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9 March 1977

MILITARY SPECIFICATION

TELESCOPE, ELBOW: M138

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 one type of elbow telescope which provides eight power magnification and an eight degree field of view. The telescope has a mil scale reticle for setting elevation. The reticle pattern is radioactively illuminated. (see 6.1)

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards and handbooks. The following specificaitons, 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-O-13830 -Optical Components for Fire Control Instruments, General Specification Governing the Manufacture, Assembly, and inspection 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 AIDEC, ATTN: SMCAR-BAC-S, Picainny Arsenal, New Jersey 07806-5000 by using the self-addressed Standardization Document Improvement Proposal (DD Form l426 appearing at the end of this document or by letter.

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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

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 date of the solicitation.

DRAWINGS

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

5549108	Telescope, Collimating
7680631	Dioptometer
8565556	Pressure Tester
10549199	Adapter, Vibration and/or Shock
10558254	Test Fixture
11741626	Telescope, Elbow: M138
11747956	Gage, Interchangeability, Maximum

PACKAGING DATA SHEET

F11741626	Packaging of Telescope, Elbow M138

(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 Supply System.

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(Applicaiton for copies of the DSAM should be addressed to the Superintendent of documents, Government Printing Office, Washington, DC 20402.)

2.3 Order of precedence. In the event of a conflict between the text of this specification 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 the applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Hazardous material. This telescope 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 telescope shall be manufactured in accordance with Drawing F11741626.

3.5 General specifications. The contractor shall be responsible for the compliance with the requirements of specifications MIL-0-13830 and MIL–F–13926.

3.6 Orientation. Whenever specified herein, the conditions listed below shall apply:

a. The telescope shall be mounted on an appropriate fixture, which locates and holds in place the locating Pin in a horizontal plane and positions the "V" Holder Assembly 10549272 .750 ± 002" above and to the rear of the pin.

b. The "V" located on holder assembly 10549272, snail be seated over a .812" - .0005" diameter. The latch on the holder assembly shall be locked to a .500 - .001" diameter.

c. A horizontal line of sight shall be-provided which is parallel in azimuth to the place defined by surfaces "X" and "Y" on Drawing 11741626.

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3.7 Environmental.

3.7.1 Storage temperature. The telescope shall show no evidence of physical failure when thermally stabilized at ambient temperatures of +160°F (+71°C) ± 5°F (±3°C) and -50°F (-46°C) ± 5°F (+3°C) for a period of 4 hours ± 15 minutes at each temperature.

3.7.2 Operating temperature. The telescope shall meet the applicable requirements of 3.12 while exposed and thermally stabilized 2 hours + 15 minutes at ambient temperatures of +150°F (+65°) + 5°F (+3°C) and exposed and thermally stabilized for 4 hours + 75 minutes at an ambient temperature of -50°F (-46°C) ± 5°F (+3°C). Upon return to standard ambient temperature, +60°F to +90°F (+16°C) to +32°C), from each operating temperature, the telescope shall meet the requirements of 3.7.6 through 3.13.1.

3.7.3 Shock. When required, the telescope shall withstand a total of 18 shock impulses, 3 in each direction of 3 mutually perpendicular axes. Each shock impulse shall be a half sine wave with a time duration of 6 + 1 milliseconds. The peak amplitude of each shock impulse shall be 75g's. Subsequent to shock, the telescope shall show no evidence of physical damage and shall meet the requirements of 3.7.5 through 3.13.1.

3.7.4 Vibration.

3.7.4.1 Vibration "A". When required the telescope shall withstand a total of 270 minutes + 5 minutes sweep-cycle vibration. The vibration shall be applied for 90 minutes ± 2 minutes along each of the 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 (5g's + 0.5g's at 500 hz) to origin, and shall have a duration of 15 minutes + 1 minute. Double amplitude shall be constant at 1 inch between 5 hz and 10 hz, and varied with frequency to maintain a constant 5g’s ± 0.5g’s acceleration between 10 hz and 500 hz. Upon completion of vibration, the telescope shall exhibit no evidence of damage and shall meet the requirements of 3.7.5 through 3.13.1.

3.7.4.2 Vibration "B". The telescope shall be vibrated in a vertical plane at a constant frequency of 30 ± 5 cycles per second with an amplitude of 1/16 inch (1/8 ± 1/64 inch total excursion) for a period of 5 minutes ± 15 seconds. Subsequent ot vibration, there shall be no evidence of damage and the telescope shall meet the requirements of 3.7.5 through 3.13.1.

