

AD-A092 477

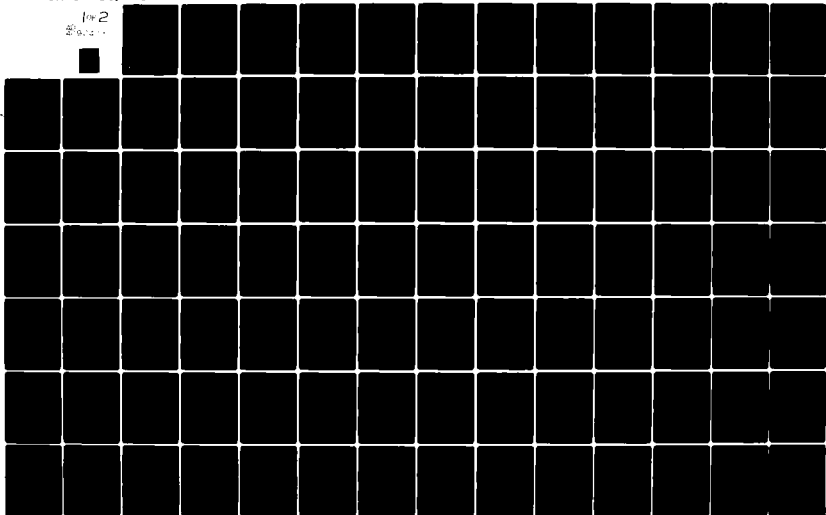
INTERNATIONAL LASER SYSTEMS INC ORLANDO FL F/6 5/9  
MAGLAD. TRAINER ENGINEERING REPORT DEMONSTRATION RESULTS.(U)  
MAR 77 D R WOODS N61339-76-C-0116

UNCLASSIFIED

NAVTRAEQUIPC-76-C-0116-3 NL

1 of 2

#00000



REPORT N61339-76C-0116

**LEVEL**

**DTIC  
SELECTED**



AD A 092477

**MAGLAD  
TRAINER ENGINEERING REPORT  
DEMONSTRATION RESULTS**

FILE  
**MACHAD  
43**

D. R. WOODS  
International Laser Systems, Inc.  
3404 N. Orange Blossom Trail  
Orlando, Florida 32804

29 March 1977

Each transmittal of this document outside of the Department of Defense must have prior approval of NTEC.

**DDC FILE COPY**

Prepared for

**NAVAL TRAINING EQUIPMENT CENTER  
NTEC N-2234  
Orlando, Florida 32813**

**DEFENSE SECRETARY A**  
For information only  
Do not disseminate

80 10 16

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER N61339-76C-0116-3	2. GOVT ACCESSION NO. AD-A092 477	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) MAGLAD, Trainer Engineering Report Demonstration Results.		5. TYPE OF REPORT & PERIOD COVERED Final 14 Feb-15 Mar 77
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) D. R. Woods	15.	8. CONTRACT OR GRANT NUMBER(s) N61339-76C-0116-1
9. PERFORMING ORGANIZATION NAME AND ADDRESS International Laser Systems, Inc. 3404 N. Orange Blossom Trail Orlando, Florida 32804		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 6831 (13) 1091
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Training Equipment Center NTEC N-2234 Orlando, Florida 32813	11.	12. REPORT DATE 29 March 1977
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Commander, DCASD Orlando P.O. Box 20025 Orlando, Fla. 32814	13. NUMBER OF PAGES 109	
	15. SECURITY CLASS. (of this report) Unclassified	
15a. DECLASSIFICATION DOWNGRADING SCHEDULE Unclassified		
16. DISTRIBUTION STATEMENT (of this Report) Each transmittal of this document outside of the Department of Defense must have prior approval of NTEC.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) 1. 116-3		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Accuracy of Alignment Tolerance Effective Simulation of Firing Service Ammunition at Standard and Scaled Ranges Operation Under Ambient Light Conditions Moving Target Lead Angle Simulation		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report documents the results of the MAGLAD Effective Simulation, Range and Alignment Tolerance Demonstration Test Plan, Report N61339-76C-0116-2		



TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
I	SCOPE . . . . .	1
	1.1 Introduction . . . . .	1
	1.2 Test Duration . . . . .	1
	1.3 Test Dates . . . . .	1
	1.4 Test Site Locations . . . . .	2
	1.5 Test Specimens . . . . .	2
	1.6 Test Firing . . . . .	2
	1.7 Support Concept . . . . .	2
	1.8 Applicable Documents . . . . .	3
	1.9 General Requirements . . . . .	3
	1.9.1 Personnel . . . . .	3
	1.9.2 Documentation . . . . .	3
II	DESCRIPTION OF THE TEST RESULTS . . . . .	4
	2.1 General . . . . .	4
	2.2 Demonstration of Accuracy of Alignment . . . . .	4
	2.2.1 25 Meter Alignment Tolerance Demonstration . . . . .	4
	2.2.2 150 and 300 m Alignment Tolerance Demonstration . . . . .	25
	2.3 Eye Safety Test . . . . .	45
	2.4 Effective Simulation of Firing With Service Ammunition at Minimum, Maximum and Intermediate Ranges . . . . .	45
	2.4.1 Effective Simulation Demonstration . . . . .	45
	2.5 Operation Under Ambient Light Conditions . . . . .	87
	2.5.1 System Operation Under Varying Ambient Light Conditions . . . . .	87
	2.5.2 System Invulnerability to Ambient Light Induced False Alarms . . . . .	87
	2.6 Effective Simulation of Firing With Service Ammunition at Scaled Record Fire Range . . . . .	89
	2.6.1 Effective Simulation Demonstration, Scale . . . . .	89
	2.7 Moving Target Lead Angle Simulation Demon- stration, Static . . . . .	104
	2.7.1 Target Lead, Moving Target Demon- stration . . . . .	104

## SECTION I

## SCOPE

## 1.1 INTRODUCTION

The purpose of this test report is to document results of the Effective Simulation, Range and Alignment Tolerance Demonstration. This report of test results is based on the MAGLAD Effective Simulation, Range and Alignment Tolerance Demonstration Test Plan, Report N61339-76C-0116-2, hereafter referred to as the Demonstration Test Plan.

## 1.2 TEST DURATION

The demonstration commenced on 14 February and was conducted over a period of days ending with the static moving target tests on 15 March 1977. A total demonstration time of seven days yielded the test results reported herein.

## 1.3 TEST DATES

The five demonstration tests as outlined in the Demonstration Test Plan, were conducted on the following dates:

- Demonstration of Accuracy of Alignment Tolerance -- test were conducted on 14 and 15 February 1977;
- Effective Simulation of Firing with Service Ammunition at Minimum, Maximum and Intermediate Ranges -- tests began on 22 February and concluded on 23 February 1977;
- Operation Under Ambient Light Conditions -- tests were conducted on 25 February 1977;
- Effective Simulation of Firing with Service Ammunition at Scaled Record Fire Range -- Scale range tests were started on 16 February, but were discontinued when eye safety power measurements made in the afternoon indicated low laser transmitter power. An alternate laser diode was installed and aligned and the scale record fire range demonstration was conducted on 28 February and 1 March 1977.
- Moving Target Lead Angle Simulation Demonstration, Static -- test was conducted on 15 March 1977.

#### 1.4 TEST SITE LOCATIONS

The demonstration tests were conducted at three test site locations; they were as follows:

- The demonstration of accuracy of alignment at 25 m using the Rifle Sight/Laser Alignment Kit and laser transmitter was conducted at a semi-isolated area adjacent to the contractor facility in Orlando, Fla.;
- The 150 and 300 m demonstration of accuracy of alignment and the Effective Simulation of Firing with Service Ammunition at Minimum, Maximum and Intermediate Ranges demonstrations were conducted on a range located on city property, Orlando, Fla.; and
- The Operation Under Ambient Light Conditions, the Scaled Record Fire Range demonstration and the Static Moving Target Lead Angle Simulation demonstration were conducted at the contractor's facility at Orlando, Fla.

#### 1.5 TEST SPECIMENS

The specimens demonstrated were breadboard models of the following:

- Laser Rifle Marksmanship Trainer Device/A3F77 (CLIN 0003);
- Laser Radiation Detectors (CLIN 0003AA);
- Rifle Sight/Laser Alignment Kit (CLIN 0003AB);
- Laser Hit Indicator with Test Target Kit (CLIN 0003AC); and
- Scaled Record Range Targets and Radiation Detector (CLIN 0003AD).

#### 1.6 TEST FIRING

All test firing, during the effective simulation demonstration, were conducted with laser pulses only. Blank firing of the M16A1 was not required.

#### 1.7 SUPPORT CONCEPT

The contractor supplied the personnel and test equipment needed to support the demonstration. The government supplied the necessary GFE M16A1 rifles, two marksmen and test operating personnel in support of the demonstration.

1.8 APPLICABLE DOCUMENTS

Applicable documents are the MAGLAD Demonstration Test Plan Report N61339-76C-0116-2 and the trainer specifications detailed in Appendix A, Section 2.0.

1.9 GENERAL REQUIREMENTS

1.9.1 PERSONNEL. All test personnel were cognizant of MAGLAD Effective Simulation Demonstration Test Plan N61339-76C-0116-2.

1.9.2 DOCUMENTATION. The results of all tests were recorded on reproducible data sheets.

SECTION II

DESCRIPTION OF THE TEST RESULTS

2.1 GENERAL

The tests and results are described in the order in which they were conducted.

2.2 DEMONSTRATION OF ACCURACY OF ALIGNMENT

The initial Demonstration of Accuracy of Alignment was conducted on 14 February 1977 at the contractor's facility. Two GFE M16A1 rifles of Colt manufacture were provided by the contractor and two M16A1 rifles, one each GMC and H&R, were provided by the government for the alignment demonstration. The test setup and procedure was as described in paragraph 2.1 of the Demonstration Test Plan. Laser transmitter power had previously been set to 375 MW for engineering field test.

2.2.1 25 METER ALIGNMENT TOLERANCE DEMONSTRATION. A 25 m zeroing target was prepared with a 3/8 in. diameter opening displaced downward 1-3/8 in. from the target aim point to compensate for rifle sight/transmitter parallax. The zeroing target was attached to the test detector with the opening located over the detector active area.

Various marksmen aligned the rifle sights using the Rifle Sight/Laser Alignment Kit and aimed the machine rest mounted rifle at the 25 m zeroing target. The beam centroid was determined and recorded on the alignment tolerance test forms along with other pertinent data. The data is recorded on test forms in the following format:

<u>Column</u>	<u>Description</u>
Start Reference	X-Y positioner location in inches
Left Endpoint	Left hand extreme location of beam detection in inches
Right endpoint	Right hand extreme location of beam detection in inches
Up Endpoint	Upward extreme location of beam detection in inches

<u>Column</u>	<u>Description</u>
Down Endpoint	Downward extreme location of beam detection in inches
Left/Right Centroid	1st no. center point between left/right extremity in inches. LEFT < 8.5 in. < RIGHT 2nd no. displacement from start reference in cm
Up/Down Centroid	1st no. center point between up/down extremity in inches. DOWN < 8.5 in. < UP 2nd no. displacement from start reference in cm

The beam centroid determined above is plotted with a "+" on the Test Record Chart (on reverse side of the test form). A 1.4 cm radius circle is shown on the chart indicating the two sight-click acceptance criteria for the 25 m alignment tolerance.

In going from the rifle-mounted 25 m to the scope/sight transmitter adapter for the 150 and 300 m alignment tolerance demonstration, it was discovered that an incorrect value had been used for sight/transmitter parallax. A value of 1.115 in. should have been used instead of the 1.375 in. used on the test detector zeroing target. As this discrepancy is a known value amounting to 0.66 cm in elevation, the beam centroid has been shown replotted as a "Δ" on the Test Record Chart.

2.2.1.1 Test Group Results. Results of this test group are shown on test data sheets for test 1 through 8 at 25 m and as detailed in the following descriptions.

Test #1, 2, 3, conducted by SFC Mondon using H&R and two different Colt weapons, provided alignment accuracy within one sight click resolution.

Test #4, conducted by SFC Mondon using GMC weapon proved out of tolerance on the first try. The rifle was re-aimed at the zeroing target, again resulting in an out of tolerance condition. The rifle sights were then re-aligned using the sight alignment kit which provided alignment accuracy equivalent to the previous three tests.

Test #5, 6, 7, conducted by SGT Batt using one each Colt, H&R and GMC weapons, provided alignment accuracy within the acceptance criteria.

Test #8, conducted by SGT Batt using a Colt weapon proved to be marginal in alignment tolerance on the first try. The rifle was re-aimed at the zeroing target which resulted in an out of tolerance condition. The rifle sights were then re-aligned using the sight alignment kit and again proved to be marginal. Re-aiming the rifle (without sight adjustment) resulted in a larger discrepancy.

Test #9 - The laser transmitter was rotated about the rifle barrel, to the extreme allowed by the front sight post indexing, while attempting to hold the sight aimpoint on the test target. Transmitter beam centroid shifted by approximately 1/2 cm in elevation and windage from one extreme to the other.

TYPE TEST ALIGNMENT TOLERANCE TEST # 1

TARGET RANGE 25 M TYPE ZEROPING DATE 2/14/77

TEMPERATURE ~60-65 HUMIDITY \_\_\_\_\_ TIME 1304

TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET

RIFLE S/N 2112793 MFG. H&R

SCOPE SIGHT/LASER TRANSMITTER ADAPTER \_\_\_\_\_

MARKSMAN SFC MONDON TEST OPERATOR WOODS

ATMOSPHERIC CONDITIONS/EST VISIBILITY OVERCAST

TRANSMITTER MOUNTING TIME 2 MIN ALIGNMENT TIME (IRON SIGHTS) 4 MIN <sup>1304-1306</sup> <sup>1314/1322-2</sup>

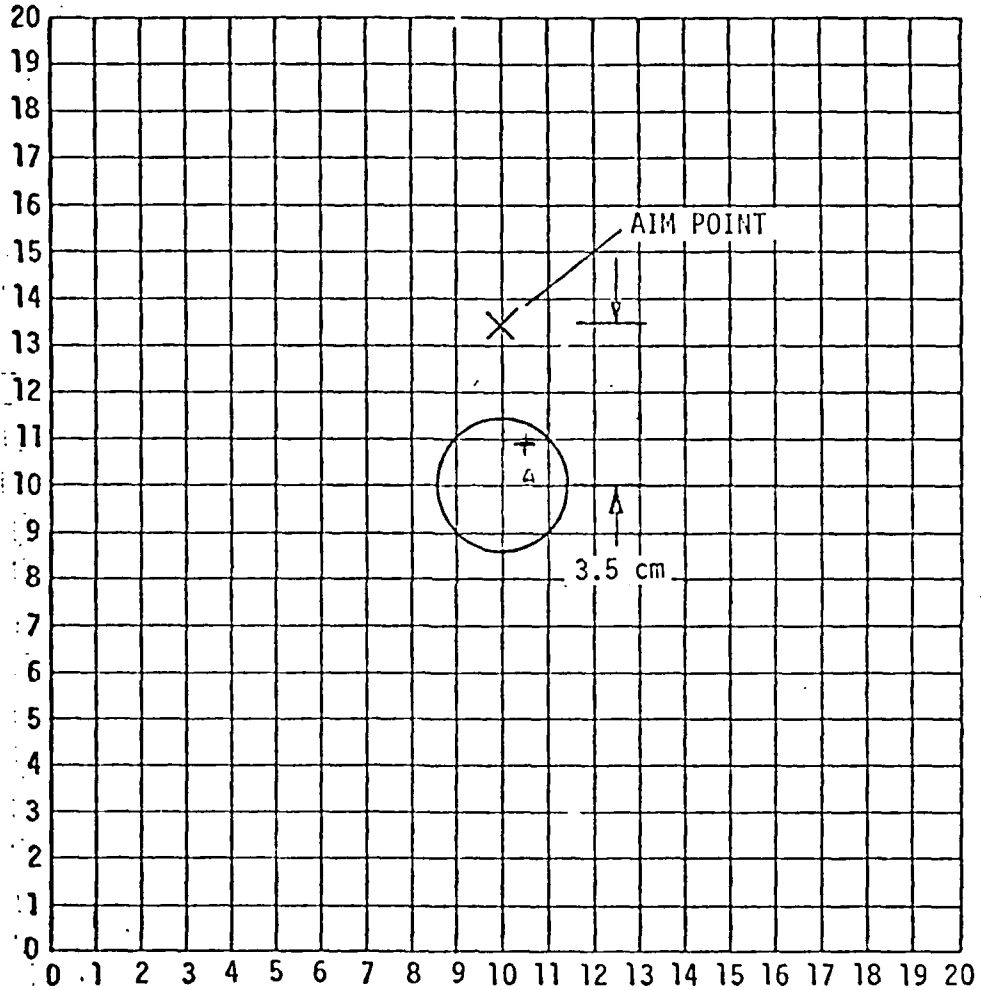
SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT: SEVERAL STOPS

WINDAGE EAR RIGHT ELEVATION VERY HIGH <sup>15 clicks ABOVE</sup>  
4 clicks LEFT OF EAR RIGHT EXTREME <sup>1005H</sup>

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	7.216	10.205	10.776	7.275	R 8.7105 .53	U 8.875 .95
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: DRW

TEST WITNESSED BY: Jack H. Bentley

APPROVAL BY: \_\_\_\_\_

DATE: \_\_\_\_\_

TYPE TEST ALIGNMENT TOLERANCE TEST # 2  
 TARGET RANGE 25M TYPE ZEROING DATE 2/14/77  
 TEMPERATURE 60-65 HUMIDITY 80% TIME 1330  
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET  
 RIFLE S/N 4637118 MFG. COLT  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER \_\_\_\_\_  
 MARKSMAN S.F.C. MONDON TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY OVERCAST  
 TRANSMITTER MOUNTING TIME 1'10" ALIGNMENT TIME (IRON SIGHTS) 2'30"

SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:

WINDAGE RIGHT ELEVATION HIGH (RANGE ERROR 2 CLICKS ABOVE FL.)  
5 CLICKS LEFT OF AX RIGHT EXTREME

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	7.691	9.289	11.25	8.157		
2	8.5	7.206	10.190	10.449	7.290	8.698	.503
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form



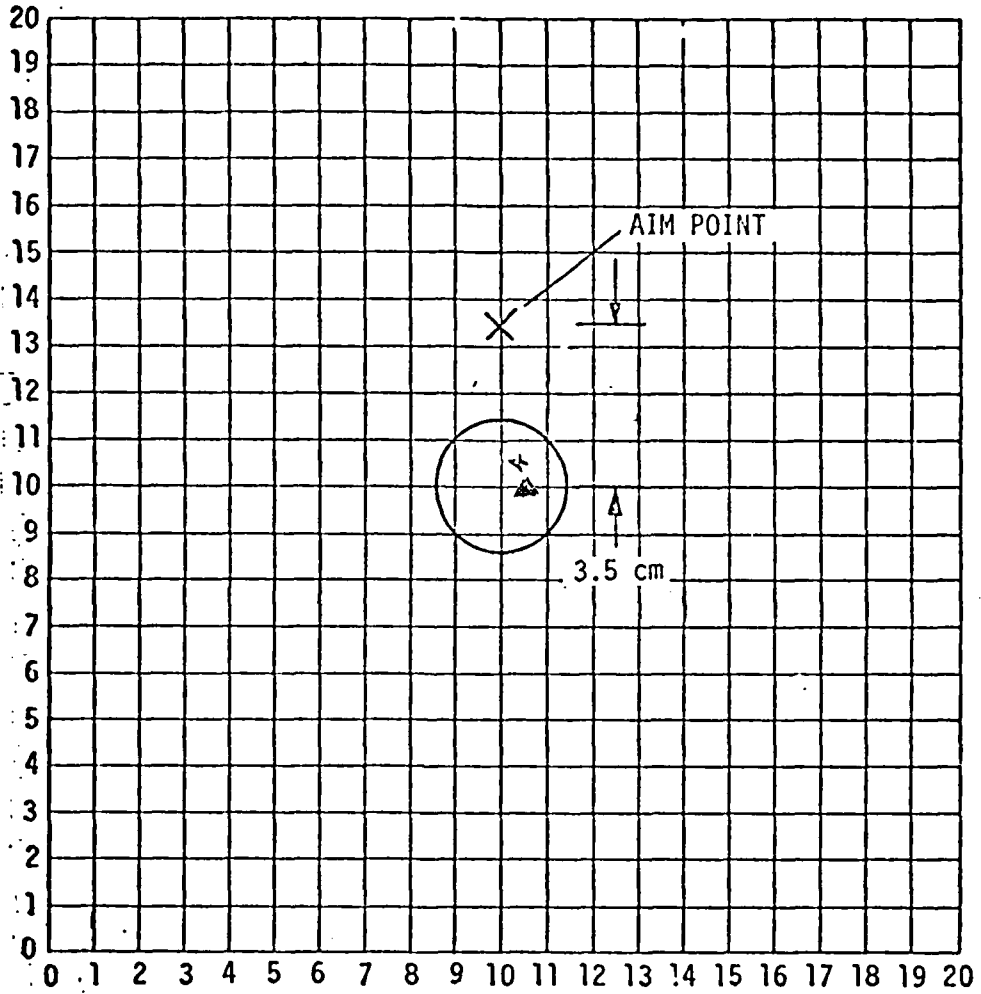
TYPE TEST ALIGNMENT TOLERANCE TEST # 3  
 TARGET RANGE 25M TYPE ZEPHINO DATE 2/14/77  
 TEMPERATURE 63-75 HUMIDITY \_\_\_\_\_ TIME 1340  
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET  
 RIFLE S/N 463 0048 MFG. COLT  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER \_\_\_\_\_  
 MARKSMAN SFC MANDON TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY OVERCAST  
 TRANSMITTER MOUNTING TIME 295SEC ALIGNMENT TIME (IRON SIGHTS) 2' 21"  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:

WINDAGE RIGHT ELEVATION HIGH 13 CLICKS ABOVE 100  
6 CLICKS LEFT OF FAR RIGHT ENDPOINT

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	7.073	10.199	10.260	7.113	R 8.636 .345	U 8.686 .474
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: DRW

TEST WITNESSED BY: Joseph H. Hartley

APPROVAL BY: \_\_\_\_\_

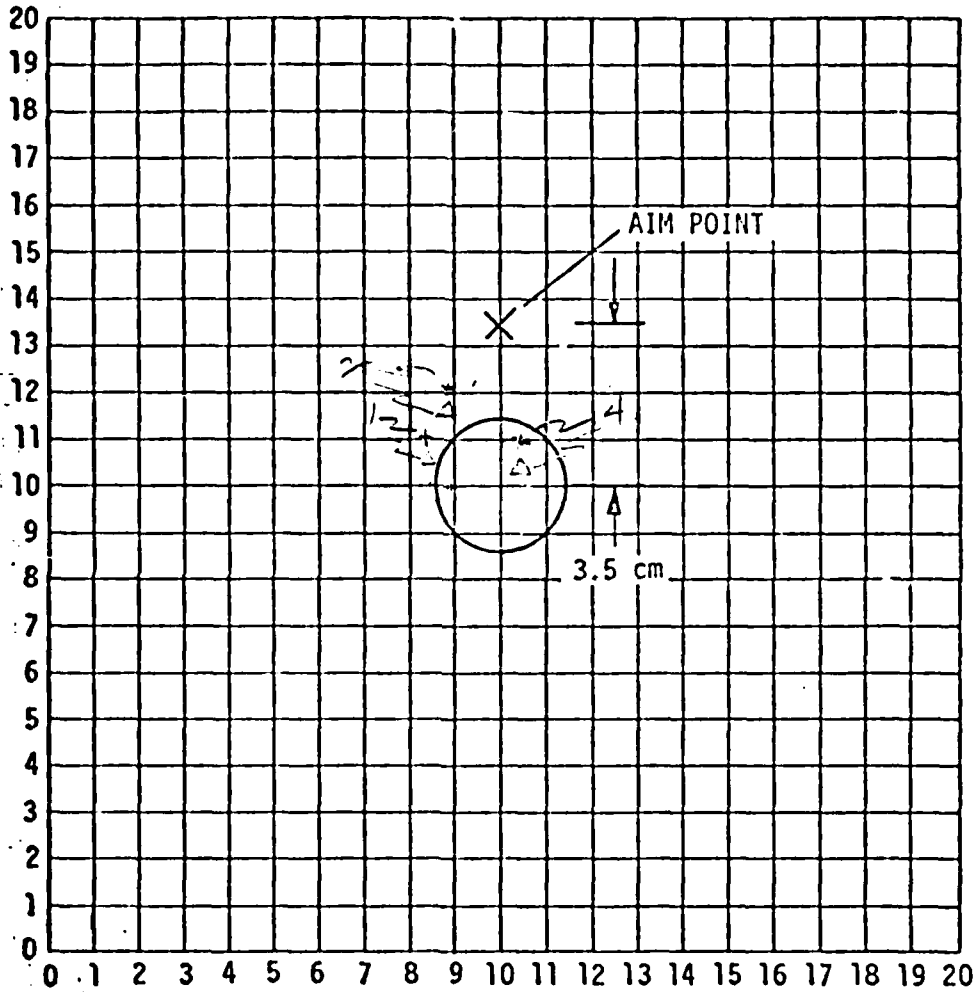
DATE: \_\_\_\_\_

TYPE TEST ALIGNMENT TOLERANCE TEST # 4  
 TARGET RANGE 25M TYPE ZEPHYRUS DATE 5-14-77  
 TEMPERATURE 61-65 HUMIDITY 80% TIME 13:50  
 TRANSMITTER S/N PRIMITIVE DETECTOR S/N TEST DFT  
 RIFLE S/N 3245289 MFG. GMC  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER \_\_\_\_\_  
 MARKSMAN SFC MCKINNON TEST OPERATOR Woops  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY 2UFACAST  
 TRANSMITTER MOUNTING TIME 35 SEC ALIGNMENT TIME (IRON SIGHTS) 2'  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE 20000 ELEVATION 17 clicks

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	6.242	9.366	10.277	7.585	L 7.874 1.59	U 8.931 1.09
2	8.5	6.629	9.499	10.747	7.921	L 8.06 1.11	U 9.33 2.118
3	RETEST - REALIGN SIGHTS						
4	7.5	7.082	13.225	10.491	7.328	R 7.65 2.889	U 7.909 1.04
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: J.R. Woods

TEST WITNESSED BY: J. H. Bentley

APPROVAL BY: \_\_\_\_\_

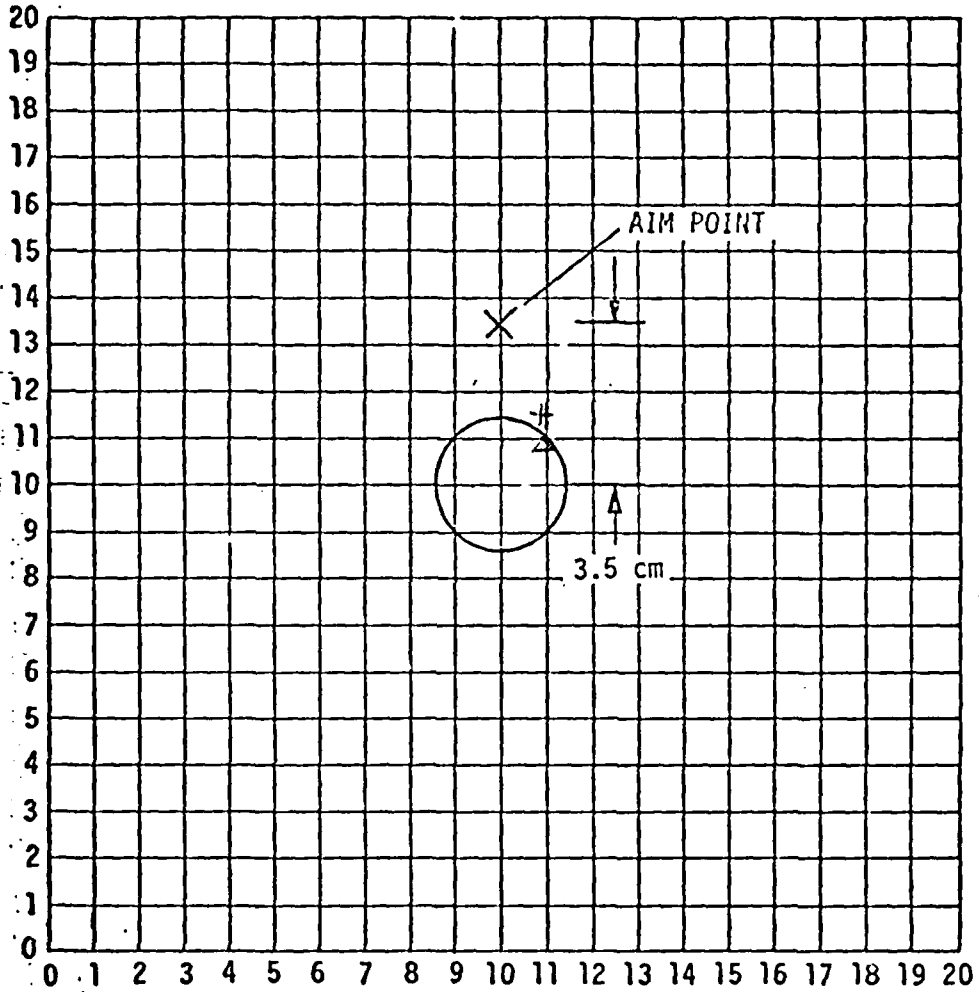
DATE: \_\_\_\_\_

TYPE TEST ALIGNMENT TOLERANCE TEST # 5  
 TARGET RANGE 25 m TYPE ZEROWG DATE 2/14/77  
 TEMPERATURE 60.65 HUMIDITY \_\_\_\_\_ TIME 1430  
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET  
 RIFLE S/N 4637118 MFG. COLT  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER \_\_\_\_\_  
 MARKSMAN S.G.T BATT TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY OVERCAST  
 TRANSMITTER MOUNTING TIME 46" ALIGNMENT TIME (IRON SIGHTS) 4'51"  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	7.949	10.959	10.29	7.810		
2	8.5	7.362	10.328	10.68	7.481	R 8.845, 8.76	H 9.08 1.47
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: F. R. W. D.

