

108-9,015

NUMBER

Customer Release

AMP SECURITY CLASSIFICATION

PRODUCT SPECIFICATION

DUO-TYNE LEAF CONNECTORS, GENERAL PURPOSE, ELECTRICAL CONNECTORS
-65° C. TO +105° AMBIENT OPERATING TEMPERATURE

1. SCOPE:

1.1 This specification describes the electrical and mechanical performance requirements for the A-MP Duo-Tyne Leaf male and Duo-Tyne Leaf female connectors. This assembly is used where an inter-connection in wiring is required. Normal application would be to use as a rack and panel connector.

2. APPLICABLE DOCUMENTS:

2.1 The following documents and standards of the issue indicated form a part of this specification to the extent as specified herein:

MIL-G-45204	Gold Plating - Electrodeposited
MIL-M-19833	Molding and Molded Plastic Parts, Dialyl Phthalate, Thermosetting
MIL-M-20693A	Molding Plastic, Polyamide
MIL-W-16878D	Wire, Electrical, 600 Volt
MIL-STD-202B	Test Methods for Electronic and Electrical Component Parts
QQ-N-290	Nickel Plating - Electrodeposited
QQ-P-330	Phosphor Bronze
OS 12302	Connector, Electrical Removable Contact, Panel Type, dtd. 5-21-62
OS 12346	Connector, Electrical Single-Pin, Removable Contact Panel Type, dtd. 5-21-62

3. REQUIREMENTS:

3.1 DEFINITIONS - For the purpose of this specification, the following definitions shall apply:


3.1.1 MALE - This portion of the connector accommodates the Duo-Tyne Leaf male contact. This connector is produced in a 20 position housing.

3.1.2 FEMALE - This portion of the connector accommodates the Duo-Tyne Leaf female contact. The plastic housing is assembled into a metallic grid plate. One grid plate with twenty housings are required to mate with a 20 position male connector.

3.2 MATERIALS - Materials used shall be as specified herein; however, if a substitute material is used it shall meet all the performance and environmental tests of this specification.

3.2.1 MALE HOUSING - Materials used for the male housing shall conform to MIL-M-19833, Type GDI-30F.


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		A	Revised per ECN 1715	S.I.	REV	8-1-63	SHEET		NAME		PRODUCT SPECIFICATION FOR		
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- 3.2.2 FEMALE HOUSING - Materials used for the female housing shall conform to MIL-M-20693.
- 3.2.3 CONTACTS - Materials used for the contacts shall conform to QQ-P-330. Contacts are plated .00003 min. gold over .00005 min. nickel. Gold plating conforms to MIL-G-45204, and nickel plating conforms to QQ-N-290.
- 3.3 ELECTRICAL CHARACTERISTICS - Unless otherwise stated, the maximum current rating for all contacts shall be 4 amps.
 - 3.3.2 OPERATING TEMPERATURE - Connector assemblies shall have a continuous maximum operating temperature of +105° C. and -65° C.
- 3.4 DESIGN AND CONSTRUCTION:
 - 3.4.1 CONNECTOR DESIGN - Connector bodies shall be of the design so that they will not chip, crack, or break during assembly or in normal service. Dimensions shall be in accordance with the applicable product drawing.
 - 3.4.2 CONTACT DESIGN - Contacts shall be of the dimensions specified by the applicable product drawing and meet the performance requirements of this specification.
 - 3.4.3 CONTACT IDENTIFICATION - The contact location shall be marked on both faces of the male block. The grid plate which accepts the female housing shall have contacts 1, 10, 11 and 20 identified on both faces. Marking shall be permanent and be legible after all environmental testing required by this specification.
 - 3.4.4 CONTACT FINISH - The contact finish shall be smooth, free of shear lines, tear out and shall show no signs of porosity or surface cracks.
- 3.5 PERFORMANCE:
 - 3.5.1 INSULATION RESISTANCE - When connectors are tested as specified in 4.4.2, the insulation resistance shall be greater than 50,000 megohms.
 - 3.5.2 HIGH POTENTIAL VOLTAGE - The connectors shall show no evidence of breakdown or flashover when tested to 1,800 volts RMS in accordance with 4.4.3.

