD

CALIBER	TYPE	MARK	MOD
<u>250#</u>	<u>G.P. Bomb</u>	<u>AN-M57</u>	
MANUFACTURER	LOT NUMBER	HEAD NUMBER	
		<u>7</u>	
FILLER TYPE	FILLER WEIGHT	EMPTY WEIGHT	WEIGHT AS FIRED
<u>Cement</u>			<u>21.8#</u>
FUZES	BOOSTERS		
<u>#1633 HG</u>	<u>Inert</u>		
<u>EX-200 Mod 3</u>			

ROCKET MOTOR (3)

CALIBER	MARK	MOD	TEMPERATURE
<u>580</u>	<u>10</u>	<u>5</u>	<u>900</u>

COMPLETE ROUND

MARK	MOD	WEIGHT (As fired)	WEIGHT (Burned)
		<u>Wt. 80.15#</u>	
		<u>488.45#</u>	

OTHER INFORMATION

ALN:RMDA-453-H-51

ROCKET PERFORMANCE

FLIGHT	VELOCITY
<u>70° Yaw</u>	<u>Mean 1090</u>
FUZE FUNCTIONING	EXPLOSIVE ACTION
<u>Armed</u>	☐ HIGH ORDER ☐ LOW ORDER ☒ NONE
DISTANCE OF BURST BEHIND FACE OF TARGET	

CONDITION OF RECOVERED ROUND

CONDITION OF RECOVERED HEAD

☒ EFFECTIVE ☐ INEFFECTIVEIntact

SIGNATURE

F. W. Kasdorf

TITLE

F. W. KASDORFOrd. Eng.

ROCKET IMPACT RECORD
NAVORD FORM 1882 (Rev. 8-52)

ACTIVITY U. S. Naval Proving Ground

Dahlgren, Virginia

CONFIDENTIAL SECURITY INFORMATION (When Filled In)

REFERENCE: (a) NOL Conf ltr NP/NOL/X1-1(1258)WA:NCB:gbh Ser 01811 of 9 Oct 1951
(b) NOL Conf Work Request FA-43 of 8 Sep 1952
(c) NPG Report No. 1108

TASK ASSIGNMENT NO. NPG-Re2b-20-1-53

TEST OBJECT

Heavy Plate Test of EX-200 Electric Bomb Fuze in
250# G.P. Bomb

IMPACT NUMBER

40309

TEST NUMBER

T2b20-1

DATE OF IMPACT

10-29-52

PLATE TARGET DATA

GAUGE	CLASS	DIMENSIONS
3/4"	STS	105" X 220"
MANUFACTURER	NUMBER	GROUP

CONCRETE TARGET DATA

NUMBER	GAUGE	DIMENSIONS	DATE POURED
MIXTURE (Per cubic foot cement)			
SAND	CU. FT.	GRAVEL	CU. FT. WATER GAL.
COMPRESSIVE STRENGTH (psi)			
REINFORCEMENT			

IMPACT DATA

OBLIQUITY	PENETRATION
30°	Complete
THICKNESS AT IMPACT	NO. OF IMPACT ON TARGET
750	
DISTANCE FROM NEAREST IMPACT	DISTANCE FROM NEAR EDGES
	T-53" L-77"
THROUGH OPENING	CRACKS
12" X 24-1/2"	0
TARGET CONDITION (Spall, dish, punching, button, etc.)	
Dish 4" Spur 9"	
Button Thrown	
Impact Dim. 14" X 27"	

LAUNCHER USED

1050' Rocket Launcher

PHOTOGRAPH NUMBER

NP9-62158

REMARKS

Fuze armed but 11 sec. primer did not fire

ROCKET HEAD

CALIBER	TYPE	MARK	MOD
250#	G.P. Bomb	AN-M57	
MANUFACTURER	LOT NUMBER	HEAD NUMBER	
		6	
FILLER TYPE	FILLER WEIGHT	EMPTY WEIGHT	WEIGHT AS FIRED
Cement			245#
FUZES	BOOSTERS		
#1716 HG EX-200 Mod 3	Inert		

ROCKET MOTOR (3)

