
COXICON* Standard High Voltage Connector

1.0 SCOPE

1.1 This specification contains performance requirements and test procedures for AMP* COXICON Standard High Voltage Connectors. These connectors incorporate a bayonet disconnect similar to conventional "BNC" connectors, however, these connectors will only mate with connectors of this series. Connectors of this series will provide a shielded disconnect for high voltage applications up to 5000 volts D.C.

2.0 APPLICABLE DOCUMENTS

2.1 The following specifications and standards form a part of this specification to the extent specified herein.

2.1.1 Military Specifications:

Mil-G-45204	Gold Plating, Electrodeposited
Mil-P-19468	Polytetrafluorethylene

2.1.2 Federal Specifications:

O-F-499	Flux, Brazing
QQ-A-225	Aluminum Alloy Bar, Rod and Wire
QQ-B-613	Brass, Leaded and Non-Leaded
QQ-B-626	Brass, Leaded and Non-Leaded
QQ-B-750	Phosphor Bronze
QQ-C-530	Beryllium Copper
QQ-C-533	Beryllium Copper
QQ-C-576	Copper
QQ-S-365	Silver Plating, Electrodeposited
QQ-S-561	Silver Solder
QQ-S-571	Tin Alloy Solder
QQ-S-763	Steel, Corrosion Resisting
ZZ-R-765	Silicone Rubber

2.1.3 Test Specifications:

Mil-C-45662	Calibration of Standards
Mil-I-17214	Indicator, Permeability, Low-Mu
Mil-Std-202	Test Methods for Electrical and Electronic Component Parts
National Bureau of Standards ND-545	NIM Standard High Voltage Connector, Specification for

2.1.4 AMP Specifications:

109-1	Definitions of Terms and Methods used in AMP Test Specifications
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3.0 REQUIREMENTS

3.1 Definitions. For the purpose of this specification, the following definitions shall apply:

3.1.1 Connector Assembly: Consists of a mated plug and jack terminated to their respective cable.

3.1.2 Plug: Contains female inner contact and rotating outer collar for locking purposes.

3.1.3 Jack: Contains male inner contact and may be either cable or panel mount type.

3.2 Design and Construction. Connectors shall be of the design, construction and physical dimensions specified on the AMP Product Drawing. Interface mating dimensions shall be in accordance with Figure I. Connectors shall be permanently and legibly marked including as a minimum the connector part number and manufacturers trademark.

3.3 Materials. Materials shall be as specified in Table I. Use of substitute materials is permitted provided the resulting product is capable of meeting the performance requirements of this specification.

TABLE I

MATERIALS	
Component Material	Applicable Specification
Brass	QQ-B-613 or QQ-B-626
Beryllium Copper	QQ-C-530 or QQ-C-533
Phosphor Bronze	QQ-B-750
Copper	QQ-C-576
Aluminum	QQ-A-225
Steel, Corrosion Resisting	QQ-S-763
Flux	O-F-199
Polytetrafluorethylene	MIL-P-19468
Silicone Rubber	ZZ-R-765
Silver Solder	QQ-S-561
Soft Solder	QQ-S-571

3.4 Finish. The finish of the connector shall be as specified on the AMP Product Drawing.

3.5 Functional Characteristics:

TABLE II

<u>Connector Operating Temperature</u>	-65° to +200°C.
<u>Operating Voltage @ Sea Level</u>	
Direct Current	5000 volts
Alternating Current	3500 volts
<u>Operating Voltage @ 70,000 Feet</u>	
Alternating Current	350 volts
<u>Maximum Current Rating</u>	3 Amperes

3.6 Performance. Connectors shall be designed to meet the mechanical and electrical performance requirements specified herein. To verify compliance, the required samples specified shall be tested and meet the minimum performance requirements specified.

