

MIL-X-48399 (PA)
12 December 1974

MILITARY SPECIFICATION
X-RAY ASSEMBLY, LIGHT WEIGHT
ASSEMBLING AND PACKING

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

1. SCOPE

1.1 This specification covers the assembling and packing for one type of portable x-ray equipment and repair parts kit, designated as X-ray Assembly, Light Weight.

2. APPLICABLE DOCUMENTS

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

SPECIFICATION

MILITARY

MIL-A-48078 - Ammunition, Standard Quality Assurance Provisions, General Specification For

STANDARDS

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes (ABC-STD-105)
MIL-STD-271 - Non-destructive Testing Requirements for Metals
MIL-STD-810 - Environmental Test Methods
MIL-STD-1168- Lot Numbering of Ammunition

FSC: 6635

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DRAWINGS

U.S. ARMY PICATINNY ARSENAL

- 9288634 - Light Weight X-Ray Assembly
- 9288637 - Light Weight X-Ray Unit Repair Parts
- 9294937 - Packing and Marking for Box, Fiberboard, Outer for Light Weight X-ray
- 9294939 - Packing and Marking for Box, Fiberboard, Inner for Light Weight X-ray
- 9294944 - Packing and Marking for Box, Fiberboard for Case, Storage

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

3. REQUIREMENTS

3.1 Material. - Materials and parts shall be in accordance with applicable drawings and specifications.

3.2 Assembly. - The assembly shall comply with all requirements specified on drawing (Dwg.) 9288634, and with all requirements specified in applicable specifications.

3.2.1 Light weight x-ray unit repair parts. - The x-ray unit repair parts shall comply with all requirements specified on dwg. 9288637, and with all requirements specified in applicable specifications.

3.3 Weight. - The weight of the x-ray assembly, excluding the carrying case, shall not exceed 20 pounds.

3.4 Radiation

3.4.1 Output. - The radiation output shall be an average of 3.3 milli Roentgen (mR) per pulse from consecutive pulse trains, when measured at 12 inches from the indicated focal spot, throughout the operating range of the equipment.

3.4.2 Consistency. - The radiation output from consecutive pulse trains shall not vary more than plus or minus 10 percent of the average dose rate.

3.5 Radiation energy/Half value layer (HVL). - The output radiation energy shall be equivalent to 120 kilovolt (KV) constant potential such that the HVL is not less than 3.7 millimeter (mm) of aluminum (Al) throughout the operating range.

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3.6 Pulse repetition rate. - The pulse repetition rate shall be not less than 19 pulses per second (pps) when powered at 118 volts alternating current (VAC), or not less than 10 pps at 90 VAC; and not less than 14 pps when powered by the self contained battery.

3.6.1 Pulse counter accuracy. - The accuracy of the pulse counter shall be 100% for pulse trains less than 10, 95% for pulse trains greater than 10.

3.7 Radiation beam angle. - The beam angle shall be 40 degrees, plus or minus 3 degrees.

3.8 Radiographic quality

3.8.1 Image quality. - The image quality shall be such that a radiograph of #26 AWG copper wire taken through 1/4 inch steel, using Polaroid TLX film with hi-speed screen, is clearly visible.

3.8.2 Contrast sensitivity. - The x-ray system contrast sensitivity, using Polaroid TLX film with hi-speed screen and aluminum plaque penetrameters, shall be 6 percent.

3.9 Power requirements. - Power required in the pulsing and stand-by modes is 1000 watts maximum (max.) at 90 to 130 VAC and 50 to 60 Hertz (Hz).

3.10 Battery

3.10.1 Capacity. - The capacity of a fully charged battery shall be not less than 1800 pulses per charge.

3.10.2 Recharge time. - The time required to recharge a discharged battery shall be not more than 12 hours from a 110 to 118 VAC supply. The battery shall be considered to be fully charged if it complies with the requirements of 3.10.1.