3.7.5 Post vibration and shock.

3.7.5.1 Collimation change. The line of sight established by paragraph 3.6 prior to vibration shall not deviate more than

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.25 mil in azimuth and elevation due to subjecting the telescope to Vibration "A", Vibration "B", or Shock.

3.7.6 Radiological requirement.

3.7.6.1 Radiological contamination. Any part of Tritium shall not be present on the external surfaces of the Elbow Telescope in excess of 1000 dpm/100 sq. cm. subsequent to exposure of requirements 3.7.1 through 3.7.4.2 as required by para 4.3.2 Final acceptance inspection provisions or para 4.4 Special sampling provisions, as applicable.

3.7.7 Reliabiltiy. The Telescope shall be subjected to reliability assurance tests as follows:

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

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

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

3.8 Sealing and purging.

3.8.1 Sealing. The telescope shall show no evidence of leakage when subjected to an internal pressure of 5.0 + 0.1 pound per square inch gage (psig) for a minimum of one hour. The diopter scale must not be moved from its initial position during this test.

3.8.2 Purging. The interior of the telescope shall be purged with dry nitrogen supplied at a pressure of 6 ± 1/4 psi until the dew point of the emergent gas is no higher than -25°F. Purging apparatus shall be removed when relief valve is reseated and maintains pressure of 3 + 0.10 PSIG.

3.9 Cleanliness.

3.9.1 The Telescope shall meet the cleanliness requirement of specification MIL-0-13830.

3.9.2 Dirt. This requirement shall be met with the observations for dirt and foreign particles (classed as dirt) made through the eye end of the telescope. The maximum size of any particle appearing on the reticle surface shall not exceed the width of the reticle line. There shall be no more than three particles within the central 50 mil diameter field of view. There shall be no more than three particles outside the central 50 mil

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diameter field of view. The angular separation between particles shall be greater than 15 mils Particles smaller than 1/4 reticle line width shall be ignored regardless of distribution.

3.9.3 Optical components. The telescope shall show no evidence of moisture, grease, fingerprints, condensates, fractures, or adhesive separation of any glass component.

3.10 Optical characteristics.

3.10.1 Parallax. Parallax at the center of the field shall not exceed 0.25 mil when viewing targets between 125 meters and infinity.

3.10.2 Reticle accuracy. The angular separation between the 0 mil and 60 mil graduations shall be 60 ± 0.5 mils

3.10.3 Resolution. The resolution of the optical axis shall be 5 seconds of arc or less when using an observation telescope of at least 3 power and an entrance pupil of at least 0.4 inches. Resolution consists of detectable line structure and proper line count in all four meridians. Total spread in focus shift between meridians shall not exceed 1/2 diopter as measured at the eyepiece.

3.10.4 Parallelism of reticle and image. This requirement shall be met with the telescope oriented as specified in 3.6. The Telescope 20 mil horizontal line shall be parallel to the image of a target horizontal line and shall not exceed 30 minutes of arc.

3.10.5 Image tilt. This requirement shall be met with orientation of 3.6 established. The image of a horizontal line shall be horizontal and shall not exceed one degree of arc.

3.11 Accuracy.

3.11.1 Collimation of reticle. The boresight graduation cross shall coincide with a target 20 mils above the horizontal (Para 3.6) within 1.0 mil. The azimuth of the boresight cross shall coincide with the plane defined by surfaces "X" and "Y" on Drawing 11741626 within 1.0 mil.

3.12 Operability of moving Darts.

3.12.1 Torque. The running torque required to operate the diopter adjustment shall be within the values specified for standard ambient temperature of +60° to +90°F (+16° to +32°C), and shall not exceed the values at the Operating Temperatures specified in 3.7.2.

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Control	At +60°F to +90°F (+16° to +32°C	At -50°F and +150°F (-46° and +66°C)
Diopter Adjustment	5 to 9 inch lbs	25 in. lbs. max.

3.12.2 Attachment. 3.12.2 Attachment. The elbow telescope locking mechanism shall be operable when exposed to the requirements of 3.7.2. The The telescope shall be retained in a manner representative of its use representative of its use on the Mount, Telescope M172.