- 3.6.1 Permeability. When tested as specified in Paragraph 4.6.2, the magnetic properties of the connector shall be less than 2 Mu.
- 3.6.2 Force to Engage/Disengage. The torque required to couple or uncouple the plug to its standard mating part shall not exceed 60 inch ounces when tested in accordance with Paragraph 4.6.3.
- 3.6.3 Coupling Nut Retention. When tested as specified in Paragraph 4.6.4, the plug connector coupling nut shall not become dislodged when a force of 100 pounds is applied.
- 3.6.4 Mating Characteristics. When tested as specified in Paragraph 4.6.5, a connector plug outer spring contact shall enter a .319 inch diameter test ring with a force not exceeding 5 pounds. All spring members shall then contact a .324 inch diameter ring within .050 inch of their tip ends. After one insertion with a pin having a diameter of .057 inch, the female inner contact of a connector plug shall accept a maximum pin diameter of .054 inch with a resulting force less than 2 pounds. With a minimum pin diameter of .052 inch, the minimum withdrawal force shall be greater than 2 ounces.
- 3.6.5 Insulation Resistance. When tested as specified in Paragraph 4.6.6, the insulation resistance measured at 500 volts shall not be less than 1,000,000 megohms. The measurement shall be taken between the inner contact and outer shell of the connector.
- 3.6.6 Contact Resistance. When tested as specified in Paragraph 4.6.7, the contact resistance of mated inner contacts shall not exceed 2.1 milliohms. Contact resistance of mated outer contacts shall not exceed 1.50 milliohms.
- 3.6.7 Corrosion/Salt Spray. When tested as specified in Paragraph 4.6.8, there shall be no exposure of base metal on the interface or mating surfaces of the connector. Upon completion, the connector shall meet the performance requirement for Force to Engage/Disengage and Contact Resistance.

- 3.6.8 Dielectric Withstanding Voltage. When tested as specified in Paragraph 4.6.9, a mated connector shall withstand a 10,000 volt D. C. test potential for a period of one minute. The connector shall then withstand a 5000 volt A. C. test potential for a period of one minute. During each test, leakage current shall be monitored and shall not exceed 1 milliampere.
- 3.6.9 Altitude/Corona. When tested as specified in Paragraph 4.6.10, the connector assembly shall satisfactorily withstand a A. C. test potential of 350 volts at a simulated altitude of 70,000 feet. During the test, there shall be no evidence of sustained corona discharge with a detector operating at a sensitivity of 5 pico coulombs.
- 3.6.10 Connector Durability. Connectors shall be mated and unmated 500 times when tested as specified in Paragraph 4.6.11. After conditioning, the connectors shall meet the performance requirements for mated inner contact resistance Paragraph 3.6.6.
- 3.6.11 High Frequency Vibration. When tested as specified in Paragraph 4.6.12, the connectors shall experience vibration up to 500 Hz at 10 gravity units. During the test, there shall be no evidence of electrical discontinuity exceeding 10 microseconds in duration. After test, visual examination shall show no evidence of cracking, breaking or loosening of component parts of the connector.
- 3.6.12 Physical Snock. When tested as specified in Paragraph 4.6.13, the connectors shall experience a total of eighteen 50G shock pulses. During the test, there shall be no evidence of electrical discontinuity exceeding 10 microseconds in duration. After test, visual examination shall show no evidence of cracking, breaking or loosening of component parts of the connector.
- 3.6.13 Temperature Cycling. Connectors tested with RG 58C/U shall be subjected to temperature extremes of -55° to $+85^{\circ}\text{C}$. when tested as specified in Paragraph 4.6.14. Upon completion of the exposure, connectors shall show no evidence of physical damage and shall meet the requirements for Dielectric Withstanding Voltage, Paragraph 3.6.8.

- 3.6.14 Cable Retention. When tested as specified in Paragraph 4.6.15, the minimum cable retention shall be as specified in Table III when testing crimped plug or jack connectors.