3.11 X-ray tube life. - The x-ray tube life shall be not less than 15,000 pulses.

3.12 Altitude. - The x-ray system shall withstand the altitude test specified in MIL-STD-810B, Test Method 500, Procedure I, with the addition that the system shall also be capable

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of operating at 5,000 feet using both A.C. and battery power, with not more than 50 percent reduction of output intensity. After exposure to these altitude conditions, the x-ray system shall comply with the requirements of 3.4.1 and 3.8.1.

3.13 Low temperature. - The x-ray system shall withstand low temperature storage at $-50^{\circ}\text{F} \pm 5^{\circ}\text{F}$ for a minimum period of 4 hours, and $-25^{\circ}\text{F} \pm 5^{\circ}\text{F}$ for a minimum period of 2 hours. The x-ray system shall comply with the requirements of 3.8.1 during the -25°F exposure using both A.C. and battery power.

3.14 High temperature. - The x-ray system shall withstand high temperature storage at $155^{\circ}\text{F} \pm 5^{\circ}\text{F}$ for a minimum period of 4 hours, and at $120^{\circ}\text{F} \pm 5^{\circ}\text{F}$ for a minimum period of 2 hours. The x-ray system shall be capable of firing a minimum of 1000 pulses and shall comply with the requirements of 3.4.1 and 3.8.1 during the 120°F exposure using both A.C. and battery power. In addition, the equipment shall show no evidence of oil seepage.

3.15 Humidity. - The x-ray system shall withstand a temperature of $95^{\circ}\text{F} \pm 5^{\circ}\text{F}$ and 95% relative humidity (RH) for a minimum of 24 hours. After exposure to the humidity conditions, the x-ray system shall comply with the requirements of 3.8.1 using both A.C. and battery power.

3.16 Insulation breakdown. - The electrical power cable assembly, dwg. 9288635, and the remote control cable assembly, dwg. 9288636, shall withstand a minimum voltage of 600 V. RMS, 60 Hz A.C. for a minimum period of 15 seconds without any evidence of insulation breakdown or the inability to attain and maintain the test potential.

3.17 Workmanship. - All parts and assemblies shall be fabricated and finished in a thorough workmanlike manner and all manufacturing, processing, and assembly operations shall be correctly performed. They shall be free of burrs, chips, sharp edges, cracks, crazes, unblended radii, porosity, warpage, burn marks, checks, chipped edges, blisters, excess flash, dirt, grease, rust, salt deposits, visible raised cement seams, solder splash, corrosion products, and other defects and foreign matter which would affect their serviceability. The cleaning method used shall not be injurious to any part or assembly nor shall the parts be contaminated by the cleaning agent. All required markings shall be neat, legible and sharply defined.

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3.18 First article inspection. - This specification contains technical provisions for first article inspection. Requirements for the submission of first article samples by the contractor shall be as specified in the contract.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection and standard quality assurance provisions. - Unless otherwise specified herein or in the contract, the provisions of MIL-A-48078 shall apply and are hereby made a part of this detail specification.

4.2 Classification of inspections. - The following types of inspection shall be conducted on this item.

- a. First article inspection
- b. Quality Conformance Inspection

4.3 First article inspection

4.3.1 Submission. - The contractor shall submit a first article sample (see 6.1b) as designated by the Contracting Officer for evaluation in accordance with provisions of 4.3.2 and 4.3.3. The first article sample shall consist of the following items in sample quantities as indicated.

<u>Part Description</u>	<u>Drawings</u>	<u>Quantity</u>
Light weight x-ray assy	9288634	2
X-ray tube, cold cathode	9288639	1
Battery pack, rechargeable	9288641	1
Line, electrical power cable assembly	9288635	1
Remote control cable assy	9288636	1

4.3.2 Inspections to be performed. - See MIL-A-48078 and paras. 4.4.2.1 thru 4.4.2.16, and testing per Table I specified herein.

