

FIRST ARTICLE TEST PLAN
FOR
HYDRA-70 M260 AND M261 LIGHTWEIGHT
LAUNCHERS (LWL)

May 1993

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ATTACHMENT 010

TABLE OF CONTENTS

1.0 INTRODUCTION

- 1.1 Purpose
- 1.2 Objective

2.0 APPLICABLE DOCUMENTS

3.0 TEST PROCEDURES AND REQUIREMENTS

- 3.1 General Test Conditions
- 3.2 Receiving Inspection
- 3.3 Continuity/Structural Vibration
- 3.4 Transportation Vibration
- 3.5 Salt Fog
- 3.6 Ground Firing
- 3.7 Detent Retention

4.0 MISCELLANEOUS

5.0 APPENDICES

- Appendix A: Test Procedure Matrix
- Appendix B: Continuity Vibration Test Plan

1.0 INTRODUCTION

1.1 Purpose:

This specification establishes the requirement and test procedures which are to be conducted on three First Article M-260 (7-tube) and/or M-261 (19-tube) Lightweight Launchers (LWL).

1.2 Objective:

The objective of these tests is to verify that the First Articles are fabricated and assembled in accordance with the specified requirements. It also requires the First Article to meet the First Article Inspection criteria of MIS-34583(B), paragraph 4.2.1

2.0 APPLICABLE DOCUMENTS

MIS-34583(B) Missile Command Specification Prime Item
Production Fabrication Specification for launcher,
Rocket Aircraft: 2.75 Inch Rocket, 7-tube and
19-tube, M-260 and M-261

3.0 TEST PROCEDURES AND REQUIREMENTS

For testing purposes, the three 7-tube launchers will be numbered 7-1 through 7-3 and the three 19-tube launcher will be numbered 19-1 through 19-3. The type of tests, the applicable MIS-34583(B) paragraph requirements and the test plan paragraph are presented in Table I. The matrix for the schedule test sequence for each launcher is listed in appendix "A". The details of each test are described below.

TABLE I LAT TEST SEQUENCE

TEST	MIS-34583(B) REQUIREMENT	PARAGRAPH PROCEDURE	TEST PLAN PARAGRAPH	M260			M261		
				1	2	3	1	2	3
Receiving & Electrical Inspection	3.2.1	4.3.2.2	3.2	x	x	x	x	x	x
Structural Vibration w Continuity	3.2.3.9	4.3.2.4.9	3.3	x			x		
Transportation Vibration	3.2.4.1	4.3.2.5.1	3.4			x			x
Salt Fog	3.2.3.8	4.3.2.4.8	3.5		x			x	
Ground Firing	3.2.2.2	4.3.2.3.2	3.6	x	x	x	x	x	x
Detent Test	3.2.2.1	4.3.2.3.1	3.7	x	x	x	x	x	x

3.1 GENERAL TEST CONDITIONS

All test, unless specified otherwise, will be conducted at standard ambient conditions. The following are considered ambient conditions.

- | | |
|-------------------------|---------------------------------------|
| a. Temperature | 13 to 33 C (55 to 91 F) |
| b. Relative Humidity | 20 to 80 percent |
| c. Atmospheric Pressure | 650 to 775 mm Hg (25.5 to 35.5 in Hg) |

3.2 RECEIVING INSPECTION

3.2.1 Visual Inspection:

A visual inspection will be performed on the launchers upon arrival. The launchers shall be removed from their containers and inspected for damage, quality of workmanship and general conformance to drawing requirements (13048750 for 7-tube and 13048850 for 19-tube). The following items are recommended to be checked initially and following each test.

- a. The suspension lugs are glued into their respective locations.
- b. The contact pins and detent retainer are in their proper locations with the contact arm in the fire position.
- c. The contact pins and detent retainer are in their proper locations with the contact arm in the load position.

3.2.2. Electrical inspection:

3.2.2.1 Inspection Equipment:

- a. Continuity Tester (i.e. multimeter)
- b. Inert or simulated electrical shorted motor of either the MK40 or MK66 type. (See MIS-34583(B) section 3.2.1.1)
- c. Megohmmeter
- d. Cable tester

3.2.2.2. Continuity:

3.2.2.2.1 The continuity of the electrical circuits will be tested in accordance with MIS-34583(B), paragraph 4.3.2.2.1. The total resistance of each firing circuit between J1 to ground shall not exceed 1.0 ohms. The resistance of each fuse set circuit shall not exceed 0.20 ohms.

