INCH-POUND

MIL-L-49426(CR)

6 November 1989

MILITARY SPECIFICATION

LENS ASSEMBLY, OBJECTIVE FOR AVIATOR'S NIGHT VISION IMAGING SYSTEM AN/AVS-6(V)1, AN/AVS-6(V)2

This specification is approved for use by USACECOM, Department of Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the Lens Assembly, Objective, referred to herein as the objective, which is part of Aviator's Night Vision Imaging System, AN/AVS-6(V)1, AN/AVS-6(V)2, referred to herein as ANVIS (see 6.1).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards. The following specifications, standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the Department of Defense Index of Specifications and Standards (DODISS) and supplement there, cited in the solicitation (see 6.2.g).

SPECIFICATIONS

MILITARY

MIL-P-11268	-	Parts, Materials and Processes Used in Electronic Equipment
MIL-O-13830	-	Optical Components for Fire Control Systems

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: HQ, USA Communications-Electronics Command, ATTN: AMSEL-ED-TO, Fort Monmouth, NJ 07703 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 5855

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STANDARDS

MILITARY

MIL-STD-150	-	Photographic Lenses
MIL-STD-171	-	Finishing of Metal and Wood Surfaces
MIL-STD-810	-	Environmental Test Methods

(Unless otherwise indicated, copies of federal and military specifications, standards and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099).

2.1.2 Other Government documents, drawings and publications. The following other Government documents, drawings and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

5002499	-	Objective Cell Assembly
5002550	-	Lens Assembly, Objective
5002760	-	Image Intensifier Assembly, 18mm, MX-10160/AVS-6

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

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

3. REQUIREMENTS

3.1 Construction. The objective shall be constructed in accordance with 5002550 and as specified herein.

3.2 Qualification. Objective Lens furnished under this specification shall be products which are authorized by the Government as Qualified Products (see 3.9.5).

3.2.1 Initial production testing (IPT). When required by the contract, the supplier shall furnish and test objectives as specified herein (see 6.2.b). Disposition of IPT samples shall be in accordance with contract or purchase order.

3.3 Parts and materials. Parts and materials shall be as specified herein and as shown on applicable drawings. Materials not specified shall be selected by the contractor and shall meet the requirements of MIL-P-11268.

3.4 Performance characteristics. The objective shall be designed and fabricated to operate through the input glass faceplate on an Image Intensifier Assembly, 18mm, MX-10160/AVS-6 in accordance with 5002760. The glass plate shall be 5.537, ± 0.050 mm thick Corning 7056 glass, or equivalent. The following performance parameters, unless otherwise specified, shall be met when the image lies on the rear surface of this glass plate. Unless otherwise specified, the following requirements will be met at room temperature (see 3.9.2).

3.4.1 Equivalent focal length. The equivalent focal length (EFL) of the objective shall be 27.03, ± 0.50 mm.

3.4.2 Flange focal distance. The flange focal distance of the objective shall be no less than 1.0 millimeter measured from the rearmost flange to the input faceplate of the image intensifier assembly, when the infinity focal plane of the objective is coincident with the rear surface of the input faceplate.

3.4.3 f-number. The f-number of the objective shall be no greater than f/1.23.

3.4.4 Veiling glare.

3.4.4.1 Stray light. The stray light of the objective shall be no greater than 2.35 percent over the spectral region defined in Figure 1.

3.4.4.2 Veiling glare, off axis. The objective lens when installed on the AN/AVS-6 system shall not display visible signs of ghost imagery, crescents, moons or streaking when a point light source of 2856 ± 200K is illuminating the objective lens aperture at .005 ± 0.001 fc, outside the field-of-view of the system and up to an angle of 90 degrees off the optical axis of the objective lens.

3.4.5 Linear distortion. The linear distortion of the objective at a 9mm semi-field height shall be 8, ± 0.5 percent barrel distortion.

3.4.6 Relative illumination. At full aperture, the image illuminance at the edge of the format shall be no less than 45 percent of the image illuminance on axis.

3.4.7 Field of view (FOV). The objective shall have a FOV of 40, ± 1 degrees for an 18 mm format.

3.4.8 T-number. The T-number of the objective shall be no greater than 1.35.

3.4.9 Modulation transfer function (MTF). Over the spectral region defined in Figure 1, the objective shall have MTF performance as follows.

3.4.9.1 MTF, axial and two-thirds field. The objective shall have an axial MTF not less than that specified in Figure 3. In the same flat focal plane chosen for axial MTF, the objective shall have two-thirds field performance not less than that specified in Figure 4.

3.4.9.2 MTF, full field. In the same focal plane chosen for axial MTF, the objective shall have full-field performance not less than that specified in Figure 5.

3.4.10 Concentricity. The image displacement of the mechanical and optical axis of the objective shall not exceed 0.1mm.

3.4.11 Minus blue coating. One of the inside surfaces of a lens element in the objective shall be coated with a minus blue filter meeting the transmission requirements of Figure 6. The inside surface of the first element is preferred.

3.4.12 Weight. The weight of the objective lens assembly (5002550) shall not exceed 58 grams. The weight of the objective cell assembly (5002499) (see 3.9.4) shall not exceed 47 grams.

3.5 Environmental characteristics. When the objective is incorporated into the ANVIS, it shall not cause the ANVIS to fail environmental requirements. The change in the objective optical performance with temperature shall not cause the ANVIS to fail specified performance requirements.

3.5.1 Vibration. The objective shall not be damaged (see 3.9.1) by vibrations in the frequency range of 5 to 600 Hertz (Hz) at an amplitude level of 0.2-inch double-amplitude or 2-g acceleration, whichever is smaller.

3.5.2 Temperature-altitude. The objective shall not be damaged (see 3.9.1) by continuous operation throughout the operating temperature range at altitudes of sea level to 15,000 feet or the nonoperating temperature range at altitudes to 50,000 feet.