TABLE I - FIRST ARTICLE INSPECTION

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CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE X-Ray Assembly, Lightweight		SHEET 1 OF 1		DRAWING NUMBER See Below
					NEXT HIGHER ASSEMBLY
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
	<u>X-Ray Assembly (Dwg. 9288634)</u>				
	Examination for defects	2		3.1 & 3.2	4.4.2.1 thru 4.4.2.11
	<u>Tests</u>				
	Weight	1		3.3	4.5.1
	Radiation output and consistency	1		3.4.1 & 3.4.2	4.5.2.1 & 4.5.2.2
	Radiation Energy/HVL	1		3.5	4.5.3
	Pulse repetition rate	1		3.6	4.5.4
	Pulse counter accuracy	1		3.6.1	4.5.4.1
	Radiation beam angle	1		3.7	4.5.5
	Image quality	1		3.8.1	4.5.6.1
	Contrast sensitivity	1		3.8.2	4.5.6.2
	Power req. - Pulsing and stand-by modes	1		3.9	4.5.7.1 & 4.5.7.2
	Battery Capacity and recharge time	1		3.10.1 & 3.10.2	4.5.8.1 & 4.5.8.2
	X-ray tube life	1 (a)		3.11	4.5.9
	Altitude	1		3.12	4.5.10
	Low temperature	1		3.13	4.5.11
	High temperature	1		3.14	4.5.12
	Humidity	1		3.15	4.5.13
	Insulation breakdown - Power cable and remote control cable	1 ea.		3.16	4.5.14.1 & 4.5.14.2
NOTES:					
(a) Tube life test to be run concurrently with other tests. See para. 4.5.9					

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4.3.3 Rejection. - (see MIL-A-48078)

4.4 Quality conformance inspection

4.4.1 Inspection lot formation. - See MIL-A-48078. Lot numbering as required shall be in accordance with MIL-STD-1168.

4.4.2 Examination. - (See MIL-A-48078). Unless otherwise specified in the classification of defects and test tables, sampling plans for major and minor defects shall be in accordance with MIL-STD-105, Inspection Level II. Equipment necessary for the performance of the inspections listed shall be in accordance with 4.4.4.

QUALITY CONFORMANCE INSPECTION

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CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE	SHEET 1 OF 1			DRAWING NUMBER	
		CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH
					9288634	
					PARAGRAPH REFERENCE / INSPECTION METHOD	
<u>Critical:</u>	None defined					
<u>Major B:</u>						
131.	Relief valve missing or improperly assembled		0.40%	3.2	Visual/Gage	
132.	Relief valve label missing, improperly located or illegible		0.40%	3.2	Visual/Gage	
133.	Warning label missing, improperly located or illegible		0.40%	3.2	Visual/Gage	
<u>Minor:</u>						
201.	Evidence of poor workmanship		0.65%	3.17	Visual	
NOTES:						

CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET 1 OF 1			DRAWING NUMBER
4.4.2.2	Case Assembly				9294788 NEXT HIGHER ASSEMBLY 9288634
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
<u>Critical:</u>	None defined				
<u>Major B:</u>					
131.	Top cushion missing or improperly secured		0.40%	3.2	Visual/Manual
132.	Bottom cushion missing or improperly secured		0.40%	3.2	Visual/Manual
<u>Minor:</u>					
201.	Evidence of poor workmanship		0.65%	3.17	Visual
NOTES: .6					

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CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET 1 of 1			DRAWING NUMBER
4.4.2.3	Cushion, Top				9294792
					NEXT HIGHER ASSEMBLY 9288634
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
<u>Critical:</u>	None defined				
<u>Major A&B:</u>	None defined				
<u>Minor:</u>					
201.	Overall length		0.65%	3.2	Gage
202.	Overall width		0.65%	3.2	Gage
203.	Overall depth		0.65%	3.2	Gage
204.	Location of pads		0.65%	3.2	Gage
205.	Evidence of poor workmanship		0.65%	3.17	Visual
NOTES:					

CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET 1 OF 1			DRAWING NUMBER
4.4.2.4	Cushion, Bottom				9294793
					NEXT HIGHER ASSEMBLY
					9288634
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
Critical:	None defined				
Major A&B:	None defined				
Minor:					
201.	Overall length		0.65%	3.2	Gage
202.	Overall width		0.65%	3.2	Gage
203.	Overall depth		0.65%	3.2	Gage
204.	Location of pads		0.65%	3.2	Gage
205.	Evidence of poor workmanship		0.65%	3.17	Visual
NOTES:					
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CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET ¹ OF ¹		DRAWING NUMBER	
				9294795	NEXT HIGHER ASSEMBLY 9288634
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
<u>Critical:</u>	None defined				
<u>Major A&B</u>	None defined				
<u>Minor:</u>					
201.	Diameter of recess		0.65%	3.2	Gage
202.	Depth of recess		0.65%	3.2	Gage
203.	Evidence of poor workmanship		0.65%	3.17	Visual
NOTES:					

CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET 1 OP ¹			DRAWING NUMBER
4.4.2.6	Label				9294797
					NEXT HIGHER ASSEMBLY 9288634
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
<u>Critical:</u>	None defined				
<u>Major A&B:</u>	None defined				
<u>Minor:</u>					
201.	Legend misleading or unidentifiable		0.65%	3.2	Visual
202.	Evidence of poor workmanship		0.65%	3.17	Visual
NOTES:					
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CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET 1 OF 1			DRAWING NUMBER
4.4.2.7	Light Weight X-ray Unit				9294801
					NEXT HIGHER ASSEMBLY 9288634
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
<u>Critical:</u>	None defined				
<u>Major A:</u>					
101.	Manufacturer's model number incorrect		0.40%	3.2	Visual
102.	Any component visibly damaged		0.40%	3.2	Visual
<u>Minor:</u>					
201.	Evidence of poor workmanship		0.65%	3.17	Visual
NOTES:					

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PARAGRAPH	TITLE	SHEET 1 OF 1			DRAWING NUMBER
4.4.2.8	Label, Radiation, Warning				9294860
					NEXT HIGHER ASSEMBLY 9288634
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
<u>Critical:</u>	None defined				
<u>Major A&B:</u>	None defined				
<u>Minor:</u>					
201.	Legend misleading or unidentifiable		0.65%	3.2	Visual
202.	Evidence of poor workmanship		0.65%	3.17	Visual
NOTES:					

CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE	SHEET 1 OF 1			DRAWING NUMBER	
		CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH
4.4.2.9	Line, Electrical Power Cable Assembly					9288635
						9288634
<u>Critical:</u>	None defined					
<u>Major B:</u> 101.	Overall length			0.10%	3.2	Gage
<u>Minor:</u> 201.	Evidence of poor workmanship			0.65%	3.17	Visual
NOTES:						

CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET 1 OF 1			DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.10	Remote Control Cable Assembly				9288636 NEXT HIGHER ASSEMBLY 9288634
<u>Critical:</u>	None defined				
<u>Major B:</u> 131.	Overall length		0.40%	3.2	Gage
<u>Minor:</u> 201.	Evidence of poor workmanship		0.65%	3.17	Visual
NOTES:					

CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE	SHEET 1 OF 1			DRAWING NUMBER
4.4.2.11	Light Weight X-ray Assembly				9288634
					NEXT HIGHER ASSEMBLY 9288634
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
<u>Critical:</u>	None defined				
<u>Major A:</u> 101.	Any component missing or damaged		0.40%	3.2	Visual/Manual
<u>Minor:</u> 201.	Evidence of poor workmanship		0.65%	3.17	Visual
NOTES:					

CLASSIFICATION OF DEFECTS & TESTS

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PARAGRAPH	TITLE		SHEET 1 OF 1		DRAWING NUMBER 9288637
NEXT HIGHER ASSEMBLY 9288634					
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE /INSPECTION METHOD
<u>Critical:</u> <u>Major A:</u> 101. 102. <u>Minor:</u> 201.	None defined Any component missing or damaged Any label legend or marking misleading or unidentifiable Evidence of poor workmanship		 0.40% 0.40% 0.65%	 3.2.1 3.2.1 3.17	 Visual/Manual Visual Visual
NOTES: 19					

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CLASSIFICATION OF DEFECTS & TESTS

