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AMC ltr 14 Aug 1973

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\sim	USATECOM PROJECT NO. 4-WE-300-200-003	
870137	USACDC AC NO.	
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AD	of XM200 2.75-INCH AIRCRAFT ROCKET LAUNCHER	
	Final Report	
	by	

LTC John O. Gilliland October 1969

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DEPARTMENT OF THE ARMY UNITED STATES ARMY AVIATION TEST BOARD Fort Rucker, Alabama 36360

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DEPARTMENT OF THE ARMY HEADQUARTERS, U.S. ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND, MARYLAND 21005

AMSTE-BG

17 APR 1570

SUBJECT: Final Reports, Engineering and Service Test, XH200 Rocket Launcher for 2.75-Juch FFAR, USATECOI Project No. 4-ME-300-209-001/003

Project Eninger for 2.75-Jach Bocket . U. S. Army Murdisons Cosmand . MTFE: JEGELIER Dover, New Jersey 07801

1. References:

a. RUTEE Project No. 121418060134.

b. letter, CDCHALV, USACHO, 14 April 1969, subject: Department of the Army Approved Advanced Development Objective (ADO) for Selective DEfects Armenent Subsystem for Army Mireraft.

c. letter, AMSTERBS, USASECCM, 13 November 1969, subject: Conditional Release of Rocket Launcher for 2.75-luch FEAR, XM200.

d. Letter, ANSTRANG, USARICON, 13 January 1970, subject as above.

c. letter, AMSER-BG, USANDOCH, 27 February 1970, subject as shows.

2. Anoroval Statement:

a. Subject reports are approved except as stated herein.

b. Reference 1d forwarded final reports of the engineering and service tests (NT/ST) of subject Launchar, however, the NT report contained data that was in error. The data was corrected and revised reports substitued by reference 1e. Subsequently, further revision to the NT report was decoud necessary to preclude misinterpretation of the data contained in the NT report. This latter and the inclosed reports superside reference 1d and reference 1e and the reports inclosed therewith. Request reports forwards 1 by reference 1d and reference 1e to destroyed. The revisions node to the engineering test report have had no effect on the THCC quitability position: AMSTELEG

1.7 APR 1970 Rocket

SUBJER: Final Reports, Engineering and Service Test, XM200 Rocket Launcher for 2.75-Inch FFAR, USATFOCH Project No. 4-ME-300-200-001/003

3. Rach ground:

a. The X03, a 24-tube reuseable/repairable rocket launcher, provided the Army with its first 2.75-inch folding fin serial rocket (FIAM) capability for helicopters. An additional rocket capability was effected with the development of the NI6 and N21 armament subsystems which provided a 7-tube launcher (M158A1) and a machine gun capability.

b. When it was decided that the XN3 launcher would not be standendined and would no longer be produced, the need for a launcher with a expectly larger than the N158A1 because apparent. Consequently, the Army turned to a 19-tube rocket launcher which was being used by the Navy and Air Force (1.4.2.3/A). These launchers which were designed for a one-time use were redified to provide a reuscable capability and identified so the XN159.

c. An initial production test (IPT) of the XM159C, a later version of the launcher, revealed problems with detents and firing contacts which made the launcher uncoitable for full release. This in addition to other circumstancer led to the development of the XM200, which is a 19-jube reuserble/repeirable rocket launcher.

d. An engineering test and service test of the XH200 launcher was conducted by Abordeen Proving Ground (APG) and U. S. Army Aviation Test Hourd respectively from July 1969 to October 1969. The results of these tests are contained in the inclosed reports.

c., An JPT on an improved version of the XH2CO is also being conducted by APC. Testing has been completed and a final report is being written. On 13 November 1969, prior to the completion of all testing, this headquarters interposed no objection to the conditional release of the JPT XH2CO launcher (reference lc).

4. Test Recolts:

a. The XM200 rocket launcher met 33 of 36 applicable requirements. A total of 2 deficiencies and 2 shortcomings were reported. After analysis and reclassification, 2 deficiencies and 1 shortcoming relation.

2



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17 APR 1573

SUBJECT: Final Reports, Engineering and Service Test, XM200 Rocket Launcher for 2.75-Juch FFAR, USATECCI Project No. 4-ME-300-200-001/003

Project Nousgar for 2.75-Jach Rocket U. S. Army Numbilong Command ATTN: JUGFILAR Dover, New Jersey 07801

1. References:

a. RDNSE Project No. 1X3438060134.

b. letter, CBCHELV, USACHO, 14 April 1969, subject: Department of the Army Approved Advanced Povelops and Objective (ADO) for Selective Diffects Amazont Subsystem for Army Mineraft.

c. letter, AMSTELES, USATECCA, 13 November 1969, subject: Conditional Release of Rocket Laureher for 2.75-lack FFAR, XM200.

d. Lotter, MSHR-BS, USATIONA, 13 January 1970, subject as above.

e. Jottor, MSEE 33, USMALCON, 27 February 1970, subject as above.

2. Annoval State

a. Subject reports are approved except as stated herein.

b. Reference 1d forwarded final reports of the engineering and service tests (EP/SP) of subject launchar, however, the EF report contained data that was in error. The data was corrected and revised reports substitued by reference 1e. Subsequently, further revision to the EF report was decaded necessary to preclude misinterpretation of the data contained in the EF report. This latter and the inclosed reports superscale reference 1d and reference 1e and the reports inclosed therewith. Request reports forwarded by reference 1d and reference 1e to destroyed. The revisions made to the engineering test report have had no effect on the THOCI suitability position. AMSTR-EG SUBJECT: Final Reports, Engineering and Service Test, XM200 Rocket Launcher for 2.75-Luch FFAR, USATECOM Project No. 4.EE-300-200-001/003

3. Background:

a. The XH3, a 24-tube reuseable/repairable rocket launcher, provided the Army with its first 2.75-inch folding fin aerial rocket (FWR) capibility for helicopters. An additional rocket capability was effueled with the development of the MH6 and M21 armanent subsystems which provided a 7-tube launcher (M158A1) and a machine gun capability.

b. When it was decided that the XH3 launcher would not be standendined and would no longer be produced, the need for a launcher with a capabily har or that the N158AD because apparent. Consequently, the Army turned to a 19-tube rocket launcher which was being used by the Navy and Air Force (1422.3/4). These launchers which were designed for a one-ture use were redified to provide a reuscable capability and identified as the XH159.

c. An initial production test (IPT) of the NH159C, a later version of the launcher, revealed problems with detents and firing contacts which node the launcher uncuitable for full release. This in addition to other einconstances led to the development of the XH200, which is a 19-tube reuserble/repairable recket launcher.

d. An engineering test and service test of the XH200 launcher was conducted by Abordeen Proving Ground (APG) and U. S. Army Aviation Test Hound respectively from July 1969 to October 1969. The results of those tests are contained in the inclosed reports.

c. An JPT on an improved version of the XM200 is also being conducted by APG. Testing has teen completed and a final report is being written. On 13 November 1969, prior to the completion of all testing, this headquarters interposed no objection to the conditional release of the JPT XM200 launcher (reference le).

4. Test Repults:

a. The XM200 rocket launcher met 33 of 36 applicable requirements. A total of 2 deficiencies and 2 shortcomings were reported. After analysis and reclassification, 2 deficiencies and 1 shortcoming relation.

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SUBJECT: Final Reports, Engineering and Service Test, XM200 Hocket Launcher for 2.75-Juch HIR, USACECOM Project No. 4-EC-300-200-001/003

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b. Difficiencies (2):

(1) The follows of the rocket launcher to meet the reliability requirered is clearliked as a deficiency. Two of the 36 applicable requirements who not not because of this deficiency. The requires meaks state that each two will be reliably reuseable through 100 rockst finder, without repair and 500 rocket findings without major perts replacement. At a 90% confidence level one can expect to fire no more than 35 rounds prior to repair and 82 rounds prior to a major part reducement. This deficiency is attributed to the following two conditions which note classified as deficiencies in both the Er and for reputes.

(a) The electrical wiring arrangement permitted numerous pinch points, resulting in severed wires and/or insulation damage which in turn course nicrimes.

(b) The conclusion on the tube firing-arm dotent ascembly broke frequently during firing taking the tube unuscable.

(2) The endersive arount of unscheduled maintenance manhours required to keep the lauscher operational is classified as a deficiency. Although toresand si the organization minimumos level have the tochades) shilling to perform the unscheduled maintenance on the X1200 laughce, the nucleo of menhouse required to disassamble, remain, and ascendle the lauscher (15 to 2) manhours) will place an undue burden on the user. There is no prescribed level of maintainability stated in the technical requirements; however, the following reintenance characteristic is stated in reference 1b (an eduanced develorment objective for a future respect subsystem): "At the organizational level, the prohibility of restoring the subsystem to opprational status in 30 minutes when a failure has occurred should be .9 based on two mechanics with a standard argament repairman's tool kit authorized in the time frame of the weapons subsystem utilization." The excessive encurt of unscheduled saintenance membours was not classified . as a deficiency or shorteening in either report, however, maintainability features were identified as unacceptable in the ST report (page 3, paragraph 1.5.8).

c. Shortcoming: (1) The excessive amount of time required to load rockets into the launcher is classified as a shortcoming. One of the 36 applicable requirements was not not because of this shortcoming. The excessive amount of time was due to the following conditions which were classified as two shortcomings in the ET report:

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SUBJECT: Final Reports, Engineering and Service Test, XM200 Rocket Launcher for 2.75-Inch FFAR, USATECOM Project No. 4-MM-300-200-001/003

(1) Difficulty was experienced during front-end loading of rockets assembled with variable other than the XH229. Due to the shorter overall rocket longth, with H151 or similar warhoads it was a problem to position the rocket to lock in the detent. In most cases it was necessary to go to the aft-end of the hauncher to effect the locking of the rocket in the detent.

(2) Difficulty was experienced while loading rockets into the aft-end of the launcher. In order to load rockets into the aft-end the firing are rust be turned out of the way. This action causes the stop part of the detent to be caused away from the inside of the tube, therefore, the rocket must be seated by trial and error.

d. A potential screty hazard associated with the breaking of the causing plu is identified in the EP report. It is stated that a broken creating plu could result in the unexpected firing of an adjacent reshet, if the firing and is accidentally rotated to a position behind an adjacent tube and power is inservertently applied to the firing and. A potential safety hazard exists any time power is inservertently applied to the launcher. This is an operational hazard associated with amunition. The fact that an adjacent round may be fired instead of the round which is set to fire does not increase the operational safety hezard which already exists, therefore, the breaking of the causing plu is not classified as a potential safety hazard. No other unsafe conditions were reported.

c. A comparison between the reliability of the XM200 and the XM1590 launcher to complete a 19-round mission is provided below:

RELIABILITY TO COMPLETE A 19-ROUND MISSION

Type	No. of	Chargeable	Minimum Reliability				
Launcher	<u>Rds Fired</u>	Failwes					
XM1.59C	109	3	32.0				
XM200	2054	69	47.3				

The above is based on serial firing data obtained during ET and ST of the XH200 and IPT of the XH1590.

f. Night firing without artificial illumination restricted the pilot's vision outside the helicopter because of rocket burnout. MS:R-16

- SUBJER: Hund Reports, Engineering and Service Test, XN200 Rocket Loundher for 2.75-Juch FFER, USATHCON Project No. 4-15-300-200-001/003

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5. Corcumte:

a. A stronger causing pin has been incorporated into the production laughter and there have been no reported failures of this pin during the HF. Evaluation of this correction will be used upon review of the final JFF report.

b. It is the opinion of this headquarters that the lawncher will meet the reliability requirements if the causing pin and wiring harness failures are corrected.

c. A direct exchange of the XH200 launcher at direct-support maintenance level would alleviate the maintenance burden placed on the user when discussibly of the launcher is required.

6. Conclusions:

a. The common tool set and equipment with the maintenence package is recepted to perform maintenance on the launcher at the organizational level.

- b. The maintenance instructions in the manual were adequate.

c. The skill level and background of an armorer (MOS 453) is sufficient to maintain the levenher.

d) The maintainability of the rocket launcher is inadequate due to an excessive amount of unscheduled maintenance manhours.

c. The reliability of the X200 launcher is inadequate due to an excessive number of canning pin and electrical failures.

f. The XH200, 2.75-inch rocket launcher submitted for HI and SF is unsuitable for Army use.

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7. Recommendation: The deficiencies and the shortcoming be corrected.

FOR THE COLMANDER:

2 Incl.

MICHAEL PAULICK Brigedier General, USA DCG/CofS

17 APR 1970

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Final Reports, Engineering and Service Test, XM200 Rocket Leuwsher for 2.75-Inch FFAR, USATECOM Project No. 4-MF- 300-200-001/003

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CG, USOCIANC, ATTT-ND-NO (w/o incl)
CO, USALDSRA, TCSLOG-LDSRA-ME (w/o incl)
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Pres, USAAVETED, STEPS-NO = w incl 2 RDTE PROJECT NO.

USATECOM PROJECT NO. 4-WE-300-200-003

USACDC AC NO.

SERVICE TEST 'of XM200 2.75-INCH AIRCRAFT ROCKET LAUNCHER

> Final Report by LTC John O. Gilliland October 1969

DEPARTMENT OF THE ARMY UNITED STATES ARMY AVIATION TEST BOARD Fort Rucker, Alabama 36360

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ABSTRACT

The US Army Aviation Test Board service tested the XM200 2.75-Inch Rocket Launcher to determine its suitability for Army use. The test was conducted at Yuma Proving Ground, Arizona, in July 1969. The XM200 was installed on UH-1C and AH-1G Helicopters and ground and flight tested day and night, with an expenditure of 1,864 aerial rockets. The XM200 generally met the Technical Requirements, except in the area of reliability. Two deficiencies were discovered--one in the electrical wiring and one in the contact detent assembly. These deficiencies resulted in excessive unscheduled maintenance and decreased operational reliability. It was concluded that the XM200, in its present configuration, is not suitable for Army use, and that it is not an acceptable replacement for the XM159() launcher. It was recommended that the XM159() not be replaced by the XM200; that immediate action be taken to correct the deficiencies; and that after the deficiencies are corrected, a check test be conducted.

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FOREWORD

The Commanding General, US Army Test and Evaluation Command (USATECOM), directed this service test by letter, AMSTE-BG, Headquarters, USATECOM, 5 September 1968, subject: "Test Directive, Engineering and Service Test of Rocket Launcher, 2.75-Inch, XM200."

The US Army Aviation Test Board (USAAVNTBD) was responsible for planning and conducting the test and for reporting the test results. USAAVNTBD personnel, other than the author, who participated in and are knowledgeable in the details of the test include: Mr. Joseph E. Givens (Project Officer); LTC Raymond P. Bosworth (Planner); CW2 David F. Minner (Maintenance); Mr. Clarence J. Carter (Armament Equipment Specialist).

The US Army Aeromedical Research Laboratory conducted gascontamination studies and provided a report on that subject.

All data concerning this test are on file at the USAAVNTBD under USATECOM Project No. 4-WE-300-200-003. The RDTE Project No. is unknown.

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Figure 1. XM200 2.75-Inch Rocket Launcher

SECTION 1. SUMMARY

1.1 BACKGROUND

A requirement exists for an additional armament subsystem with a larger capacity for 2.75-inch rockets than that of the present M158 seven-tube, reusable, repairable rocket launcher. The XM159 nineteen-tube rocket launcher was developed to satisfy this requirement. The engineering test and initial-production test of the XM159A and XM159C rocket launchers indicated considerable problems with indents and firing contacts which made the launcher marginally acceptable for Army issue. The M158 has proven to be reliable and trouble free. The XM200 rocket launcher was developed in an effort to provide a 19tube, reusable, repairable launcher comparable to the M158. On 5 September 1908, USATECOM directed the USAAVNTBD to service test the XM200 2.75-inch rocket launcher (ref 7, app V).

1.2 DESCRIPTION OF MATERIEL

The XM200 rocket launcherswas designed for the 2.75-inch Limited-Spin Folding-Fin Aerial Rocket (LSFFAR). It is a 19-tube, reloadable, reusable, and repairable launcher. The launcher consists of a cluster of 19 tubes packaged in a round configuration encased by a cylindrical shroud. The launcher is 58 inches long and 15.7 inches in diameter, and weighs 140 pounds empty. It is capable of being loaded from the front and rear. The rocket is released from the launcher tube by pressure generated by the firing motor overcoming a restraining detent. The XM200 was designed to be compatible with the firing subsystems on the UH-1B/C, AH-1G, and AH-56A Helicopters.

1.3 TEST OBJECTIVE

To determine the suitability of the XM200 2.75-inch rocket launcher and its maintenance package for Army use.

1.4 SCOPE

1.4.1. The USAAVNTBD conducted this service test during July $1^{9}0^{9}$ at Yuma Proving Ground, Arizona. Ground and flight testing was conducted with the UH-1C and AH-1G Helicopters during both day and night with the expenditure of 1,864 2.75-inch LSFFAR's (using the MK40

motor with mods through MOD 3 and the modified XM229 warhead with both the M423 and XM429 fuzes) over a 30-day period. Four XM200 launchers as test items and one launcher as spare parts were used during the test.

1.4.2. The criteria used during this test were the technical requirements for Launcher, Rocket, Aircraft, 2.75-Inch, XM200 (ref 6), the Qualitative Materiel Requirements for Armed Helicopter Weapons Systems (ref 2), appropriate technical manuals, and the qualitative judgment of project personnel. Special attention was given to design deficiencies and the elimination of unnecessary features which would not adversely affect the essential performance, reliability, compatibility, or safety of the subsystem.

1.5 SUMMARY OF RESULTS

1.5.1. Weights and dimensions were similar to those for the XM159() launcher. Cluster arrangement and design configuration were adequate.

1.5.2. The XM200 was physically compatible with the UH-1() and AH-1G Helicopters. The design gross weight and center-of-gravity (c.g.) limitations of the UH-1() were not exceeded with the XM200 installed and loaded; however, the design gross weight of the AH-1G could be exceeded in the HOG configuration if more than 1,330 pounds of fuel were used, when conforming to the flight safety release for this test (part D, app. I).

1.5.3. Only the Aircraft Armament Repairman's Organizational Maintenance Tool Set was required for a "fly-away" kit to support the XM200 in the field. The XM200 was adequately boresighted and harmonized using standard equipment. Loading and unloading were performed without difficulty. Reloading procedures were adequate and the turnaround times were not excessive.

1.5.4. Operation was compatible with the UH-1() and AH-1G Helicopters and the aircraft subsystems and no adverse effects on aircraft flight control or stability were encountered. The XM200 was operationally suitable and was compatible with other armament subsystems and the pilot's gunsight on both aircraft.

1.5.5. Effective and minimum safe ranges of the rockets were comparable to those when launched from an XM159() launcher. Operation resulted in a high degree of kill probability on simulated area targets.

1.5.6. Ripple firing during the hours of darkness, without artificial illumination, was hazardous because rocket burnout restricted the pilot's vision outside the helicopter.

1.5.7. Rocket noise levels were acceptable and no apparent damage to personnel resulted. Rocket gas is were no more detectable than those from other wing-mounted subsystems when fired under similar conditions.

1.5.8. Maintainability features were unacceptable and unscheduled maintenance was excessive.

1.5.9. Operational reliability was unsuitable. Logistical support requirements were excessive and the maintenance reliability features were inconsistent with like features found in similar armament subsystems. Although the tubes should meet their intended service life, parts usage was excessive. The calculated MRTS was 23 to 37 rounds at a 90percent confidence level.

1.5.10. Mainténance instructions contained in the manual were adequate for the level of maintenance required.

1.5.11. Operational safety was acceptable.

1.5.12. The XM200 generally met the criteria as stated in the technical requirements, except in the area of reliability. (See appendix II.)

1.0 DISCUSSION

The unscheduled maintenance of the launcher was excessive, thus decreasing the operational reliability. The excessive maintenance was attributed to two deficiencies, the electrical wiring and an unreliable pin located in the contact detent assembly. Approximately 15 man-hours were required for each disassembly, repair, and reassembly of the launcher. (See Maintenance and Reliability Analysis Charts, app IV.) If both deficiencies are corrected, there should be practically no unscheduled maintenance.

1.7 CONCLUSIONS

a. The XM200 2.75-inch rocket launcher, in its present configuration, is not suitable for Army use.

b. The XM200 launcher is not an acceptable replacement for the XM159() launcher.