TEST WITNESSED BY: Jan H. Bentley

APPROVAL BY: \_\_\_\_\_

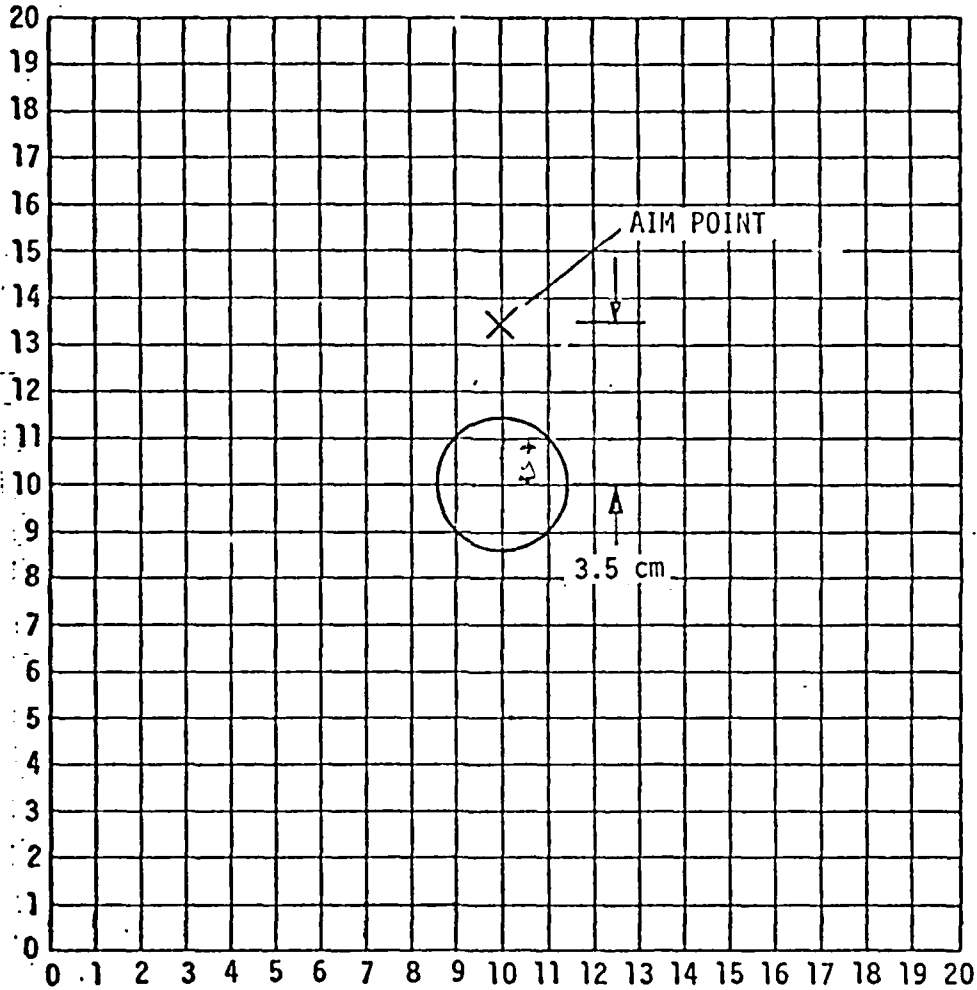
DATE: \_\_\_\_\_

TYPE TEST ALIGNMENT TOLERANCE TEST # 6  
 TARGET RANGE 25M TYPE TRAINING DATE 2-14-77  
 TEMPERATURE 62-55 HUMIDITY 87 TIME 14:46  
 TRANSMITTER S/N 1A-00-449 DETECTOR S/N TEST DET  
 RIFLE S/N 2112793 MFG. 1-1 ER  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER \_\_\_\_\_  
 MARKSMAN SGT BATT TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY DUPLICATE  
 TRANSMITTER MOUNTING TIME 53" ALIGNMENT TIME (IRON SIGHTS) 4' 47"  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	7.45	10.003	11.055	7.814		
2	8.5	7.194	10.241	10.428	7.206	<sup>R</sup> 8.717	<sup>U</sup> 8.517 .805
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: F. R. [Signature]

TEST WITNESSED BY: John H. Bentley

APPROVAL BY: \_\_\_\_\_

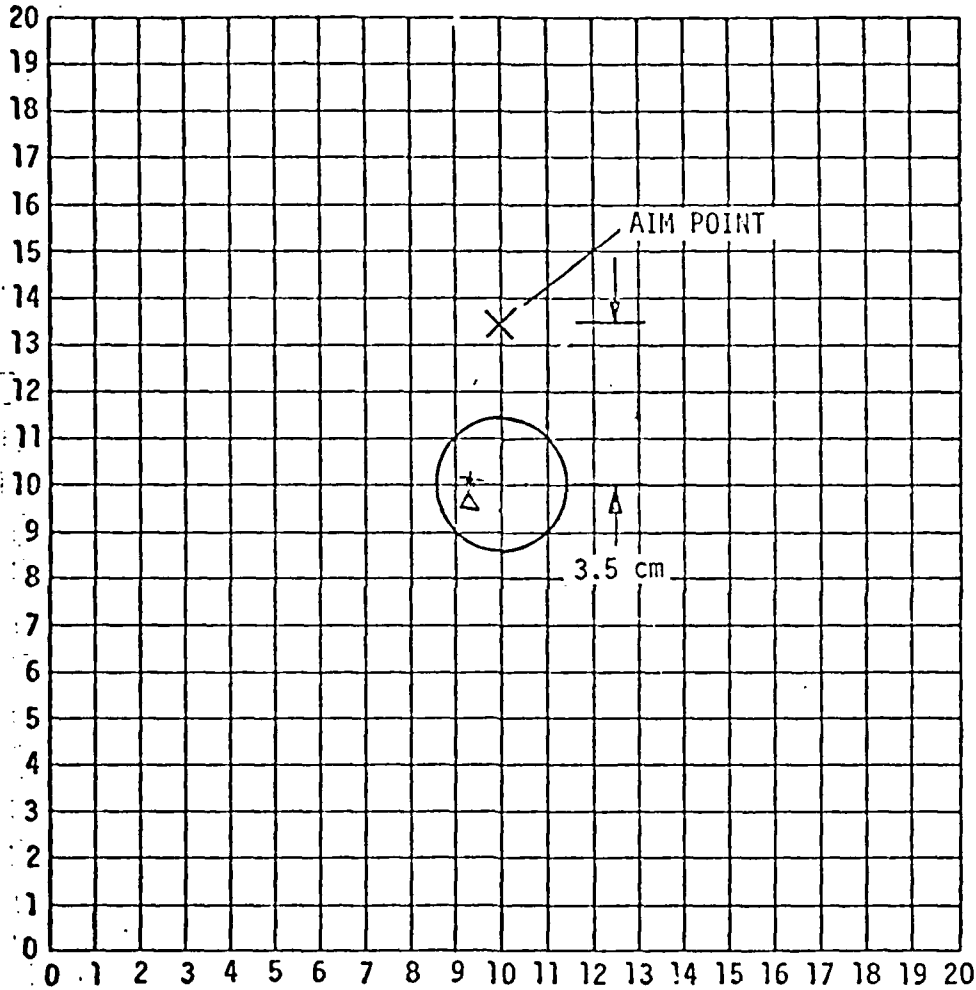
DATE: \_\_\_\_\_

TYPE TEST ALIGNMENT TOLERANCE TEST # 7  
 TARGET RANGE 25 M TYPE ZEROS DATE 2-14-77  
 TEMPERATURE 15-15 HUMIDITY 50% TIME 15:10  
 TRANSMITTER S/N PA-77-47E DETECTOR S/N \_\_\_\_\_  
 RIFLE S/N 3245289 MFG. GM  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER \_\_\_\_\_  
 MARKSMAN SGT BATT TEST OPERATOR \_\_\_\_\_  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY \_\_\_\_\_  
 TRANSMITTER MOUNTING TIME 45" ALIGNMENT TIME (IRON SIGHTS) 3' 15"  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

#	TEST DETECTOR X-Y POSITION								
	START	ENDPOINT				CENTROID			
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN		
1	8.5	6.650	9.794	10.054	7.033	8.22	7.06	8.54	.110
2									
3									
4									
5									
6									
7									
8									
9									
10									
AVERAGE									

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: J.R. Wood

TEST WITNESSED BY: Jacob H. Smith

APPROVAL BY: \_\_\_\_\_

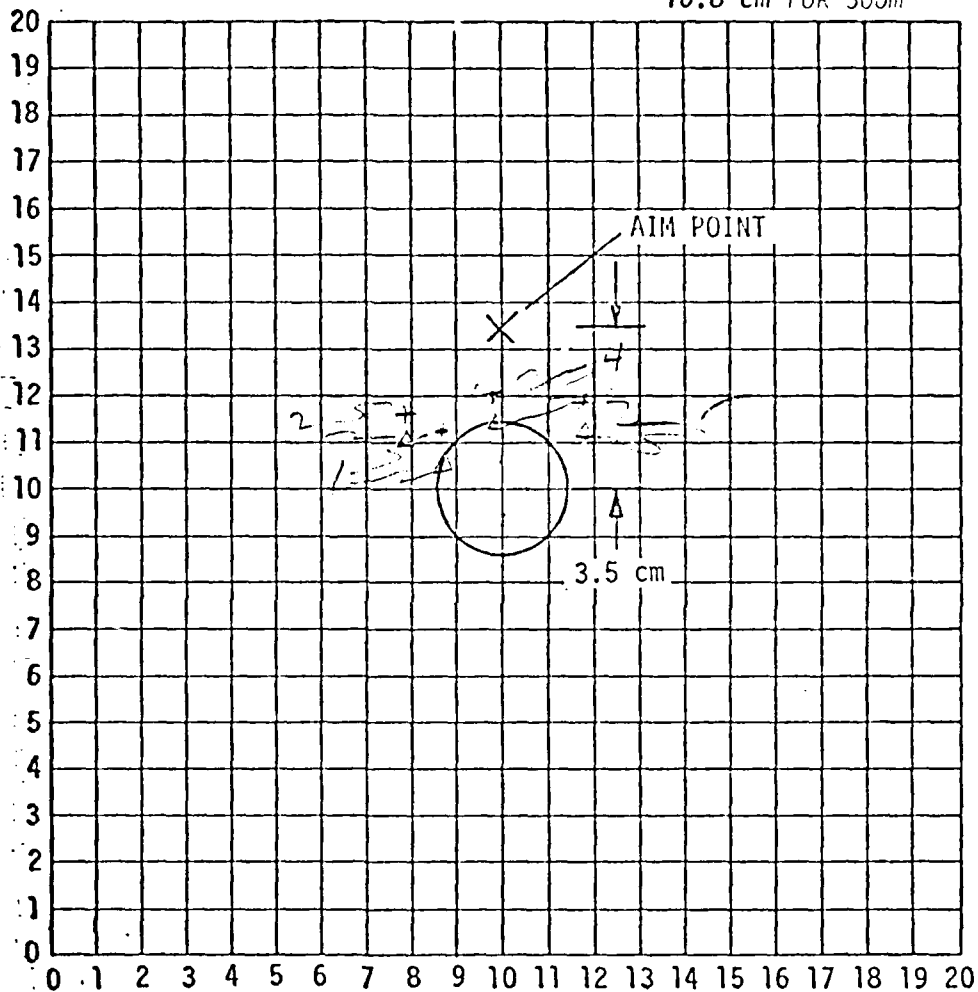
DATE: \_\_\_\_\_

TYPE TEST ALIGNMENT TOLERANCE TEST # 8  
 TARGET RANGE 25 m TYPE ZERON'S DATE 2/14/77  
 TEMPERATURE 60 HUMIDITY \_\_\_\_\_ TIME 1520  
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET  
 RIFLE S/N 4630.48 MFG. P.L.T  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER \_\_\_\_\_  
 MARKSMAN SGT BATT TEST OPERATOR \_\_\_\_\_  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY \_\_\_\_\_  
 TRANSMITTER MOUNTING TIME 50 SEC ALIGNMENT TIME (IRON SIGHTS) 2 Min  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	7.5	5.96	9.94	10.257	7.676	7.95 1.74	4.96 1.12
2		6.10	9.15	10.44	7.733	7.625 2.22	4.12 1.58
3	RETEST - REALIGN SIGHTS						
4	8.5	6.95	7.765	10.846	7.750	7.41 .228	4.298 2.027
5	7.5	7.5	7.995	10.797	7.583	7.197 1.77	4.24 1.88
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: D.R.W.

TEST WITNESSED BY: Joseph H. Dudley

APPROVAL BY: \_\_\_\_\_

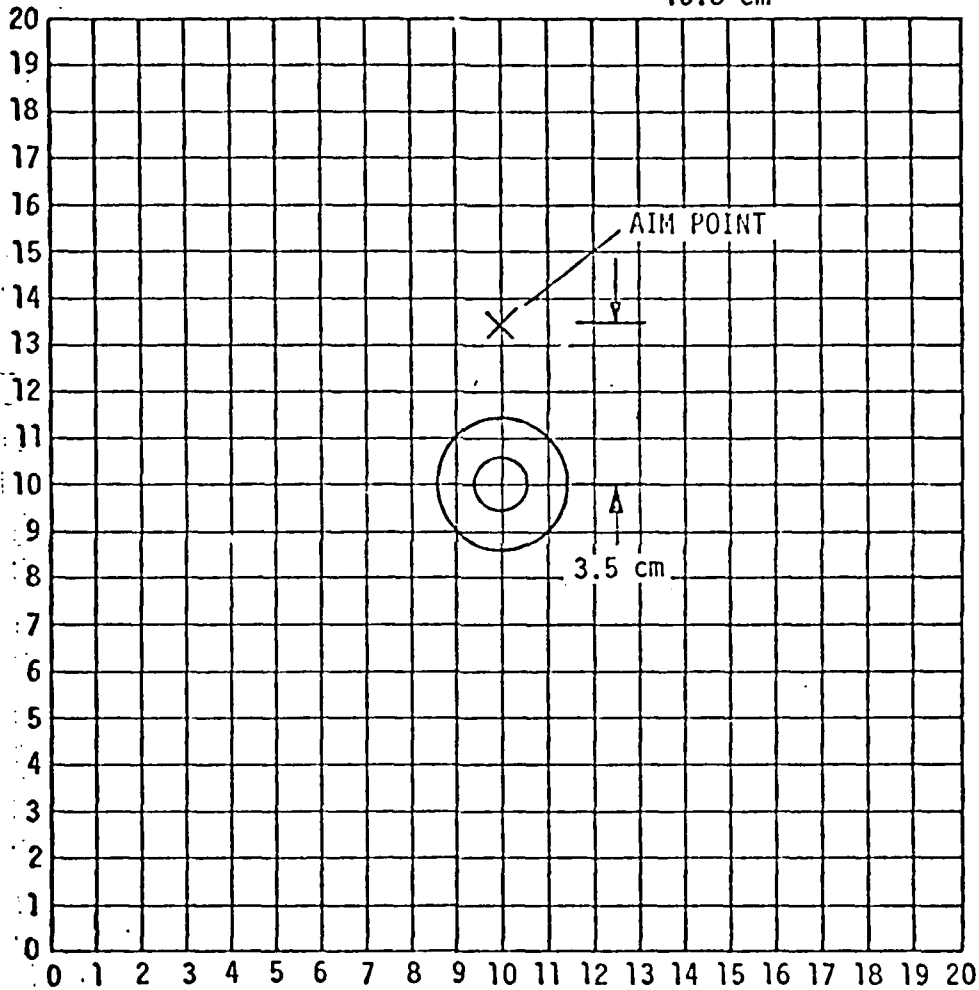
DATE: \_\_\_\_\_

TYPE TEST ROTATION TEST ALIGNMENT TOLERANCE TEST # 9  
 TARGET RANGE \_\_\_\_\_ TYPE \_\_\_\_\_ DATE 2/11/77  
 TEMPERATURE \_\_\_\_\_ HUMIDITY \_\_\_\_\_ TIME \_\_\_\_\_  
 TRANSMITTER S/N \_\_\_\_\_ DETECTOR S/N \_\_\_\_\_  
 RIFLE S/N \_\_\_\_\_ MFG. \_\_\_\_\_  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER \_\_\_\_\_  
 MARKSMAN \_\_\_\_\_ TEST OPERATOR Woods  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY \_\_\_\_\_  
 TRANSMITTER MOUNTING TIME \_\_\_\_\_ ALIGNMENT TIME (IRON SIGHTS) \_\_\_\_\_  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1		1.533	9.297	11.991	9.083	8.115	12.537
2		1.339	9.410	11.906	8.751	7.899	12.328
3						.55cm	.53cm
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

2/11  
 ROTATE

CIRCLES OF FOLLOWING RADII SCALE 1.4 cm  
8.4 cm  
16.8 cm



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: J. J. Wood

TEST WITNESSED BY: John H. Hardy

APPROVAL BY: \_\_\_\_\_

DATE: \_\_\_\_\_

2.2.2 150 AND 300 M ALIGNMENT TOLERANCE DEMONSTRATION. The laser transmitter was mounted on the Scope Sight/Laser Transmitter Adapter during the balance of the demonstration. The test procedure was as described in paragraph 2.1 of the Demonstration Test Plan and as described in the previous section of this report.

Corrections were made for the parallax discrepancy on the zeroing target/test detector arrangement prior to this test.

2.2.2.1 Test Group Results. Results of this test group are shown on test data sheets for tests 1 through 5 at 300 m, 6 through 9 at 150 m and as detailed in the following descriptions.

Test #1 (300 m) - Boresight of the rifle scope to the transmitter was accomplished indoors, prior to the field demonstration, using a 10 m lens procedure representative of the sight alignment kit.

Test #2, 3, 4, 5 (300 m) - Boresighted using the Rifle Sight/Transmitter Alignment Kit.

Test #6, 7, 8, 9 (150 m) - Boresighted using the Rifle Sight/Transmitter Alignment Kit.

TYPE TEST ALIGNMENT TOLERANCE TEST # 1  
 TARGET RANGE 300 m TYPE \_\_\_\_\_ DATE 2/15/77  
 TEMPERATURE 65 HUMIDITY \_\_\_\_\_ TIME 1140  
 TRANSMITTER S/N PRO-D-VIS DETECTOR S/N TEST DET  
 RIFLE S/N N/A MFG. UA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓  
 MARKSMAN SFC MONDAN TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR  
 TRANSMITTER MOUNTING TIME \_\_\_\_\_ ALIGNMENT TIME (IRON SIGHTS) \_\_\_\_\_  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:

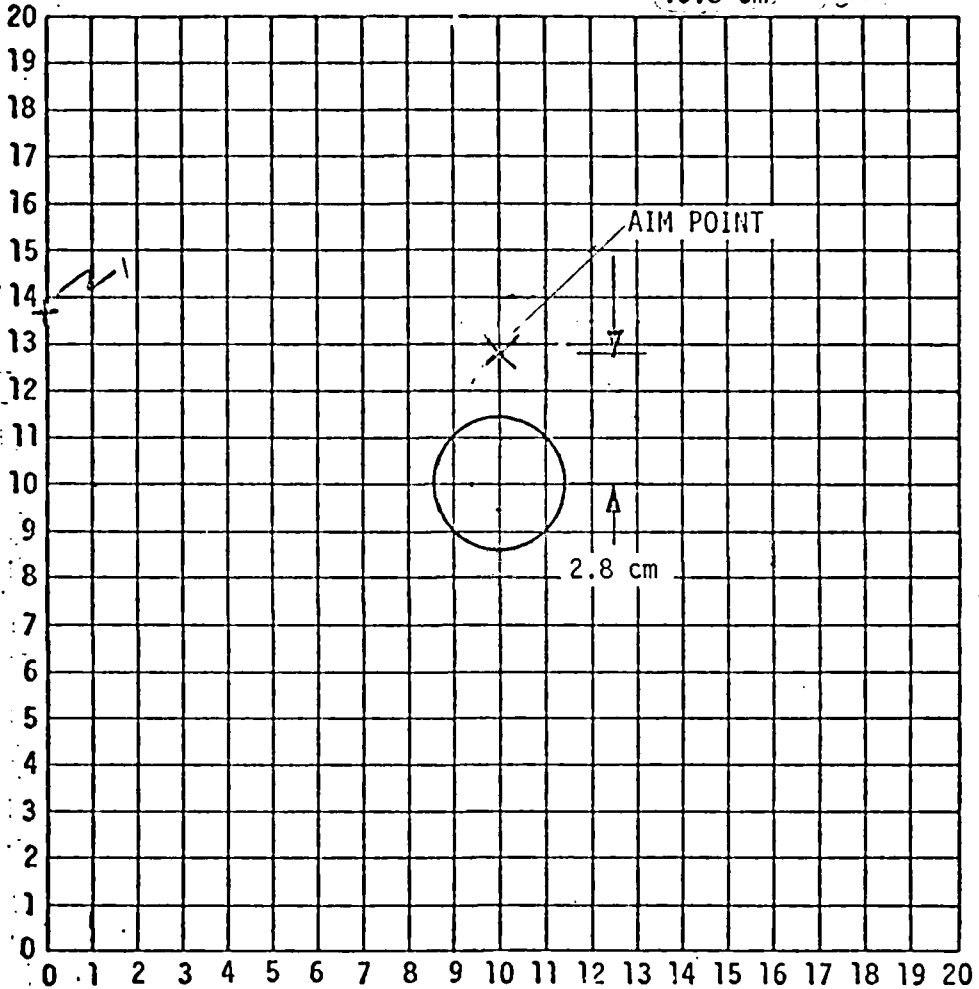
WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

BORE SIGHT AT PLANT WITH 10M LENS

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	<u>12" X 8.5" Y</u>	<u>2.138</u>	<u>13.985</u>	<u>16.315</u>	<u>3.609</u>	<u>L 9.06 10cm</u>	<u>U 9.962 3.7cm</u>
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: DR Wood

TEST WITNESSED BY: J. H. Kelly

APPROVAL BY: \_\_\_\_\_

DATE: \_\_\_\_\_

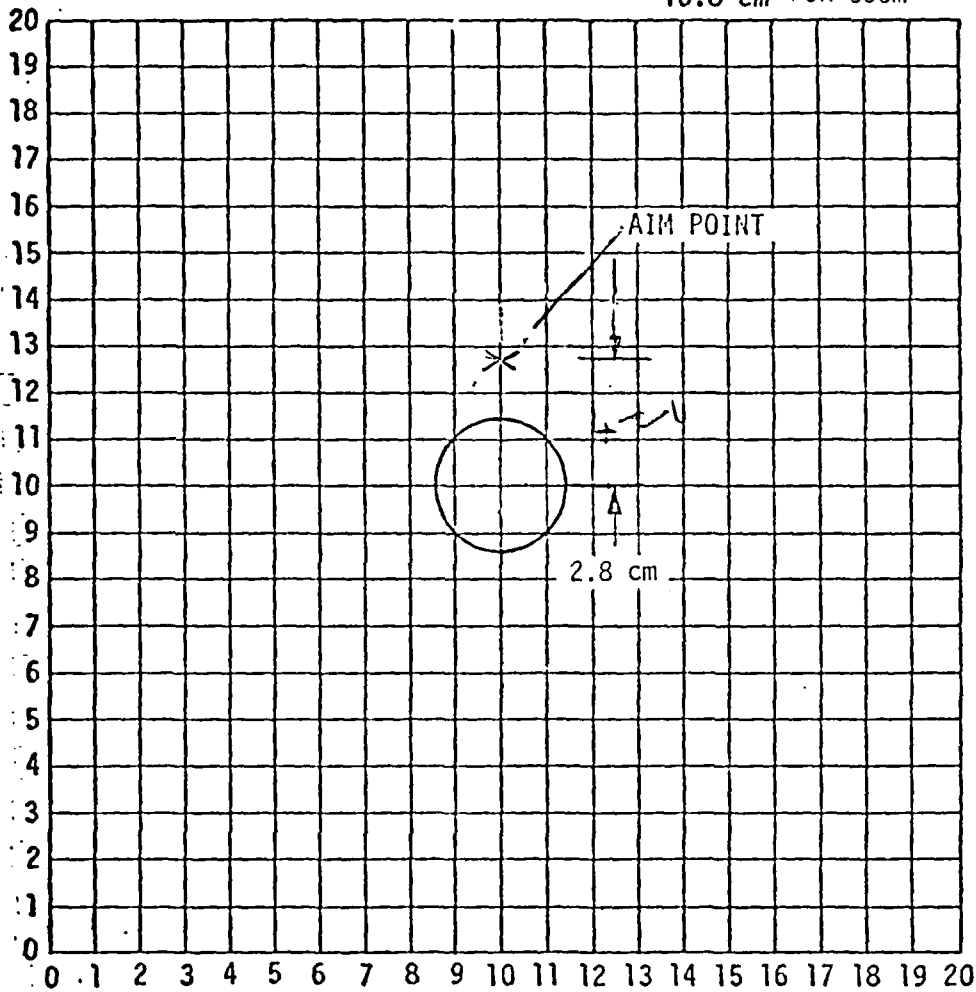
TYPE TEST ALIGNMENT TOLERANCE TEST # 2  
 TARGET RANGE 300 TYPE \_\_\_\_\_ DATE 2/15/77  
 TEMPERATURE 65 HUMIDITY \_\_\_\_\_ TIME 1200  
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER   
 MARKSMAN SFC MENDON TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR  
 TRANSMITTER MOUNTING TIME \_\_\_\_\_ ALIGNMENT TIME (IRON SIGHTS) \_\_\_\_\_  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

ALIGNMENT KIT

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	7.5	3.678	15.156	15.799	2.097	R 7.417 2.33	U 5.948 1.138
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: Dr. W. ...

TEST WITNESSED BY: Jack H. Hartley

APPROVAL BY: \_\_\_\_\_

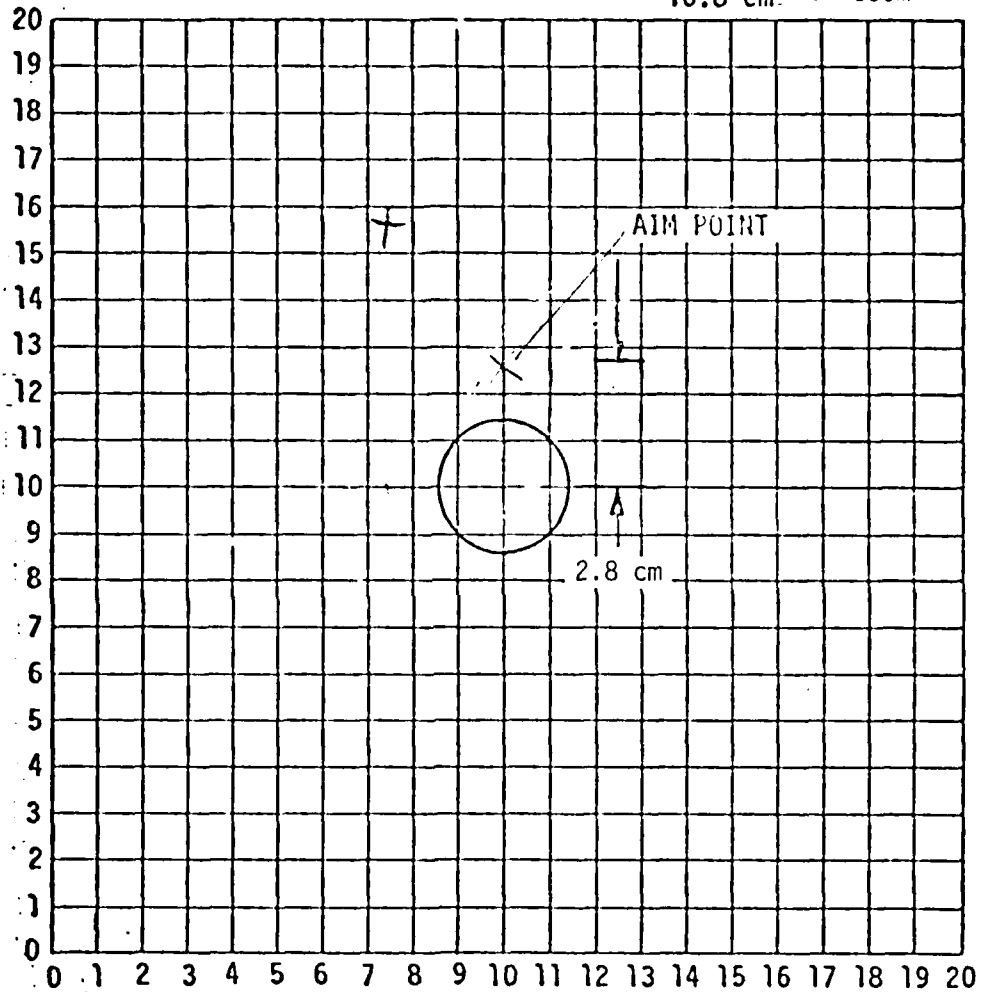
DATE: \_\_\_\_\_

TYPE TEST ALIGNMENT TOLERANCE TEST # 3  
 TARGET RANGE 300 TYPE \_\_\_\_\_ DATE 2/15/77  
 TEMPERATURE 6.5-70 HUMIDITY \_\_\_\_\_ TIME 1230  
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓  
 MARKSMAN SGT BATT TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR  
 TRANSMITTER MOUNTING TIME \_\_\_\_\_ ALIGNMENT TIME (IRON SIGHTS) \_\_\_\_\_  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	1.593	12.187	ALL WAY UP	5.747		
2	X=8.5 Y=6.0	1.192	13.830	15.255	2.912	7.506 2.5	2.207 5.61
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIIS: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: *G. R. W. J.*

TEST WITNESSED BY: *John H. Hardy*

APPROVAL BY: \_\_\_\_\_

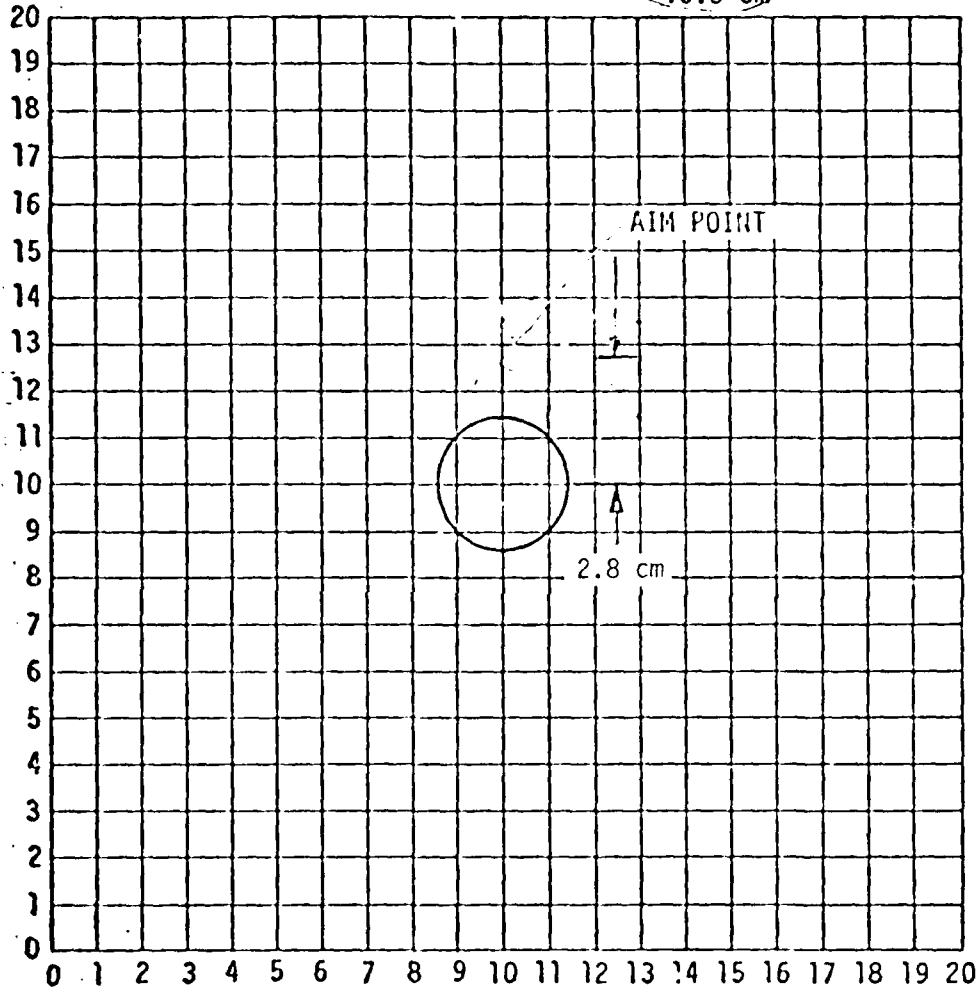
DATE: \_\_\_\_\_

TYPE TEST ALIGNMENT TOLERANCE TEST # 4  
 TARGET RANGE 300 m TYPE \_\_\_\_\_ DATE 2/15/77  
 TEMPERATURE 70 HUMIDITY \_\_\_\_\_ TIME 1245  
 TRANSMITTER S/N PROFORME DETECTOR S/N TEST  
 RIFLE S/N NA M.G. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER   
 MARKSMAN PHIL SPRINKLE TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST. VISIBILITY CLEAR  
 TRANSMITTER MOUNTING TIME \_\_\_\_\_ ALIGNMENT TIME (IRON SIGHTS) \_\_\_\_\_  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	85			11.54	3.5		
2	x=0.5 y=10.0	16.22	5.5	11.49	8.0	3.56	2.5
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



+

SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: D. R. W.

TEST WITNESSED BY: J. H. H.