PARAGRAPH	TITLE Packing and Marking for Box, Fiberboard for Case, Storage, Sealed		SHEET 1 OF 1		DRAWING NUMBER
					9294944
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	NEXT HIGHER ASSEMBLY
					PARAGRAPH REFERENCE /INSPECTION METHOD
<u>Critical:</u>	None Defined				
<u>Major B:</u> 131.	Carton damaged to extent that contents are exposed or liable to become exposed		0.40%	3.2	Visual
<u>Minor:</u> 201.	Contents loose		0.65%	3.2	Visual
202.	Marking misleading or unidentifiable		0.65%	3.2	Visual
203.	Evidence of poor workmanship		0.65%	3.17	Visual
NOTES:					

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PARAGRAPH	TITLE	SHEET 1 of 1			DRAWING NUMBER
4.4.2.14	Packing and Marking for Box, Fiberboard, Inner, for Light Weight X-ray (prior to inserting into bag)				9294939
					NEXT HIGHER ASSEMBLY 9294937
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
<u>Critical:</u>	None defined				
<u>Major B:</u> 131.	Box damaged to extent that contents are exposed or liable to become exposed.		0.40 %	3.2	Visual
<u>Minor:</u> 201.	Contents loose		0.65%	3.2	Visual
202.	Sealing strip(s) missing or insecure		0.65%	3.2	Visual
203.	Evidence of poor workmanship		0.65%	3.17	Visual
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PARAGRAPH	TITLE	SHEET 1 OF 1			DRAWING NUMBER
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
4.4.2.15	Packing and Marking for Box, Fiberboard, Inner for Light Weight X-ray (Sealed)				9294939 NEXT HIGHER ASSEMBLY 9294937
<u>Critical:</u>	None defined				
<u>Major B:</u> 131.	Bag punctured, torn or seal incorrectly located		0.40%	3.2	Visual
<u>Minor:</u> 201.	Marking misleading or unidentifiable		0.65%	3.2	Visual
202.	Excess air in bag		0.65%	3.2	Visual
203.	Evidence of poor workmanship		0.65%	3.17	Visual
NOTES:					

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PARAGRAPH	TITLE	SHEET 1 OF 1			DRAWING NUMBER
4.4.2.16	Packing and Marking for Box, Fiberboard Outer for Light Weight X-ray				9294937
					NEXT HIGHER ASSEMBLY N/A
CATEGORY	EXAMINATION OR TEST	NO. OF SAMPLE UNITS	AQL OR 100%	REQUIREMENT PARAGRAPH	PARAGRAPH REFERENCE / INSPECTION METHOD
<u>Critical:</u>	None defined				
<u>Major B:</u> 131.	Carton damaged to extent that contents are exposed or liable to become exposed		0.40%	3.2	Visual
<u>Minor:</u> 201.	Contents loose		0.65%	3.2	Visual
202.	Sealing strip(s) missing or insecure		0.65%	3.2	Visual
203.	Marking misleading or unidentifiable		0.65%	3.2	Visual
204.	Evidence of poor workmanship		0.65%	3.17	Visual
NOTES:					
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4.4.3 Testing - (The tests shall be performed in the following sequence).

4.4.3.1 Weight (see 3.3). - Major A defect - This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. The test shall be performed as specified in 4.5.1 using equipment in accordance with 4.4.4.

4.4.3.2 Radiation

4.4.3.2.1 Output (see 3.4.1). - Major A defect. - This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. The test shall be performed as specified in 4.5.2.1 using equipment in accordance with 4.4.4.

4.4.3.2.2 Consistency (see 3.4.2). - Major A defect. - This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. The test shall be performed as specified in 4.5.2.2 using equipment in accordance with 4.4.4.

4.4.3.3 Radiation energy/HVL (see 3.5). - Major A defect. - This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. The test shall be performed as specified in 4.5.3 using equipment in accordance with 4.4.4.

4.4.3.4 Pulse repetition rate (see 3.6). - Major A defect. - This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. The test shall be performed as specified in 4.5.4 using equipment in accordance with 4.4.4.

4.4.3.4.1 Pulse counter accuracy (see 3.6.1). - Major A defect. - This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. This test shall be performed as specified in 4.5.4.1 using equipment in accordance with 4.4.4.

4.4.3.5 Radiation beam angle (see 3.7). - Major A defect. - This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. The test shall be performed as specified in 4.5.5, using equipment in accordance with 4.4.4.

