SUPERSEDING
MIL-I-55340(EL)
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MILITARY SPECIFICATION

IMAGE INTENSIFIER ASSEMBLY 25 MILLIMETER WITH AUTOMATIC BRIGHTNESS CONTROL

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

1. SCOPE

1.1 Scope. This specification covers 2 types of 25 millimeter image intensifier assemblies with automatic brightness control.

1.2 Classification. Image intensifier assemblies covered by this specification shall be of the following types, as specified (see 6.2):

Type I - MX 7854A/UV	- Assemblies which contain a window with no reticle over the output screen.
Type II - MX 8501A/UV	- Assemblies which contain a window with M-14 reticle over the output screen.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL

QQ-S-781	- Strapping Steel, Flat and Seals
PPP-B-585	- Boxes, Wood, Wirebound
PPP-B-601	- Boxes, Wood, Cleated-Plywood

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: (CDR, USA Electronics Command, ATTN: DRSEL-RD-TS-S, 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.

PPP-B-621	- Boxes, Wood, Nailed and Lock Corner
PPP-B-636	- Boxes, Shipping Fiberboard
PPP-T-60	- Tape, Pressure-Sensitive Adhesive, Waterproof, for Packaging

MILITARY

MIL-B-18	- Batteries, Dry
MIL-P-116	- Preservation-Packing, Methods of
MIL-P-11268	- Parts, Materials, and Processes used in Electronic Equipment
MIL-F-22191	- Films, Transparent, Flexible, Heat-Sealable, for Packaging Applications

STANDARDS

MILITARY

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	- Marking for Shipment and Storage
MIL-STD-130	- Identification Marking of U.S. Military Property
MIL-STD-781	- Reliability Tests: Exponential Distribution

FEDERAL

FED-STD-356	- Commercial Packaging of Supplies and Equipment

DRAWINGS

ELECTRONICS COMMAND

SC-DL-611800	- Image Intensifier Assembly (25 mm) MX 7854A/UV
SC-DL-611780	- Image Intensifier Assembly (25 mm) MX 8501A/UV
SC-D-611783	- Container, Packaging Image Intensifier Assembly
SC-D-611775	- Test Housing Assembly, (25 mm)

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

3. REQUIREMENTS

3.1 Description. The image intensifier assembly, 25mm, with automatic brightness control hereinafter designated as "intensifier", shall consist of three stages, and a high voltage multiplier and oscillator. It shall have an S-20 spectral response input photocathode modified with an extended red (ER) response, an aluminized P-20 type phosphor output image screen and an automatic brightness control adapter. The nominal input voltage shall be 6.75 volts direct current (dc).

3.2 Construction. The intensifier shall be in accordance with SC-DL-611780 or SC-DL-611800 (see 2.1).

3.3 First article. When specified in the contract or purchase order, the contractor shall furnish first article units in accordance with 6.2.

3.4 Parts and materials. Parts and materials shall be as specified herein and as shown on the applicable drawings. Materials not specified shall be selected by the contractor and shall be subject to all provisions of this specification and shall conform to MIL-P-11268.

3.5 Major components.

3.5.1 High voltage oscillator. The oscillator shall be wrap-around construction and shall be an integral part of the intensifier assembly. The oscillator shall operate with a 6.5, + 0.25 - 0.00 volts dc input supplied by a BA-1100/U battery conforming to MIL-B-18. The output voltage of the oscillator shall not exceed 2800 volts peak to peak. Prior to installing the oscillator in an assembly each oscillator shall be operated using an operational multiplier as a load for 72 hours. Necessary precaution shall be taken in the oscillator design to prevent stray magnetic fields from causing intensifier performance degradation below that specified herein.

3.5.2 High voltage multiplier. The multiplier shall be wrap-around construction and shall have sufficient output leads to allow voltage selection for optimizing intensifier performance. The output voltages shall be such that not more than 17,000 volts will be applied to a single stage module. With the high voltage oscillator operating with a dc input voltage of 6.75 volts and 2 X 10^{-5} footcandle (fc) of 2870° kelvin (k) radiation incident on the first stage photocathode, the multiplier output voltage between the first stage cathode and the third stage anode shall not exceed 47,000 volts dc. Prior to installing a multiplier in an assembly, each multiplier shall be operated under no-load conditions for a minimum of 72 hours. Before and after the 72 hour no-load operation, each multiplier shall be ground probe tested. The multiplier shall be an integral part of the intensifier.

3.6 Operating and environmental.

3.6.1 First stage photocathode sensitivity. The first stage photocathode sensitivity shall be not less than the following values for the conditions specified.

3.6.2 Vibration. The intensifier shall not be damaged (see 6.3.1) and shall meet all the operational requirements after being rigidly mounted, singly or in groups, and vibrated with simple harmonic motion parallel and perpendicular to the optical axis (see 6.3.2) of the intensifier over a frequency range of 10 to 55 hertz (hz) at an amplitude of not less than 0.10 inch total excusion for 10 minutes in each plane with no voltage applied during the vibration.

3.6.3 Mechanical shock. The intensifier shall not be damaged and shall exihibit no flashing, flickering, or electrical breakdown when subjected to six shock impacts applied perpendicular to the optical axis of the intensifier and six shock impacts parallel to the optical axis of the intensifier. The shock impacts shall have a minimum of 75 g's (see 6.3.3) at peak amplitude.

3.6.4 Environmental temperature. The intensifier shall not be damaged by storage, operation, or thermal shock and shall meet specified operational requirements under the following environmental temperature conditions (see figure 1).

a. Storage -	At +68°C for 2 hours, and -54°C for 2 hours.
b. Operation -	(1) When subjected to +52°C for 30 minutes, and at the end of the 30 minute period with the intensifier operating at +52°C the intensifier shall show no evidence of damage when the cathode is uniformly illuminated with a 100 to 150 foot candle for not less than 10 seconds.
	(2) When subjected to -54°C for 2 hours and while operating at -54°C the intensifier shall have a relative low temperature gain of not less than 25,000 with an input radiation of 1×10^{-5} to 3×10^{-5} foot candle. During low temperature operation, the rise time shall not exceed 5 seconds when the operating potential is supplied by a BA-1100/U battery.
Thermal shock -	When subjected to thermal shock from +52°C to room temperature (see 6.3.4) and from -54°C to room temperature.

3.6.5 Equivalent background input. - The equivalent background input of the intensifier with no radiation on the photocathode shall not exceed 2×10^{-11} lumen per square centimeter (lumen/cm^2) at room temperature.

3.6.6 Luminance gain. - When operating with a 6.75 volt dc input the intensifier shall have a luminance gain at room temperature and the input current shall not exceed 50 milliampere (ma) for any of the light levels specified below.

MINIMUM GAIN	INPUT LIGHT LEVEL IN FOOTCANDLES (fc)
40,000	1 to 3 x 10^{-5}
5,000	2 to 5 x 10^{-3}
200	5 x 10^{-2}
20	5 x 10^{-1}
0.5	2.4

3.6.7 Low voltage luminance gain. When operating with a 6.0 volt dc input at room temperature the intensifier shall have a minumum luminance gain of 20,000 when the photocathode is uniformly illuminated with 1 X 10^{-5} to 3 X 10^{-5} fc and a minimum luminance gain of 12 when the photocathode is uniformly illuminated with 5 X 10^{-1} fc.

3.6.8 Maximum output luminance. The maximum steady state intensifier output luminance shall not exceed 150 footlamberts.

3.6.9 Response time. When the photocathode is subjected to a change in input level of 5 x 10^{-4} fc to 1 fc in 1 x 10^{-3} seconds or less the intensifier shall exibit a response time (see 6.3.5) of 1.5 seconds or less. When the photocathode is subjected to a change in input light level of 1 fc to 5 x 10^{-4} fc in 1 x 10^{-3} seconds or less the intensifier shall exhibit a response time of 1.5 seconds or less.

