

INCH-POUND

MIL-M-48557A (AR)  
15 May 1990

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SUPERSEDING  
MIL-M-48557  
23 October 1979

## MILITARY SPECIFICATION

## MOUNT, TELESCOPE AND QUADRANT:M171

This specification is approved for use by the U.S. Army Armament, Munitions and Chemical Command and is available for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE

1.1 Scope. This specification covers a telescope and quadrant mount which supports a panoramic telescope and fire control quadrant. The mount provides adjustments in pitch and to compensate for angles of sights for indirect fire. (see 6.1)

## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards and handbooks. The following specifications, standards and handbooks form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and Supplement thereto, cited in the solicitation. (see 6.2)

## SPECIFICATIONS

## MILITARY

MIL-F-13926	-	Fire Control Materiel, Manufacture and Inspection, General Specification for
MIL-P-14232	-	Parts, Equipment and Tools for Ordnance Materiel, Packaging of
MIL-I-45607	-	Inspection Equipment, Acquisition, Maintenance and Disposition of

**Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document, should be addressed to: Commander U.S. Army ARDEC, ATTN: SMCAR-BAC-S, Picatinny Arsenal, New Jersey 07806-5000 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.**

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STANDARDS

MILITARY

MIL-STD-109 - Quality Assurance Terms and  
Definitions

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from: Military Specifications and Standards, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.1.2 other Government documents, drawings and publications.  
The following other Government documents, drawings and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issue shall be those in effect on the date of the solicitation.

DRAWINGS

U.S. Army Armament Research, Development and Engineering  
Center (ARDEC)

8658940	Gunners Quadrant, Calibrated
10549200	Sighting Device
10549201	Fixture
10558253-1.1.	Level Adapter
11727800	Mount, Telescope & Quadrant: M171
11747196	Adapter, Shock and/or Vibration
11747840	Gage, Interchangeability
11747844	Gage, Interchangeability, Maximum
11747889	Gage, Interchangeability, Maximum
11747949	Adapter, Torque
11747950	Fixture, Holding
11836289	Level Assembly

PACKAGING DATA SHEETS

11727800	Packaging of Mount, Telescope and Quadrant: M171
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(Copies of drawings, and packaging data sheets required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

DEPARTMENT OF DEFENSE, DEFENSE SUPPLY AGENCY

DSAM 4145.8	-	Radioactive Commodities in the DOD supply System.
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(Application for copies of the DSAM should be addressed to the Superintendent of documents, Government Printing Office, Washington, DC 20402.)

2.2 Order of precedence. In the event of a conflict between the text of this specifications and the references cited herein (except for associated detail specifications, specification sheets, or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Hazardous material. This mount contains tritium, a radioactive material. A Nuclear Regulatory Commission License is required for the manufacture of this item, and DSAM 4145.8 for procurement and possession of radioactive material.

3.2 First article. When specified, a sample shall be subjected to first article inspection (see 4.2 and 6.2).

3.3 Materials. Materials shall be in accordance with drawings, material specifications, and general specifications forming a part of this specification.

3.4 Fabrication. The mount shall be manufactured in accordance with Drawing 11727800.

3.5 General specifications. The contractor shall be responsible for the compliance with the requirements of specification MIL-F-13926.

3.6 Orientation. The mount shall be positioned and orientated as follows:

a. The mounting surface (internal surface) of the mount shall be in a vertical plane.

b. The mount locating keyway shall be horizontal within 10 seconds.

c. The top locating surface for the telescope shall be parallel to the mount's locating keyway within 0.5 mil.

d. The elevation and cross level vial bubbles shall be centered within the thickness of a graduation line.

e. The locating keys for the telescope shall be parallel to the vertical mounting surface within 1.0 mil. (.005 inches).

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f. The seating surface for the quadrant shall be parallel to the recessed mounting surface within 3.0 mils (.015 inches) .

g. The locating keys for the M17 quadrant shall be parallel to the mount locating keyway within .5 mil.

h. The four mounting bolts shall be torqued to 85-90 foot pounds.

### 3.7 Environmental.

3.7.1 Storage temperature. The mount shall show no evidence of physical failure when thermally stabilized at ambient temperatures of  $+160^{\circ} \pm 5^{\circ}\text{F}$  ( $+71^{\circ} \pm 3^{\circ}\text{C}$ ) and  $-50^{\circ} \pm 50^{\circ}\text{F}$  ( $-46^{\circ} \pm 3^{\circ}\text{C}$ ) for a period of 6 hours 15 minutes at each temperature.

3.7.2 Operating temperature. The mount shall meet the applicable requirements of 3.9 while exposed and thermally stabilized 6 hours -15 minutes at an ambient temperature of  $+150^{\circ} \pm 5^{\circ}\text{F}$  ( $+65^{\circ} \pm 3^{\circ}\text{C}$ ) and exposed and thermally stabilized for 6 hours +15 minutes at an ambient temperature of  $-50^{\circ} \pm 5^{\circ}\text{F}$  ( $-46^{\circ} \pm 3^{\circ}\text{C}$ ). Upon return to standard ambient temperature,  $+60^{\circ}\text{F}$  to  $+90^{\circ}\text{F}$  ( $+16^{\circ}\text{C}$  to  $+32^{\circ}\text{C}$ ), from each operating temperature, the mount shall meet the requirements of 3.7.5 thru 3.9.

3.7.3 Shock. When required the mount shall withstand a total of 18 shock impulses, three in each direction of three mutually perpendicular axis. Each shock impulse shall be a half-sine wave with a time duration of  $3 \pm 1$  milliseconds. The peak amplitude of each shock impulse shall be 100 g's. Subsequent to shock, the mount shall show no evidence of physical damage and shall meet the requirements of 3.7.5 through 3.10.