1.8 RECOMMENDATIONS

a. The XM159() launcher not be replaced with the XM200 launcher for Army use.

b. Immediate action be taken to correct the deficiencies listed in appendix III.

c. After the deficiencies listed in appendix III are corrected, a check test be conducted to determine suitability for Army use.

SECTION 2. DETAILS OF TEST

2.1 DESIGN CHARACTERISTICS

2.1.1. Objective

To determine the design characteristics of the XM200 rocket launcher.

2.1.2. Criteria

a. The 19 tubes shall be clustered in a minimum volume package which shall be essentially cylindrical. Fore or aft aerodynamic fairings are not required, but accommodations for fairings must be provided. (Para 3.1.3.2, ref 6)

b. The launcher shall have 19 round tubes cylindrically shrouded in a maximum 15.72-inch diameter package. The launcher tubes are to be compatible with the maximum length combination of motors and warheads. (Para 3.1.3.3, ref 6)

c. The empty weight of one complete 19-tube launcher shall be minimum weight compatible with performance. (Para 3.1.3.4, ref 6)

d. The rocket will utilize the 17-pound warhead with either the M423 or XM429 fuze. The rocket weight is 28.22 pounds with the M423 fuze. The overall length of the MK40 rocket motor with the XM229 warhead and M423 fuze is 67.72 inches. The c.g. is located 26.90 inches from the rocket nose. (Para 3.1.3.7, ref 6)

e. POMM 9-1090-204-12/2 (XM200).

2.1.3. Method

The rocket launchers were inspected, weighed, measured, and photographed. The c.g. was determined. The weights and measurements were compared with those of the XM159 launcher. The cluster arrangement of the tubes and the accommodations for fairing were evaluated. The spring tension on each contact was measured. The fire control panel and location of the panel were inspected and photographed.

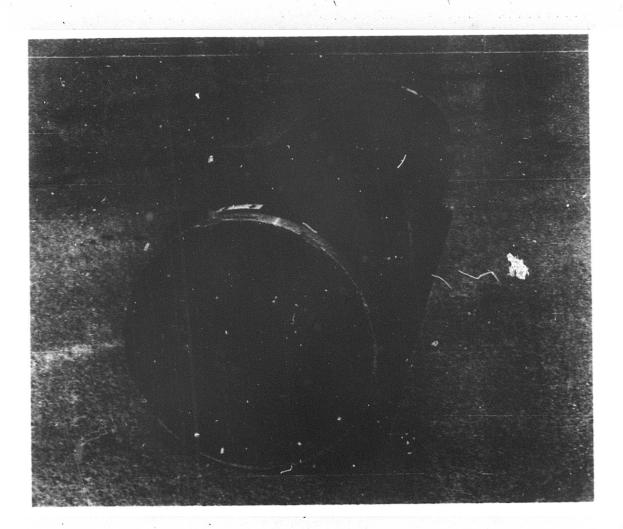


Figure 2. Rear View of XM200.

2.1.4. Results

2.1.4.1. Condition on Receipt. The four launchers that were used as test items were new and were in excellent condition upon receipt (fig 1 and 2). The one launcher that was used for spare parts was not in operational condition and was stenciled "do not fire." The launcher had been used during the vibration test at Redstone Arsenal by US Army Missile Command (USAMICOM) and internal damage had resulted. Later, when the launcher was disassembled, cracks in the forward and inner bulkhead and numerous damaged wires were discovered. The hardback, the rods, spacer sleeves, tubes, and contacts were usable. The launchers were fired using the standard fire control panels in the AH-1G and CH-1C Helicopters.

2.1.4.2. Weight and Dimensions. The weights and dimensions of the XM200 launcher and the XM159 launcher and components are listed below:

	<u>XM200</u>	<u>XM159</u>
Weight without rockets	140.016.	138.015.
Weight with 19 rockets	672.9 lb.	670.7 lb.
Weight of tube	4.0 lb.	4.0 lb.
Length of launcher	60.5 in.	59.8 in.
Length of launcher and rockets installed	63.6 in.	63.1 in.
Length of tube	58.0 in.	56.0 in.
Horizontal diameter of launcher	15.5 in.	15.2 in.

Vertical diameter of launcher	15.5 in.	15,5 in.
Tube inside diameter	2.8 in.	2.8 in.
Tube outside diameter	2.9 in.	2.9 in.

XM200

XM159

2.1.4.3. Center of Gravity. The c.g. of the launcher empty was 31.2 inches and loaded was 23.8 inches from the front.

2.1.4.4. Cluster Arrangement. The arrangement of the tube cluster was compact, yet the contacts could be placed so as not to interfere with loading and/or unloading. The cluster was inclosed in a metal fairing and accomodations for "break away" nose and tail fairings were provided. The average tension on the contact springs was 18 pounds (high, 22 pounds; low, 14 pounds) prior to the launching of rockets.

2.1.5. Analysis

2.1.5.1. The weight and dimensions of the XM200 launcher were similar to those for the XM159 launcher and met the criteria.

2.1.5.2. The cluster arrangement and design configuration of the launcher were adequate and met the criteria.

2.2 INSTALLATION CHARACTERISTICS

2.2.1. Objective

To determine the installation characteristics of the XM200 rocket launcher when installed on and removed from the UH-1() and AH-1G Helicopters.

2.2.2. Criteria

a. The launcher will be compatible with the AH-1G sway braces and ejector. The stores support will have 14-inch lug spacing and will be compatible with the standard aircraft MA-4A bomb rack, the AH-1G RPI rack, the UH-1B XM156 mount, and the Aero 65A1 bomb rack on AH-56A Helicopter. (Para 3.1.2, ref 6)

b. The launcher support lugs will be spaced 14 inches apart to be compatible with the MA-4A bomb rack. The lug location will be such that a fully loaded rocket package will have the c.g. located at a point approximately midway between the lugs. (Para 3.1.3.5, ref 6)

c. Preliminary Operating and Maintenance Manual (POMM) 9-1090-204-12/2.

d. Technical Manual (TM) 55-1520-221-10.

e. TM 55-1520-211-10.

2.2.3. Method

2.2.3.1. Installation and Removal. The launchers were installed and removed in accordance with instructions contained in the technical publications using various numbers of personnel. Motion and still photographic documentation was obtained during the operation. The combinations of equipment and tools, the minimum and optimum number of personnel, and times required for installation and removal of a launcher and combinations of launchers were recorded. The capability for manual and emergency jettison and the compatibility of the support lugs with the MA-4A bomb rack were determined. Clearances between launchers, launchers and airframe, and launchers and surface were measured.

2.2.3.2. Boresighting and Harmonizing Procedures. With the aircraft in the static position, each launcher was boresighted and harmonized. Still and motion photographic documentation was obtained during the operation. The times, optimum number of personnel, and equipment required to boresight and harmonize the launchers were recorded.



Figure 3. Installing the XM200 on the AH-1G.

2.2.4. Results

2.2.4.1. Installation and Removal. Installation and removal of the XM200 consisted of attaching and removing the launchers from the bomb rack assemblies. The support lugs were compatible with the bomb rack (fig 3). No special tools or equipment were required. The minimum and optimum number of personnel required to install and remove each unloaded launcher was three (fig 4) using only those tools contained in the Organizational Maintenance Tool Set. Three men required an average of 10 minutes to attach and 5 minutes to detach a launcher to or from the AH-1G Helicopter. Approximately 30 minutes were required for installation on the UH-1(). This was attributed to more awkward working conditions because when the launcher was mounted on the helicopter, it was extremely close to the surface. A manual jettison capability was provided in the UH-1(), but was not provided in the AH-1G crew compartments. Electrical jettison was provided on both helicopters. On the AH-1G, the minimum clearance between launchers was 3 inches, between the inboard launcher and airframe 17 1/2 inches, between the inboard launcher and surface 22 1/8 inches, and between the outboard launcher and surface 28 1/4inches (fig 3). On the UH-1(), the clearance between the launcher and airframe was 13 1/4 inches, and between the launcher and the surface 3 3/4 inches (fig 4).

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2.2.4.2. Boresighting and Harmonizing. Three persons and 30 minutes were required to boresight and harmonize one launcher on each helicopter. Standard equipment was adequate. Procedures were not provided in the POMM 9-1090-204-12/2. To obtain maximum effective range, the launchers were adjusted to 5 degrees above the water-line on both helicopters.

2.2.5. Analysis

2.2.5.1. The launcher was physically compatible with each helicopter.

2.2.5.2. Only the Aircraft Armament Repairman's Organizational Maintenance Tool Set (FSN 4933-987-9816) was required to support operations in a remote area.

2.2.5.3. Standard equipment was adequate for boresighting and harmonizing the launcher.



Figure 4. Installing the XM200 on the UH-1C.

2.3 COMPATIBILITY

2.3.1. Objective

To determine the compatibility of the XM200 rocket launcher and firing system with the UH-1() and AH-1G Helicopters.

2.3.2. Criteria

a. The detent shall allow both front end and aft end loading. The detent shall not incorporate an item which must be replaced for each rocket firing. The detent shall be designed to require a forward force of from 175 to 250 pounds to release the rocket. (Para 3.1.3.8, ref 6)

b. The launcher electrical connector shall be compatible with the UH-1B, AH-1G, AH-56A, and the UH-1C Helicopter firing systems. The electrical power for firing rockets and jettisoning shall be drawn from the aircraft's own 24-28 v.d.c. system under operational conditions. No intervalometer is required or desired. (Para 3.1.3.9, ref 6)

c. The electrical wiring shall be such that each tube is wired to fire individually and to be safely grounded and shielded. (Para 3.1.3.10, ref 6)

d. Human factors design criteria shall conform to specifications on human factors. The design shall be compatible with the use of arctic mittens. The firing contact can be rotated to cam up the detent and allow easy field loading or removal of the rocket from both fore and aft end. (Para 3.1.3.12, ref 6)

e. POMM 9-1090-204-12/2.

f. TM 55-1520-221-10.

g. TM 55-1520-211-10.

2.3.3. Method -

2.3.3.1. Pre-Fire Check. The compatibility of the launcher and aircraft electrical connectors was evaluated. A continuity check of each launcher was performed with the aircraft power source off and then an

electrical power check of each launcher (less rockets) with all electrical and avionics equipment on, while operating the aircraft at normal rotor operating speed, to determine whether stray voltage existed. Flights were then conducted in clear and contaminated atmospheric conditions. Upon landing, electrical continuity checks were again conducted and the results were compared with the data previously obtained. The capability of each tube to fire individually was determined.

2.3.3.2. Weight and Balance. The gross weight and c.g. for the UHl() and AH-lG Helicopters were computed in accordance with the flight release for this test (part D, app I) with minimum and maximum fuel, with and without ordnance, to determine the minimum and maximum aircraft gross weights, the most forward and rearward c.g. displacement of the aircraft, and whether any operating limitations could be exceeded.

The weights and c.g.'s for the UH-1() were computed with the M5 armament subsystem and two launchers installed.

The weights and c.g.'s of the AH-1G were computed with four launchers installed for the HOG configuration (four launchers and the XM28 armament subsystem with XM134 guns), and for the HEAVY SCOUT configuration (two launchers, XM28 subsystem, and two XM18 pods).

2.3.3.3. Loading and Unloading. The launchers were loaded and unloaded from the front and rear in accordance with instructions contained in the technical publications. Still and motion photographic documentation was obtained during the operation. The times, optimum number of personnel and equipment required, and any difficulties encountered were recorded.

2.3.3.4. Static Fire. With the helicopters on the ground and rotors at normal operating speed, a sufficient number of rockets was launched in predetermined combinations of pairs and ripples from each individual launcher and combination of launchers to determine the electrical requirements and the reliability and adequacy of the single or combination tube firing capability and selector. Boresighting and harmonizing were confirmed and the adequacy of the fire control system was evaluated. Cameras were mounted on the test helicopters and high-speed motion photographic documentation of the debris pattern in relation to the helicopter airframes was obtained. Upon completion of static firing, the helicopters, mounts, and launchers were inspected for

damage or adverse effects. All data obtained were analyzed prior to in-flight firing.

2.3.4. Results

2.3.4.1. Pre-Fire Check. The launcher and aircraft electrical connectors were compatible, and a lock collar was provided on the male adapter to prevent the connector from becoming loose in flight. Stray voltage did not exist during initial static electrical power checks. The capability was provided to fire each tube separately. The electrical pins and firing order of each corresponding rocket tube were easily identified.

2.3.4.2. Weight and Balance. Computed weight and balance sample forms (DD 365F) are contained in part A, appendix I. The weights and c.g.'s were:

Helicopter Configuration	Weig Takeoff*	ht (lb.) Landing**	C.G. Takeoff*	. (in.) Landing***
UH-1C	8,789.7	6,319.2	130.1	128.9
AH-1G with 4 launchers	9,462.7	6, 107. 5	200.1	200.3
AH-1G HOG	9,500.0	6,531.6	197.1	200.5
AH- 1G HEAVY SCOUT	9,358.3	6,389.5	196.2	198.4

With 30 pounds of ballast (lead shot) located in the extreme rear of the tail boom, the flight characteristics of the UH-1C were enhanced and the design gross weight and c.g. limitations were not exceeded.

C.g. limitations of the AH-1G were not exceeded in either configuration with the battery located in the avionics compartment. To enhance personnel safety, the battery was not installed in the nose compartment. Ballast was not required in either configuration to remain within c.g. limits. The design gross weight of the AH-1G in the HOG configuration could be exceeded if the fuel cell was filled with more than 1,330 pounds of fuel.

*Maximum fuel and full load of ordnance. **Minimum fuel and ordnance expended.



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Figure 5. Loading the XM200 from the front, when mounted on the UH-1C.

2.3.4.3. Loading and Unloading. The average time for loading four rocket launchers (AH-1G) was 30 minutes (15 minutes per two launchers) and for unloading was 18 minutes (9 minutes per two launchers). Times were the same for loading and unloading from either front or rear. Times were comparable for the UH-1(); however, loading and unloading from the front were more easily accomplished (fig 5). Two men, both minimum and optimum, were required to load and unload either side of either helicopter.

2.3.4.4. Static Fire. The electrical systems of both helicopters provided sufficient power to operate the aircraft, avionics subsystems, and the launchers simultaneously. The launcher did not require hydraulic power. The capability of selecting and firing a single or various combinations of rockets was adequate and the selector and combinations selected were compatible and reliable. The boresight and harmonizing alignment was determined to be accurate. There was no skin or structural damage to either aircraft. Minor debris hit the AH-1G fuselage when rockets were fired from launchers mounted on either the inboard or outboard wing stations. No damage occurred to the mounts or launchers.

2.3.4.5. Hover Fire. No adverse effects on the control and stability of either helicopter or aircraft subsystems were encountered when launching rockets during hover flight. The engine and flight instruments were unaffected by the rocket blasts. Antitorque control was adequate when launching various numbers of rockets during ripple fire, symmetrically or asymmetrically. Debris patterns were similar to those during static fire, and no damage occurred to the mount or launchers.

2.3.5. Analysis'

2.3.5.1. Stray voltage in the launcher was not encountered. Electrical connectors and wiring met the criteria; however, an intervalometer was required for firing.

2.3.5.2. The UH-1() design gross weight and c.g. limitations were not exceeded. The AH-1G c.g. limitations were not exceeded; however, the design gross weight could be exceeded in the HOG configuration.

2.3.5.3. No difficulties were encountered when loading or unloading the launcher. The detent allowed both front and rear loading and met the criteria.

2.3.5.4. The operation of the launcher, the helicopters, and aircraft subsystems was compatible. No adverse effects on aircraft flight control and stability were encountered.

2.4 OPERATIONAL SUITABILITY

2.4.1. Of ective

To determine the operational suitability of the XM200 rocket launcher when employed from the UH-1() and AH-1G Helicopters.

2.4.2. Criteria

a. This technical requirement outlines the objectives and describes a program for the detail design of prototype hardware for a nineteen-tube reusable and maintainable launcher for firing 2.75-inch rockets, composed of the MK40, MOD3 motor, and the XM229 warhead with the XM429 fuze (hereafter referred to as the rocket). The nineteentube launcher shall consist of a cluster of tubes packaged in a round configuration and essentially encased by a cylindrical shroud. The launcher is to be compatible with the firing subsystems on the UH-1B, AH-1G, AH-56A, and the UH-1C Helicopters. The launcher shall be compatible with the rocket MK40 motor and MODS through MOD3 and the modified XM229 warhead with either the M423 or the XM429 fuze. (Para 1.1, ref 6)

b. The primary design goals will be reliability, lightweight, and safety. The nineteen-tube launcher shall be designed so that each tube will be reliably reusable through one-hundred rocket firings without repair. It is desired that each tube reliably fire 250 rounds without repair. It is required that each tube fire 500 rounds without major parts replacement. (Para 3.1.3.1, ref o)

c. No seals will be required to protect the launcher against applicable environmental conditions of AR 705-15 with Change 1, during transportation, storage, and service. No accodynamic fairings, neither fore nor aft, nor individual tube end closures are required. (Para 3.1.3.15, ref 6)

- d. POMM 9-1090-204-12/2.
- •. TM 55-1520-221-10.
- f. TM: 55-1520-211-10.

2.4.3. Method

2.4.3.1. Inflight Firing. Rockets with various types of warheads were launched from the launchers throughout the established flight limitations of each aircraft using dive angles of 5, 10, 15, 20, and 25 degrees: altitudes of 1,000, 1,500, 2,000, and 2,500 feet above ground level (AGL). entry airspeeds of 80, 100, 120, and 140 knots indicated airspeed (KIAS). and slant ranges of 500, 1,000, 1,500, 2,000. 2,500. and 3,000 meters to determine optimum delivery techniques and whether any adverse effects on stability and control of the aircraft or aircraft subsystems could be encountered. Flight conditions were determined from the aircraft indicators. The rockets were launched at a bull's-eye target with a 10-meter center and 20-, 40-, and 80-meter circles from known distances in uncoordinated and coordinated flight, symmetrically and asymmetrically, in predetermined combinations of pairs and ripples from individual and combinations of launchers. Sufficient data were obtained to determine the maximum engagement, effective, and minimum safe ranges. The compatibility of the sights and launchers was evaluated and an attempt was made to determine whether any unsafe conditions existed. Then rockets were launched at automobile bodies and silhouette targets spaced at known distances to simulate area targets. Center-of-impact deviations and dispersion patterns were determined by aerial observation and film. Normal and high speed motion photographic documentation of the firing results and debris patterns were obtained. One launcher electrical cannon plug was deactivated to conduct asymmetrical launching. The compatibility of the XM200 launcher with the other armament subsystems normally employed on the AH-1G and UH-1() Helicopters was evaluated. Prior to loading all rockets were inspected for external damage, bent or damaged fins. and adequate tightness of the warhead and motor. After each flight, the firing contacts were inspected for damage, and the launchers were inspected after each day's operation for damage and wear.

2.4.3.2. Night Effectiveness. Rockets were launched in predetermined combinations of pairs and ripples during the hours of darkness, with and without artificial illumination, to determine the effects of rocket

burnout on the flight personnel, night visual detection from the ground, and whether any special flight techniques were required. The adequacy of the sights and the fire control systems was evaluated. High speed motion photographic documentation of rocket burnout was obtained.

2.4.3.3. Turnaround Time. Following each mission, the launchers were serviced as required and the times to return the launchers to an operational status were recorded. Various numbers of personnel were used to determine minimum and optimum turnaround time. The turnaround time for the UH-1() was determined with two launchers installed. The turnaround times for the AH-1G were determined with four launchers installed, then for the HOG (four launchers and the XM28 armament subsystem with two XM134 guns) and the HEAVY SCOUT (two launchers, XM28 armament subsystem, and two XM18 pods) configurations. The reloading procedures were evaluated and compared with the prescribed procedures and any difficulties were recorded.

2.4.3.4. Noise Levels. Internal and external noise levels during static, hover, and inflight firing were qualitatively evaluated.

2.4.3.5. Gas Contamination. US Army Aeromedical Research Laboratory (USAARL) personnel measured and recorded gas levels in the crew compartment during static, hover, and inflight firing.

2.4.4. Results

2.4.4.1. / Inflight Firing. Best results were obtained using a dive angle of 15 degrees, an entry airspeed of 80-100 KLAS, and an altitude of 1,500 feet AGL. No difficulties or problems were encountered which adversely affected the flight characteristics of either the UH-1() or AH-1G Helicopters, when rockets were asymmetrically launched singly, in pairs, or in ripple from either wing station. When rockets were launched symmetrically from either wing station in ripples, a slight tuck was evident in the flight attitude. During asymmetrical ripple firing, the aircraft yawed approximately five degrees toward the side from which the rockets were launched.

