

MIL-T-12424D

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Superseding

MIL-T-12424C

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MILITARY SPECIFICATION

TEST SET, ELECTRON TUBE TV-7()/U

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

1. SCOPE

1.1 This specification covers one type of portable tube tester, designated as Test Set, Electron Tube TV-7()/U, which will provide rejection limits for receiving tubes and small transmitting tubes.

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 the specification to the extent specified herein:

SPECIFICATIONS

FEDERAL

PPP-B-636	Box, Fiberboard.
PPP-F-320	Fiberboard, Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes.
PPP-T-76	Tape, Pressure-Sensitive Adhesive Paper, (for Carton Sealing).
PPP-T-97	Tape, Pressure-Sensitive Adhesive, Filament Reinforced.

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MIL-E-1	Electron Tube, General Specification for.
MIL-P-116	Preservation, Methods of.
MIL-S-901	Shock, Test, High Impact.
MIL-P-11268	Parts, Materials and Processes Used in Electronic Equipment.
MIL-M-13231	Marking of Electronic Items.
MIL-F-14072	Finishes for Ground Signal Equipment.

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STANDARDS

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MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129	Marking for Shipment and Storage.
MIL-STD-147	Palletized Unit Loads.
MIL-STD-169	Extreme-Temperature Cycle.
MIL-STD-170	Moisture Resistance Test Cycle for Ground Signal Equipment.
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts.
MIL-STD-252	Wired Equipment, Classification of Visual and Mechanical Defects.
MIL-STD-781	Reliability Tests Exponential Distribution.
MIL-STD-810	Military Standard Environmental Test Methods for Aerospace and Ground Equipment.

DRAWINGS

ELECTRONICS COMMAND

SC-A-46439	List of Accessories for Package Tester.
SC-DL-425525	Drawing and Data List for Test Set, Electron Tube TV-7()/U.

(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. Both the title and number or symbol should be stipulated when requesting copies).

3. REQUIREMENTS

3.1 Description. Test Set, Electron Tube TV-7()/U shall provide facilities for testing commercial and MIL type tubes of the receiving and low power transmitting class. This instrument shall be capable of differentiating between satisfactory and unsatisfactory commercial and MIL type electron tubes, using a simple numerical scale. In addition, this tester shall be capable of indicating the presence of gas in tubes and of indicating short circuits between any elements of the tubes under tests.

3.2 Construction. Test Set, Electron Tube TV-7()/U shall be constructed in accordance with SC-DL-425525, and the requirements specified herein.

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3.3 First article samples. The contractor shall furnish four (4) complete first article samples of the Test Set, Electron Tube TV-7()/U for approval provided the invitation for bid and the contract requires first article samples.

3.4 Parts, materials and processes; general. In addition to the requirements of this specification, the requirements of MIL-P-11268, including the selection requirements therein, shall apply.

3.5 Finish, protective. The equipment shall be given a protective finish in accordance with MIL-F-14072. This includes finish of hardware; such as handles, hinges, screws, etc., and necessary touch-up after mounting. The final paint film on type I surfaces shall be final Film E, semi-gloss, light gray enamel, conforming to MIL-F-14072.

3.6 Marking. Marking shall conform to MIL-M-13231.

3.6.1 Visibility. Wherever practicable, parts and assemblies shall be so mounted that their identification markings will be readily visible with minimum disassembly of the equipment.

3.6.2 Serial numbers. Serial numbers are required for this equipment.

3.7 Electrical.

3.7.1 Test equipment. The test equipment required for performance measurements of the tube tester shall have the accuracies and sensitivities as specified in 4.7.1.

3.7.2 Internal adjustment controls. The following internal adjustment controls shall be provided to insure uniform electrical characteristics between tube testers when tested in accordance with 4.7.2.

3.7.2.1 Line voltage indicator control. A potentiometer (R-134) shall be provided for adjustment of the plate voltage to 150 ± 3 Vdc when the deflection on the meter of the tube tester indicates 60 units, (mid-scale). Each meter division equals two (2) units. The equipment shall be tested in accordance with 4.7.2.1.

3.7.2.2 Bias and screen voltages "B" range adjustment controls. An adjustable slide power resistor R-130 shall be provided for voltage calibration of the bias control and shall insure the voltage deflection accuracies listed below, at the following dial settings, using one (1) slider tap of the resistor.

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Standard Meter Voltage Reading

<u>Bias Dial Setting</u>	<u>Range</u>	<u>Deflection</u>	<u>Tolerances</u>
100	0 - 50	40.0	± 2.0 Vdc
22	0 - 10	3.0	± 0.3 Vdc
50	0 - 50	13.2	± 1.5 Vdc
75	0 - 50	26.8	± 1.5 Vdc

The other slider taps of Resistor R-130 shall provide for adjustments of the high and low screen voltages to obtain 128 ± 3 Vdc and 56 ± 2.0 volts dc for tube testing when the deflection on the meter of the tube tester indicates 60 units. The equipment shall be tested in accordance with 4.7.2.2.