APPROVAL BY: \_\_\_\_\_

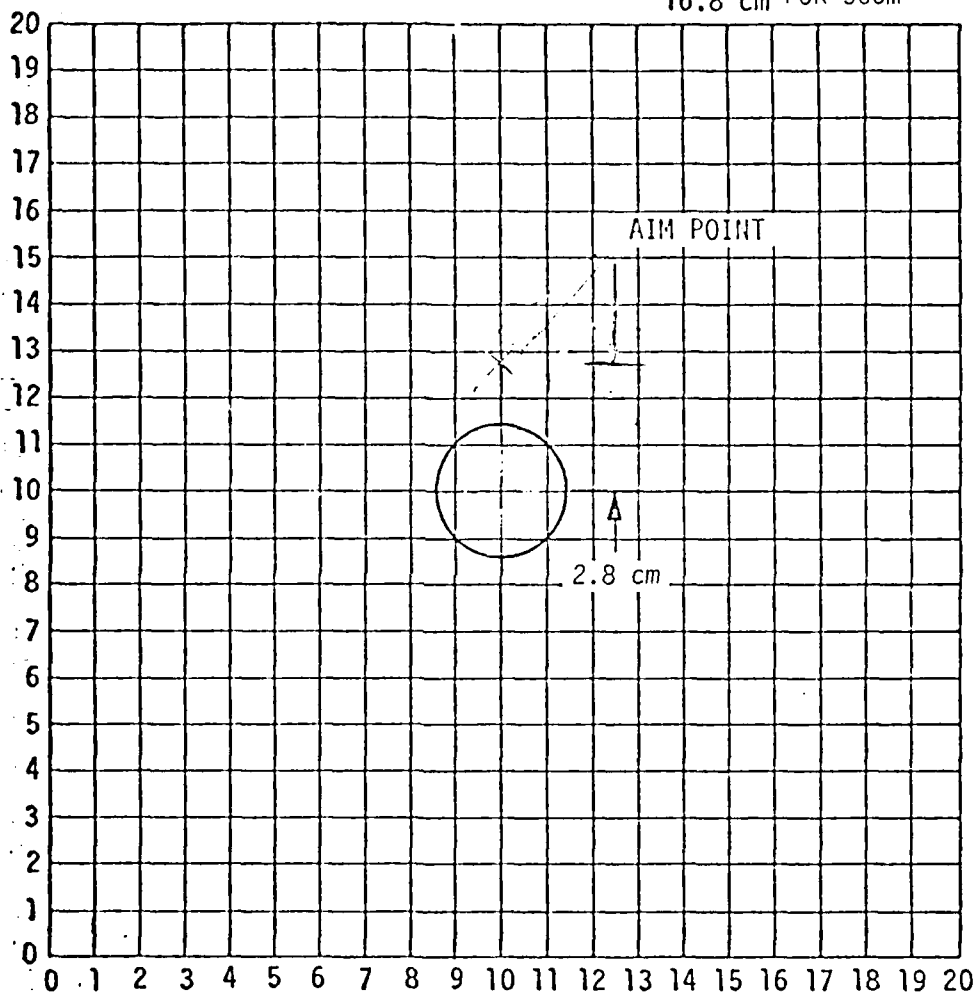
DATE: \_\_\_\_\_

TYPE TEST ALIGNMENT TOLERANCE TEST # 5  
 TARGET RANGE 300m TYPE \_\_\_\_\_ DATE 2/15/77  
 TEMPERATURE 70 HUMIDITY \_\_\_\_\_ TIME \_\_\_\_\_  
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET  
 RIFLE S/N N/A MFG. N/A  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER   
 MARKSMAN TACK HARTLEY TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR SUNNY  
 TRANSMITTER MOUNTING TIME \_\_\_\_\_ ALIGNMENT TIME (IRON SIGHTS) \_\_\_\_\_  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5				ALTYE 1.21		
2	x=8.5 y=13.5	2.182	3.716	12.31	0.31	2.949 1.4	2.314 14.5
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: D.R. W.

TEST WITNESSED BY: Josh H. Hartley

APPROVAL BY: \_\_\_\_\_

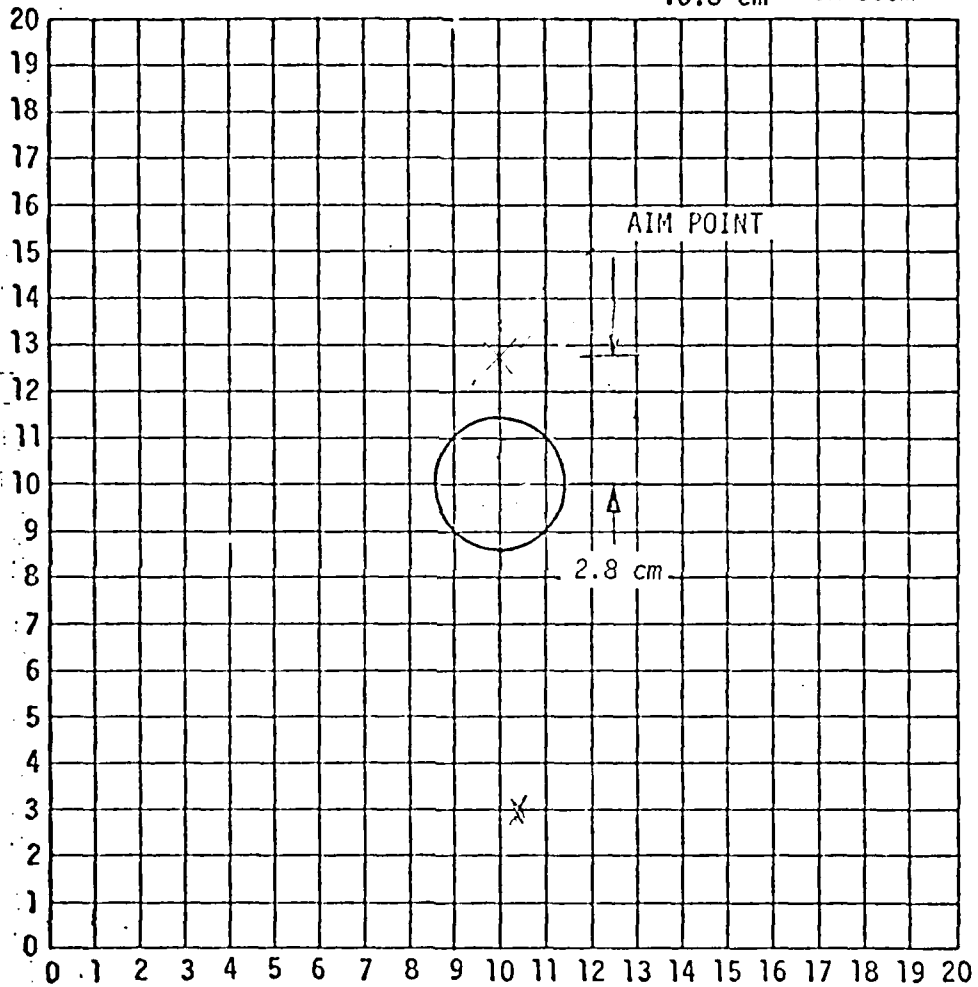
DATE: \_\_\_\_\_

TYPE TEST ALIGNMENT TOLERANCE TEST # 6  
 TARGET RANGE 150 m TYPE \_\_\_\_\_ DATE 2/15/77  
 TEMPERATURE 70 HUMIDITY \_\_\_\_\_ TIME 1330  
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER —  
 MARKSMAN JACK HARTLEY TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR SUNNY  
 TRANSMITTER MOUNTING TIME \_\_\_\_\_ ALIGNMENT TIME (IRON SIGHTS) \_\_\_\_\_  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	7.5	5.884	11.440	9.703	1.810	R 2.662 .41	D 5.756 4.97
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: DR Wood

TEST WITNESSED BY: John A. Hartley

APPROVAL BY: \_\_\_\_\_

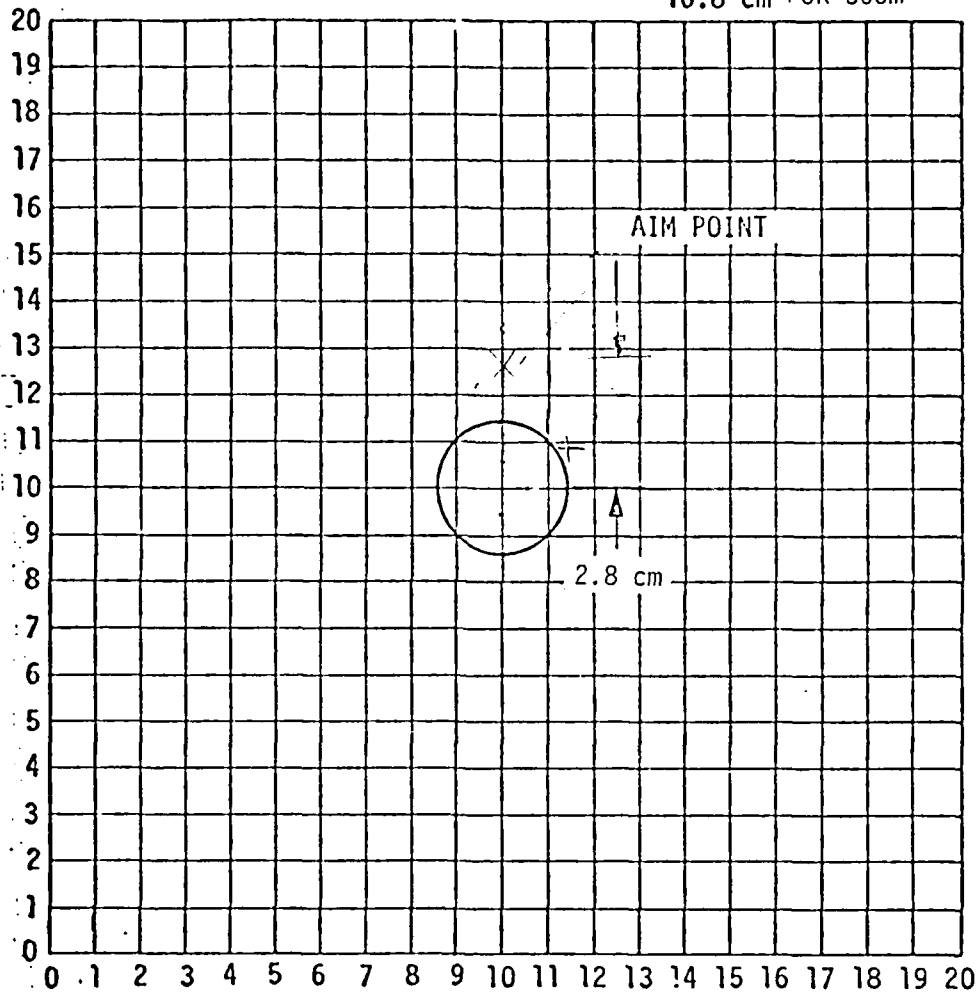
DATE: \_\_\_\_\_

TYPE TEST ALIGNMENT TOLERANCE TEST # 7  
 TARGET RANGE 150 m TYPE \_\_\_\_\_ DATE 2/15/77  
 TEMPERATURE 70 HUMIDITY \_\_\_\_\_ TIME 1345  
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓  
 MARKSMAN SFC MONDUN TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR - SUNNY  
 TRANSMITTER MOUNTING TIME \_\_\_\_\_ ALIGNMENT TIME (IRON SIGHTS) \_\_\_\_\_  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	5.421	12.714	12.753	4.999	R 7.067" 1.44	U 7.876" .955
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: DR Wood

TEST WITNESSED BY: John H. Hartley

APPROVAL BY: \_\_\_\_\_

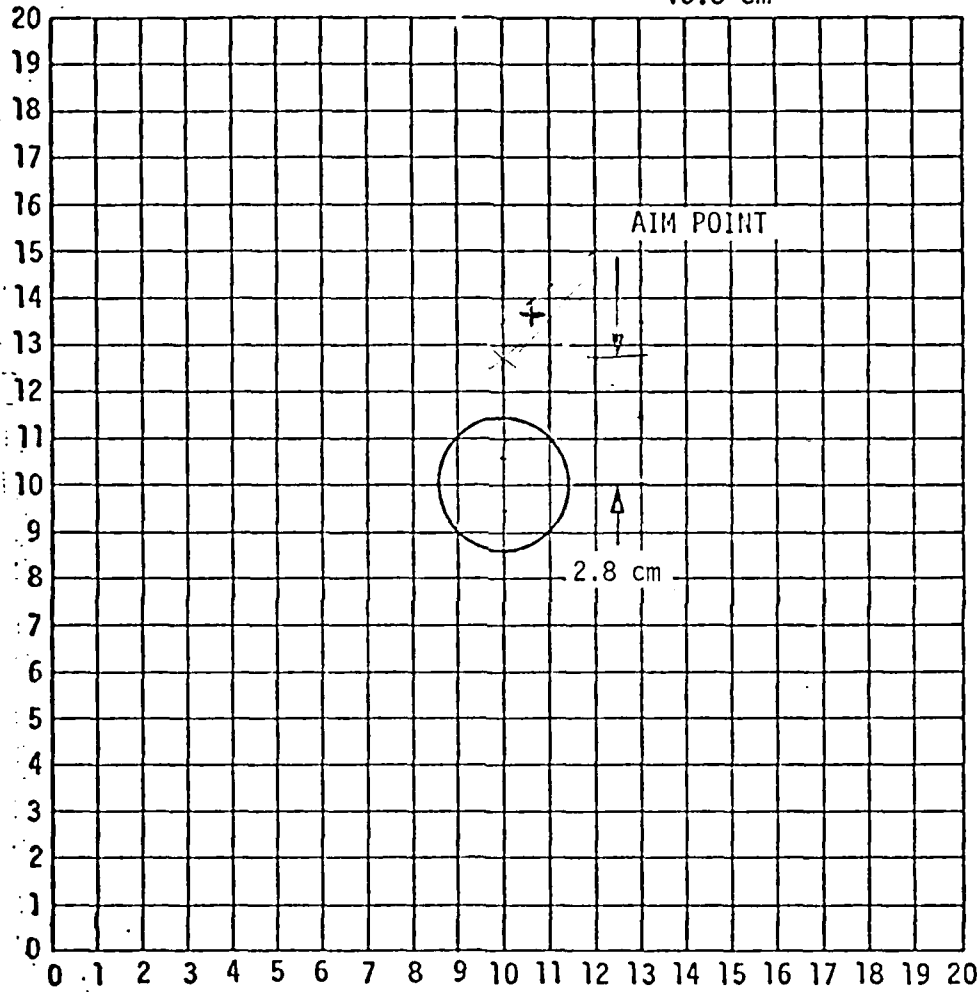
DATE: \_\_\_\_\_

TYPE TEST ALIGNMENT TOLERANCE TEST # 8  
 TARGET RANGE 150 m TYPE \_\_\_\_\_ DATE 2/15/77  
 TEMPERATURE 70 HUMIDITY \_\_\_\_\_ TIME 1350  
 TRANSMITTER S/N IR-071/E DETECTOR S/N TEST DET  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓  
 MARKSMAN SGT BATT TEST OPERATOR LOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY \_\_\_\_\_  
 TRANSMITTER MOUNTING TIME \_\_\_\_\_ ALIGNMENT TIME (IRON SIGHTS) \_\_\_\_\_  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	7.5	5.179	12.414	13.635	6.233	R 8.796 .753	U 9.934 3.14
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADIIS: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

P3443

Test Record Chart

TEST CONDUCTED BY: D. H. W. [Signature]

TEST WITNESSED BY: J. A. [Signature]

APPROVAL BY: \_\_\_\_\_

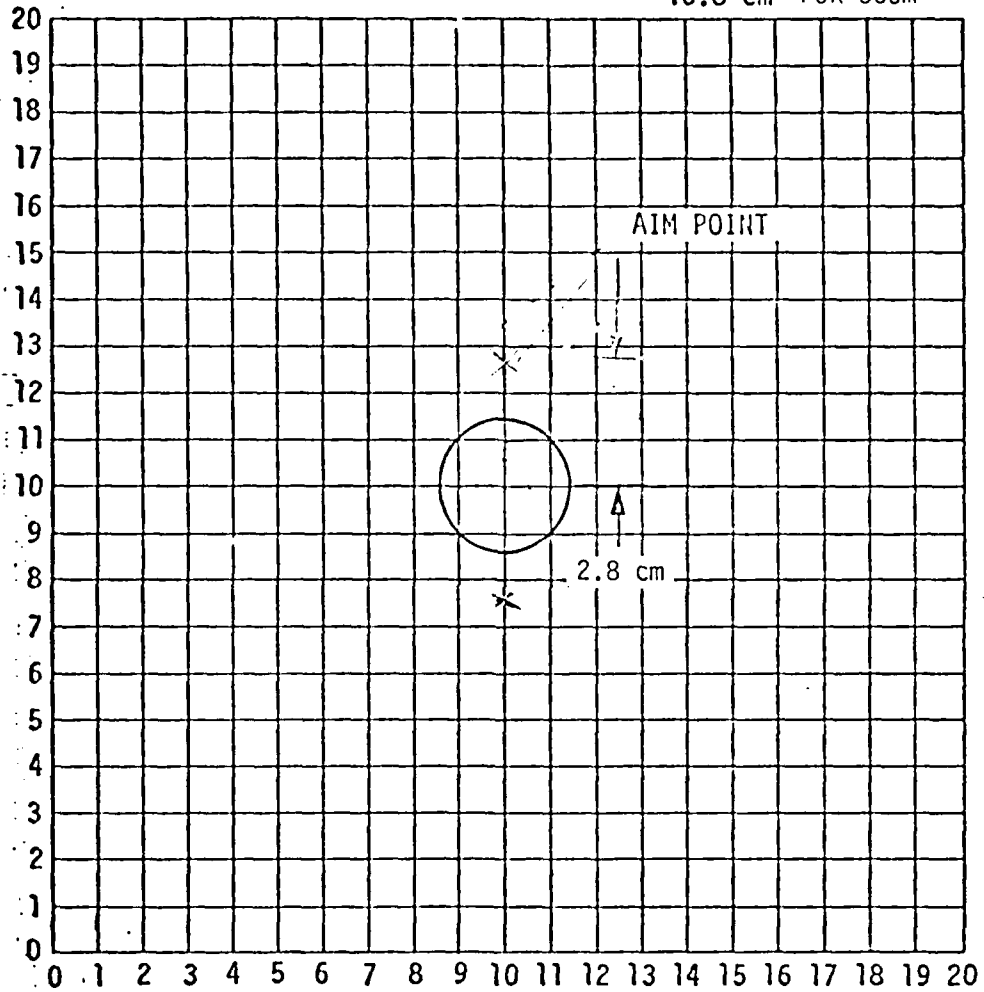
DATE: \_\_\_\_\_

TYPE TEST ALIGNMENT TOLERANCE TEST # 9  
 TARGET RANGE 150m TYPE \_\_\_\_\_ DATE 2/15/77  
 TEMPERATURE 70 HUMIDITY \_\_\_\_\_ TIME \_\_\_\_\_  
 TRANSMITTER S/N PROTOTYPE DETECTOR S/N TEST DET  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER   
 MARKSMAN PHIL SPRINKLE TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR - SUNNY  
 TRANSMITTER MOUNTING TIME \_\_\_\_\_ ALIGNMENT TIME (IRON SIGHTS) \_\_\_\_\_  
 SIGHT SETTING, RANGE OF CLICKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_

#	TEST DETECTOR X-Y POSITION						
	START	ENDPOINT				CENTROID	
	REFERENCE	LEFT	RIGHT	UP	DOWN	LEFT/RIGHT	UP/DOWN
1	8.5	5.510	11.470	7.94	2.128	L 8.495 .013	D 6.038 2.54
2							
3							
4							
5							
6							
7							
8							
9							
10							
AVERAGE							

Test Form

ACCEPTANCE CIRCLES OF FOLLOWING RADII: 1.4 cm FOR 25m  
8.4 cm FOR 150m  
16.8 cm FOR 300m



SCALE: 1 SQUARE = 1 cm

IP3443

Test Record Chart

TEST CONDUCTED BY: DR Wood

TEST WITNESSED BY: Jacob M. Bentley

APPROVAL BY: \_\_\_\_\_

DATE: \_\_\_\_\_

### 2.3 EYE SAFETY TEST

A representative of Aberdeen Proving Ground conducted eye safety measurements on the MAGLAD breadboard transmitter following a preliminary demonstration of the Scaled Record Fire Range. Output power of the transmitter was found to be approximately 100 MW, down by nearly a factor of four from the 375 MW expected. This power reduction was verified using contractor equipment.

Additional demonstrations were postponed until the laser diode could be replaced in the transmitter and performance verified.

### 2.4 EFFECTIVE SIMULATION OF FIRING WITH SERVICE AMMUNITION AT MINIMUM, MAXIMUM AND INTERMEDIATE RANGES

The laser transmitter power was measured each day and remained constant at approximately 409 MW during the balance of the Effective Simulation Demonstration. Detector sensitivity was set and measured to be nominally  $15.3 \mu\text{W}/\text{cm}^2$  for all ranges except 25 m where  $8.5 \mu\text{W}/\text{cm}^2$  was selected.

The test setup was as described in paragraph 2.2 of the test plan. However, the test procedure was modified, by the NTEC MAGLAD project manager, to perform target profiling rather than fire at selected aim points per the Demonstration Test Plan.

**2.4.1 EFFECTIVE SIMULATION DEMONSTRATION.** All detectors except the head were masked off for boresighting. Boresighting was accomplished by aligning the transmitter sighting scope crosshairs on the head detector and scanning the test target to determine the beam centroid. The test target was then positioned with the head detector at the beam centroid and the scope crosshairs adjusted to center on the detector, resulting in boresight at the test range.

Remaining detectors were unmasked and the transmitter scanned upward until detection ceased, then downward until detection resumed; thereby defining the target edge. The aim coordinate is then read on the test target grid scale and plotted as an "\*" on E-Target and F-Target Test Record Charts. The transmitter was subsequently aimed at consecutive rows on the test target grid and scanned left/right to determine target edge profile.

Following profiling, aimpoints were selected on the target grid and single shots were fired to verify the target edge resulting from the above procedure. "Hits" are plotted on the Test Record Chart as an "H" and "miss" as an "M". Detector locations are plotted as a "•". The test form, on the reverse side of E-Target and F-Target Test Record Charts, records data pertinent to that test.

2.4.1.1 Test Group Results (E-Target, 300 to 200 m). Results of this test group are shown on test data sheets for tests 1 through 3 at 300 m, 4 through 6 at 250 m and 7 through 10 at 200 m and as detailed in the following descriptions.

Test #1 (300 m) - Full visibility.

Test #2 (300 m) - Reduced visibility by 8 dB, noted boresight error due to ND filter wedge beam steering.

Test #3 (300 m) - Reduced visibility by 12 dB (ref. only, not part of acceptance criteria), noted boresight error.

Test #4 (250 m) - Full visibility.

Test #5 (250 m) - Reduced visibility by 6.7 dB.

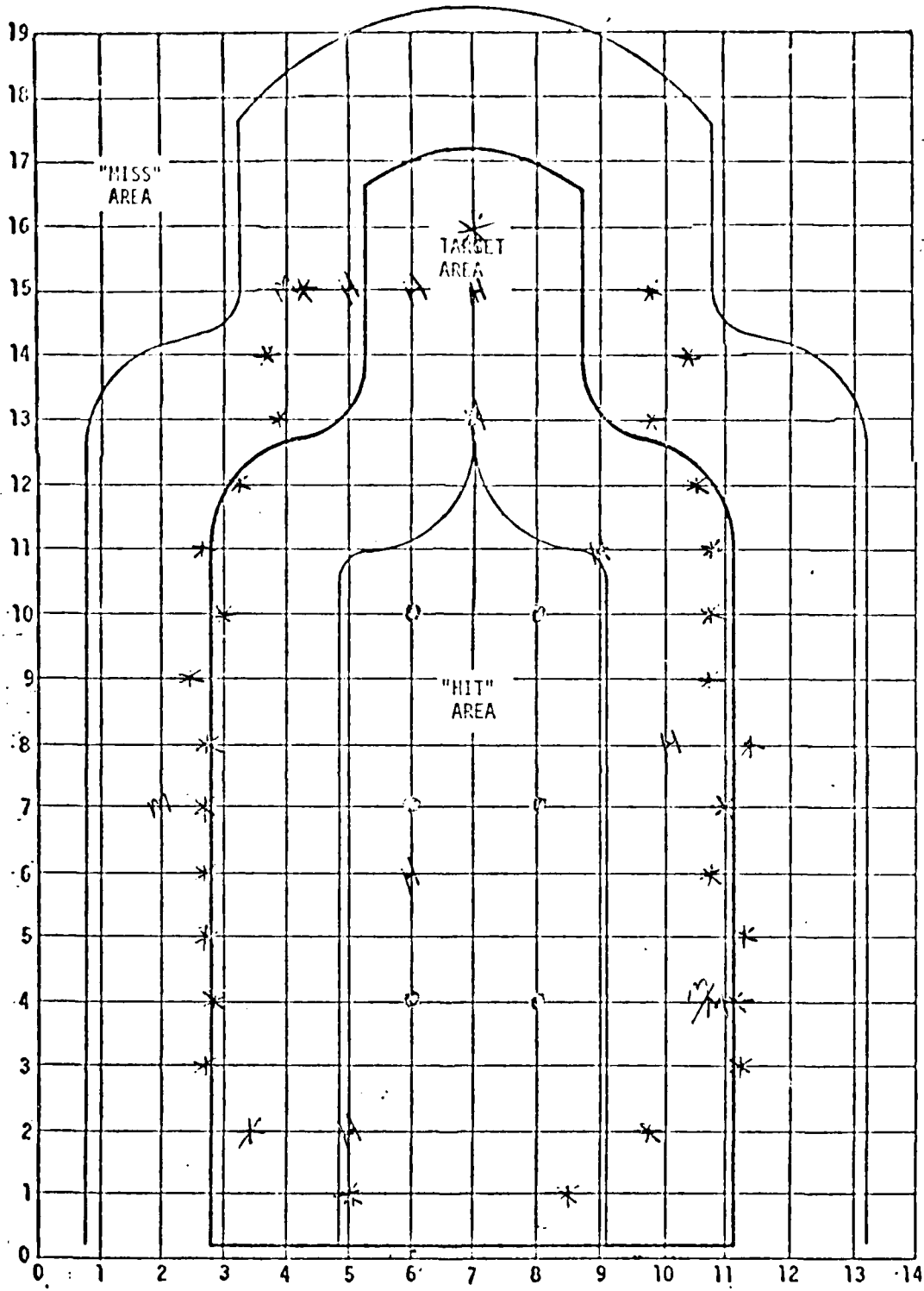
Test #6 (250 m) - Reduced visibility by 10.5 dB (ref. only, not part of acceptance criteria).

Test #7 (200 m) - Full visibility, unacceptable results.

Test #8 (200 m) - Full visibility, repositioned detector on test target.

Test #9 (200 m) - Reduced visibility by 5.3 dB.

Test #10 (200 m) - Reduced visibility by 8 dB (ref. only, not part of acceptance criteria).



# 1  
2/22/77  
\* = MISSILE  
SS  
H = HIT  
M = MISS

P3450-1

E-Target Test Record Chart, 300 m (Sheet 1 of 4)

TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: EN Wood

TEST WITNESSED BY: John H. Hartley

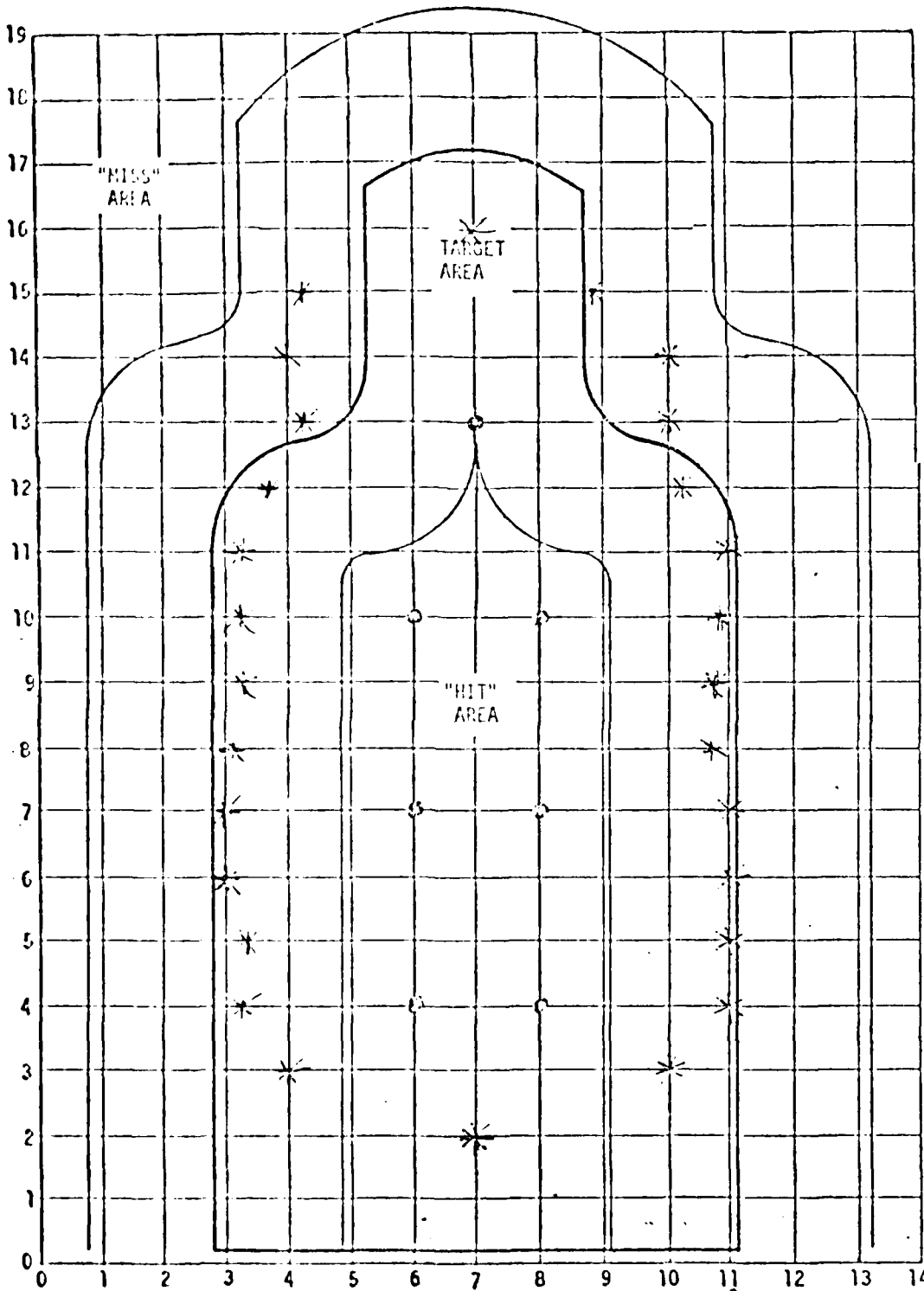
APPROVAL BY: \_\_\_\_\_

TYPE TEST 20 ROUND GROUP SHOTS TEST # 1  
 TARGET RANGE 300 TYPE 2 DATE 2/22/77  
 THEORETICAL S/N \_\_\_\_\_ DETECTOR S/N \_\_\_\_\_  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER 6  
 MAINTENANCE \_\_\_\_\_ TEST OPERATOR 10100  
 ATMOSPHERIC CONDITIONS/LETT VISIBILITY 2000 70°  
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA  
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:  
 WINDAGE NA ELEVATION NA  
 SIMULATED VISIBILITY RANGE NA  
 ATTENUATOR (ND) FILTERS USED None  
 LOCATION COORDINATE OF AIM POINT (PLOT ON REVERSE SIDE) \_\_\_\_\_  
 AIM POINT FOR HITS \_\_\_\_\_ OR MISSES \_\_\_\_\_

20 ROUND GROUP SHOTS

20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
TOTAL					

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = \_\_\_\_\_  
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = \_\_\_\_\_



# 2  
 REDUCED WSBG  
 NDC 79  
 2/22/77  
 \* PROFILE

BARE SIGHT IS 1/2 DIV HIGH

P3450-1

E-Target Test Record Chart, 300 m (Sheet 1 of 4)

TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
 NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: G. J. Woods

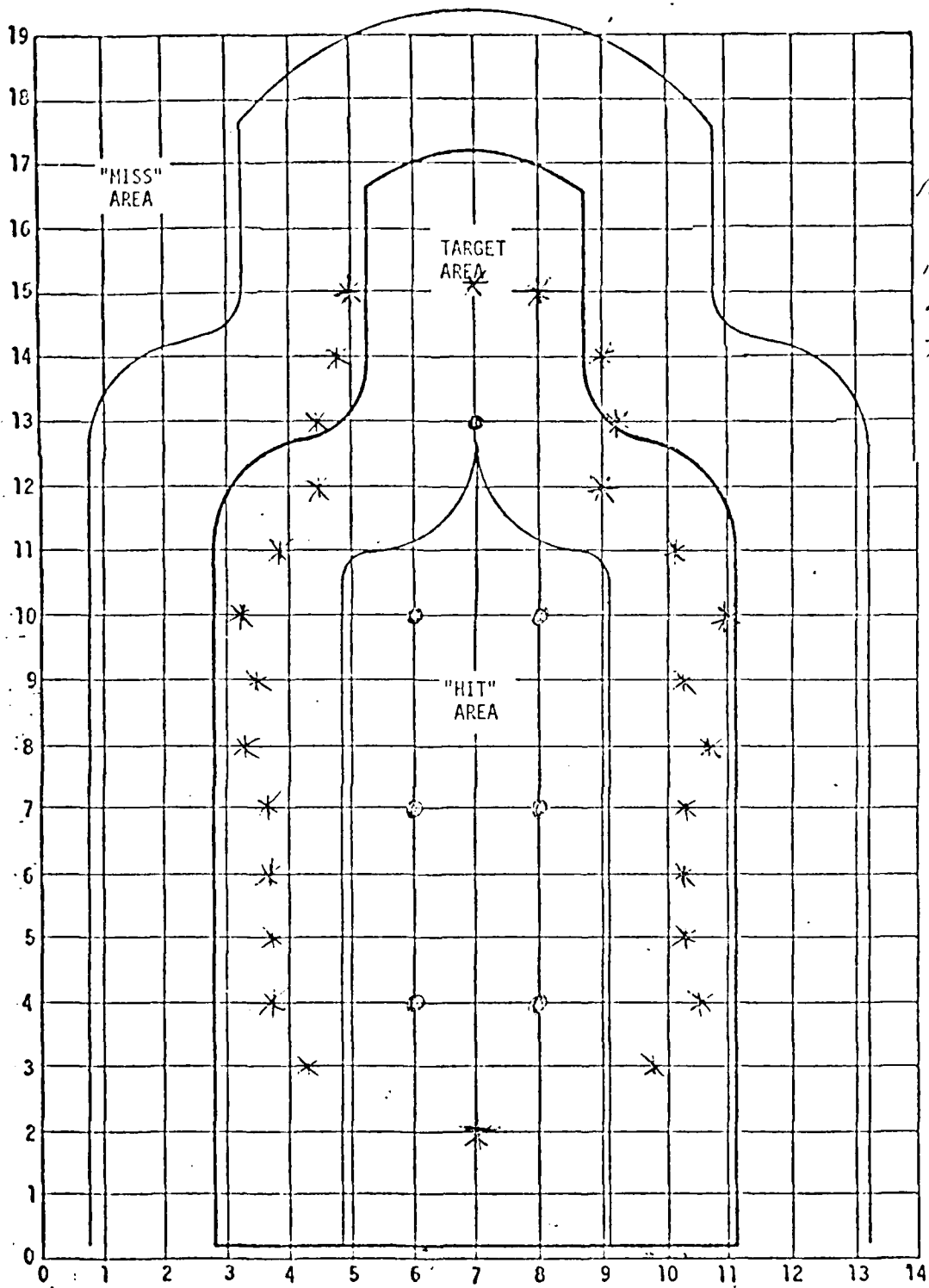
TEST WITNESSED BY: [Signature]

APPROVAL BY:

TYPE TEST REDUCED VISIBILITY TEST # 2  
 TARGET RANGE 300 TYPE E DATE 2/22/57  
 TEMPERATURE S/N \_\_\_\_\_ DETECTOR S/N \_\_\_\_\_  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER \_\_\_\_\_  
 MARKSMAN \_\_\_\_\_ TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR Sunny 70°  
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA  
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:  
 WINDAGE NA ELEVATION NA  
 SIMULATED VISIBILITY RANGE \_\_\_\_\_  
 ATTENUATOR (ND) FILTERS USED 0.79  
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) \_\_\_\_\_  
 AIM POINT FOR HITS \_\_\_\_\_ OR MISSES \_\_\_\_\_

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = \_\_\_\_\_  
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = \_\_\_\_\_



#3  
 2/24  
 REDUCED  
 VISIBL  
 ND = 1.7  
 # + .77  
 \* M. P. H.