The maximum effective range was approximately 2,000 -2,500 meters and the most effective range was approximately 1,500 meters. Minimum safe range was approximately 500 meters. That distance was sufficient to permit a breakaway maneuver for the aircraft, at all airspeeds, and would allow the pilot to use evasive action, if necessary.

The mil-increment references on the sight reticle were adequate and were compatible with the harmonization of the launchers to allow sufficient elevation adjustment, including maximum effective range.

Accuracy depended upon flight and weather conditions and the proficiency of flight personnel; however, when using the optimum delivery techniques previously discussed, center-of-impact deviations were unaffected. An estimated 90-percent kill probability constantly resulted in the simulated area targets. When the rockets were ripple fired, the dispersion was elongated in an effective pattern.

The operation of the launcher was compatible with the XM28, XM18, and M5 armament subsystems normally employed on the AH-1G and UH-1() Helicopters. No abnormal operational difficulties or problems were encountered.

2.4.4.2. Night Effectiveness. Night operations with artificial illumination presented no unusual problems. Without artificial illumination, the rocket burnout restricted the pilot's vision outside the helicopter to the extent that instrument flight was required during recovery from firing runs. The helicopters could be detected from the ground when rocketz were launched. The operation and location of the fire controls were adequate and the intensity of the brightness of the sight could be decreased sufficiently to permit night targets to be engaged effectively with or without artificial illumination.

2.4.4.3. Turnaround Time. The personnel and times required for turnaround between missions were:

Helicopter/Configuration	Minimum and Optimum No. of Personnel	Lapsed Time (Min.)
UH-1C	3	15
AH-1G/four launchers	4	30
AH-1G/HOG	4	50
AH-1G/HEAVY SCOUT	4	50

The required and prescribed reloading procedures were similar and adequate.

2.4.4.4. Noise Levels. When rockets were launched singly, in pairs, or in ripple, the noise did not exceed the acceptable level, and had no apparent damaging effects on personnel.

2.4.4.5. Gas Contamination. Rocket gases were noticeable from both crew stations in both helicopters when rockets were launched from a static position, during hover, and in flight. Results of the USAARL evaluation are contained in part E, appendix I.

2.4.5. Analysis

2.4.5.1. No difficulties or problems were encountered which adversely affected the control and stability of the helicopters.

2.4.5.2. The effective and minimum safe ranges of the rockets when launched from the XM200 launcher were comparable to the ranges when launched from the XM159 launcher.

2.4.5.3. The harmonization of the launcher and sight was compatible and a high degree of kill probability resulted on the area targets.

2.4.5.4. The launcher was compatible with other armament subsystems.

2.4.5.5. Night firing without artificial illumination was hazardous because rocket burnout restricted the pilot's vision outside the helicopters.

2.4.5.6. The reloading procedures were adequate and the turnaround times were not excessive.

2.4.5.7. Noise levels were acceptable with no apparent damage to personnel.

2.4.5.8. Rocket gases were no more detectable than those from other wing-mounted subsystems when fired under the same conditions.

2.5 MAINTAINABILITY

2.5.1. Objective

To determine whether the test item meets the maintainability requirements as defined in the technical requirements for the aircraft rocket launcher, 2.75-inch, XM200.

2.5.2. Criteria

a. The primary design goals will be reliability, light weight, and safety. The nineteen-tube launcher shall be designed so that each tube will be reliably reusable through 100 rocket firings without repair. It is desired that each tube reliably fire 250 rounds without repair. It is required that each tube fire 500 rounds without major parts replacement (Para 3.1.3.1, ref 6)

b. The wiring harness shall conform to the wire routing table. All launchers will be identical, i.e., no right hand or left hand peculiar features. (Para 3.1.3.11, ref 6)

c. Special tools shall not be required for maintenance of the launcher. Failed parts of the launcher shall be removable and replaceable at organizational level. (Para 3.1.3.13, ref 6)

d. No seals will be required to protect the launcher against applicable environmental conditions of AR 705-15 with Change 1, during transportation, storage, and service. No aerodynamic fairings, neither fore nor aft, nor individual tube end closures are required. (Para 3.1.3.15, ref 6)

e. POMM 9-1090-204-12/2.

i. USATECOM Regulation 750-15.

g. USAAVNTBD Memorandum 750-2.

2.5.3. Method

2.5.3.1. The XM200 launcher was maintained in accordance with USATECOM Regulation 750-15 as implemented by reference 5, appendix V.

2.5.3.2. The scheduled and unscheduled maintenance performed during the test period was recorded and compared with the prescribed procedures contained in the technical manuals. All maintenance was performed using only the Aircraft Armament Repairman's Organizational Tool Set (FSN 4933-987-9816). After expending 855 rockets from the four launchers, each of the launchers was completely disassembled, repaired, and reassembled. After expending a total of 1,380 rockets,

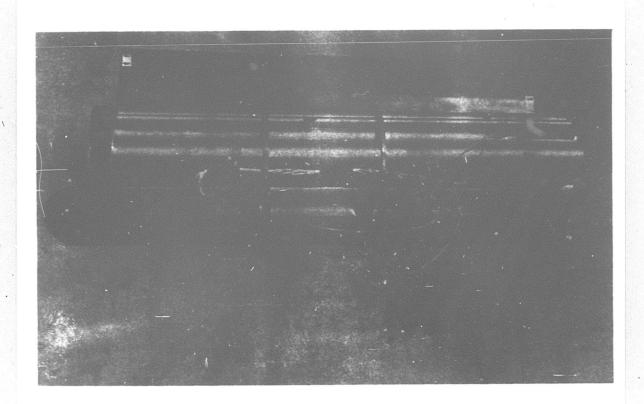


Figure 6. XM200 partially disassembled to show routing of electrical wiring.

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the four launchers were again disassembled, repaired, and reassembled. The metal covering was removed from and replaced around the frame. Numerous tube assemblies were removed and replaced and the launchers were re-wired and/or the wires repaired, as appropriate. Numerous contacts were re-wired. The ease of removal and/or replacement of the components and wiring, the conformity of the wiring harness to those contained in the technical requirements, and the need for special tools were determined. Two launchers were compared to determine that all launchers were identical.

2.5.4. Results

2.5.4.1. No problems were encountered when cleaning or servicing the launchers. The required and prescribed procedures were similar and adequate. Ten maintenance man-hours were expended on scheduled maintenance (cleaning).

2.5.4.2. The wiring harness conformed to the routing table contained in the technical requirements. All launchers were identical and there were no left or right peculiarity features. No special tools were required. The Aircraft Armament Repairman's Organizational Tool Set was adequate and the prescribed procedures in the technical manual were appropriate.

2.5.4.3. Unscheduled maintenance required 128 man-hours. Excessive maintenance requirements were attributed to the magnitude of electrical shorts within the launchers and number of contact locking pins that broke.

The electrical wires from the individual firing contacts to the aircraft quick-disconnect were routed through a channel in the launcher frame between the rocket tubes and around the supporting structure (fig 6). Due to lack of space, the insulation on the wires was easily pinched and/or damaged. In addition, the exposed wires at the electrical firing contacts were damaged from the rocket blast and deteriorated with use (fig 7). Stray voltage, electrical shorts, and misfires resulted from both conditions, thus requiring partial disassembly of the launcher for outside tubes and complete disassembly for the center tubes within the cluster to correct the situation. During reassembly of the launcher, the end play of the wires at the contact end allowed the wires to flex resulting in wires being bound between the tubes and launcher rear bulkhead again causing damage to the insulation. Stray voltage and electrical shorts were encountered after reassembly.

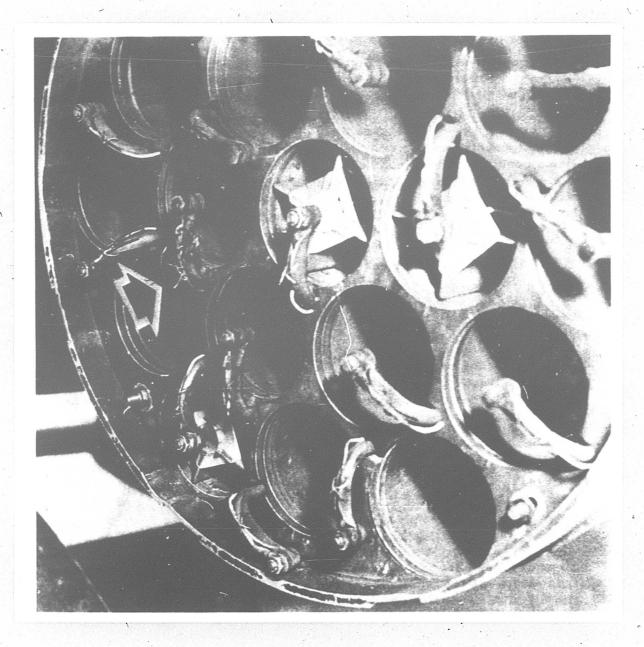


Figure 7. Rear view of XM200 showing wires damaged by rocket blast.

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The small pin which locked the contact shaft in the clear or armed detent broke on numerous occasions. The shaft required rotating when loading, arming, and unloading a rocket from the tube. Wear on the pin was caused during this operation; however, the pins were broken when the rocket was launched. This was attributed to the rocket blast. The pin could not be replaced. The tube and contact assembly required replacing, thus requiring partial disassembly of the launcher for outside tubes and complete disassembly for center tubes to correct the problems.

2.5.4.4. Equipment Performance Reports (EPR's) submitted during the test are summarized in part C, appendix I.

2.5.5. Analysis

The electrical wire damage and the breaking of the contact locking arms caused excessive unscheduled maintenance, and were thus considered deficiencies. Should these problems be corrected, practically no unscheduled maintenance would be required.

2.6 RELIABILITY

2.6.1. Objective

To assess the reliability of the test item under normal operations and derive information regarding expected service life and required logistical support.

2.6.2. Criteria

a. The primary design goals will be reliability, light weight, and safety. The nineteen-tube launcher shall be designed so that each tube will be reliably reusable through one-hundred rocket firings without repair. It is desired that each tube reliably fire 250 rounds without repair. It is required that each tube fire 500 rounds without major parts replacement. (Para 3.1.3.1, ref 6)

b. USATECOM Regulation 750-15.

c. USAAVNTBD Memorandum 750-2.

2.6.3. Method

2.6.3.1. Maintenance, Reliability, and Spare Parts Analysis Charts were prepared in accordance with USAAVNTBD Memorandum 750-2 (ref 5) from the record of scheduled and unscheduled maintenance and parts usage.

2.6.3.2. The launcher reliability is expressed in terms of Mean Rounds to Stoppage (MRTS) per launcher. The following factors were utilized to measure achieved launcher reliability: cumulative operating time, cumulative operating time, cumulative rockets launched per tube, and net chargeable failures to launch.

2.6.3.3. The number of rockets expended for each launcher varied because of the number of malfunctions and the test requirements. The number two and three launchers were used on both the UH-1C and AH-1G Helicopters and tubes number 1, 4, 6, 8, 11, and 15 of the number two launcher were used in an attempt to determine whether the tubes would meet the service life requirement of a minimum of 100 launches. The numbers 1, 4, and 6 tubes were originally selected and 242 rockets were programmed to be launched through the tubes in addition to the rockets previously expended. These rockets were fired statically. An auxiliary power unit was applied to the helicopter prior to each launching and removed from the helicopter during loading. Approximately ten rockets per tube were launched in sequence and the launcher was allowed twenty-five minutes to cool prior to the next launches.

2.6.3.4. The tension of each contact spring was recorded at the conclusion of the test.

2.6.4. Results

2.6.4.1. A Maintenance and Reliability Chart and a Parts Analysis Chart are contained in appendix IV. Parts usage was considered excessive.

2.6.4.2. During the test, 1,864 rockets were expended from four launchers. Sixty-four chargeable stoppages occurred. The majority of the stoppages were attributed to electrical wiring and contact pin malfunctions (para 2.5.4.3.). The location of the launcher, number of rockets expended, chargeable stoppages, and MRTS per launcher are listed below.

Launcher No.	Aircraft/Side Mounted	Rockets Expended	Chargeable Stoppages	MRTS
1	AH-1G/left outboard	279	6	46.5
2	UH-lC/left AH-lG/left inboard	792	19	41.5
3 .	UH-1C/right AH-1G/right i nboard	419	25	16.1
• 4	AH-1G/right outboard	374	14	26.7
	TOTAL	1,864	64	

The calculated MRTS was 23 to 37 rounds at a 90-percent confidence level. 2.6.4.3. Tube damage was not encountered throughout the test. The total number of rockets expended from the selected tubes is stated below:

a. <u>Tube No. 1</u>. The contact pin broke after a total of 86 rockets had been launched. Since it was the center tube and was fired first by the intervalometer, the firing contact was placed on the rocket contact each time thereafter and a total of 118 rockets was launched.

b. <u>Tube No. 4</u>. The contact pin broke after a total of 85 rockets had been launched. The No. 8 tube was then selected to fire in lieu of the No. 4 tube. The No. 8 contact pin broke after 45 rockets were launched. The No. 11 tube was then selected to fire in lieu of No. 8 tube. The No. 11 contact pin broke after 36 rockets were launched. After breaking the No. 11 pin, the contact was placed on the rocket contact each time thereafter and a total of 42 rockets was launched through the tube.

c. <u>Tube No. 6</u>. The contact pin broke after a total of 57 rockets had been launched. The No. 15 tube was then selected to fire in lieu of the No. 6 tube. The No. 15 tube was still firing at the conclusion of the test and a total of 75 rockets had been launched.

2.6.4.4. The average tension on the contact springs at the conclusion of the test was 21.5 pounds (high - 26 pounds; low - 16 pounds).

2.6.4.5. A detailed firing schedule for each launcher, malfunctions, action taken, and chargeable failures summary per launcher are contained in part B, appendix I.

2.6.5. Analysis

2.6.5.1. The logistical support requirements were excessive and the maintenance reliability features of the launcher were inconsistent with like features of similar armament subsystems. Parts usage was excessive.

2.6.5.2. The operational reliability of the launcher was unsuitable.

2.6.5.3. It appears that the tubes will meet their life requirement.

2.6.5.4. Contact spring tension did not deteriorate with use.

2.7 SUITABILITY OF TOOLS AND TEST EQUIPMENT

2.7.1. Objective

To determine whether appropriate common tools and test equipment are suitable for the intended purpose and maintenance category.

2.7.2. Criteria

a. Special tools shall not be required for maintenance of the launcher. Failed parts of the launcher shall be removable and replaceable at organizational level. (Para 3.1.3.13, ref 8)

b. Organizational maintenance should be performed using only the common tool set issued to the individual armorer (MOS 45J()) and the test equipment issued with the maintenance package. (USAAVNTBD)

2.7.3. Method

2.7.3.1. Organizational maintenance was performed using only the common tool set issued to the individual armorer (MOS 45J()).

2.7.3.2. Common tools and test equipment were utilized in accordance with prescribed maintenance procedures to assure that procedures and tools were adequate.

2.7.4. Results

All maintenance on the launcher could be adequately performed at the organizational level, by the armorer, using the common tool set

and equipment issued with the maintenance package, when used in accordance with the prescribed maintenance procedures. Special tools were not required.

2.8 TECHNICAL MANUSCRIPTS AND MANUALS

2.8.1. Objective

To ascertain whether the maintenance instructions in technical manuscripts and manuals and maintenance charts are adequate for the intended maintenance category.

2.8.2. Criteria

Published maintenance literature provided with the test item.

2.8.3. Method

2.8.3.1. The technical manual (preliminary operating and maintenance manual (POMM) 9-1090-204-12/2) was analyzed throughout the test for all applicable operations including the preparation of the maintenance package literature charts, as outlined in USAAVNTBD Memorandum 750-2 (ref 5).

2.8.3.2. The maintenance records were analyzed to determine the need for and/or the adequacy of special training.

2.8.3.3. The maintenance instructions were analyzed for simplicity and clarity. Troubleshooting procedures, instrumentation, and aids were observed during the test. Preventive maintenance procedures were evaluated for completeness. The adequacy of safety instructions, including environmental protection during operation and maintenance, was evaluated and analyzed.

2.8.3.4. Errors or omissions in nomenclature and stock numbers repair parts lists were noted.

2.8.3.5. Equipment serviceability criteria were compared at various intervals during the test with published criteria to determine the adequacy of the published criteria.

2.8.3.6. Maintenance operations actually performed were closely observed in an effort to determine whether instructions were clear and

the sequence of operations was adequate for the level of training possessed by the maintenance personnel. Desirable changes or comments were reported.

2.8.4. Results

The technical maintenance manual was complete and adequate. The manual will require only minor corrections. Boresighting procedures for the AH-1G and AH-56 are to be included when the information becomes available. Appropriate recommended changes were submitted. The instructions were simple and clear and the sequence of operations was adequate for the level of training possessed by the armorer. Troubleshooting and preventive maintenance procedures and safety instructions were adequate and complete. No errors or omissions in nomenclature, stock, or parts numbers were found. The published equipment serviceability criteria compared favorably with the test results. A maintenance package literature chart is contained in appendix IV.

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2.8.5. Analysis

The maintenance instructions in the manual were adequate for the intended category.

2.9 PERSONNEL AND TRAINING

2.9.1. Objective

To determine personnel and training requirements.

2.9.2. Criteria

Appropriate technical manuals.

2.9.3. Method

Military personnel of various skill levels (MOS 45J()) and background were used for testing the XM200 rocket launcher and determining the level of performance required to maintain the launcher.

2.9.4. Results

The skill level and background of an armorer (MOS 45J) were sufficient to maintain the launcher. On-the-job training was easily accomplished and no additional instruction or special training was considered necessary.

2.10 SAFETY CHARACTERISTICS

2.10.1. Objective

To determine any unsafe features of the XM200 rocket launcher and to obtain operational safety data.

2.10.2. Criteria

a. The primary design goals will be reliability, light weight, and safety. (Para 3.1.3.1, ref 6)

b. The electrical wiring shall be Jich that each tube is wired to fire individually and be safely grounded and shielded. (Para 3.1.3.10, ref 6)

c. POMM 9-1090-204-12/2.

d. USATECOM Regulation 385-6.

e. USATECOM Regulation 385-7.

2.10.3. Method

The test item was observed throughout the test and all safety hazards were recorded.

2.10.4. Results

2.10.4.1. Personnel. No safety hazards or features unsafe to personnel were noted when loading or unloading and arming or dearming the launcher or launching rockets from the launcher if safety procedures normally required for the handling of the ordnance were adhered to. Personnel passed in front of the launchers when leaving or entering either crew station on both the UH-1() and AH-1G Helicopters, however:

the launchers were not connected to the aircraft electrical system or the ground removed from the aircraft until after personnel had entered the crew station. No injuries to personnel were encountered during the test.

2.10.4.2. Flight. There were no adverse effects on aircraft control or stability or aircraft subsystems that would cause unsafe flight conditions. Rocket blast damaged the AH-1G Helicopter, but the damage was insignigicant. No damage occurred to the UH-1C.

2.10.5. Analysis

The operational safety of the launcher was acceptable.