3.7.2.3 Bias voltage "F" range adjustment control. A potentiometer shall be provided for voltage calibration of the bias control on "F" range, at the following dial setting and shall insure the voltage deflection accuracy listed below when tested in accordance with 4.7.2.3:

Standard Meter Voltage Reading

<u>Dial Setting</u>	<u>Range</u>	<u>Deflection</u>	<u>Tolerances</u>
75	0 - 10	2.7	± 0.3 Vdc

3.7.3 Signal voltage accuracy. The tube tester's signal voltages when tested in accordance with paragraph 4.7.3 shall have the following values:

<u>Range</u>	<u>External Meter Reading</u>	<u>Tolerances</u>
B	5	± 0.25 Vac
C	5	± 0.25 Vac
D	0.95	± 0.06 Vac
E	0.50	± 0.03 Vac
F	0.50	± 0.03 Vac

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3.7.4 Mutual conductance adjustment controls. Three (3) potentiometers shall be provided for calibration of the tube tester's mutual conductance performance quality at the following function switch range settings and shall insure the deflection accuracies listed below when tested in accordance with 4.7.4.

<u>Function switch</u> <u>Range setting</u>	<u>Tube testers</u> <u>Meter deflection</u>
B	40 \pm 2 units
C	20 \pm 2 units
D	40 \pm 2 units
E	40 \pm 2 units
F	40 \pm 2 units

3.7.5 Dual potentiometer calibration. The tube tester meter shall show zero \pm 2 units deflection when tested in accordance with 4.7.5. (If meter reads negative value, depress meter reverse button to obtain positive reading).

3.7.6 Gas indications, D & F ranges. The tube tester shall be capable of indicating gas content in electron tubes with a minimum sensitivity of \pm 2 units when tested in accordance with 4.7.6.

3.7.7 Continuity indication. There shall be continuity from each respective socket pin to the corresponding socket pin on all other sockets when tested in accordance with 4.7.7.

3.7.8 Interlocking action indication. Selector switches S-103 thru S-107 shall be constructed and interconnected so that it is impossible to apply more than one voltage to any tube socket pin at the same time or create a short condition by accidental disturbance of the switch settings, when tested in accordance with 4.7.8.

3.7.9 Short circuit indication and non-indication. The tube tester shall be capable of performing a short test of electron tubes and shall indicate the presence and non-presence of an inter-element short on a neon lamp as noted below when tested in accordance with 4.7.9.

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Resistor between elements	Pin Connections	Function Switch Position									
		100 K Resistor					500 K Resistor				
		1	2	3	4	5	1	2	3	4	5
Filament to plate	2 3	X	X	-	X	X	-	-	-	-	-
Filament to screen	2 4	X	-	X	X	X	-	-	-	-	-
Filament to grid	2 5	X	X	-	-	X	-	-	-	-	-
Filament to cathode	2 6	-	-	X	-	-	-	-	-	-	-
Filament to suppressor	2 8	-	X	-	-	-	-	-	-	-	-
Plate to screen	3 4	-	X	X	-	-	-	-	-	-	-
Plate to suppressor	3 8	X	-	-	X	X	-	-	-	-	-
Screen to suppressor	4 8	X	X	X	X	X	-	-	-	-	-
Grid to plate	5 3	-	-	-	X	-	-	-	-	-	-
Grid to screen	5 4	-	X	X	X	-	-	-	-	-	-
Grid to cathode	5 6	X	X	X	-	X	-	-	-	-	-
Grid to suppressor	5 8	X	-	-	-	X	-	-	-	-	-

NOTE: X indicates presence of a short.
 -: indicates non-presence of a short.

3.7.10 Tube tester calibration accuracy. The tube tester when tested with any one or all of the eighteen (18) standard tube gages Winslow Tele-
 Tronics P/N HT-100, or equal, shall read within ± 10 percent of the certified
 tube gage readings when tested in accordance with 4.7.10.

3.7.11 Operating power. The tube tester shall be capable of complying with the requirements of this specification when operated from an external
 power source of 115 ± 10 percent Vac over the frequency range of 50 to 450
 Hz. The tube tester shall meet the requirements of 3.7.10 when tested in
 accordance with 4.7.11. A power rheostat shall be provided for adjustment of
 the input line voltage to 93 Vac.

3.8 Service conditions. The Test Set, Electron Tube TV-7() shall be
 so constructed that no fixed part shall become loose, cracked, flaked, pitted
 or blistered, no movable part or control shall be shifted in setting, position
 or adjustment, and no permanent degradation shall be caused in performance
 below that specified herein when subjected to the following conditions.

3.8.1 Shock, ballistic. The tube tester shall show no evidence of
 physical damage except minor surface abrasion and shall meet the requirements
 of 3.7.10 when tested in accordance with 4.8.1.

3.8.2 Temperature. The tube tester shall be subjected to temperature
 extremes specified.

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3.8.2.1 Operating. Temperature extreme of 125°F and -4°F and shall meet the electrical requirements of 3.7.10 when tested in accordance with 4.8.2.1. The tube tester shall be exposed for six hours at the low and six (6) hours at the high temperature extremes specified.

3.8.2.2 Non-operating. Temperature extreme of 160°F and -80°F and shall meet the electrical requirements of 3.7.10 when tested in accordance with 4.8.2.2. The tube tester shall be exposed for six (6) hours at the low and six (6) hours at the high temperature extremes specified.

3.8.3 Immersion. The tube tester shall show no evidence of leakage when tested in accordance with 4.8.3.

3.8.4 Vibration. The tube tester shall show no evidence of breakage or loosening of parts and shall meet the requirements of 3.7.10 when tested in accordance with 4.8.4.

