

INCH-POUND

MIL-PRF-49136C(CR)

26 September 2000

SUPERSEDING

MIL-PRF-49136B(CR)

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PERFORMANCE SPECIFICATION COUNTERMEASURES TEST SET, AN/ALM-178()

This performance specification is approved for use by USACECOM, Department of the Army and is available for use by all departments and agencies of the Department of Defense.

1.0 SCOPE

1.1 Scope. This performance specification covers the requirements for construction of an AN/ALM-178 and AN/ALM-178A Countermeasures Test Sets, herein referred to as the "CM Test Sets."

2.0 APPLICABLE DOUMENTS

2.1 General. The documents listed in this section are in sections 3 and 4 of this specification. This section does not include documents in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

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

AMSC N/A

FSC 6625

MIL-PRF-49136C(CR)

2.2 Government Documents

2.2.1 Specifications, Standards, and Handbooks. The following specifications, standards and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the Department of Defense Index of Specifications and Standards (DoDISS) and supplements thereto, cited in the solicitation (see 6.2). Handbooks are for guidance only and therefore are not mandatory.

Military Standard

MIL-STD-810	Environmental Test Methods and Engineering Guidelines
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Handbooks

Department of Defense

MIL-HDBK-454	Standard General Requirements for Electronic Equipment
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(Unless otherwise indicated, copies of the above specifications, standards and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building #4, Section D, Philadelphia, PA 19111-5094).

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

DrawingsUSA Communications-Electronics Command

SM-D-879376	Cable Assembly, Special Purpose Electrical (AN/ALM-178())
SM-D-879377	Cable Assembly, Special Purpose Electrical (AN/ALM-178())
SM-D-879378	Cable Assembly, Special Purpose Electrical (AN/ALM-178)
SM-A-883939	Performance Test Procedure for (AN/ALM-178())
SM-D-879348	Test Set, Countermeasures Set, AN/ALM-178
PLSM-D-879348	Test Set, Countermeasures Set, AN/ALM-178
SM-D-879386	Meter, Multifunction Test, ME-499/ALM-178
PLSM-D-879386	Meter, Multifunction Test, ME-499/ALM-178

MIL-PRF-49136C(CR)

SM-D-883913	Case, Countermeasures Test Set, CY-7612/ALM-178
PLSM-D-883913	Case, Countermeasures Test Set, CY-7612/ALM-178
A3274941	Cable Assembly, Special Purpose Electrical (AN/ALM-178A)
PLA3274941	Cable Assembly, Special Purpose Electrical (AN/ALM-178A)
A3274939	Test Set, Countermeasures Set, AN/ALM-178A
A3274943	Cable Assembly, Transmitter Control (AN/ALM-178A)
PLA3274939	Test Set, Countermeasures Set, AN/ALM-178A
A3274940	Meter, Multifunction Test, ME-499A/ALM178A
PLA3274940	Meter, Multifunction Test, ME-499A/ALM-178A
A3275349	Case, Countermeasures Test Set, CY-7612A/ALM-178A
PLA3275349	Case, Countermeasures Test Set, CY-7612A/ALM-178A

(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.)

2.3 Non-Government Publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents, which are DoD adopted, are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

American National Standards Institute (ANSI)

ANSI C63.4-1991	Methods of Measurement of Radio-Noise Emissions From Low Voltage Electronic Equipment
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(Application for copies should be addressed to the American National Standards Institute Inc., 1430 Broadway, NY, NY 10018.)

2.4 Order of Precedence. In event of a conflict between the text of this document and the reference cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3.0 REQUIREMENTS

3.1 First Article. Where specified in the contract (see 6.2), the contractor shall furnish first article units for inspection (see 4).

MIL-PRF-49136C(CR)

3.2 Materials. The contractor shall select materials that are fully capable of meeting all operational and environmental requirements specified herein. The materials specified in the applicable drawings are recommended, not mandatory. Selection criteria of the class, grade or type part shall be that the material will be able to perform its intended function when it is assembled. Verification of the supplier meeting the overall performance requirements shall be the governing acceptance standard. Recovered materials shall be used to the maximum extent possible.

3.3 Description. The CM Test Set, AN/ALM-178, SM-D-879348, is Special Test Equipment (STE) for the Countermeasures Set (AN/ALQ-144(V)1 and (V)3 and Countermeasures Set AN/ALQ-144A(V)1 and (V)3.

The CM Test Set, AN/ALM-178A, A3274939, is Special Test Equipment (STE) for the Countermeasures Set AN/ALQ-144(V)1 and (V)3, Countermeasures Set AN/ALQ-144A(V)1 and (V)3 and Countermeasures Set AN/ALQ-144A(V)5.

3.3.1 Design. The CM Test Set, AN/ALM-178, shall meet the requirements of this specification. The end item shall also consist of the following: Three (3) special purpose cable assemblies, a multifunctional test meter, and a carrying case. The three cable assemblies shall meet the dimensions and dimensional tolerances of drawings SM-D-879376, SM-D-879377, and SM-D-879378 to ensure proper physical and electrical interface with existing hardware. The carrying case shall be capable of containing the CM Test Set and all ancillary items.

The CM Test Set, AN/ALM-178A, shall meet the requirements of this specification. The end item shall also consist of the following: Four (4) special purpose cable assemblies, a multifunctional test meter, and a carrying case. The four (4) cable assemblies shall meet the dimensions and dimensional tolerances of drawings SM-D-879376, SM-D-879377, A3274941 and A3274943 to ensure proper physical and electrical interface with existing hardware. The carrying case shall be capable of containing the CM Test Set and all ancillary items.

3.3.2 Dimensions and Weight. The CM Test Set, AN/ALM-178, SM-D-879348 and PLSM-D-879348, SM-D-879386 and PLSM-B-879386, SM-D-883913 and PLSM-D-883913 set including all major components (see 3.3.1) shall not exceed 36.0 pounds (16.2 kg). The nominal dimensions of the CM Test Set are provided on the respective drawings.

The CM Test Set AN/ALM-178A, A3274939 and PLA3274939, A3274940 and PLA3274940, A3275349 and PLA3275349 including all major components (see 3.3.1) shall not exceed 36.0 pounds (16.2 kg). The nominal dimensions of the CM Test Set are provided on the respective drawings.

3.3.3 Finish. All surfaces of the CM Test Sets requiring a protective coating shall not chip, crack, or peel and shall protect against corrosion when subjected to the environmental requirements herein (see 4.4).

MIL-PRF-49136C(CR)

3.4 Nameplates and Product Marking. The CM Test Sets, parts, components, subassemblies, and assemblies thereof shall be marked for identification and reference designation markings. For guidance, use MIL-HDBK-454.

3.4.1 Serial Numbers. The following items shall have serial numbers:

- a. Countermeasures Test Sets, AN/ALM-178()
- b. Case, Countermeasures Test Sets, CY-7612()ALM-178()
- c. Meters, Multifunction Test, ME-499()ALM-178()

3.5 Performance Characteristics

3.5.1 Personnel Hazards. The CM Test Sets shall be protected against personnel hazards as indicated herein. Also, the applicable parts of Requirement 1 of MIL-HDBK-454 are recommended for reference.

3.5.2 Rounding Exposed Edges. Exposed edges and corners shall be rounded sufficiently to minimize lacerations/puncture hazards. The design goal is a minimum radius of 0.04 inch (1 mm) for edges and a minimum of 0.5 inch (12.7 mm) for corners.

3.5.3 Radioactive Materials. Radioactive materials shall not be used (e.g. luminous dials/markings, electron tubes, surge arresters and lenses).

3.5.4 Mechanical/Electrical Interchangeability. Like units, assemblies, subassemblies and replaceable parts shall be physically and functionally interchangeable without modification. Electrical adjustment shall be made at all maintenance levels as referenced in the maintenance manuals.

3.5.5 Bounce Preconditioning. Each CM Test Set shall be bounce preconditioned for one minute by a vibration shaker (20-60 Hz vertical plane). Afterwards, the unit shall not be repaired, aligned, cleaned or otherwise changed prior to inspection.

3.5.6 Burn-In. The CM Test Sets shall be submitted for a minimum of 24 hours under the following temperature cycling:

Transit	Ambient to -25°F (-32 °C)	1 Hour
Stabilized	-25°F (-32 °C)	9 Hours
Transit	-25°F (-32 °C) to 125°F(+52°C)	2 Hours
Stabilized	+125°F(+52°C)	9 Hours
Transit	+125°F(+52°C) to ambient	1 Hour
Stabilized	Ambient	2 Hours

3.5.7 Electrical Requirements. The CM Test Sets shall meet the requirements of this section.

MIL-PRF-49136C(CR)

3.5.7.1 Input Power. The CM Test Sets shall operate and meet the requirements specified herein with an input voltage of 27.5 volts (DC) ± 1.5 volts (DC) and input current not greater than 260 milliamperes (mA).

3.5.7.2 CM Test Set ON-OFF Control. The CM Test Sets shall provide ON-OFF control of the 28 volt (DC) power to the transmitter of the Countermeasures Set, AN/ALQ-144().

3.5.7.3 CM Test Set Power Control. The CM Test Sets shall supply a 28 VDC signal to the Countermeasures Set AN/ALQ-144() to disable the source power when it is desired to operate without the source being on and to inhibit activation of INOP indications.

3.5.7.4 CM Test Set Output Control. The CM Test Sets shall measure the infrared source monitor voltage of the Countermeasure Set, AN/ALQ-144().

3.5.7.5 Lamp Test Operation. The CM Test Sets shall provide for testing the operation of the indicating lamps of the Multifunction Test Meter, ME-499()/ALM-178().

3.5.7.6 CM Test Set Voltage Measurements. The CM Test Sets shall measure voltage over the range of zero to 32 VDC with an accuracy of ± 3 percent.

3.5.7.7 CM Test Set Current Measurements. The CM Test Sets shall measure current over the range of zero to 10 amperes (A) with an accuracy of ± 3 percent.