3.5.3 Temperature shock. The objective shall not be damaged (see 3.9.1) by sudden temperature changes over the temperature range of +71°C to +23°C and +23°C to -35°C.

3.5.4 Humidity. The objective including its lens coating shall successfully pass a humidity test conducted in accordance with MIL-STD-810, Method 507.1, Procedure I. Neither the coating nor the objective shall be damaged (see 3.9.1).

3.6 Treatment and painting. The finishes on the objective shall be in accordance with 5002550. Any metal parts shall have finishes which are in compliance with MIL-STD-171.

3.7 Marking. The objective shall be marked in accordance with 5002550.

3.8 Workmanship. All objectives shall be free from cracks, splits, cold flow, shrinkage, inclusions, porosity, or any similar characteristics. Threads shall be full and undamaged for the entire length or depth as required on the applicable drawing. Objectives shall be free from burrs and shall be free from chips, dirt, grease, rust, corrosion, or any embedded foreign material. The cleaning methods used shall not damage any of the objectives, nor shall the parts be contaminated by the cleaning agent. Optical quality requirements defined as scratches, digs, edge chips, bubbles, coating defects and cementing defects shall be in accordance with MIL-O-13830 except that inspection of optical cleanliness shall be with the unaided eye (without 3X magnification). All moving parts and adjustments shall be examined to insure that they move freely throughout their entire range without sticking, binding, or creeping.

3.9 Technical interpretations. The following technical interpretations are, when referenced in sections 3, 4, or 5, mandatory for this specification.

3.9.1 Damage. Damage is defined as:

a. Failure of a finish, dents or breakage of hardware.

b. Condensation, fogging or moisture on internal surface.

c. Coating, blistering, peeling or milky condition.

3.9.2 Room temperature. Room temperature is defined as +23°C, +10°C, -2°C.

3.9.3 Environmental tests. For the purpose of this specification, environmental tests are those tests discussed in 4.6.

3.9.4 Objective lens cell. The objective lens cell is defined as the cylindrical part which is in direct contact with the lens elements, holds the lens elements in their fixed relative position, and has no external sleeves, flanges, or other surfaces or fittings permanently attached to it.

3.9.5 Qualified product. A product which has successfully met all of the requirements of an IPT or First Article witnessed by the procuring activity.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may use his own 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 that supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of section 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 ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspections and tests. Inspections and tests shall be classified as follows:

a. Initial production testing (4.3)
b. Quality conformance inspections and tests (4.4)

4.3 Initial production testing (IPT). Unless otherwise specified (see 6.2.b) fifteen objectives manufactured with production tooling shall be selected from the first production lot and provided for IPT. Each objective shall be inspected in accordance with Table I and shall be subjected to Table II, subgroup 1 tests. Three objectives which pass subgroup 1 tests shall be subjected to Table II, subgroup 2 tests. The tests in subgroup 1 may be performed in any order except for MTF. For objectives subjected to subgroups 1 and 2, MTF shall be performed last. Three (3) samples which have passed subgroup 1 shall be selected for the subgroup 3 (minus blue coating) testing. Subgroup 4, humidity shall be conducted with eight (8) samples which have passed subgroup 1 tests. Failure of any inspection or test of Table I or Table II may be cause for rejection of IPT. Molded parts shall be chosen so as to have equal representation from all molds.

TABLE I. Inspections.

Requirement	Method
Workmanship (see 3.8)	Visual
Parts missing/damaged	Visual
*Packaging, missing or not as specified	Visual
Marking	Visual

*Final examination only

TABLE II. Initial production testing.

Test	Requirement paragraph	Test paragraph
Subgroup 1		
Equivalent focal length	3.4.1	4.5.1
Flange focal distance	3.4.2	4.5.2
F-number	3.4.3	4.5.3
On axis veiling glare	3.4.4.1	4.5.4.1
Off axis veiling glare	3.4.4.2	4.5.4.2
Linear distortion	3.4.5	4.5.5
Relative illumination	3.4.6	4.5.6
Field of view	3.4.7	4.5.7
T-number	3.4.8	4.5.8
MTF	3.4.9	4.5.9
Concentricity	3.4.10	4.5.10
Weight	3.4.12	4.5.12
Subgroup 2		
Vibration	3.5.1	4.6.1
Temperature-altitude	3.5.2	4.6.2
Temperature shock	3.5.3	4.6.3
Subgroup 3		
Minus blue coating	3.4.11	4.5.11
Subgroup 4		
Humidity	3.5.4	4.6.4

4.4 Quality conformance inspections and tests.

4.4.1 Inspections. All objectives shall be inspected for the requirements listed in Table I. Failure to meet the requirements specified shall be cause for rejection of the objective inspected.

4.4.2 Tests. For purposes of group B and group C testing, a lot shall be formed by the contractor.

4.4.2.1 Group A tests. All objectives shall be tested for the requirements listed in Table III. Failure of an objective to meet the requirements specified shall be cause for rejection of that objective.

TABLE III. Group A tests.

Requirement	Requirement paragraph	Test paragraph
Flange focal distance	3.4.2	4.5.2
Stray light	3.4.4.1	4.5.4.1
MTF, axial and 2/3 field	3.4.9.1	4.5.9.1

4.4.2.2 Group B tests. Objectives which have passed the inspections and tests of Tables I and III shall be tested in accordance with Table IV. Sampling for inspection shall be as described in the contract or purchase order (see 6.2.f).

TABLE IV. Group B tests.

Requirement	Requirement paragraph	Test paragraph
Subgroup 1		
Equivalent focal length	3.4.1	4.5.1
T-number	3.4.8	4.5.8
Concentricity	3.4.10	4.5.10
Subgroup 2		
F-number	3.4.3	4.5.3
Linear distortion	3.4.5	4.5.5
Relative illumination	3.4.6	4.5.6

4.4.2.3 Group C tests. Lots which have passed the group B tests shall be tested in accordance with Table V. Sampling for inspection shall be as described in the contract or purchase order (see 6.2.f).