SECTION 3. APPENDICES

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APPENDIX I. TEST DATA

Part A. Weight and Balance Computations

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TOTA	NL WEIGHT ADDED DATFEMENCE (Raf. II)	+ #ITATIONS * ences w1 9500		1000 (A)		7 9 10 11 12 13 14	BURLT III (BOMB BAY (EXTERNAL (SMATER III, IL JATO GR BATO TAKBOFF COMB CORRECTIONS TAKBOFF COMB	100 (1100 (Das 2) regulated 1100 (Clare 10 % 12 A 100 (Clare 10 % 12 A 10 (Clare 10 % 12 A 10 (Clare 10 % 12 A 10 (Clare 10 % 12 A 10 % 12 % 12 A 10 % 12 % 12 % 12 % 12 % 12 % 12 % 12 %			afe.	5	0	0 0	0		87	7 2 7	2 2	2
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TOTA NET 1 64006 1 PERMIS	NL WEIGHT ADDED DATTENDICE (Raf. II) LII WT. TAKBOTT (R.) 9500 SSIBLE ALEOFT	+ #ITATIONS * ences w1 9500	20			7 9 10 11 12 13 14	Built III (BUILT III (BUILT III (EXTERNAL (EXTERNAL (INTER IIL PL JATO GR BATO TAKBOFF COMB COMPECTIONS (TAKBOFF COMB TAKBOFF COMB TAKBOFF COMB TAKBOFF COMB ANNOUTIONS (ANNOUTION PUBL 127 62 100	10 (17 regulated) 17 regulated) 17 regulated) 17 regulated) 17 regulated) 18 regulated) 19 regulated)			9	5	0		0		8 8 1 3 5	7 2 7 7 2 4 6 1 4 6 1	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	2
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TOTA MET 1 MET 1 MET 1 MET 10 MET 10	NL WEIBHT ADOED DEFFERENCE (Auf. II) LII WT. TAKSOFF (B) 9500 SSIBLE AACOFF SJBLE AACOFF	+ ITATIONS 'ences ut 9500 rideu 192.0 rideu 190.0	71 20 71 20			7 9 10 11 12 13 14 15 16	BURLT III (BURLT III (BURLT III (EXTERNAL (EXTERNAL (INTER III. (L.) JATO GR BATO TAKBOFF COMB COMMECTIONS (TAKBOFF COMB TAKBOFF COMB TAKBOFF COMB TAKBOFF COMB AND GR BATO BOHBS AMMENTION PUBL 127 G2 ro CSTIMATED LAND	#0 (#7 reputed #7 reputed #8 reputed		~	9	5 5 3 8 7 9 5	0 0 197 9 2 4 6 3		0 7 7 4 6		8 8 1 3 3	7 2 7 2 4 6 1 4	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
TOTA MET I SADDE I PERMIS C. G. T. PERMIS C. G. L. Enter I Sanor I Sanor I	NL WEIGHT ADOLD DEFFERENCE (Auf. II) LII WT. TAKEOFF (B.) 9500 SSIBLE AALEOFF SSIBLE AADDING	+ #ITATIONS * Ences with 9500 FIBNI 192.0 FIBNI 190.0 Mil applicable 7 br (Jonf, J.D.	71 20 71 20			7 9 10 11 12 13 14 15 16 0000	BURLT III (BOMB BAY (EXTERNAL (EXTERNAL (BRITCH III, FL JATO OR BATO (TAIGOTY COME CORRECTIONS (TAIGOTY COME GETIMATED LAN	### (####################################	64L) 64L)	~	9	5 5 3 8 7 9 5	0 0 197 9 2 4 6 3		0 7 7 4 6		8 8 1 3 3	7 2 7 2 4 6 1 4	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	

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Part B. Armament Profiles, Configuration and Malfunctions

PRECEDING PAGE BLASE-NOT FILMED

D - D.y 1 N - Night 1 1 - Luncher No. 1 1 2 - Luncher No. 2 3 3 - Luncher No. 3 4 4 - Luncher No. 3 5 5 of 9 and 10 rockets only were load 5 release 1 - I.C D 1 - I.C D 5 - I.C Static/Sy/Asy 6 - I.C Static/Sy/Asy 1.1.C D 1.1.C Static/Compatistic 1.1.C Mover/Sy/Combistic 1.1.C Vart/Combistic	
D - Day N - Night 2 - Launcher 3 - Launcher 4 - Launcher 4 - Launcher 1 - La D	FND: D - DJy N - Night 1 - Launcher 3 - Launcher 3 - Launcher 3 - Launcher 3 - Launcher 4 - Launcher 4 - AH-1G D 1 AH-1G D 1 AH-1G D 2 - AH-1G D 1 AH-1G D 1 AH-1G D 1 AH-1G D 1 AH-1G D 1 AH-1G D 1 AH-1G D
	FND: T At Split load Card No. Ac 2 1 At 2 10

The flights. incredit flight conditions, reckets expended, malfunctions, and action taken pertaining to the XM200 rocket launchers used during the test are listed below:

t

	Action Taken/Remarks	None							None	P			None. Note: Since the	No. 1 tube fired first the	firing contact was set on	the rocket contact and the	rocket was launched.	None													None. *NC: Loaded to	d verify previous data.		No. 11 charged on Flt 10	
	Malfunction	11-2	No. 15 contact pin	failed	No. 2 contact pin failed	RI-3	No. 5 contact pin failed	•	R-3	No. 13 contact pin failed	RO-4	No. 1 contact pin failed	1-01	No. 3 contact pin failed			X	11-2	No. 18 misfired (E)	No. 19 mistired (E)	RI-3	No. 11 mistired (E)	No. 13 mistired (E)	No. 17 mistired (E)	No. 18 misfired (E)	No. 19 mistired (E)	RO-4	No. 11 mistired (E)	No. 12 mistired (E)	No. 14 misfired (E)	1-01	No. 10 contact pin failed	No. 6 contact pin failed	LI-2	No. 11 mindland and
	C	~							7				-					10													s				
	RO-4	6/6	10/10						6/6	10/10			6/6	10/10				6/6	10/7												6/6	10/7			
Expended	RI-3	61/61							19/19				19/19					19/14		-											91/61				
s loaded/	Center					·	9																							•					
2.75 Rockets Ipaded/Expended	L1-2	61/61					·		19/19				61/61					19/17													81/61				
	1.0-1	6/6	01/01						6/6	10/10			6/6	01/01				6/6	10/10												6/6	10/10			
	FIt Conditions	Inflight/Sy/S/D	Var/Comb.						Inflight / Asy /	Uncoordinated			Inflight/Asy/Rip					Hover/Asy/Comb. 9/9													Inflight/Sy/Rip				
	D/N	۵							٩				۵					۵													٥				
	Acft ,	AH-1G							AH-1C	•	•	•	AH-1G					AH-1G													AH-1G				
Card	No.	12							1				15					ŝ													16				
F	No.	2							×				6					10													=				

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Action Taken/Remarks	*NC: Loaded to verify previous data. RO-4 No. 11, 12, 14 charged on Flt 10	None. *NC: Loaded to verify previous data. RI - 3 No. 2 and 8 charged on FH 11 RO - 4 No. 12 charged on Flt 10	Upon completion of flight No. 13, all launchens were disamembled, re- patred, and reamembled. *NC: Loaded to verify prevjous data. LI-2 No. 11 charged on Fit 11 RI-3 No. 8 charged on Fit 10 No. 13 charged on Fit 10 No. 13 charged on Fit 10	*NC: Intervalometers removed, ütassembled, cleaned, reassembled, and reinstalled. Broken wire was replaced after Fit 30.
Ma Ifunction	RI-3 No. 8 misfired (E) No. 2 contact pin failed No. 11 misfired (E)* RO-4 No. 11 misfired (E)* No. 12 misfired (E)* No. 14 misfired (E)*	RI-3 No. 2 misfired (E)* No. 8 misfired (E)* RO-4 No. 12 misfired (E)*	LO-1 No. 12 misfired (E) L1-2 No. 11 misfired (E)* R1-3 No. 3 misfired (E) No. 3 misfired (E) No. 8 misfired (E)* No. 13 misfired (E)* No. 13 misfired (E)* No. 4 contact pin failed	LO-1 Intervalometer did not cycle Tubes 16, 17, 18, 19* RO-4 Intervalometer did not cycle
U		0	Ś	0
RO-4		12/11	9/9 10/8	9/9 10/5
cpended RI-3		12/12	21/61	XM18 XM18
2.75 Rockets Loaded/Expended LI-2 Center RI-3		74		
2.75 Rockel LI-2		12/12	19/18	XMI8 XMI8
1-01			9/9 10/1	9/9
Flt Conditions		Infligfa/Asy/Rip	Inflight/Sy/Comb/ 9/9 Area Target 10/7	Static/Sy Compatibility with XM18 subsystem
N/Q		۹	٩	٩
Åcfi		2H-1G	AH-IG	THAT T
Card No.		2	35	e
FIL		21	<u></u>	1

3 Alt-1G D Hower/Any/Comb 10/10 10/10 -MC: Identify and another	No.	No.	Acfi	D/N	Fh Conditions	1.01	LI-2	LI-2 Center RI-3	RI-3	RO-4	C	Malfunction	Action Taken/Remarks
 Al-LG D Hover/Asy/Comb U/10 10/10 0 Nose responsed. Al-LG D Startc/Asy/Comb U/10 10/10 0 Nose Responsed. Al-LG D Startc/Asy/Comb U/10 10/10 0 Nose Millerd (R) No. 18 multerd (R) No. 18 multerd (R) No. 19 multerd (R) No. 10 multerd (R												Tubes 16, 17, 18, 19+	+NC: Intervalometers
Alt-IG D Horee/Awy/Comb 10/10 10/10 0/10 0 None None No Ult-IC D Saatic/Awy/Comb 9/9 9/0 0 No No Ult-IC D Saatic/Awy/Comb 9/9 9/0 0 No No Ult-IC D Saatic/Awy/Comb 9/9 9/0 0 No No Alt-IC D Saatic/Awy/Comb 9/19 19/15 No 14.13 No Alt-IC D Inflight/Sy/Rip 19/19 19/15 2 No No No Alt-IC D Inflight/Sy/Rip 19/19 19/15 2 No 11.12 Alt-IC D Inflight/Sy/Rip 19/19 19/15 2 No 3 11.13 Alt-IC D Inflight/Sy/Rip 19/15 1 1 1.2 No 3 11.13 Alt-IC D Inflight/Sy/Rip 19/15 5/4 1 1.1.2 No 3 11.12 Alt-IC D Inflight/Sy/Comb 19/15 5/4 1 1.1.2 No 1 1.2 Alt-IC D Inflight/Sy/Comb							,					No. 11 centact wire	removed, disassembled,
All-LG D Horer/Aw/Comb 10/10 10/10 0 Nor A Ull-LC D Static/Aw/Comb 10/10 10/10 0 Nor 7 Ull-LC D Static/Aw/Comb 9/9 9/16 5 LL-3 No. 1 Ull-LC D Static/Aw/Comb 9/9 10/10 0 No. No. Milled(f) No. B Static/Aw/Comb 9/15 1 No. Milled(f) No. No. Milled(f) No. No. Milled(f) No. No. Milled(f) No.												war broken by mainte-	cleaned, reasembled,
All-1G D Hover/Any/Comb 10/10 10/10 10/10 0 None 1.2 No 16 nutlered (B) No 16 17 16 No 16 17 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 16 <th16< th=""> <th16< th=""></th16<></th16<>												nance personnel. +	and reinstalled. Broken
Alt-IG D Hover/Any/Comb 10/10 10/10 0 None No Ult-IC D Static/Any/Comb 9/9 9/6 5 1.2 No. 16 No. 16 No. 16 No. 16 No. 16 No. 16 No. No. 16 No. No. 16 No.													wire was replaced after
Alt-1G D Hover/Ay/Comb 10/10 10/10 0/10 0 Nos 1 2 Ult-1C D Satic/Ay/Comb 9/9 9/6 5 11-2 No. 18< millined (8)													FIL 30.
UI-IC D Static/Any/Comb 9/9 9/6 5 11-2 No. Ballicat(B) No. Ballicat(B) No. Ballicat(B) No. No. No. Ballicat(B) No. Ballicat(B) No. No. No. Ballicat(B) No. Ballicat(B) No. No. Ballicat(B) No. Ballicat(B) No. No. Indiget/Sy/Rap 19/19 19/15 2 No. Ballicat(B) Alt-IC D Indiget/Sy/Rap 19/19 19/15 2 No. Ballicat(B) Alt-IC D Indiget/Sy/Rap 19/19 19/15 2 No. Ballicat(B) Alt-IC D Indiget/Sy/Rap 19/19 19/15 2 No. 3 Contact Alt-IC D Indiget/Sy/Rap 19/15 5/4 1 1.2 No. 1 Alt-IC D Indiget/Sy/Comb/Area 19/15 5/4 1 1.2 No. Alt-IC D Indiget/Sy/Comb/Area 19/15 2 1.2 No. 1.1 Alt-IC D Indiget/Sy/Comb/Area 19/15 2 1.2 2 1.2	c	æ	AH-1G	٩	Hover/Asy/Comb		10/10		10/10	. `	0	None	V/N
10.9 10/10 No. 18 mailtred (B) No. 1 No. 1 No. 1			UH-IC	٩	Static/Asy/Comb		6/6		9/6		ŝ	11-2	None
Alt-IG D Indilage/Sy/Rip 19/19 19/15 2 R1-3 Alt-IG D Indilage/Sy/Rip 19/19 5/4 1 11-2 Alt-IG D Indilage/Sy/Comb/Area Target No. 3 3 2 Alt-IG D Indilage/Sy/Comb/Area Target 1 11-2 No. 3 No. 4 Alt-IG D Ana Target 1 11-2 No. 10 1 Ana Target 1 1/12 1 11-2 No. 10 1 Ana Target No. 10 No. 10 No. 10 1 1 Ana Target 1 1 1 1 1 An							10/9		01/01			No. 18 mistired (E)	
Alt-IG D Indiget/Sy/Rip 19/19 19/15 Z No. 5 matricet (E) and vice burned off (fring, contact No. 6 matricet (E) and off (fring, contact No. 7 matricet (E) and vice fring, contact No. 7 matricet (E) and vice fring, contact No. 8 matricet (E) and vice (E) and vice fring, contact No. 8 matricet (E) vice No. 1 matricet (E) vice No. 9 matricet (E) vice N												RI-3	
All-IG D Indiget/Sy/Rtp 19/19 19/15 2 R1-3 All-IG D Indiget/Sy/Rtp 19/19 5/4 1 11-2 All-IG D Indiget/Sy/Comb/ 19/18 5/4 1 11-2 All-IG D Indiget/Sy/Comb/ 19/18 5/4 1 11-2 All-IG D Indiget/Sy/Comb/ 19/17 5/4 1 11-2 All-IG D Indiget/Sy/Comb/ 19/17 19/15 2 11-2 All-IG D Indiget/Sy/Comb/ 19/17				1						•		No. 1 midlred(E) No. 6 midlred (E)	
Alt-IG D Iadlage/Sy/Rup 19/19 19/15 Z RU: 3 Runded (E) Alt-IG D Iadlage/Sy/Rup 19/19 19/15 Z RU: 3 Alt-IG D Iadlage/Sy/Rup 19/19 19/15 Z RU: 4 Alt-IG D Iadlage/Sy/Rup 19/18 S/4 1 L2.3 Alt-IG D Iadlage/Sy/Comb/Area Target 19/18 S/4 1 L3.2 Alt-IG D Iadlage/Sy/Comb/Area Target 19/15 2 L3.2 No. 18 midfred (E) Alt-IG D Iadlage/Sy/Comb/Area Target 19/15 2 L3.2 No. 18 midfred (E) Alt-IG D Iadlage/Sy/Comb/Area Target 19/15 2 L3.2 No. 19 midfred (E) Alt-IG D Area Target 19/15 2 L3.2 No. 50 midfred (E) Alt-IG D No. 60 midfred (E) No. 60 midfred (E							:					No. 7 minfred (E) and	-
Att-IG D Inflight/Sy/Rip 19/19 19/15 2 Rt-3 Att-IG D Inflight/Sy/Rip 19/19 19/15 2 Rt-3 Att-IG D Inflight/Sy/Rip 19/19 19/15 2 Rt-3 Att-IG D Inflight/Sy/ 19/19 5/4 1 1.2 Att-IG D Inflight/Sy/ 19/18 5/4 1 1.2 Att-IG D Inflight/Sy/ 19/18 5/4 1 1.2 Att-IG D Inflight/Sy/ 19/19 5/4 1 1.2 Att-IG D Inflight/Sy/Comb/Atea 19/15 5/4 1 1.2 Att-IG D Inflight/Sy/Comb/Atea 19/15 1.1-2 No. 3 multired (E)* Att-IG D Inflight/Sy/Comb/Atea 19/15 2 11-2 Att-IG D Inflight/Sy/Comb/Atea 19/15 2 11-2 Att-IG D Inflight/Sy/Comb/Atea No. 19 multired (E)* No. 10 multired (E)* Att-IG D Inflight/Sy/Comb/Atea 19/15 2 11-2 Att-IG D Inflight/Sy/Comb/Ataa 19/15 2 11-2												Contact	
Att-IC D Inflight/Sy/Rup 19/19 19/15 2 RL-3 No. 6 midfred (E) • • No. 1 No. 5 midfred (E) No. 5 midfred (E) No. 5 midfred (E) •												No. 15 wire burned off firing contact	
All-IG D Inflight/Sy/Rip 19/19 19/15 2 RL-3 No. 6 midfred (E) - No. 7 midfred (E) No. 7 midfred (E) No. 7 midfred (E) - <													
 No. 6 multiced (E)* No. 7 multiced (E)* No. 7 multiced (E)* No. 3 multiced (E)* No. 3 multiced (E)* No. 3 multiced (E)* No. 18 multiced (E)* No. 3 multiced (E)* No. 10, 11, 11, 2 No. 10, 10, 11, 11, 2 No. 10, 10, 10, 10, 10, 10, 10, 10, 10, 10,		24	AH-1G	a	Inflight/Sy/Rip		19/19	ŗ	19/15		8	RI-3	Relocated sprung contact.
 No. 7 maffred (E)⁶ All-IG D Inflight/Sy/ Ig/IS Ig							-1					No. 6 misfired (E)+	+NC: Loaded to verify
All-IG D Inflight/Sy/ 19/18 5/4 1 1-2 Comb/Area Target 19/18 5/4 1 1-2 Comb/Area Target 19/18 5/4 1 1-2 No. 3 contact sprung No. 3 contact sprung No. 18 midfred (E)* * * No. 19 midfred (E)* * * No. 2 midfred (E)* * *												No. 7 midfred (E)+	previous data.
All-IG D Inflight/Sy/ 19/18 5/4 1 LI-2 No. 3 contact grung No. 3 contact grung Comb/Area Target No. 19/18 5/4 1 LI-2 No. 18 mulfired (E)+ + Comb/Area Target No. 1 LI-2 No. 18 mulfired (E)+ + RI-3 No. 19 mulfired (E)+ + No. 19 mulfired (E)+ + No. 19 mulfired (E)+ + No. 19 mulfired (E)+ + No. 10 mulfired (E)+ + No. 2 mulfired (E)+ + No. 2 mulfired (E)+ + No. 2 mulfired (E)+ + No. 3 mulfired (E)+ + No. 2 mulfired (E)+ + No. 3 mulfired (E)+ + No. 4 mulfired (E)+						•						and was shorted with	RL-3
AH-IG D Inflight/Sy/ 19/18 5/4 1 L1-2 No. 3 contact sprung AH-IG D Inflight/Sy/ 19/18 5/4 1 L1-2 No. 18 minified (E) Comb/Area Target 19/15 S/4 1 L1-2 No. 18 minified (E) All-IG D Inflight/Sy/Comb/ 19/17 19/15 2 L1-2 All-IG D Inflight/Sy/Comb/ 19/17 19/15 2 L1-2 Area Target 19/17 19/15 2 L1-2 No. 18 minified (E) Area Target 19/17 19/15 2 L1-2 No. 19 minified (E) Area Target 19/17 19/15 2 L1-2 No. 19 minified (E) Area Target 0.01 19.01 No. 10 minified (E) No. 6 minified (E)												debris.	No. 6 and 7 charged on
Alt-IG D Inflight/Sy/ 19/18 5/4 1 1.2 No. 3 contact sprung Comb/Area Target Comb/Area Target 19/18 5/4 1 1.2 No. 18 midfred (E)* * Comb/Area Target 19/17 19/15 2 1.1-2 No. 3 midfred (E)* * Alt-IG D Inflight/Sy/Comb/ 19/17 19/15 2 1.1-2 Ant-IC D Inflight/Sy/Comb/ 19/17 19/15 2 1.1-2 Area Target No. 18 midfred (E)* No. 18 midfred (E)* * No. 19 midfred (E)* No. 19 midfred (E)* No. 19 midfred (E)* No. 19 midfred (E)* No. 6 midfred (E)* No. 6 midfred (E)* No. 6 midfred (E)* No. 0. 8 midfred (E)*												No. 8 misfired (E)	Fk 16.
AH-IG D Inflight/Sy/ Comb/Area Target 19/18 5/4 1 11-2 No. 18 midfred (E) Comb/Area Target No. 3 No. 3 No. 3 No. 3 Inflied (E) AH-IG D Inflight/Sy/Comb/ 19/17 19/15 2 11-2 AH-IG D Inflight/Sy/Comb/ 19/17 19/15 2 11-2 Area Target No. 19 No. 19 No. 19 No. 19 No. 19 Area Target No. 19 No. 19 No. 19 No. 19 No. 6 Area Target No. 6 No. 6 No. 6 No. 7 No. 6												No. 3 contact sprung	
Comb/Area Target No. 18 minfred (E)* v No. 18 minfred (E)* v No. 3 minfred (E) No. 3 minfred (E) No. 3 minfred (E) v No. 19 minfred (E) v No. 19 minfred (E) v No. 19 minfred (E) v No. 6 minfred (E) No. 6 minfred (E)* No. 8 minfred (E)* No. 9		26	AH-1G	٩	Inflight/Sy/		81/61		19/1		-	11-2	None. +NC: Loaded to
D hullight/Sy/Comb/ 19/17 19/15 2 LI-2 No. 3 minfred (E) No. 3 minfred (E) No. 3 minfred (E) No. 19 minfred (E) No. 19 minfred (E) No. 6 minfred (E) No. 6 minfred (E) No. 6 minfred (E) No. 8 minfred (E) No. 8 minfred (E) No. 8 minfred (E) No. 9 m					Comb/Area Target							No. 18 minfired (E)+	verify previous data.
D Initigle/Sy/Comb/ 19/17 19/15 2 LI-2 No. 3 minfred (E) Area Target No. 19 minfred (E) No. 19 minfred (E) No. 6 minfred (E) No. 8 minfred (E) No. 8 minfred (E)												RI-3	11-2
D Iniligiu/Sy/Comb/ 19/17 19/15 2 LI-2 No. 18 minfred (E)* * No. 18 minfred (E)* * No. 19 minfred (E) L No. 19 minfred (E)* * No. 6 minfred (E)* * No. 6 minfred (E)* * No. 7 minfred (E)* * No. 8 min								\				No. 3 midlred (E)	No. 18 charged to Flt 16.
No. 18 minfred (E)* v No. 19 minfred (E) L RI-3 No. 6 minfred (E)* No. 8 minfred (E)* No. 8 minfred (E)*		26A	AH-1G	•	Inflight/Sy/Comb/		21/61		19/15		2	11-2	None. *NC: Loaded to
19 minfred (E) L 6 minfred (E)* * R 7 minfred (E)* 8 minfred (E)* 9 minfred (E)*					Area Target							No. 18 misfired (E)+	verify previous data.
6 minfired (E)+ * R 7 minfired (E)+ 8 minfired (E)+ 9 minfired (E)+												No. 19 misfired (E)	11-2
*												RI-3	No. 18 charged on Flt 16.
													N-3
												No. 7 misfired (E)+	No. 6, 7 charged on Flt 16.
									•			No. 8 misfired (E)+	No. 8 charged on Fh 17