BORE SIGHT 1/4 DIV HIGH

P3450-1

E-Target Test Record Chart, 300 m (Sheet 1 of 4)

TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
 NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: Lion R. Woods

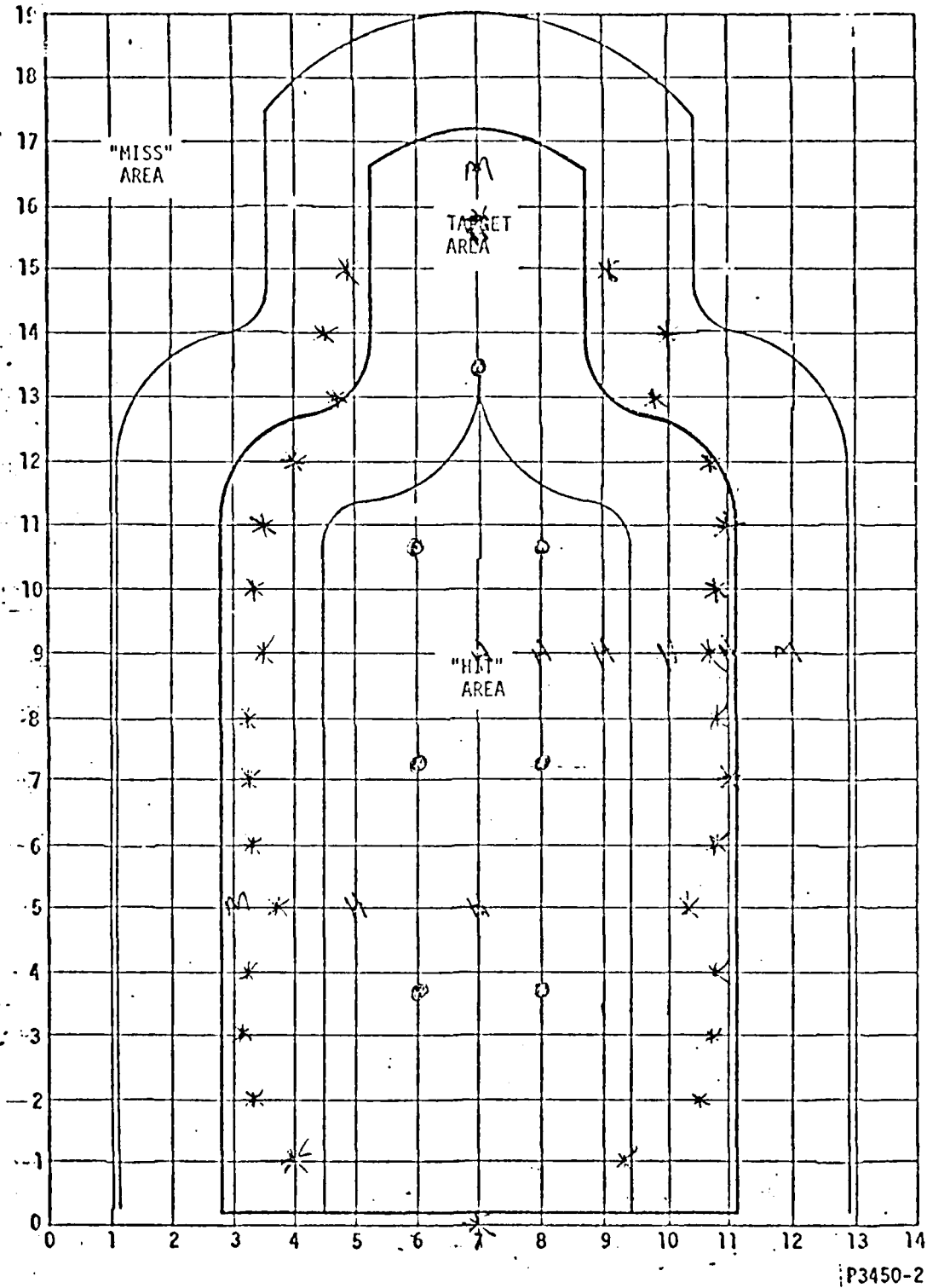
TEST WITNESSED BY: Miller

APPROVAL BY: \_\_\_\_\_

TYPE TEST REDUCED VISIBILITY TEST # 3  
 TARGET RANGE \_\_\_\_\_ TYPE \_\_\_\_\_ DATE 2/2/77  
 TEMPERATURE S/N \_\_\_\_\_ DETECTOR S/N \_\_\_\_\_  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓  
 MARKSMAN \_\_\_\_\_ TEST OPERATOR COLEMAN  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR SKY 70°  
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA  
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:  
 WINDAGE NA ELEVATION NA  
 SIMULATED VISIBILITY RANGE \_\_\_\_\_  
 ATTENUATOR (ND) FILTERS USED 4 PLUS 0.79  
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) \_\_\_\_\_  
 AIM POINT FOR HITS \_\_\_\_\_ OR MISSES \_\_\_\_\_

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = \_\_\_\_\_  
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = \_\_\_\_\_



E-Target Test Record Chart, 250 m (Sheet 2 of A)

TEST RESULTS

TEST CONDUCTED BY: DR Woods

ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

TEST WITNESSED BY: Philly E. Sparker

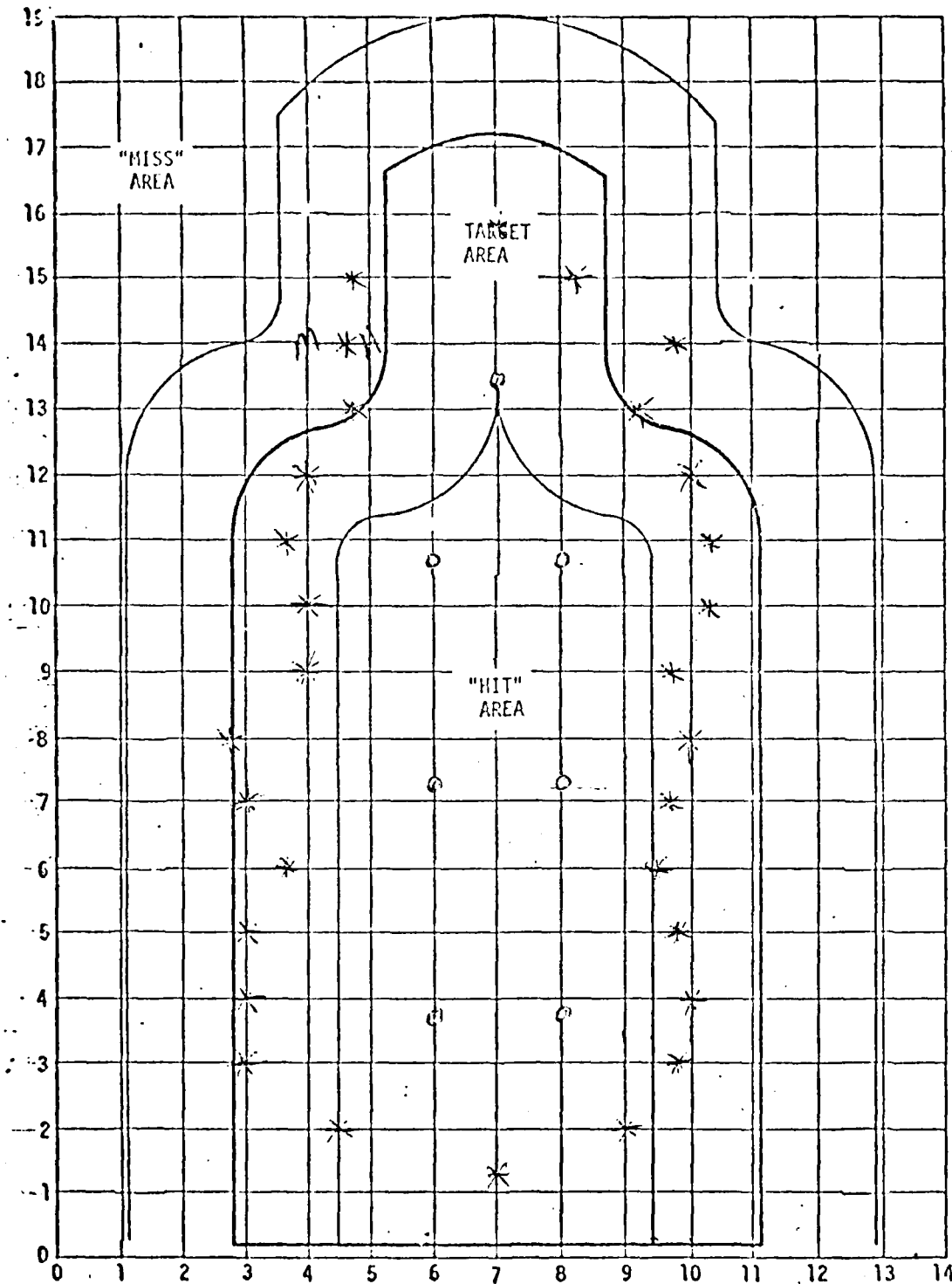
APPROVAL BY: \_\_\_\_\_

TYPE TEST Full Scope EFFECTIVE SIMULATION TEST # 4  
 TARGET RANGE 250 TYPE E DATE 2/22/77  
~~TRANSMITTER S/N~~ 571 DETECTOR S/N \_\_\_\_\_  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓  
 MARKSMAN \_\_\_\_\_ TEST OPERATOR WILLIAMS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR SUNNY 70°  
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA  
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:  
 WINDAGE NA ELEVATION NA  
 SIMULATED VISIBILITY RANGE NA  
 ATTENUATOR (ND) FILTERS USED NA  
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) \_\_\_\_\_  
 AIM POINT FOR HITS \_\_\_\_\_ OR MISSES \_\_\_\_\_

RIFLE SCOPE RE-SIGHTED TO RANGE

20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
TOTAL					

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = \_\_\_\_\_  
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = \_\_\_\_\_



TEST #5  
 2/22/77  
 REDUCED  
 VISIBL:  
 ND 15251

P3450-2

E-Target Test Record Chart, 250 m (Sheet 2 of 4)

TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
 NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: John R. Woods

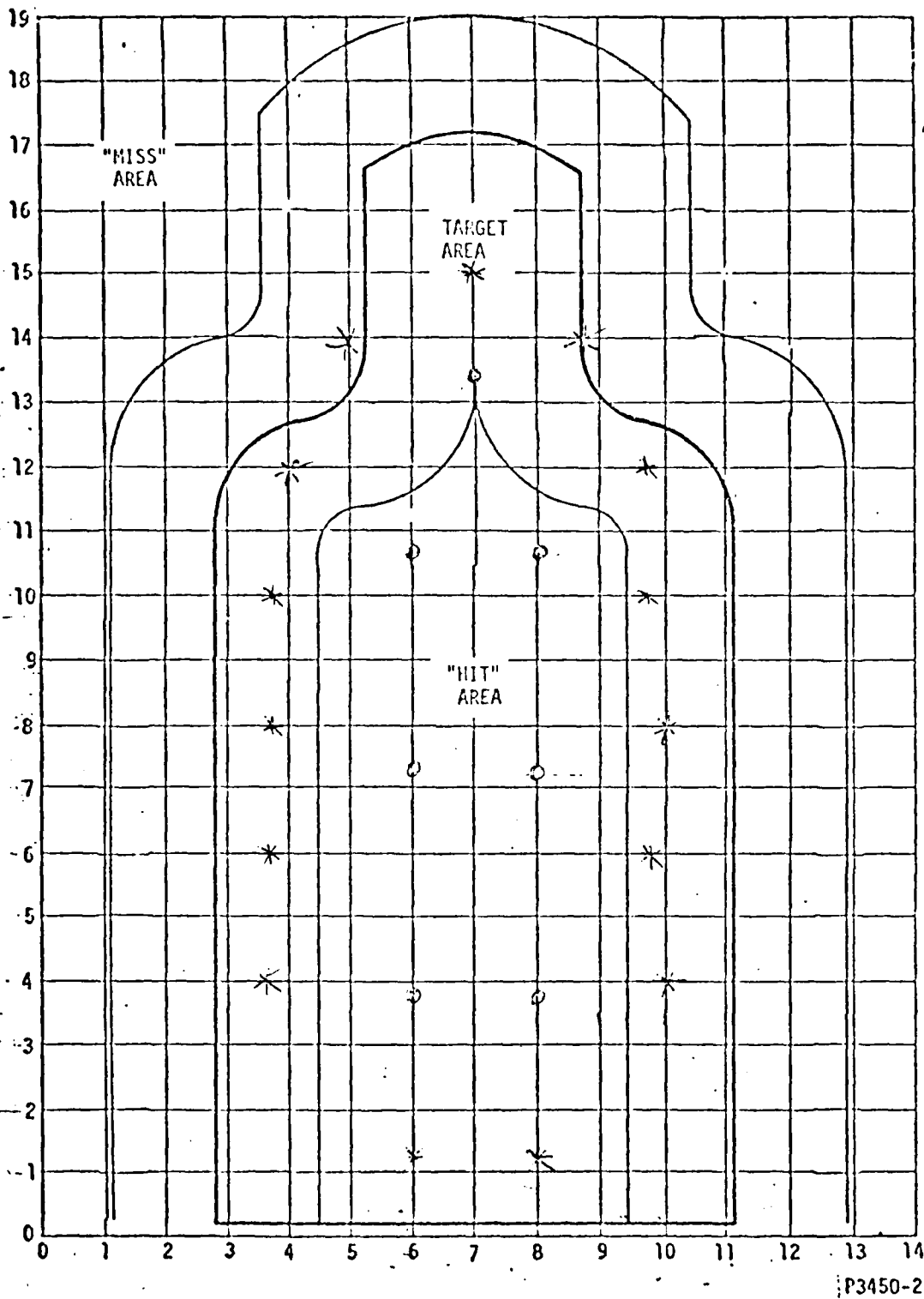
TEST WITNESSED BY: John H. Hardy

APPROVAL BY: \_\_\_\_\_

TYPE TEST FULL SCALE SIMULATION TEST # 5  
 TARGET RANGE 250 TYPE E DATE 4/24/77  
 TRANSMITTER TEMPERATURE S/N \_\_\_\_\_ DETECTOR S/N \_\_\_\_\_  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER 2  
 MARKSMAN \_\_\_\_\_ TEST OPERATOR WOODS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR SKY 70°  
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA  
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:  
 WINDAGE NA ELEVATION NA  
 SIMULATED VISIBILITY RANGE \_\_\_\_\_  
 ATTENUATOR (ND) FILTERS USED .52 + .15  
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) \_\_\_\_\_  
 AIM POINT FOR HITS \_\_\_\_\_ OR MISSES \_\_\_\_\_

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = \_\_\_\_\_  
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = \_\_\_\_\_



TEST #16  
 2/22/77  
 REDUCED  
 VISIBILITY  
 ND 1.05

E-Target Test Record Chart, 250 m (Sheet 2 of 4)

TEST RESULTS

TEST CONDUCTED BY: \_\_\_\_\_

ACCEPTABLE \_\_\_\_\_  
 NOT ACCEPTABLE \_\_\_\_\_

TEST WITNESSED BY: Jack S. Hartley

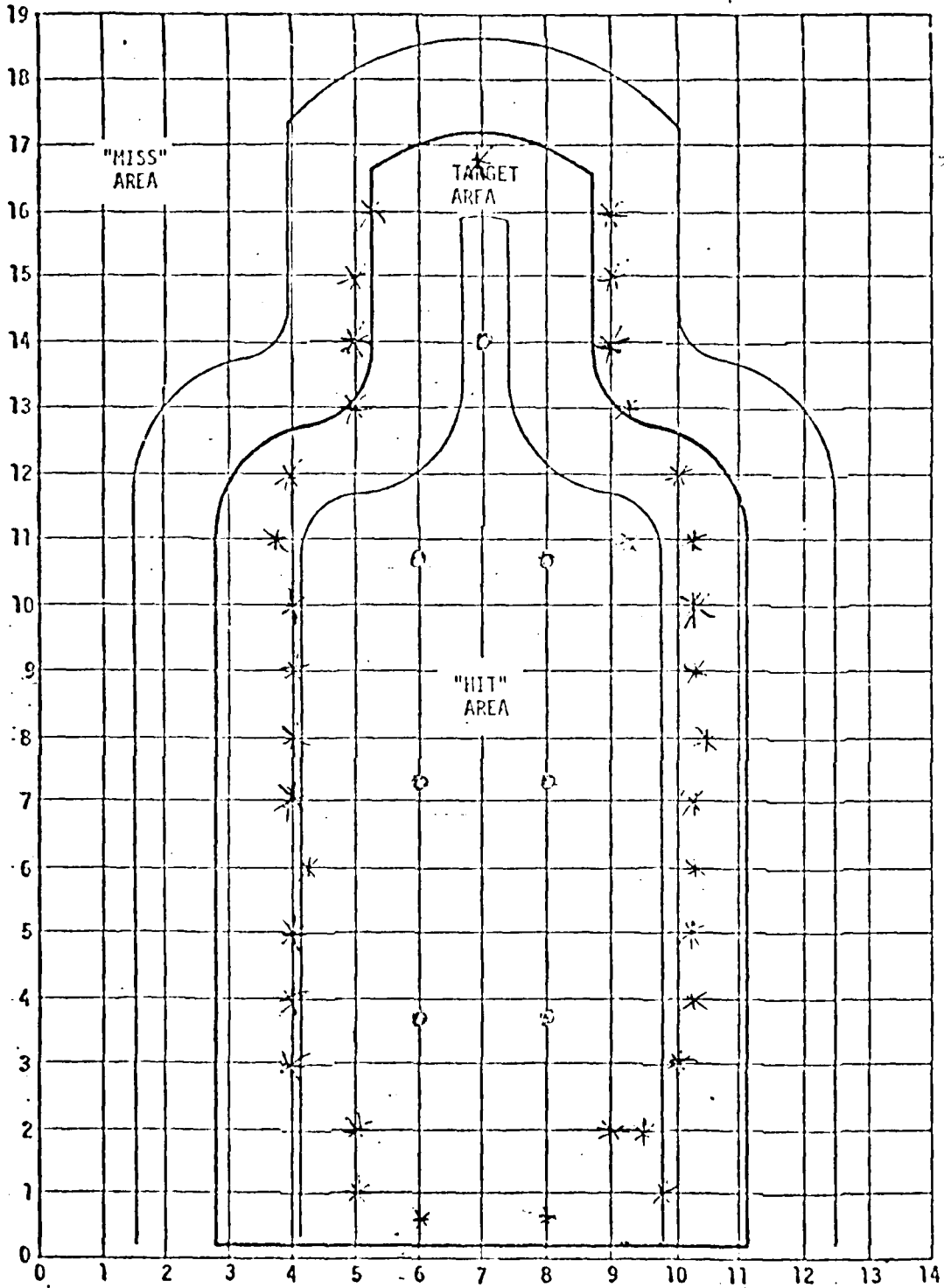
57 APPROVAL BY: \_\_\_\_\_

TYPE TEST REDUCED VISIBILITY TEST # 6  
 TARGET RANGE 250 TYPE E DATE 2/22/77  
 TEMPERATURE S/N \_\_\_\_\_ DETECTOR S/N \_\_\_\_\_  
 RIFLE S/N \_\_\_\_\_ MFG. \_\_\_\_\_  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER \_\_\_\_\_  
 MARKSMAN \_\_\_\_\_ TEST OPERATOR \_\_\_\_\_  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY \_\_\_\_\_  
 TRANSMITTER MOUNTING TIME \_\_\_\_\_ ALIGNMENT TIME (IRON SIGHTS) \_\_\_\_\_  
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_  
 SIMULATED VISIBILITY RANGE \_\_\_\_\_  
 ATTENUATOR (ND) FILTERS USED .52 + .4 + .15 = 1.07  
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) \_\_\_\_\_  
 AIM POINT FOR HITS \_\_\_\_\_ OR MISSES \_\_\_\_\_

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPPOPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = \_\_\_\_\_  
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = \_\_\_\_\_

TEST  
# 7  
2/22/75  
A: PROFILE



IP3450-3

E-Target Test Record Chart, 200 m (Sheet 3 of 4)

TEST RESULTS

TEST CONDUCTED BY: John K. [Signature]

ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

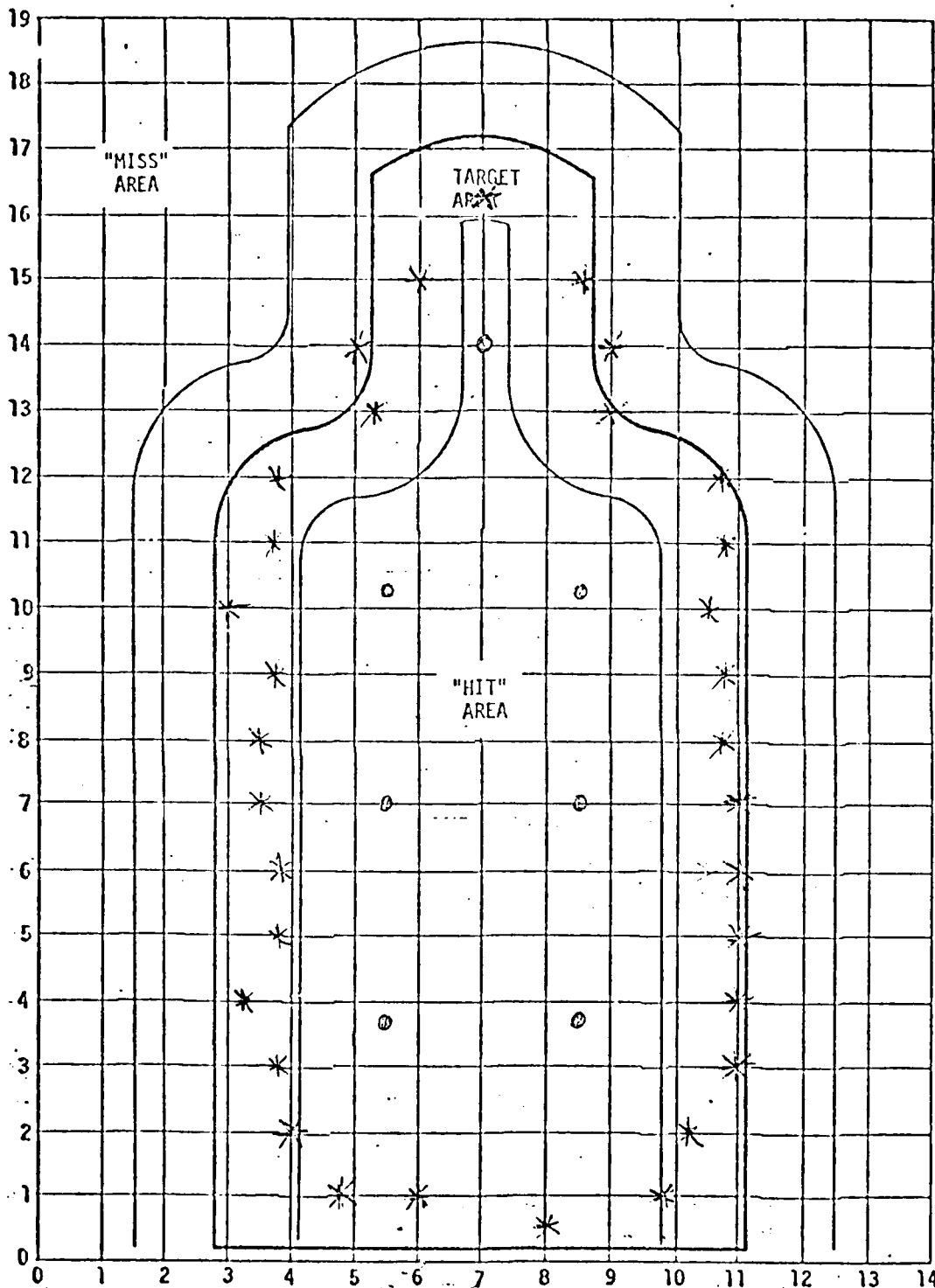
TEST WITNESSED BY: Joe L. [Signature]

59 APPROVAL BY: \_\_\_\_\_

TYPE TEST FULL CASE TEST # 7  
 TARGET RANGE 20 TYPE E DATE 11/1/00  
 TEMPERATURE S/N \_\_\_\_\_ DETECTOR S/N \_\_\_\_\_  
 RIFLE S/N N/A MFG. N/A  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER \_\_\_\_\_  
 MARKSMAN \_\_\_\_\_ TEST OPERATOR \_\_\_\_\_  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY \_\_\_\_\_  
 TRANSMITTER MOUNTING TIME \_\_\_\_\_ ALIGNMENT TIME (IRON SIGHTS) \_\_\_\_\_  
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:  
 WINDAGE \_\_\_\_\_ ELEVATION \_\_\_\_\_  
 SIMULATED VISIBILITY RANGE \_\_\_\_\_  
 ATTENUATOR (ND) FILTERS USED \_\_\_\_\_  
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) \_\_\_\_\_  
 AIM POINT FOR HITS \_\_\_\_\_ OR MISSES \_\_\_\_\_

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = \_\_\_\_\_  
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = \_\_\_\_\_



t3t#8  
2/24/77  
\* PROFILE

Repositioned Detectors

IP3450-3

E-Target Test Record Chart, 200 m (Sheet 3 of 4)

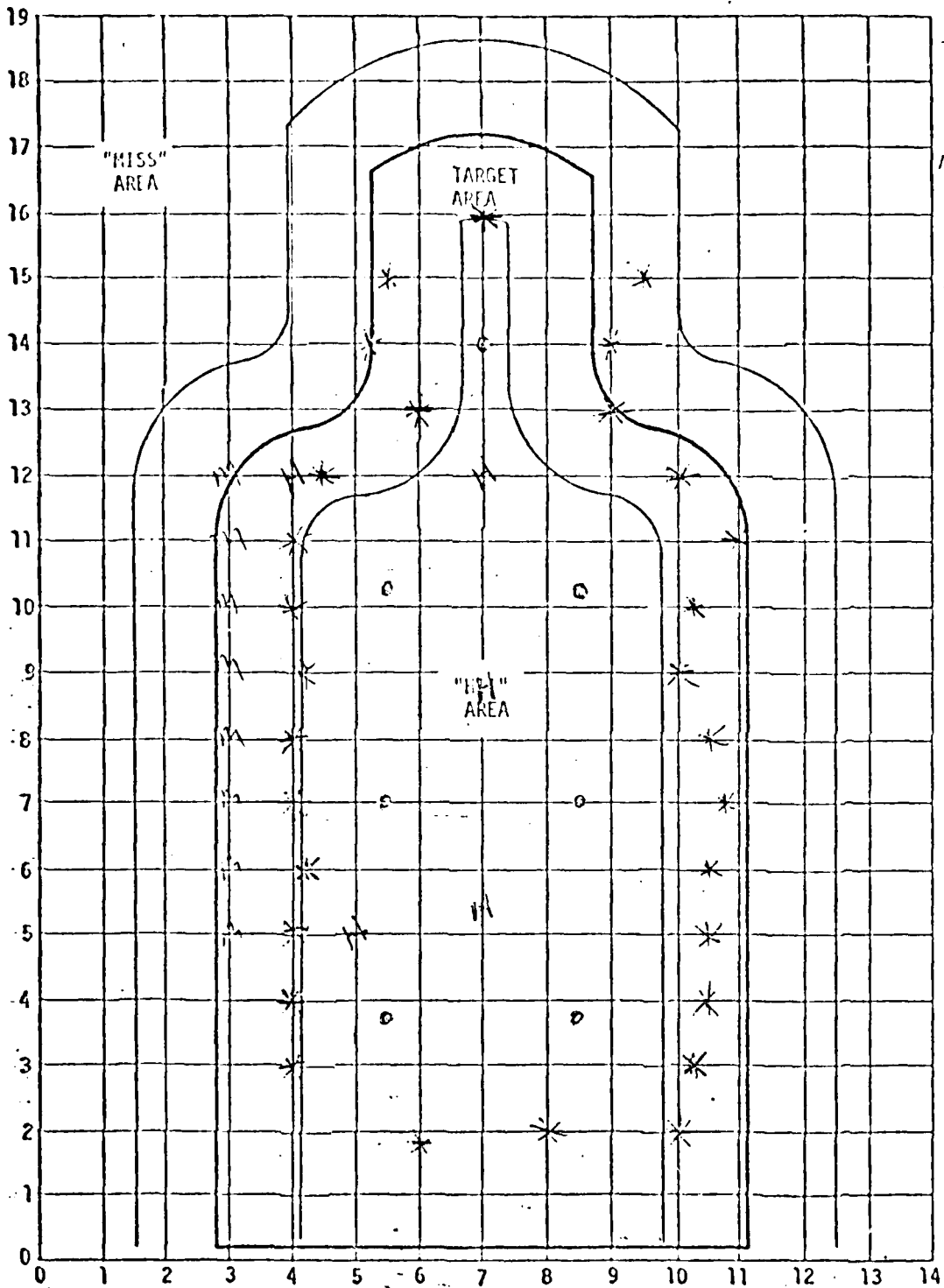
TEST RESULTS  
ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: Don J. Woods  
TEST WITNESSED BY: John A. Bailey  
APPROVAL BY: \_\_\_\_\_

TYPE TEST Full Scale TEST # 8  
 TARGET RANGE 200 TYPE E DATE 2/22  
 TEMPERATURE S/N \_\_\_\_\_ DETECTOR S/N \_\_\_\_\_  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER   
 MARKSMAN \_\_\_\_\_ TEST OPERATOR Woods  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY Clear 60'  
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA  
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:  
 WINDAGE NA ELEVATION NA  
 SIMULATED VISIBILITY RANGE NA  
 ATTENUATOR (ND) FILTERS USED NA  
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) \_\_\_\_\_  
 AIM POINT FOR HITS \_\_\_\_\_ OR MISSES \_\_\_\_\_

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = \_\_\_\_\_  
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = \_\_\_\_\_



test #9  
 2/22/77  
 REDUCED  
 VISIBILITY  
 ND = .52  
 \* PROFILE  
 SS  
 H = HIT  
 M = MISS

IP3450-3

E-Target Test Record Chart, 200 m (Sheet 3 of 4)

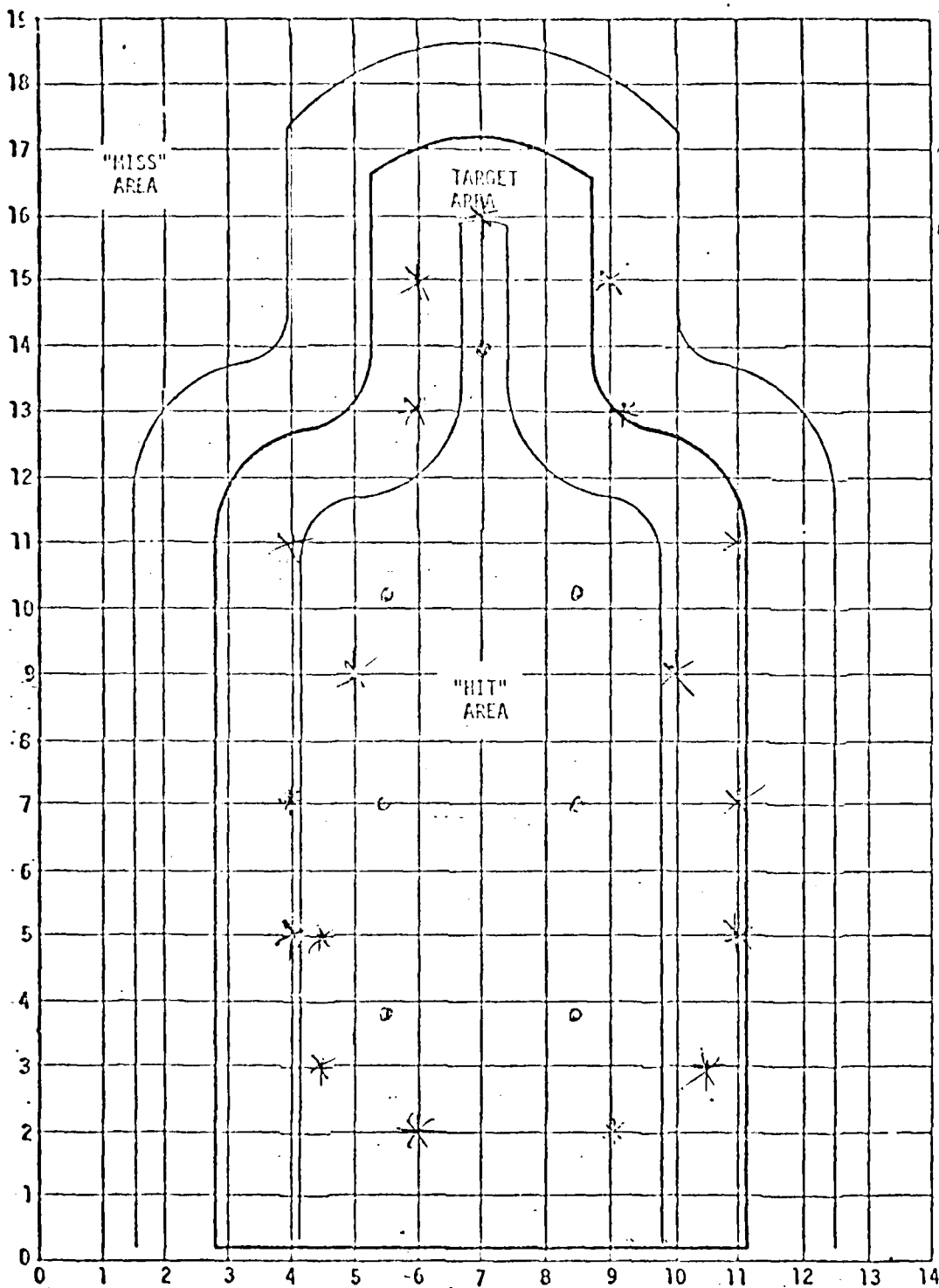
TEST RESULTS

TEST CONDUCTED BY: Richard

ACCEPTABLE \_\_\_\_\_  
 NOT ACCEPTABLE \_\_\_\_\_

TEST WITNESSED BY: Jack Hill

63 APPROVAL BY: \_\_\_\_\_



test 10  
 2/22/77  
 REDUCED  
 1/31/417  
 IV = .79

IP3450-3

E-Target Test Record Chart, 200 m (Sheet 3 of 4)

TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
 NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: Jack H. Hentley

TEST WITNESSED BY: Jack H. Hentley

64 APPROVAL BY: \_\_\_\_\_

2.4.1.2 Test Group Results (E&F Target, 150 to 15 m). Results of this test group are shown on test data sheets for tests 1 through 3 at 150 m, 4 through 7 at 100 m, 8 through 12 at 75 m, 13 and 14 at 50 m, 15 at 25 m, 16 at 15 m and as detailed in the following descriptions.