4.4.3.6 Radiographic quality

4.4.3.6.1 Image quality (see 3.8.1). - Major A defect. - This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. The test shall be performed as specified in 4.5.6.1 using equipment in accordance with 4.4.4.

4.4.3.6.2 Contrast sensitivity (see 3.8.2). - Major A defect - This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. The test shall be performed as specified in 4.5.6.2 using equipment in accordance with 4.4.4.

4.4.3.7 Power requirements

4.4.3.7.1 Pulsing mode (see 3.9). - Major A defect. This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. The test shall be performed as specified in 4.5.7.1 using equipment in accordance with 4.4.4.

4.4.3.7.2 Stand-by mode (see 3.9). - Major A defect - This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. The test shall be performed as specified in 4.5.7.2 using equipment in accordance with 4.4.4.

4.4.3.8 Battery

4.4.3.8.1 Capacity (see 3.10.1). - Major A defect. - This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. The test shall be performed as specified in 4.5.8.1 using equipment in accordance with 4.4.4.

4.4.3.8.2 Recharge time (see 3.10.2). - Major A defect. - This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. The test shall be performed as specified in 4.5.8.2 using equipment in accordance with 4.4.4.

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4.4.3.9 Insulation breakdown (See 3.16). - Major A defect - This test shall be conducted 100 percent. Any item which fails to comply with the applicable requirement shall be classed defective and removed from the lot. The test shall be performed as specified in 4.5.14.1 and 4.5.14.2 using equipment in accordance with 4.4.4.

4.4.4 Inspection equipment. - The inspection equipment required to perform the inspections and tests prescribed in this specification is identified in the 'Paragraph Reference/Inspection Method' column in the tables starting with paragraph 4.4.2.1, and the test method paragraphs (see 4.5). The contractor shall submit for approval, inspection equipment designs in accordance with the terms of the contract. See Section 6 of MIL-A-48078, and section 6.2 herein.

4.5 Test methods and procedures

4.5.1 Weight. - The x-ray assembly, excluding the carrying case, shall be weighed using an approved weight measurement device. Observation shall be made for compliance with the applicable requirement (Non-destructive test).

4.5.2 Radiation

4.5.2.1 Output. - Using an approved dosimetry system (Thermoluminescent Devices [TLD] integrating dosimeter), the integrated dose of the direct beam shall be measured at a point 12 inches from the indicated focal spot, for each of five 50 pulse trains. The average dose per pulse, for each pulse train, shall be determined and observed for compliance with the requirement. Repeat the above procedure with the x-ray generator powered from 90, 120 and 130 VAC, 60 Hz and the self-contained battery.

NOTE: There should be no change in output intensity with the various power sources. (Non-destructive test).

4.5.2.2 Consistency. - Using the average dose per pulse determined from paragraph 4.5.2.1, the percent variation between each consecutive pulse train shall be determined and observed for compliance with the applicable requirement. (Non-destructive test)

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4.5.3 Radiation energy/HVL. - From paragraph 4.5.2.1, determine the average radiation dose per 50 pulse train. Place a 3.7 mm Al. filter over the x-ray exit port. A direct beam measurement shall be made 12 inches from the indicated focal spot. With the 3.7 mm Al. filter, no less than one half the dose of the unfiltered beam shall be indicated. The HVL shall be checked with the x-ray generator powered from 90 VAC and the battery; HVL should not change. (Non-destructive test)

4.5.4 Pulse repetition rate. - A calibrated oscilloscope, equipped with a Polaroid camera, shall be connected to terminal 1 of transformer T2; and the resulting waveform shall be photographed when the x-ray generator is fired while powered from 90 VAC, 120 VAC, and the self contained battery. The pulse repetition rate shall be determined for each of the input voltages by measuring the period of the waveform appearing on the respective photos, and observation made for compliance with the applicable requirement. (Non-destructive test)

4.5.4.1 Pulse counter accuracy. - The test point of paragraph 4.5.4 shall be connected to a suitable pulse counter. The pulse selector switch shall be checked in all possible settings for compliance with the applicable requirement. (Non-destructive test)