### 3.7.4 Vibration

3.7.4.1 Vibration "A". When required the mount shall withstand a total of 270 minutes  $\pm 5$  minutes of sweep-cycle vibration. The vibration shall be applied for 90 minutes  $\pm 2$  minutes along each of three mutually perpendicular major axes. A complete sweep-cycle shall consist of vibration from origin (5 hz at 1 inch double amplitude) to mid-point (5 g's  $\pm$  0.5 g's at 500 hz) to origin, and shall have a duration of 15 minutes  $\pm 1$  minute. Double amplitude shall be constant at 1 inch between 5 hz and 10 hz, and varied with frequency to maintain a constant 5 g's  $\pm$  0.5 g's acceleration between 10 hz and 500 hz. Upon completion of vibration, the mount shall

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exhibit no evidence of damage and shall meet the requirements of 3.7.5 through 3.10.

3.7.4.2 Vibration "B". The mount shall be vibrated in a vertical plane at a constant frequency of  $30 \pm 5$  cycles per second with an amplitude of  $1/16$  inch ( $1/8 \pm 1/64$  inch total excursion) for a period of five minutes plus or minus 15 seconds. Subsequent to vibration, there shall be no evidence of physical failure and the mount shall meet the requirements of 3.7.5 through 3.10.

3.7.5 Radiological requirement.

3.7.5.1 External tritium contamination. Tritium shall not be present on the external surfaces of the mount in excess of 1000 dpm/100 square centimeters.

3.7.5.2 Illumination check. Illumination areas shall be given a visual check to determine adequacy of illumination in a darkened area subsequent to requirements 3.7.1 thru 3.7.4.2.

3.8 Performance.

3.8.1 Elevation travel. The locating keyway of the vertical mounting surface shall rotate through an excursion of at least 1333 mils in elevation and 270 mils in depression from the position established in 3.6.

3.8.2 Deviation. The line of sight shall not deviate horizontally from the position obtained when mount is oriented as specified in Paragraph 3.6 by more than .25 mil when rotated through an excursion of 270 mil depression to 800 mil elevation. Without changing starting point, the line of sight shall not deviate more than .5 mil total lateral spread through the balance of the excursion as specified in 3.8.1.

3.8.3 Pitch level travel. The mount shall travel through an excursion of at least 178 mils right and 178 mils left.

3.8.4 Plumb travel. A line of sight shall track a plumb line within 0.5 mil (total lateral spread) when the mount is subjected throughout the range of requirements of 3.8.3.

3.8.5 Backlash (pitch level). Backlash shall not exceed 1.5 mils at zero elevation.

3.8.6 Cross level travel. The mount shall travel throughout an excursion of at least 178 mils to the left and 178 mils to the right.

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3.8.7 Backlash (cross level). Backlash shall not exceed 1.5 mils at zero elevation and zero cant.

3.8.8 Mount rigidity. A line of sight shall be established at zero elevation and zero cant. Apply a twenty pound horizontal tangential load at the right side of the telescope support at 2.3 inches from center line of the support. Apply the same load at the left side of the telescope support. Release the load and record the movement. The total movement as indicated by the two readings shall not exceed the following values at the specified elevation settings:

<u>ELEVATION</u> (In Mils)	<u>CANT ANGLE</u> (In Mils)	<u>TOTAL MOVEMENT</u> (In Mils)
0	0	.25
800	0	.75
1100	0	1.75
1333	0	3.50

3.8.9 Azimuth correction. The mount shall make left and right azimuth corrections in accordance with the following requirements and values:

AZIMUTH CORRECTION

<u>ELEVATION</u> (In Mils)	<u>CANT ANGLE</u> (In Mils)	<u>AZIMUTH CORRECTION</u> (in Mils)	<u>TOLERANCE</u> (In Mils)
300	88.9	27.0	.3
600	88.9	59.6	
900	88.9	108.8	1.5
1200	88.9	216.8	1.8
300	177.8	54.5	.6
600	177.8	120.3	1.0
1100	177.8	342.4	2.0

3.9 Illumination.

3.9.1 Level vial illumination. The level vial bubbles and graduation lines shall be clearly distinguishable when observed in ambient light conditions ranging from dusk into darkness.

3.10 Torque. The running torque required to operate the following knobs shall be within the values specified for standard ambient temperature of +60° to +90°, and shall not exceed the values specified for extreme operating temperature.

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<u>KNOB</u>	AT +60°F TO +90°F	AT -50°F AND +150°F
	(+16°C TO +32°C)	<u>(-46°C AND +65°C)</u>
Cross Level	4 to 12 inch lbs.	27 inch lbs. max.
Pitch Level	4 to 12 inch lbs.	27 inch lbs. max.

3.11 Interchangeability.

3.11.1 Mounting surface for Panoramic Telescope, M137. Interchangeability shall be verified by the insertion, seating, securing, and subsequent removal of maximum fit gage on the mount's top surface.

3.11.2 Mounting surface for Quadrant, M17. Interchangeability shall be verified by the insertion, seating, securing, and subsequent removal of maximum fit gage on the mounting surface for the quadrant.

3.11.3 Mounting surface of mount, M171. Interchangeability shall be verified by the insertion, seating, securing, and subsequent removal of maximum fit gage on the mount's surface and keyway.