CALIBER	MARK	MOD	TEMPERATURE
570	10	5	90°
COMPLETE ROUND Wt. 80.25#			
MARK	MOD	WEIGHT (As fired)	WEIGHT (Burned)
		485.75#	

OTHER INFORMATION

AIN:RMDA-453-H-51

ROCKET PERFORMANCE

FLIGHT	VELOCITY
5° Yaw	Mean 1084
FUZE FUNCTIONING	EXPLOSIVE ACTION
Armed	☐ HIGH ORDER ☐ LOW ORDER ☒ NONE
DISTANCE OF BURST BEHIND FACE OF TARGET	

CONDITION OF RECOVERED ROUND

CONDITION OF RECOVERED HEAD

☒ EFFECTIVE ☐ INEFFECTIVE

Intact

SIGNATURE

F. W. KASDORF

TITLE

Ord. Eng.

CONFIDENTIAL

CONFIDENTIAL SECURITY INFORMATION (When Filled In) Dahlgren, Virgin.REFERENCE: (a) NOL Conf ltr NP/NOL/X1-1(1258)WA:NCB:gbh Ser 01811 of 9 Oct 1951
(b) NOL Conf Work Request FA-43 of 8 Sep 1952
(c) NPG Report No. 1108TASK ASSIGNMENT NO. NPG-Re2b-20-1-53

TEST OBJECT

Heavy Plate Test of EX-200 Electric Bomb Fuze in
250# G.P. Bomb

IMPACT NUMBER

40310

TEST NUMBER

T2b20-1

DATE OF IMPACT

10-29-52

PLATE TARGET DATA

GAUGE	CLASS	DIMENSIONS
3/4"	STS	105" X 220"
MANUFACTURER	NUMBER	GROUP

CONCRETE TARGET DATA

NUMBER	GAUGE	DIMENSIONS	DATE POURED
MIXTURE (Per cubic foot cement)			
SAND	CU. FT.	GRAVEL	CU. FT. WATER GAL.
COMPRESSIVE STRENGTH (psi)			
REINFORCEMENT			

ROCKET HEAD

CALIBER	TYPE	MARK	MOD
250#	G.P. Bomb	AN-M57	
MANUFACTURER	LOT NUMBER	HEAD NUMBER	WEIGHT AS FIRED
		5	245#
FILLER TYPE	FILLER WEIGHT	EMPTY WEIGHT	BOOSTERS
Cement			Inert
FUZZES			
#1640 HG EX-200 Mod 3			

ROCKET MOTOR (3)

CALIBER	MARK	MOD	TEMPERATURE
5"0	10	5	90°

COMPLETE ROUND

MARK	MOD	WEIGHT (As fired)	WEIGHT (Burned)
		486.20#	

OTHER INFORMATION

AIN:RMDA-453-H-51

IMPACT DATA

OBLIQUITY	PENETRATION
45°	Complete
THICKNESS AT IMPACT	NO. OF IMPACT ON TARGET
#750	
DISTANCE FROM NEAREST IMPACT	DISTANCE FROM NEAR EDGES
57"	T-53" L-134"
THROUGH OPENING	CRACKS
24" X 28"	0
TARGET CONDITION (Spall, dish, punching, button, etc.)	
Dish 4" Spur 13"	

Button Thrown

Impact Dim 26" X 31"

LAUNCHER USED

1050' Rocket Launcher

PHOTOGRAPH NUMBER

NP9-62160

REMARKS

Fuze armed OK and 11 sec. delay primer fired OK

ROCKET PERFORMANCE

FLIGHT	VELOCITY
9-1/2° Yaw	Mean 1094
FUZE FUNCTIONING	EXPLOSIVE ACTION
Complete	☐ HIGH ORDER ☐ LOW ORDER ☐ NONE
DISTANCE OF BURST BEHIND FACE OF TARGET	

CONDITION OF RECOVERED ROUND

CONDITION OF RECOVERED HEAD

☒ EFFECTIVE ☐ INEFFECTIVE

Intact

SIGNATURE

F. W. Kasdorf

F. W. KASDORF

TITLE

Ord. Eng.

