

NUMBER 108-12057

PRODUCT SPECIFICATION

AMP\* ECONOMATE\* II CONNECTOR RECEPTACLE  
AND BLADE HEADER ASSEMBLY

1.0 SCOPE

1.1 This specification contains performance requirements and test procedures for AMP ECONOMATE II Connector Assembly.

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-C-45662	Calibration of Standards
MIL-W-16878	Wire, Electrical, Insulated High Temperature

2.1.2 Military Standards.

MIL-STD-105	Sampling Procedures and Tables For Inspection By Attributes
MIL-STD-202	Test Methods For Electronic And Component Parts
MIL-STD-1285	Marking Of Electrical And Electronic Parts


3.0 REQUIREMENTS

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

3.1.1 Blade Contact. This contact is the male part of the mating pair and is inserted into a header housing to make a blade header assembly which is normally mounted onto a printed wiring board.

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3.1.2 Receptacle Contact. This contact contains spring members which mate with the blade contact. Receptacle contacts are inserted into a printed wiring board, and then a receptacle housing applied. The receptacle contact is intended to provide a reliable connection between a printed wiring board circuit and wiring employing TERMI-POINT or Wrap-Type, Point-To-Point wiring.

3.1.3 Connector Assembly. Connector housing containing the required number of blade or receptacle contacts properly assembled and prepared for test.

3.2 Design and Construction. Contacts and connector assemblies shall be of the design, construction, and physical dimensions specified on the applicable AMP Product Drawing. When required, each connector shall be identified by part number and shall be date coded in accordance with the applicable portions of MIL-STD-1285.

3.3 Materials and Finish. The materials utilized in the construction of the contacts and the finish or plating of the contacts shall be as specified on the applicable AMP Product Drawing.

3.4 Functional Characteristics.

3.4.1 Current Rating Maximum. 3 Amperes, unless otherwise restricted by the printed wiring board or circuit wiring.


3.4.2 Operating Temperature. Connectors shall be capable of continuous operation throughout a temperature range of  $-55^{\circ}$  to  $+105^{\circ}$ C. The upper temperature limit shall include current heating effects as specified in Paragraph 3.5.1. The temperature requirements for the Action Pin contacts when used in glass epoxy printed wiring boards, such as G-10 or FR-4 type material, shall not exceed  $85^{\circ}$ C.

3.4.3 Operating Voltage @ Sea Level. 800 volts rms.


3.5 Performance. Connectors shall be designed to meet the performance requirements specified herein. To verify compliance to this specification, representative samples shall be subjected to the tests specified in Table I.

3.5.1 Examination of Product. When test specimens are examined as specified in Paragraph 4.6.1, all contacts shall be free from burrs and all contact edges except the wire-wrap tail shall be free from sharp edges. There shall be no evidence of other physical damage or defects that could render the specimens unsuitable for test.

3.5.2 Engaging and Separating Force. When tested as specified in Paragraph 4.6.2, insertion force shall not exceed an average of 10 ounces per contact and withdrawal forces shall not be less than 2 ounces.

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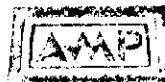
- 3.5.3 Contact Retention. When tested as specified in Paragraph 4.6.3, an axial force in either direction, of 15 pounds for soldered contacts, or 7 pounds for press-fit contacts, shall not dislodge any contacts from the connector.
- 3.5.4 Torque. When tested as specified in Paragraph 4.6.4, a twisting force of 3 inch-ounces in both directions shall not dislodge any contacts from the connector.
- 3.5.5 Dielectric Withstanding Voltage. When tested as specified in Paragraph 4.6.5, the connector shall show no evidence of dielectric breakdown or flashover with 1000 volts A.C. applied between all contacts and between insulated contacts and conductive mounting plate, if applicable.
- 3.5.6 Insulation Resistance. When tested as specified in Paragraph 4.6.6 at 500 volts D.C., the insulation resistance shall be 25,000 megohms or greater between all contacts and between insulated contacts and conductive mounting plate, if applicable.
- 3.5.7 Low Level Contact Resistance. When tested as specified in Paragraph 4.6.7, the contact resistance of any mated contact pair shall not exceed 1 ohm.
- 3.5.8 Contact Resistance. When tested as specified in Paragraph 4.6.8 at 1 Ampere D.C., the termination resistance of a mated pair shall not exceed 8 milliohms.
- 3.5.9 Current Overload. When tested as specified in Paragraph 4.6.9, contact plating shall show no signs of peeling, or discoloration, and the mated contacts shall meet the requirements for Contact Resistance, Paragraph 3.5.8.
- 3.5.10 Durability. After 100 cycles of durability as specified in Paragraph 4.6.10, contacts shall show no evidence of physical damage. Samples shall then meet the requirements for Contact Resistance and Engaging/Separating Force, Paragraphs 3.5.8 and 3.5.2, respectively.
- 3.5.11 Physical Shock. When tested as specified in Paragraph 4.6.11 at 75 G's, there shall be no evidence of cracking, loosening, or breaking of component parts. Throughout the test, there shall be no loss of electrical continuity in excess of 1 microsecond.