3.12 Reliability. The mount shall be subjected to reliability assurance tests as follows:

a. The mount shall meet the requirements of storage and operating temperatures of paragraphs 3.7.1 and 3.7.2.

b. The mount shall be shocked and conform to the requirements of paragraph 3.7.3.

c. The mount shall withstand the Vibration "A" requirements as noted in paragraph 3.7.4.

3.13 workmanship. The workmanship of MIL-F-13926 shall apply.

## 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 other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by 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.

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4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material .

4.1.2 General provisions. The component and subassembly inspection requirements of MIL-F-13926 form a part of the quality assurance provisions of this specification. Definitions of inspection terms shall be listed in MIL-STD-109.

4.2 First article (initial production) approval. The requirement for first article approval and the responsibility (Government or contractor) for first article testing shall be as specified in the contract. The sample for first article approval tests shall consist of three (3) mounts plus three (3) each of all items covered by Quality Assurance Provisions (QAPs) . The sample shall be manufactured in the same manner, using the same materials, equipment, processes, and procedures as used in regular production. All parts and materials, including packaging and packing, shall be obtained from the same source of supply as used in regular production. The 3 mounts shall be tested in accordance with, and meet the requirements of, Tables I and II and paragraph 4.7.1.3.

4.2.1 Government testing. When the Government is responsible for conducting first article approval tests, the contractor, prior to submitting the sample to the government, shall inspect the sample to insure that it conforms to all requirements of the contract and submit a record of this inspection, with the sample, including certificates of conformance for materials.

4.2.2 Contractor testing. When the contractor is responsible for conducting first article approval tests, the sample shall be inspected by the contractor for all the requirements of the contract. The sample and a record of this inspection, including certificates of conformance for materials, shall be submitted to the government for approval. The Government reserves the right to witness the contractor's inspection.



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4.3 Examinations and tests.

4.3.1 Components and subassemblies. All components and subassemblies shall be inspected in accordance with the inspection provisions contained in QAPs listed in the Technical Data Package (TDP). In the absence of QAPs, the applicable Quality Assurance Provisions of MIL-F-13926 shall apply.

4.3.2 Final acceptance inspection. Subsequent to first article approval, examination and tests related to Section 3 herein shall be performed. The tabulated classification of defects in Tables I and II shall constitute the minimum inspection to be performed by the supplier after first article approval and prior to government acceptance or rejection by item or lot.

4.3.3 Classification of characteristics. Quality conformance examinations and tests are specified in the following Classification of Characteristics paragraphs. The contractor's quality program or detailed inspection system shall provide assurance of compliance of all characteristics with the applicable drawing and specification requirements utilizing as a minimum the conformance criteria specified herein.

4.3.4 Alternative inspection provisions. Alternative inspection procedures, methods, or equipment such as statistical process control, tool control, other types of sampling procedures, etc. , may be used by the contractor when they provide, as a minimum, the level of quality assurance required by the provisions specified herein. Prior to applying such alternative procedures, methods, or equipment the contractor shall describe them in a written proposal submitted to the procuring contracting officer for evaluation and approval by the Government. When required, the contractor shall demonstrate that the effectiveness of the proposed alternative(s) is equal to or better than the specified quality assurance provisions herein. In cases of dispute as to whether the contractor's proposed alternative(s) provide equal assurance, the provision of this specification shall apply. All approved alternative inspection provisions shall be specifically incorporated into the contractor's quality program or detailed inspection system, as applicable.

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TABLES I. Requirements and test procedures.

<u>No.</u>	<u>Characteristic</u>	<u>Requirement</u>	<u>Test procedure</u>
<u>Critical:</u> None			
<u>Major:</u> <u>100% Inspection</u>			
101.	Orientation	3.6	4.8 thru 4.8.5
102.	Illumination	3.9.1	4.11.1
103.	Interchangeability for Telescope Surface	3.11.1	4.10.1
104.	Interchangeability for Quadrant Surface	3.11.2	4.10.2
105.	Interchangeability of Mounting Surface	3.11.3	4.10.3
106.	Vibration "B"	3.7.4.2	4.7.1.5
107.	Elevation Travel	3.8.1	4.8.6
108.	Deviation (plumb travel)	3.8.2	4.8.7
109.	Pitch Level Travel	3.8.3	4.8.8
110.	Plumb Travel (pitch)	3.8.4	4.8.9
111.	Backlash (pitch)	3.8.5	4.8.10
112.	Cross Level Travel	3.8.6	4.8.11
113.	Backlash (cross level)	3.8.7	4.8.12
114.	Mount Rigidity	3.8.8	4.8.13
115.	Azimuth Correction	3.8.9	4.8.14
116.	Torque	3.10	4.9.1
117.	External Tritium Contamination	3.7.5.1	4.11.2
118.	Fabrication	3.4	11727800
119.	Workmanship	3.13	MIL-F-13926
120.	Packaging	5.1	4.12

Minor: None

#### 4.4 Special sampling.

4.4.1 General. Subsequent to meeting the requirements of Table I, three mounts shall be selected at random by a Government representative as a special sample from each 50 produced or from each month's production, whichever occurs first. The samples shall meet the requirements and tests in Table I, except characteristic 106, after being subjected to Table II testing.

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TABLE II. Requirements and test procedures.

<u>No.</u>	<u>Characteristic</u>	<u>Requirement</u>	<u>Test procedure</u>
301.	Storage temperature	3.7.1	4.7.1.2 & Visual
302.	Operating temperature	3.7.2	4.7.1.2
303.	Torque (+150°F & -50°F)	3.10.1	4.7.1.2 & 4.9.1

4.4.2 Failure of sample. Should any one item of a special sampling fail to meet the specified test requirements, acceptance of the represented inspection lot will be suspended by the government until necessary corrections have been made by the contractor and the resubmitted sampling have been approved.