4.5.5 Radiation beam angle. - A 10 inch by 12 inch polaroid cassette shall be placed at a film focal distance (FFD) of eight (8) inches, and the film exposed using 1 pulse. The radius of the resulting homogeneous radiation pattern shall be measured and the total beam angle calculated as follows:

$$\text{Total beam angle} = 2 \text{ arc tan (image radius/FFD)}$$

Observation shall be made for compliance with the applicable requirement. (Non-destructive test)

4.5.6 Radiographic quality

4.5.6.1 Image quality. - Using the specified film/screen combination and located at a source to film distance of 18 inches, a #26 AWG copper wire covered by a .25 inch steel plate shall be radiographed. The resulting radiograph shall be observed for compliance with the applicable requirement. (Non-destructive test).

4.5.6.2 Contrast sensitivity. - Using the specified film/screen combination, a .5 inch thick block of Al. shall be radio-

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graphed at a source to film distance of 24 inches with the following aluminum plates (plaques) laid on top: 10 mil, 15 mil, 20 mil, 25 mil, 30 mil and 35 mil. Standard aluminum plaque penetrameters constructed for this purpose in accordance with MIL-STD-271D are available for this purpose. The system contrast sensitivity is obtained as follows:

% Contrast Sensitivity =

$$\frac{\text{Thickness (inches) of thinnest plaque detectable} \times 100}{\text{thickness of base (.5 inch)}}$$

Observation shall be made for compliance with the specified requirement. (Non-destructive test)

4.5.7 Power requirements

4.5.7.1 Pulsing Mode. - A 0.1 ohm 70 watt equivalent resistor is connected in series with the x-ray generator battery dwg. 9288641. The voltage drop across this resistor is displayed on a calibrated oscilloscope (equipped with Polaroid camera) while the x-ray is fired. The picture of the resulting waveform is used to obtain the peak voltage, pulse width, and time constant of the pulse. The closed circuit voltage of the battery (V_B) is measured. From this data, the constant current equivalent (I_c) and effective power can be calculated as follows:

$$\text{Effective Power} = I_c \times V_B$$

where:

$$I_c = A/t \int_0^t e^{-t/\tau} dt, \text{ evaluated between time 0 and } t.$$

A = peak current, amps (10X peak voltage)

t = pulse width, milliseconds (ms)

τ = time constant, MS, (time at .63 peak voltage)

Observation shall be made for compliance with the specified requirement. (Non-destructive test)

4.5.7.2 Stand-by mode. - Power required in the stand-by mode can be measured by inserting a simple ammeter in series with the battery or AC supply cord and measuring the terminal voltage of the battery or AC supply. Observation shall be made for compliance with the specified requirement. (Non-destructive test)

4.5.8 Battery

4.5.8.1 Capacity. - A fully charged battery shall be used to fire the x-ray generator continuously (in accordance with its duty cycle) until it requires more than eight (8) seconds to fire 99 consecutive pulses. The battery is considered to be discharged when the pulse rate has slowed to the point where the max. pulse setting (99) can no longer be fired within 8 seconds. Observation shall be made for compliance with the specified requirement. (Non-destructive test)

4.5.8.2 Recharge time. - The x-ray generator of para. 4.5.8.1 shall be connected to a 110 VAC supply and allowed to recharge the battery for 12 hours maximum. The recharged battery shall then be tested in accordance with 4.5.8.1 to determine compliance with the applicable requirement. (Non-destructive test)

4.5.9 X-ray tube life. - Prior to the initiation of any tests, a suitable pulse counter shall be connected to the x-ray generator as specified in paragraph 4.5.4.1, and a cumulative record kept of all pulsing accomplished on any one x-ray tube. Observation shall be made for compliance with the specified requirement. (destructive test)

4.5.10 Altitude. - The x-ray generator shall be subjected to the altitude test of MIL-STD-810B, Test Method 500, Procedure I with the following addition: During step 3, the equipment shall also be subjected to and operated at 5,000 ft. Radiographs and radiation intensity measurements shall be taken both during and after the test, as specified, using both A.C. and battery power. Observation shall be made for compliance with the specified requirement. (Non-destructive test)