3.5.7.8 CM Test Set Frequency Measurements. The CM Test Sets shall measure frequency and frequency sweep limits with an accuracy of ± 1 percent.

3.6 Environmental Conditions

3.6.1 Altitude. The CM Test Sets shall operate at all altitudes up to and including 10,000 feet (3408 m) above sea level and shall be air transportable, non-operating, at any altitude up to and including 40,000 feet (12,192M) above sea level.

3.6.2 High Temperature. The CM Test Sets shall continuously operate at temperatures up to and including $+55^{\circ}\text{C}$ ($+131^{\circ}\text{F}$) and shall withstand non-operating exposure at temperatures up to and including $+60^{\circ}\text{C}$ ($+140^{\circ}\text{F}$).

3.6.3 Low Temperature. The CM Test Sets shall continuously operate at temperatures as low as -40°C (-40°F) and shall withstand non-operating exposure at temperatures as low as -56.7°C (-70°F).

3.6.4 Humidity. The CM Test Sets shall operate satisfactorily after prolonged storage or non-operating exposure at all humidity up to and including 98 percent relative humidity and shall show no evidence of corrosion or rust of the internal or external parts as a result of this exposure.

MIL-PRF-49136C(CR)

3.6.5 Rain. The CM Test Sets shall operate during and after prolonged exposure to rain, with or without an intermittent wind.

3.6.6 Immersion. The transit case of the CM Test Sets shall withstand immersion in fresh water to a covering depth of three feet for not less than two hours and not greater than two and a quarter hours.

3.6.7 Dust. The CM Test Sets shall operate during and after exposure to wind-borne dust with velocities up to 35 knots.

3.6.8 Salt Fog. The CM Test Sets shall operate during and after exposure to salt fog of marine coastal atmospheres and salt fallout over land areas of the world, and shall show no evidence of corrosion or rust of external parts and no binding of rotary controls and switches when rotated.

3.6.9 Fungus. The CM Test Sets shall operate after exposure to fungus growth as is encountered throughout the world, and shall show no evidence of deterioration that adversely affects operation.

3.6.10 Vibration I. The CM Test Sets shall withstand vibration that is sustained during field transport by military vehicle.

3.6.11 Vibration II. The CM Test Sets shall withstand vibration in the frequency range of 5.5 to 200 Hz and at a 1.5 g test level. Sweep rate shall be 5-200 Hz in 12 minutes with a total of 84 minutes per axis.

3.6.12 Shock. The CM Test Sets shall withstand shock that is induced by rough handling.

3.6.13 Bench Handling. The CM Test Sets shall withstand bench-handling shock that is encountered in servicing.

3.7 Electromagnetic Compatibility. The CM Test Set, AN/ALM-178, when connected to Countermeasures Set, AN/ALQ-144() (V)1 and 3 and simulating flight line operation, shall meet the emissions and susceptibility requirements of Appendix A.

The CM Test Set, AN/ALM-178A, when connected to Countermeasures Set, AN/ALQ-144() (V)1 and 3 or Countermeasures Set, AN/ALQ-144A(V)5 and simulating flight line operation, shall meet the emissions and susceptibility requirements of Appendix A.

3.8 Workmanship. All electronic parts, components, assemblies and subassemblies shall be free of smudges, excess solder, metal chips or the existence of any foreign material on any surface. Bearing assemblies shall be free from rust, dirt or tool marks. Wires and integrated circuitry shall be protected from contact with rough or irregular surfaces and be shielded from shorting.

MIL-PRF-49136C(CR)

4.0 VERIFICATION

4.1 Classification of Inspections. The inspection requirements specified herein are classified as follows:

- a. First Article Inspection (4.2)
 - 1. Inspection by Subsidiary Documents (4.3)
- b. Conformance Inspection (4.4)

4.2 First Article. Unless otherwise specified in the contract, the first article inspection shall be performed by the contractor.

4.2.1 First Article Units. The contractor shall furnish four (4) first article units of the CM Test Sets for Group A, B and C testing.

4.2.2 First Article Inspection. The first article inspection shall consist of the inspection specified in Table I and shall be performed in the order specified.

4.2.3 First Article Test. The first article test plan and test reports shall be as required in the contract.

4.3 Inspection Covered by Subsidiary Document. The following shall be inspected under the applicable documents as part of the inspection required by this specification and the inspection requirement specified in the contract.

<u>Item</u>	<u>When Required</u>
Design	3.3.1
Finish	3.3.3
Nameplate and Marking	3.4

MIL-PRF-49136C(CR)

Table I. First Article Inspection

Inspections	Requirement Paragraph	Test Paragraph	Order of Tests			
			Unit 1	Unit 2	Unit 3	Unit 4
1. Bounce Preconditioning (1)	3.5.5	4.5.5	Tests to be performed on all units			
2. Inspections covered by subsidiary documents	3.3.1 3.3.2 3.4	Visual	Inspections to be performed on all units			
3. Burn-In	3.5.6	4.5.6	Tests to be performed on all units			
4. Group A Inspection (1)	See Table II		Tests to be performed on all units			
5. Group B Inspection (1)	See Table III		Tests to be performed on all units			
6. Group C Inspection						
Altitude	3.6.1	4.6.1	1			
High Temperature	3.6.2	4.6.2	2			
Low Temperature	3.6.3	4.6.3	3			
Humidity	3.6.4	4.6.4	4			
Rain	3.6.5	4.6.5	5			
Immersion	3.6.6	4.6.6		1,6		
Dust	3.6.7	4.6.7			2	
Salt Fog (2)	3.6.8	4.6.8			3	
Fungus (2)	3.6.9	4.6.9				1
Vibration Part I	3.6.10	4.6.10		2		
Vibration Part II	3.6.11	4.6.11		3		
Shock	3.6.12	4.6.12		4		
Bench Handling	3.6.13	4.6.13		5		
7. EMI	3.7	4.7			1	

NOTES:

(1) Inspections 1 to 5, in the order shown, shall be performed on all first article units before subjecting units to any other inspection requirements.

(2) The equipment shall be thoroughly washed, cleaned, dried and refurbished after this inspection before proceeding with subsequent inspections.

4.4 Conformance Inspection. The contractor shall perform the inspections specified in 4.3 and 4.4.1 through 4.4.3. This does not relieve the contractor of the responsibility for performing any additional inspection which is necessary to control the quality of the product and to ensure compliance with all specification requirements.

MIL-PRF-49136C(CR)

4.4.1 **Group A Inspection.** Each unit on contract or purchase order shall be inspected for conformance to the inspections in Table II. Lots shall be formed from units that pass this inspection. Lots in which samples exhibit any failure shall be screened for that failure prior to being subjected to Group B inspection.

Table II. Group A Inspection

Inspection	Requirement Paragraph	Test Paragraph
Visual and Mechanical	3.3, 3.4	
Personnel Hazards	3.5.1	4.5.1
Edge Rounding	3.5.2	4.5.2
Input Power	3.5.7.1	4.5.7.1
CM Set ON-OFF Control	3.5.7.2	4.5.7.2
CM Set Power Control	3.5.7.3	4.5.7.3
CM Set Output Control	3.5.7.4	4.5.7.4
Lamp Test Operation	3.5.7.5	4.5.7.5
CM Set Voltage Msmts	3.5.7.6	4.5.7.6
CM Set Current Msmts	3.5.7.7	4.5.7.7
CM Set Freq. Msmts	3.5.7.8	4.5.7.8

4.4.2 **Group B Inspection.** Group B inspection shall be performed on lots that have passed Group A inspection. This inspection shall consist of the inspection listed in Table III. Each lot shall be subjected to sampling inspection in accordance with the contract (see 6.2.c). Lots in which samples exhibit any failures shall be screened for that failure prior to the units within the lot being subject to Group C inspection.

Table III. Group B Inspection

Inspection	Requirement Paragraph	Test Paragraph
Interchangeability	3.5.4	4.5.4
Dimensions and Weight	3.3.2	4.5.4.2

4.4.2.1 **Group B Sampling Plans.** Group B shall be performed in an order satisfactory to the Government (6.2.c).

4.4.3 **Group C Inspection.** Group C inspection shall be performed on units that have passed Group A and Group B inspections. The inspection shall consist of the inspections specified in Table IV. Samples shall be selected in accordance with the contract (see 6.2.c).

4.4.3.1 **Group C Failures.** Action required relative to Group C failure shall be as specified in the contract (see 6.2.d).

MIL-PRF-49136C(CR)

4.4.3.2 Reinspection of Conforming Group C Sample Units. Unless otherwise specified, sample units which have been subjected to and passed Group C inspection may be accepted on the contract provided all damage is repaired and the sample units are re-subjected to and pass Group A inspection, with the exception of safety engineering.

Table IV. Group C Inspection

Inspection	Requirement Paragraph	Test Paragraph
Sub Group 1		
Altitude	3.6.1	4.6.1
High Temperature	3.6.2	4.6.2
Low Temperature	3.6.3	4.6.3
Humidity	3.6.4	4.6.4
Rain	3.6.5	4.6.5
Sub Group 2		
Immersion	3.6.6	4.6.6
Bench Handling	3.6.13	4.6.13
Vibration	3.6.10	4.6.10
Shock	3.6.12	4.6.12
Sub Group 3 (5)		
Electromagnetic Comp.	3.7	4.7
Dust	3.6.7	4.6.7
Salt Fog (4)	3.6.8	4.6.8
Sub Group 4 (5)		
Fungus	3.6.9	4.6.9

(4) The equipment shall be thoroughly washed, cleaned, dried and refurbished after this inspection before proceeding with subsequent inspections.

(5) Shall be performed at first production lot only.

4.5 Methods of Inspection

4.5.1 Personnel Hazards. Verify via visual examination that the CM Test Set is protected against personnel hazards as described in 3.5.1.