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- 3.5.12 Vibration. When tested as specified in Paragraph 4.6.12 at 10 - 2000 Hz, there shall be no evidence of cracking, breaking, or loosening of parts. Throughout the test, there shall be no loss of electrical continuity in excess of 1 microsecond. Upon completion of test, connectors shall meet the requirements for Contact Retention, Paragraph 3.5.3.
- 3.5.13 Thermal Shock. After 5 cycles of Thermal Shock at -55° and +105°C as specified in Paragraph 4.6.13, connectors shall show no evidence of cracking, breaking, loosening of any parts, or any damage that would affect the operation of the connector.
- 3.5.14 Salt Spray. After 48 hours of exposure to a 5% salt spray solution as specified in Paragraph 4.6.14, connectors shall meet the performance requirements for Low Level and Contact Resistance, Paragraphs 3.5.7 and 3.5.8, respectively.
- 3.5.15 Humidity. After 96 hours exposure to humidity as specified in Paragraph 4.6.15, connectors shall meet the requirements for Insulation Resistance, Paragraph 3.5.6. Measurements shall be taken at room ambient conditions within 1 to 2 hours after removal of specimen from the humidity 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 purposes.

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4.3.3 Connector Assembly Wiring. Four-inch lengths of 26 gage, MIL-W-16878 Type E wire shall be terminated to the connector posts. The wiring shall be arranged to facilitate the test requirements for each connector.

4.4 Qualification Inspection.

4.4.1 Sample Selection. Connectors selected for test purposes shall be representative of current production and shall be certified to the dimensional requirements of the AMP Product Drawing.

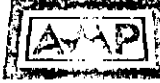
4.4.2 Test Procedure. Qualification Inspection shall be conducted in accordance with Table I in the sequence specified, using 4 connector assemblies for each Test Group.

TABLE I

Test or Examination	Test Group & Sequence		
	I	II	III
Examination of Product	1	1	1
Low Level Contact Resistance	2	2-10	2
Contact Resistance	3-8	3-7-11	3
Engaging and Separating Force	4	4-8	4
Torque	5	5	5
Contact Retention	12	12	9
Insulation Resistance	10		8
Dielectric Withstanding Voltage	9		
Thermal Shock	6		
Current Overload	7		
Vibration	11		
Durability		6	
Salt Spray		9	
Physical Shock			6
Humidity			7

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 Specification. Dimensional requirements shall be in accordance with the applicable AMP Product Drawing.

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4.5.2 Test Procedure. Contacts supplied in accordance with this specification shall meet the requirements for Quality Conformance Inspection, Table II. Examination and tests shall be conducted in the order specified.

TABLE II

Quality Conformance Inspection	
Test or Examination	Test Method
Examination of Product Engaging and Separating Force	Quality Specification Paragraph 4.6.2

4.6 Test Methods.


4.6.1 Examination of Product. Connectors shall be thoroughly examined prior to test for evidence of any physical damage or defects, as specified in Paragraph 3.5.1.

4.6.2 Engaging and Separating Force. The force required to mate a connector with a corresponding blade header assembly and to withdraw a minimum size gage from each individual contact shall not be more than or less than the respective values specified in Paragraph 3.5.2. The dimensions of the separating force gage shall be as specified in Figure II.