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3.5.2.1 HIGH POTENTIAL - ALTITUDE - Completely wired and assembled connectors shall show no evidence of breakdown when tested in accordance with 4.4.3.1. Test voltages and altitudes are listed in the following table:

TABLE I
TEST VOLTAGES (AC-RMS)

ALTITUDE (Feet)	VOLTAGE
25,000	1,000
50,000	675
70,000	450
100,000	250

3.5.3 RESISTANCE OF CONTACTS - When tested as specified in 4.4.4, the resistance of contacts at 25° C. ±3° C. shall be as specified in Table II. Test amperage shall be 4 amps.

TABLE II
RESISTANCE OF CONTACTS

Wire Sizes	Initial	After Salt Spray
24 thru 18	15 millivolts	20 millivolts

3.5.4 VIBRATION - When tested in accordance with 4.4.5, connectors shall not crack or break and there shall be no loosening of parts. Connectors shall be in full engagement during vibration. Interruption of electrical continuity shall not exceed one (1) microsecond.

3.5.5 INDIVIDUAL CONTACT ENGAGING & SEPARATING FORCES - When tested in accordance with 4.4.6, the individual engagement force shall be a maximum of twelve (12) ounces, separation force shall be a minimum of two (2) ounces.

3.5.5.1 PROBE DAMAGE - When tested in accordance with paragraph 4.4.6.1, there shall be no damage to the female contact which would prevent the contact from meeting the requirements of paragraph 3.5.5.

3.5.6 CONNECTOR MATING & UNMATING FORCES - When the completely wired connector is tested in accordance with 4.4.7, of this specification, the maximum average mating force per contact shall be one (1) pound, the minimum average unmating force shall be one-quarter (1/4) pound.

3.5.7 DURABILITY - When tested in accordance with 4.4.8, mated pairs of fully assembled connectors shall show no mechanical or electrical defects.

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3.5.8 TEMPERATURE CYCLING - After testing in accordance with 4.4.9, and after subjection to the temperature extremes shown in Table III, connectors shall show no evidence of cracking, fracture, or other damage detrimental to the operation of the connector. The connectors shall be capable of being mated and unmated at the specified temperature.

TABLE III

TEMPERATURE CYCLING EXTREMES

<u>Extremes</u>	<u>Degrees C.</u>
Low	+0
	-65 -3
High	+3
	105 -0

- 3.5.9 CORROSION - After being tested in accordance with 4.4.10, their shall not be excessive corrosion which would prevent the contact from meeting the requirements of 3.5.3 and 3.5.5.
- 3.5.10 SHOCK - During and after testing in accordance with 4.4.11, connectors shall show no signs of damage. Interruption of electrical continuities shall not exceed one (1) microsecond.
- 3.5.11 HUMIDITY - (Moisture Resistance) - When tested in accordance with 4.4.12, the initial insulation resistance shall be greater than 50,000 megohms. The final insulation resistance shall be greater than 5,000 megohms after the connector has dried for a period of 1 to 3 hours at room temperature without forced drying.
- 3.5.12 CONTACT RETENTION IN HOUSINGS - The contact shall withstand an initial axial load of ten (10) pounds minimum retention and after ten extractions with the applicable tool the retention shall not be less than eight (8) pounds when tested in accordance with 4.4.13.
- 3.5.13 INSERT RETENTION - When tested in accordance with 4.4.14, no insert shall push out of its respective cavity in the grid plate when a force of twenty (20) pounds is applied.

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3.6 WORKMANSHIP - Details of workmanship shall be in accordance with high-grade manufacturing practices for similar connectors. All sharp corners shall be broken and shall be smooth, all surfaces shall be free from porosity, blow holes, burrs, and cracks.

4. QUALITY ASSURANCE PROVISIONS:

4.1 TEST CONDITIONS - Unless otherwise stated herein, tests and examinations required by this specification shall be made under any combination of conditions within the range below. Any specified condition shall not affect the other two ambient ranges.

Temperature: 20° to 30° C.
Relative Humidity: 30 to 80 percent
Barometric Pressure: 24 to 31 inches of mercury

4.2 TEST SAMPLES - Completely wired connectors shall be tested as indicated in Table IV. Contacts shall be crimped on #24 wire conforming to MIL-W-16878, Type B.

4.3 TEST REPORT - Test report shall state the actual values obtained where applicable.


4.4 TEST METHODS:

4.4.1 EXAMINATION OF PRODUCT - Connectors shall be examined for compliance with the construction and workmanship specified herein (see 3.6).