4.5.11 Low Temperature. - The x-ray generator shall be subjected to the low temperature test in accordance with MIL-STD-810B, Test Method 502, Procedure I with the following exceptions: The battery and film will not be stored with the x-ray generator during step 2 of Procedure I. Three (3) radiographs shall be taken in each power mode during the operating phase of this test, and observation made for compliance with the applicable requirement. (Non-destructive test)

4.5.12 High Temperature. - The x-ray generator shall be subjected to the high temperature test of MIL-STD-810B, Test Method 501, Procedure II except that the temperature levels

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and duration shall be as specified in 3.14. Three (3) radiographs and radiation intensity measurements shall be taken, as specified, in each power mode during the operating phase of this test. In addition, the generator shall be cycled to fire a minimum of 1,000 pulses. Observation shall be made for compliance with the applicable requirement. (Non-destructive test).

4.5.13 Humidity. - The x-ray generator packed in its carrying case shall be subjected to the humidity test of MIL-STD-810B, Test Method 507, Procedure V with the following exceptions:

- a. Eliminate step 3 of Proc. V
- b. In step 7, only 1 cycle is required

Three (3) radiographs shall be taken in each power mode during the operating phase of this test. Observation shall be made for compliance with the applicable requirement. (Non-destructive test).

4.5.14 Insulation breakdown

4.5.14.1 Electrical power cable assembly, dwg. 9288635. The test voltage shall be applied between the following points of the female receptacle for the specified period of time:

- a. From connection 1 to connection 2, 3 and metal portion of connector, separately.
- b. From connection 2 to connection 3 and metal portion of connector, separately.
- c. From connection 3 to the metal portion of the connector.

Observation shall be made for compliance with the applicable requirement. (Non-destructive test)

4.5.14.2 Remote control cable assy, dwg. 9288636. - The test voltage shall be applied between the following points of the cable connector for the specified period of time:

- a. With the switch not activated, from connection 1 to connection 2, 3, and 4 separately, and from connection 3 to 4.
- b. With the switch depressed, from connection 2 to connection 3 and 4, separately.

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- c. With the switch not activated, from connections 1, 2, 3 and 4 to the metal portion of the cable connector and to exposed metal on the switch, separately.

Observation shall be made for compliance with the applicable requirement. (Non-destructive test).

5. PREPARATION FOR DELIVERY

5.1 Preservation and Packaging

5.1.1 Level B. - The light weight x-ray with or without cable assemblies shall be preserved and packaged in accordance with dwg. 9294939.

5.2 Packing

5.2.1 Level B. - The storage case assembly shall be preserved and packed in accordance with dwg. 9294944.

5.2.2 Level B. - The light weight x-ray shall be packed in accordance with dwg. 9294937.

5.3 Marking. - Inner boxes, barrier bags and outer boxes shall be marked in accordance with dwgs. 9294937, 9294939 and 9294944.

6. NOTES

6.1 Ordering Data. - Procurement documents shall specify the following:

- a. Title, number and date of this specification.
- b. Provisions for submission of first article samples.
- c. Provisions of MIL-A-48078.

6.2 Submission of Inspection Equipment Designs for Approval. (See MIL-A-48078). Submit equipment designs as required, to Commander: Picatinny Arsenal, ATTN: SARPA-QA-T- Dover, New Jersey 07801.

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6.3 Distribution of ammunition data cards . - Distribution of data cards shall include the following: Commander, Picatinny Arsenal, ATTN: SARPA-QA-A-M Dover, New Jersey 07801.

Custodian:
Army-PA

Preparing Activity:
Army-PA

Project Number: FSC: 6635-A-082

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

 DIRECT GOVERNMENT CONTRACT SUBCONTRACT

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

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?

 YES NO (If "Yes", in what way?)

4. REMARKS

SUBMITTED BY (Printed or typed name and address - Optional)

TELEPHONE NO.

DATE

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1 JAN 72

REPLACES EDITION OF 1 JAN 66 WHICH MAY BE USED