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	D Indigit/CC 19/17 19/17 0 11-2 No. 6 mathred (E)* 1 No. 6 No. 7 No. 6 Mathred (E)* No. 7 No. 7 No. 7 No. 7 D Indigit/CC 19/18 19/16 1 11-2 No. 7 No. 7 No. 7 D Indigit/Sy/ 19/18 19/16 1 11-2 No. 7 No. 7 No. 7 Taget No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 7 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10	No.	Card No. Acft	2	D/N	D/N Fit Conditions	1.0.1	2.75 Rockets Loaded/Expended LI-2 Center 91-3	aded/Expended ter 91-3	RO-4	3	Malfunction	Action Taken/Remarks
D Indluge/CC 19/16 1 11-2 No. 10 multired (E)* 1 No. 5 0.0 6 multired (E)* No. 2 7 1 No. 7 1 1 2 No. 2 7 No. 1 11-2 No. 10 1 1 No. 2 1 1 3 1 No. 10 1 1 2 1 No. 10 1 1 1 3 No. 10 1 1 1 1 No. 10	D Indiged (E) No. 6 multired (E) No. 7 multired (E) No. 7 multired (E) No. 7 multired (E) No. 1 No. 7 multired (E) No. 1 No. 1 No. 1 Mo. 1 No. 1 Mo. 1 No. 1 Multired (E) No. 1 No. 1 No. 1 No. 1 Mo. 1 No. 1 No. 1 No. 1 No. 1 No. 1 No. 1 No. 1 <			110	۵	Inflight/GC	-	21/61	21/61		•	11-2	None. +NC: Londed to
D Inditigat/Set 19/16 19/16 1 1.2 No. 19 multired (E)* 10. D Inditigat/Set 19/16 1 1.2 No. 18 multired (E)* No. 18 multired (E)* D Inditigat/Set 19/16 1 1.2 No. 10 multired (E)* No. 10 multired (E)* No. 10 Inditigat/Set 19/16 19/15 1 1.2 No. 10 Inditigat/Set No. 10 No. 10 multired (E)* No. 10 Indited (E)* No. 10 No. 10 Traget No. 10 No. 10 No. 10 Marked (E)* No. 10 No. 10 <td>D Indlight/Sc 19/16 1 11-2 No. :0 multred (E) 1 No. :0 multred (E) No. :0 multred (E) No. :0 multred (E) No. :0 multred (E) No. :0 multred (E) No. :0 multred (E) No. :0 multred (E) No. :0 No. :0 multred (E) No. :0 multred (E) No. :0 11-2 No. :0 multred (E) No. :0 No. :0 11-3 No. :0 multred (E) No. :0 No. :0 11-3 No. :0 multred (E) No. :0 No. :0 11-3 No. :0 multred (E) No. :0 No. :0 11-3 No. :0 multred (E) No. :0 No. :0 11-3 No. :0 No. :0 No. :0 10 No. :0 No. :0 N</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>·</td> <td>No. 18 mistired (E)+</td> <td>verify previous data.</td>	D Indlight/Sc 19/16 1 11-2 No. :0 multred (E) 1 No. :0 multred (E) No. :0 multred (E) No. :0 multred (E) No. :0 multred (E) No. :0 multred (E) No. :0 multred (E) No. :0 multred (E) No. :0 No. :0 multred (E) No. :0 multred (E) No. :0 11-2 No. :0 multred (E) No. :0 No. :0 11-3 No. :0 multred (E) No. :0 No. :0 11-3 No. :0 multred (E) No. :0 No. :0 11-3 No. :0 multred (E) No. :0 No. :0 11-3 No. :0 multred (E) No. :0 No. :0 11-3 No. :0 No. :0 No. :0 10 No. :0 No. :0 N										·	No. 18 mistired (E)+	verify previous data.
D Inditight/GC 19/16 1 11-2 No. 7 multired (E)* No. 18 multired (E)* No. 7 No. 18 multired (E)* No. 18 No. 7 No. 10 11-2 No. 18 No. 10 No. 10 11-2 No. 10 No. 10 11-3 No. 10	D Indigen/Sc 19/16 1 11-2 No. 18 11-2 No. 18 11-2 No. 10 11-2 No. 10 11-2 No. 10 11-2 No. 10 11-2 No. 18 11-2 No. 10 11-2 No. 19 1 11-2 No. 10 No. 10 11-2 No. 10 11-3 No. 10 11-2 No. 18 11-3 No. 10 11-1 No. 18 No. 18 No. 10 11-2 No. 10 11-3 No. 10 11-3 No. 19 No. 19 No. 10 11-3 No. 19 No. 10 No. 10 11-3 No. 10 No. 10 No. 10 11-3 No. 10 No. 10 No. 10 11-3<											No. 19 misfired (E)+	11-2
D Indilget/CC 19/18 19/16 1 11.2 No. 18 19/16 1 11.2 No. 18 11.4 No. 18 19/16 1 11.2 No. 18 11.4 No. 18 19/16 1 11.2 No. 18 11.4 No. 18 19/15 1 11.2 No. 10 11.4 No. 10 11.12 No. 10 No. 10 11.4 No. 10 11.14 19/15 1 11.2 No. 10 11.12 No. 10 No. 10 11.4 No. 10 11.14 19/15 1 11.2 No. 10 11.14 19/15 1 11.2 No. 10 11.14 No. 10 10 11.3 No. 10 11.14 No. 10 11.14 10 No. 10 11.14 No. 10 11.4 10 No. 10 11.14 No. 10 11.2 No. 10 11.4 No. 10 11.1 19/15 1 11.2 No. 10 11.4 No. 10 11.1 19/15 1 11.2 No. 10 11.4 No. 10 11.2 No. 10 11.2 No. 10 11.4	D Indilge/GC 19/18 19/16 1 L1-2 No. 7 multired (E)* No. 18 multired (E)* 1 No. 7 No. 18 multired (E)* 1 No. 10 11.2 No. 10 11.3 No. 10 19/18 19/15 1 L1-2 Nip/Acca No. 10 No. 10 11.4 Nip/Acca No. 10 No. 10 11.4 Nip/Acca No. 10 No. 10 11.2 Nip/Acca No. 10 No. 10 11.2 No. 10 No. 10 No. 10 10.10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No.											RI-3	No. 18 charged on Flt 16
D Inflight/CC 19/16 1 1.1.2 No. 7 middred (E)* D Inflight/SV 19/16 1 1.1.2 No. 18 middred (E)* D Inflight/SV 19/15 19/15 1 1.2 Rip/Area No. 19 middred (E)* No. 18 middred (E)* No. 18 middred (E)* Target 19/15 1 1.2 No. 10 middred (E)* No. 18 middred (E)* No. 10 middred (E)* No. 19 middred (E)* No. 10 middred (E)* No. 19 middred (E)* No. 10 middred (E)* No. 18 middred (E)* No. 19 middred (E)* No. 18 middred (E)* No. 19 middred (E)* No. 18 middred (E)* No. 19 middred (E)* No. 18 middred (E)* No. 18 middred (E)* No. 18 middred (E)* No. 19 middred (E)* No. 18 middred (E)* No. 18 middred (E)* No. 18 middred (E)* No. 18 middred (E)* No. 18 middred (E)*	D Iadlugia/GC 19/18 19/16 1 1.2 No. 7 multired (E)* 1 D Iadlugia/GC 19/18 19/16 1 1.2 1 1.2 D Iadlugia/GC 19/18 19/15 1 1.1.2 1 1.3 Rip/Area No. 10 Indified (E)* No. 10 Indified (E)* 1 1.2 Rip/Area 1 19/15 1 1.1.2 No. 10 Indified (E)* Target 1 19/15 1 1.1.2 No. 10 Indified (E)* 1 Target 1 19/15 1 1.1.2 No. 10 Indified (E)* No. 10 D Indigue/Sy/ 19/16 19/15 1 1.2 No. 10 Indired (E)* No. 10 Indired (E)* No. 10 Indired (E)* No. 10 Indired (E)* No. 10 I.1.3 No. 10 Indired (E)* No. 10 I.1.3 No. 10 I.1.3 No. 10 I.1.3 No. 10 I.1.4 I											No. 6 misfired (E)*	No. 19 charged on Flt 19
D Inflight/GC 19/16 19/16 1 1.2 D Inflight/39/ 19/16 19/16 1 1.2 D Inflight/39/ 19/18 19/15 No. 10 18 multired (E)* D Inflight/39/ 19/18 19/15 1 1.2 No. 10 11 Target No. 2 Multired (E)* No. 10 No. 18 11 1 Target No. 19/18 19/15 1 1.1.2 No. 18 11 Target No. 18 No. 18 No. 18 11 1 Target No. 18 No. 18 No. 18 11 1 E No. 19 No. 18 No. 18 11 1 3 Comb No. 19 No. 18 No. 18 10 1	D Indigna/CC 19/16 1 1.1.2 No. 18 mathed (E)* No.											No. 7 misfired (E)*	RI-3
D Inflight/CC 19/16 1 1.2 No. 18 Initfleed (E)* No. 18 No. 18 Initfleed (E)* No. 10 Millight/W/ No. 10 Millied (E)* No. 10 No. 10 Millight/W/ 19/15 1 1.2 No. 10 Millight/W/ 19/16 19/15 1 1.2 No. 10 Millight/W/ 19/16 19/15 1 1.2 No. 10 Millight/SV 19/15 1 1.2 No. 10 Millight/SV 19/15 1 1.2 No. 10 Millight/SV 19/18 19/15 1 D Initight/SV 19/15 1 1.2 No. 10 Millight/SV 19/17 19/18 0 D Initight/SV 19/17 19/18 0 No. 10 No. 10 11-2 No. 10 10 No. 10 No. 10 11-2 No. 10 11-2 No. 10 No. 10 11-2 No. 10 11-3 No. 10 No. 10 No. 10 11-3 No. 10 No. 10 No. 10 No. 10 11-3 No. 10 No. 10 No. 10 11-3 No.	D Indlight/CC 19/16 1 11-2 No. 18 Indlight/W/ No. 18 Indlight(E) No. 10 Indlight(E) No. 10 Indlight(E) Image: No. 10 Indlight(E) No. 10 Image: No. 10 II No. 10 Image: No. 10 <												No. 6 and 7 charged on
D Indigen/CC 19/16 1 11-2 No. 18 mathed (E) No. D Indigen/Sy/ 19/16 19/16 1 11-2 No. 2 mathed (E) 1 D Indigen/Sy/ 19/18 19/15 1 11-2 No. 10 1 1 Rip/Areca No. 10 1 1 2 Target No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 1 1 2 No. 10 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 1 2 </td <td>D Inflight/CC 19/18 19/16 1 11-2 No. 18 No. 18 No. 18 No. 18 No. 18 No. 2 Midfred (E)* No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>FR 16.</td></t<></td>	D Inflight/CC 19/18 19/16 1 11-2 No. 18 No. 18 No. 18 No. 18 No. 18 No. 2 Midfred (E)* No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>FR 16.</td></t<>												FR 16.
D Indiget/Sy/ 19/18 19/15 1 11-2 No. 18 muttred (E)* No. 10 muttred (E)* No. 10 muttred (E)* No. 10 muttred (E)* Ny/Area No. 10 muttred (E)* No. 10 muttred (E)* No. 13 muttred (E)* Ny/Area No. 13 muttred (E)* No. 14 muttred (E)* No. 10 muttred (E)* No. 10 muttred (E)* No. 18 muttred (E)* No. 10 muttred (E)* No. 18 muttred (E)* No. 18 muttred (E)* No. 10 muttred (E)* No. 18 muttred (E)* No. 18 muttred (E)* No. 10 muttred (E)* No. 18 muttred (E)* No. 18 muttred (E)* No. 10 muttred (E)* No. 18 muttred (E)* No. 18 muttred (E)* No. 13 muttred (E)* No. 18 muttred (E)* No. 18 muttred (E)* No. 13 muttred (E)* No. 18 muttred (E)* No. 18 muttred (E)* No. 19 muttred (E)* No. 18 muttred (E)* No. 18 muttred (E)*	D Inflight/sy/ 19/18 19/15 1 11-2 No. 10 mathed (E)* No. 10 No. 10 Indired (E)* No. 10 19/15 1 11-2 Rip/Area No. 10 11-2 Rip/Area No. 10 11-2 No. 10 10/15 1 12 No. 10 11-2 No. 10 11-2 No. 10 11-2 No. 10 11-2 No. 10 10/15 1 12 No. 10 10/15 1 10/15 No. 10 11-2 No. 10 11-2 No. 10 10/15 1 10/15 No. 10 10/15 1 10/15 No. 10 10/15 1 10/15 No. 10 10/15 1		14 494			and the ACC		81/01	19/16		-	11-2	Nome MC. Loaded to
Att-IC D Inflight/Sy/ 19/18 19/15 1 11-2 No. 0 mathed (E) No. No. 10 11-2 Ny/vea Ny/vea No. 19/15 1 11-2 Ny/vea No. 19/15 1 11-2 Ny/vea No. 10 11-2 Ny/vea No. 10 11-2 No. 10 No. 10 No. 10 11-2 No. No. 10 No. 10 No. 10 11-2 No. No. 19/17 19/18 19/18 No. 19/17 19/18 No. No. 10 11-2 No.	AH-IG D Inflight(§)/ 19/18 19/15 1 11-2 No. 10 No. 10 No. 10 No. 10 No. 10 No. 10 Rip/Area Rip/Area No. 10 No. 10 No. 18 No. 18 Target No. 19/18 19/15 1 11-2 No. 10 No. 18 No. 18 No. 18 No. 18 AH-IG D Inflight(§)/ No. 18 No. 18 An-IG D No. 18 No. 18 No. 18 An-IG D No. 18 No. 18 No. 18 An-IG D No. 19 No. 18 No. 19 An-IG D No. 19 No. 19 No. 19 An-IG D No. 19 No. 19 No. 19 Anidreed (E) No. 19 No. 19 No. 19 No. 19 Anidreed (E) No. 19 No. 19 No. 19 No. 19 Anidreed (E) No. 19 No. 19 No. 19 No. 19 Anidreed (E) No. 19 No. 19 No. 19 No. 19 Anidreed (E) No. 19 No. 10 No. 10 No. 10		N 103		5	AN / MAILINE					•	No. 19 million of the	
Att-IC D Inflight/Sy/ 19/15 1 11-2 Att-IC D Inflight/Sy/ 19/15 1 11-2 Rip/Area Rip/Area No. 10 midfred (E)* No. 10 midfred (E)* Target No. 2 Midfred (E)* No. 10 Att-IC D Inflight/Sy/ 19/15 1 11-2 Att-IC D Inflied (E)* No. 18 No. 18 11red (E)* Att-IC D Inflied (E)* No. 18 No. 18 11red (E)* Att-IC D Inflied (E)* No. 19 11red (E)* Att-IC D Inflied (E)* No. 19 11red (E)* Attred D 19/17 19/18 0 11-2 Attred No. 19 No. 19 No. 19 11red (E)* Attred No. 19 No. 19 No. 10 11-3 Attred No. 19 No. 19 No. 18 No. 18	Alt-IG D Inflight/Sy/ 19/18 19/15 1 11-2 Alt-IG D Inflight/Sy/ 19/18 19/15 1 11-2 Rip/Area Rip/Area No. 10 No. 18 No. 18 11-2 Rip/Area No. 19/18 19/15 1 11-2 Rip/Area No. 10 No. 10 No. 18 No. 19/16 Alt-IC D Inflight/Sy/ 19/13 19/18 10/15 Alt-IC D Inflight/Sy/ 19/18 19/18 10/15 Alt-IC D Inflight/Sy/ 19/18 10/18 10/12 Alt-IC D Inflight/Sy/ 19/18 0 11-2 Alt-IC D Inflight/Sy/ 19/17 19/18 0 Alt-IC D Inflight/Sy/ 19/17 19/18 0 Alt-IC D Inflight/Sy/ 19/17 19/18 0 Alt-IC D Inflight/Sy/ 19/18 0 11-2 Alt-IC D Inflight/Sy/ 19/18 0 11-2 Alt-IC D Inflight/Sy/ 19/18 0 11-2 Alt-IC D Inflight/Sy/ 19/18 </td <td></td> <td>No. 15 milling (E)*</td> <td>verity previous data.</td>											No. 15 milling (E)*	verity previous data.
AH-IG D Inflight/Sy/ 19/16 19/15 1 1.2 No. 10 Nulfred (E)* No. 18 No. 18 11.2 RIP/Area No. 19 11.2 No. 18 11.2 Target No. 18 11.2 No. 18 11.4 AH-IG D Inflight/Sy/ 19/18 19/15 1 1.2 AH-IG D Inflight/Sy/ 19/18 19/15 1 1.2 AH-IG D Inflight/Sy/ 19/18 19/15 1 1.2 AH-IG D Inflight/Sy/ 19/17 19/18 0 1.2 AH-IG D II 19/18 0 1.2 AH-IG D II II II II AH D II II II II AH D II	AH-IC D Inflight/Sy/ 19/15 1 11-2 No. 10 Multiced (E) No. 10 11-2 Rip/Area No. 10 11-2 Target No. 10 11-3 Target No. 10 11-3 AH-IC D Inflight/Sy/ 19/15 1 Target No. 2 Multiced (E) No. 10 No. 10 Multiced (E) No. 2 Multiced (E) No. 10 Multiced (E)								\ `			No. 7 mident (PA	No. 19 abound on Pt 16
AH-IG D Inflight/Sy/ Np/Area 19/18 19/15 1 1.2 Np/Area Np/Area No. 10 midleed (E)* Np/Area No. 13 midleed (E)* No. 2 midleed (E)* No. 3 midleed (E)* No. 10 midleed (E)*	Att-IG D Inflight/Sy/ Rlp/Area 19/18 19/15 1 1-2 Rlp/Area Rlp/Area No. 18 midfred (E)* No. 18 midfred (E)* Target No. 10 midfred (E)* No. 18 midfred (E)* Att-IG D Inflight/Sy/ 19/17 19/18 Att-IG D Inflight/Sy/ 19/17 19/18 11-2 No. 10 midfred (E)* No. 18 midfred (E)* No. 18 midfred (E)* No. 18 midfred (E)* Att-IG D Inflight/Sy/ 19/17 19/18 0 11-2 Att-IG D Inflight/Sy/ 19/17 19/18 0 11-2 No. 18 midfred (E)* No. 18 midfred (E)* No. 18 midfred (E)* No. 19 midfred (E)* No. 8 midfred (E)* No. 8 midfred (E)* No. 8 midfred (E)*								4			No. 8 midled (E)+	RI-3
AH-IG D Inflight/Sy/ 19/18 19/15 1 11-2 Rip/Area Rip/Area No. 18 midfred (E)* Rip/Area No. 2 midfred (E)* No. 3 No. 18 midfred (E)* No. 10 No. 18 midfred (E)* No. 10 Inflight/Sy/ AH-IG D Imaged No. 19 No. 10 Imaged (E)* No. 10 No. 18 No. 18 No. 18 No. 19 No. 18 No. 19 No. 19	AH-IG D Inflight/Sy/ 19/16 19/15 1 1-2 RIp/Area Rp/Area No. 18 No. 18 11.3 Target No. 2 Midfred (E)* No. 18 11.3 AH-IG D Inflight/Sy/ 19/17 19/18 0 AH-IG D No. 18 No. 18 No. 19 AH-IG No. 19 No. 19 No. 19 No. 19 AH-IG D No. 19 No. 19 No. 19 AH D 19/18 0 11-2 AH No. 19 No. 19 No. 19 No. 19 AH No. 19 No. 10 No. 10 No. 10			ė.	/	•	V					No. 10 misfired (E)	No. 7 and 8 charged on
AH-IG D Inflight/Sy/ Rp/Area 19/18 19/15 1 1-2 Rp/Area Rp/Area No. 18 No. 18 Noi 19	All-IG D Inflight/Syl 19/18 19/15 1 1-2 Rtp/Area Rtp/Area No. 18 No. 18 No. 18 Mathred (E)* Target No. 2 Mathred (E)* No. 18 No. 19 No. 19 Alt-IG D Inflight/Syl 19/17 19/18 0 11-2 Alt-IG D Inflight/Syl 19/17 19/18 0 11-2 Comb Comb No. 19/17 19/18 0 11-2 No. 19 No. 19 Alt-IG D Inflight/Syl 19/17 19/18 0 11-2 Comb Comb No. 19 No. 19 No. 19 No. 19 No. 19			-									Flt 16 and 17.
Att-10 D Intigent/syl 19/10 19/10 19/10 19/10 19/10 10/10 11/10 18 Intified (E)* No. 19 No.	Art-Lo D Image/sy/ hp/Area D/Area D/Area <thd area<="" th=""> <thd area<="" th=""> D/A</thd></thd>												
No. 10 matred (E)* No. 10 matred (E)* No. 10 matred (E)* No. 3 matred (E)* No. 10 matred (E)* No. 10 matred (E)* No. 10 matred (E)* No. 18 matred (E)* No. 18 matred (E)* No. 18 matred (E)* No. 19 matred (E)* No. 19 matred (E)* No. 8 matred (E)* N	All-IG D Inflight/Sy/ 19/17 19/18 0 11-2 Comb No. 19/17 19/18 0 11-2 No. 18 minfred (E)* No. 19 18 No. 19 minfred (E)* No. 1	-) 	2	mingm/sy/		01/61	C1/61		-		None. The Londed to
Alt-IC D Indige/(E)* No. 19/17 19/18 0 11-2 Comb No. 18 minfred (E)* No. 19 minfred (E)* No. 19 minfred (E)* No. 19 minfred (E)* No. 8 minfred (E)* No. 8 minfred (E)*	Alt-IG D Indlight/Sy/ 19/17 19/18 0 11-2 Comb No. 18 mintleed (E)* No. 18 mintleed (E)* No. 18 mintleed (E)* No. 18 mintleed (E)* No. 19 mintleed (E)* No. 19 mintleed (E)* No. 19 mintleed (E)* No. 19 mintleed (E)* No. 8 mintl					Kip/Arca Tareet						No. 18 millied (E)*	verify previous data.
Alt-IG D Indlight/Sy/ 19/17 19/18 0 11-2 Comb 19/17 19/18 0 11-2 No. 18 mintleed (E)* 1 No. 8 mintleed (E)* 1	Alt-1G D Indlight/Sy/ 19/17 19/18 0 11-2 Alt-1G D Indlight/Sy/ 19/17 19/18 0 11-2 Comb No. 18 No. 18 No. 18 No. 18 No. 18 No. 10 Indlight/Sy/ 19/17 19/18 0 11-2 No. 18 No. 19 No. 18 No. 19 No. 19 No. 19 No. 19 No. 19 No. 19 No. 19 No. 19 No. 19 No. 19 No. 19 No. 19 No. 19 No. 19 No. 19 No. 19 No. 19											No. 7 minfired (E)*	No. 18 charged on Flt 16
No. 10 mathed (E)* No. 18 mathed (E)* No. 18 mathed (E)* No. 18 mathed (E)* No. 18 mathed (E)* Comb 0 L1-2 No. 19 No. 18 mathed (E)* Comb No. 18 mathed (E)* No. 19 No. 19 No. 19	No. 10 midfed (E)* No. 18 midfed (E)* No. 18 midfed (E)* No. 18 midfed (E)* Comb No. 19 Comb No. 19 No. 19 midfed (E)*					P						No. 8 misfired (E)+	RI-3
Alt-IG D Inflight/Sy/ 19/17 19/18 0 11-2 No. 18 minfleed (E)* 7 Comb Comb No. 19 minfleed (E)* No. 19 minfleed (E)* No. 19 minfleed (E)* 1	AH-IG D Inflight/Sy/ 19/17 19/18 0 11-2 No. 18 minfleed (E)* 1 Comb No. 19 No. 19 No. 19 No. 19 Inflifed (E)* 1 R1-3 No. 19 No. 19 No. 19 No. 19 No. 19 No. 19				. '							No. 10 mistired (E)*	No. 7 and 8 charged on
AH-IG D Indigin/Sy/ 19/17 19/18 0 11-2 Comb No. 18 minfred (E)* No. 19 minfred (E)* No. 19 minfred (E)* No. 8 minfred (E)* 1 No. 8 minfred (E)* 1	Alt-IG D Indiigle/Sy/ 19/17 19/18 0 LI-2 Comb No. 18 minfred (E)* No. 19 minfred (E)* 1 No. 19 minfred (E)* 1 RI-3 No. 8 minfred (E)* 1				·	•						No. 18 misfired (E)	Fit 16 and 17
AH-IG D Inflight/Sy/ 19/17 19/18 0 LI-2 Comb No. 18 minfred (E)* V No. 19 minfred (E)* L	All-IG D Inflight/Sy/ 19/17 19/18 0 LI-2 No. 18 Inflifted (E)* v<									Υ.			No. 10 charged on Fl: 21
No. 18 minfired (E)* v No. 19 minfired (E)* L RJ-3 No. 8 minfired (E)* P	No. 18 midfred (E)* v No. 19 midfred (E)* L RI-3 No. 8 midfred (E)*				Q	Inflight /Sy/		19/17	19/18		•	11-2	None. *NC: Loaded to
No. 19 mintired (E)* L RJ-3 No. 8 mintired (E)*	No. 19 minfired (E)* L RJ-3 No. 8 minfired (E)*					Comb						No. 18 mistired (E)+	verify previous data.
RJ-3 No. 8 minfired (E)+	RU-3 No. 8 minfired (E)*						,					No. 19 mistired (E)+	LI-2
\ _	ـ						2)					RI-3	No. 18 charged on Fht 16
EN .	RI-3 No. 8 charged on Flk 17.					/						No. 8 misfired (E)+	No. 19 charged on Flt 19
	No. 8 charged on Flt 17.												RI-3