3.8.5 Humidity. The tube tester shall exhibit no physical damage or electrical degradation when subjected to the humidity test specified and shall meet the requirements of 3.7.10 when tested in accordance with 4.8.5.

3.8.6 Elevation. The tube tested shall be subjected to the reduced atmospheric pressure specified.

3.8.6.1 10,000 feet operating. Electrical readings shall be taken and shall meet requirements of 3.7.10 at times specified when tested in accordance with 4.8.6.1.

3.8.6.2 50,000 feet non-operating. Electrical readings shall be taken and shall meet requirements of 3.7.10 at times specified when tested in accordance with 4.8.6.2.

3.8.7 Fungus. The tube tester shall show no evidence of viable fungus and shall meet the requirements of 3.7.10 when tested in accordance with 4.8.7.

3.8.8 Salt fog. The tube tester shall show no evidence of corrosion (corrosion is defined as any visible degradation that can be attributed to flaky, pitted, blistered, cracked, or loosened finish of metals and metal surfaces) and shall meet the requirements of 3.7.10 when tested in accordance with 4.8.8.

3.9 Visual and mechanical. The tube tester shall meet the requirements of MIL-STD-252 as specified in 4.9.

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3.10 Interchangeability. Like units, assemblies, subassemblies, and replaceable parts shall be physically and functionally interchangeable, without modification of such items or of the equipment. Individual items shall not be hand picked for fit or performance. Reliance shall not be placed on any unspecified dimensions, rating, characteristics, etc. Where selection of a component having special characteristics is required, such selection shall be made from qualified or standard parts where possible and the specific characteristics of the selected part shall be defined (see 4.10).

3.11 Burn-in and debugging. Each tube tester produced shall be subjected to the burn-in and debugging test of 4.11 prior to bounce preconditioning and Group A inspection. The tube tester shall be monitored for tube tester calibration accuracy with one (1) of the standard tube gages per 3.7.10 during period of test.

3.12 Bounce preconditioning. Each tube tester produced shall be subjected to the bounce preconditioning test of 4.6 prior to Group A inspection. After bounce preconditioning, the tube tester shall not be repaired, aligned, cleaned or otherwise changed prior to performing Group A acceptance test.

3.13 Workmanship. The tube tester shall be manufactured and assembled in accordance with the applicable portions of the following:

(a) In MIL-P-11268:

General requirements for plastic material and parts.
Wiring and cabling including:

Slack.
Protection.
Clearance.
Splicing.
Connectors, general.
Grounding, general.

Flux and cleaning agents for soldering.
Process for soldering.
Cleaning of equipment.
General process for securing of parts.
Process of welding.
Connectors, general.
Mechanical operation of controls.
Tropicalization of material.
Lubricants.

(b) In this specification

Marking.
Finish.
Construction.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the contractor may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the contract and specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.2 Classification of inspection. Inspection shall be classified as follows:

- (a) First article inspection. (Does not include preparation for delivery) (see 4.3)
- (b) Inspection covered by subsidiary documents (see 4.4).
- (c) Quality conformance inspection.
 - (1) Quality conformance inspection of equipment before preparation for delivery (see 4.5).
 - (2) Quality conformance inspection of preparation for delivery (see 4.12).

4.3 First article inspection. This inspection will be performed by the contractor and witnessed by a Government representative unless otherwise specified in the contract. It shall consist of Group A, B and C inspections (see Tables I, II and III, respectively) on the four (4) samples. The first article samples will be inspected in this order: Group A and B for all units; and designated units for specific Group C inspections. Designation of units to specific Group C inspections shall be determined by the Government production engineer. After completion of all Group C tests, conforming units must be reinspected and pass all Group A inspections.

4.4 Inspection covered by subsidiary documents. The following shall be inspected under the applicable subsidiary documents as part of the inspection of equipment before preparation for delivery:

Item	Where required.
Finish	3.5
Marking	3.6

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4.5 Quality conformance inspection of equipment before preparation for delivery. The contractor shall perform the inspection specified in 4.4 and 4.5.1 through 4.5.4. This does not relieve the contractor of his responsibility for performing any additional inspection which is necessary to control the quality of the product and to assure compliance with all specification requirements. The Government will review and evaluate the contractor's inspection procedures and examine the contractor's inspection records. In addition, the Government--at its discretion--may perform all or any part of the specified requirements. Test equipment for Government verification inspection shall be made available by the contractor.

4.5.1 Group A inspection. This inspection, including sampling, shall conform to Table I and the ordinary inspection procedures of MIL-STD-105.

4.5.1.1 Order of inspection within Group A. Group A inspection shall be performed in any order which is satisfactory to the Government.