4.4.2.3.1 Group C failure actions. Actions required in the event of a Group C failure shall be as specified in the contract (see 6.2.d).

TABLE V. Group C tests.

Requirement	Requirement paragraph	Test paragraph
Subgroup 1		
Veiling glare off axis	3.4.4.2	4.5.4.2
Field of view	3.4.7	4.5.7
MTF, full field	3.4.9.2	4.5.9.2
Weight	3.4.12	4.5.12

4.4.2.3.2 Group C special tests.

4.4.2.3.2.1 Witness samples. Testing of representative flat witness samples for minus blue coating shall be performed on each lot of lens elements coated one sample per lot.

4.4.2.3.2.2 Objective assemblies testing. Testing of completed objective assemblies for minus blue coating shall be performed on a sample of 2 objective assemblies taken from the first delivered lot, at the 50 percent point of manufacture and the last delivered lot of objective lens assemblies.

TABLE V. Group C tests. - (Continued)

Requirement	Requirement paragraph	Test paragraph
Subgroup 2		
Vibration	3.5.1	4.6.1
Temperature-altitude	3.5.2	4.6.2
Temperature shock	3.5.3	4.6.3
Subgroup 3		
Humidity	3.5.4	4.6.4
Subgroup 4		
Minus blue coating	3.4.11	4.5.11

4.5 Test methods. Unless otherwise specified, all tests shall be performed at room temperature. The tolerances specified herein are absolute with no allowance for test equipment inaccuracy. The tolerances used by the contractor shall be equal to the absolute tolerances less the accuracy tolerances of the test equipment. All optical tests with the exception of T number, relative illumination, concentricity, on-axis veiling glare and off-axis veiling glare shall be conducted with a glass plate before the image plane of the objective in order to simulate the effects of the glass plate on the input of an Image Intensifier Assembly, 18mm, MX-10160/AVS-6. The glass plate shall be a 5.537, ± 0.050 mm thick piece of Corning 7056 glass, or equivalent. This plate shall be flat to within 1/4 wavelength at 632.8 nanometers and parallel within 2 arc-seconds. The focus of the objective shall be at the rear surface of the plate, with the front surface being anti-reflective coated. Unless otherwise specified optical tests shall be in accordance with MIL-STD-150.

4.5.1 Equivalent focal length. The objective lens with the simulated photocathode substrate is placed on a goniometric table that includes a measuring microscope. The light source is a collimated beam, with a pinhole or slit target, of sufficient bundle size as to fill the lens under test at all possible field angles. The size of the pinhole/slit width as geometrically projected through the lens under test shall not be greater than 0.005mm. The objective lens/photocathode substrate is aligned to the plane of the microscope measuring ways.

The microscope measuring ways are previously aligned to the point source or slit source target. The Effective Focal Length (EFL) of the objective lens assembly is determined by measuring the image translation produced by rotating the goniometer though an angle of ± one (1) degree. The effective focal length is the quotient of the difference in the measuring microscope readings divided by two over the tangent of one degree. Failure to meet the requirements of 3.4.1 shall constitute failure of this test.

4.5.2 Flange focal distance. The flange focal length of the objective shall be measured as part of the on-axis MTF test. A 1.0mm thick spacer shall be used to establish the reference distance between the objective and the simulated face plate. Location of the plane of best MTF shall be found and the change in reference distance calculated or measured. Failure to meet requirements of 3.4.2 shall constitute failure of this test.

4.5.3 f/number. The f/number of the objective shall be calculated by dividing the equivalent focal length by the effective aperture. The effective aperture is measured with a low power microscope viewing the front of the lens aperture and determining the size of the aperture stop located inside the lens under test. Failure to meet the requirements of 3.4.3 shall constitute failure of this test.

4.5.4 Veiling glare.

4.5.4.1 Stray light. Veiling glare is the percent energy that from a one hundred eighty (180) degree white surrounding field enters a one degree black spot. The veiling glare shall be measured with an integrating sphere where the lens under test is placed at the entrance of the sphere on the sphere's equator and at 180 degrees from the entrance a black spot is located. A radiometer consisting of a small pinhole (0.05mm) shall be used over a detector apparatus. The spectral response of the light source/detector combination shall be in accordance with figure 1. The radiance of the surrounding sphere shall be greater than one hundred times the black spot. The aerial image of the sphere with the black spot is scanned for minimum signal level (i.e. finding the black spot). The geometry of the scanning pinhole relative to the detector position shall not be less than 120 degrees. A 100% level is set by replacing the black spot with a white surface. With the white spot removed the radiometric reading is the veiling glare. The light source/detector combination shall be in accordance with figure 1. Failure to meet the requirements of 3.4.4 shall constitute failure of this test.

4.5.4.2 Veiling glare, off axis. The objective lens shall be installed on an AN/AVS-6 and a point source of color temperature 2856 ± 200K shall be placed at the edge of the field-of-view of the AN/AVS-6. The light source shall illuminate the lens entrance pupil at a level of 0.005 ± 0.001 fc. The light source shall be placed at least 10 feet away. The brightness of the surrounding field shall be 1.0 ± 0.5 E-4 fc. Failure to meet the requirements of 3.4.4.2 shall constitute failure of this test.

4.5.5 Linear distortion. Using the set-up as described for the effective focal length test, measure the semi-field angle for a semi-field height of plus and minus nine millimeters. Using the average of the semi-field angle (sfa), the percent distortion is 100* (9.0- efl*tan(sfa)) / (efl*tan(sfa)). Failure to meet the requirements of paragraph 3.4.5 shall constitute failure of this test.