4.4.2 INSULATION RESISTANCE - The insulation resistance shall be tested in accordance with Method 302, Test Condition B of MIL-STD-202. The insulation resistance shall be measured separately between any pair of contacts, between the body and any contact and between the grid plate and any contact. Connectors shall be unmated. (See 3.5.1).

4.4.3 HIGH POTENTIAL - The connectors shall be tested in accordance with Method 301 of MIL-STD-202. The test voltage shall be applied between the closest contacts gradually at the rate of approximately 500 volts each second until the voltage specified in 3.5.2 is reached. Connectors shall be mated.

4.4.3.1 DIELECTRIC WITHSTANDING VOLTAGE ALTITUDE - Connectors shall be placed in a suitable chamber at room temperature and tested at sea level, 25,000 50,000, 70,000 and 100,000 feet. Testing shall be in accordance with Method 301 of MIL-STD-202. Values specified in Table I shall be met. Connectors shall be mated. (See 3.5.2.1).

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- 4.4.4 RESISTANCE OF CONTACTS - Potential drop across mated pairs of male and female contacts shall be measured using a test current of 4 amps. Measurements shall be taken after the temperature of the wire has stabilized and readings shall not exceed those specified in Table II. The points of measurement shall be as shown in Figure 1. (See 3.5.3).
- 4.4.5 VIBRATION - The completely mated connector assembly shall be vibrated in accordance with Method 204, Condition D of MIL-STD-202. All contacts shall be wired with the appropriate size wire. The connector assembly shall be series connected and energized with 0.1 ampere flowing through the contacts. Contacts shall be monitored for continuity during and after the test. Loss of continuity greater than one micro-second constitutes a failure. Wires shall be supported on a stationary frame not closer than 12 inches from the connectors. Following this test, the contacts shall be subjected to the individual contact engaging and separating force test of 4.4.6. (See 3.5.4 & 3.5.5).
- 4.4.6 INDIVIDUAL CONTACT ENGAGEMENT & SEPARATION FORCES - Using a steel gage, (nominal thickness of the male contact), the female contacts shall be measured for engagement forces. The rate of lead shall be approximately one pound per second. Values specified in paragraph 3.5.5 shall be met.
 - 4.4.6.1 PROBE DAMAGE - This test shall be performed with the insert mounted in a 1/8 metal panel and the female contact in place. A test probe of hardened steel having a thickness equal to the nominal dimensions of the mating male contact shall be inserted into the female contact to a depth of 3/16 inch. A bending moment measured from the face of the insert of 1/2 inch pounds \pm 10% shall be applied to the probe. The connector shall be rotated in one direction through 360° so that a uniform force is applied to the inside surface of the female contact. Upon completion of this test, the female contact shall meet the requirements of paragraph 3.5.5.1.
- 4.4.7 CONNECTOR MATING & UNMATING FORCES - A completely wired connector assembly shall be mated and unmated for this test. The force required to mate and unmate the connector shall be divided by the number of contacts. Values obtained shall not exceed those specified in 3.5.6.
- 4.4.8 DURABILITY - The connector assembly shall meet the requirements of 3.5.3 and 3.5.5 after being subjected to 500 insertions at a rate 400 to 600 cycles per hour. (See 3.5.7).