3.6.10 Cathode and screen quality. When the screen of the intensifier is viewed with a 6 to 10 power (x) magnifier with no radiation incident on the photocathode, there shall be ion spots (see 6.3.6) or field emission (see 6.3.7). When the screen is viewed with a 6 to 10 power magnifier with the radiation level adjusted to obtain best spot contrast, the opaque or dark spots and bright spots which exceed a contrast of 30 percent of their surrounding area shall not exceed the size and quantities specified in Table 1. Size of the noncircular spots shall be determined on the basis of equal area to circular spots. When the distance between two spots is less than the maximum dimension of either spot, the two spots shall be considered as one spot with a size equal to the sum of the maximum dimensions of the two spots plus the amount of separation between them.

TABLE I Cathode and screen spots.

Size of Spots	Number of Spots Within 0.30 Inch Diameter Circle	Number of spots Within Area Bounded by Two Circles 0.30 and 0.80 Inch in Diameter	Number of Spots Within Area Bounded by Two Circles 0.80 and 0.984 Inch in Diameter
Greater than 0.015	0	0	0
0.012 to and including 0.015	0	1	2
0.009 to less than 0.012	0	3	8
0.006 to less than 0.009	0	12	26
0.003 to less than 0.006	3	40	Minimum
0.001 to less than 0.003	15	Minimum	Minimum

NOTE: The 0.30, 0.80 and 0.984 inch circles on the image screen shall be concentric with the optical axis of the intensifier.

3.6.11 Image alinement. The center of an image produced on the screen of an intensifier by focusing a test reticle on the photocathode concentric with the optical axis shall fall within a 0.060 inch diameter circle on the image screen that is concentric with the optical axis (see figure 2).

3.6.12 Image shift. The center of an image produced on the screen of the intensifier by focusing a test reticle on the photocathode concentric with the optical axis shall shift not more than 0.005 inch during 30 seconds of operation.

3.6.13 Center resolution. The center resolution of the intensifier shall be not less than 28.0 line pairs per millimeter (lp/mm) (see figure 3).

3.6.14 Peripheral resolution. The peripheral resolution of the intensifier shall be not less than 25 lp/mm at the four points 7 mm from the center of the photocathode (see figure 3).

3.6.15 Modulation transfer function. The modulation transfer function (MTF) at the center of the image screen shall be not less than:

a. 90 percent MTF at 2.5 lp/mm
b. 60 percent MTF at 7.5 lp/mm
c. 20 percent MTF at 16 lp/mm

3.6.16 Center magnification. The center magnification shall be no less than 0.82 or greater than 1.0.

3.6.17 Distortion. The intensifier distortion from center to edge shall be not greater than 21 percent.

3.6.18 Useful cathode diameter. The useful cathode diameter shall be not less than 23 mm.

3.6.19 Luminance uniformity. The intensifier image screen uniformity shall vary not more 4 to 1 over a circular area 20 mm in diameter centered on the optical axis and variations in screen brightness shall not fall outside the tolerance band shown in figure 4 when the photocathode in uniformly illuminated with 2870° K tungsten lamp radiation. When the screen is viewed with a 6 to 10 power magnifier the background shading shall be uniformly graded with no distinct line demarcation between the light and dark areas. There shall be no evidence of large mottled areas that appear as multi-fiber shading within the 0.80 inch diameter quality circle and there shall be no evidence of heavy, dark boundary areas between the fiber optic multi-fiber bundles.

3.6.20 Operational safety. The intensifier assembly shall not be damaged when subjected to a reverse polarity input voltage of 6.8 volts dc for a period of 60 seconds.

3.7 Mean time between failure. The intensifier shall have a specified mean time between failure (MTBF) of 2000 hours.

3.8 Identification marking. Each intensifier shall be marked for identification in accordance with MIL-STD-130. The marking shall include a coded acceptance date. The first two numbers of the code shall be the last two digits of the number of the year. The last two numbers of the code shall be two digits indicating the calendar week of the year (01 through 52). Reading from left to right (or top to bottom) the code number shall designate the year and week of acceptance in that order.

3.9 Workmanship. All parts and components of the intensifier shall be free from dirt, grease, oil or other extraneous material and from defects that could impair the performance of the intensifier.

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 supplies and services conform to prescribed requirements.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

a. First article inspection (see 4.3).
b. Quality conformance inspection (see 4.5).
c. Inspection of packaging (see 4.8).

4.3 First article inspection. Unless otherwise specified in the contract or purchase order, the first article inspection shall be performed by the contractor (see 6.2).

4.3.1 Inspection. Each intensifier shall be examined in accordance with Table II. One or more defects shall be cause for rejection of that intensifier.

TABLE II Inspection

Defects	Requirement paragraph
Major	
101. Dimensions not as specified	3.2
102. Parts and Materials not as specified	3.4
103. Marking not in accordance with MIL-STD-130	3.8
104. Workmanship not as specified	3.9

4.3.2 Tests. Following successful completion of the examination specified in 4.3.1 each first article intensifier shall be subjected to all tests in Table III. Failure of any test shall be cause for rejection of that intensifier any may be cause for termination of first article inspection.

TABLE III First article inspection

Inspection	Requirement paragraph	Test paragraph
First stage photocathode sensitivity	3.6.1	4.6.1
Vibration	3.6.2	4.6.2
Mechanical shock	3.6.3	4.6.3
Environmental temperature	3.6.4	4.6.4
Equivalent background input	3.6.5	4.6.5
Luminance gain	3.6.6	4.6.6
Low voltage luminance	3.6.7	4.6.7
Maximum output luminance	3.6.8	4.6.8
Response time	3.6.9	4.6.9
Cathode and screen quality	3.6.10	4.6.10
Image alinement	3.6.11	4.6.11
Image shift	3.6.12	4.6.12
Center resolution	3.6.13	4.6.13
Peripheral resolution	3.6.14	4.6.14
Modulation transfer function	3.6.15	4.6.15
Center magnification	3.6.16	4.6.16
Distortion	3.6.17	4.6.17
Useful cathode diameter	3.6.18	4.6.18
Luminance uniformity	3.6.19	4.6.19
Operational safety	3.6.20	4.6.20
Mean time between failure	3.7	4.7

4.4 Test conditions. Tests shall be conducted in accordance with the test procedures specified herein. Unless otherwise specified the following conditions shall apply.

a. The radiation source used in the tests shall be a tungsten filament lamp operated at a color temperature of 2870° K, ± 50° K.
b. The photometer used for screen brightness measurements shall be a Pritchard Model 1970 PR or equal.
c. The photometer used for screen brightness measurements shall be a calibrated against a standard source which has a tungsten lamp, opal glass and filters as specified below.
   (1) Tungsten filament lamp operated at 2400° K, ± 100° K color temperature.
   (2) Corning spectral filter Nos. 3-71 and 4-67 or equal.
   (3) Opal glass to produce uniform diffuse output.
   (4) Output brightness to be 0.5 to 0.7 footlambert uniformly distributed our an output aperture of not less than 25 mm.
d. The amount of radiation from the source incident on the photocathode for each test shall be the amount specified in that test. Tolerances on specified radiation levels shall be ± 10 percent.
e. Operating potential applied to the intensifier shall be 6.75 volts dc.
f. Tests shall be performed at room temperature.
g. Meters used for monitoring intensifier input voltage shall be accurate within 1.0 percent of full scale reading. Meters used for monitoring lamp current and voltage shall be accurate within 0.25 percent of full scale reading.
h. Neutral density filters used in test equipment shall have transmission characteristics within 10 percent of the nominal filter transmission from 0.35 micron to. 1.0 micron.
i. All tests shall be performed with the intensifiers mounted in a grounded test housing equivalent to that shown in SC-DL-611775.
j. Test chambers shall maintain specified temperature within ± 2°C.
k. X-Y recorders shall be Moseley Autograf, Model 7030 AM or equal.

4.5 Quality conformance inspection.

4.5.1 Inspection lot. Unless otherwise specified in the contract or purchase order, for purposes of inspection, all intensifiers offered for inspection at one time shall be considered a lot as defined in MIL-STD-105.

4.5.2 Sampling. Samples shall be selected in accordance with MIL-STD-105.

4.5.3 Examination. The intensifiers shall be examined in accordance with Table II. Presence of one or more defects shall be cause for rejection.