EX 500 000 3
0-83-15
101

22 October 1952

RD 5
EX 200 Mod 3
10-55-01

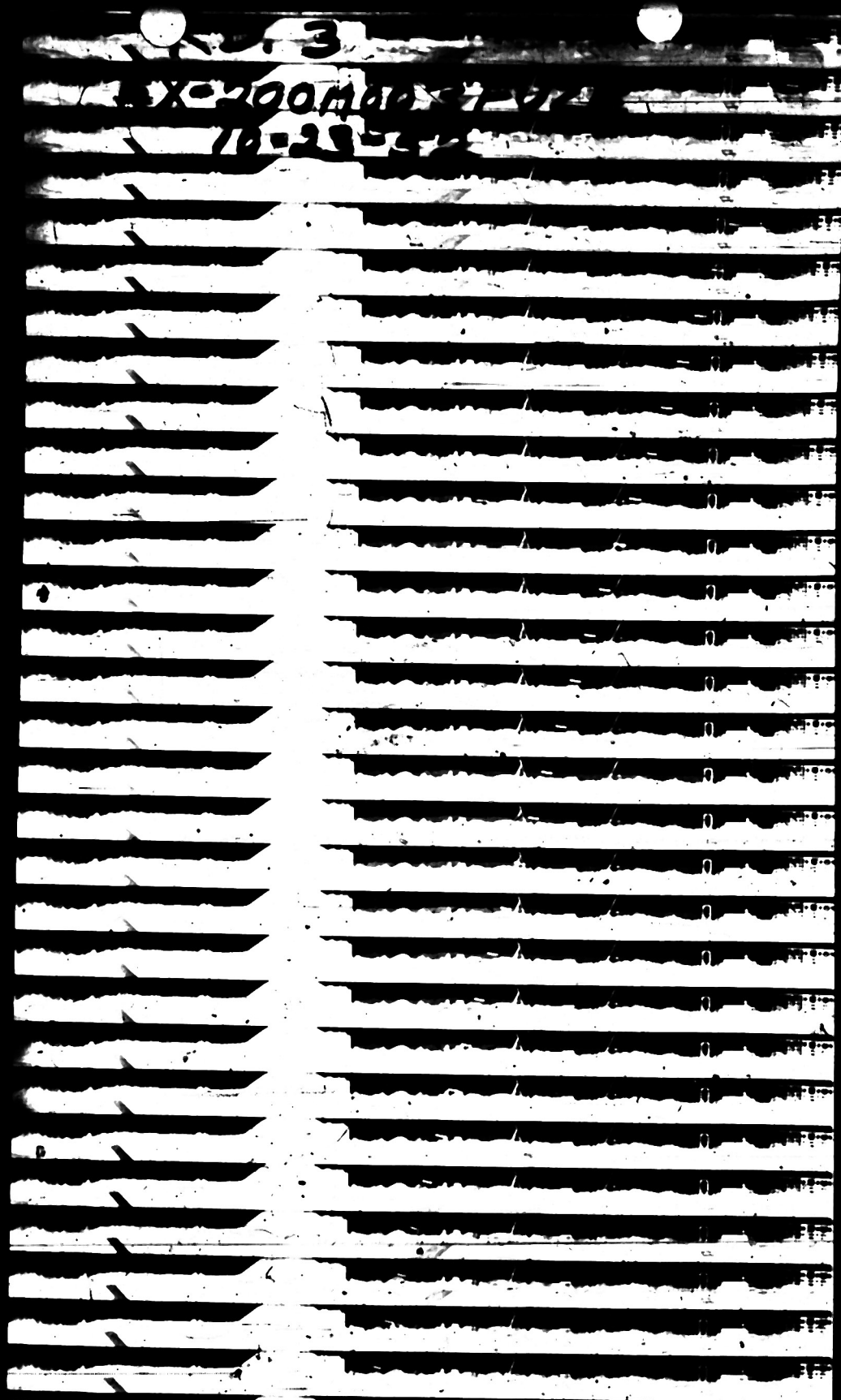
NP9 51433

Figure 2

CONFIDENTIAL

SECURITY INFORMATION

Heavy plate impact test of EX 200 Mod 3 Electric Bomb Fuze. Fired
from NPG 500 ft. launcher at 1129 ft./sec. in 250 lb. G.P. Bomb.
Target: 1"0 STS plate at 0° obliquity. Date Fired: 22 October 1952.