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Table I. Group A inspection

Inspection	Requirement Paragraph	Inspection Paragraph	AQL	
			Major	Minor
Visual and mechanical				
Function switch assembly	3.9	4.9	4.0 dphu* for the group	15.0 dphu for the group
Selector switch assembly	3.9	4.9		
Alignment control assembly	3.9	4.9		
Pushbutton assembly	3.9	4.9		
All other switches	3.9	4.9		
Transformer and harness	3.9	4.9		
Complete assembly	3.9	4.9		
Electrical				
Internal adjustment controls	3.7.2	4.7.2	1.5 dphu for the group	**
Line voltage indicator control	3.7.2.1	4.7.2.1		
Bias and screen voltage "B" range adjustment controls	3.7.2.2	4.7.2.2		
Bias voltage "F" range adjustment control	3.7.2.3	4.7.2.3		
Signal voltage accuracy	3.7.3	4.7.3		
Mutual conductance adjustment controls	3.7.4	4.7.4	1.5 dphu for the group	**
Dual potentiometer calibration	3.7.5	4.7.5		
Gas indications				
"D" range	3.7.6	4.7.6.1		
"F" range	3.7.6	4.7.6.2		
Continuity indication	3.7.7	4.7.7		
Interlocking action indication	3.7.8	4.7.8		
Short circuit indication and non-indication	3.7.9	4.7.9		
Tube tester calibration accuracy	3.7.10	4.7.10		
Operating power	3.7.11	4.7.11		

*Defects per hundred units.

**All electrical tests are major.

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4.5.2 Group B inspection. This inspection, including sampling, shall conform to Table II and to the special procedures for small-sample inspection of MIL-STD-105. Group B inspection shall be performed on inspection lots that have passed Group A inspection, and on samples selected from units that have been subjected to and met the Group A inspection.

Table II. Group B inspection

Inspection	Requirement Paragraph	Inspection Paragraph	AQL
Interchangeability	3.10	4.10	6,5%

4.5.3 Group C inspection. This inspection shall consist of the inspection specified in Table III and shall be performed on sample units that have been subjected to and met Group A and B inspection. Sample units shall be selected in accordance with 4.5.3.1.

4.5.3.1 Sampling for inspection.

4.5.3.1.1 Four (4) samples of complete tube testers shall be selected at random, one (1) sample for each Group 1 through Group 4 in Table III. The samples selected shall be at the start of the contract from the first quality conformance inspection lot. The samples shall constitute Group C requirement for first 100 units produced.

4.5.3.1.2 Thereafter, two (2) samples of complete tube testers shall be selected at random, one (1) sample for each Group 1 and Group 2 in Table III from every 200 units and fraction thereof produced.

4.5.3.2 Evaluation of samples submitted to individual Group C inspection. After referenced samples in 4.5.3.1, have been subjected to an individual Group C inspection test and prior to subjection to the next Group C test (unless otherwise specified in the individual test), the sample must be subjected to and pass the Group A "Tube Tester Calibration Accuracy," per 3.7.10 and 4.7.10.

4.5.3.3 Noncompliance. The contractor shall immediately report in writing each Group C failure occurrence, including details of the failure and characteristics affected. The contractor shall immediately investigate the cause of failure and further report the results of investigation and details of the proposed corrective action on (i) the process and materials, as applicable, and (ii) all units of production which were manufactured under the same conditions and which the Government considers subject to the same failure. Reports shall be forwarded to the responsible technical activity designated in the contract through the Quality Assurance Representative. After corrective action has been

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taken, additional sample units shall be subjected to Group C inspection (all inspections, or the inspections which the sample failed, at the option of the Government) and Groups A and B inspection may be reinstituted; however, final acceptance and shipment will be withheld until the Group C reinspection results have shown that the corrective action was effective.

4.5.3.4 Order of inspection within Group C. Group C inspection shall be performed in any order which is satisfactory to the Government.

Table III. Group C inspection

Inspection	Requirement Paragraph	Inspection Paragraph
Shock, ballistic	3.8.1	4.8.1
Temperature (nonoperating)	3.8.2.2	4.8.2.2
Group 1		
Immersion	3.8.3	4.8.3
Vibration	3.8.4	4.8.4
Group 2		
Humidity	3.8.5	4.8.5
Elevation	3.8.6	4.8.6
Temperature (operating)	3.8.2.1	4.8.2.1
Group 3		
Fungus	3.8.7	4.8.7
Group 4		
Salt fog	3.8.8	4.8.8

4.5.4 Reinspection of conforming Group B and Group C sample units. Unless otherwise specified, sample units which have been subjected to and passed both Group B and Group C inspection may be accepted on contract or order provided all damage is repaired and the sample units are subjected to and pass Group A inspection.

4.5.5 Disposition of Group C sample units. Unless otherwise specified, sample units which have been subjected to and passed Group C inspection may be delivered on the contract or order, provided units meet requirements of 4.5.4.

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4.6 Bounce preconditioning. Each tube tester shall be placed in its normal operating position on the table of package tester of suitable capacity as made by the L.A.B. Corporation, Skaneateles, New York, with accessories as per Model 1000SC and SC-1-46439, or equal. The package tester, shafts in phase, shall have a speed such that it is just possible to insert a 1/32 inch thick strip of material under one corner or edge of the equipment under test to a distance of three (3) inches as the equipment bounces. The equipment shall be subjected to this preconditioning for one (1) minute and shall meet the requirements of 3.12.

4.7 Electrical tests.

4.7.1 Test equipment. The test instruments with accuracies as specified below shall be used in performing all the applicable electrical tests in 4.7.2.1 through 4.7.11. Voltage measuring instruments having an accuracy of $\pm 1/2$ percent and a sensitivity of 1,000 ohms per volt shall be connected from plate to cathode (0 to 200 Vdc range) screen to cathode (0 to 150 Vdc range) and control grid to cathode (0 to 50 and 0 to 10 Vdc ranges, also an ac voltmeter having a resistance of 1,000 ohms per volt and an accuracy of ± 1 percent full scale, with 0 to 5 volt and 0 to 3 Vac ranges) of the tube socket terminals, and shall meet the requirements of 3.7.1.