Test #1 (150 m) - Full visibility.

Test #2 (150 m) - Reduced visibility by 4 dB.

Test #3 (150 m) - Reduced visibility by 6.6 dB (ref. only, not part of acceptance criteria).

Test #4 (100 m) - Full visibility.

Test #5 (100 m) - Reduced visibility by 2.6 dB.

Test #6 - Omitted.

Test #7 (100 m) - Reduced visibility by 4 dB (ref. only, not part of acceptance criteria).

Test #8 (75 m) - Full visibility, unacceptable results.

Test #9 (75 m) - Moved detectors and retested, full visibility.

Test #10 (75 m) - Reduced visibility by 2 dB, unacceptable results.

Test #11 (75 m) - New detector locations, reduced visibility by 2 dB.

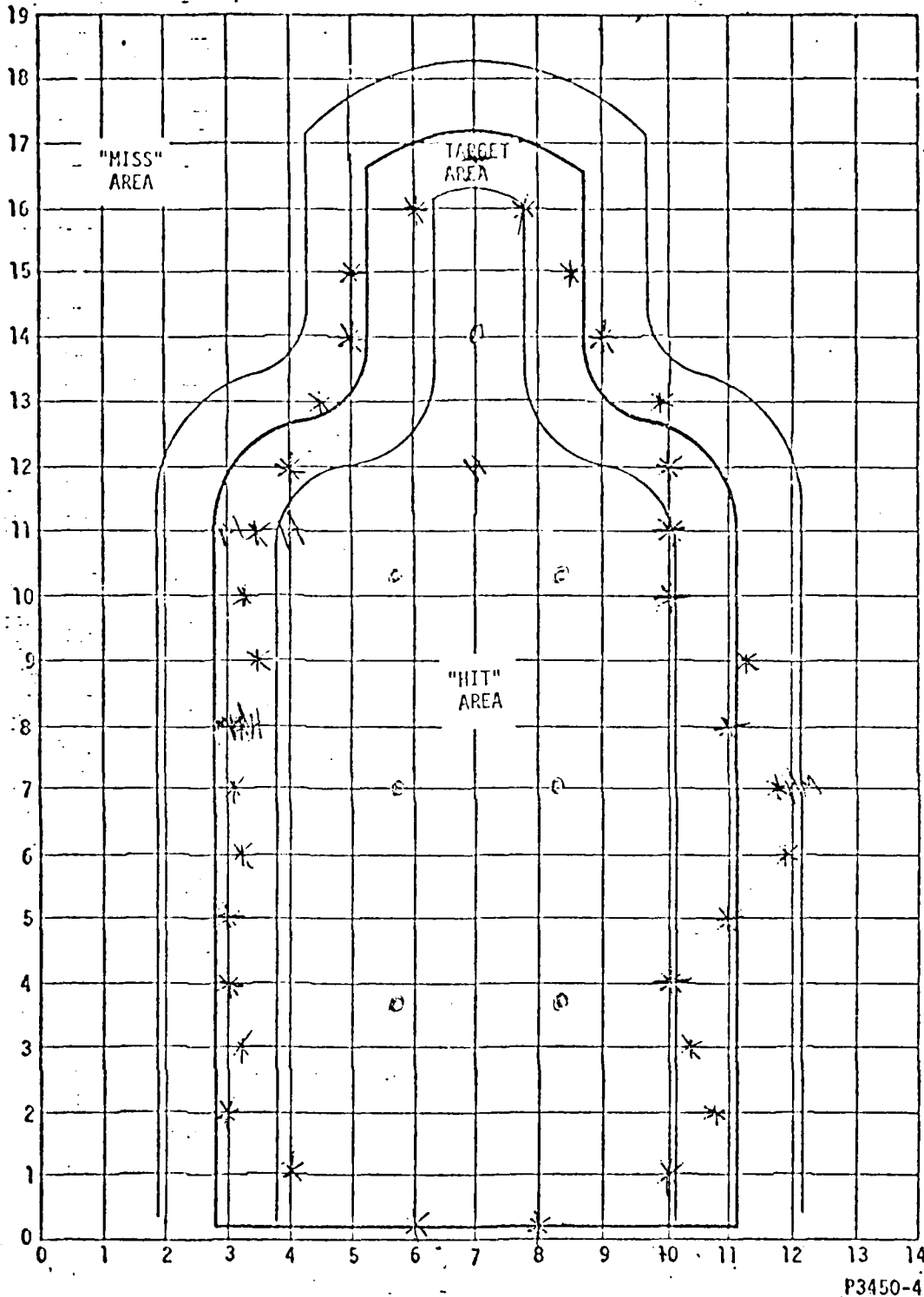
Test #12 (75 m) - Full visibility.

Test #13 (50 m) - Full visibility.

Test #14 (50 m) - Reduced visibility by 1.3 dB.

Test #15 (25 m) - Full visibility.

Test #16 (15 m) - Not part of program requirements.



test # /  
 2/23/77  
 \* PROFILE  
 S3  
 H = HIT  
 M = MISS

P3450-4

E-Target Test Record Chart, 150 m (Sheet 4 of 4)

TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
 NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: J. R. Woods

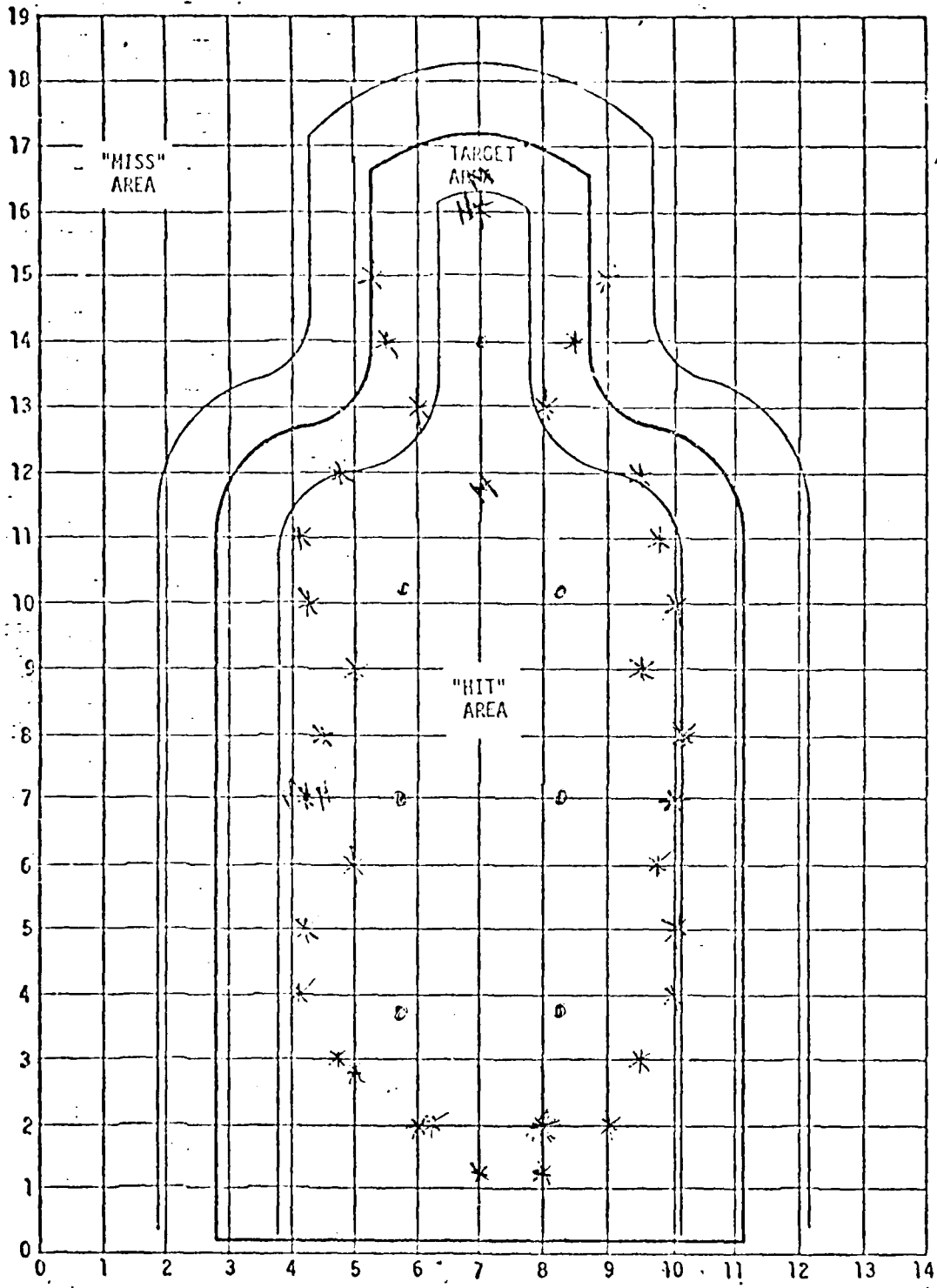
TEST WITNESSED BY: J. T. H. Hardy

APPROVAL BY: \_\_\_\_\_

TYPE TEST FULL SCALE TEST # 1  
 TARGET RANGE 150 TYPE F DATE 2/23/77  
 TEMPERATURE S/N 109 m.c. DETECTOR S/N 1510  
 RIFLE S/N N/A MFG. N/A  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER L  
 MARKSMAN \_\_\_\_\_ TEST OPERATOR LEEDS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR SUNNY 70°  
 TRANSMITTER MOUNTING TIME N/A ALIGNMENT TIME (IRON SIGHTS) N/A  
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:  
 WINDAGE N/A ELEVATION N/A  
 SIMULATED VISIBILITY RANGE N/A  
 ATTENUATOR (ND) FILTERS USED N/A  
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) \_\_\_\_\_  
 AIM POINT FOR HITS \_\_\_\_\_ OR MISSES \_\_\_\_\_

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = \_\_\_\_\_  
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = \_\_\_\_\_



test #2  
 2/23/77  
 REDUCED  
 VISIBILITY  
 AD = 0.4  
 \* = PROFILE  
 SS  
 H = HIT  
 M = MISS

BORESIGHT AT RANGE

P3450-4

E-Target Test Record Chart, 150 m (Sheet 4 of 4)

TEST RESULTS

TEST CONDUCTED BY: Don H. Woods

ACCEPTABLE \_\_\_\_\_  
 NOT ACCEPTABLE \_\_\_\_\_

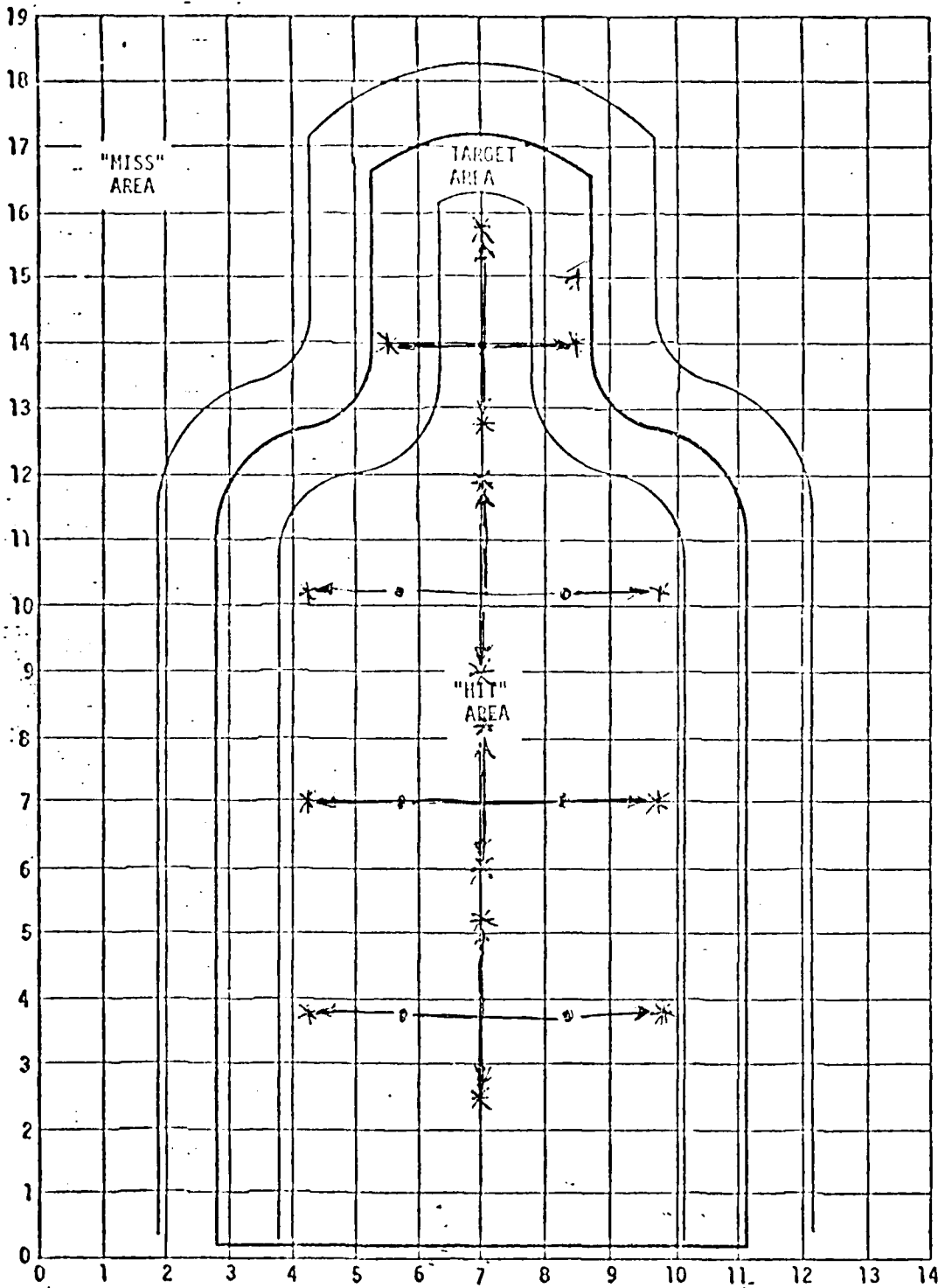
TEST WITNESSED BY: Jack H. Hendley

69 APPROVAL BY: \_\_\_\_\_

TYPE TEST REDUCED VISIBILITY TEST # 2  
 TARGET RANGE 152 TYPE E DATE 2/23/77  
 TEMPERATURE S/N 400 1100 DETECTOR S/N 322  
 RIFLE S/N N/A MFG. N/A  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓  
 MARKSMAN \_\_\_\_\_ TEST OPERATOR W. B. D. S.  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY CLEAR SUNNY 40°  
 TRANSMITTER MOUNTING TIME N/A ALIGNMENT TIME (IRON SIGHTS) N/A  
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:  
 WINDAGE N/A ELEVATION N/A  
 SIMULATED VISIBILITY RANGE \_\_\_\_\_  
 ATTENUATOR (ND) FILTERS USED 0.4  
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) \_\_\_\_\_  
 AIM POINT FOR HITS \_\_\_\_\_ OR MISSES \_\_\_\_\_

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = \_\_\_\_\_  
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = \_\_\_\_\_



LETH 3  
 2/23/77  
 REDUCED  
 VISIBILITY  
 NID = .655  
 \* = PROFILE

P3450-4

E-Target Test Record Chart, 150 m (Sheet 4 of 4)

TEST RESULTS

TEST CONDUCTED BY: [Signature]

ACCEPTABLE

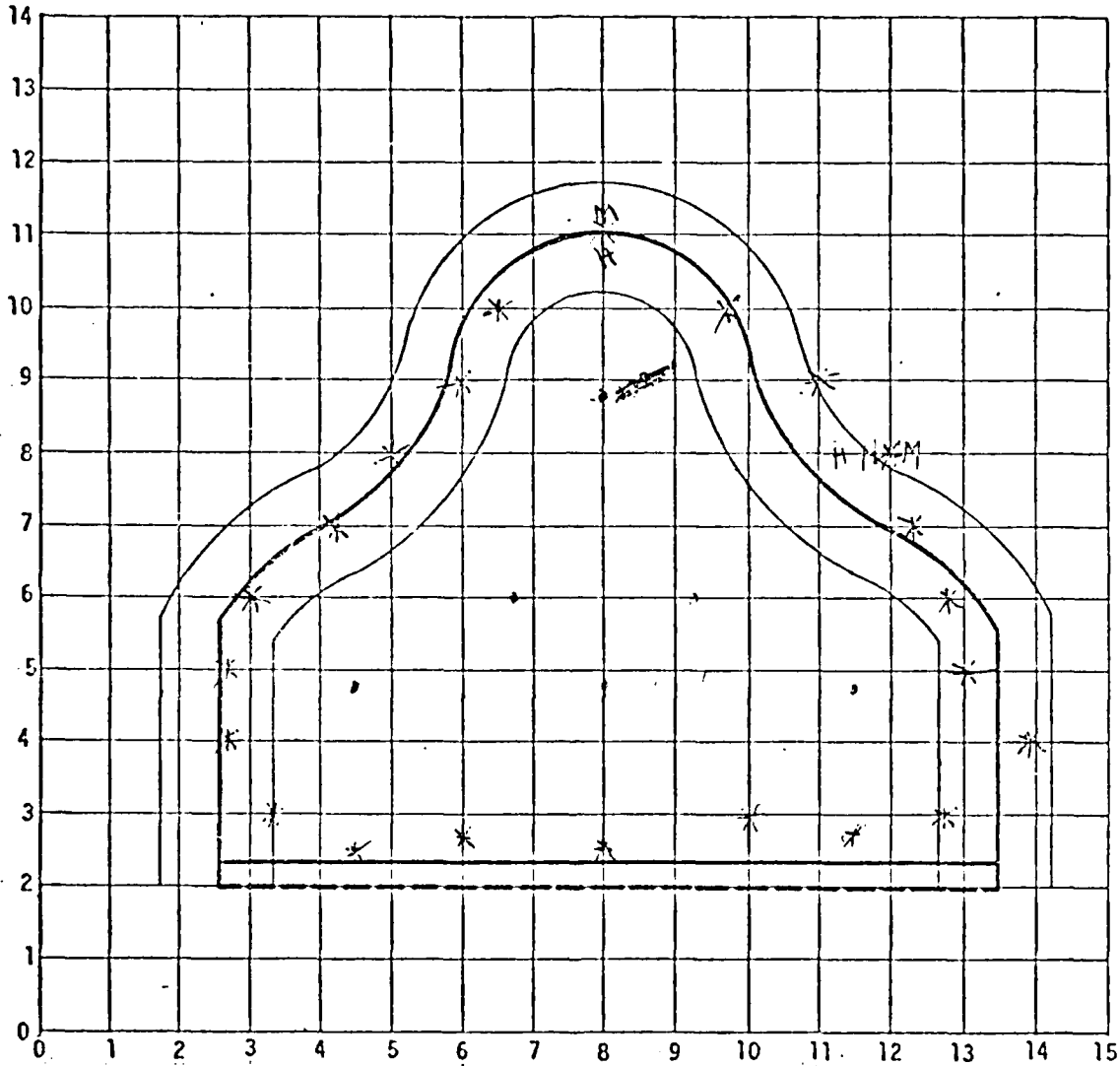
TEST WITNESSED BY: [Signature]

TYPE TEST REDUCED VISIBILITY TEST # 3  
 TARGET RANGE 150 TYPE E DATE 2/23/77  
 TEMPERATURE S/N 409 MW DETECTOR S/N SEN  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER L  
 MARKSMAN \_\_\_\_\_ TEST OPERATOR LEWIS  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY PARTLY CLEAR / 68-70°  
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA  
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:  
 WINDAGE NA ELEVATION NA  
 SIMULATED VISIBILITY RANGE PARTLY CLEAR / WINDY / 68-70°  
 ATTENUATOR (ND) FILTERS USED 505 + .15  
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) \_\_\_\_\_  
 AIM POINT FOR HITS \_\_\_\_\_ OR MISSES \_\_\_\_\_

20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
TOTAL					

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = \_\_\_\_\_  
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = \_\_\_\_\_

TEST # 4  
2/23/77  
X=PROFILE  
SS  
H= HIT  
M= MISS



BORE SIGHT AT RANGE

P3451

700 M  
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: D.R. Woods

TEST WITNESSED BY: [Signature]

APPROVAL BY: \_\_\_\_\_

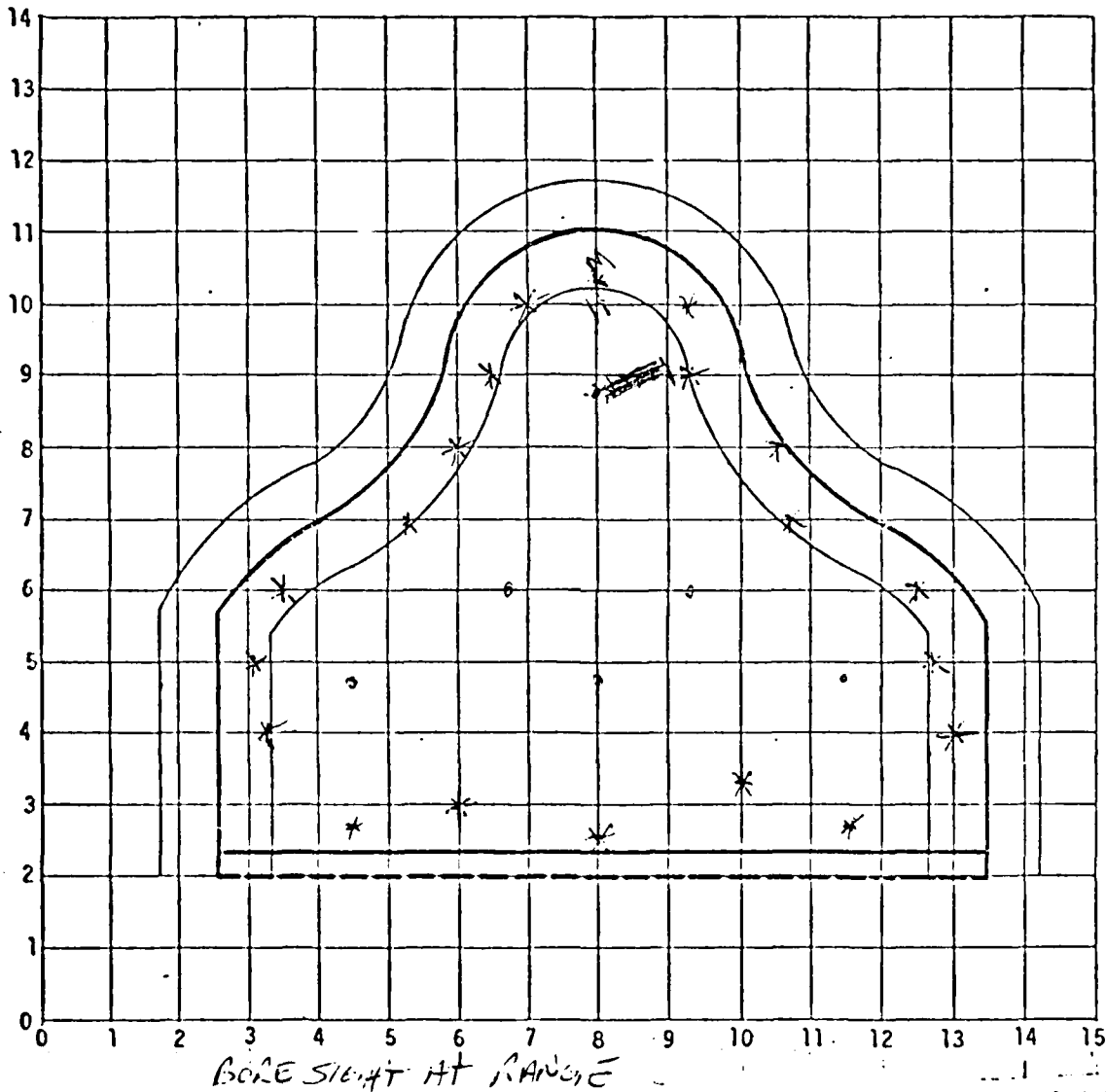
NAVTRAEQUIPCEN N61339-76C-0116-1.