4.5.2 Edge Rounding Exposed. Physically examine the CM Test Sets case and exposed metal surfaces to determine that all machined surfaces, exposed edges, and metal corners are rounded to prevent injury to operating personnel. Condition of the edges shall be verified to conform to the requirement of 3.5.2.

MIL-PRF-49136C(CR)

4.5.3 Radioactive Materials. Determine that CM Test Set does not use any radioactive materials as defined in 3.5.3 in its design or construction.

4.5.4 Mechanical/Electrical Interchangeability. Verify that like units, assemblies, subassemblies and parts are electrically interchangeable with those of the CM Test Set without additional wiring, calibration or adjustments beyond what is normally required at time of manufacture. The CM Test Sets shall be in compliance with 3.5.4 herein.

4.5.4.1 Dimensional Interchangeability. Verify that like units, assemblies, subassemblies and parts are dimensionally interchangeable with those of the CM Test Sets to determine compliance with 3.5.4 herein.

4.5.4.2 Dimensions and Weight. The dimensions of the CM Test Sets and carrying case shall be measured and shall meet the requirements of 3.3.2. The CM Test Sets, carrying case and cables shall be weighed and shall not exceed the total weight specified in 3.3.2.

4.5.5 Bounce Preconditioning. Subject the CM Test Sets to bounce preconditioning in accordance with 3.5.5.

4.5.6 Burn-In. Conduct burn-in of the CM Test Sets in accordance with 3.5.6.

NOTE: The CM Test Sets shall be submitted for Burn-in after the conduct of bounce preconditioning of 3.5.5 and verification of this requirement. Burn-in shall be conducted prior to the conduct of any other tests.

4.5.7 Electrical Requirements. Verify that the CM Test Sets meets the requirements stipulated in 3.5.7. The Performance Test Procedure for AN/ALM-178(), SM-D-883939, is recommended and may be used for guidance in determining methods to demonstrate compliance with 3.5.7.

4.5.7.1 Input Power. Verify that the CM Test Sets operates on a specified input power of 27.5 volt (DC), ± 1.5 volts (DC) at 260 milliamperes (mA).

4.5.7.2 CM Test Set ON-OFF Control. Verify that the CM Test Set, AN/ALM-178, provides ON-OFF control of the 28 volt (DC) power to the transmitter of the Countermeasures Set, AN/ALQ-144()(V)1 and 3.

Verify that the CM Test Set, AN/ALM-178A, provides ON-OFF control of the 28 volt (DC) power to the transmitter of the Countermeasures Set, AN/ALQ-144()(V)1, 3 and 5.

4.5.7.3 CM Test Set Power Control. Verify attainment of 3.5.7.3.

4.5.7.4 CM Test Set Output Control. Verify attainment of 3.5.7.4.

MIL-PRF-49136C(CR)

4.5.7.5 Lamp Test Operation. Verify attainment of 3.5.7.5.

4.5.7.6 CM Test Set Voltage Measurement. Verify attainment of 3.5.7.6.

4.5.7.7 CM Test Set Current Measurement. Verify attainment of 3.5.7.7.

4.5.7.8 CM Test Set Frequency Measurement. Verify attainment of 3.5.7.8.

4.6 Environment Tests. Environmental testing shall be performed in accordance with the requirements of this specification, except when a contractor's own test plan showing equivalent methods has been approved by the contracting office. The CM test set shall be in compliance with 3.5.7 after environmental tests.

4.6.1 Altitude. Test for altitude in accordance with MIL-STD-810, Method 500.3, Procedure I, except that in step 2, the chamber press shall be 523 mm of Hg (20.6 inches of Hg or 10,000 feet above sea level). The CM test set shall be compliance with 3.6.1. Failure to meet the requirement of 3.6.1 shall constitute failure of the sample.

4.6.2 High Temperature. Test for high temperature in accordance with MIL-STD-810, Method 501.3, Procedure II, except that in step 7, the internal chamber temperature shall be plus 55 degrees Celsius. The CM test set shall be compliance with 3.6.2. Failure to meet the requirement of 3.6.2 shall constitute failure of the sample.

4.6.3 Low Temperature. Test for low temperature in accordance with MIL-STD-810, Method 502.3, Procedure I, except that the following temperatures shall apply:

- a. Step 2: minus 56.7 degrees Celsius
- b. Step 3: minus 40 degrees Celsius

The CM test set shall be in compliance with 3.6.3. Failure to meet the requirement of 3.6.3 shall constitute failure of the sample.

4.6.4 Humidity. Test in accordance with MIL-STD-810, Method 507.3, Procedure I, except that the CM test set shall be operating the last 5 hours of the last cycle. The test set shall be in compliance with 3.6.4. Failure to meet the requirement of 3.5.4 shall constitute failure of the sample.

4.6.5 Rain. Test in accordance with MIL-STD-810, Method 506.3, Procedure I, except that the CM test set shall be operated during the last 10 minutes of each 30 minutes rain period. The CM test set shall be in compliance with 3.6.5. Failure to meet the requirement of 3.6.5 shall constitute failure of the sample.

MIL-PRF-49136C(CR)

4.6.6 Immersion. Test only the transit case of CM test set in accordance with MIL-STD-810, Method 512.3, Procedure I. All equipment shall be removed the transit case prior to the test. The transit case shall be compliance with 3.6.6. Failure to meet the requirement of 3.6.6 shall constitute failure of the sample.

4.6.7 Dust. Test in accordance with MIL-STD-810, Method 510E, Procedure I, except as specified herein. The CM test set shall be reoriented in the test chamber every one and one-half hours during step 1 so that all sides will be exposed directly to the dust stream. The CM test set shall not be operated during steps 1 through 4. Step s of the procedure shall follow immediately after temperature stabilization in step 2. The CM test set shall be in compliance with 3.6.7. Failure to meet the requirement of 3.6.7 shall constitute failure of the sample.

4.6.8 Salt Fog. Test in accordance with MIL-STD-810, Method 509.3, Procedure I. The test shall be performed on the outer case, selected component parts of the CM test set, and samples of all materials, finishes and process that are used in the fabrication of the CM test set. No electronic operation shall be performed. The CM test set shall be in compliance with 3.6.8. Failure to meet the requirement of 3.6.8 shall constitute failure of the sample.

4.6.9 Fungus. Test in accordance MIL-STD-810, Method 508.4. The test shall be performed on selected component parts of the CM test set and samples of all materials, finishes and processes used in the fabrication of the CM test set. No electronic operation shall be performed. At the conclusion of the test, component part and samples shall show no fungal growth which will interfere in any way with the intended operation of the CM test set as a whole. The CM test set shall be in compliance 3.6.9. Failure to meet the requirement of 3.6.9 shall constitute failure of the sample.

4.6.10 Vibration. Test the CM test set, in its transit case, in accordance with MIL-STD-810, Method 514.4, Procedure I, Category I.

4.6.11 Vibration II. The CM test set, in its transit case, shall be attached to a vibrator exciter table by means of a rigid fixture capable of transmitting the vibration conditions given below. Precautions shall be taken in the establishment of mechanical interfaces to minimize the introduction of undesirable response in the test set up. Whenever possible, the test load shall be uniformly distributed on the vibrator-exciter table in order to reduce to the smallest amount, the effects of unbalanced loads. Vibration-amplitudes and frequencies shall be measured by techniques that will not significantly affect test item input control or response. The input control sensing device(s) shall be rigidly attached to the vibration table or to the intermediate structure, if used, at or as near as possible to the attachment point(s) of the CM test set. The CM test set shall be vibrated along each of its three mutually perpendicular axes in accordance with the table given directly below. The frequency of the applied vibration shall be swept logarithmically over the specified frequency range.

Test level:	1.5g
Frequency range:	5.5 to 200 Hz
Time schedule:	84 minutes per axis
Sweep rate:	5-200-5 Hz in 12 minutes

MIL-PRF-49136C(CR)

At the conclusion of the above test, inspect the CM test set and case for any evidence of damage, operate the equipment, and compare results with pre-test operational information. Satisfactory performance (see 3.5.7) shall constitute compliance with 3.6.11.

4.6.12 Shock. Test the CM test set, inside its transit case, in accordance with MIL-STD-810, Method 516.4, Procedure II. The CM test set shall be in compliance with 3.6.12. Failure to meet the requirement of 3.6.12 shall constitute failure of the sample.

4.6.13 Bench Handling. Test all equipment that requires bench serving in accordance with MIL-STD-810, Method 516.4, Procedure VI. The CM test set shall be in compliance with 3.6.13. Failure to meet the requirement of 3.6.13 shall constitute failure of the sample.

4.7 Electromagnetic Interference. Test the CM test set in accordance with appendix A.

5.0 PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or purchase order (see 6.2.f). When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department of Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products or by contacting the responsible packaging activity.

MIL-PRF-49136C(CR)

6.0 NOTES

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

6.1 Intended Use. The Test Set, Countermeasures Set AN/ALM-178A is intended to be used during maintenance and testing of the Countermeasures Set AN/ALQ-144() (V)1 and 3, Countermeasures Set, AN/ALQ-144(V)1 and A(V)3 and Countermeasures Set, AN/ALQ-144A(V)5.

The Test Set, Countermeasures Set AN/ALM-178 is intended to be used during maintenance and testing of the Countermeasures Set AN/ALQ-144() (V)1 and (V)3 and the Countermeasures Set, AN/ALQ-144A(V)1 and A(V)3 only.

The Test Set, Countermeasures Set AN/ALM-178/A is a unique military test set that can only be used for testing of military Infrared Countermeasures equipment. It cannot be used for any commercial equipment and or other military system other than what is stated herein.