4.7.2 Internal adjustment controls.

4.7.2.1 Line voltage indicator control. The line voltage rheostat shall be adjusted for a plate voltage of 150 ± 3 Vdc with the mutual conductance button depressed. With the line adjust button depressed the tube tester shall meet the requirements of 3.7.2.1.

4.7.2.2 Bias and screen voltage test "B" range. Set the function switch to "B" range and adjust the line voltage to line test point (mid-scale) on the tube tester's meter. Proceed to test the equipment at the specified dial settings to obtain the deflections in accordance with the requirements of 3.7.2.2. When testing the high and low screen voltages the bias dial is set at zero and, in addition, the low screen voltage reading is obtained by depressing both the mutual conductance and diode buttons simultaneously. The results shall meet the requirements of 3.7.2.2.

4.7.2.3 Bias voltage "F" range. With the tube tester's function switch set to "F" range and the bias dial at 75 the equipment shall meet the requirements of 3.7.2.3.

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4.7.3 Signal voltage accuracy. The line voltage should be adjusted to the line test point on the tube tester's meter. The signal voltages, when read on an ac voltmeter, having a resistance of 1,000 ohms per volt and an accuracy of ± 1.0 percent full scale, shall meet the requirements in 3.7.3.

4.7.4 Mutual conductance adjustment controls. The function switch shall be set to the required ranges and the external plate meter disconnected, set the selection plate to 3, cathode to 8. The bias and shunt dials shall be set to zero and the line voltage adjusted to the line test point. A phased 50 Vac signal shall be inserted in series with a 10 k ohm resistor between the plate and the cathode. With the mutual conductance button depressed, the tube tester's meter shall meet the requirements of 3.7.4.

4.7.5 Dual potentiometer calibration. The function switch shall be set to A, and the line voltage adjusted to line test point. The shunt potentiometer dial shall be set to 90 and a 6 k ohm resistor inserted between plate and cathode. With the mutual conductance button depressed the equipment meter shall meet the requirements of 3.7.5.

4.7.6 Gas indications.

4.7.6.1 "D" range. The gas indication test for range "D" shall be performed in the following manner:

- (a) Adjust selectors on the tube tester under test as required for type 6L6WGB tube, and after adjustments insert a 6L6WGB tube, per MIL-E-1/197, in the octal socket of the tube tester.

<u>Tube type</u>	<u>Fil</u>	<u>Selectors</u>	<u>Bias</u>	<u>Shunt</u>	<u>Range</u>
6L6WGB	6.3	HS5-3481	23	---	D

- (b) Insert a 1.2 megohm resistor between grid and cathode (pins 5 and 8).
- (c) Depress gas 1 button (P4) and adjust bias for 10 units on the tube tester's meter.
- (d) While holding gas 1 (P4) button down, depress gas 2 (P5) button.
- (e) The tube tester's meter shall meet the requirements of 3.7.6.

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4.7.6.2 "F" range. The gas indication test for range "F" shall be performed in the following manner:

- (a) Adjust selectors on the tube tester under test as shown below for a type 5842 tube, and after adjustments insert a 5842 tube per MIL-E-1/466, in the nine (9) pin miniature socket of the tube tester.

<u>Tube type</u>	<u>File</u>	<u>Selectors</u>	<u>Bias</u>	<u>Shunt</u>	<u>Range</u>
5842	6.3	DZ4-1060	<u>75</u>	---	<u>F</u>

- (b) Insert a 500 K ohm resistor between grid and cathode (pins 4 and 6).
- (c) Depress gas 1 button (P4) and adjust bias for 10 units on the tube tester's meter.
- (d) While holding gas 1 (P4) button down, depress gas 2 (P5) button.
- (e) The tube tester's meter shall meet the requirements of 3.7.6.

4.7.7 Continuity indication. Any suitable method shall be used to test the wiring from each respective socket pin to the corresponding socket pin on all other sockets and shall meet the requirements of 3.7.7.

4.7.8 Interlocking action indication. Utilizing a suitable test fixture each selector switch and individual tube pin of the sockets shall be tested and shall meet the requirements of 3.7.8.

4.7.9 Short circuit.

4.7.9.1 Short circuit indication. Utilizing a suitable test fixture, short circuit indications shall be tested and shall meet the requirements of 3.7.9.

4.7.9.2 Short circuit non-indication. Utilizing the same test fixture referenced above, except for resistor value, no-short indications shall be tested and shall meet the requirements of 3.7.9.

4.7.10 Tube tester calibration accuracy. The tube tester shall be tested using standard tube gages simulating the following tube types and shall meet the requirements of 3.7.10.

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0A2	6L6G	5678
0Z4	7V7	5842
1S5	117N7	5847
2C39	2050	
6AT6	5591	

4.7.11 Operating power. The test referenced in 4.7.10 above, shall be made at 103.5 and 126.5 and only at 60 Hz and shall meet the requirements of 3.7.11.