4.5.4 Tests.

4.5.4.1 Group A inspection. Each intensifier shall be subjected to the tests in Table IV. The first 6 tests shall be performed in the sequence listed. Failure of any test shall be cause for rejection.

TABLE IV Group A inspection.

Inspection	Requirement paragraph	Test paragraph
First stage photocathode sensitivity	3.6.1	4.6.1
Mechanical shock	3.6.3	4.6.3
Equivalent background input	3.6.5	4.6.5
Luminance gain (room temperature)	3.6.6	4.6.6
Response time	3.6.9	4.6.9
Cathode and screen quality	3.6.10	4.6.10
Center resolution	3.6.13	4.6.13
Peripheral resolution	3.6.14	4.6.14
Modulation transfer function	3.6.15	4.6.15

4.5.4.2 Group B inspection. Samples selected in accordance with 4.5.2 and which have passed the tests specified in 4.5.4.1 shall be subjected to the tests in Table V. AQL shall be 1.5 percent defective, inspection level III combined.

TABLE V Group B inspection.

Inspection	Requirement paragraph	Test paragraph
Environmental temperature	3.6.4	4.6.4
Low voltage luminance gain	3.6.7	4.6.7
Maximum output luminance	3.6.8	4.6.8
Center magnification	3.6.16	4.6.16
Distortion	3.6.17	4.6.17
Luminance uniformity	3.6.19	4.6.19
Operational safety	3.6.20	4.6.20

4.5.4.3 Group C inspection. This inspection shall consist of the tests specified in Table VI and shall be performed on units that have been subjected to and met Groups A and B inspection. Sample units shall be selected in accordance with 4.5.4.3.1. The tests shall be performed in the sequence listed. Failure of any test except MTBF shall be cause for rejection.

4.5.4.3.1 Sampling for inspection. Five sample units shall be selected at random for inspections in Table VI, except for MTBF, from every 100 produced or every 30 days, whichever occurs first. A minimum of 10 units shall be tested for MTBF selected from units which have met the requirements of Group A. The first samples selected shall be at the start of the contract from the first quality conformance inspection production lot (see 4.5.4.3).

TABLE VI Group C inspection

Inspection	Requirement paragraph	Test paragraph
Vibration	3.6.2	4.6.2
Image alinement	3.6.11	4.6.11
Image shift	3.6.12	4.6.14
Useful cathode diameter	3.6.18	4.6.18
Mean time between failure	3.7	4.7

4.5.4.3.2 Group C failures. Actions required relative to Group C failures shall be as specified in the contract or purchase order, (see 6.2).

4.6 Test methods.

4.6.1 First stage photocathode sensitivity. This test shall be performed on the first stage module of the intensifier after coupling the cascaded assembly and prior to attaching the high voltage oscillator-multiplier assembly. Prior to conducting the sensitivity tests a value shall be determined for combined dark current and leakage current for each first stage module. To determine the dark current and leakage current apply plus 300 volts dc to the anode of the first stage module. With no radiation incident on the photocathode measure total first stage current. This current reading in microamperes is the combined dark current and leakage current. With +300 volts dc applied to the anode of the first stage module illuminate a 0.750 inch diameter area centered on the photocathode with 0.01 to 0.02 lumen of 2870° K tungsten lamp radiation. Measure total first stage current and subtract dark current and leakage current. This photocurrent in microamperes divided by the actual input lumens is the 2870° K first stage photocathode sensitivity in microamperes per lumen. With plus 300 volts dc applied as above, insert a 0.80 micron filter between the photocathode and the 2870° K tungsten source. The 0.750 inch diameter area on the photocathode shall be illuminated with 5×10^{-6} to 10^{-4} watt of 0.80 micron radiation. Measure total first stage current and subtract the leakage and dark current determined above. This photocurrent in microamperes divided by the actual input radiation in watts is the first stage cathode radiant sensitivity at 0.80 micron in microamperes per watt. Remove the 0.80 micron filter and insert the 0.85 micron filter between the photocathode and the 2870° K tungsten source. The 0.750 inch diameter area on the photocathode shall be illuminated with 5×10^{-6} to 10^{-4} watt of 0.85 micron radiation. Measure the total first stage current and subtract the leakage and dark current. This photocurrent in microamperes divided by the actual input radiation in watts is the first stage cathode radiant sensitivity at 0.85 microns in microamperes per watt.

The 0.80 and 0.85 micron filters shall have the following characteristics:

a. Far infrared blocking out to 4 microns.
b. Peak wavelength of 0.8000, ±0.0025 micron and 0.8500, ±0.0010 micron.
c. Bandwidth at the 10 percent points of 0.0125, ±0.0015 micron.
d. Minimum peak transmission of 50 percent.

Failure to meet the requirements specified in 3.6.1 shall constitute failure of this test.

4.6.2 Vibration. The operating potential shall not be applied to the intensifier during vibration testing. Tolerances on specified frequencies shall be ± 2 Hz, tolerance on total excursion shall be ± 0.005 inch. Prior to beginning vibration testing the intensifiers shall be visually inspected for physical damage and missing components. No intensifier shall be vibrated which shows evidence of damage or missing components. Mount the intensifiers rigidly, singly or in groups. Subject the intensifiers to simple harmonic motion applied in planes parallel and perpendicular to the optical axis. In one minute, vary the frequency from 10 Hz to 55 Hz, and return to 10 Hz. The amplitude of vibration shall be 0.05 inch (0.10 inch total excursion) in each plane. Repeat this frequency sweep 10 times in each plane. At the conclusion of the vibration testing, inspect the intensifiers for damage. Apply the operating potential and observe for damage. Evidence of damage shall constitute failure of this test.

4.6.3 Mechanical shock. This test shall be conducted in a darkened room. Apply the operating potential to the intensifier for a minimum stabilitation period of three minutes. At the end of this stabilization period, with the operating potential applied and no light incident on the photocathode, subject the intensifier to 6 shock impacts parallel to the optical axis and 6 shock impacts perpendicular to the optical axis. Apply the shock impacts in such a way as to generate nominal half-sine wave pulses having a minimum peak amplitude of 75 g's on the intensifier. The duration of each shock pulse shall be 6 milliseconds, ± 2 milliseconds measured between the 10 percent values of peak amplitudes. The energy under the shock curve shall be not less than 0.25 g- seconds and the after oscillations shall be not greater than 15 percent of peak amplitude of the nominal half-sine wave pulse. Evidence of damage after the first shock impact in each plane or at the conclusion of the shock test shall constitute failure of this test.

4.6.4 Environmental temperature. Place the intensifier in a test chamber at room temperature and gradually (in not less than 1/2 hour) raise the temperature of the chamber to +68° C and hold at this temperature for a minimum of 2 hours. At the end of the 2 hour stabilizing period, gradually (in not less than 15 minutes) lower the chamber to +52° C and hold at this temperature for 30 minutes. At the end of the 30 minute stabilizing period with no radiation incident on the photocathode apply the operating potential to the intensifier. With the operating potential applied, project 100 to 150 footcandles of uniformly distributed radiation on the photocathode for 10 seconds. At the end of the 10 second period of illumination, reduce the light input to 1×10^{-5} to 3×10^{-5} footcandle for a period of 10 minutes and observe the intensifier for damage. After observing for damage exclude all incident radiation from the photocathode. At the conclusion of the above measurements lower the ambient temperature of the intensifier from +52° C to room temperature in not more than 5 minutes. After not less than 1 hour at room temperature operate the intensifier and observe for damage. Place the

intensifier in the test chamber with the ambient temperature of the chamber at +23° C. Apply the operating potential to the intensifier and illuminate the photocathode with 1 x 10^{-5} to 3 x 10^{-5} footcandle of tungsten lamp radiation. Measure and record the screen brightness (B_1) with a photometer (see 4.6.b). Lower the temperature of the chamber in not less than 30 minutes to -54° C and hold at this temperature for 2 hours. At the end of this 2 hour stabilizing period with no radiation incident on the photocathode apply the operating potential to the intensifier. With the operating potential applied project 1 X 10^{-5} to 3 X 10^{-5} footcandle of uniformly distributed radiation on the photocathode, measure the screen brightness (B_2) and record brightness reading. Disconnect the operating potential in use and connect a BA-1100/U battery as the operating potential. Measure the rise time.