4.5.6 Relative illumination. The relative illumination shall be measured with a set-up that consists of a collimated light source, goniometer, and an integrating sphere incorporating a detector. The light source/detector combination shall be in accordance with figure 1. The relative signal ratio as a function of angle to the axis signal, is the relative illumination. Failure to meet the requirements of 3.4.6 shall constitute failure of this test.

4.5.7 Field of view. The field of view of the objective shall be measured as part of the linear distortion test, 4.5.5. Failure to meet requirements of 3.4.7 shall constitute failure of this test.

4.5.8 T-number. The T-number is the equivalent f-number of a fictitious lens having a 100% transmission that produces the same central photocathode illumination, as the lens under test. The T-number is measured by placing the lens between a collimated light source and integrating sphere incorporating a detector. The signal level is measured. The signal level must be 100:1 above background, and the light/source detector combination must be in accordance with figure 1. An iris diaphragm shall be place one focal length from the entrance of the sphere, and its diameter adjusted until the signal level is the same as without the lens. The T-number is then, the effective focal length, divided by the diameter of the iris diaphragm. Failure to meet the requirements of 3.4.8 shall constitute failure of this test.

4.5.9 Modulation transfer function (MTF). The objective shall be tested on an MTF apparatus that yields sine-wave MTF response. The MTF apparatus shall have a light source and detector whose combination shall yield a spectral response curve complying with Figure 1. (If a microscope objective is used to relay the image of the objective lens, the numerical aperture (NA) of the microscope objective shall be not less than 0.65.) The MTF apparatus shall allow the objective to be tested either continuously or at a minimum of 4 distinct, evenly distributed points from 0 to 40 lp/mm. The area analyzed shall be at least 0.5 mm in diameter. The calibration of the MTF apparatus shall be performed before the test data is valid. The calibration procedure to be used is to measure the MTF of a known size target (e.g. slit or pinhole). All references to size are at second surface of the simulated photocathode. The MTF of a pinhole is known mathematically as a first order Bessel Function. MTF = $(2J_1(x))/x$ where x = 3.14156*(lp/mm)* (pinhole diameter in mm). The MTF of a pinhole goes to zero at a spatial frequency 1.22 times its reciprocal diameter. The MTF of a slit is known mathematically as (sine (x))/(x), where x=3.14156* (lp/mm)*(slit width). The units for x is in radians. The MTF of a slit goes to zero at a spatial frequency at its reciprocal width. The procedure shall be to measure the MTF of the lens and then measure the MTF of the lens with a very large pinhole/slit.

In case of microprocessor based MTF apparatus which correct for the pinhole/slit size, the size of the pinhole/slit entered into the computer software, when measuring the lens with large pinhole/slit should not be greater than 1/40 of the larger pinhole/slit. The geometrical size of the image shall be 0.030mm ± 0.001, at the second surface of the simulated photocathode. The size of the slit shall be 0.025 ± 0.001, at the second surface of the simulated photocathode. The MTF of the large pinhole/slit can be determined by taking the ratio of the MTF curves of the lens with large pinhole/slit, divided by the MTF of the lens under test. Differences in Modulation of greater than three percent will invalidate the MTF results. See Figure 8 for MTF as a function of spatial frequency and pinhole diameter/slit width.

4.5.9.1 MTF, axial and two-thirds field. Measure the MTF of the objective under test on axis. Move to the 2/3-field position without changing focus and measure the radial and tangential MTF across any diagonal. Move to the opposite field point and measure radial and tangential MTF. Axial MTF shall not be less than shown in Figure 3. Both the radial and tangential components of the off-axis shall not be less than shown in Figure 4. Failure to meet requirements of 3.4.9.1 shall constitute failure of this test.

4.5.9.2 MTF, full field. Move to the full field position without changing focus from the on axis position and measure the radial and tangential MTF across any diagonal. Move to the opposite field point and measure radial and tangential MTF. Both the radial and tangential components of the full field off-axis shall not be less than shown in Figure 5. Failure to meet requirements of 3.4.9.2 shall constitute failure of this test.

4.5.10 Concentricity. The mechanical axis of the objective lens is controlled the threads on the outside of objective cell assembly (5002499) and by datum A on the same drawing. The optical axis shall then be located for an image lying on the mechanical axis at infinity, and the variation in the optical axis from the mechanical axis shall be measured. The objective cell assembly shall be mounted on a fixture that engages the threads and the o-ring on the assembly. A bearing surface which rotates the mechanical axis shall be concentric to within 0.025mm. Failure to meet the requirements of 3.4.10 shall constitute failure of this test.

4.5.11 Minus blue coating. The spectral transmission of the minus blue coating shall be verified by the measurement of a witness sample on a ratio-recording spectrophotometer. The witness sample used shall be of the same glass substrate as the elements coated. Failure of this witness sample to meet requirements of 3.4.11 shall constitute failure of this test and rejection of the representative lot of objectives.

4.5.12 Weight. The objective shall be weighed on a calibrated scale or balance accurate to within ± 0.1 gram. Failure to meet the requirements of 3.4.12 shall constitute failure of this test.

4.6 Environmental tests. Each objective selected shall demonstrate its ability to perform properly after being subjected to its environmental tests. For the purpose of post-environmental testing, "perform properly" shall be defined as the ability to successfully complete the modulation transfer function axial and 2/3 field (4.5.9.1), On axis veiling glare (4.5.4.1), and flange focal distance (4.5.2) tests.

4.6.1 Vibration. The objective shall be mounted to a test fixture and subjected to harmonic motion applied in each of three orthogonal planes; the frequency of the harmonic motion shall be varied uniformly from 5 to 500 Hz and return to 5 Hz in one minute; the amplitude shall be 0.2-inch double-amplitude or 2-g acceleration, whichever is smaller; this frequency sweep shall be repeated 10 times in each plane. Failure to meet requirements of 4.6 or 3.5.1 shall constitute failure of this test.