4.8 Service conditions.

4.8.1 Shock, ballistic. The test shall be conducted on the "Shock Testing Machine for Light Weight Equipment" shown in MIL-S-901. The equipment in its transit case, shall be secured in its normal operating position to the steel test plate by means of straps or metal plates. The test shall consist of a total of 9 blows: one each, 1-foot blow, 2 foot blow, and 3-foot blow in the back and side of the test plate. The blows on the top of the test plate shall be 2, 3 and 4 feet blows. As an alternative to reorienting the test plate for the blows on the side of the plate, equivalent rotation of the equipment under test is permissible. After each three (3) blows, the equipment will be energized and examined to determine that it is still operable before proceeding to the next blow. At the completion of the 9 blows the equipment shall be subjected to the test in 4.7.10 and shall meet the requirements of 3.8.1.

4.8.2 Temperature.

4.8.2.1 Operating. The tube tester shall be subjected to the temperature cycle shown on MIL-STD-169, with the temperatures and times as specified in 3.8.2.1. The test specified in 4.7.10 shall be performed at steps 4 and 8. The tube tester shall meet the requirements of 3.8.2.1.

4.8.2.2 Non-operating. The tube tester shall be subjected to the temperature cycle shown on MIL-STD-169, with the temperatures as specified in 3.8.2.2. The test specified in 4.7.10 shall be performed after completion of test. The tube tester shall meet the requirements of 3.8.2.2.

4.8.3 Immersion. The equipment case, less the equipment but using a dummy panel and weighted to simulate the weight of the tube tester shall be closed and immersed to a minimum depth of three (3) feet of fresh water for a period of two (2) hours. Immediately prior to immersion, the temperature of the case shall be 40°F, or more, above the temperature of the water. The tank in which the case is immersed shall be of sufficient capacity to maintain the water within 2°F of its initial temperature, or the temperature of

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the water shall be maintained within those limits by other means. After completion of the 2 hour period of immersion, the case shall be removed from the water and wiped dry on exterior surfaces. The tube tester shall meet the requirements of 3.8.3.

4.8.4 Vibration. The tube tester shall be subjected to the vibration test as follows:

- (a) Secure the equipment less carrying case, directly to a vibration table that can be controlled within 10 percent of the specified amplitude. Mounting method shall be such that vibration within the equipment can be observed and measured.
- (b) The equipment shall be vibrated with the frequency varying between 10 and 55 Hz at a total excursion of 0.03 \pm 0.006 inch, the frequency varying uniformly from 10 to 55 Hz and returning to 10 Hz in approximately 1 minute. Application of the vibration test specified above shall be in each of the following directions:
 - (1) Horizontal, parallel to the major horizontal axis of the equipment for a period of 15 minutes for the specified frequency range of 10 to 55 Hz.
 - (2) Horizontal, at right angles to the major horizontal axis of the equipment for a period of 15 minutes for the specified frequency range of 10 to 55 Hz.
 - (3) Vertically, to the major horizontal axis of the equipment for a period of 15 minutes for the specified frequency range of 10 to 55 Hz.
 - (4) The equipment shall be inspected to ascertain that no fixed parts have become loose or damaged. The tests of paragraph 4.7.10 will be performed after the completion of vibration, and the tube tester shall meet the requirements of 3.8.4.

4.8.5 Humidity. The tube tester shall be tested as follows and shall meet the requirements of 3.8.5.

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4.8.5.1 Apparatus. Humidity chamber and associated equipment. The chamber and accessories shall be constructed and arranged in such a manner as to avoid condensate dripping on the test item. The chamber shall be vented to the atmosphere to prevent the buildup of total pressure. Relative humidity shall be determined from the dry bulb-wet bulb thermometer comparison method or an equivalent method approved by the procuring agency. When readout charts are used, they shall be capable of being read with a resolution within 1°F . When the wet bulb control method is used, the wet bulb and tank shall be cleaned and a new wick installed at least every 30 days. The air velocity flowing across the wet bulb shall be not less than 200 feet per minute. Provisions shall be made for controlling the flow of air throughout the internal test chamber area where the velocity of air shall not exceed 150 feet per minute. Steam, or distilled, demineralized, or deionized water having a pH value between 6.0 and 7.2 at 73°F shall be used to obtain the specified humidity. No rust or corrosive contaminants shall be imposed on the equipment by the test facility.

4.8.5.2 Standard ambient conditions. Standard ambient conditions are:

Temperature	$73^{\circ}\text{F} \pm 5^{\circ}\text{F}$.
Relative humidity	50 percent \pm 5 percent.
Atmospheric pressure	28.5 (+2-3) inches of mercury.

4.8.5.3 Installation of equipment in test facility. The tube tester shall be installed in the test facility in a manner that will simulate service usage, making connections and attaching instrumentation as necessary. Plugs, covers, and inspection plates not used in operation, but used in servicing shall remain in place. When mechanical or electrical connections are not used, the connections normally protected in service shall be adequately covered. The test chamber shall be at standard ambient conditions when the equipment is installed. The tube tester shall then be operated to determine that no malfunction or damage was caused due to faulty installation or handling.

4.8.5.4 Procedure.

Step 1 - Place the tube tester in test chamber in accordance with 4.8.5.3.

Step 2 - Dry the test item at $130^{\circ}\text{F} \pm 5^{\circ}\text{F}$ for 24 hours.

Step 3 - Condition the equipment at $73^{\circ}\text{F} \pm 5^{\circ}\text{F}$ and 50 \pm 5 percent relative humidity for 24 hours.

Step 4 - Take initial measurements as specified in 4.8.5.5 and inspect the equipment in accordance with 4.8.5.6. The tube tester shall meet full specification performance. Record all data necessary to determine compliance.