3.2.2.2.3 Procedure:

3.2.2.2.3.1 Firing Circuits: Continuity of the firing circuits will be tested by measuring the resistance between each launch tube pin in connector J1 and the ground pin in connector J1 when a device that selectively simulates the electrical characteristics of an electrically shorted motor of either the MK40 or MK66 type is loaded in the launch tube. The resistance for each tube shall be tested with both the MK40 and MK66 motor simulator devices. The test current will not be less than one milliamperes and not more than 700 milliamperes.

3.2.2.2.3.2 Fuse Set Circuits: The continuity of the fuse set circuits will be tested by measuring the resistance between each tube fuse connector to the fuse set pin in connector J2. The test current will be not less than one milliamperes and not more than 700 milliamperes.

3.2.2.3 Insulation Resistance:

3.2.2.3.1 The insulation resistance of the electrical circuits will be tested in accordance with MIS-34583(B) paragraph 4.3.3.3.3. The insulation resistance shall be equal to or greater than 500,000 ohms.

3.2.2.3.2 The insulation resistance between isolated circuits and ground will be measured with appropriate test equipment utilizing a test voltage of 500 Vdc.

3.3 CONTINUITY/STRUCTURAL VIBRATION

The continuity/structural vibration sequence will consist of the continuity vibration test followed by the structural vibration test followed by another continuity vibration test. Once the tests have been completed, the launcher will be examined and documented if any physical damage has occurred. The launcher will then be subjected to the visual and electrical test (paragraph 3.2.1 & 3.2.2) once the vibration test are completed.

3.3.1 Continuity Vibration: Continuity vibration will be performed in accordance with the continuity "Vibration Test Plan, Lot Acceptance, M260 and M261 Rocket Launchers", dated January 1982. (See Appendix B) This test will be performed at either 63 C (145 F) or -46 C (-51 F). (See Table II). The launcher and inert motors will be conditioned at the test temperature for four hours minimum before starting the test.

TABLE II VIBRATION CONDITIONS

TEMPERATURE	ROCKET TYPE
Cold (-46 C)	MK66
Hot (63 C)	MK66
Cold (-46 C)	MK40
Hot (63 C)	MK40

3.3.2 Structural Vibration:

3.3.2.1 Structural vibration will be performed in accordance with MIS-34583(B), paragraph 4.3.2.4.9, with the provision described below in paragraph 3.3.2.2.

3.3.2.2 The launcher will be subjected to the vibration events for two hours at one temperature extreme, either 63 C, (145 F) or -46 C, (-50 F) with either inert MK66 or MK40 rocket nozzles. (see Table II) The launcher will be vibrated the final six hours at the ambient temperature. The two hour temperature extreme will be divided into three segments as follows:

- (1) Full Load - 48 minutes, four minutes of which will be at a level two times the total grams.
- (2) Partial Load - 38 minutes.
- (3) Empty - 34 minutes.

3.4 TRANSPORTATION VIBRATION

3.4.1 The launcher shall be subjected to transportation vibration in accordance with MIS-34583(B), paragraph 4.3.2.5.1 and as specified in MIL-STD-810. Method 514.2, procedure X, curve AX with exceptions described below.

3.4.2 The launcher shall suffer no physical damage that will render any component unusable and shall meet the visual and electrical requirements as specified in section 3.2.1 and 3.2.2 after exposure to seven 12-minute vibration sweeps along three mutually perpendicular axes with each sweep consisting of a level profile of 0.30 inch double amplitude from 5.0 to 10.0 Hz, 2.5g peak from 10.0 to 92 Hz, to 0.059 inch double amplitude from 92 to 100 Hz, 3.5g peak from 110 to 200 Hz, and retrace.

3.4.3 The launcher shall be packed in its shipping container for the transportation vibration test.

3.5 SALT FOG

3.5.1 The launcher shall be subjected to a salt fog environment in accordance with Mis-34583(B), paragraph 4.3.2.4.8 and as specified in MIL-STD-810C, Method 509.1, Procedure 1, as described in paragraph 4.3.2.4.8.1 and 4.3.2.4.8.2 of MIS-34583(B).

3.5.2 The launcher shall exhibit no debilitating corrosion and shall meet the electrical requirements of section 3.2.2 after exposure for 48 hours to a corrosive salt atmosphere followed by a 48 hour drying period in ambient atmosphere. The corrosive agent shall be a five percent solution, in water, or sodium chloride of not more than 0.1 percent sodium iodide or 0.5 percent total impurities for each 10 cubic feet of atmospheric volume, three quarts of atomized salt solution shall be injected into the atmosphere each 24 hours.

3.6 GROUND FIRING

3.6.1 The ground firing test will be conducted for compliance with MIS-34583(B), paragraph 3.2.2.2. The firing sequence is shown in Table III.

