

MIL-T-60249 (MU)  
 20 October 1965  


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 SUPERSEDING  
 FA-PD-MI-2409, Rev. 1  
 14 November 1960

# MILITARY SPECIFICATION THRUSTER, CARTRIDGE ACTUATED, M17, ASSEMBLY

## 1. SCOPE

1.1 This specification is the applicable detail specification for Thruster, Cartridge Actuated, M17, Assembly, loaded with Cartridge, Thruster, M43 for use in conjunction with other cartridge actuated devices in aircrew emergency escape systems.

## 2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

### SPECIFICATION

#### Military

MIL-A-2550 - Ammunition and Special Weapons, General Specification For

### STANDARDS

#### Military

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes  
 MIL-STD-109 - Quality Assurance Terms and Definitions  
 MS-28741 - Hose Assembly-Detachable End Fitting, Medium Pressure

### DRAWINGS

#### Munitions Command

F8597496 - Thruster, Cartridge Actuated, M17, Assembly  
 F8597497 - Thruster, Cartridge Actuated, M17, Metal Parts Assembly  
 C8848865 - Container, Ammunition, Fiber M364 for Thruster, Cartridge Actuated, M17, with Cartridge M43 (see 5.1).  
 C8848864 - Box, Packing, Ammunition for Thruster, Cartridge Actuated, M17, with Cartridge M43 in Fiber Container M365 (see 5.1).  
 IEL-8597496 - Inspection Equipment List for Thruster, Cartridge Actuated, M17, Assembly

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## 2.1 (Cont)

(Copies of specifications, standards, drawings and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

## 3. REQUIREMENTS

3.1 General.- Material, parts and assemblies shall comply with the requirements specified on the applicable drawings and specifications.

3.2 Torque.- Torque requirements shall be as specified in Table I. No movement shall occur upon application of the breakaway torque.

Table I

<u>Components</u>	<u>Seating or Bottoming (inch pounds)</u>	<u>Breakaway (inch pounds)</u>
Head and Body	600 $\pm$ 20	400 $\pm$ 20

3.3 Residual magnetism.- The thruster shall not deflect the indicator of the compass more than 3 degrees in either direction when passed in front of the compass at a distance of 6 inches.

3.4 Functional.

3.4.1 The thruster shall not fail to fire.

3.4.2 The thruster shall function without mechanical failure (see 6.1).

3.4.3 The thruster fired in a "locked shut" condition shall show no mechanical failure (see 6.1 and 6.2).

3.4.4 The thruster fired with "no load" on the piston shall function without mechanical failure (see 6.1 and 6.3). The piston shall complete its stroke of 13 1/4 plus or minus 1/16 inches, minimum, and shall not separate from the body of the thruster.

3.4.5 The thruster fired under "load" shall perform as follows: (see 6.4).

3.4.5.1 The thruster shall be capable of moving a 350-lb. weight horizontally through a distance of 13 1/4 plus or minus 1/16 inches, when fired against a 1 1/2 g resistive force.

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3.4.5.2 Velocity.- The thruster when fired under load shall impart to the weight a velocity that does not exceed 12 ft/sec.

3.4.5.3 Acceleration.- The thruster when fired under load shall impart to the weight an acceleration that does not exceed 5 g/sec.

3.4.5.3.1 Rate of change.- The thruster when fired under load shall impart to the weight an acceleration where the rate of change of acceleration does not exceed 60 g/sec.

3.4.6 Temperature.- The thruster shall comply with all the ballistic requirements throughout the temperature range of minus 65 degrees to plus 160 degrees F.

3.4.7 Initiation.- The thruster shall be initiated with an M3A1 Initiator connected to the thruster with 15 feet of aircraft hose, size 4, Standard MS-28741.

3.5 Workmanship.- The requirements for workmanship are as specified on the applicable drawings, referenced specifications and the following:

3.5.1 Metal defects.- All components shall be free from cracks, splits, cold shuts, inclusions, porosity or other metal defects.

3.5.2 Burr.- No part shall have a burr which might interfere with the assembly or function of the item or which might be injurious to personnel handling the item.

3.5.3 Foreign matter.- No part or assembly shall contain chips, dirt, grease, rust, corrosion or other foreign matter.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection.- Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Quality assurance terms and definitions.- Reference shall be made to MIL-STD-109 to define the quality assurance terms used.

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4.1.2 Inspection.- Inspection shall be in accordance with MIL-A-2550, except as specified herein.

4.2 Inspection provisions.

4.2.1 Lot.

4.2.1.1 Submission of product.- The product shall be submitted in accordance with MIL-STD-105.

4.2.1.2 Size of lot.- A lot shall consist of an identifiable group of assembled units containing metal parts assemblies, produced by a homogeneous process and loaded with a single lot of cartridges.