4.6.3 Contact Retention. Connectors shall be held rigidly in a fixture and an axial force of the value specified in Paragraph 3.5.3 applied to the contact posts in a direction toward the connector. The required force shall be applied gradually to the post and maintained for a duration of 5 to 10 seconds.

4.6.4 Torque. Connectors shall be held rigidly in a fixture and a torque of the value specified in Paragraph 3.5.4 applied to the base of each contact post at the connector. The force shall be applied gradually clockwise and then counterclockwise in a plane perpendicular to the axis of the contact and held in each direction for a duration of 5 to 15 seconds.

4.6.5 Dielectric Withstanding Voltage. Unmated connectors shall be tested in accordance with Method 301 of MIL-STD-202. The test voltage shall be applied at the rate of approximately 500 volts each second between all contacts and between insulated contacts and conductive mounting plate, if applicable, until the voltage specified in Paragraph 3.5.5 is reached.

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- 4.6.6 Insulation Resistance. Unmated connectors shall be tested in accordance with Method 302, Test Condition B of MIL-STD-202. The Insulation Resistance shall be measured between all contacts and between insulated contacts and conductive mounting plate, if applicable.
- 4.6.7 Low Level Contact Resistance. Resistance shall be measured across each pair of mated contacts using a maximum test current of 1 milliampere and a maximum open circuit voltage of 20 millivolts. Measurements shall be taken as illustrated in Figure I and shall meet the performance requirements of Paragraph 3.5.7.
- 4.6.8 Contact Resistance. Contact resistance shall be measured across each pair of mated contacts in accordance with Method 307 of MIL-STD-202 using a test current of 1 Ampere D.C. Measurements shall be taken as illustrated in Figure I and shall meet the performance requirements of Paragraph 3.5.8.
- 4.6.9 Current Overload. Mated contacts shall be series wired and subjected to a D.C. current overload of 125% of rated current (3.75 Amperes) for a period of 2 hours. At the end of this time, the current shall be immediately increased to 150% of rated current (4.5 Amperes) for a period of 5 minutes, then removed. After cooling to room temperature, contacts shall meet the performance requirements of Paragraph 3.5.9.
- 4.6.10 Durability. Connectors shall be mated and unmated with a corresponding blade header assembly a total of 100 times at a rate not exceeding 10 cycles per minute. Upon completion, contacts shall meet the performance requirements of Paragraph 3.5.10.
- 4.6.11 Physical Shock. Mated connector assemblies held together by normal means shall be subjected to Physical Shock in accordance with Method 213, Test Condition B of MIL-STD-202. Contacts shall be wired in series, energized with .1 Ampere D.C. and monitored for loss of continuity longer than 1 microsecond duration and shall meet the performance requirements of Paragraph 3.5.11.
- 4.6.12 Vibration. Mated connector assemblies, held together by normal means, shall be subjected to vibration in accordance with Method 204, Test Condition B of MIL-STD-202. Contacts shall be monitored for loss of continuity longer than 1 microsecond duration and shall meet the performance requirements of Paragraph 3.5.12.

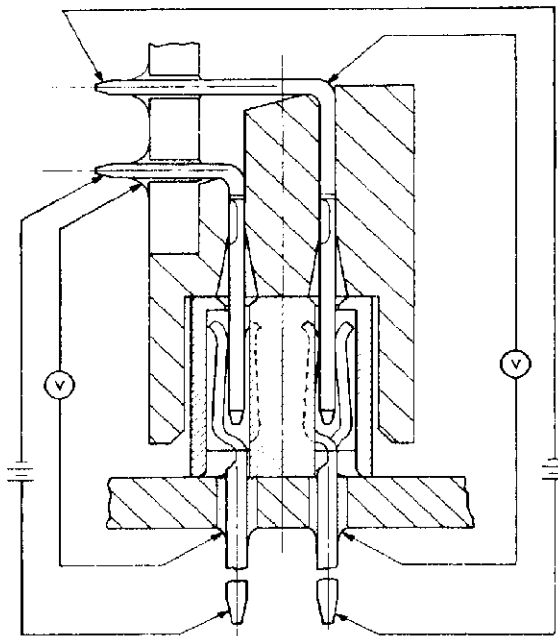
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4.6.13 Thermal Shock. Unmated connectors shall be subjected to thermal shock in accordance with Method 107, Test Condition A of MIL-STD-202 except the high temperature limit shall be +105°C. Upon completion of test, connectors shall meet the performance requirements of Paragraph 3.5.13.