TYPE TEST FULL SCALE TEST # 4  
 TARGET RANGE 100M TYPE F DATE 2/23/17  
 TEMPERATURE S/N THIRTY SEVEN POWER DETECTOR S/N 416,416  
 RIFLE S/N N/A MFG. N/A  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER   
 MARKSMAN \_\_\_\_\_ TEST OPERATOR W. J. S.  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY \_\_\_\_\_  
 TRANSMITTER MOUNTING TIME N/A ALIGNMENT TIME (IRON SIGHTS) N/A  
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:  
 WINDAGE N/A ELEVATION N/A  
 SIMULATED VISIBILITY RANGE \_\_\_\_\_  
 ATTENUATOR (ND) FILTERS USED ~~2~~  
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) \_\_\_\_\_  
 AIM POINT FOR HITS \_\_\_\_\_ OR MISSES \_\_\_\_\_

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = \_\_\_\_\_  
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = \_\_\_\_\_

test #5  
REDUCED VISIBILITY  
2/23/77  
ND = 0.24



P3451

F Target Test Record Chart

TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: DR Woods

TEST WITNESSED BY: John H. Hartley

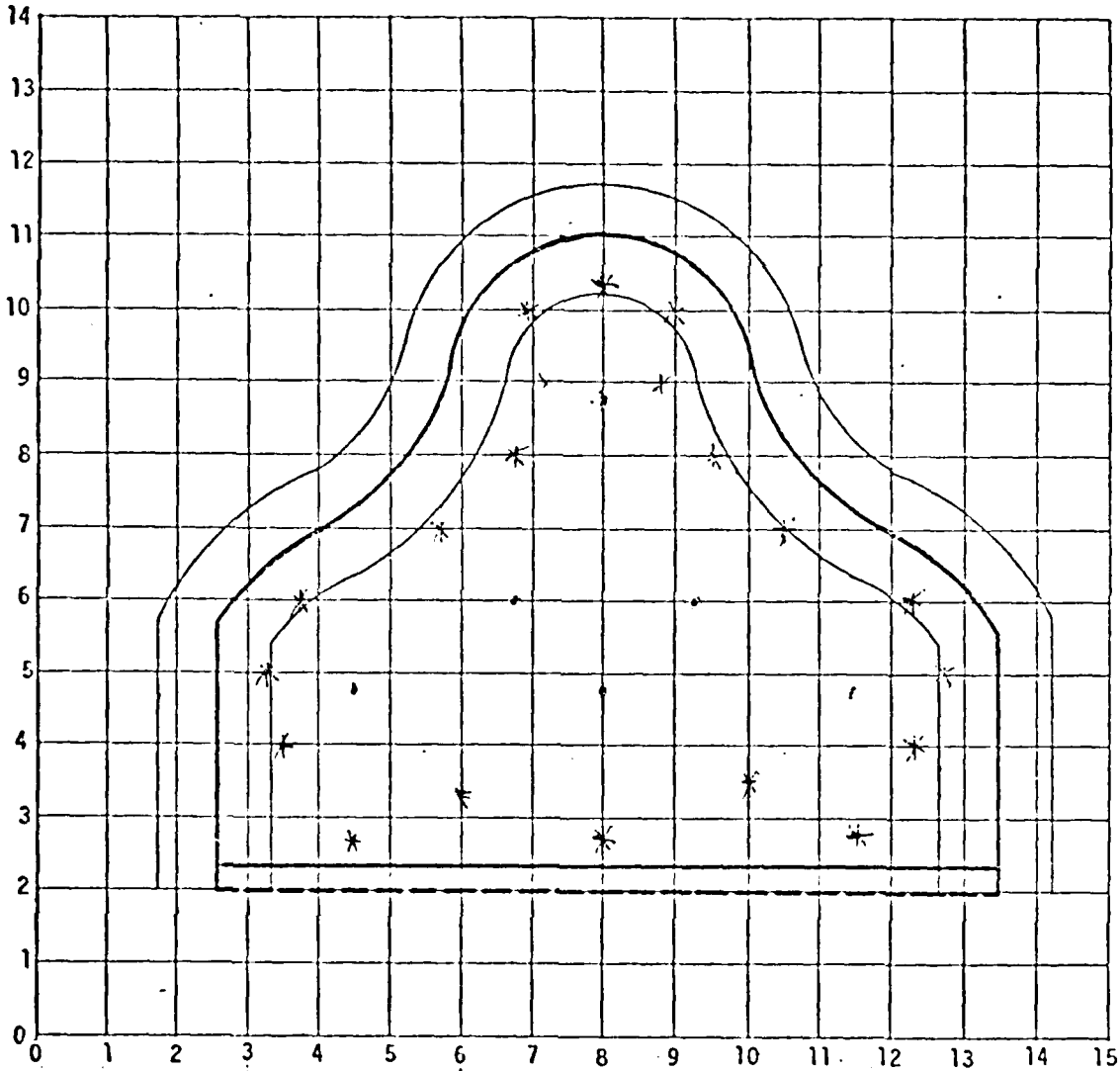
75 APPROVAL BY: \_\_\_\_\_

TYPE TEST REDUCED VISIBILITY TEST # 5  
 TARGET RANGE 100 M TYPE F DATE 2/23/77  
 TEMPERATURE S/N 409 MW DETECTOR S/N \_\_\_\_\_  
 RIFLE S/N NA MFG. NA  
 SCOPE SIGHT/LASER TRANSMITTER ADAPTER ✓  
 MARKSMAN \_\_\_\_\_ TEST OPERATOR W. J. JONES  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY PARTLY CLOUDY 70"  
 TRANSMITTER MOUNTING TIME NA ALIGNMENT TIME (IRON SIGHTS) NA  
 SIGHT SETTING, RANGE OF CLOCKS LEFT AFTER ALIGNMENT:  
 WINDAGE NA ELEVATION NA  
 SIMULATED VISIBILITY RANGE \_\_\_\_\_  
 ATTENUATOR (ND) FILTERS USED 0.24  
 LOCATION COORDINATE OF AM POINT (PLOT ON REVERSE SIDE) \_\_\_\_\_  
 AIM POINT FOR HITS \_\_\_\_\_ OR MISSES \_\_\_\_\_

	20 ROUND GROUP SHOT #	HITS	MISS	PROPER RESPONSE	IMPROPER RESPONSE	NATURE OF FAILURE
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					
TOTAL						

TOTAL ROUNDS FIRED = 20 X TOTAL NO. SHOTS = \_\_\_\_\_  
 ACCEPTABLE HIT/MISS = 0.99 X TOTAL ROUNDS FIRED = \_\_\_\_\_

test #17  
 2/23/77  
 REDUCED VISIBILITY  
 ND = 0.4



P3451

100 m  
 F Target Test Record Chart

TEST RESULTS

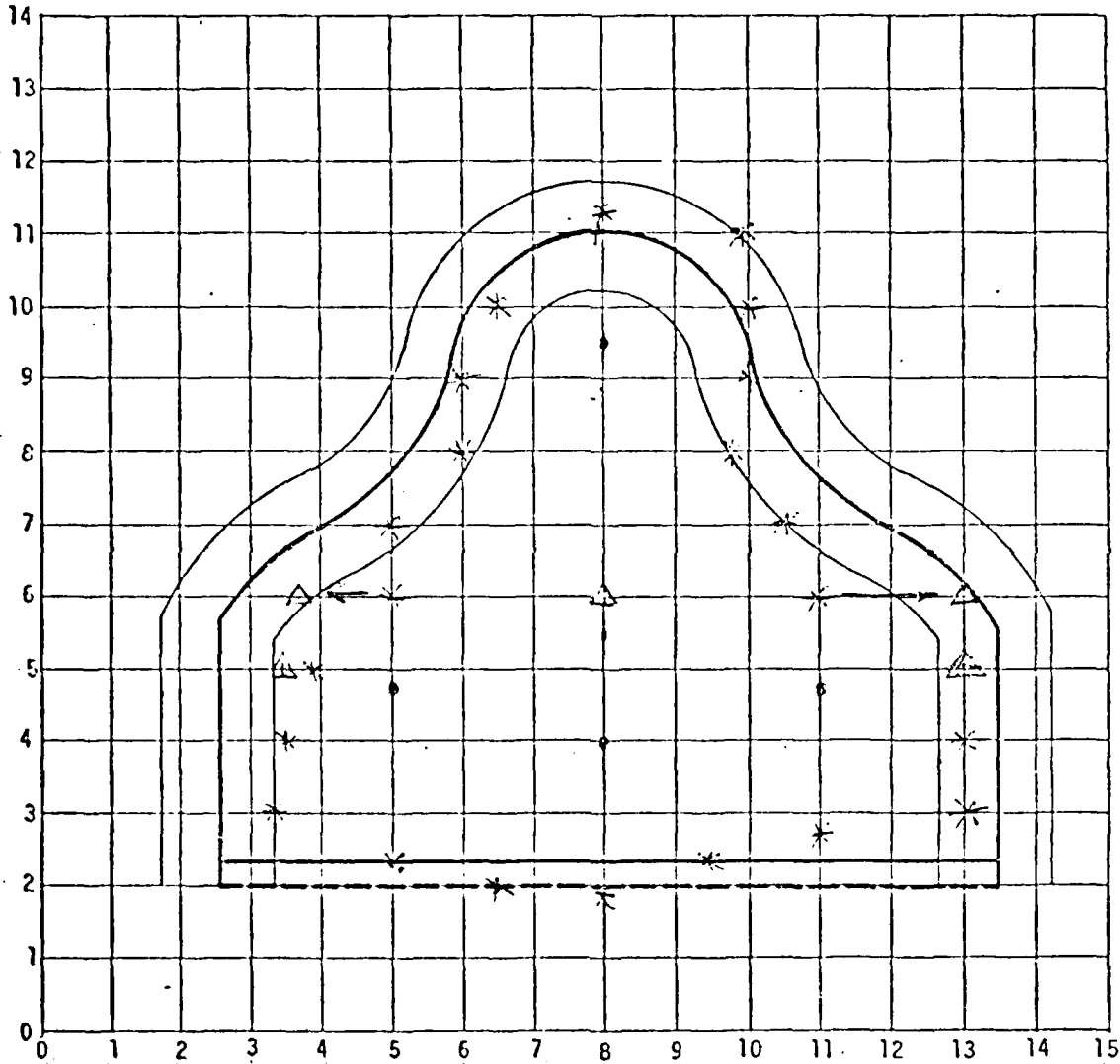
ACCEPTABLE \_\_\_\_\_  
 NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: CR Woods

TEST WITNESSED BY: Jack H. Hurdley

APPROVAL BY: \_\_\_\_\_

test #8  
2/23/77



P3451

75 METERS  
F Target Test Record Chart

TEST RESULTS

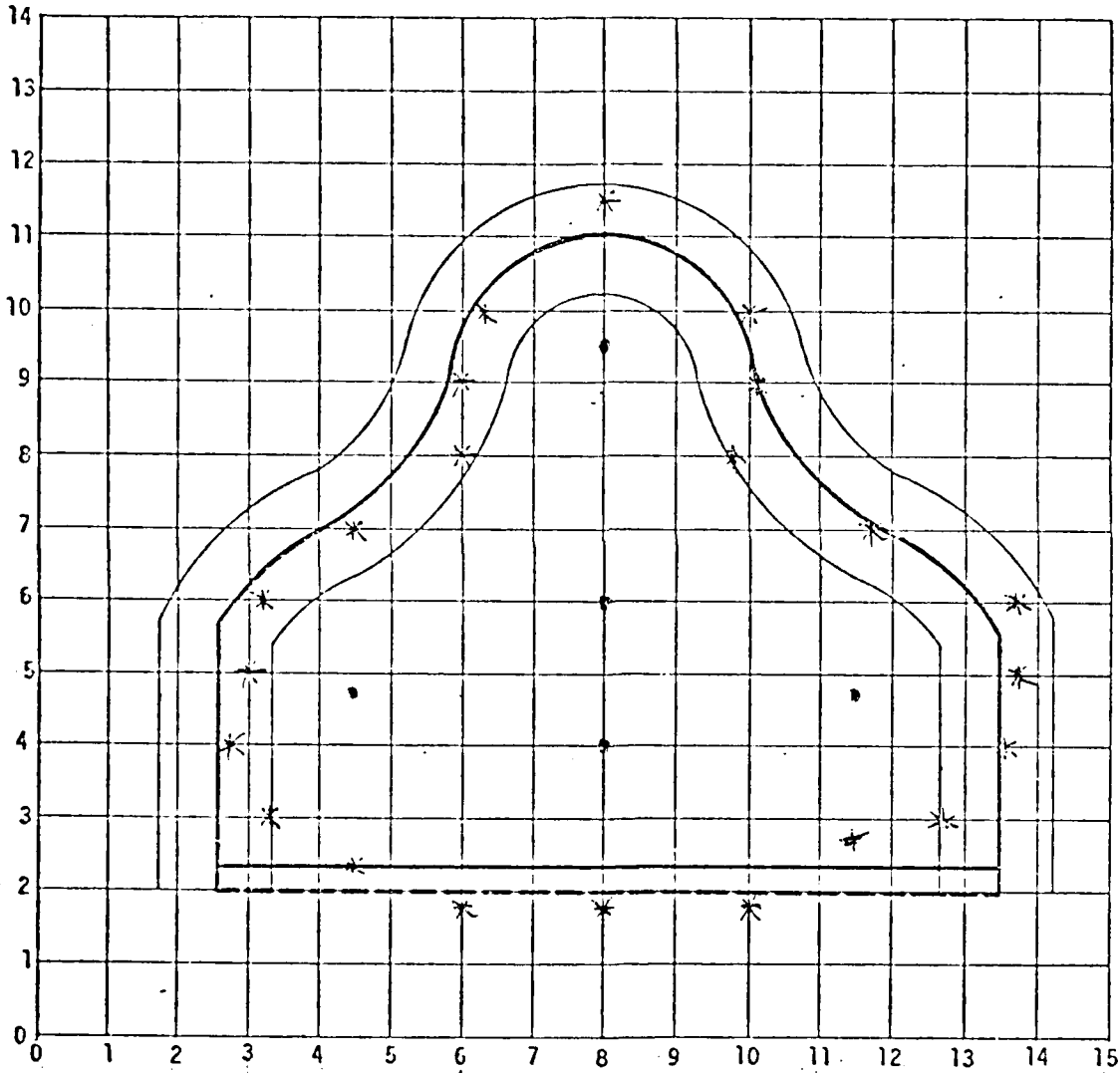
ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: Don R. Woods

TEST WITNESSED BY: \_\_\_\_\_

APPROVAL BY: \_\_\_\_\_

Test # 9  
2/23/77  
Retest - moved?  
later...



P3451

75 METERS  
F Target Test Record Chart

TEST RESULTS

TEST CONDUCTED BY: Don R. Wood

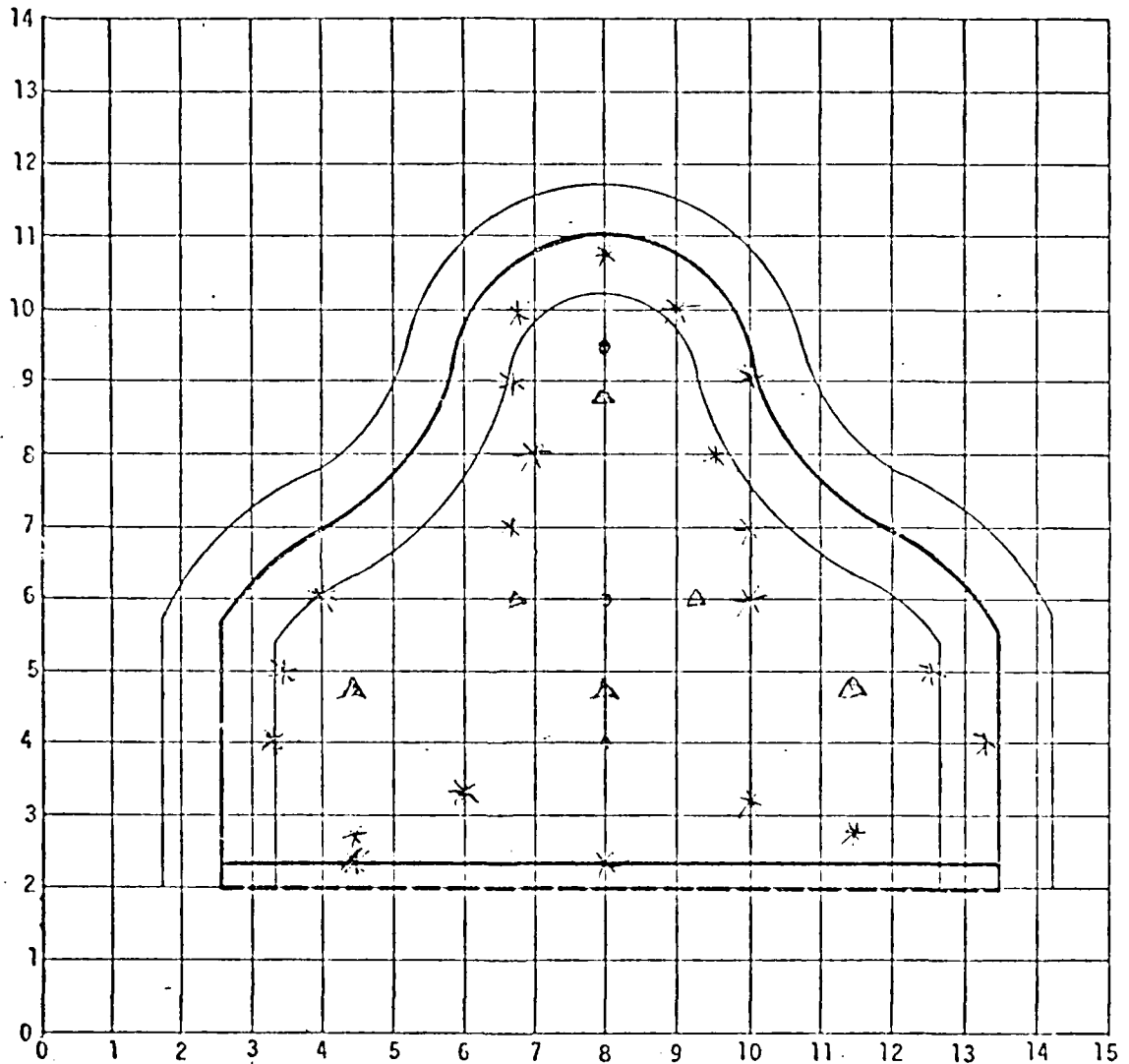
ACCEPTABLE \_\_\_\_\_

TEST WITNESSED BY: \_\_\_\_\_

NOT ACCEPTABLE \_\_\_\_\_

79 APPROVAL BY: \_\_\_\_\_

TEST #10  
2/23/77  
REDUCED VISIBIL.  
ND = 24



A CHANGED DETECTOR CONFIGURATION

P3451

75 M  
F Target Test Record Chart

TEST RESULTS

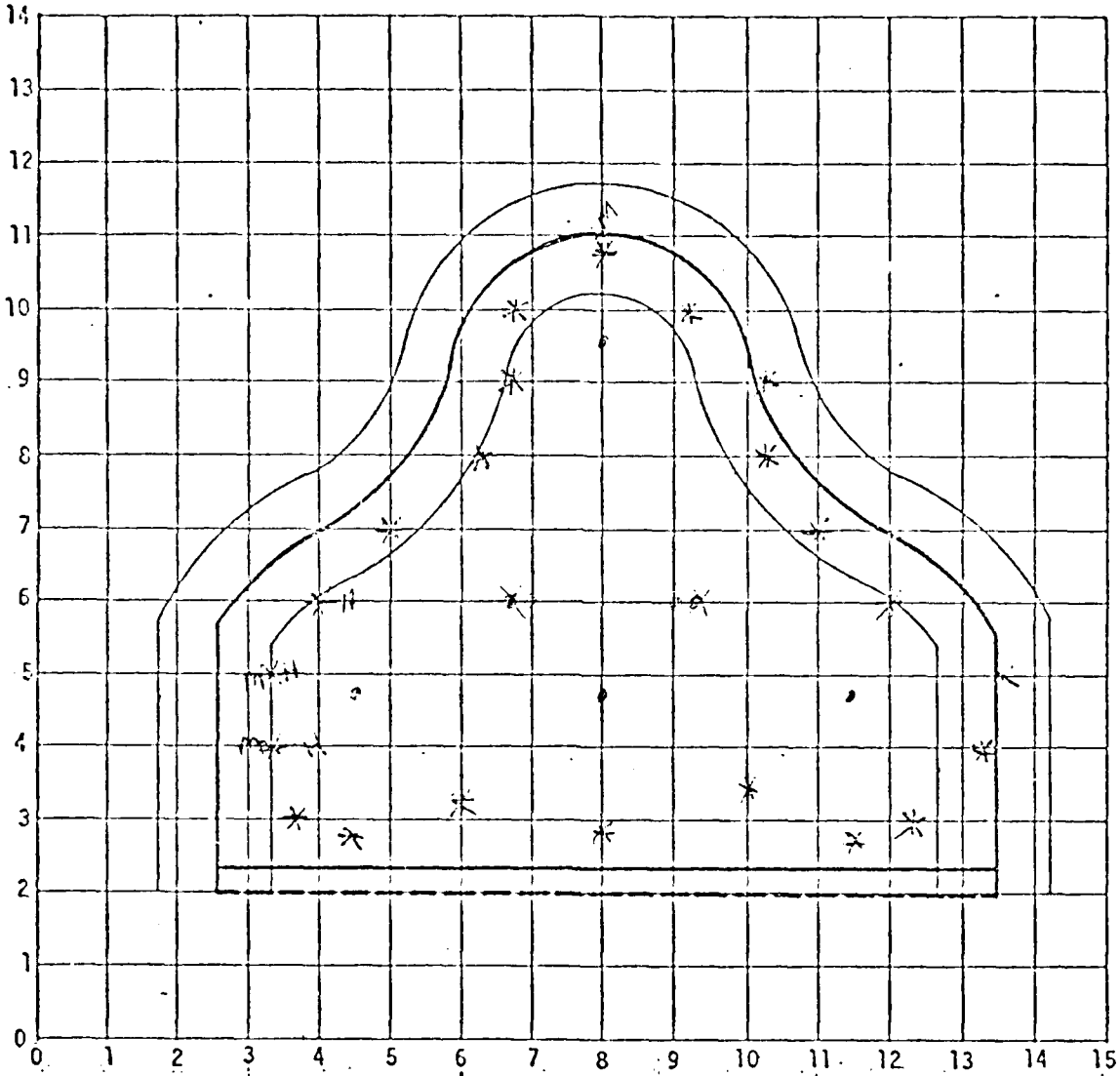
TEST CONDUCTED BY: Don R. Lopez

ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

TEST WITNESSED BY: \_\_\_\_\_

80 APPROVAL BY: \_\_\_\_\_

Test # 11  
2/23/77  
REDUCED VISIBILITY  
ND = 027



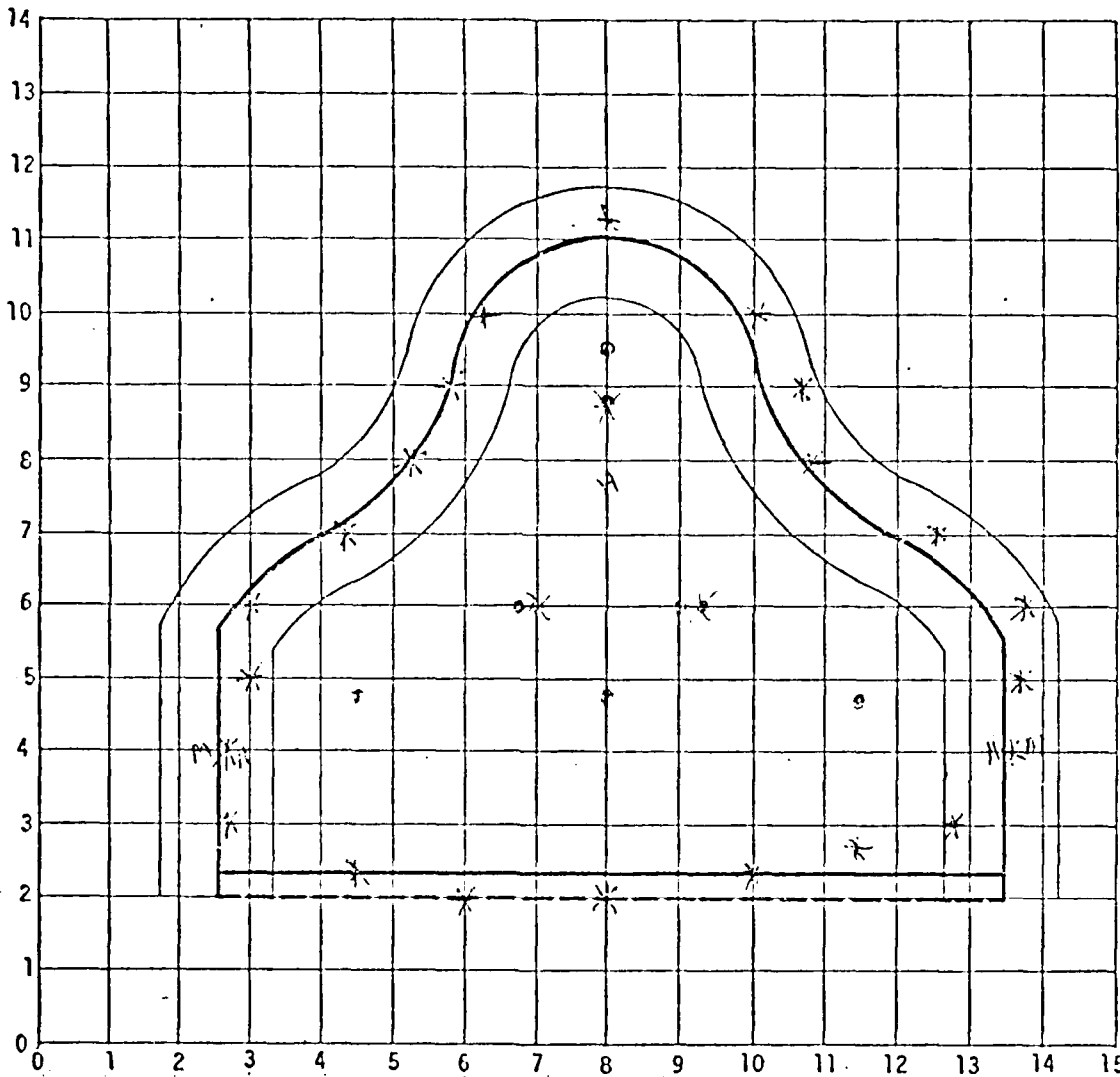
P3451

75 METERS  
F Target Test Record Chart

TEST RESULTS  
ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: Jim B. [Signature]  
TEST WITNESSED BY: Jan H. [Signature]  
APPROVAL BY: \_\_\_\_\_

TEST # 12  
2/23/77  
FULL VISIBILITY



P3451

75 METERS  
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE \_\_\_\_\_

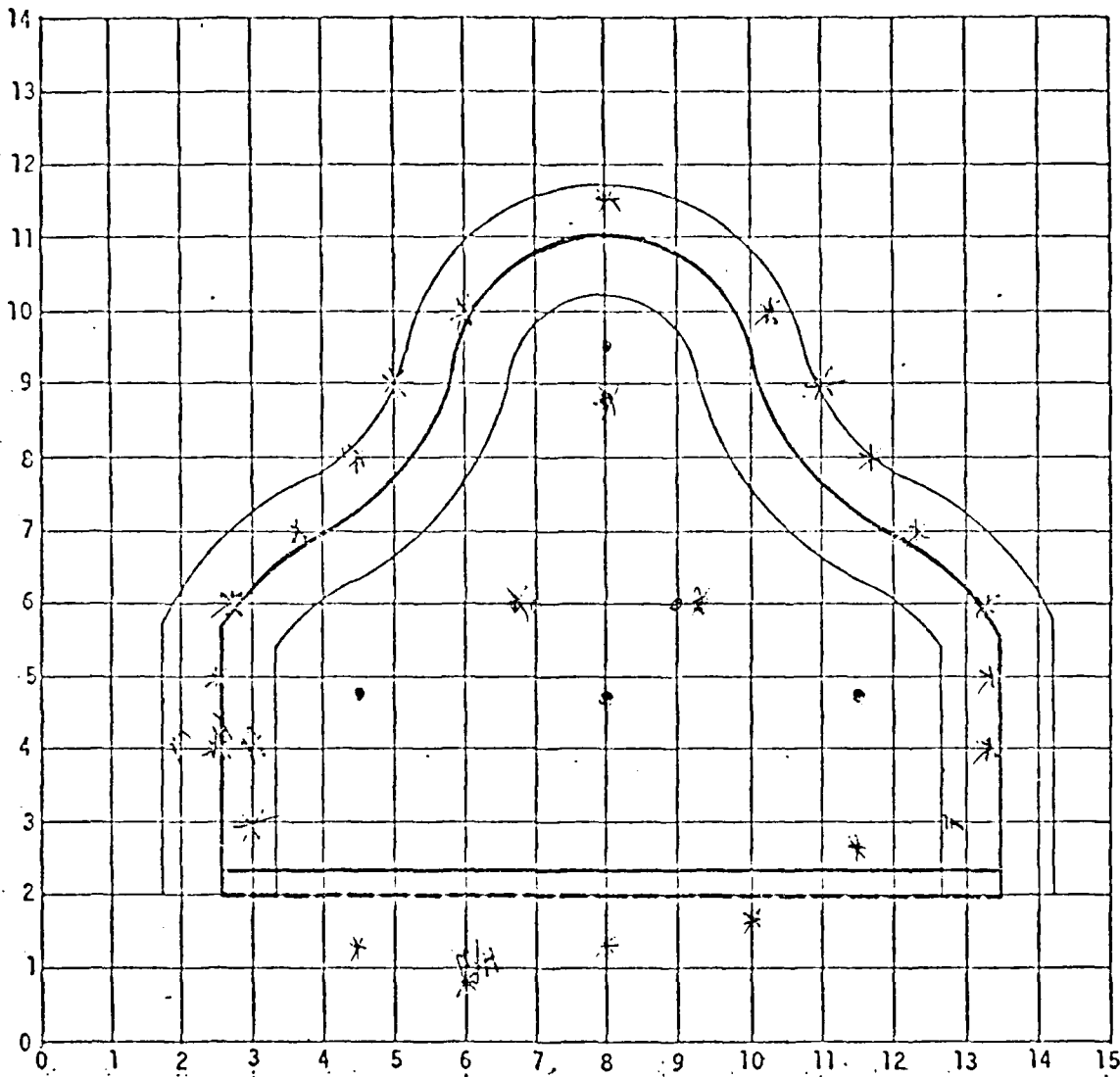
NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: *[Signature]*

TEST WITNESSED BY: *[Signature]*

APPROVAL BY: \_\_\_\_\_

test # 13  
2/23/77



P3451

50 METERS  
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE \_\_\_\_\_

NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: \_\_\_\_\_

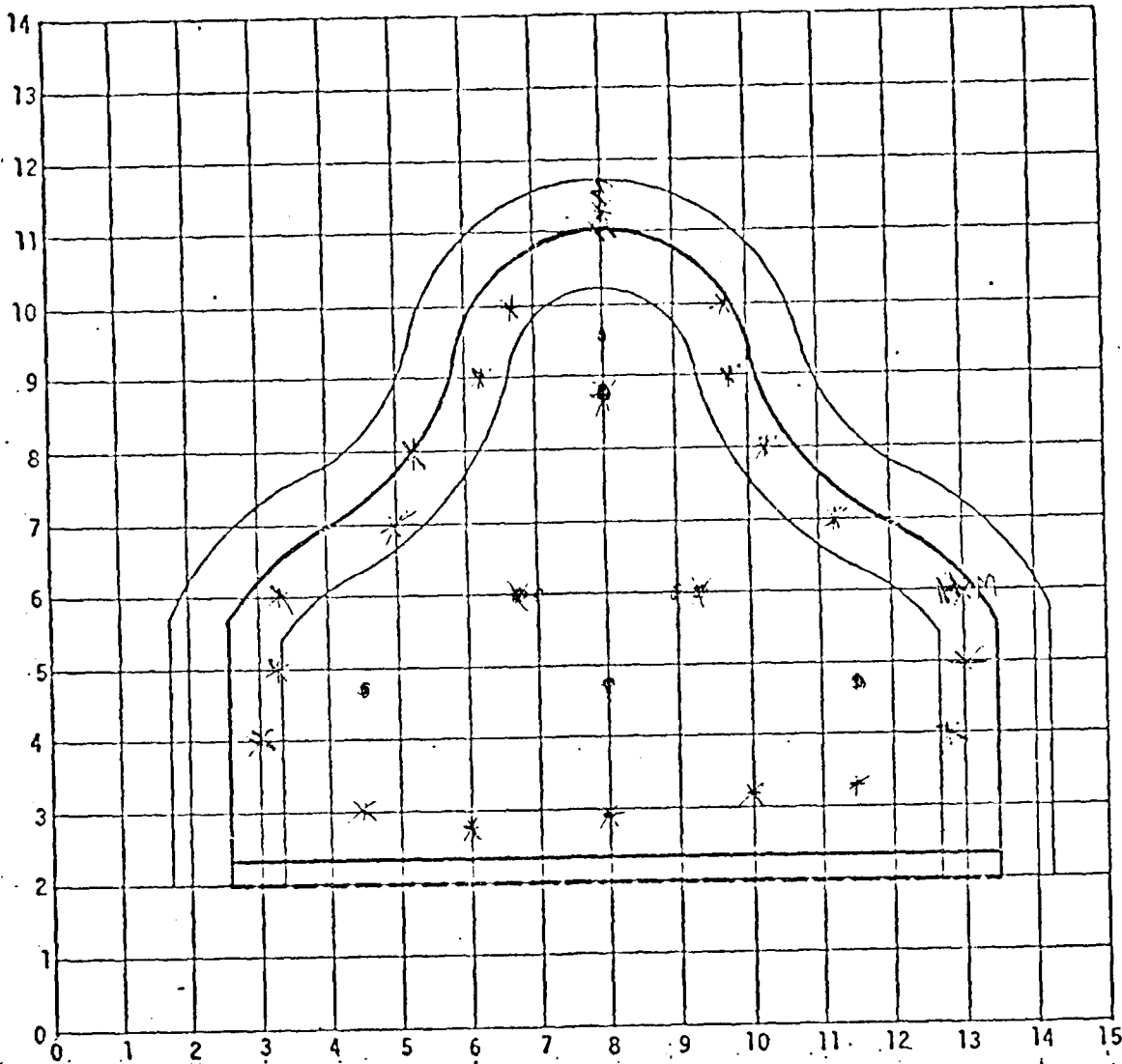
TEST WITNESSED BY: \_\_\_\_\_

APPROVAL BY: \_\_\_\_\_

83

DATE: \_\_\_\_\_

TEST # 14  
2/23/77  
REDUCED VISIBILITY  
ND = .15



P3451

50 METER  
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE \_\_\_\_\_

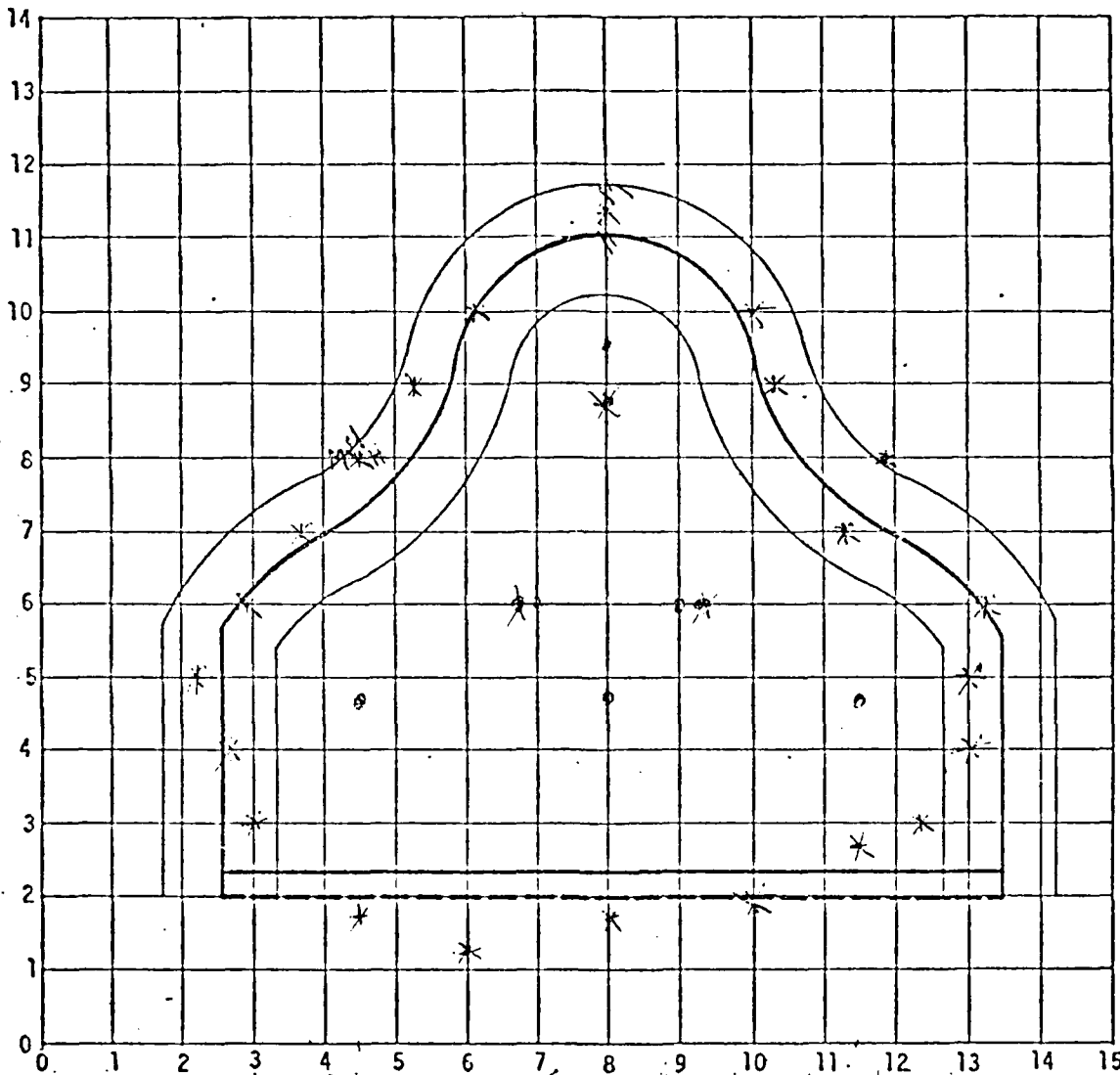
NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: Don R. Woods