TABLE III

CABLE RETENTION	
Cable Diameter Range	Minimum Retention
.175 - .199 O.D.	50 pounds
.200 - .249 O.D.	60 pounds
.250 - larger O.D.	75 pounds

- 3.6.15 Moisture Resistance. Upon completion of 240 hours of Moisture Resistance, as specified in Paragraph 4.6.16, mated connectors shall be tested for Insulation Resistance and shall not be less than 100,000 megohms within five minutes after removal from the test chamber.

4.0 QUALITY ASSURANCE PROVISIONS

- 4.1 General Provisions. The quality provisions specified herein shall be employed in the manufacturing and testing of this product to assure normal production units meet the performance requirements of this specification.
- 4.2 Classification of Test.
- (A) Qualification Inspection (See 4.4)
 - (B) Quality Conformance Inspection (See 4.5)
- 4.3 Test Conditions.
- 4.3.1 Measurements. Measurements shall be taken with instruments that have been calibrated in accordance with specification Mil-C-45662.
- 4.3.2 Laboratory Conditions. Unless otherwise specified, normal laboratory temperature, humidity and atmospheric pressure shall be considered acceptable for test purpose.
- 4.3.3 Coaxial Cable. Coaxial Cable employed for test shall be RG-58C/U in accordance with Mil-C-17.

4.4 Qualification Inspection.

- 4.4.1 Sample Selection. Connectors selected for test purpose shall be representative of current production. Preparation of test samples shall be conducted in accordance with AMP Instruction Sheets governing assembly and crimping technique.
- 4.4.2 Test Procedure. Qualification Inspection shall be conducted in accordance with Table IV in the sequence specified. Each test group shall consist of 4 mated connector assemblies terminated to suitable lengths of cable as required.

TABLE IV

QUALIFICATION INSPECTION SEQUENCE				
Test or Examination	Test Group & Sequence			
	I	II	III	IV
Examination of Product	1	1	1	1
Permeability	4			
Force to Engage/Disengage	3	5		
Coupling Nut Retention	7			7
Mating Characteristics	2			
Insulation Resistance	6*		2	
Contact Resistance		2-4	6	
Corrosion/Salt Spray		3		
Dielectric Withstanding Voltage			3	5
Altitude/Corona			4	
Connector Durability			5	
High Frequency Vibration				2
Physical Shock				3
Temperature Cycling				4
Cable Retention		6		6
Moisture Resistance	5			

* Paragraph 3.6.15 applies.

4.5 Quality Conformance Inspection.

- 4.5.1 Sample Selection. Unless otherwise specified, sampling procedures shall be in accordance with Mil-Std-105. Sampling and Acceptable Quality Levels shall be as specified in the applicable AMP Quality Engineering Procedure. Dimensional requirements shall be in accordance with the applicable AMP Product Drawing.
- 4.5.2 Test Procedure. Connectors supplied in accordance with this specification shall meet the requirements for Quality Conformance Inspection Table V. Examination and test shall be conducted in the order specified.

TABLE V

QUALITY CONFORMANCE INSPECTION	
Test or Examination	Test Method
Examination of Product	Quality Engineering Procedure
Insulation Resistance	Paragraph 4.6.5
Dielectric Withstanding Voltage	Paragraph 4.6.9

4.6 Test Methods.

- 4.6.1 Examination of Product. Each test specimen shall be thoroughly examined prior to test for evidence of physical damage or any other defect which could render the specimen unsuitable for test. A depth gage pin as specified in Figure I shall be capable of being inserted into the female center contact to a total depth of .214 inch, including the lead-in length.
- 4.6.2 Permeability. Each connector shall be measured with a permeability indicator conforming to Mil-I-17214 and shall meet the requirements for Permeability, Paragraph 3.6.1.
- 4.6.3 Force to Engage/Disengage. The connector shall be engaged with its mating standard part, during which time the torque values required to fully couple and uncouple the parts shall not exceed the requirements for Force to Engage/Disengage, Paragraph 3.6.2. The bayonet coupled connector is fully engaged with its mating standard part when the bayonet lugs have passed the detent and their reference planes coincide. The mating standard part is a steel jig containing the critical interface dimensions finished to the tolerances as specified in Figure I. Its spring members, when applicable, shall be heat treated beryllium copper.
- 4.6.4 Coupling Nut Retention. The body and coupling mechanism of the plug half shall be secured to the lower and upper jaws, respectively, of a tensile testing machine. An axial force, applied at a rate of 100 pounds per minute, shall be held for one minute at the value specified in Paragraph 3.6.3. During the minute in which the specified force is being held, the coupling mechanism shall be rotated, with respect to the connector body, two full revolutions in each direction and shall meet the performance requirements specified in Paragraph 3.6.3.