4.5 Test equipment.

4.5.1 Inspection equipment. Except as otherwise provided for by the contract, the contractor shall supply and maintain inspection equipment in accordance with the applicable requirements of MIL-I-45607.

4.5.2 Government furnished inspection equipment. Where the contract provides for Government furnished test equipment, supply and maintenance of test equipment shall be in accordance with the applicable requirements of MIL-I-45607.

4.5.3 Contractor furnished inspection equipment.

4.5.3.1 Government design. Unless otherwise stated in the contract, all inspection equipment specified by drawing number in specifications or QAP forming a part of the contract shall be supplied by the contractor in accordance with technical data listed in the List of Inspection Documents when provided with the TDP.

4.5.3.2 Contractor design. The contractor shall design and supply inspection equipment compatible with the requirements of MIL-F-13926. Since tolerance of test equipment is normally considered to be within 10% of the product tolerance for which it is considered as part of the prescribed product tolerance for which it is intended, this inherent error in the test equipment design must be considered as part of the prescribed product tolerance limit. Thus, the design of test equipment shall be so selected and controlled as to insure that the test equipment will reliably indicate acceptability of a product which does not exceed 90% of the prescribed tolerance limit, and permit a positive rejection when non-conforming. Construction shall be such as to facilitate routine calibration of test equipment.

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4.5.3.3 Test equipment. In conjunction with 4.5.3.2, the following standard test equipment shall be utilized in the performance of the applicable test as specified in 4.7.

<u>NOMENCLATURE</u>	<u>DESCRIPTION</u>
1. Hot & cold chamber	standard type conforming to the accuracies specified under Test Facilities of MIL-F-13926.
2. Light source standard	
3. Torque wrench	Standard shop type accurate to 10% of drawing tolerance.

4.6 Reliability assurance sample. Unless otherwise specified in the contract, the Government shall be responsible for reliability assurance testing. The reliability assurance test sample shall consist of one mount selected at random by the Government from any accepted regular production lot prior to delivery of the first 25% of the basic contract quantity. All mounts previously selected for First Article Test or Special Sampling shall be excluded from the lot for purpose of selecting the reliability assurance test sample.

4.6.1 Reliability assurance testing. After random selection of the sample, the contractor shall provide to the Government the inspection records, including certificates of conformance, for the sample. The contractor shall also provide a list of all changes, deviations, and waivers under the contract. The sample shall be tested for reliability as represented by the requirements of 3.7.1 through 3.7.4.1. Testing shall be performed in accordance with the procedures specified in 4.7.1.2 through 4.7.1.4.

4.6.2 Defects. Defects resulting from reliability assurance testing may be assessed as sufficient evidence that the contractor's production processes or quality control procedures do not provide adequate assurance against product reliability degradation. Upon identification by the Government to the Contractor, of the specific quality defects found, the contractor shall determine and apply effective corrective action to improve his production processes or quality control procedures as necessary to eliminate the defect(s) from mounts not yet delivered under the contract.

4.6.3 Retest. Whenever reliability assurance test results require corrective action by the contractor, a retest sample shall be selected in accordance with 4.6 except that the sample shall be selected from the first 10 telescopes produced subsequent to implementation of the corrective action. The

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retest sample shall be subjected only to the reliability test(s) which revealed the defect(s).

4.6.3.1 Inspection after retest. Inspection of the sample after retest shall be conducted by the Government and shall be in accordance with 4.3.2.2, Final Acceptance Inspection, except characters 301 and 302 of Table II. Reappearance of the previous defect(s), 4.6.2, may be cause for the Government to prescribe mandatory process corrective action by the Contractor at no additional cost to the Government.

4.7 Methods of inspection.

4.7.1 Environmental.

4.7.1.2 Storage and operating temperatures. The mount shall be subjected to one cycle of temperature variations in accordance with Table III. Upon completion of Sequence 1 and 4 soak periods (Storage), the mount shall be visually and tactually examined to insure conformance with requirements of 3.7.1. Upon completion of Sequence 2 and 4 soak periods (Operating), the mount shall be visually and tactually examined to assure conformance with requirements of 3.11. Following completion of sequence 3 and 5 soak periods (Room Temp.) the mount shall meet all the requirements of 3.7.6 through 3.10.

TABLE III. Temperature cycle.

<u>Sequence</u>	<u>Storage Temperature</u>	<u>Soak</u>	<u>Operating Temperature</u>	<u>Soak</u>	<u>Room Temp.</u>	<u>Soak</u>
1	+160°F(71°C)	6 Hrs				
2			+150°F(65°C)	6 Hrs		
3					+60°F to 90°F (+16°C to 32°C)	6 Hrs
4	-50°F(-46°C)	6 Hrs	-50°F(-46°C)	6 Hrs*		
5					+60°F to 90°F (+16°C to 32°C)	6 Hrs

\* Same 6 Hrs as Storage Soak

4.7.1.3 Shock. This test is applicable to the First Article Samples and the Reliability Samples only. The mount shall then be subjected to a shock test in accordance with 3.7.3. Upon completion of the shock test, the mount shall be examined and inspected to the requirements of 3.7.3.

4.7.1.4 Vibration "A". This test is applicable to the Reliability Assurance Sample only. The mount shall be positioned on Adapter 1.1747196 and secured to the vibration tester. The mount shall then be subjected to a vibration test

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in accordance with 3.7.4.1 of this specification. Upon completion of the vibration test, the mount shall be examined and inspected to the requirements of 3.7.4.1.