All conditions (input illumination, operating voltage and photometer settings) for brightness measurements, B_2 shall be identical to the conditions prevailing for brightness measurement, B_1. Determine the relative low temperature gain as follows:

$$\frac{B_2}{B_1} \quad X \quad \text{(ROOM TEMPERATURE GAIN)}$$

Raise the ambient temperature of the chamber to room temperature in not more than 5 minutes. After not less than 1 hour at room temperature operate the intensifier and observe for damage. Evidence of damage or failure to meet the requirements of 3.6.4 shall constitute failure of this test.

4.6.5 Equivalent background input. With the operating potential applied to the intensifier and no radiation incident on the photocathode, hold for a stabilizing period of not more than 30 minutes. At the end of the stabilizing period with no radiation incident on the photocathode measure the screen brightness (footlamberts) with a photometer and record photometer reading (R_1). In the event the reading should fluctuate observe the readings for 30 seconds and record the maximum and minimum readings. Illuminate the photocathode with 2 x 10^{-11} lumens per square centimeter uniformly distributed over the photocathode faceplate and record photometric reading (R_2). In the event the reading should fluctuate observe the reading for 30 seconds and record maximum and minimum readings. The angle of incident flux shall be not greater than 2°. The photometer shall be positioned such that the acceptance angle covers a 14 mm, $\pm$ 1 mm diameter area centered on the screen. Average the maximum and minimum dark readings, R_1 and the maximum and minimum illuminated readings, R_2 and determine equivalent background input (EBI) by the following formula:

$$EBI = \frac{R_1}{R_2 - R_1} \quad X \text{ ACTUAL INPUT ILLUMINATION}$$

Equivalent background input greater than specified in 3.6.5 shall constitute failure of this test.

4.6.5.1 An alternate method for measuring EBI may be used in lieu of that specified in 4.6.5. When used the following method shall apply:

$$EBI = \frac{I_1 - I_o}{I_2 - I_1} \quad X \; 2 \; X \; 10^{-11}$$

WHERE:

I_o = Dark current of photomultiplier tube

I_1 = Photomultiplier current due to brightness of intensifier with no incident radiation

I_2 = Photomultiplier current due to brightness of intensifier when illuminated with 2×10^{-11} lumen/cm_2

Equivalent background input greater than that specified in 3.6.5 shall constitute failure of this test.

4.6.5.2 An additional alternate method for measuring EBI which may be used in lieu of that specified in 4.6.5 and 4.6.5.1 is as follows: With the operating potential applied to the intensifier and no radiation incident on the photocathode hold for a stabilizing period of not more than 30 minutes. At the end of the stabilizing period with no radiation incident on the photocathode measure the screen brightness (footlamberts) with the photometer. Divide this reading by the luminance gain and multiply the result by 1×10^{-3}. The resultant figure is the EBI. Equivalent background input greater than that specified in 3.6.5 shall constitute failure of this test.

4.6.6 Luminance gain (room temperature). Illuminate the photocathode consecutively with 1 to 3×10^{-5}, 2 to 5×10^{-3}, 5×10^{-2}, 5×10^{-1}, and 2.4 footcandles uniformly distributed over the photocathode. Apply the operating potential to the intensifier and measure the image screen brightness with the photocathode at each light level. The acceptance angle of the photometer shall be 2° or less. Position the photometer so that the acceptance angle subtends a 14 mm $\pm$ 1 mm diameter area centered on screen. Luminance gain is determined by dividing the screen luminance in footlamberts by the actual input illumination in footcandles. A milliammeter shall be placed in series with the source voltage used in this test setup. The current shall be recorded for each light input. Luminance gain less than that specified in 3.6.6 or input current greater than specified in 3.6.6 shall constitute failure of this test.

4.6.7 Low voltage luminance gain. Illuminate the photocathode with 1 to 3×10^{-5} and 5×10^{-1} footcandles respectively, uniformly distributed over the photocathode. Apply an operating potential of 6.0 volts dc to the intensifier and measure the image screen luminance with the photometer. The acceptance angle of the photometer shall be 2° or less. Position the photometer so that the acceptance angle subtends a 14 mm $\pm$ 1 mm diamter area centered on the screen. Luminance gain is determined by dividing the screen luminance in footlamberts by the actual input illumination in footcandles. Luminance gain less than that specified in 3.6.7 shall constitute failure of this test.

4.6.8 Maximum output luminance. Determine the maximum output luminance in a similar manner and with the same equipment as specified in 4.6.6. With the operating potential applied gradually increase the input radiation level from 1 to 3×10^{-5} footcandle until maximum luminance is reached. Input radiation shall be uniformly distributed over the entire photocathode faceplate. Maximum output luminance greater than that specified in 3.6.8 shall constitute failure of this test.

4.6.9 Response time. This test shall be conducted with the same equipment as in 4.6.6 plus the following:

a. MARI electro shutter or equal.
b. X-Y recorder.

Couple the X-Y recorder to the photometer such that all readings shall be recorded on the chart. Attenuation factors on the chart shall be added such that all light fluctuations are recorded. With the photocathode illuminated with 5×10^{-4} footcandle measure the output brightness of the intensifier. A second light source shall be placed behind a shutter such that the photocathode may be illuminated with this additional source. The shutter shall then be opened, illuminating the photocathode with 1 footcandle from the additional source. The resulting output of the intensifier shall be recorded by the photometer on the X-Y recorder. Close the shutter on the 1 fc additional source and again record the output of the intensifier. Failure to meet the requirements of 3.6.9 shall constitute failure of this test.

4.6.10 Cathode and screen quality. With the operating potential applied and no radiation incident on the photocathode, observe the image screen with a 6 to 10 power magnifier. The screen shall be observed for defects listed in Table VII. Gradually increase the light level and continue to observe the screen for the defects listed in Table VII. With the light level adjusted for best spot contrast the image screen shall be observed for opaque or dark spots and bright spots which exceed the size or quantity specified in Table I and for defects listed in Table VII. The axis of the viewing system shall be perpendicular to the output screen within 3°. Failure to meet all requirements of 3.6.10 shall constitute failure of this test.

Immediately remove operating potential and discontinue testing at the first indication of leakage or breakdown.

TABLE VII Cathode and screen defects

DEFECTS	NO CATHODE ILLUMINATION	CATHODE ILLUMINATION	SCREEN LOCATION
Strong Ion Spot (see 6.3.9)	Diffuse area	Diffuse area	Center
Moderate Ion Spot (see 6.3.6)	Not visible	Diffuse area	Center
Weak Ion Spot	Not visible	Cluster of scintillation (see 6.3.9) not to be confused with electron scintillation (see 6.3.10)	Center
Field Emission (see 6.3.7)	Bright spots or patterns spatially fixed	Generally disappear	Anywhere on the screen
Dark Boundaries Between Multi-Fiber Bundles	Not visible	Geometrically shaped figures caused by heavy boundaries between the multi-fibers in the fiber optic plate	Generally Uniformly Distributed over entire screen
Corona (see 6.3.8)	Bright spots generally spatially fixed	Bright spots generally spatially fixed	Anywhere on the output screen
Leakage or Faceplate Breakdown	Appears as heavy field emission over general field with one or several bright spots spatially fixed generally accompanied with a frying or snapping sound	Bright spots appearing either intermittently or continously and brightening or flashing of general screen background	Anywhere on the output screen

4.6.11 Image alinement. With the operating potential applied focus the test pattern described in figure 2 on the photocathode. The photocathode shall be illuminated to provide a high contrast image of the test pattern. Observe the image of the test pattern formed on the screen of the intensifier with a 10 power (or higher) measuring microscope containing a reticle of 0.060 inch apparent diameter. The microscope shall be alined with the optical axis of the intensifier such that a center of the 0.060 inch diameter reticle falls on the optical axis. The center of the test pattern shall fall within the 0.060 inch diameter circle. Failure to meet the requirements of 3.6.11 shall constitute failure of this test.