NPG-5015

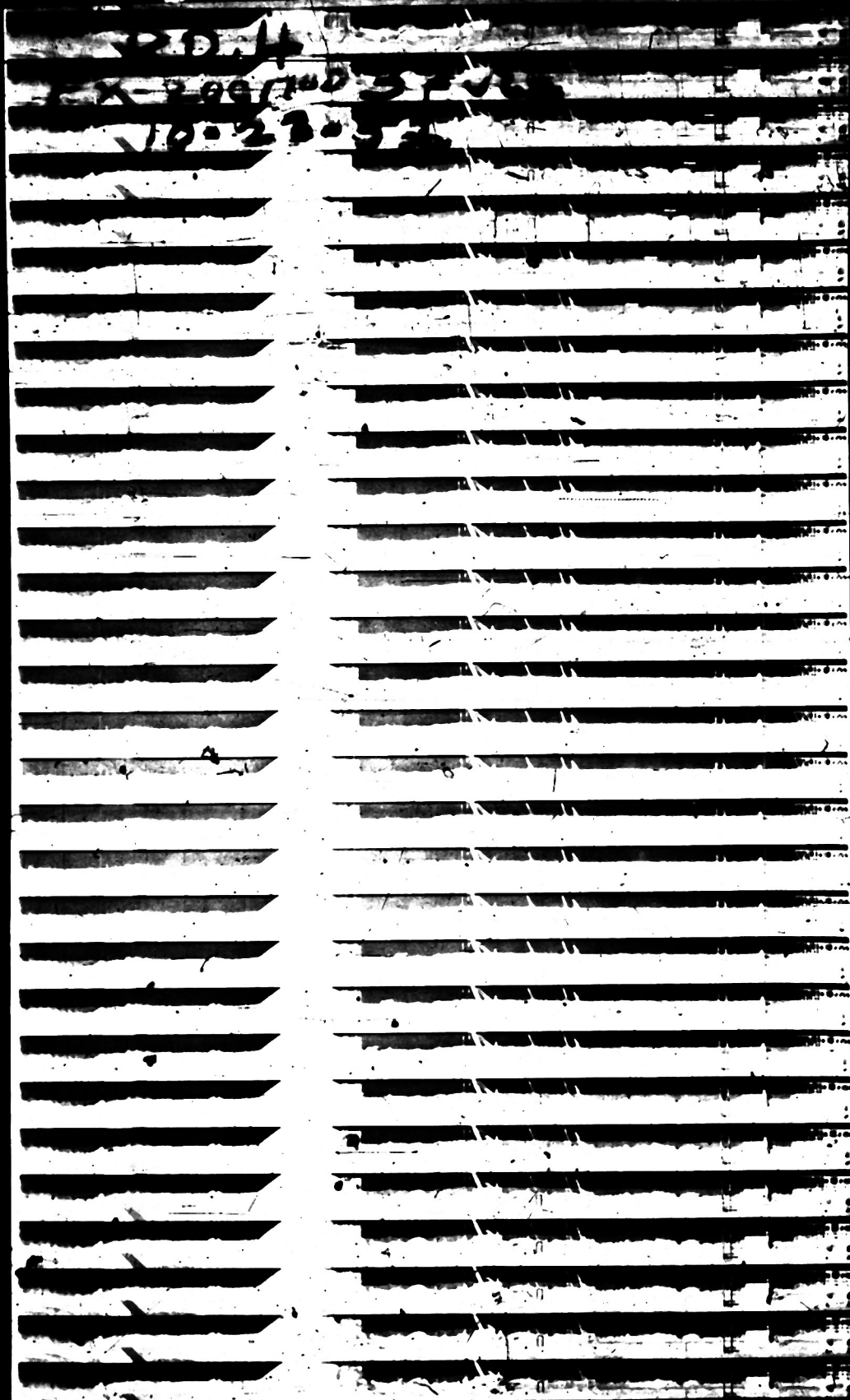
23 October 1952

CONFIDENTIAL

SECURITY INFORMATION

Impact No. 40293 - Heavy plate impact test of EX 200 Mod 3 electric bomb fuze. Fired from NPG 500 ft. launcher at 855 ft/sec. in 250 lb. G.P. Bomb. Note: One of the three pusher motors blew out of the carriage at ignition resulting in low velocity. Target: 0.75 STS plate at 0° obliquity.