4.6.2 Temperature-altitude. The objective shall be tested in accordance with MIL-STD-810, Method 504.1, with modified temperature and altitude conditions as specified herein. These conditions are: Operating temperature +52°C and -32°C, nonoperating temperature +71°C and -35°C. Operating altitude 15,000 feet, storage altitude 50,000 feet. The following test sequence shall be followed:

TABLE VI. Test sequence.

MIL-STD-810 Equipment category	Procedure step	Altitude (feet)	Temperature (°C)	Inspection Point
3	1-b	Site	-32	No
3	3	15,000	-32	Note 1
5	3	50,000	-35	Note 1
3	5	Site	Site	No
3	6	Site	+52	No
3	10	15,000	+52	Note 1
6	10	50,000	+71	Note 1
6	15	Site	Site	Check for damage

NOTE 1 Objective shall be inspected for internal moisture, fogging or frosting at the completion of the step. Failure to satisfactorily perform the listed inspections during test of Table VI, or perform properly per paragraph 4.6 shall constitute failure of this test.

4.6.3 Temperature shock. The objective shall be tested in accordance with MIL-STD-810, Method 503.1 with the temperature conditions of 3.5.3. The objective shall be held at the storage temperature extremes of -35°C and +71°C for 2 hours in each step instead of 4 hours. Step 9 shall be limited to a visual check for damage. Failure to meet requirements of 4.6 or 3.5.3 shall constitute failure of this test.

4.6.4 Humidity. The objective shall be tested in accordance with MIL-STD-810, Method 507.1, Procedure I. The end of the objective which connects to the housing may be protected. Step 1 shall consist of pre-inspection for damage (see 3.9.1). Step 6 shall consist of post inspection for damage. Step 7 shall consist of the post testing required in paragraph 4.6. Failure to meet the requirements of paragraph 4.6 or 3.5.4 shall constitute failure of this test.

5. PACKAGING

5.1 Packaging requirements. The packaging requirements for the desired level(s) of protection shall be as specified by the acquisition activity (see 6.2).

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 objective is used with the AN/AVS-6(V)1, AN/AVS-6(V)2, in military helicopters as a pilot's aid to vision during nighttime, low-level, and nap-of-the-earth flight.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number and date of this specification.
b. Time frame required for submission of IPT and number of assemblies required and disposition of IPT samples (see 4.3).
c. Qualification - If product is not qualified at time of award the contract must require qualification prior to first delivery.
d. Necessary action by contractor in event of group C failures.
e. That data item DI-T-1903, DI-T-1906 and supplements thereto should be a part of any contract incorporating this specification to guard against the use of material with hazardous levels of radioactivity.
f. Group B and Group C sampling plans. As guidance, unless otherwise specified, sampling should be conducted per the requirements of MIL-STD-105.
g. Issue of DODISS to be cited in the solicitation and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.1.2).