6.2 Acquisition Requirements. Acquisition documents must specify the following:

- a. Title, number and date of this specification.
- b. When first article inspection rough handling tests are not required.
- c. Sampling plans for Group B and Group C inspections.
- d. Necessary action by contractor in event of a Group C failure (see 4.4.3.1).
- e. Deliver all first article samples to the processing activity's contracting officer.
- f. Packaging requirements (see 5.1).
- g. Environmental pollution prevention measures are contained in the packaging material specifications or preparing activity for recommended disposability.
- h. Issue of DoDISS to be cited in the solicitation, and if required, the specific issues of individual documents referenced (see 2.2.1 and 2.3).

6.3 Subject Term (Key Word) Listing

Countermeasures Set, AN/ALQ-144(V)1 and 3
 Countermeasures Set, AN/ALQ-144A(V)1 and A(V)3
 Countermeasures Set, AN/ALQ-144A(V)5

MIL-PRF-49136C(CR)

6.4 Changes from Previous Issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

CUSTODIAN:
Army – CR

PREPARING ACTIVITY:
Army CR

(Project 6625-0904)

MIL-PRF-49136C(CR)

APPENDIX A**ELECTROMAGNETIC INTERFERENCE (EMI) VERIFICATION PROGRAM FOR
MEASURING SETS, RADIO INTERFERENCE****A.1 SCOPE**

A.1.1 Scope. This appendix outlines and specifies the requirements for the Electromagnetic Interference (EMI) verification program applicable to radio Interference Measuring Sets. It is a mandatory part of the specification. The information contained herein is intended for compliance.

A.1.2 The EMI verification program for the Radio Interference Measuring Sets shall be completed as per the following test plans:

- a. EMI Qualification Test Plan, to be performed on first article equipment as specified in the contract or order.
- b. EMI Production Verification Test Plan, to be performed on samples of production equipment as specified in the contract or order.

A.2 APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

A.3 TEST CONDITIONS

A.3.1 The equipment shall be set up in a shielded enclosure with the test equipment and its related antennas and sensing equipment.

A.3.2 The test shall be conducted at normal room ambient temperature of 20°C to 30°C (68°F to (86°F).

A.3.3. Power shall be provided to the equipment under test through Line Impedance Stabilization Networks (LISN) which provide a 50-ohm signal output port for the measurement of the radio frequency signal.

A.3.4 The equipment under test shall be accessible to the operator for switching and returning as required.

MIL-PRF-49136C(CR)

A.4 VERIFICATION PROCEDURE

A.4.1 Conducted Emissions, Power Leads, 30 Hz to 10 MHz. The equipment is to be tested for conducted emissions on the power leads over the frequency range of 30 Hz to 10 kHz using the measurement setup of Figure A-1. The emissions shall not exceed the levels shown in Figure A-2 (CE101).

A.4.2 Conducted Emissions, Power Leads, 10 kHz to 10 MHz. The equipment is to be tested for conducted emissions on the power leads over the frequency range of 10 kHz to 10 MHz using the measurement setup of Figure A-3. The emissions shall not exceed the levels shown in Figure A-4 (CE102).

A.4.3 Conducted Susceptibility, Power Leads, 30 Hz to 50 kHz. The equipment is to be tested for conducted susceptibility on the power leads over the frequency range of 30 kHz to 50 kHz using the measurement setup of Figure A-5. The emissions shall not exceed the levels shown in Figure A-6 (CS101).

A.4.4 Conducted Susceptibility, DC Power Leads, 10 kHz to 400 MHz. The equipment is to be tested for conducted susceptibility on the power leads over the frequency range of 10 kHz to 400 MHz using the measurement setup of Figure A-7. The equipment shall not exhibit any malfunction, degradation of performance, or deviation from specified indications, beyond the tolerances indicated in this specification, when subjected to the test signals shown in Figure A-8 (CS114).

A.4.7 Conducted Susceptibility, Bulk Cable Injection, Impulse Excitation, 30 Hz to 20 GHz. The equipment is to be tested for conducted susceptibility to undesired signals on the antenna port over the frequency range of 30 Hz to 20 GHz using the measurement setup of Figure A-9. The equipment shall not exhibit any malfunction, degradation of performance, or deviation from specified indications, beyond the tolerances indicated in this specification, when subjected to the calibration test signal shown in Figure A-10 at a repetition rate of 30 Hz for one minute (CS115).

A.4.8 Radiated Emissions, Electric Field, 10 kHz to 18 GHz. The equipment is to be tested for radiated emissions of the electric field over the frequency range of 10 kHz to 18 GHz using the measurement setup of Figure A-11. The emissions shall not exceed the levels shown in Figure A-12. Above 30 MHz, the limits shall be met for both horizontally and vertically polarized fields (RE102).

A.4.9 Radiated Susceptibility, Electric Field, 10 kHz to 40 GHz. The equipment is to be tested for radiated susceptibility to the electric field over the frequency range of 10 kHz to 40 GHz using the measurement setup of Figure A-13. The equipment shall not exhibit any malfunction, degradation of performance, or deviation from specified indications, beyond the tolerances indicated in this specification, when subjected to the electric fields shown below in Table A-I. Up to 30 MHz, the limits shall be met for vertically polarized fields. Above 30

MIL-PRF-49136C(CR)

MHz, the limits shall be met for both horizontally and vertically polarized fields. Circular polarized fields are not acceptable (RS103).

Table A-I. Radiated Susceptibility Limits – Electric Field

Frequency Range	Limit Level (Volts/Meter)
10 kHz – 2 MHz	20
2 MHz – 30 MHz	50
30 MHz – 1 GHz	50
1 GHz – 18 GHz	50
18 GHz – 40 GHz	50

MIL-PRF-49136C(CR)

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MIL-PRF-49136C(CR)

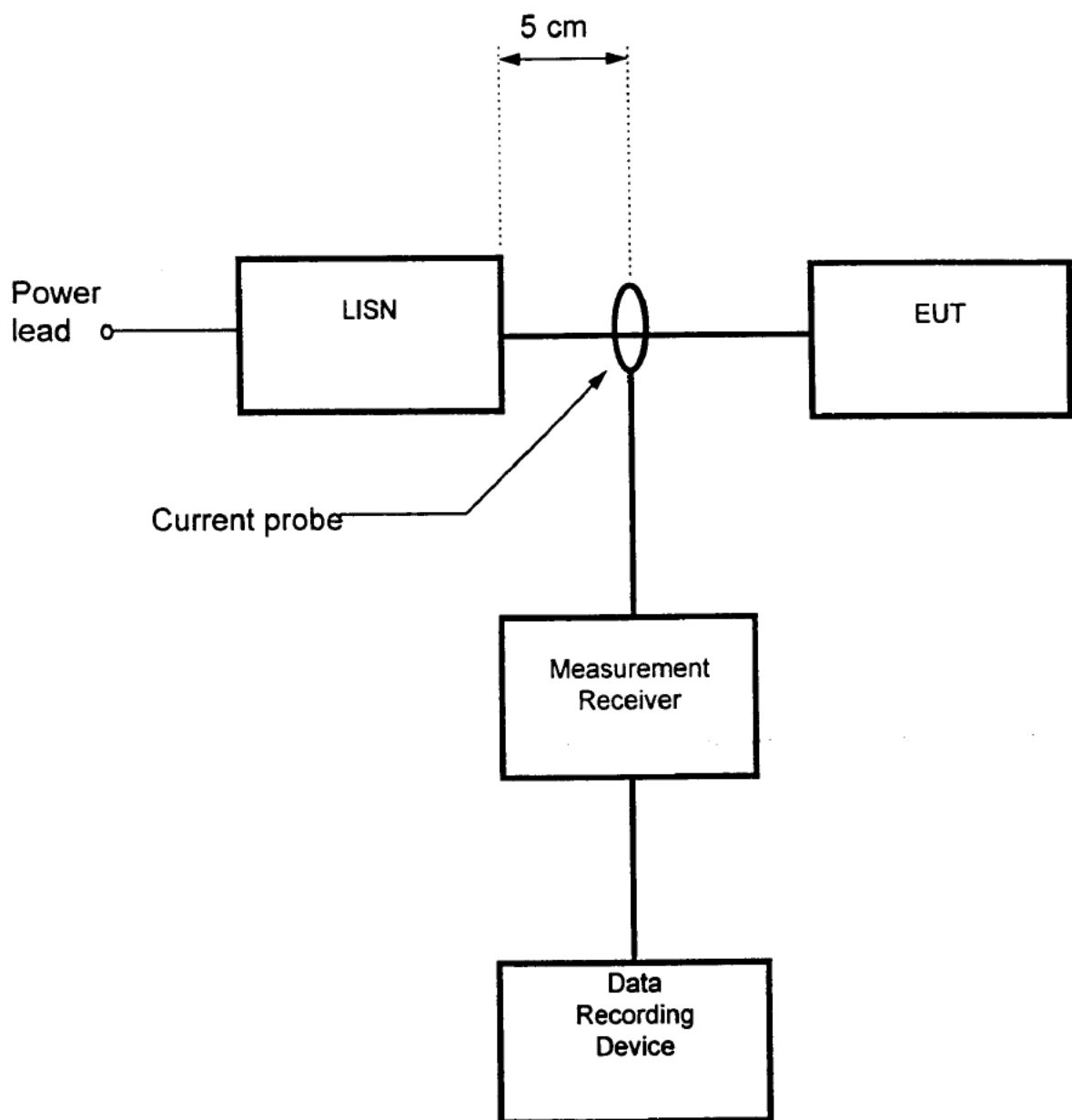
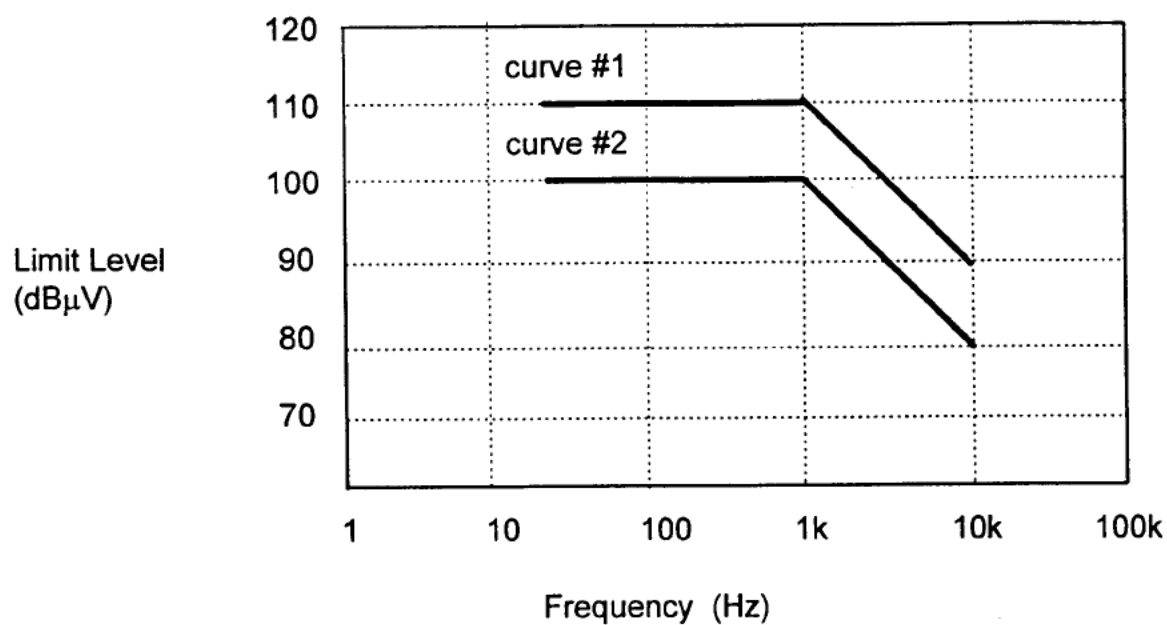