	RO-4 C Malfunction Action Tuken/Remarks	-19/17 3 L1-2 Due to the magnitude of	No. 18 misfired (E)* electrical shorts, the No.	No. 19 minfired (E)* 4 launcher was used to re-	No. 3 contact pin failed place the No. 3 launcher.	RI-4 For the purpose of this re-	No. 11 minfired (E) post the arrow indicates	No. 15 mintired (E) mounting on the AH-1G	RI and UH-IC right. The	· total rockets per launcher	is correctly indicated.	•NC:	No. 18 and 19 are charact	on Fit 16 and 19.	- 19/1/ 0 LI-2 Note: The sector reactions data.	11 misfired (E)*	No. 15 misthed (E)+ R14	and snap ring broke. No. 11 and 15 charged	on Fk 24.	- 19/17 1 LJ-2 None. +NC: Loaded to	No. 18 misfired (E)+ verify previous data.	led	No. 3 contact pin failed* No. 18 charged on Fit 16.	RI-4 No. 3 charged on Flt 24.	No. 11 midfred (E)+ RI-4	No. 15 missired attributed No. 11 and 15 charged on	to broken snap ring* Fit 24.	
2.75 Rockets Loaded/Expended	LI-2 Center RI-3	19/18 X X 81/61													 19/161					1→ X 81/61								
	Fh Conditions LO-1	Hover/Sy/Comb.													Hover/Sy/Comb					Inflight/Sy/S/D	Var	1						
	D/N	۵													2					٥								
	Acfi	AH-1G								•					VH-1C					AH-1G								
Card	No.	. 0													V6					13				+				
1	No.	24								• •					25					26				•				

No. No. <th>6 8</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>A second more second and a second sec</th> <th>C. / D ROCKER LOADED/ LY DE HOE</th> <th>LX PC HOCO</th> <th></th> <th></th> <th></th> <th></th>	6 8						A second more second and a second sec	C. / D ROCKER LOADED/ LY DE HOE	LX PC HOCO				
18 A11-1G D Infliget/Sy/Rup P 19/16 0 N1-4 midled (2)* N 19 A11-1G N Infliget/Sy/Comb/ 18/17 X 19/16 1 11.2 No. 15 midled (2)* N 19 A11-1G N Infliget/Sy/Comb/ 18/17 X 1 11.2 No. 16 context (0)* No. 1 20 A11-1G N Infliget/Sy/Comb/ 19/18 X 1 11.2 No. 16 context (0)* No. 14 context (0)	-	No.	Acft	D/N	CONTRACTOR OF	LO-1	LI-2	Center	RI-3	RO-4	C	Malfunction	Action Taken/Remarks
19 Alt-IC N Indified (2)* No. 15 Indified (2)* No. 15 20 Alt-IC N Indified (2)* No. 10 Indified (2)* No. 11 20 Alt-IC N Indified (2)* No. 11 No. 11 Indified (2)* No. 11 20 Alt-IC N Indified (2)* No. 10 No. 10 No. 10 Indified (2)* 20 Alt-IC N Indified (2)* No. 10 No. 10 No. 10 Indified (2)* 20 Alt-IC N Indified (2)* No. 10 No. 10 No. 10 Indified (2)* 20 Alt-IC N Indified (2)* No. 10 No. 10 No. 10 Indified (2)* 21 Indified (2)* No. 10 No. 10 No. 10 No. 10 Indified (2)* 22 Alt-IC N Indified (2)* No. 10 No. 10 No. 10 Indified (2)* 23 Alt-IC N Indified (2)* No. 11 No. 10 No. 11 Indified (2)* 24 ILI-IC N Indified (2)* No. 1 No. 10 No. 1 No. 1 25 ILI-IC N Indified (2)* No. 1 No. 1 <t< td=""><td></td><td>81</td><td>AH-1G</td><td>9</td><td>Inflight/Sv/Rip</td><td></td><td>61/61 °</td><td></td><td>××</td><td>19/18</td><td>0</td><td>KI-4</td><td>None. +NC: Loaded to</td></t<>		81	AH-1G	9	Inflight/Sv/Rip		61/61 °		××	19/18	0	KI-4	None. +NC: Loaded to
19 A11-1G N Inflight/Sy/Comb/ 18/17 X ← 19/10 1 1.2 20 A11-1G N Inflight/Sy/Comb/ 18/17 X ← 19/10 1 1.2 20 A11-1G N Inflight/Sy/Comb/ 19/18 X ← 19/10 1 1.2 20 A11-1G N Inflight/Sy/Comb/ 19/18 X ← 19/10 1 1.2 20 A11-1G N Inflight/Sy/Comb/ 19/18 X ← 19/10 2 1.2 20 A11-1G N Inflight/Sy/Comb/ 19/18 X ← 19/10 2 1.2 20 A11-1G N Inflight/Sy/Comb/ 19/18 X ← 19/10 2 1.2 20 A11-1G N Inflight/Sy/Comb/ 19/18 X ← 19/10 1 1.2 21 Utb Rth No.19 No.19 No.19 No.19 0.10 21 Utb Satt/Comb/ 19/18 X ← 19/10 1 1.4 2 1.4 22 Utb No.16 No.18 No.14 No.14 1.4 1.4 23 Utb No.16 No.14 No.14 1.4 1.4 24 D10												No. 11 midired (E)+	verify previous data.
19 A11-1G N Inflight/Sy/Comb/ 18/17 X 19/16 1 11-2 20 A11-1G N Inflight/Sy/Comb/ 19/18 X 19/16 1 11-2 20 A11-1G N Inflight/Sy/Comb/ 19/18 X 11-2 No. 15 constrat (P)* No. 10 20 A11-1G D Rup 19/16 Z 11-2 No. 15 constrat (P)* No. 14 constrat (P)* No. 14 constrat (P)* No. 14 constrat (P)* 21 U11-1C D Satte/Comh/ 9/8 XMS 9/9 No. 14 constrat pn failed 22 U11-1C D Satte/Comh/ 9/8 XMS 0/10 No. 14 constrat pn failed 23 U11-1C D Satte/Comh/ 9/8 No. 10 No. 14 constrat pn failed 24 D No. 15 No. 14 No. 14 No. 14 No. 14 24 D 10/10 10/10 No. 14 No. 14 No. 14 25 D 10/10 10/10												No. 15 misfired (E)+	84
19 All+IG N M0lget/Sy/Comb/ 18/17 X ← 19/16 1 11-2 No. 18 midned (B* 20 All+IG N Inhibited (B* No. 15 midned (B* No. 15 midned (B* 20 All+IG N Inhibited (B* No. 15 midned (B* No. 15 midned (B* 20 All+IG N Inhibited (B* No. 10 compact pin failed 20 All+IG N Inhibited (B* No. 10 compact pin failed 20 All+IG N Inhibited (B* No. 10 compact pin failed 21 N N I 11-2 No. 10 compact pin failed 22 All+IG N Inhibited (B* No. 10 compact pin failed 23 N N N No. 10 compact pin failed 24 No. 11 N No. 10 compact pin failed 25 UH+IC N No. 10 compact pin failed 26 All+IG No. 11 11-2 27 UH+IC N No. 10 No. 14 compact pin failed 26 No. 10 No. 10 No. 14 compact pin failed 27 UH+IC N No. 10 11-12 28 No. 14 No. 14 compact pin failed 29 <td< td=""><td></td><td></td><td></td><td></td><td></td><td>//</td><td></td><td></td><td></td><td></td><td></td><td>•</td><td>No. 11 and 15 charged</td></td<>						//						•	No. 11 and 15 charged
19 All-LG N Miliget/Sy/Comb/ 18/17 X (19/16 1 L1-2 No. 18 Indired (B)* No. 20 All-LG N Indired (B)* No. No. 10 Indired (B)* No. 20 All-LG N Indired (B)* No. 10 10 20 20 All-LG N Indired (B)* No. 10 10 20 20 All-LG N Indired (B)* No. 10 11.2 No. 10 20 All-LG N Indired (B)* No. 10 11.2 No. 10 20 All-LG N Indired (B)* No. 10 10 11.2 11 21 No. R1 No. 10 10 No. 11 12 20 All-LG N Indired (B)* No. 10 12 11 12 21 No. Indired (B)* No. 10 12 No. 10 12 21 No. Indired (B)* No. 10 12 12 12 12 21 No. Indired (B)* No. 10												١	on Fh 24.
(Inco) Rup Rup No. 18 multired (B* No. 20 Alt-IC N Initiated (B* No. 16 contact pin failed 20 Alt-IC N Initiated (B* No. 16 contact pin failed 20 Alt-IC N Initiated (B* No. 16 contact pin failed 20 Alt-IC N Initiated (B* No. 18 multired (B* No. 19 multired (B* 20 Alt-IC N Initiated (B* No. 19 multired (B* No. 10 multired (B* Mo. 11 multired (B* No. 11 multired (B* </td <td></td> <td>2</td> <td>AH-1G</td> <td>z</td> <td>Inflight/Sy/Comb/</td> <td></td> <td>18/17</td> <td></td> <td>1</td> <td>19/16</td> <td>-</td> <td>LI-2</td> <td>None. •NC: Londed to</td>		2	AH-1G	z	Inflight/Sy/Comb/		18/17		1	19/16	-	LI-2	None. •NC: Londed to
No. It inifficed (E) No. It inite init init				(flares)	Rip							No. 18 misfired (E)+	verify previous data.
20 All-IG N Indited (B) No. 15 Indited (B) No. 15 No. 16 Consact plu failed 20 All-IG N Indited (B) No. 19/16 2 II-2 U 20 All-IG N Indited (B) No. 18 No. 18 No. 18 No. 19 21 N N No. 19/16 Z II-2 No. 11 No. 13 No. 13 No. 14 No. 14 No. 14 No. 14 No. 14 No. 15 No. 14 No. 15 No. 14 No. 15 No. 14 No. 15 No. 15 No. 15 No. 15 No. 15 No. 14 No. 15 No. 15 No. 14												R-4	LI-2
20 Att-IC N Inflight/Sy/Comb/ 19/18 X (•									No. 11 minfired (E)+	No. 18 charged on Flt 16.
20 AH-IC N Inflight/Sy/Comb/ 19/18 X (19/16 2 L1-2 No. 18 mathed (E) 3 (no Rp Rp No. 19/16 2 L1-2 No. 19 hacked off 4 (no Rp No. 11 mathed (E) No. 11 mathed (E) 4 (no R1-4 No. 11 mathed (E) 6 4 (no R1-4 No. 11 mathed (E) 6 4 (no Static/Comb/ 9/8 XMS 9/9 1 L1-2 (no Static/Comb/ 9/8 XMS 9/9 1 No. 14 comact pin failed R (no Compatibility XMS 10/10 10/10 No. 8 mathed (E) No. 14 comact pin failed (no A 0/10 0/10 10/10 No. 14 comact pin failed No. 14 comact pin failed (no A 10/10 10/10 No. 1 No. 14 comact pin failed (no A 0/10 0/10 0/10 No. 1 No. 11 mather												No. 15 misfired (E)+	-
20 AH-IG N Inflight/Sy/Comb/ 19/18 X (,	•						•	No. 10 contact pin failed	
20 AH-IC N Influed (E) No. 18 Maffred (E) No. 18 Maffred (E) No. 18 Maffred (E) No. 19 No. 11 Maffred (E) No. 11 No. 11 No. 14 No< 14						a .							
(no) Rudfred (E)* No. <	•	20	21-HV		Inflight/Sy/Comb/		19/18		X (91/61	~	11-2	Upon completion of Flt
Tarea) Ro. 19 knocked of contact from blart No. 11 midfeed (E)* Li 7 UH-IC D Static/comb/ 9/8 XMS 9/9 1 L2 No. 14 contact pln failed 80 AH-IC D Static/comb/ 9/8 XMS 9/9 1 L2 No. 8 midfeed (E)* N 80 AH-IC D Influgid/Sy/Rup 0/0 0/0 9/9 5 RO-4 N 80 AH-IC D Influgid/Sy/Rup 0/0 0/0 0/0 8 No. 11 midfeed (E) N 80 AH-IC D Influgid/Sy/Rup 0/0 0/0 0/0 8 No. 11 midfeed (E) No. 11 midfeed (E) No. 11 midfeed (E) No. 15 midfeed (E) No. 15 midfeed (E) No. 5 No. 15 midfeed (E) No. 5 No. 5 No. 5 No. 5 No. 5 No. 10 No. 5 No. 10 <td></td> <td></td> <td></td> <td>01</td> <td>Rip</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>No. 18 misfired (E)+</td> <td>30, all launchers were</td>				01	Rip							No. 18 misfired (E)+	30, all launchers were
7 UH-IC D Static/Comb/ 9/8 XMS 9/9 1 L1-2 No. 13 midfred (E)+ L1 7 UH-IC D Static/Comb/ 9/8 XMS 9/9 1 L1-2 No. 14 contact pin failed 8 AnH-IC D Static/Comb/ 9/8 XMS 9/9 1 L1-2 No. 14 contact pin failed 80 AH-IC D Infligit/S//Rip/ 0/0 0/0 0/0 9/9 5 NO-4 N 80 AH-IC D Infligit/S//Rip/ 0/0 0/0 0/0 9/9 5 NO-4 N 80 AH-IC D Infligit/S//Rip/ 0/0 0/0 0/0 0/0 No. 11 midfred (E) 80 AH-IC D Infligit/S//Rip/ 0/0 0/0 0/0 No. 13 Midfred (E) 80 AH-IC D Infligit/S//Rip/ 0/0 0/0 0/0 No. 14 Model 80 AH-IC D Infligit/S//Rip/ 0/0 0/0 No. 14 Model 80 Interal C.G. 0/0 0/0 0/0 0/0 No. 14 Model			-	(lares)								No. 19 knocked off	disassembled, repaired
7 UH-IC D Static/Comb/ 9/8 XMS 9/9 I IL-2 No. 11 midfred (E)* d. 7 UH-IC D Static/Comb/ 9/8 XMS 9/9 I IL-2 No. 14 contact pin failed 8 Advise 10/10 10/10 10/10 No. 14 contact pin failed R 80 Ah-IC D Influid/S//Rip/ 0/0 0/0 9/9 5 RO-4 No. 11 midfred (E) 80 Ah-IC D Influid/S//Rip/ 0/0 0/0 0/0 No. 15 No. 15 No. 16 80 Ah-IC D Influid/E//Rip/ 0/0 0/0 0/0 No. 16 No. 15 No. 16												contact from blast	and reassembled. +NC:
7 UH-IC D Static/Comb/ 9/8 XMS 9/9 I LI-2 No. 14 contact pin failed 8 Compatibility XMS 10/10 10/10 10/10 No. 8 multired (E) N 8 A 0/10 0/10 10/10 No. 8 No. 14 contact pin failed 8 A 0/10 10/10 10/10 No. 8 No. 16 N 90 Ah-1C D Infligit/Sy/Rip/ 0/0 0/0 0/0 No. 11 No. 15 No. 15 Ifteed (E) No. 15 No. 15 No. 15 No. 15 No. 15 No. 15 No. 5 contact pin failed No. 9 Scotact pin failed No No 0/0 0/0 0/0 0/0 0/0 No. 15 No. 15 Scotact pin failed No. 9 Scotact pin failed No No No No No No No. 15 No. 16 No. 5 No. 16 No. 5 No. 16 No. 9 No. 16 No. 16 No. 9<												RI-4	Loaded to verify previous
7 UH-IC D Static/Comb/ Compatibility XMS 9/8 XMS 9/9 1 L-2 No. 14 contact pin failed N 30 AH-IC D Static/Comb/ Compatibility XMS 10/10 10/10 No. 8 minfred (E) N 30 AH-IC D Influid / 5//Rup/ Lateral C.G. 0/0 0/0 0/9 5 RO-4 N 1 Lateral C.G. 0/0 0/0 0/0 0/9 5 RO-4 N 1 Lateral C.G. 0/0 0/0 0/0 0/0 No. 11 minfred (E) No. 15 minfred (E) No. 5 contact pin failed No. 5 contact pin failed No. 5 contact pin failed No. 16 contact pin failed							/					No. 11 misfired (E)+	data.
7 UH-IC D Stattc/Comb/ 9/8 XM5 9/9 1 LI-2 No. 14 contact pin failed 8 Compatibility XM5 10/10 10/10 10/10 No. 8 minfred (E) N 30 AH-IC D Infligit/Sy/Rip/ 0/0 0/0 0/0 9/9 5 RO-4 30 AH-IC D Infligit/Sy/Rip/ 0/0 0/0 0/0 10/18 No. 11 minfred (E) 30 AH-IC D Infligit/Sy/Rip/ 0/0 0/0 0/0 10/8 No. 11 minfred (E) 30 AH-IC D Infligit/Sy/Rip/ 0/0 0/0 0/0 10/8 No. 11 minfred (E) 30 AH-IC D Infligit/Sy/Rip/ 0/0 0/0 10/8 No. 11 minfred (E) 30 AH-IC D Infligit/Sy/Rip/ 0/0 0/0 10/8 No. 11 minfred (E)				•								No. 15 misfired (E)+	11-2
7 UH-IC D Static/Comb/ 9/8 XM5 9/9 1 LI-2 No. 8 minfred (E) Compatibility XM5 10/10 10/10 No. 8 minfred (E) No. 8 minfred (E) No. 1 minfred (E) No. 1 minfred (E) No. 15 minfred (E) No. 5 contact pin failed No. 9 contact pin failed No. 9 contact pin failed No. 16 contact pin fa												No. 14 contact pin failed	No. 18 charged on Flt 16.
7 UH-IC D Static/Comb/ 9/8 XM5 9/9 1 LI-2 No. 8 muffred (E) Compatibility XM5 10/10 10/10 No. 8 muffred (E) No. 8 muffred (E) No. 1 muffred (E) No. 1 muffred (E) No. 1 muffred (E) No. 5 contact pin failed No. 9 contact pin failed No. 9 contact pin failed No. 16 contact pin fail													R4
7 UH-IC D Static/Comb/ 9/8 XM5 9/9 1 LI-2 No. 8 minfred (E) Compatibility XM5 10/10 10/10 No. 8 minfred (E) 30 AH-IC D Infligit/5//Rip/ 0/0 0/0 0/0 9/9 5 RO-4 No. 11 minfred (E) Lateral C.G. 0/0 0/0 0/0 10/8 No. 15 minfred (E) No. 5 contact pin failed No. 16 contact pin failed No. 16 contact pin failed No. 16 contact pin failed													No. 11 and 15 charged on
7 UH-IC D Static/Comb/ Compatibility XMS 9/8 XMS 9/9 1 LJ-2 Compatibility XMS 10/10 10/10 10/10 10/10 No. 8 maffred (E) 30 AH-IC D Infligit/Sy/Rip/ 0/0 0/0 9/9 5 RO-4 30 AH-IC D Infligit/Sy/Rip/ 0/0 0/0 0/0 No. 11 milfred (E) No. Lateral C.G. 0/0 0/0 0/0 No. 10/16 No. 15 milfred (E) No. Lateral C.G. 0/0 0/0 0/0 No. 10/16 No. 5 contact pin failed	2					••							Fh 24.
30 AH-1C D Infligit/S/Rip/ 0/0 0/0 9/9 5 RO-4 30 AH-1C D Infligit/S//Rip/ 0/0 0/0 9/9 5 RO-4 1 Lateral C. C. 0/0 0/0 0/0 10/18 No. 11 Init/red (E) No. 15 No. 10 10/8 No. 10 16/16	_	1	UH-1C	۵	Static/Comb/		9/8	XMS	6/6		-	п-2	None
30 AH-1C D Infligit/57/Rip/ 0/0 0/0 0/0 9/9 5 RO-4 Lateral C.G. 0/0 0/0 0/0 10/8 No. 11 midfred (E) No. 15 midfred (E) No. 15 midfred (E) No. 15 midfred (E) No. 5 contact pin failed					Compatibility XM5		01/01		01/01			No. 8 minfired (E)	
0/0 0/0 0/0	N	30	AH-1G	6		0/0	0/0		0/0	6/6	s	RO-4	None
No. 15 minfred (E) No. 5 contact pin failed No. 9 contact pin failed No. 16 contact pin failed			2			0/0	0/0		0/0	8/0		No. 11 misfired (E)	
No. 5 contact pin failed No. 9 contact pin failed No. 16 contact pin failed						•						No. 15 misfired (E)	/
No. 9-contact pin failed					1	/						No. 5 cottact pin failed	
												No. 9 contact pin failed	