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Note: The tube tester may be readjusted or realigned as necessary to meet specification requirements. No further realignment or readjustment shall be permitted throughout the test period other than with accessible controls employed for operation of the equipment. No repair or replacement of parts shall be permitted. The tube tester shall not be operated except when specified test measurements are being performed and shall not be removed from the chamber for measurements.

Step 5 - Raise the internal chamber temperature to $86^{\circ}\text{F} \pm 5^{\circ}\text{F}$.

Step 6 - Subject the tube tester to 5 continuous 48-hour cycles in accordance with MIL-STD-170. Take measurements as specified in 4.8.5.5 and inspect the equipment in accordance with 4.8.5.6 at the periods specified in the standard. Measurements shall comply with 4.8.5.5. Prior to measurements, accumulated moisture may be removed by turning the equipment upside down or shaking. Wiping is not permitted. (Certain operating procedures require an effective pre-conditioning of the equipment environment prior to operation. When this occurs, the periods of measurement shall be kept as short as possible).

Step 7 - After completion of step 6 cycling, condition the equipment for 24 hours at 73°F and 50 ± 5 percent relative humidity.

Step 8 - Operate the equipment, adjusting for optimum performance only as permitted in step 4 note, and compare with data obtained in step 4.

Step 9 - Inspect the equipment in accordance with 4.8.5.6 within an hour.

4.8.5.5 Performance. Measurements shall be completed as rapidly as practicable after the power is applied to the tube tester. Power shall not be left on after measurements have been completed. Measurements made during test and specified performance during cycling shall be in accordance with 3.7.10 and 4.7.10.

4.8.5.6 Visual inspection and failure criteria. When specified, the tube tester shall be visually inspected and a record made of any damage or deterioration resulting from the test. When practicable, visual inspection shall be performed within the chamber and at test conditions. Deterioration, corrosion, or changes in tolerance limits of any internal or external part which could in any manner prevent the equipment from meeting operational or maintenance requirements shall provide reason to consider the tube tester as having failed the test.

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4.8.5.7 Failure. If any tube tester fails to meet the performance specified in 4.8.5.5 during cycling, it shall be realigned or readjusted once. If the equipment then fails to meet 4.8.5.5 or fails subsequently during cycling, it does not pass the test. In addition, if the equipment fails to meet full specification requirements after the final specified conditioning and adjustment, it does not pass the test.

4.8.6 Elevation. The tube tester shall be subjected in its normal operating configuration to reduced atmospheric pressure (ref. Method 105C of MIL-STD-202) as follows:

4.8.6.1 10,000 feet operating. The tube tester shall be subjected to atmospheric pressure corresponding to 10,000 feet above sea level (20.6 inches of mercury) for 20 minutes. One (1) tube tester calibration accuracy reading per 4.7.10 shall be taken after 20 minutes at 10,000 feet.

4.8.6.2 50,000 feet non-operating. The tube tester shall be subjected to atmospheric pressure corresponding to 50,000 feet above sea level (3.44 inches of mercury) for 60 minutes.

4.8.7 Fungus. The tube tester in its normal operating configuration shall be subjected to 28 days of the fungus test specified in Procedure I, Method 508 of MIL-STD-810 and shall meet the requirements of 3.8.7.

4.8.8 Salt fog. The tube tester in its normal operating configuration shall be exposed to salt fog in accordance with Method 509 of MIL-STD-810 for 48 hours and shall meet the requirements of 3.8.8.

4.9 Visual and mechanical inspection. The tube tester shall be examined for the defects listed in MIL-STD-252 (see 3.9).

4.10 Interchangeability. The dimensions listed below shall be measured to determine compliance to the physical interchangeability requirements of 3.10. When a listed dimension is not within specified or design limits, it shall be considered a major defect.

- (a) External and internal dimensions of cases, covers, and insertable assemblies, when such dimensions affect mating of parts.
- (b) Dimensions of cavities, when such dimensions affect insertion of items.
- (c) Size and form of special threads.

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- (d) Location of hinges and fasteners on separable parts of assemblies which must mate, such as cases, covers, and mountings.
- (e) Location of connectors, locking pins, fasteners, slides and mountings which receive mating parts of plug-in assemblies and major units, and location of the mating parts on the plug-in assembly or major unit.
- (f) Size and form of special threads.

4.11 Burn-in and debugging. Each tube tester produced shall be placed in its normal operating position on a test table with room temperature at 77°F \pm 5°F, with specified operating voltage applied from a suitable power source. With all controls in the normal operating position, the equipment shall be turned on and remain on for a continuous 24 hour period. In case of parts failure, the equipment shall be repaired, recalibrated, and the burn-in and debugging test repeated and shall meet the requirements of 3.11. A failed item analysis report shall be submitted on each part failure with contents of report per 5.10.5 of MIL-STD-781.

4.12 Acceptance inspection of preparation for delivery. Preparation for delivery shall be inspected in accordance with MIL-P-116 to determine conformance to the requirements of Section 5.

5. PREPARATION FOR DELIVERY.

5.1 Preservation and packaging. Preservation and packaging shall be level A or C as specified (see 6.2(b)).

5.1.1 Level A.

5.1.1.1 Cleaning. Test Set Electron Tube TV-7()/U shall be cleaned in accordance with process C-1 of MIL-P-116.

5.1.1.2 Drying. Test Set, Electron Tube TV-7()/U shall be dried in accordance with the applicable procedure of MIL-P-116.