4.2.2 Examination.- One hundred percent examination shall be performed for all critical defects. Examination for major and minor defects shall be performed on a defect basis in accordance with the classification of defect contained herein, using the sampling plan and associated criteria in Table II. The total number of allowable defects per class for either the major or minor classification shall not exceed the acceptance number of Table II. All nonconforming material shall be rejected. Four power (4X magnification may be used in performing visual examination for such defects as burr and foreign matter.

Table II

<u>Lot Size</u>	<u>Sample Size</u>	<u>Major</u>		<u>Minor</u>	
		<u>Accept</u>	<u>Reject</u>	<u>Accept</u>	<u>Reject</u>
1 - 300	100% Examination				
301 - 800	50	0	1	1	2
801 - 1800	90	1	2	2	3

4.2.2.1 Cartridge, Thruster, M43, Drawing D8593275 covering a detail of Dwg. F8597496.

	<u>Defect</u>	<u>Method of Inspection</u>
<b>CRITICAL</b>		
1.	Mixed cartridges	Visual
2.	Metal defective	Visual
3.	Marking missing, incorrect or illegible	Visual
<b>MAJOR</b>		
101.	Foreign matter	Visual
<b>MINOR</b>		
201.	Case scratched, wrinkled, bulged or dented	Visual
202.	Varnish missing or inadequate	Visual

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4.2.2.2 Head, Subassembly consists of: Head F8597503, Firing Pin C8597504, Shear Pin B8597505, O-Ring MS-28775-012 and Screw MS-51017-33 covering a detail of Dwg. F8597497.

<u>Defect</u>	<u>Method of Inspection</u>
CRITICAL	
None defined.	
MAJOR	
101. Thread damaged	Visual
102. Burr	Visual
103. Foreign matter	Visual
MINOR	
201. O-Ring not lubricated	Visual
202. Set screw not filled with sealing compound	Visual

4.2.2.3 Assembly, Drawing F8597496 less Cartridge D8593275 and Head F8597503.

CRITICAL	
1. Evidence of fluid leakage	Visual
MAJOR	
101. Burr	Visual
102. Foreign matter	Visual
MINOR	
201. Varnish missing or inadequate	Visual

4.2.2.4 Assembly, Drawing D8597496 less Shipping Cap B8593297.

CRITICAL	
1. Shear pin not engaged in firing pin	Gage
2. Mixed cartridges	Visual
MAJOR	
101. Total length	Gage
102. Thread damaged	Visual
103. Burr	Visual
104. Foreign matter	Visual
MINOR	
201. Protective finish inadequate or defective	Visual
202. Set screws above flush	Visual

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4.2.2.5 Assembly, Drawing F8597496.  
Defect

## CRITICAL

- |  | <u>Method of Inspection</u> |
|--|-----------------------------|
| 1. Improper assembly                     | X-Ray                       |
| 2. Any missing part as detected by x-ray | X-Ray                       |

## MAJOR

- |  |        |
|--|--------|
| 101. Thread damaged                          | Visual |
| 102. Marking missing, incorrect or illegible | Visual |
| 103. Foreign matter                          | Visual |

## MINOR

- |  |        |
|--|--------|
| 201. Shipping cap missing                      | Visual |
| 202. Protective finish inadequate or defective | Visual |
| 203. Varnish or marking missing                | Visual |

## 4.2.2.6 Fiber Container, Drawing C8848865.

## CRITICAL

None defined.

## MAJOR

None defined.

## MINOR

- |  |        |
|--|--------|
| 201. Gap between body and cover, max.              | Manual |
| 202. Contents loose                                | Manual |
| 203. Metal ends loose or distorted                 | Manual |
| 204. Cut or damaged through all impregnated layers | Visual |
| 205. Marking missing, incorrect or illegible       | Visual |
| 206. Tape incomplete or badly wrinkled             | Visual |
| 207. Length of tear tab, min.                      | Visual |
| 208. Color of tape incorrect                       | Visual |

## 4.2.2.7 Box, Wooden, Drawing C8848864.

## CRITICAL

None defined.

## MAJOR

None defined.

## MINOR

- |   |                   |
|---|-------------------|
| 201. Contents loose   | Manual            |
| 202. Hardware missing, loose, broken or improperly engaged    | Visual and Manual |
| 203. Strapping missing, loose, broken or improperly assembled | Visual and Manual |

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## 4.2.2.7 (Cont.) MINOR

<u>Defect</u>	<u>Method of Inspection</u>
204. Contents of box exposed	Visual
205. Box damaged	Visual
206. Marking misleading or unidentifiable	Visual
207. Number of units incorrect	Visual
208. Car seal missing, unsealed or improperly positioned	Visual

4.2.3 Inspection testing.— The following tests shall be performed in accordance with 4.3:

4.2.3.1 Breakaway torque.— Each head and body assembly shall be subjected to a breakaway torque. Failure of any assembly to comply with the requirements of 3.2 and Table I shall be cause for rejection of the assembly.