Figure A-1. Measurement Setup, Conducted Emissions, Power Leads

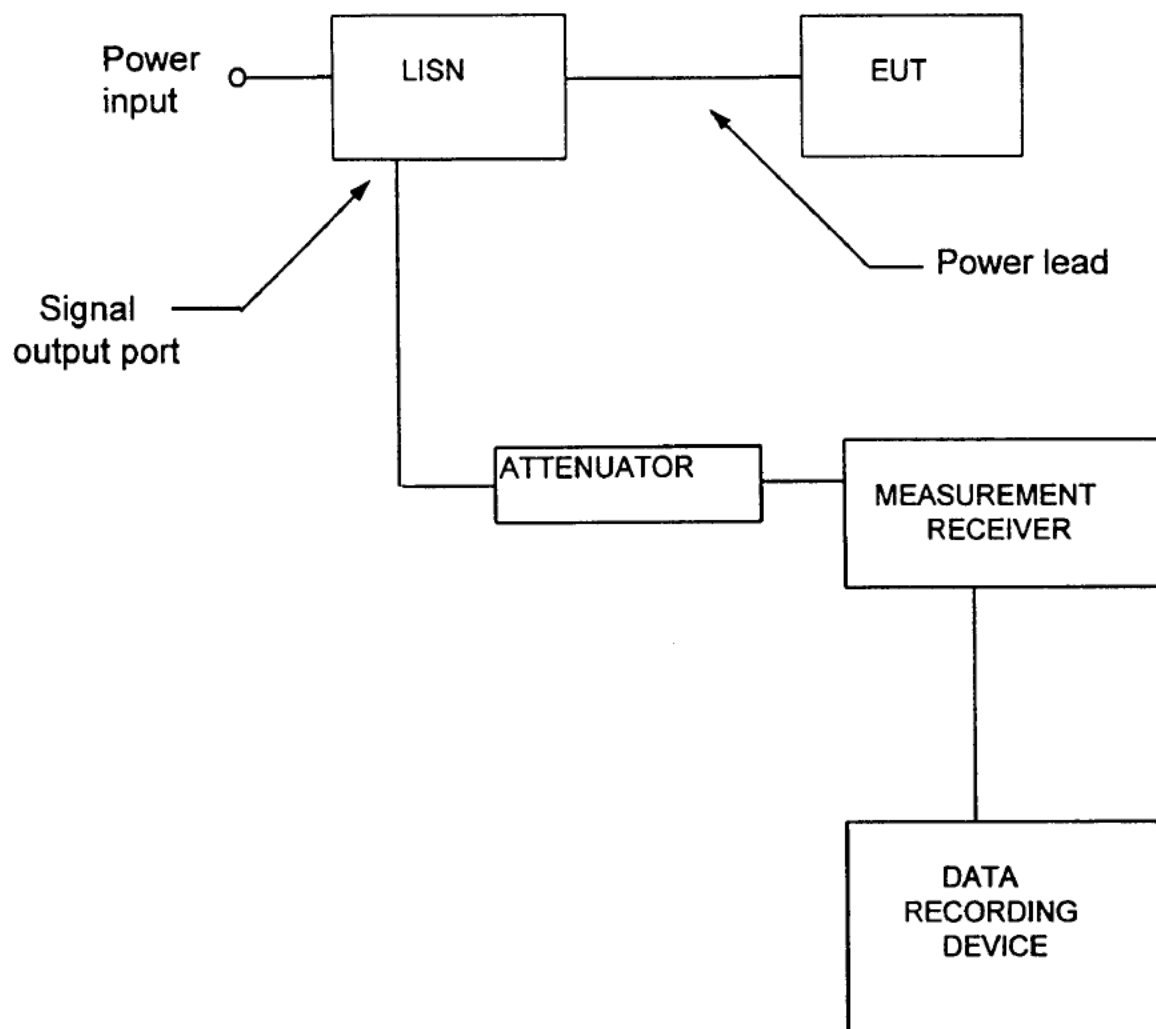
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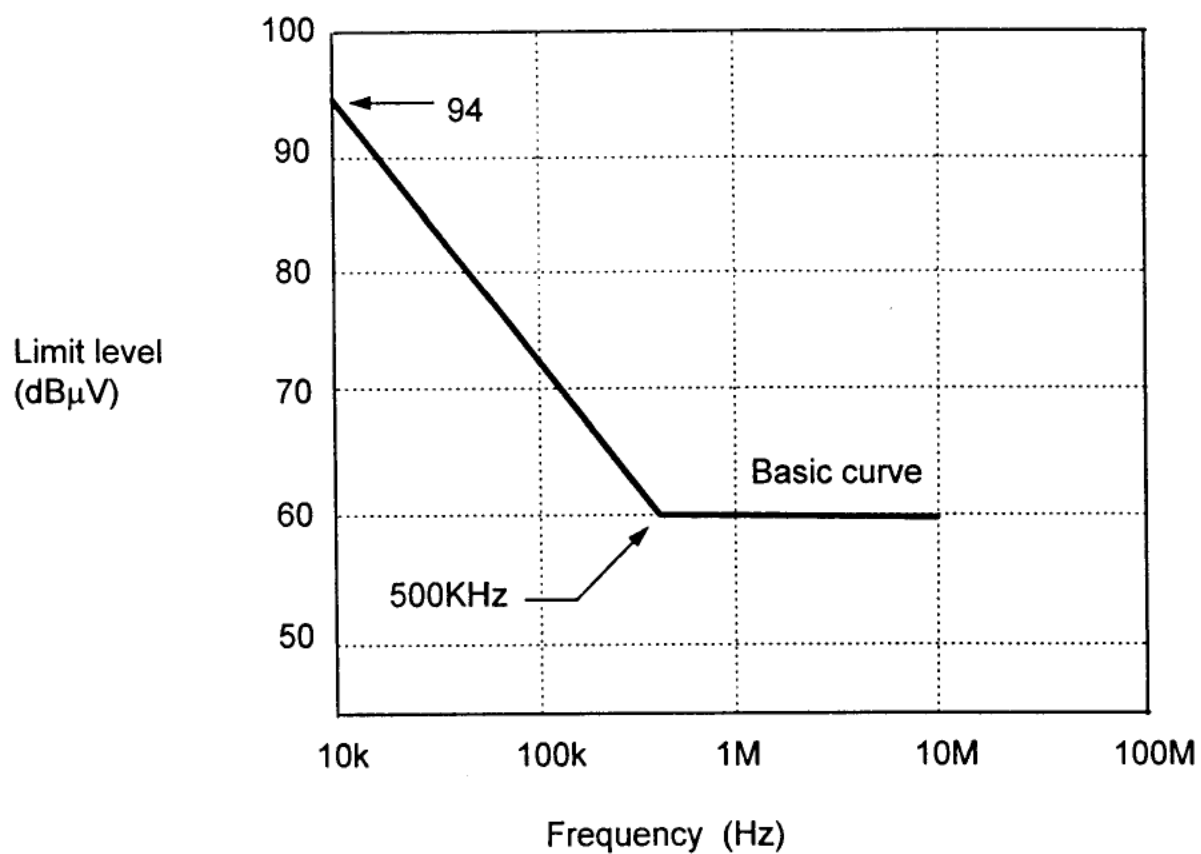
Nominal KHz source voltage (AC and DC)	Applicable curve
Above 28 volts	#1
28 volts or below	#2

Figure A-2. Conducted Emissions Limit, Power Leads

MIL-PRF-49136C(CR)

**Figure A-3. Measurement Setup**

MIL-PRF-49136C(CR)



Nominal EUT source voltage (AC & DC)	Limit relaxation
28 V	Basic curve
115 V	6 dB
220 V	9 dB
270 V	10 dB
440 V	12 dB

Figure A-4. EUT Power Leads, AC and DC

MIL-PRF-49136C(CR)