TEST WITNESSED BY: Jack H. Hendry

APPROVAL BY: \_\_\_\_\_

test # 15  
2/23/77



P3451

2-5 METERS  
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE \_\_\_\_\_

NOT ACCEPTABLE \_\_\_\_\_

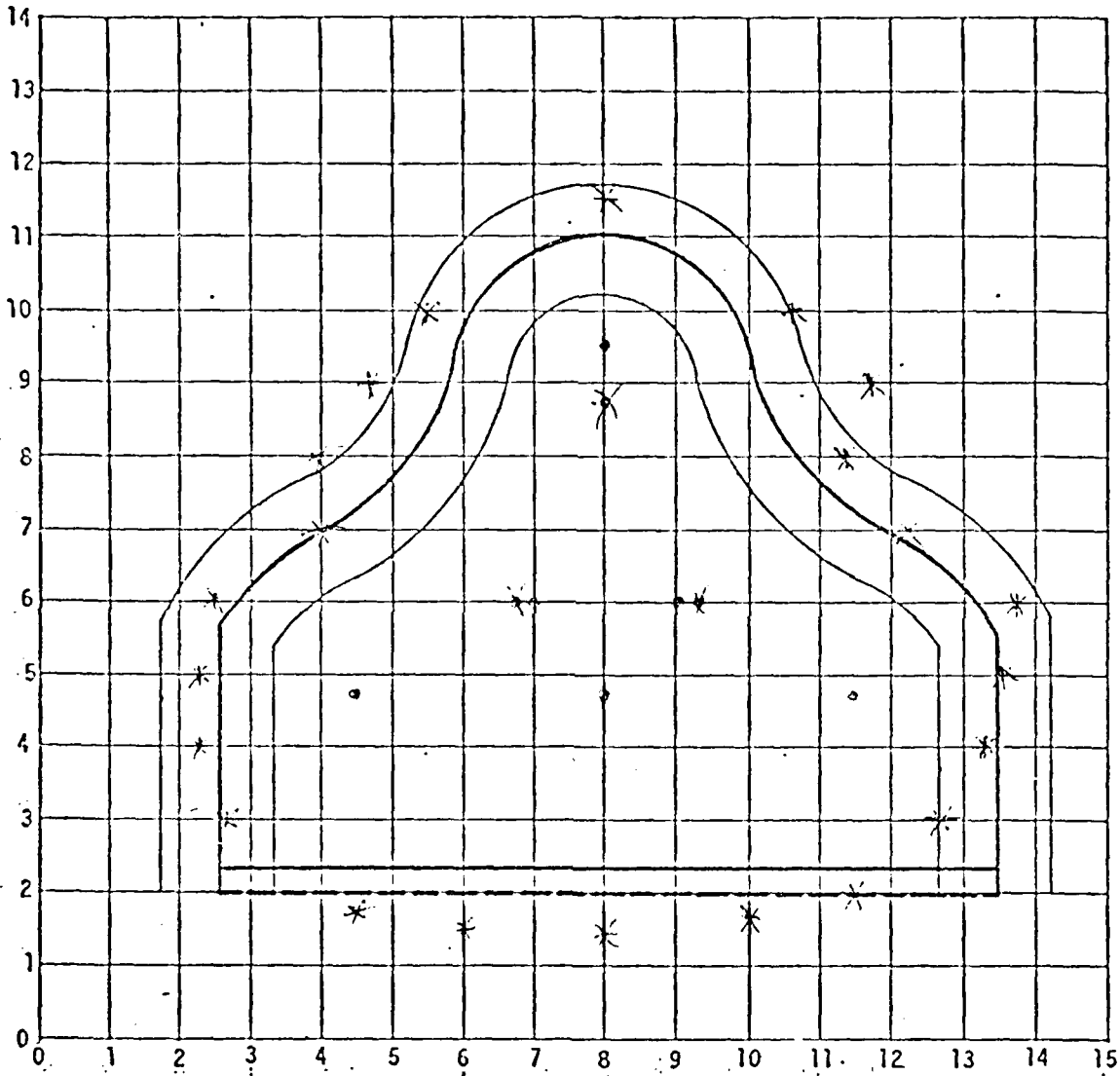
TEST CONDUCTED BY: Don R. Wood

TEST WITNESSED BY: Jack H. Penning

APPROVAL BY: \_\_\_\_\_

DATE: \_\_\_\_\_

test #16  
2/23/77



P3451

15 METERS  
F Target Test Record Chart

TEST RESULTS  
ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: Don R. Wood  
TEST WITNESSED BY: John H. Havelis  
APPROVAL BY: \_\_\_\_\_

2.5 OPERATION UNDER AMBIENT LIGHT CONDITIONS

The test setup and procedure was as described in paragraph 2.3 of the Demonstration Test Plan.

2.5.1 SYSTEM OPERATION UNDER VARYING AMBIENT LIGHT CONDITIONS (OBJECTIVE A). System operation under varying ambient light conditions was effectively demonstrated during the Effective Simulation Demonstration, paragraph 2.4.1 of this report.

2.5.1.1 Test Results (Objective A). Results of this test are documented in the test data sheets of paragraph 2.4.1 of this report, Effective Simulation Demonstration.

2.5.2 SYSTEM INVULNERABILITY TO AMBIENT LIGHT INDUCED FALSE ALARMS (OBJECTIVE B). The test target, with detectors mounted and hit counter connected was placed outdoors in clear bright sunlight and was operated continuously for five hours and five minutes.

2.5.2.1 Test Results (Objective B). No ambient light induced false alarms were recorded (see test form).

*Operation Under Ambient Light Conditions*

TYPE TEST *Rate for Rate* TEST # *1*  
 TARGET RANGE *-* TYPE *-* DATE *2/25*  
 TEMPERATURE \_\_\_\_\_ HUMIDITY \_\_\_\_\_ TIME *10:25 PM*  
 DETECTOR S/N *N* TEST OPERATOR *J. J. ...*  
 ATMOSPHERIC CONDITIONS/EST VISIBILITY *Clear bright sun*

	NO.	START TIME	END TIME	DURATION	# FALSE HITS
		<i>12:15 2/26</i>	<i>10:10 2/25</i>	<i>5h 5m</i>	<i>NONE</i>
Total					

TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
 NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: *[Signature]*

TEST WITNESSED BY: \_\_\_\_\_

APPROVAL BY: \_\_\_\_\_

DATE: \_\_\_\_\_

2.6 EFFECTIVE SIMULATION OF FIRING WITH SERVICE AMMUNITION  
AT SCALED RECORD FIRE RANGE

The test setup was as described in paragraph 2.5 of the Demonstration Test Plan. However, the test procedure was modified, by the NTEC MAGLAD Project Manager, to perform target profiling rather than fire at selected aim points per the Demonstration Test Plan.

2.6.1 EFFECTIVE SIMULATION DEMONSTRATION, SCALE. The scale target mechanism was mounted on the x-y positioner, along with the test detector and indicator used during the alignment tolerance demonstration. After determining the laser beam centroid and centering the test detector, the transmitter sighting scope crosshairs were adjusted to center on the parallax displaced aim point attached to the test detector.

This procedure was repeated at each range, to ensure parallel sight alignment, after focusing the sighting scope on the target.

The target was profiled in the same fashion as in the full scale demonstration except the target rather than the transmitter was scanned.

2.6.1.1 Test Group Results, Scale. Results of this test group are shown on subsequent test data sheets and are detailed in the following descriptions.

Test #1, 25 Feb 77 (E-Target, Scale 300 m) - Target profile assuming symmetry.

Test #1, 2, 3, 28 Feb 77 (F-Target, Scale 50 and 100 m) - Target profile assuming symmetry.

A comparison of E-target edge profiles assuming symmetry with selected aim points indicated that the target was asymmetrical. All following target profiles are based on a test grid coordinate starting point.

NAVTRAEQUIPCEN NS1339-76C-0116-1

Test #1, 28 Feb 77 (E-Target) - Scaled 150 m

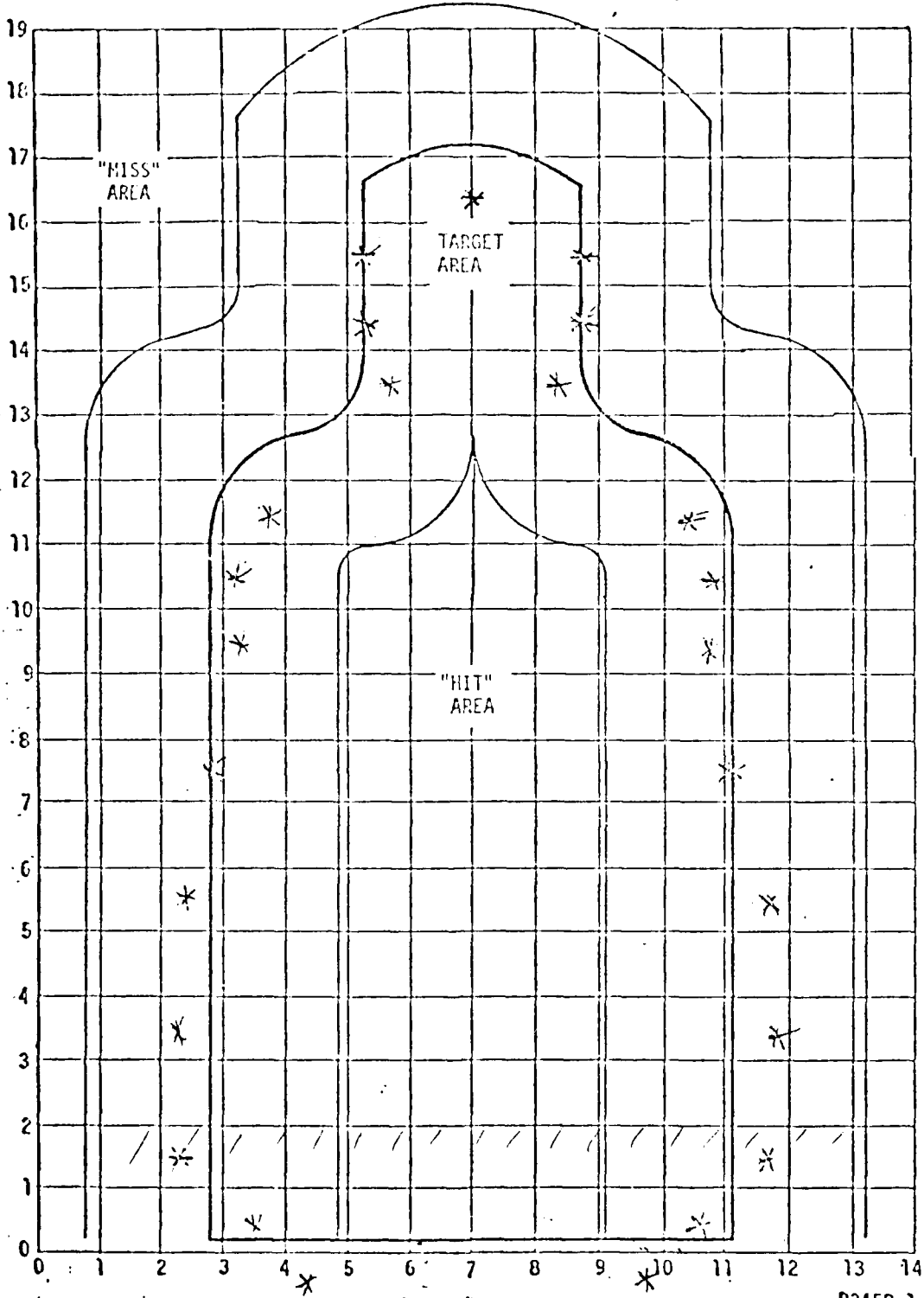
Test #1, 1 Mar 77 (E-Target) - Scaled 150 m

Test #2, 1 Mar 77 (E-Target) - Scaled 200 m

Test #3, 1 Mar 77 (E-Target) - Scaled 250 m

Test #4, 1 Mar 77 (E-Target) - Scaled 300 m, indications of boresight error

Test #5, 1 Mar 77 (E-Target) - Scaled 300 m, reboresight



P3450-1

E-Target Test Record Chart, <sup>SCALE</sup> 300 m (Sheet 1 of 4)

TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: Don R. Woods

TEST WITNESSED BY: John H. Bentley

91 APPROVAL BY: \_\_\_\_\_

2/28/77

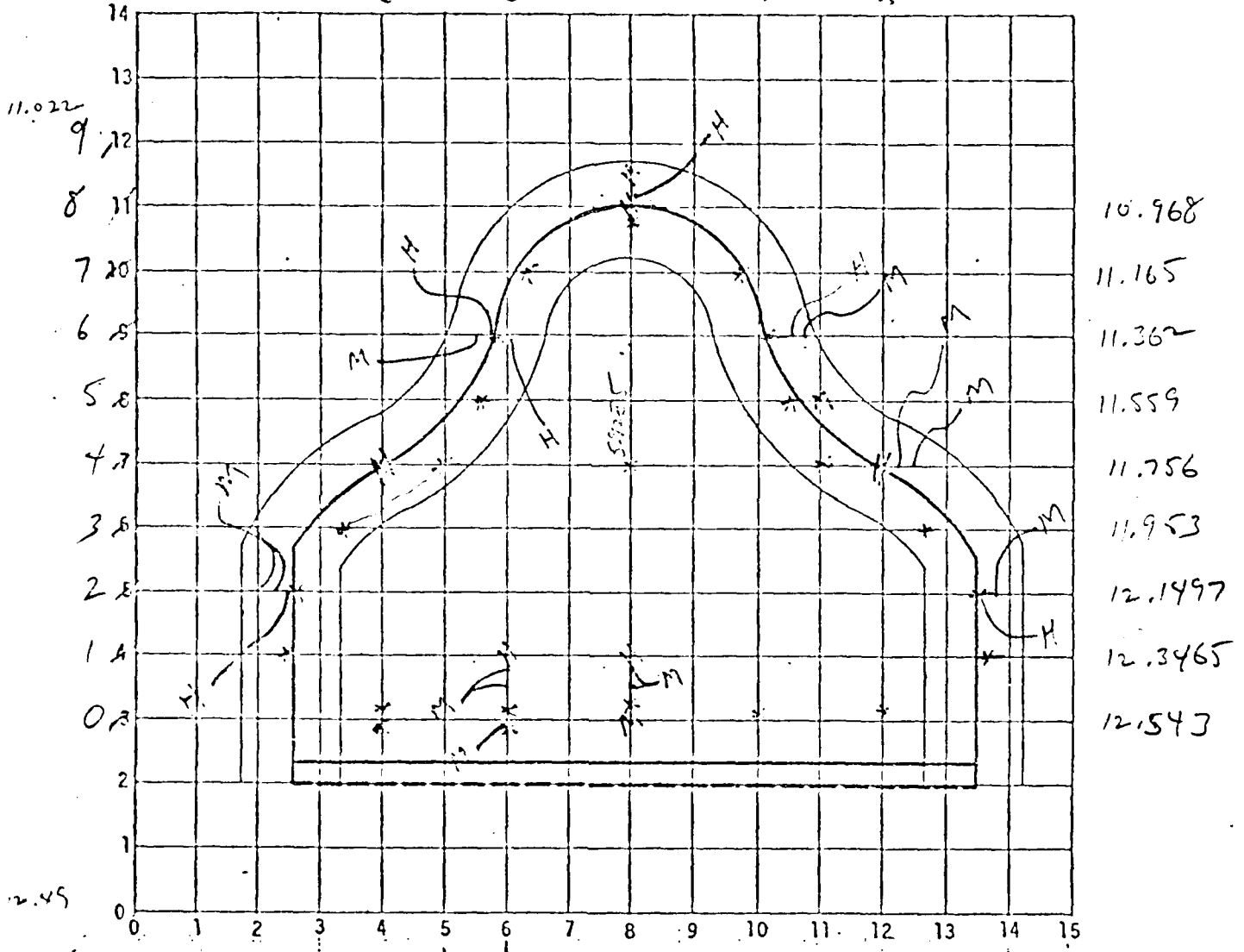
1057 22 1

6.711

6.317

5.5297

5.1355



SCALE 50 m  
F Target Test Record Chart

TEST RESULTS

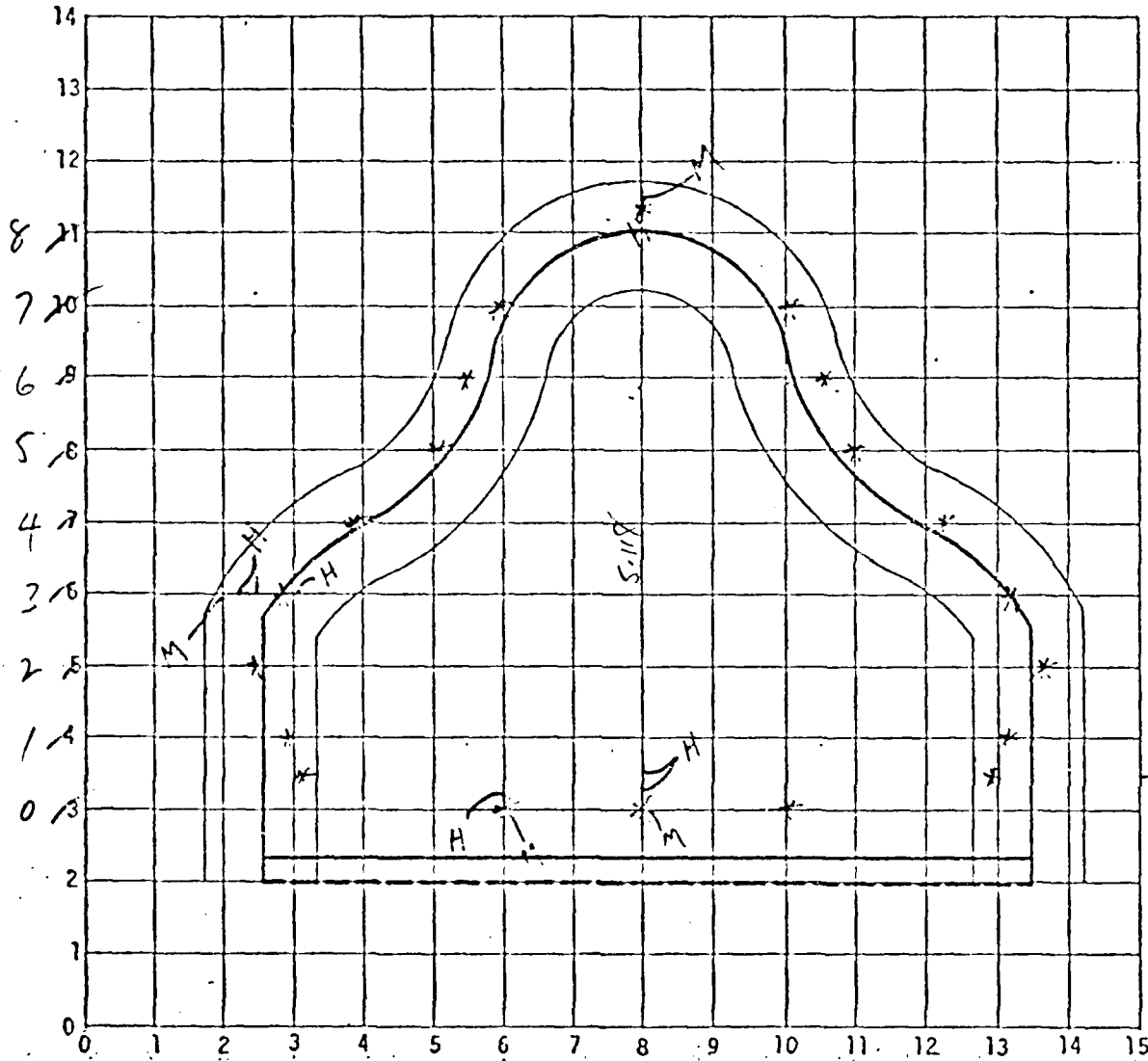
ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: DR Wooten

TEST WITNESSED BY: W. H. Kelley

APPROVAL BY: \_\_\_\_\_

2/28/77  
#2



- 12.565
- 12.762
- 12.959
- 13.156
- 13.35
- 13.55
- 13.746
- 13.943
- 14.041
- 14.139

P3451

SCALE 100M  
F Target Test Record Chart

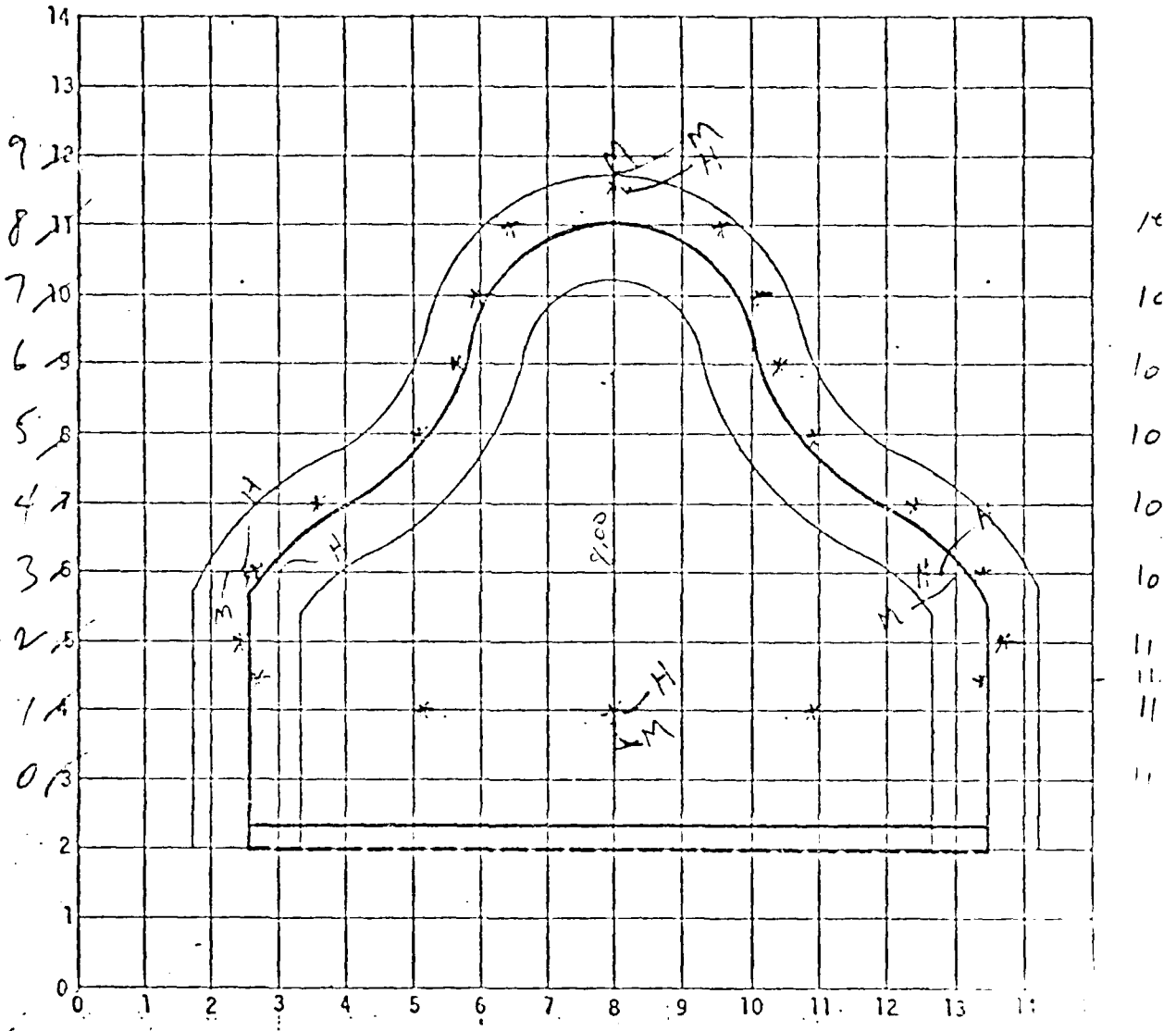
TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: \_\_\_\_\_

TEST WITNESSED BY: Jack H. Lusk

APPROVAL BY: \_\_\_\_\_



SCALE 50 M  
F Target Test Record Chart

TEST RESULTS

ACCEPTABLE \_\_\_\_\_

NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: \_\_\_\_\_

TEST WITNESSED BY: \_\_\_\_\_

APPROVAL BY: \_\_\_\_\_

AD-A092 477

INTERNATIONAL LASER SYSTEMS INC ORLANDO FL  
MAGLAD. TRAINER ENGINEERING REPORT DEMONSTRATION RESULTS.(U)  
MAR 77 D R WOODS

F/6 5/9

N61339-76-C-0116

NAVTRAE@UIPC-76-C-0116-3

NL

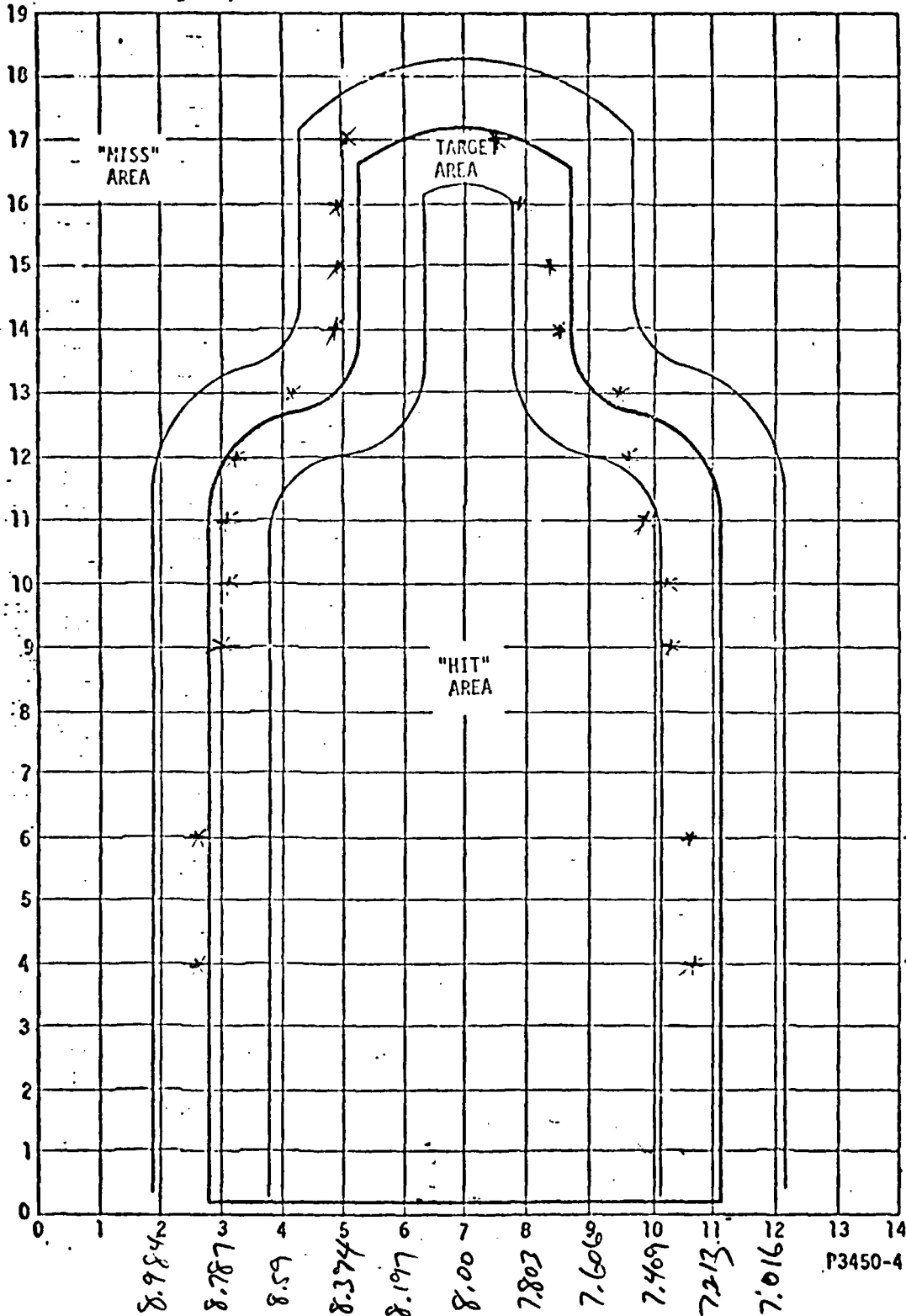
UNCLASSIFIED

2 of 2  
3/8/77



END  
DATE  
FILMED  
1 84  
DTIC

2 '28. 77  
# 4



10.0  
10.197  
10.394  
10.59  
10.787  
10.984  
11.181  
11.378  
11.575  
11.772  
11.969  
12.165  
12.362  
12.559  
12.756  
12.953

E-Target Test Record Chart, 150 m (Sheet 4 of 4)

TEST RESULTS

SCALED

TEST CONDUCTED BY:

*DR. Woods*

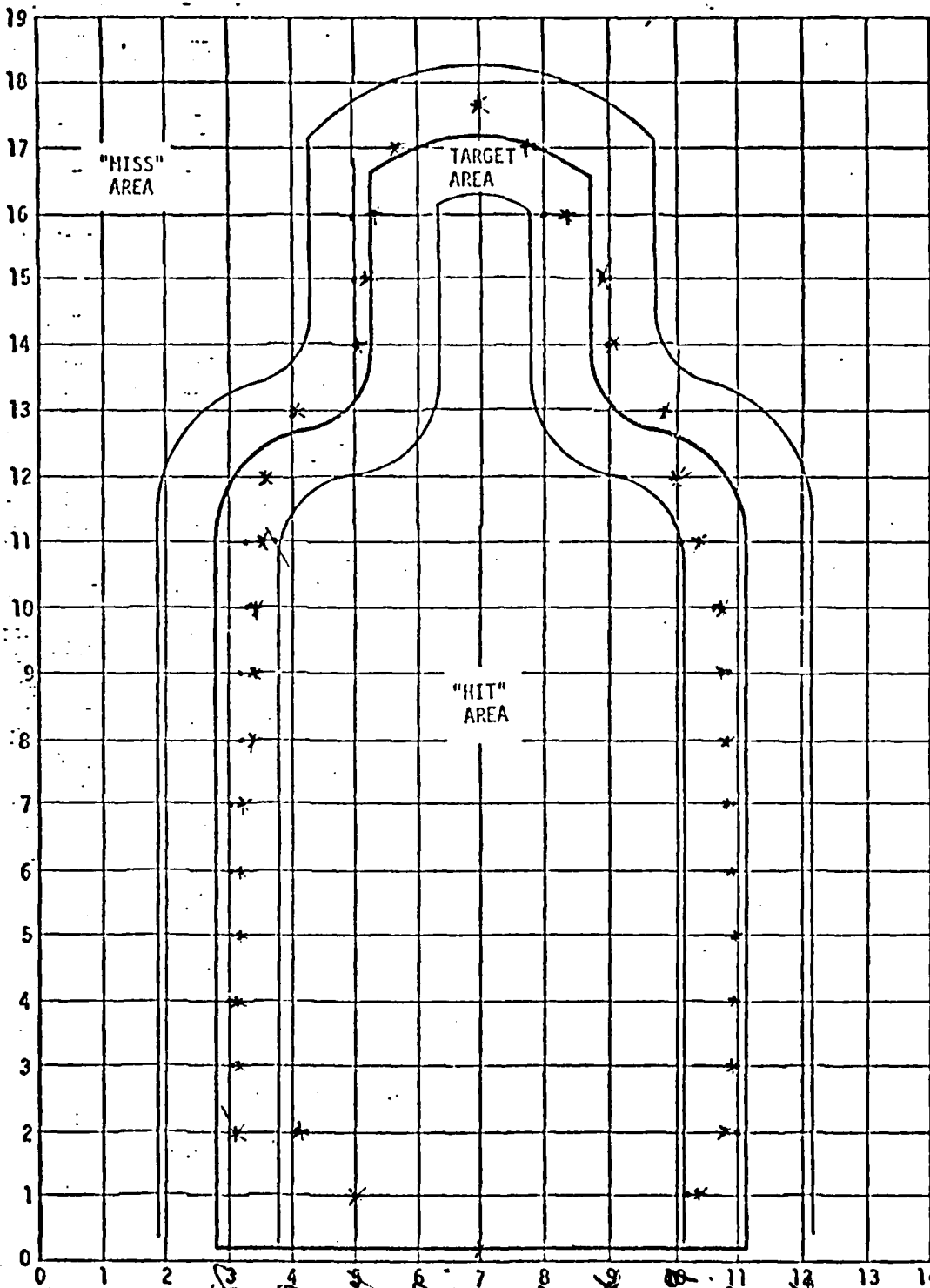
ACCEPTABLE

TEST WITNESSED BY:

*PE*

3/1/77

TEST#1



- 10.0
- 10.197
- 10.394
- 10.59
- 10.787
- 10.984
- 11.181
- 11.378
- 11.575
- 11.772
- 11.969
- 12.165
- 12.362
- 12.559
- 12.756
- 12.953
- 13.15

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14  
 P3450-4

Bore sight x axis using west tape with 1 die exposed @ 7  
 E-Target Test Record Chart, 150 m (Sheet 1 of 4)  
 SCALED

TEST RESULTS

TEST CONDUCTED BY: Don R. Woods

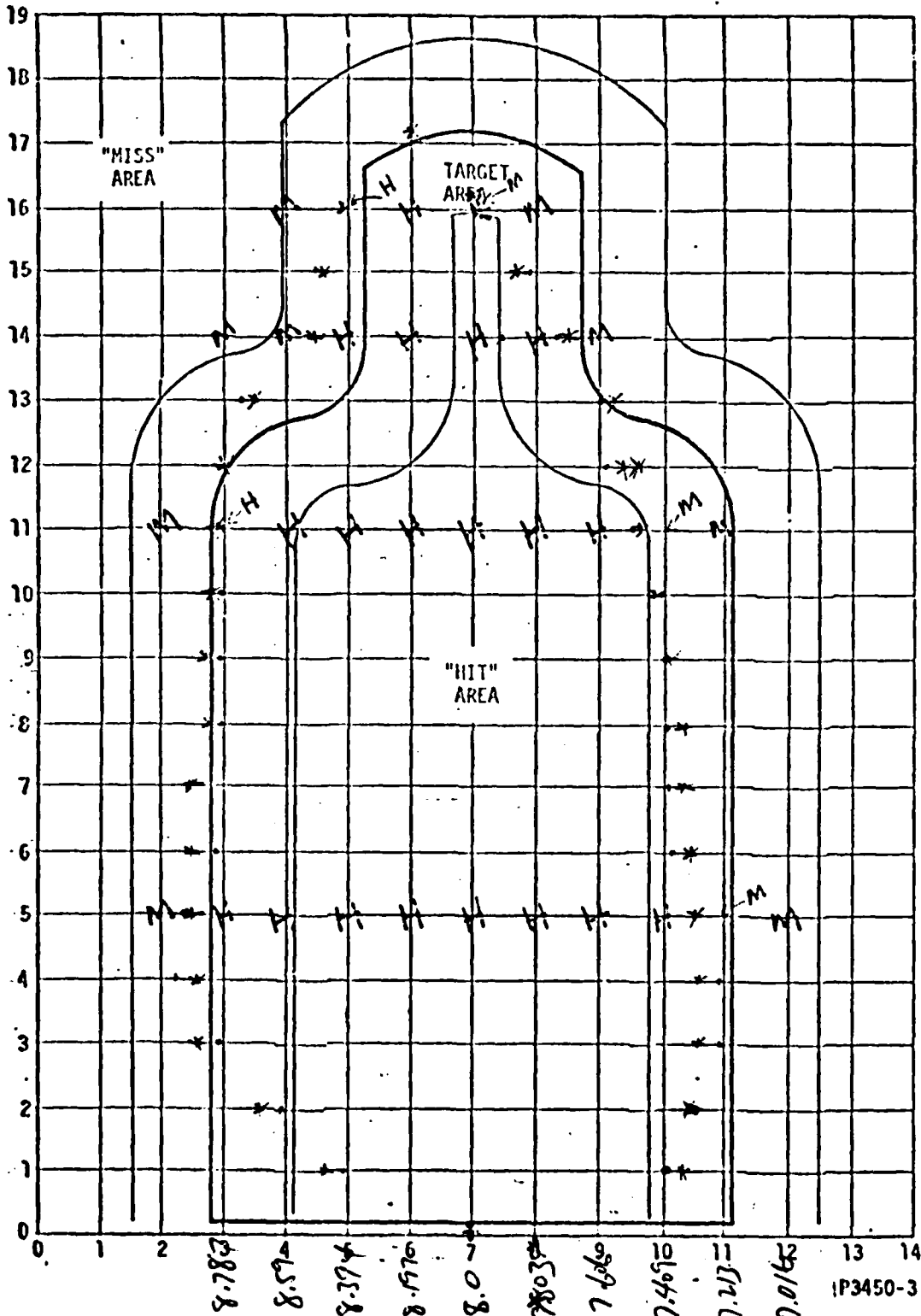
ACCEPTABLE \_\_\_\_\_

TEST WITNESSED BY: Phillip [Signature]

NOT ACCEPTABLE \_\_\_\_\_

APPROVAL BY: \_\_\_\_\_

3/1/77  
TEST 2



E-Target Test Record Chart, 200 m (Sheet 3 of 4)

SCALED

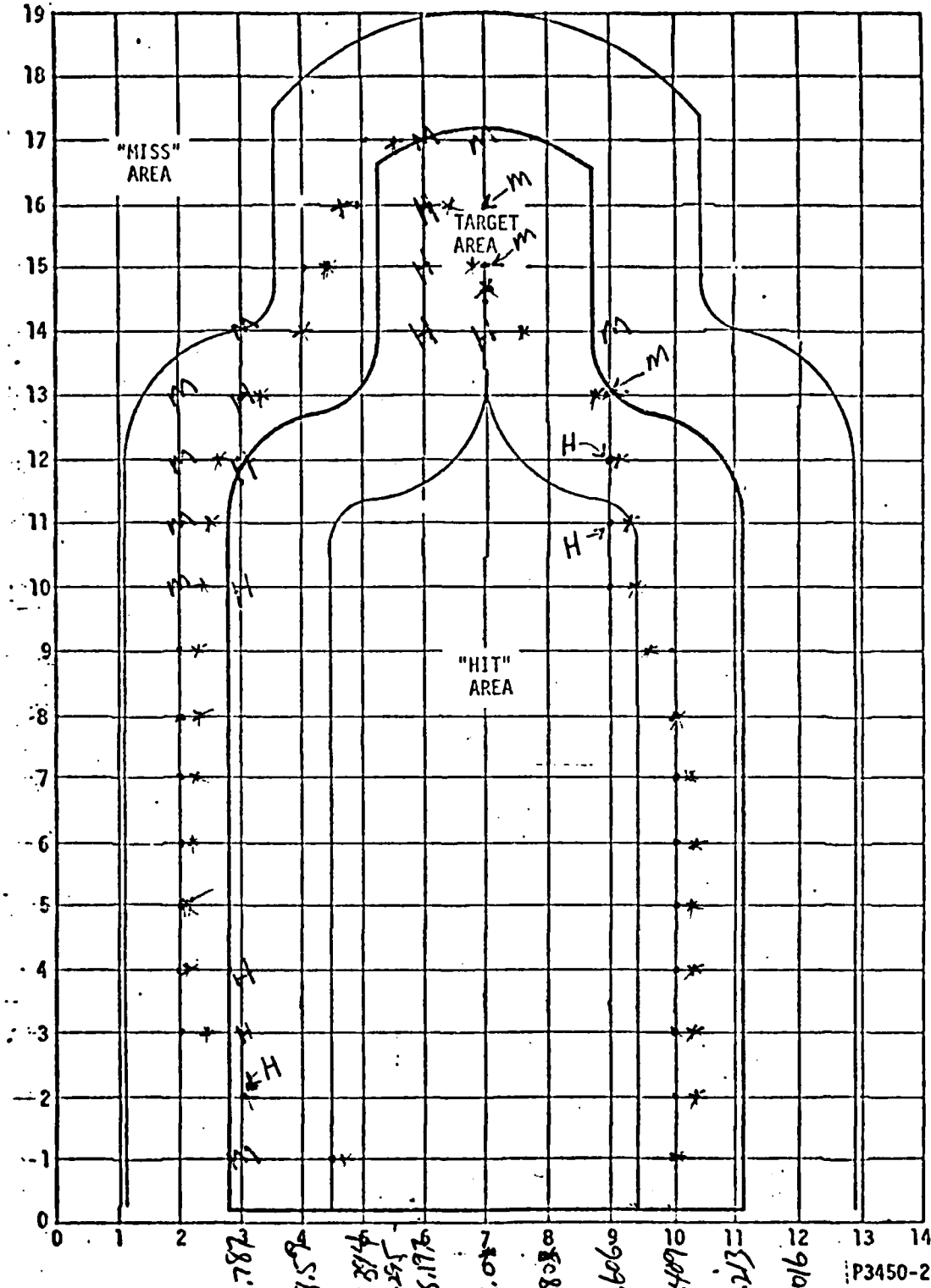
TEST CONDUCTED BY: Don R Woods

TEST WITNESSED BY: [Signature]

APPROVAL BY: \_\_\_\_\_

TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_



- 10.0
- 10.197
- 10.394
- 10.59
- 10.787
- 10.984
- 11.181
- 11.378
- 11.575
- 11.772
- 11.969
- 12.165
- 12.362
- 12.559
- 12.756
- 12.953
- 13.15
- 13.35

E-Target Test Record Chart, 250 m (Sheet 2 of 4)

TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
NOT ACCEPTABLE \_\_\_\_\_

SCALED

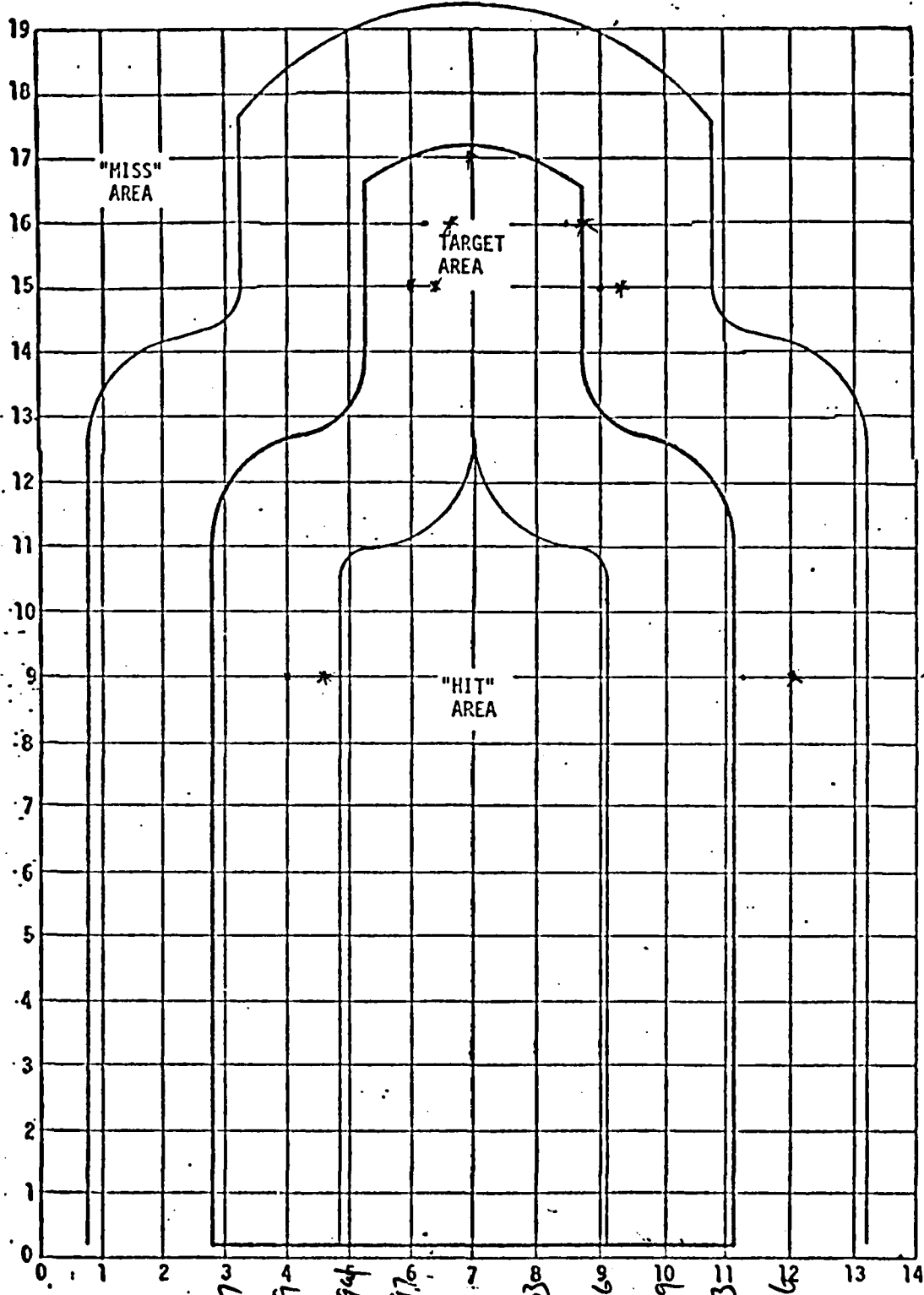
TEST CONDUCTED BY:

TEST WITNESSED BY:

*[Handwritten signature]*  
*[Handwritten signature]*

98 APPROVAL BY: \_\_\_\_\_

3/1/77  
TEST #2



- 10.0
- 10.197
- 10.394
- 10.59
- 10.787
- 10.984
- 11.181
- 11.378
- 11.575
- 11.772
- 11.969
- 12.165
- 12.362
- 12.559
- 12.756
- 12.953
- 13.15
- 13.35

8.287  
8.59  
8.394  
8.197  
8.0  
7.808  
7.608  
7.491  
7.231  
7.062  
P3450-1  
E-Target Test Record Chart, 300 m (Sheet 1 of 4)

SCALED

TEST RESULTS

ACCEPTABLE \_\_\_\_\_  
 NOT ACCEPTABLE \_\_\_\_\_

TEST CONDUCTED BY: \_\_\_\_\_

TEST WITNESSED BY: \_\_\_\_\_

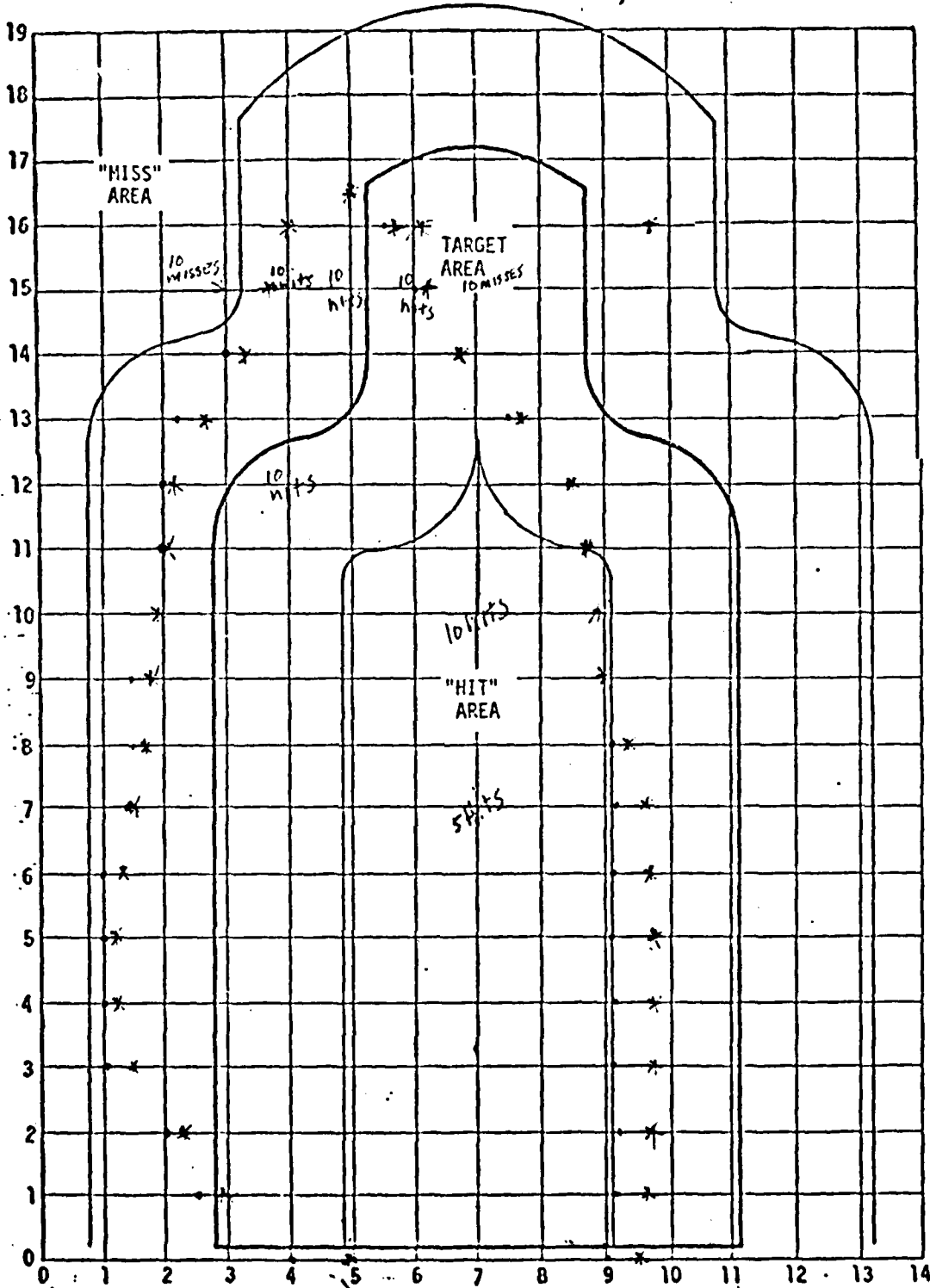
99 APPROVAL BY: \_\_\_\_\_

3/1/77  
TEST #4  
REPEAT  
BORESIGHT

SHOT 10  
at  
15-3  
15-4  
15-5  
15-6  
15-7

Shot 10  
hit 10 →

SHOT 5  
hit 5 →



E-Target Test Record Chart, 300 m (Sheet 1 of 4)

SCALED

TEST CONDUCTED BY: DR Wood

TEST RESULTS

TEST WITNESSED BY: PS Sample

ACCEPTABLE \_\_\_\_\_

NOT ACCEPTABLE \_\_\_\_\_

100 APPROVAL BY: \_\_\_\_\_

2.6.1.2 Target Masking, Scale. Masking of targets was accomplished as follows:

F-Target - The scale F-target required no masking other than shaping the Fresnel lens to conform to the target shape.

E-Target - Target masking is as shown in Figure 1 for the 100 to 250 m scale target and in Figure 2 for the 300 m target. Actual target masking will be done by simply cutting the Fresnel lens to the correct configuration.

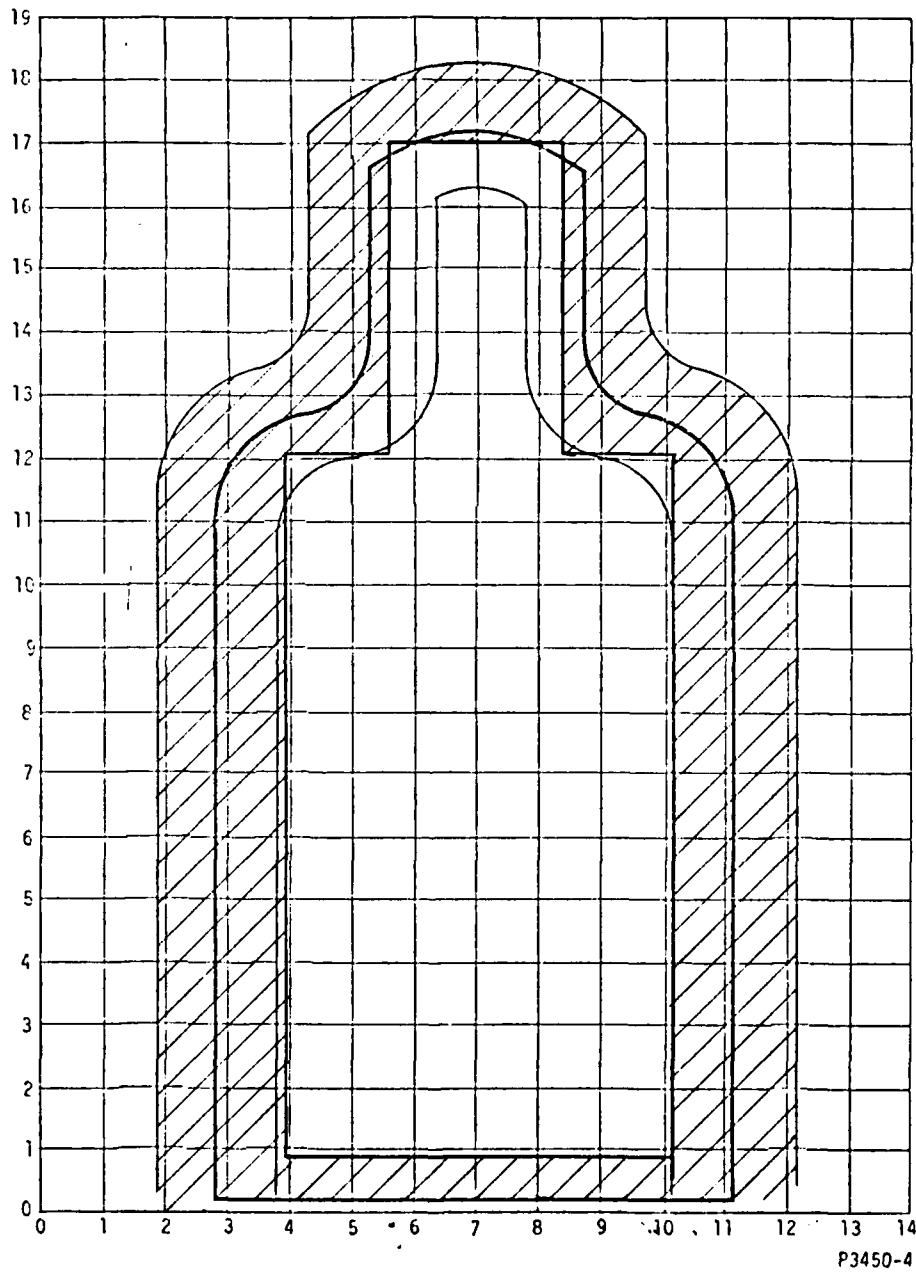


Figure 1. E-Target Mask for 100 to 250 m Scale Target

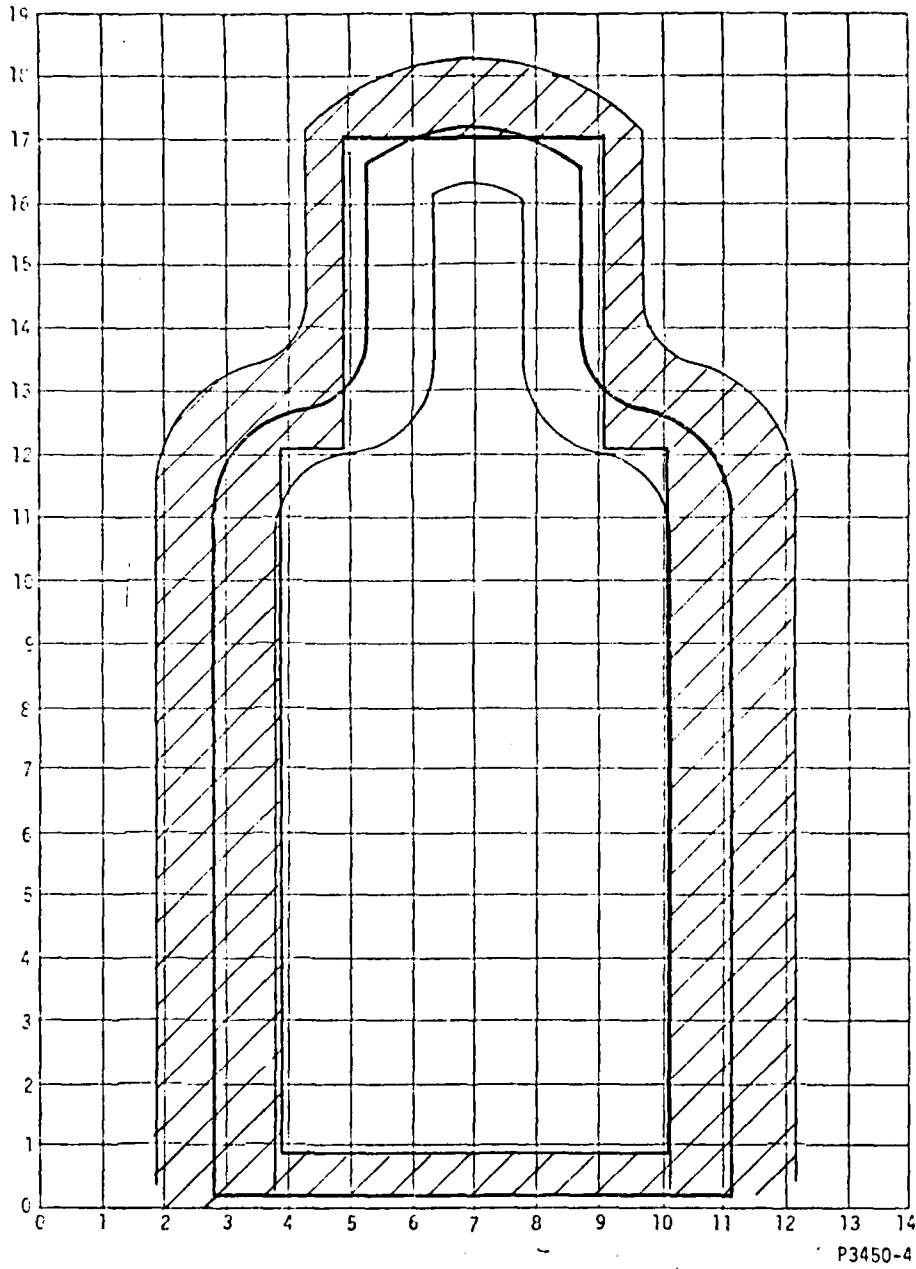


Figure 2. E-Target Mask for 300 m Scale Target

2.7 MOVING TARGET LEAD ANGLE SIMULATION DEMONSTRATION, STATIC

The test setup and procedures was as described in paragraph 2.4 of the Demonstration Test Plan with the exception of Target Pop-up and Fall (paragraph 2.4.6.1) which was modified to not include the pivot arrangement. Additionally, target speed input was not attained by a velocity function generator but was achieved by applying a voltage representing the RETS tachometer output to the lead angle servo system, and observing displacement of the detector array support.

2.7.1 TARGET LEAD, MOVING TARGET DEMONSTRATION. Lead displacements were demonstrated for ranges from 25 to 200 m (in 25 m increments) and simulated target velocities of 1.25, 1.88, 3.75 and 5 m/sec.

2.7.1.1 Test Results. Results of the test are shown in the following three test data sheets.

TYPE TEST: TARGET LEAD, MOVING TARGET

DATE: 3/15/77 TIME 1445

TEST NO.	SIMULATED		MEASURED LEAD (M)	PREDICTED LEAD (M)	VARIATION	
	RANGE (M)	SPEED (M/S)			(M)	(%)
1	L 200	L 5 (1.0V)	1.177	1.17	+0.007	.006
2	150	L 5 (1.0V)	0.87	0.845	+0.025	.03
3	100	L 5 (1.0V)	0.573	0.542	+0.031	.057
4	75	L 5 (1.0V)	0.42	0.399	+0.021	.053
5	50	L 5 (1.0V)	0.267	0.261	+0.006	.023
6	25	L 5 (1.0V)	0.145	0.128	+0.017	.133
7	200	R 5 (1.0V)	1.18	1.17	+0.01	.009
8	150	R 5 (1.0V)	0.875	0.845	+0.03	.036
9	100	R 5 (1.0V)	0.578	0.542	+0.036	.066
10	75	R 5 (1.0V)	0.432	0.399	+0.033	.083
11	50	R 5 (1.0V)	0.282	0.261	+0.021	.08
12	25	R 5 (1.0V)	0.155	0.128	+0.027	.21
13	50	R 5 (1.0V)	0.268	0.261	+0.007	.027

TEST CONDUCTED BY: DR Woods

TEST WITNESSED BY: John H. Hartley

APPROVAL BY: [Signature]

DATE: \_\_\_\_\_

TYPE TEST: TARGET LEAD, MOVING TARGET

DATE: 3/15/77

TIME 1500

TEST NO.	SIMULATED		MEASURED LEAD (M)	PREDICTED LEAD (M)	VARIATION	
	RANGE (M)	SPEED (M/S)			(M)	(%)
14	200	4.375 (0.75V)	0.885	0.88	+0.005	.0057
15	150	4.375 (0.75V)	0.660	0.637	+0.026	.041
16	100	4.375 (0.75V)	0.438	0.407	+0.031	.076
17	75	4.375 (0.75V)	0.310	0.30	+0.01	.033
18	50	4.375 (0.75V)	0.214	0.196	+0.018	.092
19	25	4.375 (0.75V)	0.109	0.0963	+0.013	.132
20	25	4.25 (0.5V)	0.077	0.0643	+0.013	.198
21	50	4.25 (0.5V)	0.118	0.131	.031	.099
22	75	4.25 (0.5V)	0.205	0.20	+0.005	.025
23	100	4.25 (0.5V)	0.265	0.272	-0.007	.026
24	150	4.25 (0.5V)	0.410	0.423	-0.013	.031
25	200	4.25 (0.5V)	0.566	0.587	-0.021	.036
26	200	4.188 (0.38V)	0.437	0.447	-0.047	.111
27	150	"	0.335	0.3188	+0.016	.051
28	100	"	0.230	0.204	+0.026	.127
29	75	"	0.174	0.1504	+0.0236	.157

TEST CONDUCTED BY: D.R. Wood  
 TEST WITNESSED BY: John H. Hardy  
 APPROVAL BY: \_\_\_\_\_  
 DATE: \_\_\_\_\_

TYPE TEST: TARGET LEAD, MOVING TARGET

DATE: 3/15/77 TIME 1511

TEST NO.	SIMULATED		MEASURED LEAD (M)	PREDICTED LEAD (M)	VARIATION	
	RANGE (M)	SPEED (M/S)			(M)	(%)
30	50	4.88 (3.76V)	0.114	0.0554	+0.029	.335
31	75	4.88 (3.76V)	0.059	0.0483	+0.0107	.222
32	25	1.25 (0.25V)	0.037	0.0322	+0.005	.149
33	50	1.25 (0.25V)	0.055	0.0655	-0.011	.16
34	75	"	0.082	0.10	-0.018	.18
35	100	"	0.122	0.136	-0.014	.103
36	150	"	0.194	0.212	-0.018	.085
37	200	"	0.266	0.294	-0.028	.055

TEST CONDUCTED BY: JR Woods  
 TEST WITNESSED BY: Jack H. Haulley  
 APPROVAL BY: \_\_\_\_\_  
 DATE: \_\_\_\_\_

Test Record Form, Moving Target