4.7.1.5 Vibration "B". The quadrant shall be positioned on Fixture 11747196 and vibrated in accordance with the frequency and duration as specified in 3.7.4.2. At the conclusion of the test, the quadrant shall be subjected to a visual and tactile examination and shall meet the requirements of 3.7.4.2.

4.8 Orientation. Test Fixture 10549201 shall be used for the inspection of Mount M171. Position the test fixture on a vibration free surface in accordance with the set-up instructions on Drawing 10549201.

4.8.1 Telescope locating keys. Prior to positioning the mount to Fixture 10549201, place the mount in holding Fixture 11747950 with the locating surface firmly seated and bolted into place. Orient the mount and fixture into position to accommodate the use of a vernier height gage and indicator. The locating keys for the telescope shall be parallel to the mount's mounting surface within the limits of 3.6e.

4.8.2 Mounting surface and keyway. Position the mount to Fixture 10549201. The mounting surface (internal face) of the mount shall be vertical. The mount's locating keyway shall be horizontal and level within the limit specified in 3.5b.

4.8.3 Telescope mounting surface. Cross level the telescope's mounting surface by turning the pitch and cross level knobs until the level vial bubbles are exactly centered. Next establish that the horizontal keyway of the mount is level within 10 seconds of arc using a precision level vial. Parallelism of the mounts keyway to the flat locating surface for the telescope shall be measured with a calibrated gunner's quadrant 8658940 by placing the quadrant across the locating surface either in front of or behind the horizontal keys. The telescope's locating surface shall be parallel to the keyway within the limit specified in 3.6c.

4.8.4 Quadrant seating surface. The seating surface for the fire control quadrant shall be parallel to the mounting surface (internal face) of the mount within the limit specified in 3.6f. Affix leveling adapter, 10558353-11, to the telescope mount for this test. This requirement can be tested in conjunction with 4.8.5.

4.8.5 Quadrant locating keys. The locating keys for the fire control quadrant shall be parallel to the mount's keyway within the limit specified in 3.5g. Affix leveling adapter, 10558253-11, to the telescope mount for this test. The

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requirement of 3.6g shall be measured directly from the calibrated gunner's quadrant. The requirement shall be met with the mount on Fixture 10549201 with the mounting surface vertical and the keyway horizontal.

4.8.6 Elevation. With the mount positioned as specified in 3.5, rotate the fixture to elevate and depress the mount. The elevation and depression excursion shall meet the minimum travel limits as specified in 3.8.1. Place the calibrated Gunner's Quadrant 8658940 on the Leveling Adapter, 10558253-11 and measure for the minimum elevation and minimum depression.

4.8.7 Deviation (plumb travel). This test can be performed in conjunction with 4.8.6. Insert Sighting Device 10549200 to the telescope's mounting surface. Affix leveling assembly 11836289 to sighting device and adjust level so that the bubble in the level vial is centered when viewed through mirror of the level vial holder, use this level throughout the test. (After level vial is centered, do not readjust level for the rest of the test). Suspend a plumb-line of adequate height and distance from the sight adapter (objective end). While sighting through the adapter, energize the fixture to provide the elevation specified in 3.8.1 and simultaneously track the plumb line to the deviation requirements specified in 3.8.2. Deviation shall be inspected throughout the total excursion specified in 3.8.1.

4.8.8 Pitch level travel. Position the mount as specified in 3.6 with Sighting Device 10549200 in the telescope mounting surface. Assure that the cross-level vial is centered (zero cant). Position the wall target (Figure 1) approximately 40 feet from the objective end of the sight adapter. Sight through the sighting adapter and turn the pitch knob left until full excursion has reached the specified travel in 3.8.3. Return to the zero position. Repeat the above procedure in the opposite direction.

4.8.9 Plumb travel (pitch). This test can be performed in conjunction with 4.8.8. Place the vertical line of the reticle in the sight adapter into coincidence with the vertical line of the wall target (Figure 1). While testing for pitch excursion (178 mils left and 178 mils right) observe plumb travel in pitch direction to the limit specified in 3.8.4.

4.8.10 Backlash (pitch). With the mount positioned as specified in 3.6, place a calibrated Gunner's Quadrant 8658940 on the telescope's mounting surface. Cross level the top mounting surface by centering the bubbles of both level vials.