4.6.14 Salt Spray. Unmated connectors shall be subjected to salt spray corrosion in accordance with Method 101, Test Condition B of MIL-STD-202. Immediately after exposure, all surfaces of the test specimens shall be thoroughly washed in tap water and dried in an air circulating oven at +100°F for a period of 24 hours. Upon completion, connectors shall meet the performance requirements of Paragraph 3.5.14.

4.6.15 Humidity. Unmated connectors shall be subjected to a relative humidity of 90-95% at 40°C for 96 hours, in accordance with Method 103, Test Condition B of MIL-STD-202. Upon completion, measurements shall meet the performance requirements specified in Paragraph 3.5.15.

FIGURE I  
CONTACT RESISTANCE



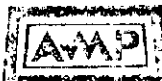
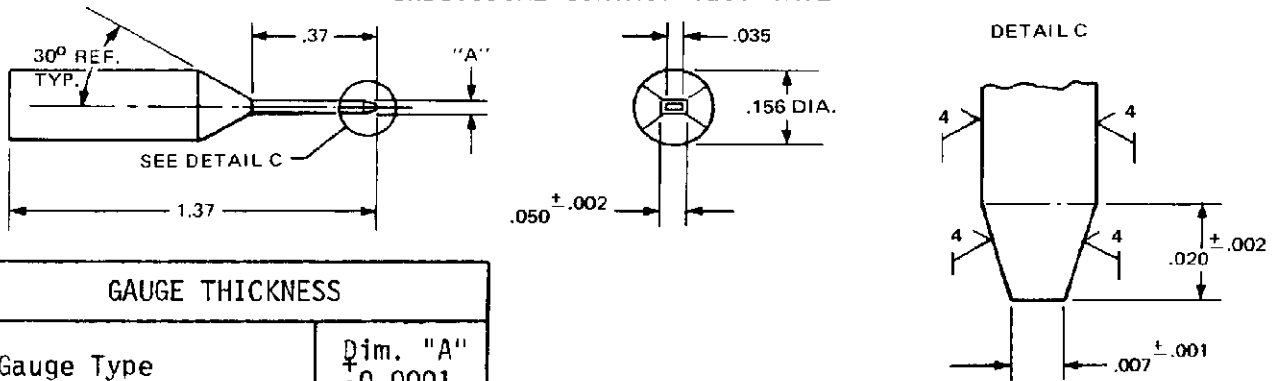
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FIGURE II

INDIVIDUAL CONTACT TEST GAGE



GAUGE THICKNESS	
Gauge Type	Dim. "A" ±0.0001
Individual Contact Separation Gage	0.0191"

NOTES:

Finish: Only the working surfaces designed  $\sqrt{4}$  shall be finished to 4 microinches. They shall be finished to 0.37 inch from end.


Tolerances: Unless otherwise specified, 0.00 = ±0.02, 0.000 = ±0.005. Remove burrs, break sharp edges 0.015 R max.

Material: Hardened tool steel, Rockwell "C" 63-64.

FIGURE III

REQUIRED HOLE DIAMETER TOLERANCES FOR  
ECONOMATE II 0.025 INCH SQUARE ACTION PIN

Type Hole	Rec'd Drill Size	Drilled Hole Dia. ± 0.0010	Plating Thickness		Hole Diameter		Copper Hardness (Knoop)	Pad Diameter Minimum
			Copper	Tin/Lead	After Plating	After Reflow		
A	1.15 mm	0.0453	0.001-0.003	0.0003 minimum	0.037-0.043	0.036-0.043	150 maximum	0.062
Z	1.15 mm	0.0453	Not Plated Thru					0.065

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