4.6.5 Mating Characteristics.

4.6.5.1 Outer Contacts. The connector plug, with coupling nut removed, shall be held rigidly in a suitable fixture. A test ring having an I. D. of 0.319 inch attached to a force indicating device shall be aligned to within .004 inch T. I. R. of any plane passing through the axis of the contact under test. While engaging the test ring and contact, the total force required shall not exceed the requirements of Paragraph 3.6.4. After this test, the spring contacts of the plug shall be inserted into a test ring with a minimum I. D. of 0.324 to within .050 inch of the spring member tip ends. Spring contacts shall meet the requirements of Paragraph 3.6.4.

4.6.5.2 Center Contact. The connector plug containing the female center contact shall be rigidly held in a fixture, assuring proper alignment with the test pin. Three test pins shall be utilized for this test. An oversize pin, having a diameter of .057 inch shall be inserted into the center contact one time as a preconditioning step. The maximum test pin (.054 inch dia.) shall then be inserted into the contact while recording the insertion force. Finally, the minimum test pin (.052 inch dia.) shall be inserted into the contact and the force required to withdraw the pin shall be recorded. Insertion depth of all pins shall be .125 inch, excluding the lead-in length, and forces shall comply to the requirements of Paragraph 3.6.4.

4.6.6 Insulation Resistance. Connector assemblies shall be tested in accordance with Test Condition B, Method 302, of Mil-Std-202. The measurement shall be taken between the inner contact and the outer shell of the assembly. The resulting measurement shall not be less than specified in Paragraph 3.6.5.

4.6.7 Contact Resistance. Contact Resistance measurements shall be conducted in accordance with Method 307 of Mil-Std-202, utilizing the circuit shown in Figure II. All measurements shall be taken while using a test current of 1 ampere D. C. The contact resistance values shall not exceed the performance requirements specified in Paragraph 3.6.6.