6.3 Definitions. See 3.9.

6.4 Subject term keyword listing.

ANVIS
Lens Assembly
Objective

Custodian
Army - CR

Preparing Activity
Army - CR

Project 5855-A303

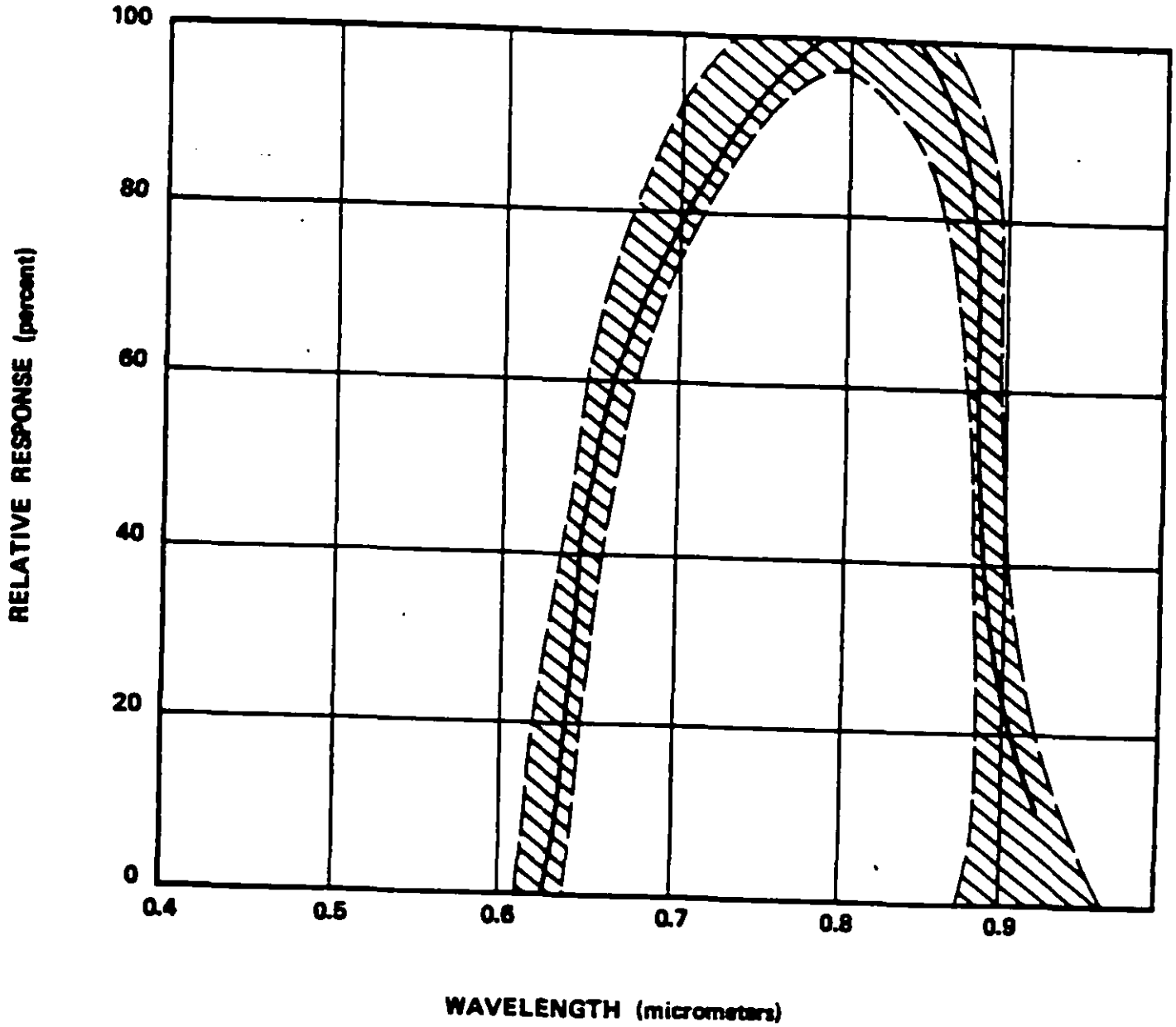

FIGURE 1. Spectral response of light source/detector combination.

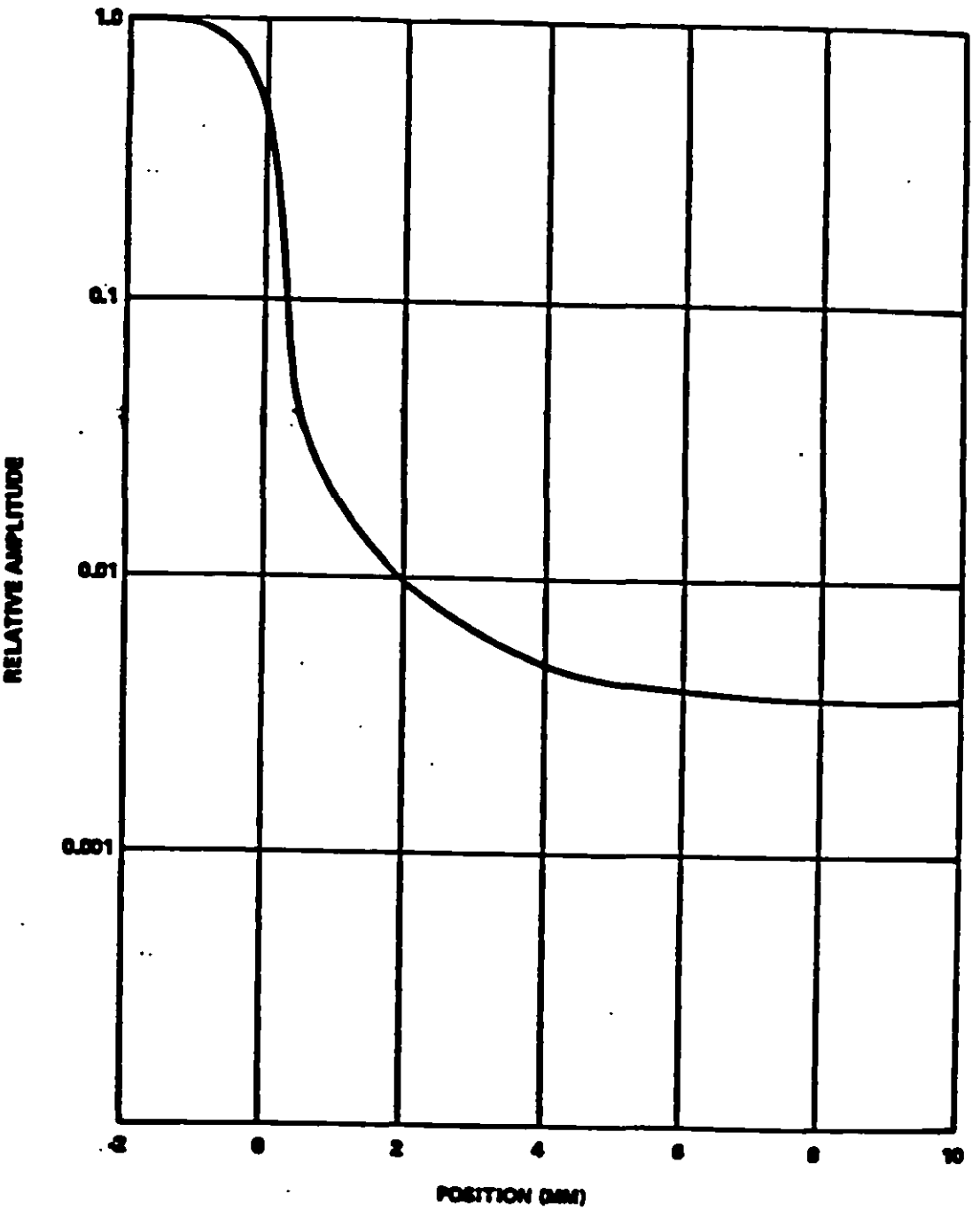

FIGURE 2. Veiling glare intensity distribution.

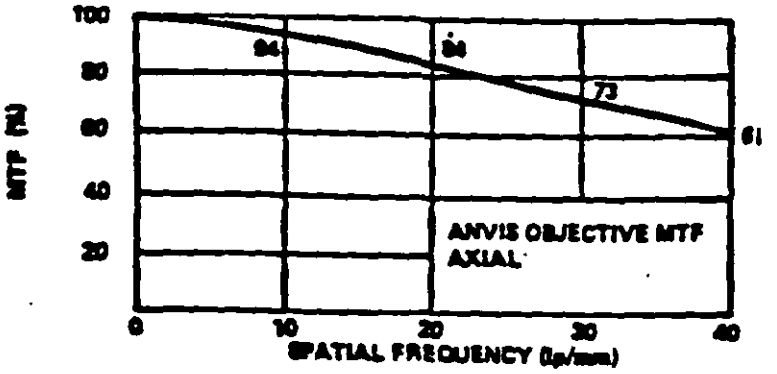

FIGURE 3. MTF, Axial.