4.6.12 Image shift. Determine image shift with same equipment used in 4.6.11. At the conclusion of the image alinement test (4.6.11) position the center of the reticle in the microscope on the center of the test reticle and remove the operating potential from the intensifier. After the intensifier is completely discharged, apply the operating potential and observe the test reticle for 30 seconds. Should the test reticle be displaced from its original position (prior to removing the operating potential) measure the displacement. Image shift greater than that specified in 3.6.12 shall constitute failure of this test.

4.6.13 Center resolution. Perform this test using:

a. A radiation source (2870° K not required).
b. A projection system having an f number not greater than 10, to project the test pattern such that the size of the pattern on the photocathode of the intensifier is the same as the pattern described in figure 3.
c. A resolving power target or the required sections of the USAF 1951 Resolving Power Test Target.
d. A 6 power or higher viewing system.

The resolving power target shall be focused or butted on the photocathode such that the center of the target is alined with the optical axis. Input radiation level shall be adjusted for best image contrast. The image of the resolving power target formed on the screen of the intensifier shall be observed for limiting resolution (see 6.3.11). Resolution less than that specified in 3.6.13 shall constitute failure of this test.

4.6.14 Peripheral resolution. Determine the peripheral resolution with the same equipment used in 4.6.13. The resolving power target shall be focused or butted on the photocathode such that the test pattern is positioned 7 mm from the optical center of the photocathode. Input radiation shall be adjusted to provide best image contrast. The image of the resolving power target formed on the screen of the intensifier shall be observed for limiting resolution. Resolution less than that specified in 3.6.14 shall constitute failure of this test.

4.6.15 Modulation transfer function. Perform this test using the modulation transfer function analyzer system furnished by the Government. Prior to conducting MTF tests a correction will be required for each spatial frequency of interest, to take into account system degradation. This correction factor shall be determined for the MTF analyzer as follows:

The theoretical spatial frequency response of a 100 micron slit is supplied with each MTF analyzer system. From this theoretical response, the MTF value at 2.5 lp/mm, 7.5 lp/mm and 16 lp/mm is recorded. Using the calibration slit assembly, an MTF curve is run on the system after it has been adjusted to obtain optimum readings. The system response is then determined for the spatial frequencies of 2.5 lp/mm, 7.5 lp/mm and 16 lp/mm. To obtain the correction factor for each of the spatial frequencies take the difference between the theoretical MTF response and the actual system MTF response at the points of 2.5 lp/mm, 7.5 lp/mm and 16 lp/mm. Place the slit assembly on the photocathode of the intensifier and illuminate the slit with 5×10^{-3} footcandle. Apply the potential to the intensifier and aline the output slit so that its center is alined with the optical axis of the MTF analyzer head. Adjust the input optics on the analyzer head for the best image as viewed through the eyepiece. Recheck the focus by adjusting the fine focus control to obtain maximum system signal response at the high spatial frequencies. The MTF at each of the spatial frequencies of interest is determined by the actual system reading plus the correction factor for that frequency. Intensifier MTF less than that specified in 3.6.15 at either 2.5 lp/mm, 7.5 lp/mm or 16 lp/mm shall constitute failure of this test.

4.6.16 Center magnification. Perform this test with the same equipment used in 4.6.11. With the operating potential applied to the intensifier, focus the center of the test pattern on the optical axis of the photocathode and adjust input radiation level for best image contrast. The size of the pattern focused on the photocathode is to be the same as the pattern described in figure 2. Measure the separation of the 1 mm graduations (M_1) as imaged on the screen of the intensifier with a 10 power (or higher) traveling microscope. Compute center magnification as follows:

$$\text{CENTER MAGNIFICATION} = \frac{M_1}{2.00 \text{ (separation)}}$$

Failure to meet the requirements of 3.6.16 in both the vertical and horizontal directions shall constitute failure of this test.

4.6.17 Distortion. Perform this test with the same equipment used in 4.6.11 and in the same manner as 4.6.16. Measure the separation of the 10 mm graduations (M_2) as imaged on the screen of the intensifier. Compute the distortion as follows:

$$\text{PERCENT DISTORTION} = \frac{\left(\frac{M_2}{20.00}\right) - \left(\frac{M_1}{2.00}\right)}{\frac{M_1}{2.00}} \times 100$$

WHERE:

a. 2.00 is the separation in millimeters of the test points on the photocathode.

b. M_1 is the measured separation in millimeters of the test points as imaged on the output screen of the intensifier.

Failure to meet the requirements of 3.6.17 in both the vertical and horizontal directions shall constitute failure of this test.

4.6.18 Useful cathode diameter. Perform this test using the same equipment used in 4.6.11. With the operating potential applied to the intensifier, focus the test pattern on the optical axis of the photocathode and adjust the input radiation level for best image contrast. The size of the pattern focused on the photocathode is to be the same size as the test pattern described in figure 2. The image screen shall be viewed with a 6 to 10 power microscope. Useful cathode diameter is determined by the number of millimeter graduations visible on the screen of the intensifier and shall be determined in both a vertical and horizontal direction. Failure to meet the requirements of 3.6.18 in both the vertical and horizontal directions shall constitute failure of this test.

4.6.19 Luminance uniformity. Measure the intensifier screen uniformity by uniformly illuminating the photocathode with 1×10^{-5} to 3×10^{-5} footcandle of 2870° K tungsten lamp radiation and scan the image screen with a spot brightness scanner. The spot brightness scanner shall view the image screen such that a 0.040 inch (or 1 millimeter) diameter area of the screen is observed at any one time. The scanner shall begin its scan at the optical center of the image screen and move in a spiral motion to the edge of the illuminated area of the screen. The spiral scan shall be such that the entire screen area is viewed by the 0.040 inch spot. Correction factors shall be generated for any non-uniformities introduced by either the input illumination system or the scanning device. The scanner shall travel from center to edge at the rate of 1.0 mm per second or less. Spot brightness shall be measured with an eye-corrected, high sensitivity fast response detector and the detector output shall be displayed on an X-Y or strip chart recorder. The spot brightness reading at the center of the intensifier shall be normalized to 4.0. Variation in screen brightness greater than 4 to 1 from the center of the screen to points 10.0 millimeters from the center or variations that fall outside the 25 percent tolerance band (see figure 4) shall constitute failure of this test.

4.6.20 Operational safety. The intensifier shall be operated with no light incident on the photocathode and a reverse polarity input voltage of 6.8 volts dc for a period of 60 seconds. At the end of this 60 second period the intensifier shall be operated at the proper voltage and polarity and examined for damage. Any evidence of damage shall constitute failure of this test.

4.7 Mean time between failure. Intensifier MTFB shall be performed each 30 days on sample intensifiers selected at random from the previous 30 day production period. The sample size shall be a minimum quantity of 10. For first article testing no replacements are permitted; for production testing, replacement of failed intensifiers is required. Sample intensifiers selected for testing shall be tested from lots which have passed the quality conformance inspection of 4.5.3, and 4.5.4.1. The test shall be accomplished in accordance with MIL-STD-781, Test Level A1, Test Plan IV. Testing shall be conducted in a darkened area with the intensifiers mounted in grounded metal housing.