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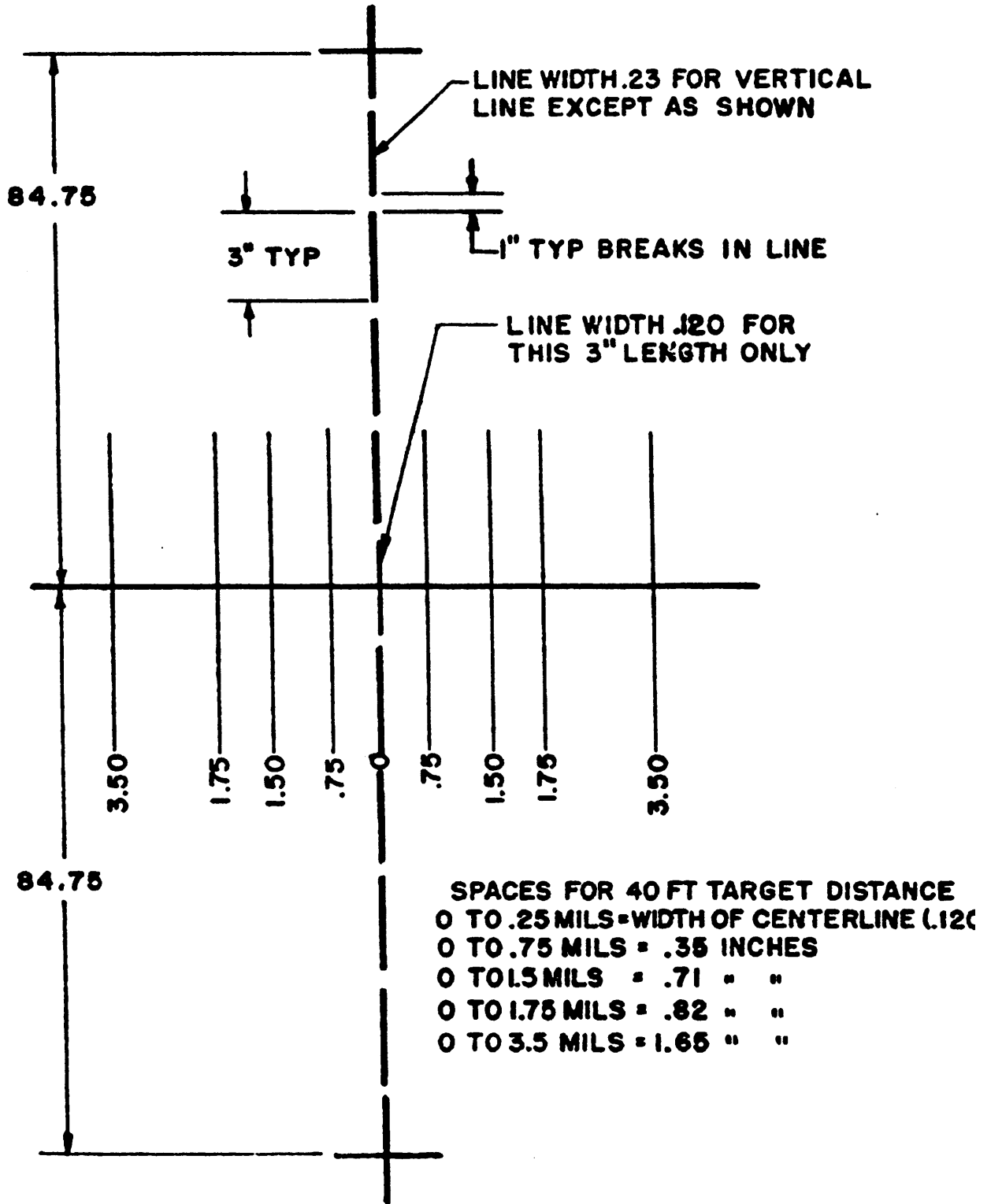


FIGURE I. Mount rigidity and pitch travel target



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Center the level vial bubble and take a reading from the gunner quadrant and record the error, if any. Scribe an index line on the mount casting nearest to the pitch knob. Place an index pointer on the pitch knob directly opposite the scribed index line. The index pointer may be held in place mechanically or by the use of commercial putty. Turn the pitch knob one-half turn and return to the position previously established by the indices and do not overtravel pointer - index coincidence. Recenter the gunner's quadrant. The difference (mils) between the first reading and the second reading is backlash. Backlash at zero elevation shall not exceed the limit specified in 3.8.5. This test will be repeated in the opposite direction.

4.8.11 Cross level travel. Position the mount as specified in 3.6 with the Sighting Device 10549200 in the telescope mounting surface. The pitch and cross level vial bubbles shall be centered. Position the wall target (see sketch Figure 1) approximately 40 feet from the objective end of the sight adapter and turn the cross level knob left until full excursion has reached the specified travel in 3.8.6. Return to the zero position. Repeat the above procedure in the opposite direction. The tolerance lines (excursion limits) on the wall target (Figure 1) will be used for this test.

4.8.12 Backlash (cross level). With the mount positioned as specified in 3.6, and install Leveling Adapter, 10558253-11 on the quadrant mounting surface, place a calibrated Gunner's Quadrant 8658940 on the Leveling Adapter to measure cant. Center the level vial bubble of the gunner's quadrant and record the error, if any. Repeat the procedure for measuring backlash outlined in 4.8.10. Repeat the test for backlash in the opposite direction and the backlash shall meet the requirements of 3.8.5.

4.8.13 Mount rigidity. With the mount positioned as specified in 3.6, sight through the Sighting Device 10549200 and establish a line of sight for zero elevation and zero cant. A wall target (see sketch Figure 1) shall be placed approximately 40 feet from the objective end of the sight adapter with the line of sight superimposed upon the vertical and horizontal lines of the wall target. Apply the 20 pound load, as specified in 3.8.8, tangentially to the mount in the direction of the target. Gradually release the load and record the movement by observing the displaced vertical line in the sight device. Re-establish the line of sight to the vertical and horizontal lines on the wall target as previously performed at the start of the test. Apply the 20 pound load at the right side of the telescope support. Gradually release the load and record the movement by observing the displaced vertical line in the sight adapter. Mount rigidity shall be ascertained by