3.12.2.1 Locating and locking mechanism. 3.12.2.1 locating and locking bechanism. With the telescope oriented per 3.6, oriented per 3.6, the latch or cam lock shall not loosen when the telescope' is telescope is subjected to the requirements of Shock 3.7.3 or 3.7.4.1 or 3.7.4.2.

3.13 Illumination.

3.13.1 Reticle. The reticle markings shall be clearly distinguishable when observed in ambient light conditions ranging from dusk into darkness.

3.14 Interchangeability. Telescope interchangeability shall be verified by the insertion, seating, and subsequent removal of a maximum fit gage.

3.15 Workmanship. The workmanship of MIL-O-13830 and 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 Bovernment The Government reserves the right to perform any of the inspection set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specifications 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

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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 as 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 specified in the contract. The sample for first article approval tests shall consist of three (3) telescopes, 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 procedutes 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 quadrants shall be tested in accordance with, and meet the requirements of Tables I and II and paragraph 4.7.2.

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, 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.

4.3 Examination and tests.

4.3.1 Components and subassemblies. All components and subassemblies shall be Inspected In accordance with the inspection provisions contained in the QAPs listed in the Technical Data Package (TDP). In the absence of QAPs, the applicable Quality Assurance Provisions of MIL-0-13830 and 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

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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. Aleternative inspection procedures, methods, or equipment, such as statisticvall 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.

TABLE I. Requirements and test procedures.

No.	Characteristic	Requirement	Test procedure
Critical:	None		
Major:	100% Inspection		
101.	Sealing	3.8.1	4.8.13.1
102.	Purging	3.8.2	4.8.13.2
lo3.	Interchangeability	3.14	4.9
104.	Orientation	3.0	4. 8.1 & 4.8.2
105.	Vibration B	3.7.4.2	4.7.4
106.	Post vibration - Collimation Change	3.7.5	4.8.3
107.	Cleanliness	3.9	4.8.4
108.	Parallax	3.10.1	4.8.5
109.	Reticle Accuracy	3.10.2	4.8.6
110.	Resolution	3.10.3	4.8.7
111.	Parallelism of Reticle and Image	3.10.4	4.8.8

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TABLE I. Requirements and test Procedures. (cont.)

No.	Characteristic	Requirement	Test procedure
112.	Image tilt	3.10.5	4.8.9
113.	Collimations - Reticle	3.11.1	4.8.2
114.	Operability - Torque	3.12.1	4.8.10
115.	Attachment	3.12.2	4.8.10
116.	Locating & Locking Mechanism	3.12.2.1	4.8.10
117.	Reticle Illumination	3.13.1	4.8.11
118.	Radiological Contamination	3.6.6	4.8.12
119.	Fabrication	3.4	11741626
120.	Workmanship	3.15	MIL-O-13830 & MIL-F-13926
121.	Packaging	5.1	4.10

Minor: None

4.4 Special sampling.

4.4.1 General. Subsequent to meeting the requirements of Table I, three telescopes 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 after being subjected to Table II testing.

TABLE II

NO.	CHARACTERISTIC	REQUIREMENT	TEST PROCEDURE
301.	Storage temperature	3.7.1	4.7.1
302.	Operating temperature	3.7.2	4.7.1
303.	Operability	3.12	4.8.10

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 samples 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.

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4.5.3 Contractor furnished inspection equipment.

4.5.3.1 Government design. Unless otherwise specified in the contract, all inspection equipment specified by drawing number in specifications or QAPs 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 the tolerance of test equipment is normally considered to be within 10% of the 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, concept, construction, materials dimensions, and tolerance used in 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 positive rejection when non-contorming. Construction shall be such as to facilitate routine calibration of test equipment.

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.

NOMENCLATURE	DESCRIPTION
1. Hot and cold chamber	Standard type conforming to the accuracy outlined in test facilities specified under test facilities of MIL-F-13926.
2. Light source standard	
3. Torque wrench	Standard shop type accurate to 10% of product tolerance.

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

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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. Testing shall be performed in accordance with the procedures specified in 4.7.1 through 4.7.3.

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 degration. Upon identification by the Government to the contractor, of the specific quality defect(s) found, the contractor shall determine and apply effective and immediate corrective action to improve his production processes or quality control procedures, as necessary to eliminate the defect(s) from telescopes 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 retest sample shall be subjected only to the reliability test(s) which revealed the defect(s).

4.6.3.1 Inspeciton 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 characteristics 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 Environmental.