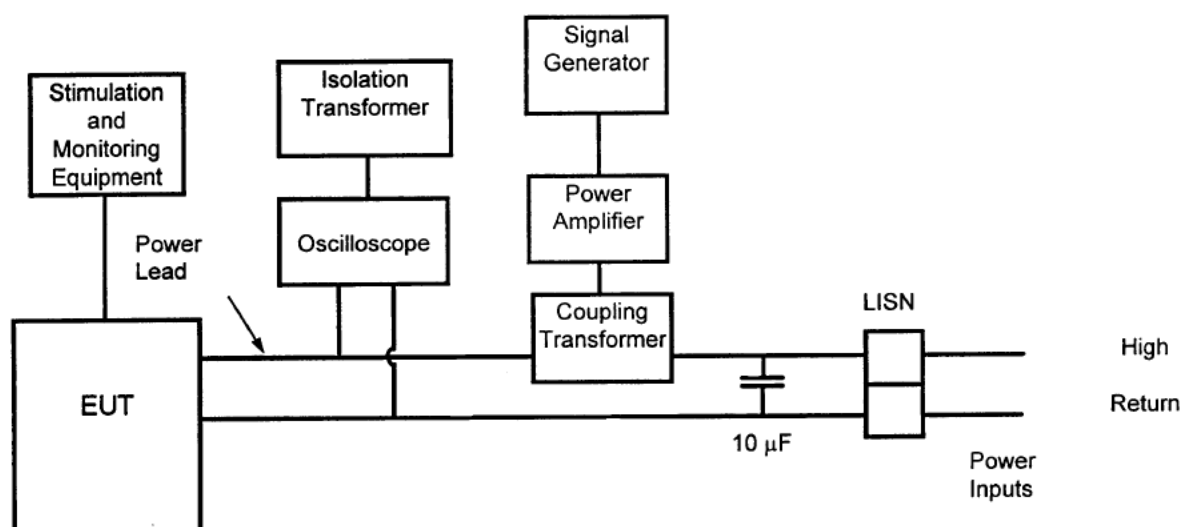


Figure A-5. Signal Injection, Conducted Susceptibility, DC or Single Phase AC Power Leads

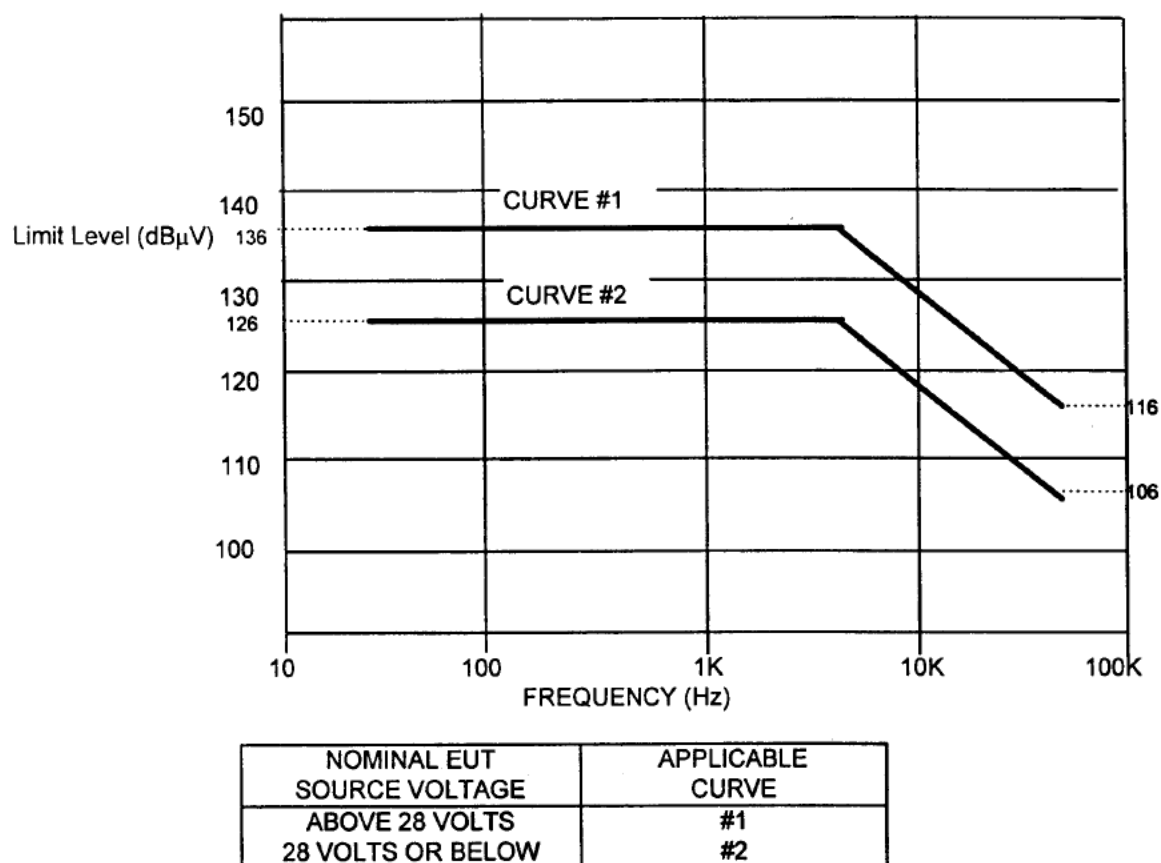
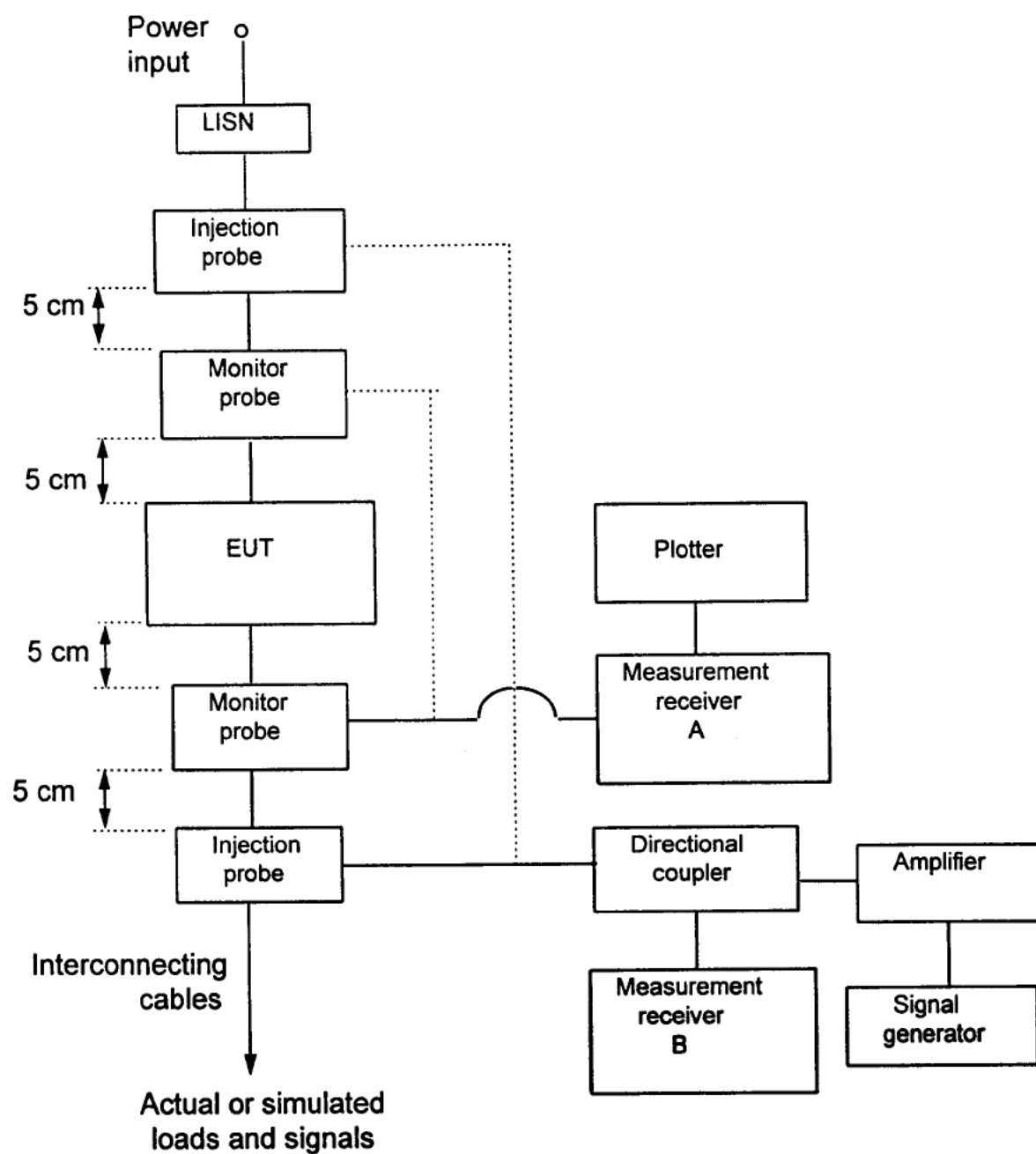


Figure A-6. Conducted Susceptibility Limit, Power Leads

MIL-PRF-49136C(CR)