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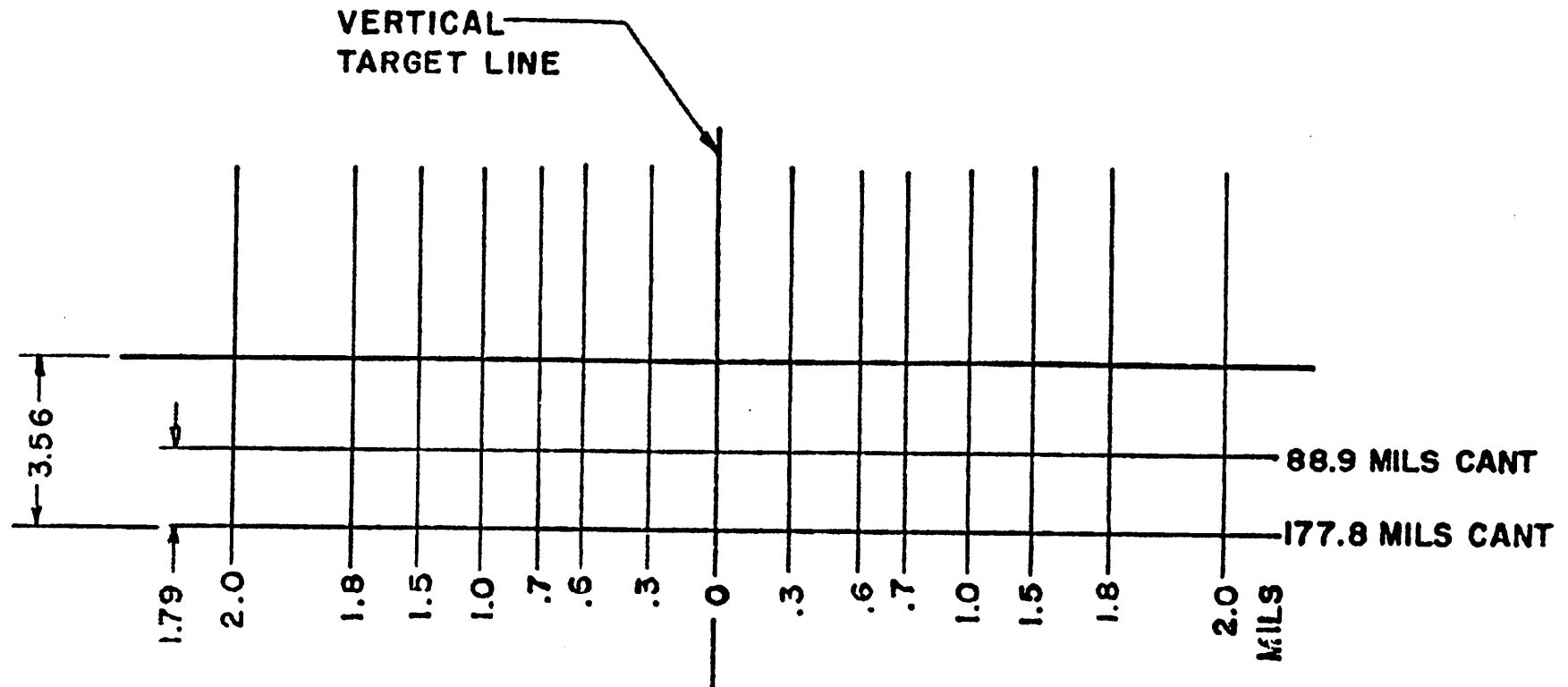
adding the movement of the first reading to the movement of the second reading. The total movement allowed shall be as specified in 3.8.8 for elevations of zero 800, 1100 and 1333 mils. The above procedure shall be performed at each of the elevation settings.

4.8.14 Azimuth correction. Position the mount as specified in 3.6 and place Sight Device 10549200 on the mounting surface for the telescope. Affix leveling assembly 11836289 to the sighting device and adjust level so that the bubble in the level vial is centered when viewed through the mirror of the level vial holder. Use this level for all leveling throughout the azimuth correction test where the cant level vial is used. (After level vial bubble is centered, do not readjust level for rest of the test.) Set the vertical line of the reticle into coincidence with the vertical line of the wall target (see sketch Figure 2). The pitch and cross level vials shall be set at zero. Energize the fixture to produce cant angle of 88.9 mils (5 degrees) , as indicated on the fixture. Then cant the mount an equal amount in the opposite direction until the level vial bubble in the leveling assembly is, centered. Energize the fixture through 301.18 mils of elevation from the canted plane as indicated on the fixture. Table IV can be used for direct elevation readings on the fixture. Set the pitch level vial bubble to the level position. Set the corresponding azimuth correction into the sight device and insert the pin into place. Sight through the device and observe where the reticle center line falls with respect to the tolerance line on the wall target. Azimuth correction tests shall be performed in the left and right direction as specified in 3.8.9. The above procedure shall be performed at each of the elevation settings in accordance with the applicable cant angles applied to the fixture and mount. Azimuth corrections and tolerance for same shall be as specified in 3.8.9.

TABLE IV. Azimuth correction tests.

<u>REQUIRED FIXTURE ELEVATION</u> (In Mils)	<u>REFERENCE ELEVATION</u> ( <u>PARA. 3.7.9</u> ) (In Mils)	<u>CANT ANGLE</u> (In Mils)
301.18	300	88.9
602.60	600	88.9
904.76	900	88.9
1209.50	1200	88.9
304.77	300	177.8
610.54	600	177.8
1130.25	1100	177.8

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**SPACES FOR 40 FT TARGET DISTANCE**

0 TO .3	= .14	INCHES
0 TO .6	= .28	" "
0 TO .7	= .33	" "
0 TO 1.0	= .47	" "
0 TO 1.5	= .71	" "
0 TO 2.0	= .94	" "

**TWO (2) ADDITIONAL VERTICAL LINES  
SIMILAR TO THOSE SHOWN WILL BE  
PLACED ON TARGET 84.75 IN. FROM "0" POSITION**

**TARGET SIZE — 1 FT X 15 FT  
WHITE BACKGROUND, BLACK NUMBERS & LINES**

FIGURE 2. Azimuth Correction Target

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4.9 Operability.