	/Comb // 9/9 8// 9/9 10/9	9/9	0/01	10/7		 L1-2 No. 8 multired (E)* R1-3 No. 13 contact pin failed L0-1 No. 13 contact pin failed No. 11 multired (E)* No. 15 multired (E)* No. 15 contact pin inop* No. 16 contact pin inop* No. 16 contact pin inop* 	None. +NC: Loaded to verify previous data. LI-2 No. 8 charged on Flt 31.
		6 a	ŝ	1 - L/6		No. 8 muttred (E)+ RI-3 No. 19 contact pin failed LO-1 No. 8 muttred (E)+ No. 11 muttred (E)+ No. 15 muttred (E)+ No. 5 contact pin inop+ No. 16 contact pin inop+ No. 16 contact pin inop+	verify previous data. Li-2 No. 8 charged on Flt 31.
		1	a	9/7 10/7		 No. 19 contact pin failed No. 19 contact pin failed No. 8 minflred (E)+ No. 11 minflred (E)+ No. 15 minflred (E)+ No. 15 contact pin inop+ No. 16 contact pin inop+ 	No. 8 charged on Flt 31.
		9	a	10/7		LO-F No. 8 minfired (E) RO-4 No. 11 minfired (E)+ No. 15 minfired (E)+ No. 5 contact pin inop+ No. 16 contact pin inop+ No. 16 contact pin inop+	
		9	¢	10/2		No. 8 minfired (E) RO-4 No. 11 minfired (E)+ No. 15 minfired (E)+ No. 5 contact pin inop+ No. 16 contact pin inop+ No. 16 contact pin inop+	None. +NC: Loaded to
			a			 RO-4 No. 11 minfired (E)* No. 15 minfired (E)* No. 5 contact pin imop* No. 9 contact pin imop* No. 16 contact pin imop* 	verify previous data.
			¢			No. 11 misfired (E)+ No. 15 misfired (E)+ No. 5 contact pin inop+ No. 9 contact pin inop+ No. 16 contact pin inop+	RO-4
		Г. 9 Г. 9	¢			No. 15 misfired (E)+ No. 5 contact pin inop+ No. 9 contact pin inop+ No. 16 contact pin inop+	No. 11, 15, 5, 9, 16
			•			No. 5 contact pin inop* No. 9 contact pin inop* No. 16 contact pin inop*	charged on Flt 32.
		9				No. 9 contact pin inop* No. 16 contact pin inop*	
			Ň			the sector and the sector and the sector and	•
						/	None +NC: 1 orded to
		. X		10/7		No. 18 minflred (E)+	verify previous data.
		N			,	No. 8 contact pin failed	1-0-1
					•	R0-4	No. 18 charged on Flt 34.
		N				No. 11 minfred (E)+	RO-4
						No. 15 minfred (E)+	No. 11, 15, 5, 9, 16
				\		No. 5 contact pin inop+	charged on Flt 32.
						No. 16 contact pin inop*	
D Inflade / Sv /		14/14	14/14			3	Nome INC. Loaded to
		6/6	117			No. 2 contact nin failed	
						No. 19 contact pin failed	u-2
	U	•				No. 8 minfired (E)+	No. 8 charged on Fk 31.
UILIC N Inflight/Sy/		9/8	9/8			u-2	None. +NC: Loaded to
(tares)		•				No. 3 contact pin failed	verify previous data.
						No. 2 contact pin mop+	11-2
					-	RI-3	No. 2 charged on Flt 36.
					. \	No. 2 contact pin fuiled	
21A UII-1C N. Inflight/Sy/		01/01	10/10	0		RI-3	None. *NC: Londed to
2						No. 19 contact pin inop*	verify previous data.
flares)							RL3

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CHARGEABLE FAILURES SUMMARY

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Launcher No.	1	2	3	4	Total per type of failure
Contact Pin Failures	. 4	12	6	5	27
Tube Electrical Short Circuits	2	6	17	7	32
Wires Burned Off Contacts			1		1
Sprung Contacts			1		1
Snap Ring Failures				1	1
Off Contacts		1		1	2
Total per launcher	6	14	<u></u> 25	14	
Total Chargeable Failures	· · ···				

Fotal Chargeable Failures

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Part C. Equipment Performance Reports (EPR's).

1. EPR KF-1: Electrical Firing Contact Locking Pin. The small pin which locks the contact shaft in the clear or armed detent breaks. The shaft must be rotated to arm, load, and unload the rocket. Wear on the pin is caused by the rotation of the shaft; however, the pins are broken when the rocket is launched. This breaking is attributed to the rocket blast. The pin could not be replaced. The tube and contact assembly required replacement, thus requiring excessive maintenance. This condition occurred 11 times while firing 855 rockets from 4 launchers.* The mean number of rockets launched per tube per failure was approximately 11. Recommend a more rugged, replaceable pin be provided.

2. <u>EPR KF-2</u>: Electrical Wiring. Insulation on the electrical wire to electrical firing contact deteriorated when the rockets were launched. The wire was then exposed or damaged, thus causing electrical shorts to the tube, resulting in misfires. Also, during operation of the contacts while loading, unloading, and arming, the wire was damaged. The present arrangement requires inspection after each launching, and excessive maintenance and repairs are required. This condition occurred 32 times while firing 855 rockets from 4 launchers.** The mean number of rockets launched per tube per failure was approximately seven. Recommend a wire protected with a more durable insulation be provided.

3. EPR KF-3: Electrical Wiring. The electrical wiring within the launcher from the individual firing contact to the aircraft quickdisconnect was routed between the rocket tubes. The rockets when launched created enough heat to damage the wiring insulation. Stray voltage occurred. The launcher required component disassembly for maintenance of the w.rf g. During reassembly of the launcher, the end-play of the wires allowed the wires to flex, resulting in wires being bound between the tubes and/or the launcher and the rear bulkhead, and causing damage to the insulation. Stray voltage could again be encountered. Recommend the wires be rerouted from the rear of the launcher aircraft quick-disconnect through a conduit mounted externally on the launcher.

*At the conclusion of the test, this condition had occurred 27 times while firing 1,864 rockets from 4 launchers. **At the conclusion of the test, chargeable electrical malfunctions had

occurred 32 times while firing 1,864 rockets from 4 launchers.

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Part D. Flight Safety Release

C-O-P-Y

DEPARTMENT OF THE ARMY US ARMY AVIATION SYSTEMS COMMAND P.O. Box 209, St. Louis, Missouri 63166

AMSAV-R-F

11 Jun 1969

SUBJECT: Flight Release for Testing the XM-200 Rocket Launcher

Commanding General U.S. Army Test and Evaluation Command Aberdeen, Md. 21005

1. Reference: AMSMI-XBT letter 5 June 69, subject: Safety Statement for Launcher, Rocket, Aircraft 2.75 inch XM-200.

2. This letter constitutes a Safety of Flight release for flight testing the XM-200 rocket launcher on the AH-1G and the UH-1C aircraft.

3. The aircraft shall be flown in accordance with the flight envelope and operating instructions of TM's 55-1520-220-10. and 55-1520-221-10.

4. The XM-200 loaded with 27.85 lb rockets, will be restricted to 14 rockets when mounted on the UH-1C and 12 rockets when mounted on the outboard wing stores of the AH-1G.

5. The XM-200 shall be mounted on the XM-156 multi-armament mount with the 4 inch spacer when used with the UH-1C.

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C-O-P-Y

AMSAV-R-F SUBJECT: Flight Release for Testing the XM-200 Rocket Launcher

6. Test results shall be provided AMSAV-R-F upon completion of the test program.

FOR THE COMMANDER:

s/Robert D. Jubbard for t/CHARLES C. CRAWFORD, JR. Director of Flight Standards and Qualification

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C-O-P-Y

DEPARTMENT OF THE ARMY HEADQUARTERS, U.S. ARMY TEST AND EVALUATION COMMAND Aberdeen Proving Ground, Maryland 21005

AMSTE-BG 4-4-1542-23/24

7 Jul 1969

SUBJECT: Interim Safety Release for Service Test of Launcher, XM200 for 2.75-Inch FFAR

President US Army Aviation Test Board ATTN: STEBG-PO-M

1. References:

a. Letter, AMSMI-XBT, dated 5 June 1969, subject: Safety Statement for Launcher, Rocket, Aircraft, 2.75-Inch, XM200, Inclosure 1.

b. Letter, AMSAV-R-F, dated 11 June 1969, subject: Flight Release for Testing the XM200 Rocket Launcher, Inclosure 2.

c. Letter, AMSTE-BG, dated 5 September 1968, subject: Test Directive, Engineering and Service Test of Rocket Launcher, 2.75-Inch, XM200.

2. This letter constitutes an interim safety release for conduct of the service test directed by reference lc.

3. A review of the test data collected during the coordinated development/ engineering test program indicates subject launcher is safe for conducting the service test directed by reference lc. The restrictions outlined

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AMSTE-BG 4-4-1542-23/24

SUBJECT: Interim Safety Release for Service Test of Launcher, XM200 for 2.75-Inch FFAR

in reference lb are to be observed. All flight tests are to be conducted such that no firings are conducted over the heads of personnel. This release is interim since results of all ET are not yet available.

FOR THE COMMANDER:

2 Incls as s/Richard H. Miller t/RICHARD H. MILLER Acting Director Avn Mat Testing

C-O-P-Y

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Part E. Gas Contamination Report

ANALYSIS OF MISSILE EXHAUST OF 2.75 ROCKET SYSTEM ON AH-1G

COBRA FOR CARBON MONOXIDE

(Letter Report - Not for Publication)

MAJ DONALD T. BUTTS

September 1969

Avation Medicine Research Division U. S. ARMY AEROMEDICAL RESEARCH UNIT FORT RUCKER, ALABAMA 36360

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ANALYSIS OF MISSILE EXHAUST OF 2.75 ROCKET SYSTEM ON AH-1G

COBRA FOR CARBON MONOXIDE

INTRODUCTION

Analyses for carbon monoxide in the missile exhaust from firing 2.75 rockets from the AH-1G Cobra in flight were conducted at Yuma Proving Grounds, Yuma, Arizona, by US Army Aeromedical Research Laboratory personnel.

METHOD

Data was obtained by means of a Co Det carbon monoxide analyzer mounted in the cockpit with air samples taken from the level of the pilot's head. Samples were taken continuously during the firing of various numbers of rockets on different firing runs with the cockpit vents open.

RESULTS

Figure #1 shows the number of rockets fired, the exposure of carbon monoxide in terms of carbon monoxide parts per million X minutes which the crew received, and the calculated rise in blood levels of carboxyhemoglobin which could be expected from that level of exposure.

COMMENT

A review of the data in Figure [#]I shows very low carbon monoxide exposure levels and very small increases in the percentage of blood carboxyhemoglobin. Bearing in the mind that one would not be in danger of carbon monoxide intoxication until a blood level of 10% is reached, it becomes obvious that a crew could not fire enough missiles in a twenty four hour period to risk carbon monoxide poisoning.

It is further obvious by looking at the data, that many factors influence the carbon monoxide exposure besides number of missiles. In several cases a smaller number of missiles appears to have yielded a higher CO exposure. This discrepancy can be explained on the basis of variation in wind speed and direction relative to the gunship, variation in length of time the gunship flies toward the target after firing, and possibly many other factors.

CONCLUSION

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In summary, the 2.75 rocket system tested on the AH-1G Cobra does not appear to present a hazard in terms of carbon monoxide exposure to the crew during firing operations.