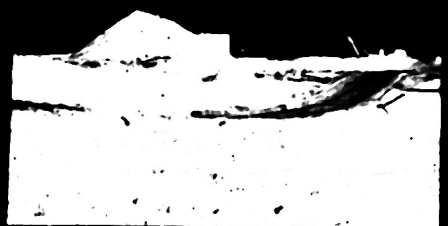
Figure 3



CONFIDENTIAL

SECURITY INFORMATION

NP9-62152 23 October 1952
Impact No. 40294 - Heavy plate impact test of EX 200 Mod 3 electric bomb fuze. Fired from NPG 500 ft. launcher at 1096 ft/sec. in 250 lb. G.P. Bomb. Target: 0475 STS plate at 0° obliquity.
Figure 4



NP9-62154

28 October 1952

CONFIDENTIAL

SECURITY INFORMATION

Impact No. 40303 - Heavy plate impact test of EX-200 Mod 3 electric bomb fuze. Fired from NPG 500 ft. launcher at 1072 ft/sec. in 250 lb. G.P. Bomb. Target: 0775 SIS plate at 0° obliquity.

Figure 5



NP9-62155

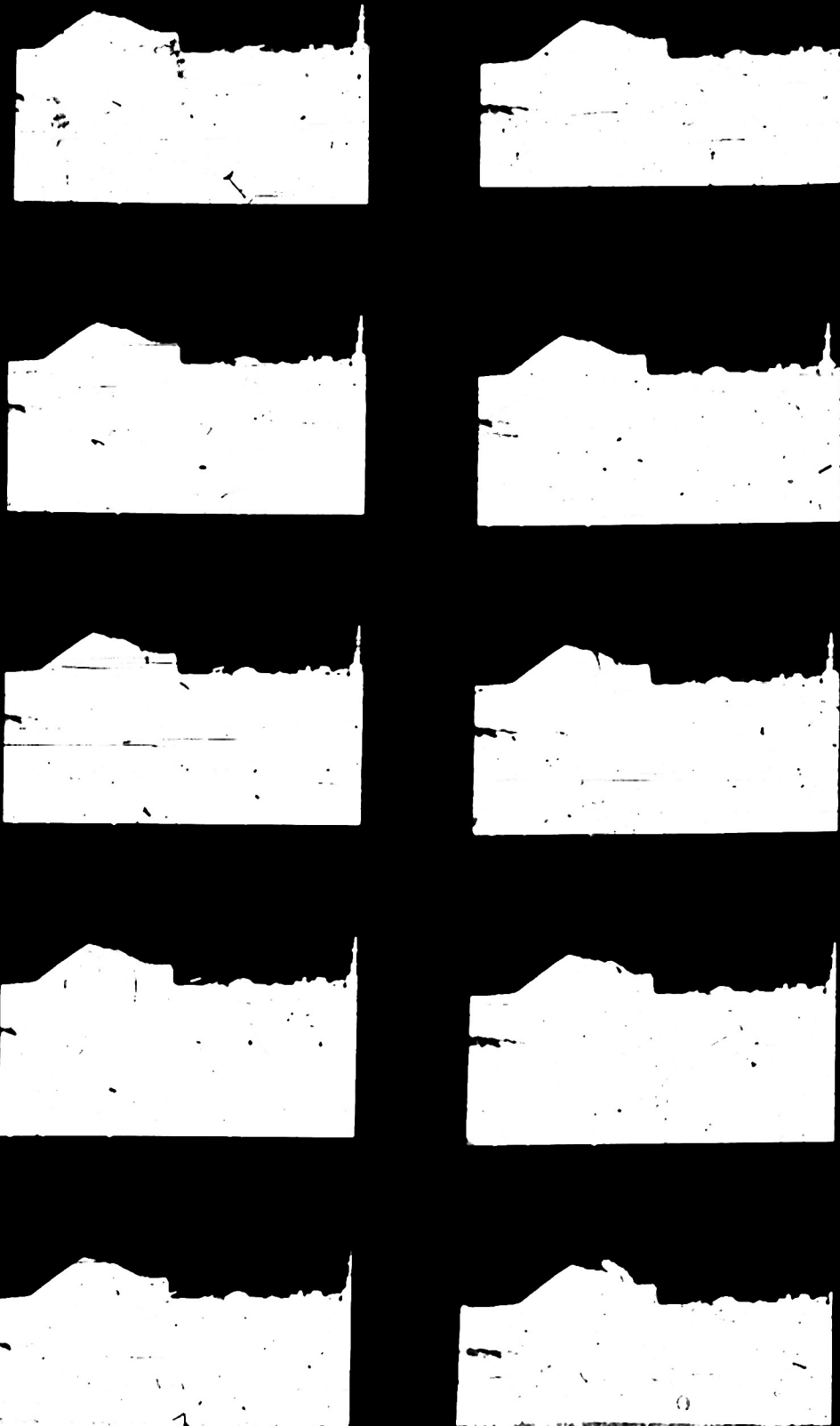
28 October 1952

CONFIDENTIAL

SECURITY INFORMATION

Impact No. 40304 - Heavy plate impact test of EX 200 Mod 3 electric bomb fuze. Fired from NPG 500 ft. launcher at 1074 ft/sec. in 250 lb. G.P. Bomb. Target: OT75 STS plate at 0° obliquity.