4.9.1 Torque. Use a standard torque measuring device with Adapter 11747949 to test the running torque as specified in 3.10 at standard ambient temperature and operating temperatures. Each knob shall be rotated a minimum of 3 turns in each direction.

4.10 Interchangeability.

4.10.1 Mounting surface for Panoramic Telescope M137. Each mount shall be inspected for maximum fit condition using the interchangeability gage 11747889. Any mount which does not accept the interchangeability gage as stated in 3.11.2, without using force, shall be rejected.

4.10.2 Mounting surface for Quadrant M17. Each mount shall be inspected for maximum fit condition using the interchangeability gage 11747844. Any mount which does not accept the interchangeability gage as stated in 3.11.2, without using force, shall be rejected.

4.10.3 Mounting surface of Mount M171. Each mount shall be inspected for maximum fit condition using the interchangeability gage 11747840. Any mount which does not accept the interchangeability gage as stated in 3.11.3, without using force, shall be rejected.

4.11 Illumination.

4.11.1 Pitcha nad cross level vials. The mount shall be placed in a room having a controlled light source. The level vial bubble and graduation lines shall be clearly discernible to the observer in various light level ranging from standard ambient light to dusk and then into darkness to meet the requirements of 3.9.1.

4.11.2 Radiological contamination. Contamination test shall be performed by wiping the telescope with filter paper moistened in distilled water. The wiping shall be performed with moderate finger pressure. The damp filter paper shall be placed in a container with the proper portion of scintillation liquid. The scintillating system used to measure contamination must be calibrated and shall be within 10% of the known standard value when counted to a total of 2000 disintegrations. The actual test for determining contamination is performed by placing the container into the scintillation system. The measured contamination shall be within the limits specified in 3.7.5.1.

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4.12 Packaging inspection. The preservation, packing, and marking shall be inspected to verify conformance to the requirements of 5.1.

5. PACKAGING

5.1 Packaging, packing, and marking. Packaging, packing, and marking shall be in accordance with MIL-P-14232 Packaging Data Sheet 11727800. The level of protection shall be as specified in the procurement document.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The mount telescope and quadrant supports a panoramic telescope, and an elevatio nquadrant. The purpose of the mount is for precise positioning of the weapon in azimuth elevation in the indirect fire mode but can also be used in the direct fire mode.

6.2 Acquisition requirements. Procurement data should specify the following:

- a. Title, number and date of this specification.
- b. Selection of an applicable level of preservation, packaging, and packing.
- c. Applicable packaging data sheet number (see 5.1).
- d. Applicable stock number.
- e. Provisions for First Article Testing.
- f. Reliability Assurance Sample.
- g. Contract data requirements for submission of inspection equipment designs conforming to Data Item Description DI-R-1714 (see 6.3.1).
- h. Prospective bidders should be made aware that a Nuclear Regulatory License is required for the manufacture of this item.

6.3 Inspection equipment design.

6.3.1 Submission of designs for approval. Contractor designs for final. acceptance inspection shall be approved by

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the Government prior to fabrication or procuring the equipment. The contractor is referred to MIL-HDBK-204 for guidance. Submission of design concept on inspection equipment is permissible for tentative approval. The completion date for design review will be based on the data of the final submission of designs and the required delivery schedule as stipulated in the contract. Submit designs as required to: Commander, US Army Armament Research, Development and Engineering Center, ATTN: AMSMC-QAF-I(D) Picatinny Arsenal, NJ 07806-5000. This address will be specified on the Contract Data Requirements List DD Form 1423 in the contract. Unless otherwise specified, data item DI-R-1714 will apply. When the contractor submits inspection equipment designs to the Government for approval, he shall give the following information in his letter of transmittal:

- a. The contract number.
- b. The contract item (name, model number, etc.).
- c. The designs remaining to be submitted and the expected date of submittal.

6.4 Drawings. Drawings listed in Section 2 of this specification under the heading US Army Armament, Research, Development and Engineering Center (ARDEC) may also include drawings prepared by and identified as Edgewood Arsenal, Frankford Arsenal, Rock Island Arsenal, or Picatinny Arsenal drawings. Technical data originally prepared by these activities is now under the cognizance of ARDEC.

6.5 Subject term (key word) listing.

Fire control  
Mount  
Radioluminous

6.6 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:  
Army-AR

Preparing activity:  
Army-AR

(Project 1240-A952)

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

## INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

**NOTE:** This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

<b>I RECOMMEND A CHANGE:</b>	1. DOCUMENT NUMBER MIL-M-48557A (AR)	2. DOCUMENT DATE (YYMMDD) 15 MAY 1990
3. DOCUMENT TITLE MOUNT, TELESCOPE AND QUADRANT: M171		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)		
5. REASON FOR RECOMMENDATION		
<b>6. SUBMITTER</b>		
a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code)	7. DATE SUBMITTED (YYMMDD)
	(1) Commercial (2) AUTOVON (if applicable)	
<b>B. PREPARING ACTIVITY</b>		
a. NAME US ARMY ARDEC STANDARDIZATION & SPECIFICATION OFFICE	b. TELEPHONE (Include Area Code)	
c. ADDRESS (Include Zip Code) ATTN: SMCAR-BAC-S/BLDG 6 PICATINNY ARSENAL, NJ 07806-5000	(1) Commercial (201) 724-6674	(2) AUTOVON 880-6674
	<b>IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:</b> Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	