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NUMBER OF MISSILES	CARBON MONOXIDE EXPOSURE PPM.MIN	CALCULATED % INCREASE IN CARBOXYHEMOGLOBIN
4	41.56 PPM. MIN	.01386
- 8	87.5	.02916
14	125.31	.04166
10	164.06	. 05466
34	156.56	.05216

Figure No. I

1

APPENDIX II. FINDINGS

<u> Remarks</u>	Met.	Met. AH-56A determined.	Met.	Met. AH-56A determined.
Applicable Subtest	· 	٤, ٩	- ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	~ ~ ~ ~
kequirement	The nineteen tube fauncher shall consist of a cluster of tubes packaged in minimum volume in a round configuration and en- cased in a cylindrical shroud.	The launcher shall be compatible with the firing subsystems on the UH-1B, AH-1G, AH-56A Heli- copters.	The fauncher shall be compatible with the rocket MK40 motor with Mods thru Mod 3 and the modified XM229 warhead (17 pounds) with either the M423 of the XM429 fuze. The overall length of the rocket is 64.72 inches. The CG is located 26.90 inches from the nose.	The requirement depicts the design of the launcher to be used as an in- tegral component of the armament fire subsystem on the UH-1B, AH- 1G, UH-1C and AH-56A Heli- copters.
Source	Para 1.1, ref 6	Para 1.1, ref 6	Para 1.1 and 3.1.3.7, ref 6	Para 1.2, ref 6
Item	-	2		Ŧ

not

not

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Remarks	Met.	Met. AH-56A not dêtermined.	Met.	Met.	Undetermined. Not within the scope of this test.	Not met because of excessive contact pin and electrical wiring failures. See para 2.5.4.2, sec 2, and Def- iciencies 1.1 and 1.2, app III.	
Applicable Subtest	2.2	2.2	2.1	2.1 2.6 2.10	4	2.5	
Requirement	The launcher hardback will be com- patible with the AH-1G sway braces and ejector.	The stores support will have 14 inch lug spacing and will be compatible with the Standard MA-4A bomb rack, the AH-1G RP1 rack, the UH-1B XM156 mount and AERO 65A1 bomb rack on the AH-56A.	The launcher shall be designed for minimum weight.	The primary design goals will be reliability, light weight, and safety.	The secondary design goal will be low cost with mass production capability.	The launcher shall be designed so that each tube will be reliably re- usable through 100 rocket firings without repair.	
Source	Para 3.1.2, ref 6	Para 3.1.2 and 3.1.3.5, ref 6	Para 3.1.2, ref 6	Para 3.1.3.1, ref 6	Para 3.1.3.1, ref 6	Para 3.1.3.1, ref 6	١
Item	Ś	9 \	2	œ	6	10	

Remarks	Not met. See item 10.	Met.	Met.	Met.	Met.	Met.
Applicable Subtest	2.5 2.6	2.1	2.1	2.1	2.1	2.1
Requirement	It is desired that each tube reliably fire 250 rockets without repair. It is required that each tube fire 500 rockets without major parts replacement.	Fore or aft aerodynamics are not required, but accommodations for fairing must be provided.	Maximum diameter of the launcher shall not exceed 15.72".	The launcher tubes are to be com- patible with the maximum length combination of motors and war- heads.	The empty weight of one launcher shall be minimum weight com- patible with performance.	The support lug location will be such that when the launcher is fully loaded the CG will be lo- cated approximately midway between the lugs.
Source	Para 3.1.3.1, ref 6	Para 3.1.3.2, ref 6	Para 3. 1. 3. 3, ref 6	Para 3. 1. 3. 3, ref 6	Para 3.1.3.4, ref 6	Para 3.1.3.5, ref 6
Item	=	12	13	. 14	15	16

Remarks	Met, as stated by USAMICOM rep- resentative.	Met, as stated by USAMICOM rep- resentative.	Met, as stated by USAMICOM rep- resentative.	Met.	Met.
Applicable Subtest				2.3	2.3
Requirement	All launcher parts will be structurally designed to handle the ultimate AH-56A Aircraft design loads of 9 g's forward, 4.5 g's upward, 4.5 g's down- ward, and .15 g's inboard and outboard. These loads are to be considered to act both separately and in combination to determine the maximum critical load.	The launcher shall be designed to withstand rocket firing loads of 700 pounds for 0.15 seconds duration for one individual rocket in combination with the flight load.	The launcher shall be capable of structurally withstanding a minimum firing interval of 0.075 second.	The detent shall allow both front and rear loading.	The detent shall not incorporate an item which must be replaced for each rocket firing.
Source	Para 3. 1. 3. 6. ref 6	Para 3. 1. 3. 6, ref 6	Para 3. 1. 3. 6, ref 6	Para 3.1.3.8, ref 6	Pará 3.1.3.8, ref 6
ltem	1 .	8	19	50	21
		••	•		

	Remarks	Met, as stated by USAMICOM rep- resentative.	Met. AH-56A not determined.	Mct.	Not met. Inter- valometer was re- quired.	Met.	Met.
	Applicable Subtest		2.3	2.3	2.3	2.3 2.10	2.5
ŗ	Requirement	The detent shall be designed to re- quire a forward force of from 175 to 200 pounds to release the rocket.	The launcher electrical connector shall be compatible with the UH-1B, AH-1G, AH-56A and UH-1C Heli- copter firing systems.	The electrical power for firing roc- kets and jettisoning the launcher shall be drawn from the aircraft's own 24-28 VDC system under operational conditions.	<u>No</u> intervalometer is required or desired.	The electrical wiring shall be such that each tube is wired to fire indi- vidually and be safely grounded and shielded.	The wiring harness shall conform to the wire routing table.
	Source	Para 3. 1. 3. 8, ref 6	Para 3. J. 3. 9, ref 6	Para 3. 1. 3. 9, ref 6	Para 3.1.3.9, ref 6	Para 3.1.3.10, ref 6	Para 3. 1. 3. 11, ref 6
	Item	22	23	24	25	56	27

Remarks	Met.	Met.	Met.	Met.	Met.	Met.	Met.
Applicable Subtest	2.5	2.5	2.3	2.5 2.7	2.5	2.1	2.4
Requirement	All launchers will be identical, with no left or right peculiar featuré.	The design will be compatible with the use of arctic mittens.	The firing contact can be rotated to cam up the detent and allow easy field loading or removal of the rocket from either end.	Special tools shall not be required for maintenance of the launcher.	Failed parts of the launcher shall be removable and repairable at organizational level.	Over packing shall be provided for shipment and depot storage.	No seals will be required to protect the launcher against environmental conditions during transportation, storage, and service.
Source	Para 3. 1. 3. 11, ref 6	Para 3.1.3.12, ref 6	Para 3. 1. 3. 12, ref 6	Para 3. 1. 3. 13, reí 6	Para 3.1.3.13, ref 6	Para 3. 1. 3. 14, ref 6	Para 3. 1. 3. 15, ref 6
Item	28	29	30	31	32	. 33	34

APPENDIX III. DEFICIENCIES AND SHORTCOMINGS

1. DEFICIENCIES

Deficiency

1.1 The electrical wiring was unsatisfactory because: a. The insulation on the wires was easily pinched and/or damaged due to lack of space and the way the wires were routed. b. The exposed wires at the electrical firing contacts were damaged from rocket blast and deteriorated with use. c. During reassembly of the launcher, the end play of the wires at the contact end allowed the wires to flex resulting in wires being bound between the tubes and launcher rear bulkhead.

1.2 The small pin which locked the firing contact shaft in the clear or armed detent broke on numerous occasions.

Suggested Corrective Action

Reroute the wires from the rear of the launcher to the aircraft quick disconnect through a conduit assembly mounted externally on the launcher. Provide a more durable insulation.

Remarks

The electrical wires from the individual firing contacts to the aircraft guickdisconnect were routed through a channel in the launcher frame, between the rocket tubes and around the supporting structure. When. condition a or b occurred, stray voltage, electrical shorts, and misfires resulted, requiring either partial or complete disassembly of the launcher. When condition c occurred, stray voltage and electrical shorts were encountered after reassembly. EPR's KF-2 and KF-3 were submitted.

The shaft required rotating when loading, arming, and unloading a rocket from the tube. Wear on the pin was caused during

III-1

Deficiency

Suggested Corrective Action Re

Remarks

this operation; however, the pins were broken by the rocket blast. The pin could not be replaced. The tube and contact assembly required replacing, thus requiring partial disassembly of the launcher for outside tubes and complete disassembly for center tubes. EPR KF-1 was submitted.

2. SHORTCOMINGS

There were no shortcomings discovered during the test.

APPENDIX IV. MAINTENANCE EVALUATION

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MAINTENANCE AND RELIABILITY ANALYSIS CHART

INSTRUCTION SHEET - SECTION 1

COLUMN

DESCRIPTION

1 Entry number of each item.

2 Group number as indicated in the Maintenance Allocation Chart.

- 3 Component and related operations as indicated in the Maintenance Allocation Chart. Operations indicated as in Depot Category are not shown.
- 4 Maintenance Level, Prescribed. Category prescribed by the Maintenance Allocation Chart is indicated by utilizing the letters O/C, O, DS, or GS. O/C - Operator or crew; O - Organizational; DS - Direct Support; GS - General Support.
- 5 Maintenance Level, Recommended. Letters O/C, O, DS, or GS indicate the category recommended by the test agency.
- 6 TM Instructions, Adequate. An X in this column indicates the TM instructions are considered adequate.
- 7 TM Instructions, Inadequate. The test agency reference number used on DA Forms 1598/2028 is indicated in this column, if the instructions are considered inadequate.
- 8 Active Maintenance Time. Man-hours used to the closest tenth. If the operation was not actually performed but was reviewed, the estimated active maintenance time is indicated by using the prefix E. Average active maintenance time is used if the operation was performed more than once.

9 Life. Number of hours, miles, or rounds accumulated before or since this operation was performed. An entry is made each time this operation is performed, followed by the appropriate life unit; i.e., M, H, or R. An "S" will be placed in this column if the operation was performed on a sampling basis and not because of an actual failure.

10 Reason performed. The symbol "Unsched" will be shown in this column if the operation was performed as a result of unscheduled maintenance. If the operation was performed as a result of scheduled maintenance, it is indicated by the symbol "Sched" in this column. If the operation was performed only to verify procedures and tools, not as a result of breakdown, it is indicated by the symbol "Sim" in this column.

COLUMN

11

DESCRIPTION

Remarks. If the operation is related to any other sub-test covered in the body of the test report, the paragraph number is inserted for cross reference. If the operation was not performed as a result of using the sampling technique authorized by AR 750-6, one of the following remarks is entered as appropriate.

a. Reviewed - not performed.

b. Neither reviewed nor performed due to (No TM's) or (insufficient service test time).

c. Other, as appropriate.

If an EPR is related to a maintenance operation, the EPR number will be inserted.

HAINTBUNCE AND RELIABLITY ANALYSIS CHART

			0 - Ce D6 - Di	Pect		ni Uctions	,	uni		
ENTRY NO	CROUP NO	OFERA TIONS	CS - Co Pro- Isochasi	Recom-	Ada-	lande- quale 1996/2008	ACTIVE MAINT TIME	R - Jane		
1	10	3 Tube Amembly - Replace Center Tube	•	5 0	×	,	2.0	•	10 Unscheduled	11 Average time required per operation.
2	10	Tube Agembly - Replace Outside Tube	ο.	0 -	· x	-	1.0		Unscheduled	Average time required for operation.
3.	1	Launcher - Rewise and rebuild	ò	0	x		15.0		Unscheduled	Average time required per operation.
4	4	Harness Assembly - Re- place	0	•	x		3.0		Unscheduled	Average time required per operation.
5		Launcher - Cleaning	' 0/C	0/C	΄ χ		2.0		Scheduled	Average time required per operation.
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MAINTENANCE AND RELIABILITY ANALYSIS CHART

INSTRUCTION SHEET - SECTION 2

COLUMN

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DESCRIPTION

- 1 Entry number which will correspond to the same item entry in Section 1.
- 2-5 Appropriate man-hours used to the closest tenth. If man-minutes are a more appropriate unit of measure, so stipulate in Column 8, Remarks.

6 Total man-hours as recorded in Columns 2 through 5.

7 Man-hours used to the closest tenth.

8 Remarks as appropriate.

MAINTENANCE AND RELIABILITY ANALYSIS CHART (SECTION 2)

Rewire/rebuild one launcher. REMARKS Replace harness assembly. Replace outside tube. Replace center tube. TOTAL LOCATION ٠ FAULT TIME 1.0 0.1 0.1 ••• ~ TDME 2.0 1.0 15.0 3.0 9 FINAL 0.3 TIME 3.0 1.0 ŝ 1.0 CALIBRATION ADJUSTMENT AND TIME 1.0 1.0 Ŧ 0.2 0.2 CORRECTION FAULT TIME V/N V/N V/N 8.0 m ENTRY PREPARATION 0.5 3.0 1.0 TIME 0.8 N ١ Q N

PARTS ANALYSIS CHART

INSTRUCTION SHEET

GENERAL: Parts will be assembled on this chart by functional groups and in numerical order within groups.

COLUMN

DESCRIPTION

1 Record one of the following: Federal Stock Number, Technical Service Part Number, Manufacturer's Part Number, or Drawing Number in this order of preference.

2 Noun Nomenclature. Self-explanatory.

- 3 Maintenance Level, Prescribed. Maintenance level as prescribed by the parts list under review: O/C - Operator/Crew; O - Organizational; DS - Direct Support; GS - General Support.
- 4 Maintenance Level, Recommended. O/C, O, DS, or GS indicate Maintenance Level recommended by the test agency.
- 5 Life. The number of hours, miles, or rounds accumulated before or since this part was replaced. An entry in this column is made for each part used followed by the appropriate life unit; i.e., M, H, or R.
- 6 Reason Used. The symbol "Unsched" will be shown in this column if the part was used as a result of unscheduled maintenance. If the part used was the result of scheduled maintenance, the symbol "Sched" will be used. If the part was consumed to verify procedures or tools, not as a result of breakdown, the symbol "Sim" will be used.
- 7 Group Number, Cross Reference. Parts usage by maintenance operation is indicated by cross referencing to the group number from Column 2 of the Maintenance and Reliability Analysis Chart.
- 8 Remarks. If the part usage is related to any other subtest covered in the body of the test report, the paragraph number for cross reference is indicated. If an EPR is related to the part used, the EPR number will be inserted in this column.

PARTS ANALYSIS CHART

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		MAINTENANCE LEVEI	NNCE LEVEL		١		
<u> </u>		O/C - Operator/Ciren	rator/Crew	_			
		0 - Organ					
	•	DS - Direct		urt			
		GS - General	lai	M - Miles		CP NO	
FEDERAL STOCK	NON	Pre-	Recom-	H - Hour	NEASON	C NOSS	
NUMBER	NOMENCLATURE	writed	membed	R - Rounds	USED	REFT NENCE	REMARKS
-	2	3	•	S	ø	2	
10240636	Tube anembly	0	0	6R	Unsched	01	Replace Tube No. 15 Launcher J
10240636	Tube amembly	0	0	6R	Unsched	01	Replace Tube No. 2 Launcher N
10240636	Tube amembly	0	0	7R	Uniched	2	Replace Tube No. 5 Launcher N
10240636	Tube anembly	0	0	88	Umched	10	Replace Tube No. 13 Luancher 1
10240636	Tube amembly	0	0	8 R	Unsched	01	Replace Tube No. 1 Lamether N
10240636	Tube anembly	0	0	8 2 8	Unached	10	Replace Tube No. 3 Launcher N
10240636	Tube amembly	0	0	10R	Unsched	01	Replace Tube No. 10 Launcher 1
10240636	Tube anembly	0	•	118	Unached	01	Replace Tube No. 6 Launcher N
10240636	Tube assembly	0	0	108	Unsched	01	Replace Tube No. 2 Launcher N
10240636	Tube anembly	0	0	13R	Unsched	0	Replace Tube No. 4 Luncher N
10240636	Tube anembly	0	0	22R	Unsched	01	Replace Tube No. 3 Launcher N
10240636	Tube and mbly	0	0	24R	Unsched	01	Replace Tube No. 2 Launcher N
10240636	Tube anymbly	0	0	18R	Unsched	01	Replace Tube No. 16 Launcher N
10240636	Tube amembly	0	0	19 R	Unsched	01	Replace Tube No. 14 Launcher 1
10240636	Tube assembly	0	0	21R	Unsched	0	Replace Tube No. 5 Launcher N
10240636	Tube anembly	0	•	21 R	Unsched	01	Replace Tube No. 9 Lauacher N
10240636	Tube anembly	0	0	18 R	Unsched	0	Replace Tube No. 16 Launcher 1
10240636	Tube amembly	0	0	20R	Unsched	2	Replace Tube No. 19 Launcher N
10240636	Tube amembly	0	0	16R	Unsched	10	Replace Tube No. 8 Launcher N

IV-8

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NOTE: Tube assemblies were replaced because of broken contact pins; EPR KF-1 was submitted to cover all chargeable malfunctions. An insufficient number of tubes were available to replace 8 additional malfunctions.

SPECIAL TOOL ANALYSIS CHART

INSTRUCTION SHEET

GENERAL: All special tools provided with the test item will be evaluated to determine their function, adequacy, category of use and desirability. Any requirement for additional special tools or recommendation for deletion of special tools will also be reported.

COLUMN

DESCRIPTION

- 1 List all special tools, their noun nomenclature, and identifying part number.
- 2 Give function of special tool.
- 3,4 List maintenance category that special tool was designed to be used at in column 3. In column 4 indicate confirmation or recommendation for usage.
- 5,6 Indicate the adequacy/inadequacy/of the special tool in relation to its intended use.
- 7 Include information as to change in category of use (column 4) or inadequacy of the tool (column 6). Refer to paragraph in report that contains substantiating data.

SPECIAL TOOL ANALYSIS CHART

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MAINTENANCE PACKAGE LITERATURE CHART

INSTRUCTION SHEET

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DESCRIPTION

- 1 Give Army publication or draft manual number.
- 2 Number of copies received. Insert "O" if none were supplied. Use Para IIIi, Chapter 9, of AR 310-3 as a guide to determine those manuscripts and publications that should accompany the test item. Manuscripts and publications contained in the maintenance package should cover operation functions through general support maintenance and should specify the categories involved.

3 Complete title.

- 4 Fill in date manuscript (MSS) or publication was received.
- 5 Fill in date test item or materiel was received.
- 6,7 Insert "X" in appropriate block. Minor errors on 1598/2028 forms are not in themselves sufficient reason to term a manuscript inadequate. Evaluation may be omitted if fewer than 25 percent of the specified maintenance operations were performed.
- 8 Insert date 1598 form was forwarded.
- 9 In addition to appropriate remarks, explain if manuscript was not evaluated.

VIAINTENANCE PACKACE LITERATURE CHART

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APPENDIX V. REFERENCES

1. USATECOM Regulation 385-6, "Safety Release," 2 October 1962.

2. Letter, CDCMR-O, US Army Combat Developments Command, 24 October 1962, subject: "Approved Qualitative Materiel Requirement (QMR)," (U), with 1 Inclosure, QMR for Armed Helicopter Weapons Systems.

3. USATECOM Regulation 385-7, "Safety Confirmation," 18 December 1902.

4. USATECOM Regulation 750-15, "Maintenance of Supplies and Equipment," 10 July 1905.

5. USAAVNTBD Memorandum 750-2, "Maintenance of Supplies and Equipment," 25 January 1966.

b. Technical Requirements for Launcher, Rocket, Aircraft, 2.75-Inch,
 XM200, 10 August 1968, AMSMI-RLR, US Army Missile Command.

 Letter, AMSTE-BG, US Army Test and Evaluation Command,
 September 1968, subject: "Test Directive, Engineering and Service Test of Rocket Launcher, 2.75-Inch, XM200, USATECOM Project No. 4-4-1542-23/24."

8. Test Plan, "Service Test of the XM200 2.75-Inch Aircraft Rocket Launcher," USATECOM Project No. 4-4-1542-24, US Army Aviation Test Board, November 1908.

9. Chart No. 10240050, "Preliminary Maintenance Allocation Chart; Launcher, Rocket, Aircraft: 2.75-Inch, XM200," (including tool pages), 30 April 1969.

10. Maintenance Support Plan 9-1090-203/204, "Launcher, Rocket, Aircraft: 2.75-Inch XM200," June 1969.

11. Preliminary Operating and Maintenance Manual 9-1090-204-12/2, "Launcher, Rocket, Aircraft: 2.75-Inch, XM200," June 1969.

V-1

12. Technical Manual 9-1090-204-35 (Extract).

APPENDIX VI. ABBREVIATIONS

AC No. - Action Control Number AGL - above ground level app - appendix(es) AR - Army Regulation c.g. - center of gravity EPR - Equipment Performance Report fig - figure(s) FSN - Federal Stock Number in. - inch(es) KIAS - knots indicated airspeed lb. - pound(s) LSFFAR - Limited-Spin Folding-Fin Aerial Rocket MAC - Maintenance Allocation Chart min. - minute(s) MOS - Military Occupational Specialty MRTS - Mean Rounds to Stoppage No. - number para - paragraph(s) POMM - Preliminary Operator and Maintenance Manual QMR - Qualitative Materiel Requirement ref - reference(s) RDTE - Research, Development, Test, and Evaluation TM - technical manual USAAVNTBD - United States Army Aviation Test Board USAARL - United States Army Aeromedical Research Laboratory USACDC - United States Army Combat Developments Command USAMICOM - United States Army Missile Command USATECOM - United States Army Test and Evaluation Command v.d.c. - volts direct current

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