The operating potential shall be applied and the intensifiers shall be tested on a 60 minute cycle consisting of 45 minutes "ON" time and 15 minutes "OFF" time. During the 45 minute "ON" time period, the photocathode shall be illuminated with 0.5 footcandle for 1 minute, 2.4 footcandles for 5 seconds and 1 to 3 x 10^{-5} footcandle for the balance of the 45 minute period (2870° K not required). The total number of operating hours for all units, failed and unfailed, original and replacement, shall be monitored and recorded. Once each 96 hours the following inspections shall be performed; and time to failure for any intensifier failing any test shall be computed to the beginning of the 96 hour period during which the failure occurred.

a. Screen brightness. After 1 hour of operation the intensifier(s) image screen brightness shall be measured with a photometer as specified in 4.6.6. There shall be no light incident on the photocathode. This brightness reading shall be recorded as the initial screen brightness. When screen brightness varies more than 30 percent from the initial brightness, the intensifier(s) shall be removed from the test and a complete equivalent background input test, 4.6.5, shall be performed. Failure to meet the requirements of 3.6.5 shall constitute intensifier failure. When the intensifier meets the requirements of 3.6.5 it shall be placed back on test.
b. Cathode and screen quality. Observe the intensifier with a 6 to 10 power magnifier, with no light incident on the photocathode, for ion spots and field emission. The cathode shall then be uniformly illuminated and the screen observed for ion scintillations and bright spots. Failure to meet the requirements of 3.6.10 shall constitute failure of this test.
c. Luminance uniformity. Observe the intensifier with cathode uniformly illuminated for non-uniformities in screen brightness and mottled areas. Failure to meet the requirements of 3.6.19 shall constitute failure of this test.
d. Evidence of breakdown or intermittent operation. Observe the intensifier for flickering, flashing, blanking, breakdown of any type, snapping or frying noises or evidence of corona on output faceplate. Appearance of any of these disturbances shall constitute failure of this test.

Failure to meet the requirements of a, b, c or d shall constitute failure. In the event of failure of this test, 4.5.4.3.2 shall apply.

4.8 Inspection of packaging. The sampling and inspection of the preservation-packaging and interior package marking shall be in accordance with the group A and B quality conformance inspection requirements of MIL-P-116. The sampling and inspection of the packing and marking for shipment and storage shall be in accordance with the quality assurance provisions of the applicable container specification and the marking requirements of MIL-STD-129.

5. PACKAGING

5.1 Preservation. Preservation shall be level A, B or Commercial as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Cleaning. Image Intensifier Assembly, 25 MM (ABC) MX-8501A, shall be cleaned in accordance with process C-1 of MIL-P-116.

5.1.1.2 Drying. Image Intensifier Assembly 25 mm (ABC) MX-8501A, shall be dried in accordance with the applicable procedure of MIL-P-116.

5.1.1.3 Preservative application. None required.

5.1.1.4 Unit packing. Unit packing shall be in accordance with the methods prescribed in MIL-P-116 as specified herein.

5.1.1.4.1 Technical literature. Each technical literature shall be unit packed method IC-1.

5.1.1.4.2 Image Intensifier Assembly 25 mm (ABC) MX-8501A. Each intensifier shall be individually unit packed method IA-8 as follows: a protective cap shall be placed over the photocathode and screen of each intensifier as prescribed in SC-D-611780. Place each item within a bag fabricated of material conforming to MIL-F-22191, type I. Cushion the bagged item within a two piece interlocking block of expandable polystryene as prescribed in SC-D-611783. The polystryene blocks shall be taped together with tape conforming to PPP-T-60. Place the cushioned item within a close-fitting fiberboard box conforming to PPP-B-636, W5c, Place the technical literature, unit packed as specified in 5.1.1.4.1, on top of the contents, directly under the lid of the box. Close the box in accordance with the appendix of the box specification.

5.1.2 Level B. Cleaning, drying, preservative application and unit packing shall be as specified in 5.1.1 except that method IC-1 shall be substituted for method IA-8.

5.1.3 Commercial preservation. Preservation shall be in accordance with FED-STD-356.

5.2 Packing. Packing shall be level A, B or Commercial, as specified (see 6.2). Shipping containers for level A and B shall be capable of stacking and supporting superimposed loads during shipment and storage without damaging the container(s) or its contents.

5.2.1 Level A. A quantity of Image Intensifier Assembly 25 mm (ABC) MX-8501A, unit packed as specified in 5.1, shall be packed within a close-fitting box conforming to PPP-B-601, overseas type; PPP-B-621, style 4, class 2; or PPP-B-585, style 2 or 3, class 3. When the gross weight exceeds 200 pounds, of the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, 3 x 4 inch skids, laid flat, shall be applied in accordance with the requirements of the container specification, or if not specified in the specification, in a manner which will adequately support the item and facilitate the use of material handling equipment. Closure and strapping shall be in accordance with the applicable container specification or appendix thereto except that metal strapping shall conform to QQ-S-781, type 1, finish A.

5.2.2 Level B. A quantity of Image Intensifier Assembly 25 mm (ABC) MX-8501A, unit packed as specified in 5.1, shall be packed within a close-

fitting box conforming to PPP-B-601, domestic type; PPP-B-621, style 4, class 1; or PPP-B-585, style 2 or 3, class 3. When the gross weight exceeds 200 pounds or the container length and width is 48 x 24 inches or more and the weight exceeds 100 pounds, 3 x 4 inch skids, laid flat, shall be applied in accordance with the requirements of the container specification, or if not specified in the specification, in a manner which will adequately support the item and facilitate the use of material handling equipment. Closure and strapping shall be in accordance with the applicable container specification or appendix thereto.

5.2.3 Commercial packing. Packing shall be in accordance with FED-STD-356.

5.3 Marking.

5.3.1 Military marking. In addition to any special marking required by the contract or order, interior packs and exterior shipping containers shall be marked in accordance with MIL-STD-129.

5.3.2 Commerical marking. In addition to any special marking required by the contract or order, interior packs and exterior shipping containers shall be marked in accordance with FED-STD-356.

6. NOTES

6.1 Intended use. The image intensifier covered by this specification is intended for use in an electro-optical viewing device to intensify low level light such that a visible image is presented for viewing and sighting purposes.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number and date of this specification and amendment thereto.
b. Type of intensifier required (see 1.2).
c. Level of preservation and packaging and level of packing required (see 5.1 and 5.2).
d. When first article tests are to be conducted and the number of units to be tested (see 4.3).
e. Environmental pollution prevention measures are contained in the packaging material specifications referenced herein. Refer to material specifications or preparing activity for recommended disposability methods.
f. Actions required related to Group C failures.

6.3 Definition of terms.

6.3.1 Damage. Damage is defined as:

a. Electrical failure of malfunctioning including arcing, corona, flashing, flickering or blanking.
b. Cracks, breakage, deformation, corrosion, deterioration of any part or finish, or missing and loose components.
c. Mottled areas, blotches, dark spots, or other visual indications of module separation or degradation of coupling media.

6.3.2 Optical axis. Optical axis is defined as the mean cylinder formed by the outside diameter of the intensifier housing.

6.3.3 "g". "g" is defined as an acceleration or deceleration of 32.17 feet per second per second.

6.3.4 Room temperature. Room temperature is defined as +23° C ±3°C.

6.3.5 Response time. The time that is required for the screen brightness to transition through a maximum, minimum and return to 1 footlambert. Should the screen brightness transition through a maximum and remain above 1 footlambert, the response time shall be defined as zero.

6.3.6 Ion spots. An ion spot appears as a diffuse area or spot of higher brightness in the center of the field. It increases in intensity as the cathode illumination is increased and is usually visible only when the photocathode is illuminated. Its diffuse appearance distinguishes it from other bright defects.

6.3.7 Field emission. Field emission is an undesirable extraneous emission (excluding thermionic emission) which appears as bright spots or patterns that flicker, or appear intermittently on the image screen in one general position. Field emission is voltage dependent and is best observed with no radiation incident on the photocathode.

6.3.8 Corona on output faceplates. Appears as bright spots in field which are still visible when input exceeds maximum luminance. Occur both intermittently and continuously in position and time. Generally do not occur immediately on turn on but some short time later as faceplate charges. As conditions become worse, spots glowing other than green appear and can cause breakdown in face-plates.

6.3.9 Ion scintillationss. Bright spots which are much brighter and larger than electron scintillations. Very easy to resolve and occur in the center of the field, generally in clusters. These bright spots are constantly moving in intermittent random fashion and are best observed with the photocathode illuminated. One is actually observing the emission of large numbers of electrons from a single ion impact with the photocathode.

6.3.10 Electron scintillations. Very small bright spots of light which vary in position and time. Usually visible only when well dark adapted and intensifier is not illuminated. When present are far too numerous to count and appear as a scintillating uniform field. These account for the major average background brightness under conditions of no illumination. One is actually observing each separate electron emission event at the photocathodes.