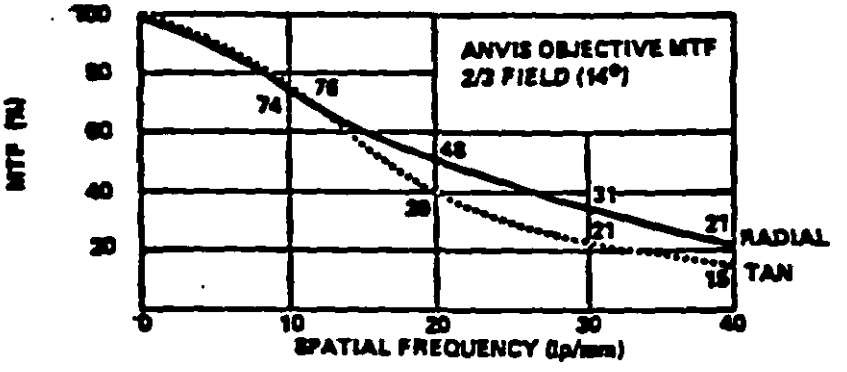

FIGURE 4. MTF, 2/3-field.

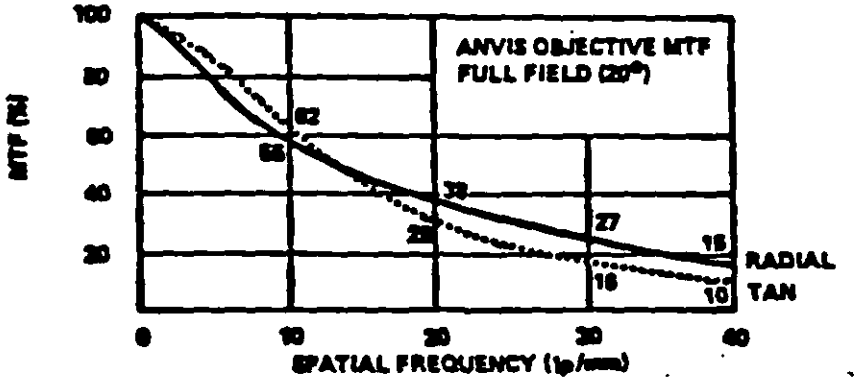

FIGURE 5. MTF, full-field.

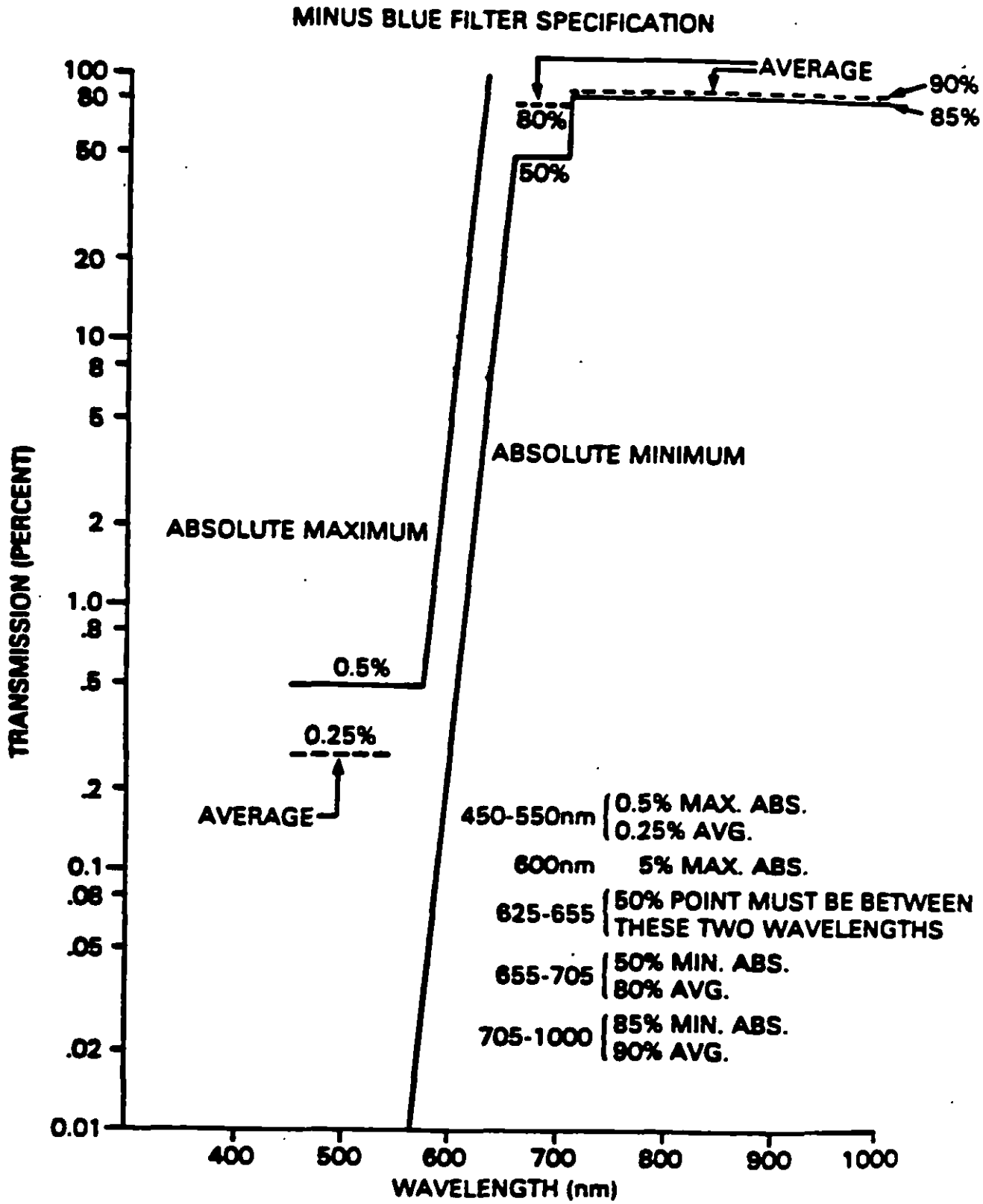

FIGURE 6. Minus blue filter transmission.