4.2.3.2 Residual magnetism.— Each thruster shall be subjected to the test for excessive residual magnetism. Failure of any thruster to comply with the requirements of 3.3 shall be cause for rejection of the thruster.

4.2.3.3 Functional tests.— The following tests will be performed by the Government:

4.2.3.3.1 Ballistics.— Twenty-three units shall be tested in accordance with Table III to determine compliance with the requirements of 3.4.1 through 3.4.7. The units shall be temperature conditioned as provided in 4.3.3.1. Failure of any unit to comply with the requirement shall be cause for rejection of the lot.

Table III

<u>Sample Size</u>	<u>Method</u>	<u>Temperature</u>
7	Load with 350-lb. wt. and 525-lb. restraining force (see 3.4.5.1)	-65° to -70°F.
7	Load with 350-lb. wt. and 525-lb. restraining force (see 3.4.5.1)	160° to 165°F.
7	Load with 350-lb. wt. and 525-lb. restraining force (see 3.4.5.1)	65° to 75°F.
1	No load	160° to 165°F.
1	Locked shut	160° to 165°F.

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4.2.4 Inspection equipment.- The examination and tests shall be made using equipment listed on IEL-8597496.

4.3 Test methods and procedures.

4.3.1 Breakaway torque.- A torque wrench, set at the torque requirements as specified in 3.2, Table I, shall be used in conjunction with a fixture to determine the adequacy of the joint. The thruster body shall be secured in the holding device and the breakaway torque shall be applied to the head.

4.3.2 Residual magnetism.- The thruster shall be tested for excessive residual magnetism in an area free of local magnetic effects by placing the thruster 6 inches from and at the same height as the compass, in a north-south horizontal position (cap end at south) with the compass set in an east-west heading as shown in Figure 1. The thruster shall be moved slowly past the compass in a longitudinal direction for its entire length, rotated 90 degrees in the horizontal position about its longitudinal axis and moved slowly back past the compass. This procedure shall be repeated for each 90-degree rotation of the thruster.

4.3.3 Functional tests.

4.3.3.1 Ballistics.- The samples shall be temperature conditioned in accordance with Table III and the following:

4.3.3.1.1 Upon completion of the required temperature conditioning, the sample shall be ballistically tested within 10 minutes after removal from the conditioning chamber. Samples shall be reconditioned if this time is exceeded. When reconditioning thrusters at minus 65 degrees F., all condensation shall be removed from the interior surfaces before returning the thruster to the conditioning chamber.

4.3.3.1.2 Temperature conditioning time.- A simulated thruster and cartridge with a temperature sensitive element inserted in the dummy cartridge, shall be placed in the temperature conditioning chamber at the time as the thrusters. The conditioning time shall be a minimum of one hour longer than the time necessary to bring the element contained in the dummy cartridge to the required temperature.

4.3.4 Method of testing.- The thruster tested under the conditions as specified herein, shall be mounted so that the weight will be propelled horizontally when fired, and supported rigidly so that the entire thrust will be borne by the thruster mounting points and tested in accordance with the functional requirements of 3.4. A velocity and acceleration recording system shall be used to determine velocity and acceleration of the moving weight in the ballistic testing of any thruster under "load" condition.



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4.3.4.1 The following method for determining ballistic performance of thrusters has proven satisfactory: The thruster is clamped in a test fixture with piston end mounted against a horizontal carriage on wheels. The carriage is guided along and impact energy of moving carriage is absorbed by a shock absorbing device mounted at end of track. Velocity measurements are taken with an electrically wired board to record a travel-time relationship by means of breaking carbon contacts. Acceleration measurements are taken by means of an accelerometer.

4.3.4.2 Upon completion of ballistic tests any thruster fired under "locked shut" condition, shall be disassembled at cartridge end of thruster and examined to determine that the cartridge has functioned properly.

## 5. PREPARATION FOR DELIVERY

5.1 Packing and marking—level A.—Packing and marking shall be in accordance with Drawings C8848864 and C8848865.

5.2 Data cards.—Data card information shall be as specified in MIL-A-2550.

## 6. NOTES

6.1 A "mechanical failure" is defined as any deformation or breakage of a part, the occurrence of which is other than a design function.