6.3.11 Limiting resolution. Limiting resolution is defined as the smallest resolution pattern which the observer can see and distinguish between the black lines and the clear area between the black lines. The observer must be able to determine the number of line pairs in the test pattern and the direction of the line pairs in both the vertical and horizontal test patterns.

Custodians:
Army - EL
Air Force - 99
Navy - EC

Review Activity:
Army - MU

Preparing Activity:
Army - EL

Project No. 5855-0021

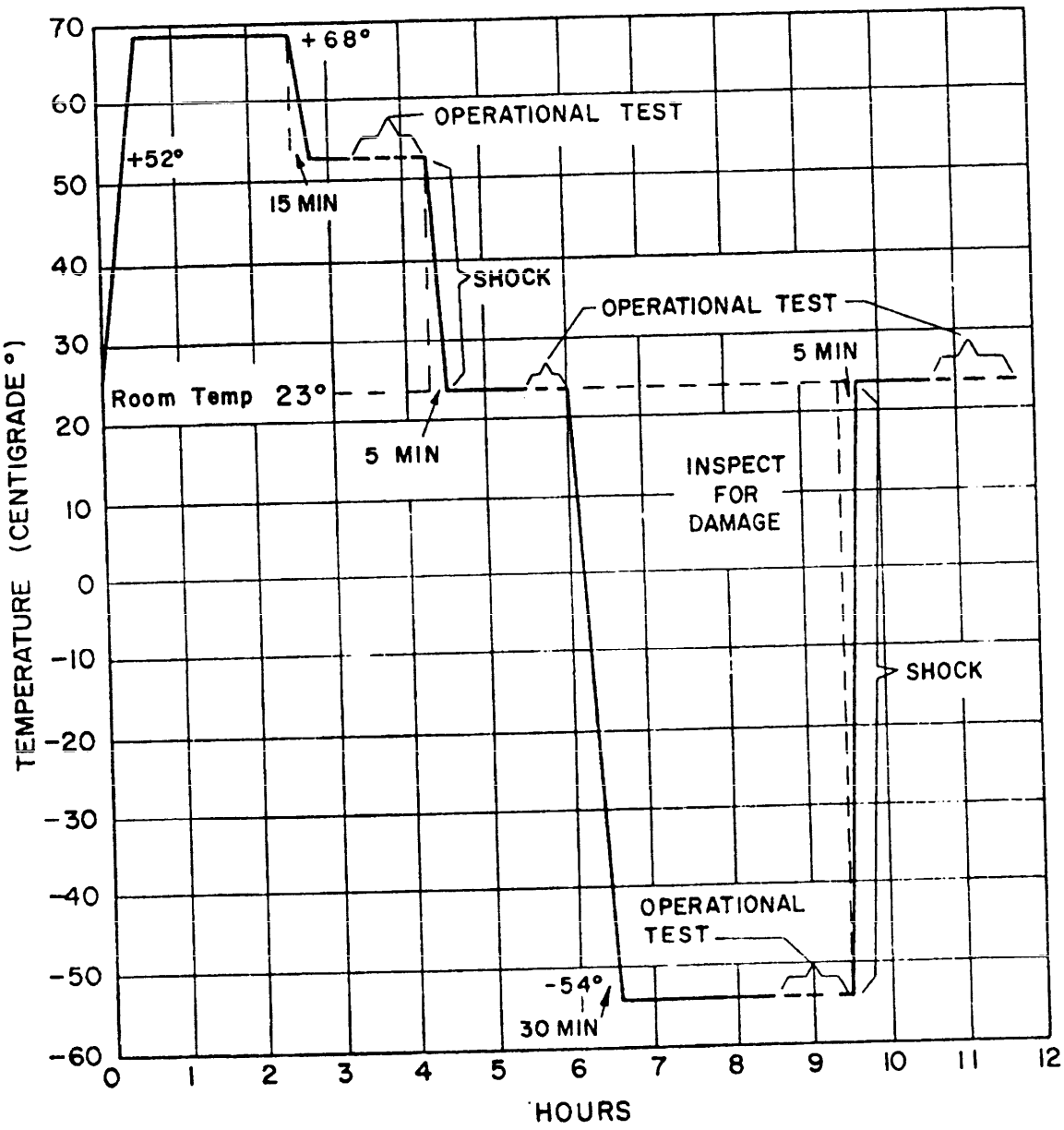
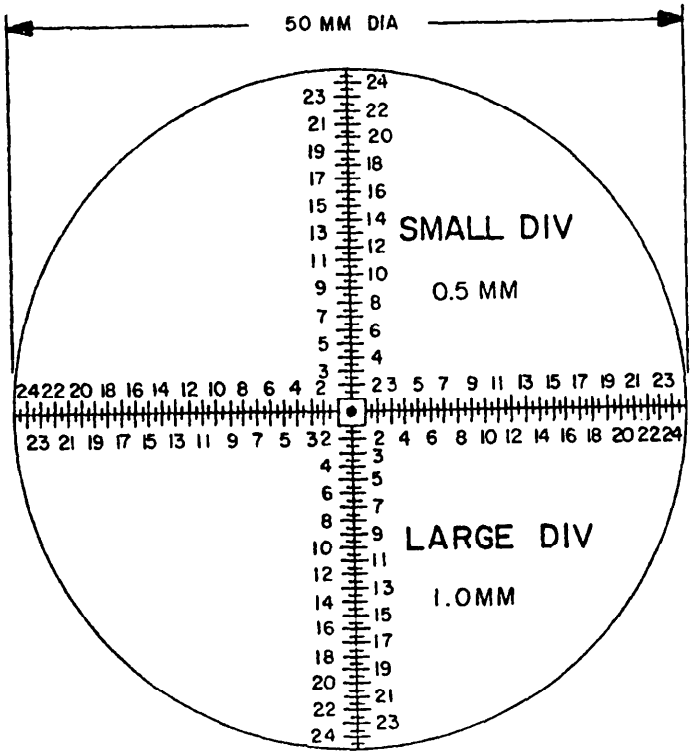


FIGURE 1
ENVIRONMENTAL CYCLE
25mm ASSEMBLY

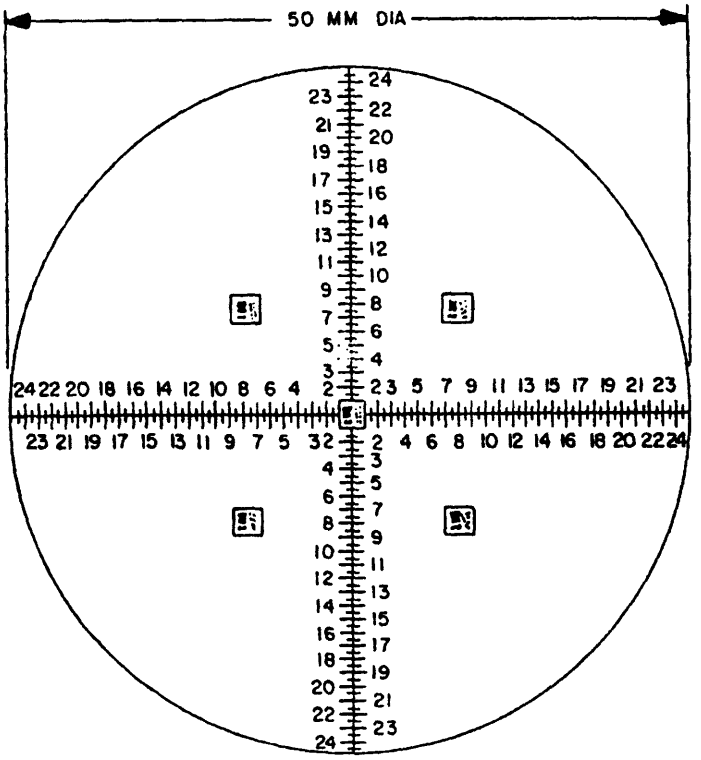


NOTES:

1. THE TEST RETICLE SHALL CONSIST OF EQUALLY SPACED LINES FROM THE CENTER OF THE 50 MM DIAMETER CIRCLE TO THE EDGE OF THE CIRCLE, IN 4 DIRECTIONS 90° APART. SPACING BETWEEN A LARGE GRADUATION AND A SMALL GRADUATION SHALL BE 0.5 MILLIMETER ± .03 MILLIMETER. SPACING BETWEEN TWO LARGE GRADUATIONS SHALL BE 1.0 MILLIMETER ± .03 MILLIMETER. THE CENTER OF THIS TEST RETICLE SHALL BE A SQUARE 2 MILLIMETER ON A SIDE WITH A 0.1270 MILLIMETER DIAMETER SPOT CONCENTRIC WITH THE CENTER OF THE TEST RETICLE. WIDTH OF ALL LINES TO BE 0.127 MILLIMETER ± .0254 MILLIMETER. ALL LINES, LETTERS AND NUMBERS SHALL BE HIGH CONTRAST, BLACK ON A CLEAR GLASS SUBSTRATE 2 INCHES WIDE X 2 INCHES LONG X .060 TO .10 INCHES THICK. THE LETTERING SHOWN IN THE FIRST AND FOURTH QUADRANTS SHALL BE AS LARGE AS POSSIBLE WITHOUT INTERFERING WITH THE GRADUATIONS AND NUMBERS AND SHALL FALL WITHIN A CIRCLE 10 MILLIMETER RADIUS, WHICH IS CONCENTRIC WITH THE 50 MM DIA.

25 mm ASSEMBLY

FIG. 2 MAGNIFICATION, IMAGE ALINEMENT AND USEFUL CATHODE DIAMETER TEST RETICLE

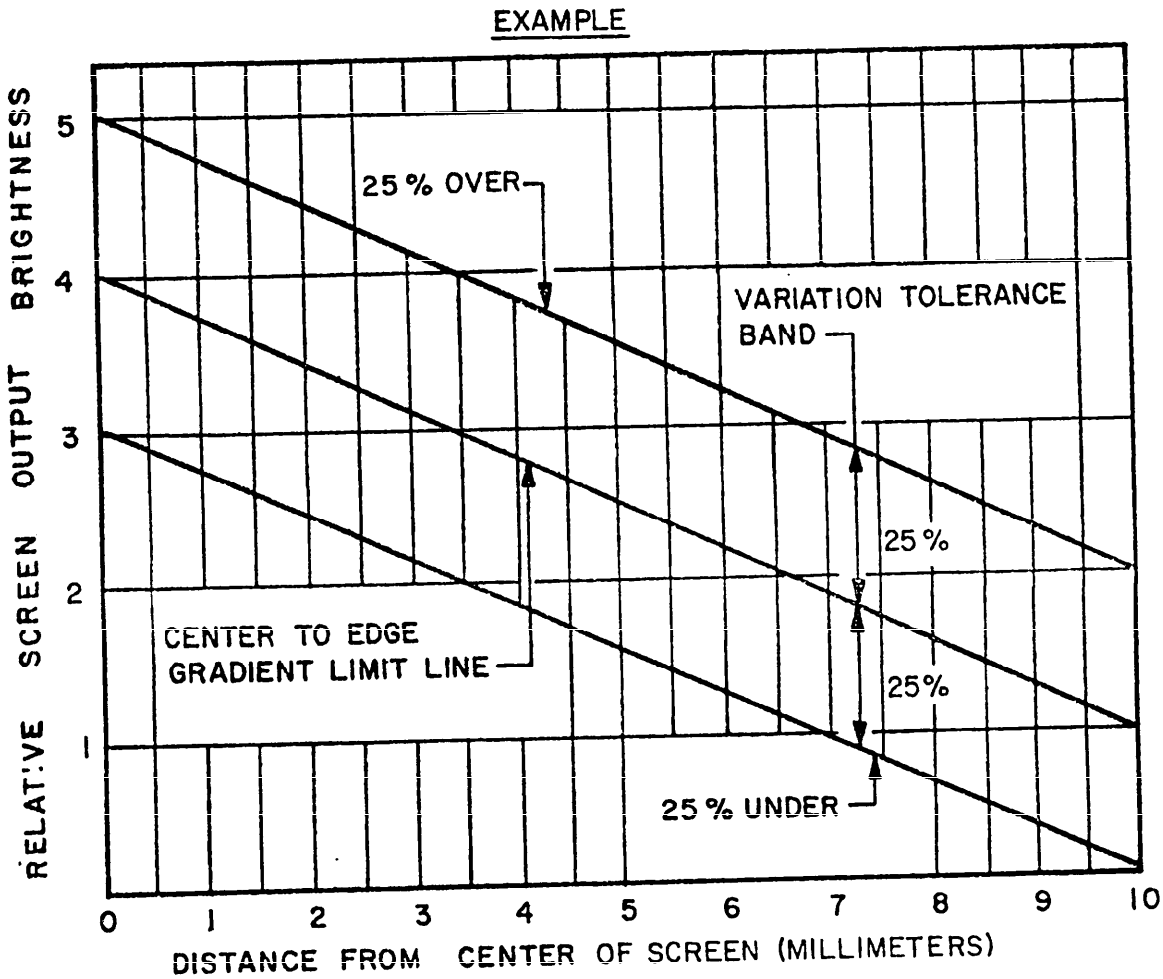


NOTES:

1. THE TEST RETICLE SHALL CONSIST OF EQUALLY SPACED LINES FROM THE CENTER OF THE 50 m m DIAMETER CIRCLE TO THE EDGE OF THE CIRCLE, IN 4 DIRECTIONS 90° APART. SPACING BETWEEN A LARGE GRADUATION AND A SMALL GRADUATION SHALL BE 0.5 MILLIMETER ± .03 MILLIMETER. SPACING BETWEEN TWO LARGE GRADUATIONS SHALL BE 1.0 MILLIMETER ± .03 MILLIMETER. THE CENTER OF THIS TEST RETICLE SHALL BE A SQUARE 2 MILLIMETER ON A SIDE WITH A USAF 1951 RESOLVING POWER TEST TARGET CONCENTRIC WITH THE CENTER OF THE TEST RETICLE. WIDTH OF ALL LINES TO BE 0.127 MILLIMETER ± .0254 MILLIMETER. ALL LINES, LETTERS AND NUMBERS SHALL BE HIGH CONTRAST, BLACK ON A CLEAR GLASS SUBSTRATE 2 INCHES WIDE X 2 INCHES LONG X .060 TO .10 INCHES THICK.
2. THE USAF 1951 RESOLVING POWER TEST TARGET IN THE CENTER SQUARE IS TO BE USED FOR MEASURING CENTER RESOLUTION.
3. THE FOUR EDGE USAF 1951 RESOLVING POWER TEST TARGETS ARE TO BE USED TO MEASURE PERIPHERAL RESOLUTION.

25 mm ASSEMBLY

FIG. 3 RESOLVING POWER TEST TARGET, USEFUL CATHODE DIAMETER, AND RESOLUTION TEST RETICLE



CATHODE AND SCREEN UNIFORMITY ACCEPTANCE LIMITS

NOTE: THE VARIATION TOLERANCE BAND IS DETERMINED BY DRAWING TWO LINES PARALLEL TO A STRAIGHT LINE GRADIENT FROM 4.0 IN CENTER TO 1.0 AT 10mm FROM CENTER. ONE LINE IS 25% ABOVE (OR AT 5.0) AND THE OTHER 25% UNDER (OR AT 3.0)

FIGURE 4 25mm ASSEMBLY

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 22-R255

INSTRUCTIONS: This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.

SPECIFICATION MIL-I-55340A IMAGE INTENSIFIER ASSEMBLY 25 MILLIMETER WITH AUTOMATIC BRIGHTNESS CONTROL

ORGANIZATION

CITY AND STATE

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ YES ☐ NO *(If "yes", in what way?)*

4. REMARKS *(Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)*

SUBMITTED BY *(Printed or typed name and activity - Optional)*

DATE

DD FORM 1 JAN 66 1426

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To detach this form, cut along this line