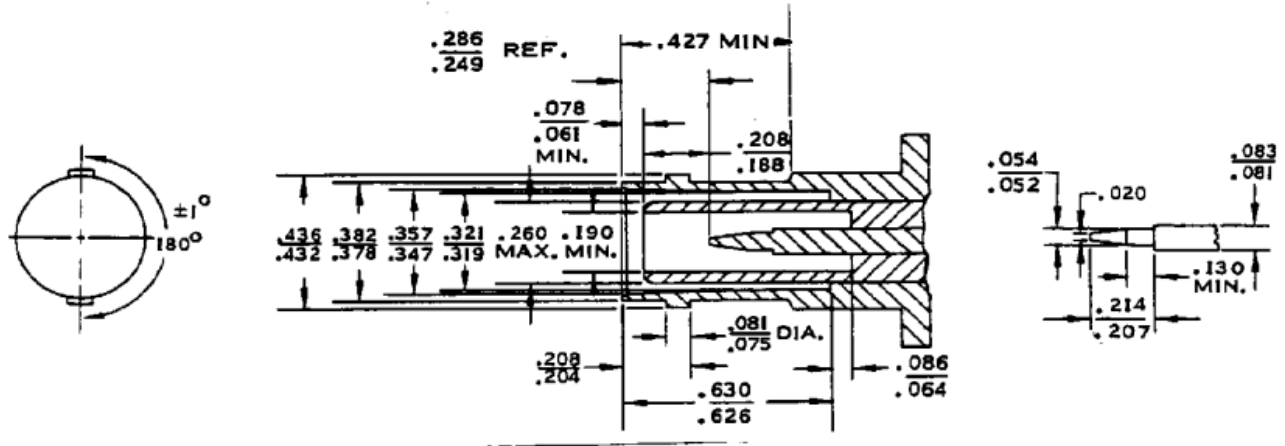
- 4.6.8 Salt Spray Corrosion. Unmated connectors shall be subjected to the salt spray corrosion test in accordance with Method 101, Test Condition B, of Mil-Std-202, using a 5% salt solution concentration. After 48 hours exposure to the salt fog environment, connectors shall be taken from the test chamber, washed in distilled water, brushed lightly, and then air dried for a period of 24 hours at 40°C. After the drying period, the connectors shall meet the performance requirements of Paragraph 3.6.7.
- 4.6.9 Dielectric Withstanding Voltage. The following tests shall be conducted in accordance with Method 301 of Mil-Std-202, utilizing both D. C. and A. C. test potentials, with provisions incorporated in the test circuit to measure the leakage current. All tests shall be performed at +25°C with a relative humidity of 50% by applying the test voltage between the inner contact and the outer shell of the connector. The D. C. test shall be performed with the connectors mated. A. C. tests shall be performed with the connectors mated and unmated. When testing unmated plugs or cable jacks, the connector shall be positioned on a metal plate in such a manner to simulate the shortest electrical path to the inner contact and the metal plate. One side of the test circuit shall be connected to the metal plate and the connector shell, and the remaining lead shall be connected to the inner contact through the inner conductor of the cable. Test voltages shall be applied at a rate of approximately 1000 volts per second, and connectors shall meet the requirements of Paragraph 3.6.8.
- 4.6.10 Altitude/Corona. Connector assemblies shall be connected to the test circuit illustrated in Figure III. The test circuit shall be corona free to the extent that a discharge of 5 pico coulombs or less can be measured when the test voltage specified in Paragraph 3.6.9 is applied at an altitude of 70,000 feet (33.95 MMHg.). No grease or similar compounds shall be used in or on the connector assembly. After the sample has been purged of air at the reduced pressure, the 60 Hertz voltage shall be slowly increased until the detector, operated at a sensitivity of 5 pico coulombs, indicates a sustained corona discharge. The test voltage shall then be decreased until the corona discharge is 5 pico coulombs, the latter voltage being the corona level of the connector assembly.

- 4.6.11 Connector Durability. Connector assemblies shall be mated and unmated a total of 500 times. Each mating shall include the utilization of the coupling nut on the plug. After conditioning, the connector assemblies shall meet the performance requirements specified in Paragraph 3.6.10.
- 4.6.12 Vibration. Mated connectors assembled to appropriate cables and mounted as illustrated in Figure IV, shall be subjected to vibration in accordance with Method 204, Test Condition A of Mil-Std-202, in each of the two planes perpendicular to their axis. During the test, all connectors shall be wired in series and a D.C. current of 0.1 ampere shall be applied. Instrumentation shall be incorporated to detect electrical discontinuities as short as 10 microseconds. At the conclusion of the test, connectors shall meet the requirements specified in Paragraph 3.6.11.
- 4.6.13 Physical Shock. Mated connectors assembled to appropriate cable and mounted as illustrated in Figure IV shall be subjected to a 50G deceleration in accordance with Method 213, Test Condition A, of Mil-Std-202. The connectors shall withstand nine shocks in each of the two planes perpendicular to their axes. During the test, all connectors shall be wired in series and a D.C. current of 0.1 ampere shall be applied. Instrumentation shall be incorporated to detect electrical discontinuities as short as 10 microseconds. At the conclusion of the test, connectors shall meet the requirements specified in Paragraph 3.6.12.
- 4.6.14 Temperature Cycling. Connector assemblies shall be subjected to temperature cycling in accordance with Test Condition D, Method 102, of Mil-Std-202. Upon completion of five temperature cycles, the connector assemblies shall meet the requirements specified in Paragraph 3.6.13.