6.2 "Locked shut" shall mean that the piston is to be restrained from moving out of the thruster proper upon firing.

6.3 No load.—Permanent yielding of the body, ring, end cap or piston shall not be cause for rejection when thrusters are tested under "no load" condition.

6.4 Load.—The expected performance of the thruster, under conditions simulating those existing in aircraft, shall be referred to as "load" condition in this specification.

Custodian:

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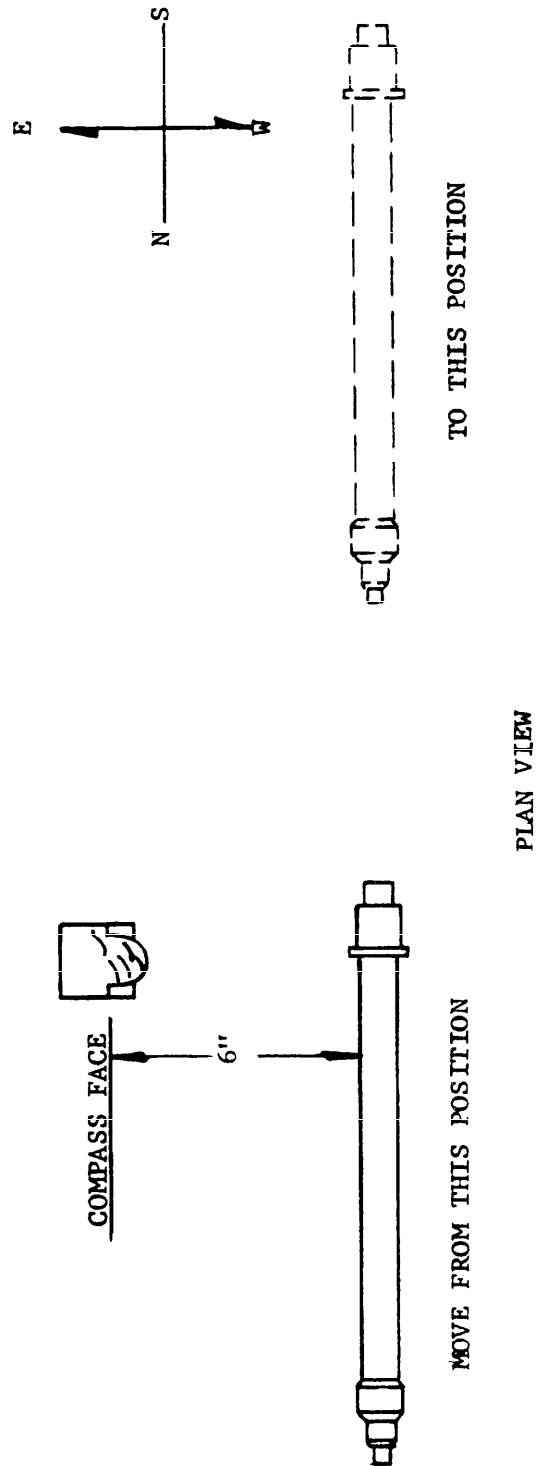
Preparing activity:

Army - MU

Project No. 1377-A009

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PILOT'S STANDBY COMPASS, TYPE AN-5766



NOTE:

THRUSTER AND COMPASS SHALL LIE IN A HORIZONTAL PLANE

FIGURE 1

LAYOUT FOR DETERMINATION OF RESIDUAL MAGNETISM IN THRUSTER, CARTRIDGE ACTUATED, M17

<b>SPECIFICATION ANALYSIS SHEET</b>		Form Approved Budget Bureau No. 119-R004
<b>INSTRUCTIONS</b>		
<p>This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity.</p>		
<b>SPECIFICATION</b>		
<b>ORGANIZATION</b>	<b>CITY AND STATE</b>	
<b>CONTRACT NO.</b>	<b>QUANTITY OF ITEMS PROCURED</b>	<b>DOLLAR AMOUNT</b> \$
<b>MATERIAL PROCURED UNDER A</b>		
<input type="checkbox"/> <b>DIRECT GOVERNMENT CONTRACT</b> <input type="checkbox"/> <b>SUBCONTRACT</b>		
<b>1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?</b> <b>A. GIVE PARAGRAPH NUMBER AND WORDING.</b>		
<b>B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES</b>		
<b>2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID</b>		
<b>3. IS THE SPECIFICATION RESTRICTIVE?</b> <input type="checkbox"/> <b>YES</b> <input type="checkbox"/> <b>NO</b> IF "YES", IN WHAT WAY?		
<b>4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)</b>		
<b>SUBMITTED BY (Printed or typed name and activity)</b>		<b>DATE</b>

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