3.6.2 MK66 rockets with 10 pound inert warheads shall be used in all ground firings.

3.6.3 If any one of the tubes which is selected to fire a total of 16 rockets fails to function properly, then two additional tubes, selected by the test engineer will be used to fire additional rockets until each selected tube has accomplished a total of 16 firings.

3.6.4 All launch tubes shall function properly on the first firing, including the proper function of the fuse setting network. During each firing the launcher shall remain intact, and if there is any debris as a result of structural failure of any portion of the launcher, it shall have the ballistic properties not greater than the MK40 rocket fin retainer. If either type of launcher fails to meet the specified requirements, it is considered a failure and the normal sequence of testing is suspended. Upon completion of this test, the launcher shall be examined for physical damage and then subjected to the visual and electrical inspection requirements specified in paragraph 3.2.1 & 3.2.2.

3.6.5 The launcher shall be cleaned and lubricated prior to firing and may be cleaned between firings as deemed necessary.

TABLE III FIRING TEST SEQUENCE

SAMPLE #'s <u>7-1 & 19-1</u>	SAMPLE #'s <u>7-2 & 19-2</u>	SAMPLE #'s <u>7-3 & 19-3</u>
Full load ripple with EPD	Full load ripple @ -51 F with EPD	Full load ripple @ 145 F w/o EPD
Six full loads ripple fired @ ambient condition without EPD	Six full load ripple fired @ ambient condition without EPD	Six full load ripple fired @ ambient condition without EPD
For the seven tube launcher select one tube and fire eight rockets @ ambient condition	For the seven tube launcher select one tube and fire eight rockets @ ambient condition	For the seven tube launcher select one tube and fire eight Rockets @ ambient condition

For the 19 tube launcher select three tubes and fire eight rockets from each @ ambient condition

Full load ripple w/o EPD

For the 19 tube launcher select three tubes and fire eight rockets from each @ ambient condition

Full load ripple @ -51 F w/o EPD

For the 19 tube launcher select three tubes and fire eight rockets from each @ ambient condition

Full load ripple @ 145 F w/o EPD

3.7 DETENT RETENTION

3.7.1 Detent retention will be performed in accordance with MIS-34583(B), paragraph 4.3.2.3.1.1, with the exception described below.

3.7.2 Equipment needed: 500# or 1000# load cell, voltmeter, variable resistor, oscillograph, power supply, hydraulic test console, simulated rocket with appropriate nozzle and the mounting test fixture.

3.7.3 Zero and calibrate all the equipment. Mount the launcher into the test fixture. Open all contact arms. Load a simulated rocket with a MK40 or MK66 rocket nozzle into the forward end of the launcher and place the contact arm in the fire position. Seat the rocket so that it is locked into place by the detent retainer. Attach one end of the load cell to the simulated rocket. Attach the other end of the load cell to the hydraulic piston that is mounted on the test fixture. Gradually apply a force on the simulated rocket in the forward direction. The force will be increased until a minimum force of 170 pounds is reached on launchers that have not been fired or 100 pounds for launchers that have been fired. The forward directed force will be applied until the detent retainer releases the rocket or until a maximum force of 600 pounds is reached.

4.0 MISCELLANEOUS

4.1 All test branches will be responsible for following local safety and operating procedures specified for their area during testing.

4.1.1 Care shall be taken when transporting the launcher to, during and from testing. The launcher shall be placed on two saddles while being transported. The saddles shall preferably be placed beneath the bulkheads while being transported.

4.2 The present First Article Test sequence for testing is listed in Appendix "A". This test sequence is subject to change per MIS-34583, paragraph 4.2.3 and must have written notification and concurrence from the Test Engineer and procuring activity.

APPENDIX A

LAUNCHER 1:

Visual
Electrical
Detent Retention
Structural and Continuity vibration
Electrical
Ground Firing: 8 ripples and 8 triples
 1st ripple ambient with EPD
 Six ripples ambient w/o EPD
* Eight triples ambient
 Eighth Ripple ambient w/o EPD
Electrical
Detent Retention

Launcher 2:

Visual
Electrical
Detent Retention
Salt Fog
Electrical
Ground Firing: 8 ripples and 8 triples
 1st ripple @ -51 F with EPD
 6 ripples ambient w/o EPD
* 8 triples ambient
 Eighth ripple @ -51 F w/o EPD
Electrical
Detent Retention

Launcher 3:

Visual
Electrical
Detent Retention
Transportation Vibration
Electrical
Ground Firing: 8 ripples and 8 triples
 1st ripple @ 145 F w/o EPD
 Six ripples ambient w/o EPD
* Eight triples ambient
 Eighth ripple @ 145 F w/o EPD
Electrical
Detent Retention

* The triple firings are for the 19-tube launchers only. The 7-tube launchers will have eight single firings in place of the triple firings.