Figure 6



NP9-62156

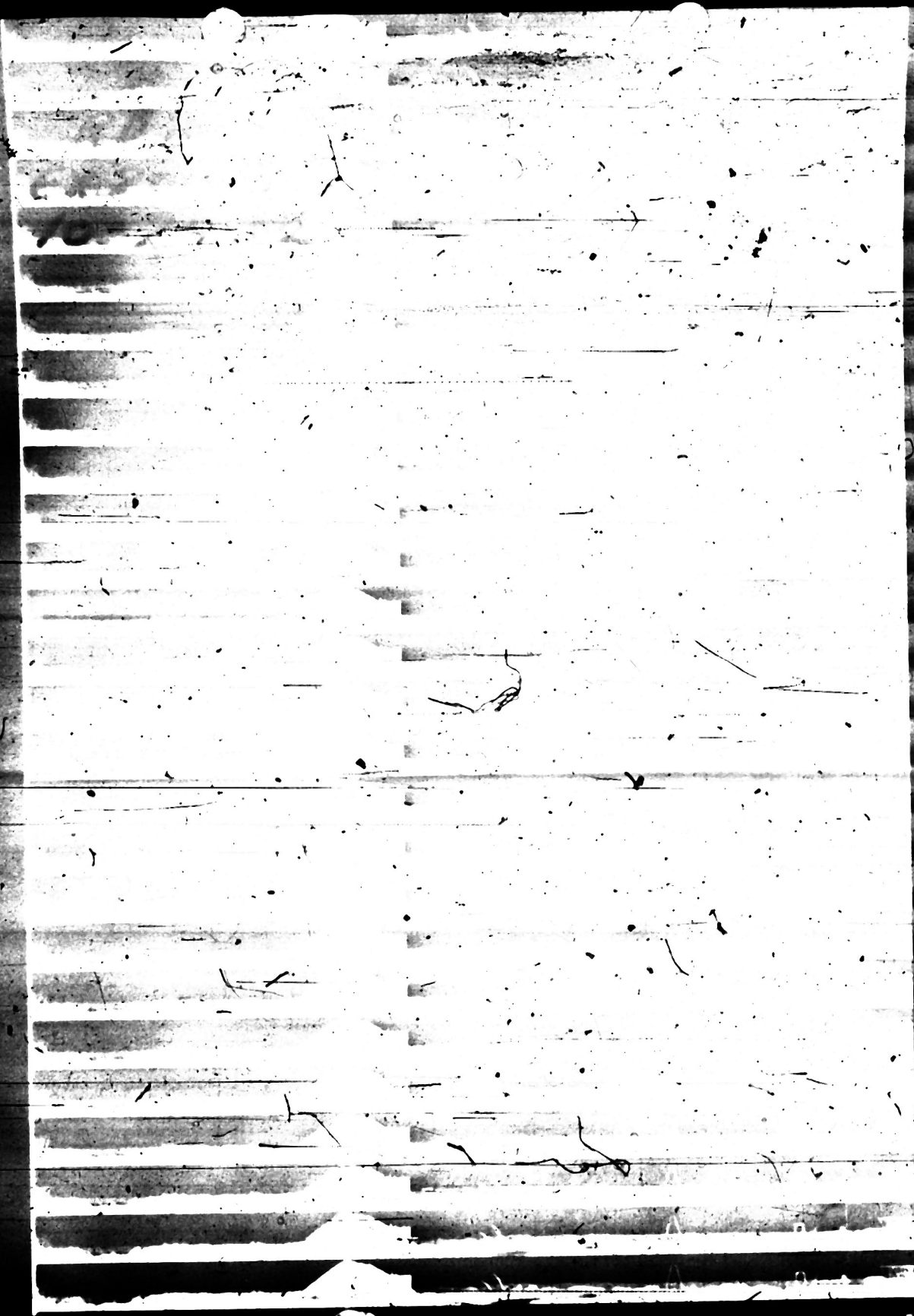
28 October 1952

CONFIDENTIAL

SECURITY INFORMATION

Impact No. 40305 - Heavy plate impact test of EI-200 Mod 3 electric bomb fuse. Fired from NPG 500 ft. launcher at 2098 ft/sec. in 250 lb. G.P. Bomb. Target: OV75 STS plate at 0° obliquity.

Figure 7



NPG-5-107

October 1952

GENERAL INFORMATION

Impact No. 40202 - Heavy plate impact test of EX 200 Mod 3 electric bomb fuze. Fired from NPG 500 ft. launcher at 1040 ft/sec. in 250 lb. G.P. Bomb. Target: Q475 STS plate at 0° obliquity.

Figure 8

RD 9
EX 200 Mod 3
10-29-52

NPG-311

29 October 1952

CONFIDENTIAL

SECURITY INFORMATION

Impact No. 40300 - Heavy plate impact test of EX 200 Mod 3 electric bomb motor. Fired from NPG 500 ft. launcher at 10-4 ft/sec. in 250 lb. G.P. Bomb. Target: 0275 STS plate at 30° obliquity.

Figure 6

RD. 10
EX 200 Mod 3
10-29-52

NP.9-62160 29 October 1952 CONFIDENTIAL
Impact No. 40310 - Heavy plate impact test of EX 200 Mod 3 electric
bomb fuze. Fired from NPG 500 ft. launcher at 1094 ft/sec. in
250 lb. G.P. Bomb. Target: O775 STS plate at 45° obliquity.
Figure 10

CONFIDENTIAL

NPG REPORT NO. 1108

Rocket Launcher Tests of Electric Bomb Fuze BX-200 Mod 3

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Naval Liaison Officer USAFPGC, Eglin Field, Florida	1
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CONFIDENTIAL
SECURITY INFORMATION

CONFIDENTIAL

NPG REPORT NO. 1108

Rocket Launcher Tests of Electric Bomb Fuze EX-200 Mod 3

DISTRIBUTION (Continued)

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NOTS, Inyokern, China Lake, California Attn: Explosives Department	1
Aviation Ordnance and Test Department	1
Daystrom Electric Corp., Poughkeepsie, N. Y. Attn: Mr. T. C. Smith, Chief Engineer (Via BUORD, Section Re2b)	1
Commanding Officer Picatinny Arsenal Dover, New Jersey Attn: Technical Division-Bomb Unit	1
Local: OT	1
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