5.1.1.3 Preservation application. None required.

5.1.1.3.1 Technical literature. Each technical literature shall be packaged method 1C-1.

5.1.1.3.2 Stowage within Test Set TV-7()/U. Stow the spare parts of Test Set TV-7()/U within the designated compartments of the case, close cover of case and secure all fastenings.

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

5.1.1.4.1 Test Set TV-7()/U. Each Test Set TV-7()/U shall be packaged method III as follows: Cushion each assembly on all surfaces with cells or packs, or both, fabricated of fiberboard conforming to PPP-F-320, W6C, designed to protect all projections and absorb the shock of impact in handling and transit. Place the cushioned test set within a close-fitting box conforming to PPP-B-636, W6C, place the technical literature, packaged as specified in 5.1.1.5.1, on top of the contents directly under the lid of the box, close the box in accordance with the appendix of the box specification. In addition, seal all seams and joints with tape, not less than two inches wide, conforming to PPP-T-76.

5.1.2 Level C. Test Set TV-7()/U shall be preserved and packaged in a manner that will afford adequate protection against corrosion, deterioration and damage during shipment from the supply source to the first receiving activity.

5.2 Packing. Packing shall be level A, B or C as specified (see 6.2(b)).

5.2.1 Level A.

5.2.1.1 A quantity of Test Sets TV-7()/U, packaged as specified in 5.1, shall be packed within a close fitting fiberboard box conforming to PPP-B-636, type CF, class weather resistant, special requirements use. Box closure shall be as specified in the appendix to the box specification. To facilitate palletization, fiberboard boxes shall be uniform in size and contain equal quantities of the packaged items to the greatest extent practicable.

5.2.1.2 Palletized load. A quantity of containers, packed as specified in 5.2.1.1 shall be placed on a pallet, load type 1, conforming to MIL-STD-147. A fiberboard cap shall be employed over the load having two sides extending down the stacked load at least 12 inches to accommodate marking requirements. The cap shall be fabricated of fiberboard conforming to PPP-F-320, class weather resistant, W5C, the load shall be "bonded" to the pallet by strapping.

5.2.1.3 Less than palletized load. When quantities per destination are less than a pallet load, containers specified in 5.2.1.1 shall be reinforced by pressure sensitive filament tape conforming to PPP-T-97 type IV as specified in the appendix to the box specification. No further packing shall be required.

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5.2.2 Level B. A quantity of Test Sets, Electronic Tube TV-7()/U, packaged as specified in 5.1, shall be packed as specified in 5.2.1.

5.2.3 Level C. A quantity of Test Sets, Electronic Tube TV-7()/U, packaged as specified in 5.1, shall be packed as specified in 5.2.1 except that the pallet, fiberboard boxes and fiberboard caps shall be of the type, size, and kind commonly used for the purpose and shall comply with the rules and regulations of the common carrier as applicable to the mode of transportation. Packing shall be accomplished in a manner that will afford adequate protection against damage to the package and its contents during shipment from the supply source to the first receiving activity.

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

6. NOTES.

6.1 Intended Use. The test set will be used as a portable tube tester for general tube testing.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification and any amendment thereto.
- (b) Level of packaging and level of packing required for shipment. (Level A, level B, or level C). (see section 5).
- (c) Acceptance inspection of Preparation for Delivery.
- (d) Place of final inspection.
- (e) Technical literature required.
- (f) Quantity of tools and running spare parts required.
- (g) Quantity of first articles (preproduction samples) required.

6.3 Nomenclature. The parentheses in the nomenclature TV-7()/U will be deleted or replaced by a letter identifying the particular design; for example: TV-7W/U. The contractor should apply for nomenclature in accordance with the applicable clause in the contract.

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6.4 Temperature conversion. Temperature conversion from fahrenheit to centigrade as listed in this specification are as follows:

160°F	=	71°C
130°F	=	54°C
125°F	=	51.5°C
86°F	=	30°C
77°F	=	25°C
73°F	=	22.8°C
40°F	=	4.4°C
-4°F	=	-20°C
-80°F	=	-62.2°C

6.5 Verification inspection. Verification by the Government will be limited to the amount deemed necessary to determine compliance with the contract and will be limited in severity to the definitive quality assurance provisions established in this specification and the contract. The amount of verification inspection by the Government will be adjusted to make maximum utilization of the contractor's quality control system and the quality history of the product.

Custodians:

Army - EL
Navy - MC
Air Force - 82

Preparing activity:

Army - EL
Project 6625-0356

Review activities:

Army - MU

User activities:

Army - MI, ME

SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No 22-R255
<p>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.</p>		
<p>SPECIFICATION MIL-T-12424D Test Set, Electron Tube TV-7()/U</p>		
<p>ORGANIZATION</p>		
<p>CITY AND STATE</p>		<p>CONTRACT NUMBER</p>
<p>MATERIAL PROCURED UNDER A <input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT</p>		
<p>1 HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A GIVE PARAGRAPH NUMBER AND WORDING</p>		
<p>B RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES</p>		
<p>2 COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID</p>		
<p>3 IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO (If "yes" in what way?)</p>		
<p>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.)</p>		
<p>SUBMITTED BY (Printed or typed name and activity - Optional)</p>		<p>DATE</p>

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