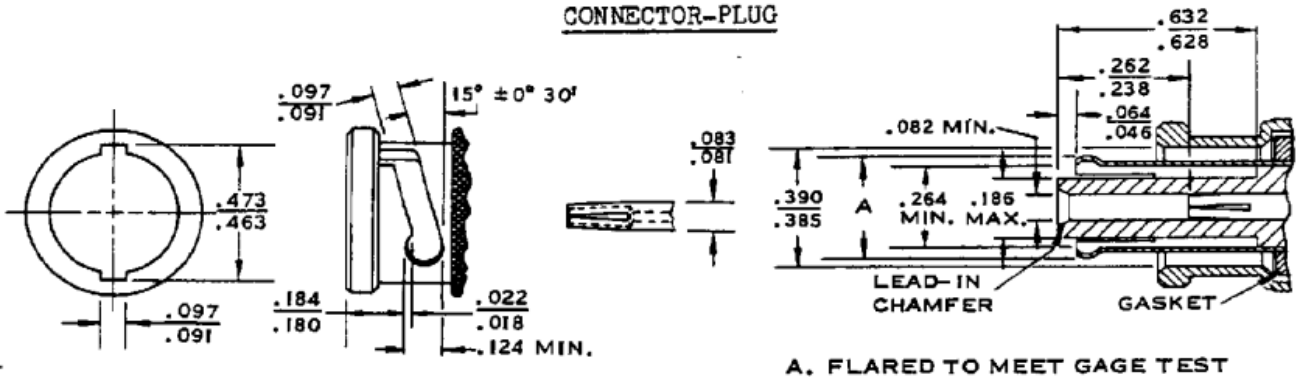
- 4.6.15 Cable Retention. Plugs assembled to appropriate cable shall meet the requirements specified in Table III when pulled on a tensile machine with a head speed of one inch per minute. To assure that both center conductor and braid are pulled simultaneously, the outer jacket shall be removed from the cable a distance of two inches from the unterminated end. The braid or shield shall be pushed back to expose the inner dielectric. The dielectric shall be removed, with caution, for a distance of one inch exposing the inner conductor. The braid shall be pulled back tightly to its original position and twisted evenly around the exposed inner conductor. Solder shall be applied to the exposed conductor to insure that the outer shield and inner conductor are securely joined. Connectors shall meet the requirements for Cable Retention specified in Paragraph 3.6.14.
- 4.6.16 Moisture Resistance. Mated connectors shall be subjected to 240 hours of Moisture Resistance in accordance with Method 106 of Mil-Std-202 excluding the Vibration Sub-cycle. Within five minutes after removal from the chamber, the connectors shall be tested for Insulation Resistance and shall meet the performance requirements of Paragraph 3.6.15.