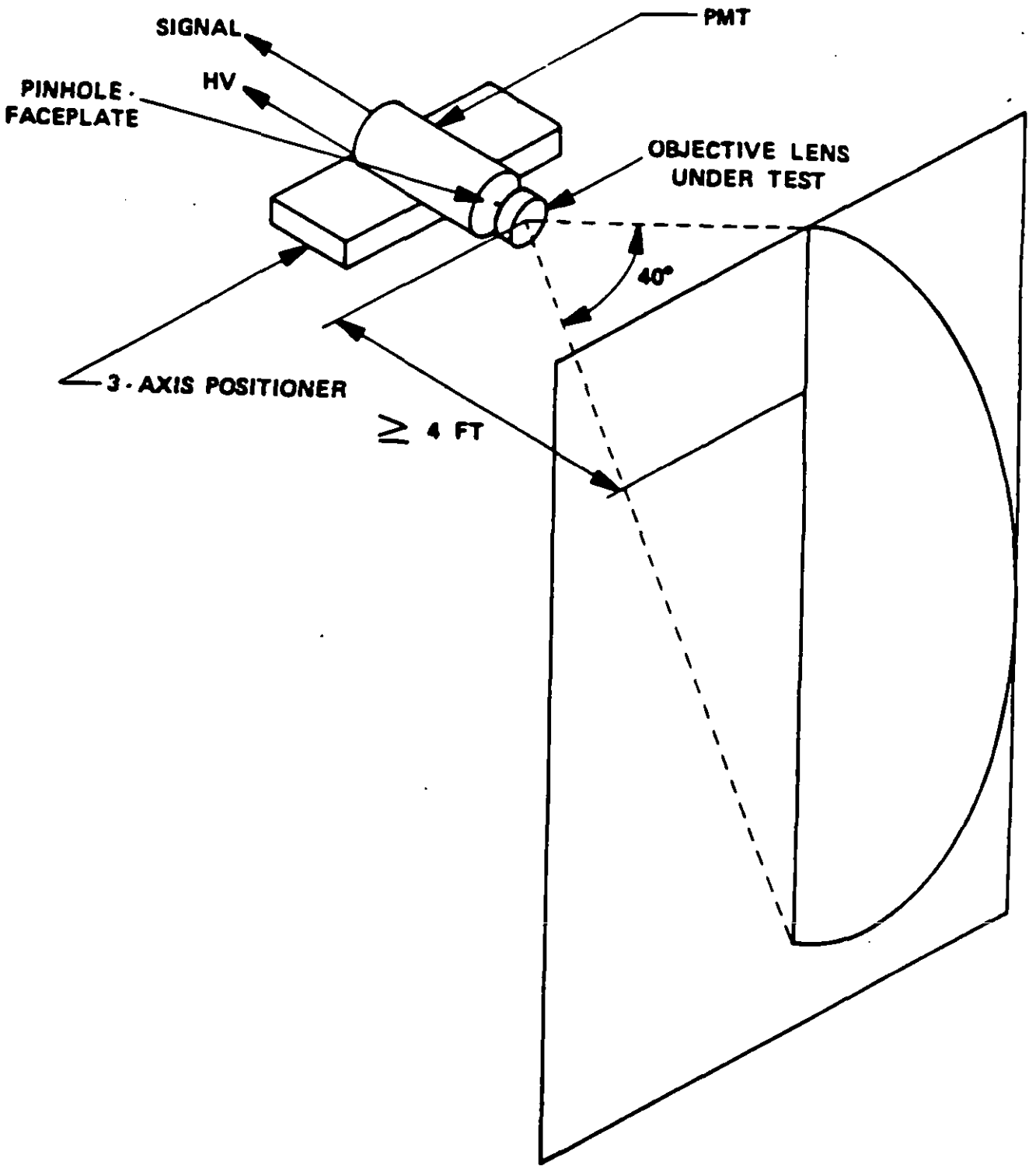

FIGURE 7. Veiling glare test setup.

PINHOLE		SLIT
lp/mm	MTF,%	MTF,%
0.000	100.000	100.000
2.000	99.500	99.589
4.000	98.000	98.363
6.000	95.600	96.340
8.000	93.000	93.549
10.000	89.000	90.032
12.000	84.000	85.839
14.000	78.500	81.033
16.000	73.000	75.683
18.000	67.000	69.865
20.000	60.000	63.662
22.000	54.000	57.162
24.000	46.900	50.455
26.000	40.000	43.633
28.000	33.000	36.788
30.000	26.000	30.011
32.000	19.000	23.387
34.000	13.500	17.001
36.000	8.000	10.929
38.000	4.000	5.242
40.000	0.000	0.000

PINHOLE DIAMETER - 0.0305
SLIT WIDTH - 0.0250

FIGURE 8. MODULATION TRANSFER FUNCTION

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-L-49426(CR)	Lens Assembly, Objective for Aviator's Night Vision Imaging System AN/AVS-6(V)1, AN/AVS-6(V)2

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
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	☐ USER
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	☐ OTHER *(Specify)*: _____

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*