**Figure A-7. Bulk Cable Injection and Loop Circuit Impedance Evaluations**

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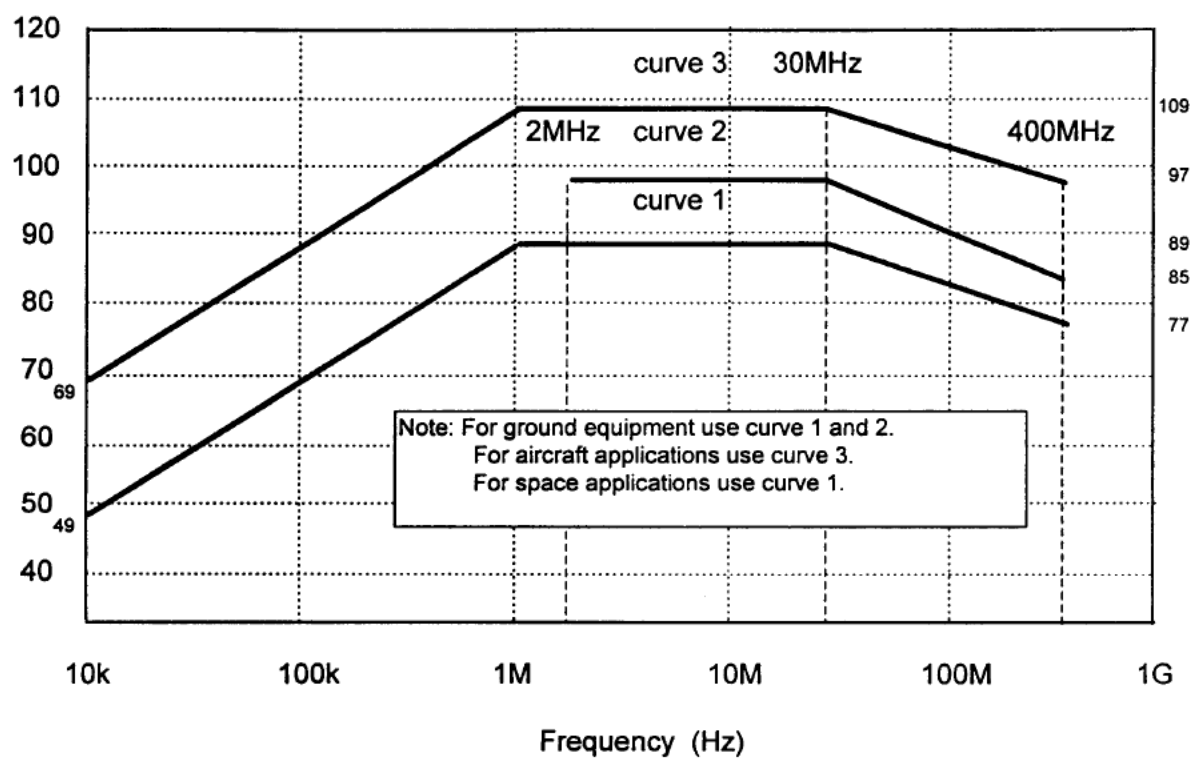


Figure A-8. Conducted Susceptibility, Bulk Cable Injection, 10 KHz to 400 MHz

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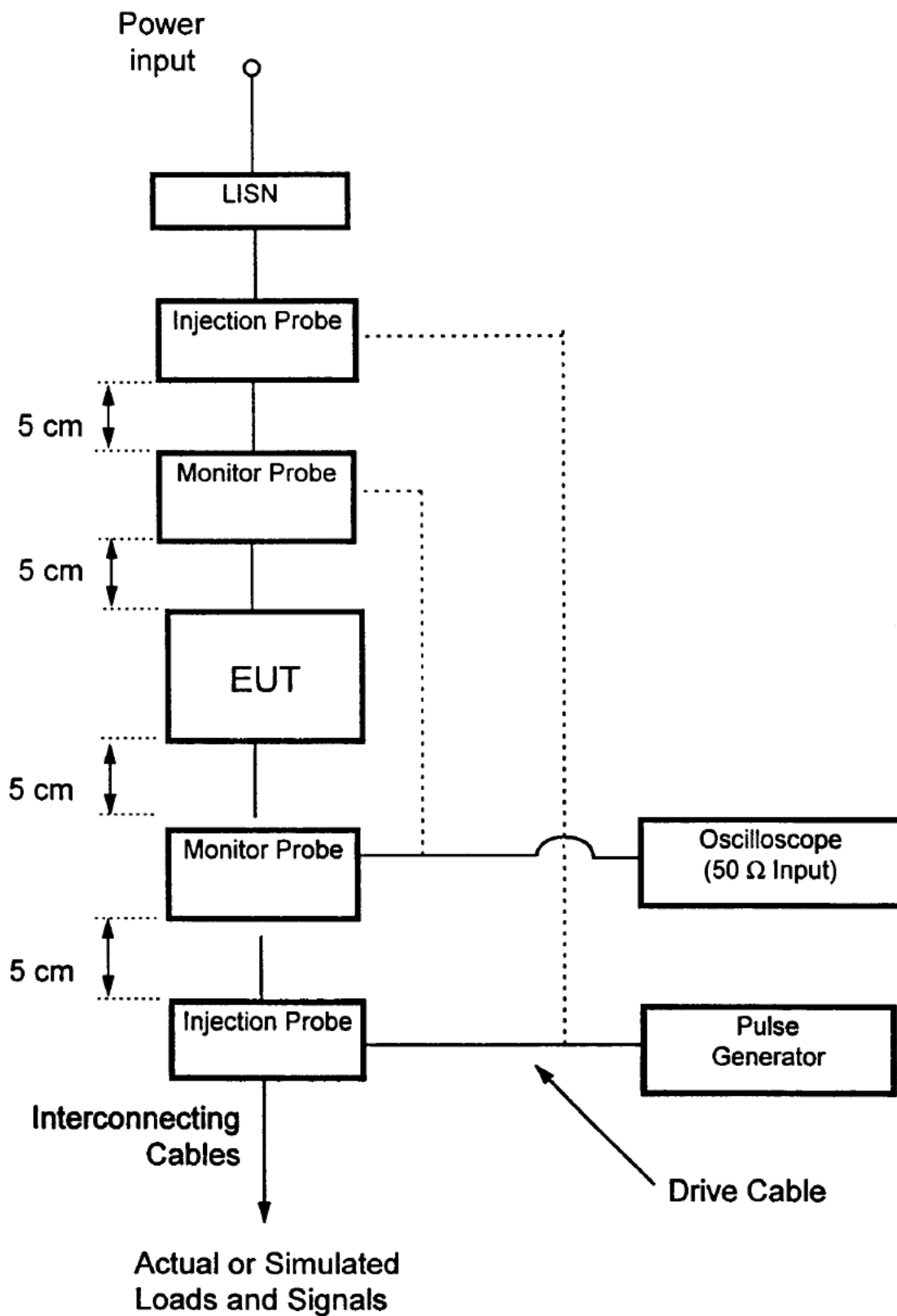


Figure A-9. Test Setup, Conducted Susceptibility, Bulk Cable Injection

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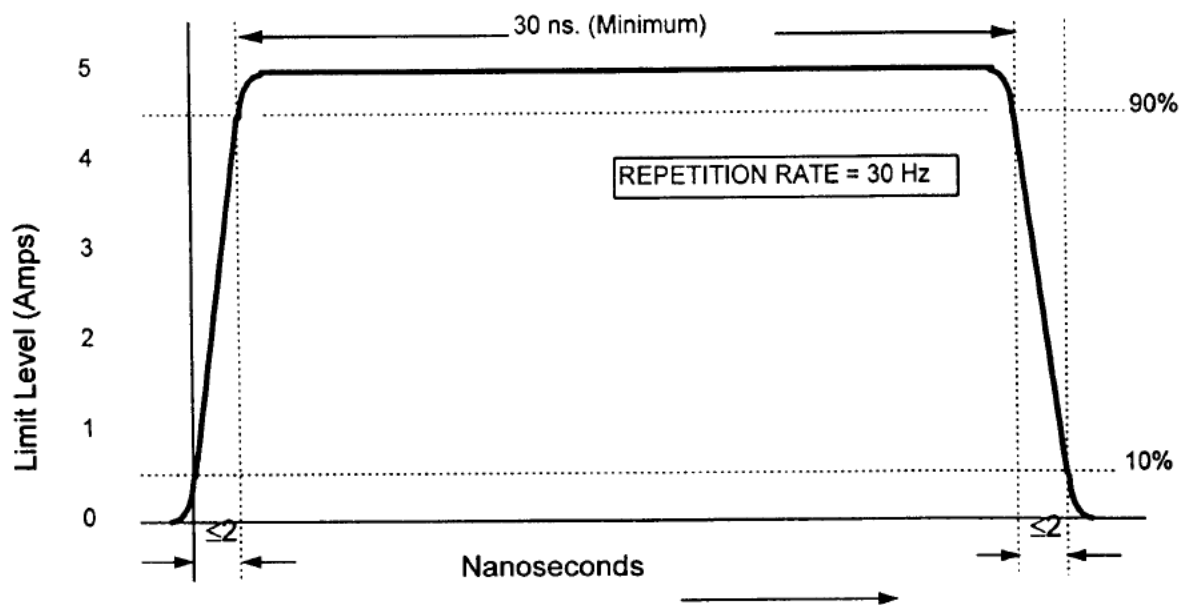


Figure A-10. Calibrated Signal Source Characteristics for all Applications

MIL-PRF-49136C(CR)