FIGURE I
CONNECTOR INTERFACE DIMENSIONS

CONNECTOR-JACK



CONNECTOR-PLUG



CONTACT DEPTH PIN GAGE

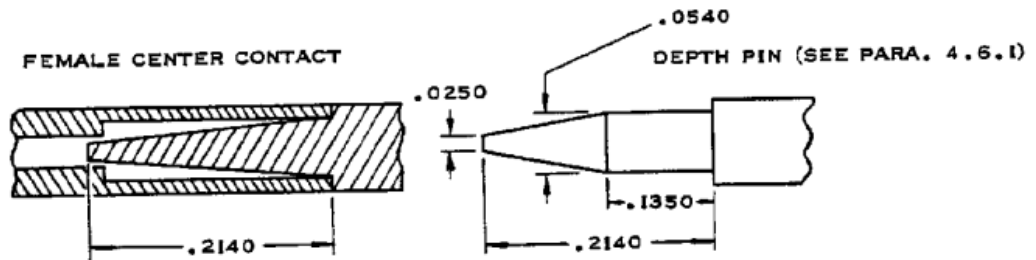
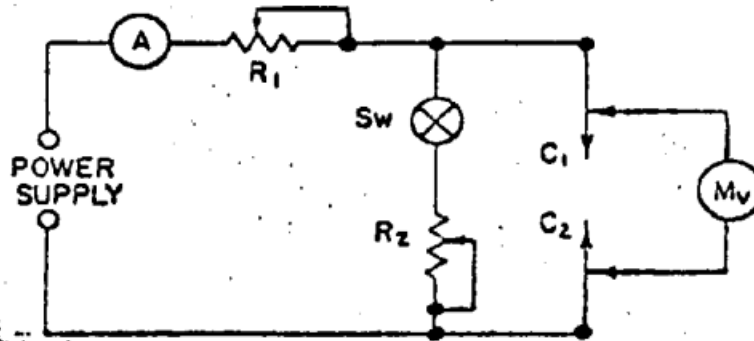
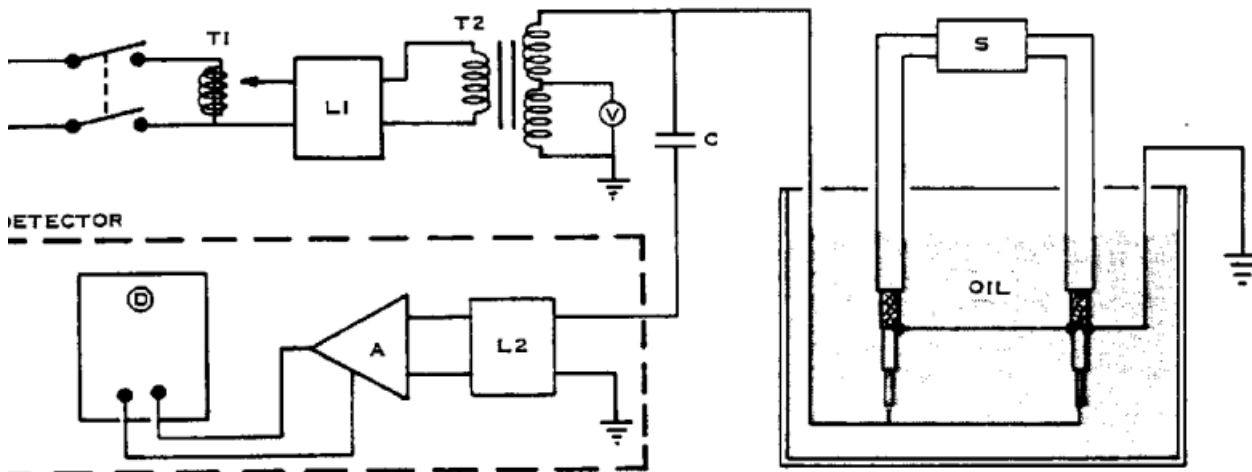


FIGURE II
CONTACT RESISTANCE



Ammeter	0-1 Amps
R ₁	0-15 Ohms
R ₂	0-0.1 Ohms
Power Supply	10VDC @ 1 Amp
C ₁ -C ₂	Connector

FIGURE III
ALTITUDE/CORONA



T1 - 0-130V VARIABLE TRANSFORMER
 T2 - HIGH VOLTAGE TRANSFORMER (CORONA
 FREE - LESS THAN 5 PICOCOULOMBS)
 V - VOLTMETER

S - TEST SPECIMEN
 C - CORONA FREE COUPLING CAPACITOR
 D - DISCHARGE DISPLAY
 L1 - INPUT LINE FILTER
 A - DETECTOR AMPLIFIER

FIGURE IV
VIBRATION/PHYSICAL SHOCK