4.7.1 Storage and operating temperatures. The telescope 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 telescope 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 telescope shall be visually and tactually examined to assure conformance with the requirements of 3.12. Following completion of Sequence 3 and 5 soak periods (Room temperature), the telescope shall meet all the requirements of 3.7.6 through 3.13.1.

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TABLE III

SEQ	STORAGE TEMP	SOAK	OPERATING TEMP	SOAK	ROOM TEMP	SOAK
1	+160°F(71°C)	4 hrs.				
2			+150°F(65°C)	2 hrs.		
3					+60°F to 90°F (+16°C to +32°C)	3 hrs.
4	-50°F(-46°C)	4 hrs.	-50°F(-46°C)	4 hrs.*		
5					+60°F to 90°F (+16°C to +32°C)	3 hrs.

* Same 4 hrs as Storage Soak

4.7.2 Shock. This test is applicable to the First Article samples and the reliability assurance sample only. The telescope The telescope shall be positioned on Adapter 10549199 and secured to the shock tester. The telescope shall then be subjected to a shock test in accordance with 3.6.3 Upon completion of the shock test, the telescope shall be subjected to a visual and tactile examination and shall meet the requirements of 3.7.3.

4.7.3 Vibration “A”. 4.7.3 Vibration "A". This test is applicable to the First Article samples and the reliability assurance sample only. The The telescope shall be positioned on Adapter 10549199 and secured to the vibration test in accordance with 3.7.4 of this specification. Upon completion of the vibration test, the telescope shall be subjected to a visual and tactile examination and shall meet the requirements of 3.7.4.

4.7.4 Vibration "B". The frequency and duration shall be as outlined in 3.7.4.2. At the conclusion of the test, the telescope shall be subjected to a visual and tactile examination and shall meet the requirements of 3.7.4.2.

4.8 Methods of inspection.

4.8.1 Orientation. Test Fixture F10558254 shall be used for the inspection of Elbow Telescope M138. Position the test fixture on a vibration free surface in accordance with the setup instructions outlined on drawing F10558254. Follow the calibration and setup instructions prior to positioning telescope to the fixture. Subsequent to completion of all setup instructions, the telescope shall be orientated as specified in paragraph 3.6 of this specification.

4.8.2 Collimation. The telescope shall be positioned as specified in paragraph 3.6. The intersectinq point of the boresight cross of the telescope reticle shall be within the tolerance block of the target reticle. The intersecting point must be within the limit specified for the collimation of reticle,

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paragraph 3.11.1. Observe and record the telescope reticle orientation to the target prior to vibration testing.

4.8.3 Post vibration and shock. Reassemble the telescope to the test fixture and repeat the test procedure outlined in 4.8.2. The unit under test shall not deviate from the previously recorded settings for those requirements outlined in 3.6 and 3.7.5.1.

4.8.4 Cleanliness. The unit under test shall be subjected to the test procedures outlined in MIL-O-13830 for conformance to the requirements outlined in 3.9.1, 3.9.2, and 3.9.3.

4.8.5 Parallax. This test shall be performed with the telescope positioned as outlined in the collimation procedure. Set the collimator projector to 125 meters. The 20 mil reticle graduation setting of the telescope will establish the geometric axis. Observe any apparent movement between the intersecting point of the telescope's boresight cross and the tolerance block of the target reticle's horizontal and vertical lines. Any apparent movement between these two points when the inspector's head is moved up and down or from side to side is considered parallax. The amount of parallax shall not exceed the limits specified in 3.10.1.1 Repeat the above test at the infinity setting.

4.8.6 Reticle accuracy. Test shall be performed with the telescope positioned as outlined in 4.8.2. The telescope should be unlocked in the adapter and the zero range graduation of the reticle placed in coincidence with the corresponding line of the target reticle. To obtain coincidence, shim the unit in the fixture. When coincidence has been established, observe that the 60 mil reticle line is within the limit lines of the target reticle to assure compliance with 3.10.2.

4.8.7 Resolution. To perform this test, a wall target containing the appropriate resolution test patter shall be employed. Construction of the resolution target and the method of inspection shall be as outlined in MIL-O-13830. The telescope must resolve the test pattern within the limits outlined in 3.10.3. During this test, the telescope may be support in a "V" block. The use of packing or shims may be used to position the telescope. When making this test. use a dioptometer having a minimum of 3 power.