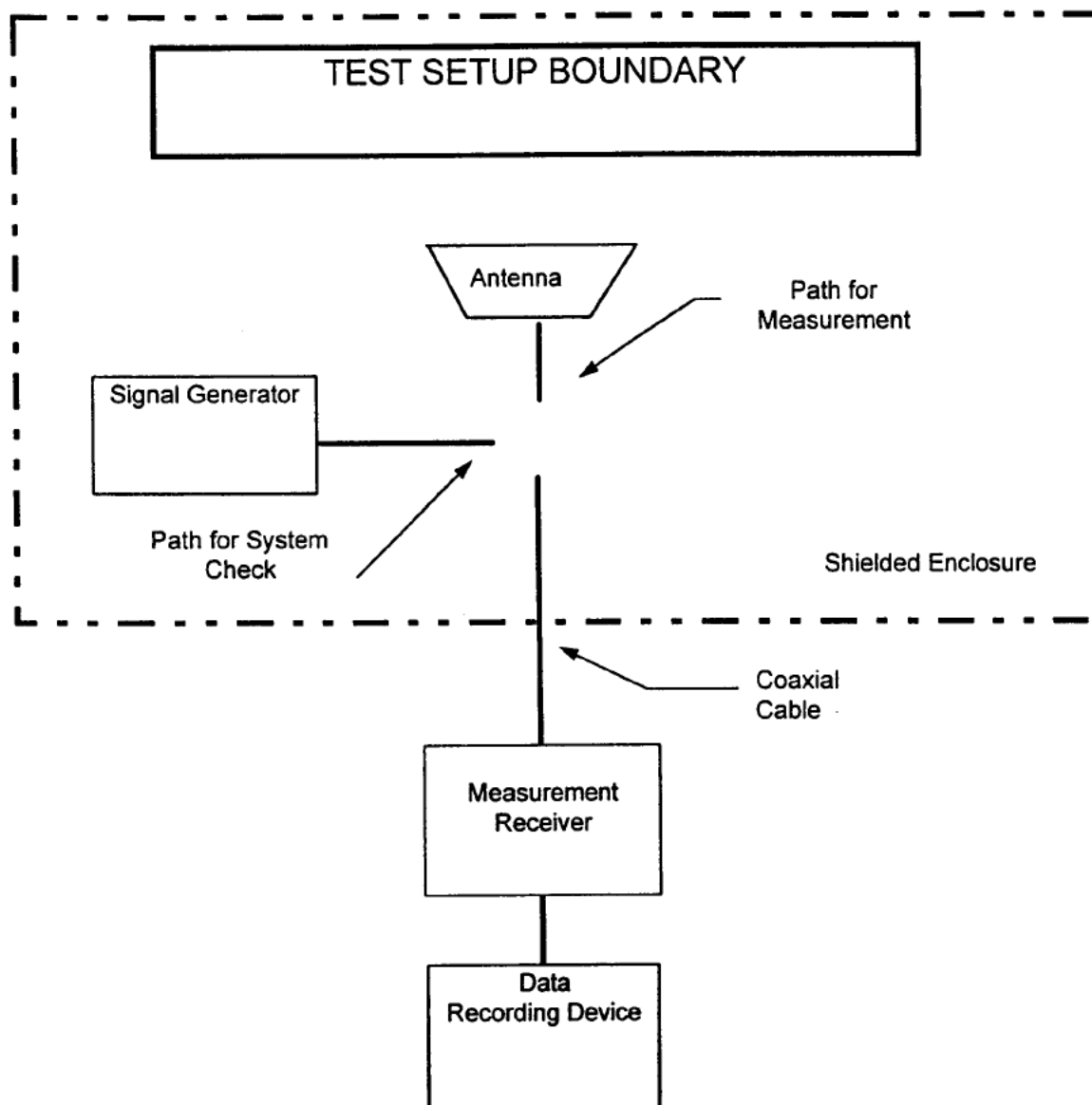


Figure A-11. Test Setup, Radiated Emissions, Electric Field, 2 MHz to 18 GHz

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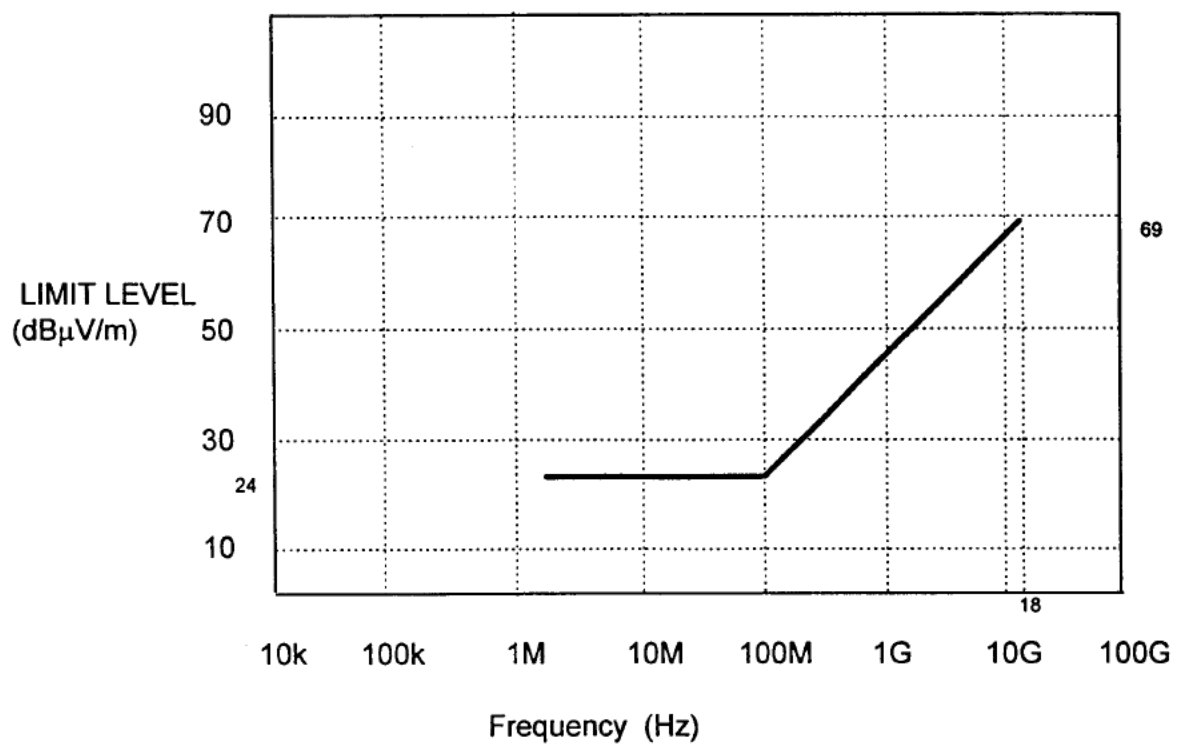


Figure A-12. Radiated Emission Limit, Electric Field

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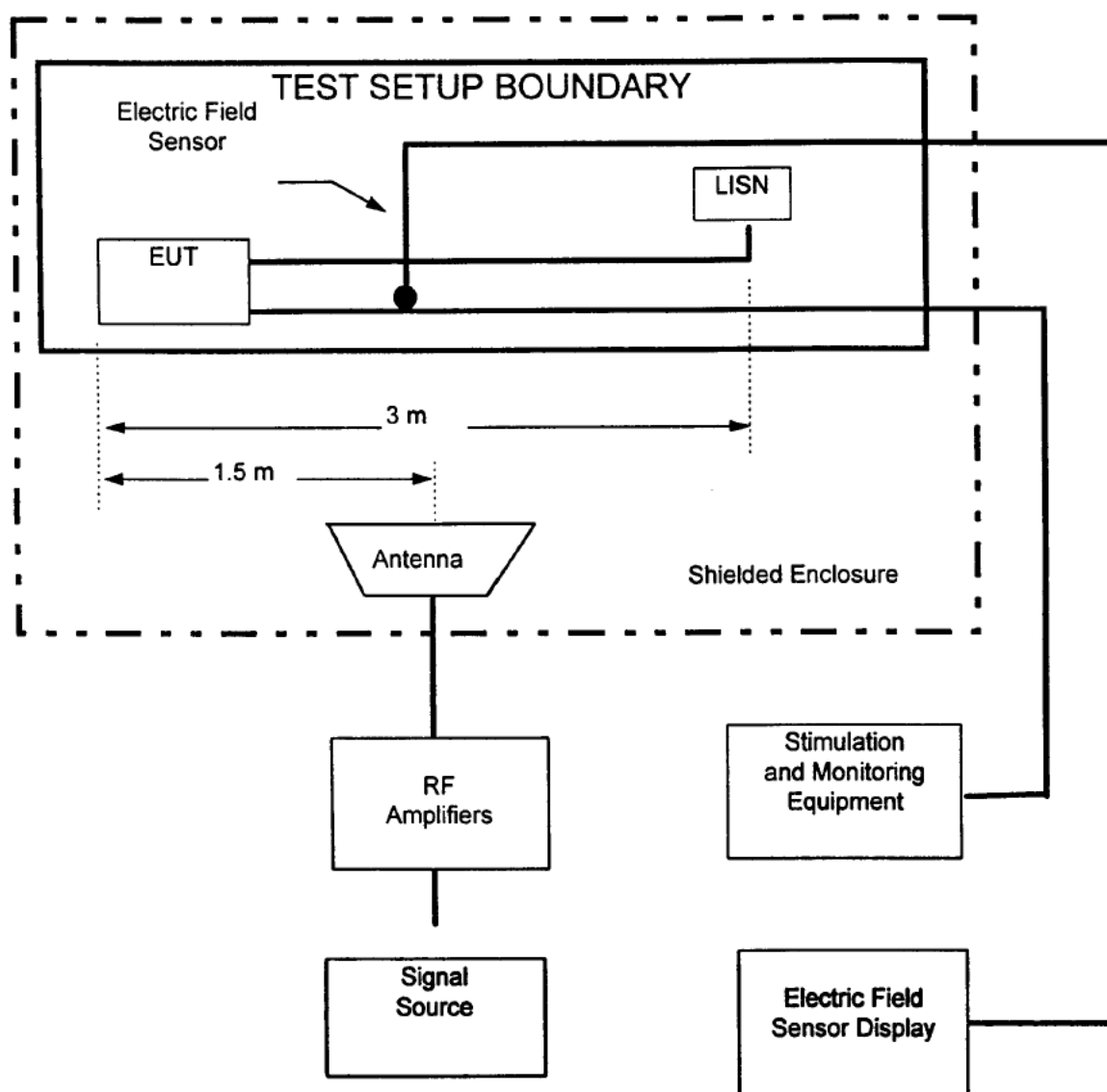


Figure A-13. Test Setup, Radiated Susceptibility, Electric Field, 2 MHz to 40 GHz

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

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2. DOCUMENT DATE (YYYYMMDD)
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3. DOCUMENT TITLE COUNTERMEASURES TEST SET, AN/ALM-178()

5. REASON FOR RECOMMENDATION

6. SUBMITTER

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b. ORGANIZATION

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