4.8.8 Parallelism of image and reticle. with the telescope and fixture positioned as outlined in 4.8.2, sight through the telescope and observe that the 20 mil horizontal line is in coincidence with the horizontal target reticle line at the short vetical line. Parallelism of the telescopes 20 mil horizontal line shall not exceed the 30 minute mark on the target reticle as per 3.10.4. This test can be performed with 4.8.6.

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4.8.9 Image tilt. Test may be performed with the telescope positioned as outlined in 4.8.2. The test is performed by sighting through a pre-plumbed auxiliary telescope 5549108 and observe parallelism between the center horizontal reticle line of the target reticle and the horizontal reticle line of the auxiliary telescope. Both horizontal lines must be parallel and shall not exceed the limits of the angular lines of the target reticle to assure compliance with 3.10.5.

4.8.10 Operability. The operability and torque of the telescope's diopter adjustment, latch, attachment, and release torque shall be tested by use of a torque wrench and appropriate adapters at the temperatures specified for compliance with 3.12.1, 3.12.2, 3.12.3, and 3.12.2.1.

4.8.11 Illumination. The reticle illumination test shall be performed under simulated conditions specified in 3.13.1. Place Place the instrument in a dark room having a controlled light source. The observer and instrument must be dark adapted. Prior to performing the test, place a white, matted surface approximately 2 feet from the telescope window. Perform the test by observing reticle pattern and determine that this pattern is clearly discernible by means of the self-illuminating source in the dark room. Gradually raise the level of illumination to where the pattern becomes indiscernible. Place a fixed stop having an aperture of one-half inch over the objective window and observe that the reticle pattern is again clearly discernible by means of the self-illuminating source. Raise the ambient level of illumination to 10 foot candle, remove the fixed stop and observe the reticle pattern.

4.8.12 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 fomger pressure. The damp filter paper shall be placed in a container with the proper portion of scintillation liquid. The The scintillating system used to measure contamination must be calibrated. The read out 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 3.7.6.

4.8.13 Sealing and purging.

4.8.13.1 Sealing. The assembled elbow telescope shall be capable of withstanding an internal pressure of 5 + 0.10 psig for a period of 1 hour with no evidence of leakage. Prior to the start of the test, secure the poppet valve in a closed position. Then pressurize the telescope with dry nitrogen as specifies in paragraph 3.8.1. Accuracy of the test equipment used for this

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test shall be equal to or exceed the accuracies depicted on Pressure Test Drawing F8565556.

4.8.13.12 Purging. Connect the test equipment to the purging valve of the telescope. Adjust the dry nitrogen pressure to the pressure specified in 3.8.2. The pressure is to remain constant (6.0 ± 1/4 psi) until the dew point of the emergent gas is no higher than -25°F. Disconnect the purging apparatus when the relief valve has reseated to maintain an internal pressure of 3 ± 0.10 psig.

4.9 Interchangeability. Each telescope shall be inspected for maximum fit condition using interchangeability gage 11747956, and meet the requirements of 3.4. Any telescope shich will not enter and properly seat on the mounting surfaces of the gage shall be rejected.

4.10 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 and Packaging Data sheet 11741626. The level of protection shall be as specified in procurement document.

6. NOTES

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

6.1 Intended use. The Telescope Elbow M138, when mounted on Telescope Mount and Quadrant M172, is primarily intended to lay the M198 Howitzer in azimuth and elevation for direct fire.

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. I

e. Provisions for First Article Testing.

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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 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 U.S. 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
Elbow telescope
Radioluminous

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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 No. 1240-A954)

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

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I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER: MIL-T-48558B (AR)
2. DOCUMENT DATE (YYMMDD): 29 MAY 1990
3. DOCUMENT TITLE: TELESCOPE, ELBOW: M138
4. NATURE OF CHANGE (*Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.*)
5. REASON FOR RECOMMENDATION
6. SUBMITTER
   a. NAME (Last, First, Middle Initial)
   b. ORGANIZATION
   c. ADDRESS (Include Zip Code)
   d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)
7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY
   a. NAME: US ARMY ARDEC STANDARDIZATION & SPECIFICATION OFFICE
   b. TELEPHONE (Include Area Code) (1) Commercial: (201) 724-6674 (2) AUTOVON: 880-6674
   c. ADDRESS (Include Zip Code): ATTN: SMCAR-BAC-S/BLDG 6, PICATINNY ARSENAL, NJ 07806-5000

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