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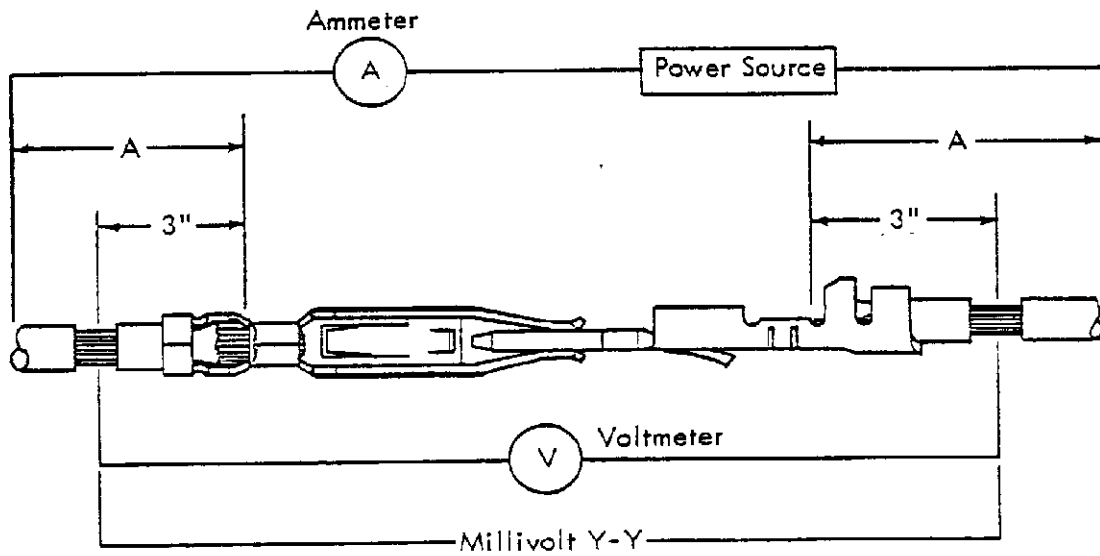
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- 4.4.9 TEMPERATURE CYCLING - The mated connector assembly shall be subjected to temperature cycling in accordance with Method 102, Test Condition C of MIL-STD-202, except that the high temperature shall be +105° C. The tests for mating shall be conducted during the fifth cycle of this test. (See 3.5.8).
- 4.4.10 SALT SPRAY - The connector assembly shall be subjected to the salt spray test in accordance with Method 101, Test Condition B of MIL-STD-202. Immediately after exposure, the connectors shall be washed and dried, then subjected to the contact resistance test of 3.5.3 and the individual contact engaging and separating force test of 3.5.5. (See 3.5.9).
- 4.4.11 SHOCK - The mated connector assembly shall be subjected to the shock test in accordance with Method 202 of MIL-STD-202. The connector assemblies shall be series wired and energized with 0.1 ampere flowing through the contacts. The contacts shall be monitored during and after the test. The assembly shall be subjected to a transient decelerating force provided by securing them to sufficient mass, and dropping the assembly through such a height that when decelerated by resilient impact, a deceleration of 50 gravity units shall be obtained. The shock test shall be repeated in each of the referenced 90 degree axis position. Loss of continuity greater than one micro-second constitutes a failure. (See 3.5.10).
- 4.4.12 HUMIDITY - (Moisture Resistance) - The mated connector assembly shall be tested in accordance with Method 106A of MIL-STD-202 with the following exceptions.
 - 1. Omit Step 7B.
 - 2. Omit paragraph 2.6.1 of Method 106.
 - 3. Final measurements shall be made upon completion of testing after the connector has dried for 1 to 3 hours without forced drying.
- 4.4.13 CONTACT RETENTION IN HOUSINGS - One half of the contacts in the connector shall be extracted ten times using the applicable extraction tool. The other half of the contacts shall be tested "as is". The connector shall be mounted in an applicable fixture and a straight axial load applied to the contact. The load or force shall be applied at the rate of one pound per second. Values obtained shall be in accordance with those specified in 3.5.12.
- 4.4.14 INSERT RETENTION - Individual female inserts shall be tested for retention. The grid plate assembly shall be placed in a suitable fixture and a force of twenty (20) pounds applied on the mating face. No inserts shall break or push out of its respective cavity of the grid plate. The values shall not be less than those specified in 3.5.13.

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- A 3 foot minimum length of continuous lead (for heat dissipation).
- Y-Y Measure across the contact wire crimps.

NOTE: The resistance of six (6) inches of wire shall be measured and that amount deducted from the total value so as to show only the resistance of a crimp and friction joint. The probe area on the wire shall be soldered so as to eliminate variables in contact resistance.

FIGURE I
MEASURING CONTACT RESISTANCE


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TABLE IV
QUALIFICATION TEST, CONNECTORS

REQUIREMENT	PARAGRAPH	SAMPLE GROUPS (2 Each)	
		1	2
Examination of Product	4.4.1	X	X
Insulation Resistance	3.5.1	X	X
High Potential	3.5.2	X	X
High Potential - Altitude	3.5.2.1	X	X
Temperature Cycling	3.5.8	X	X
Probe Damage	3.5.5.1	X	X
Contact Resistance	3.5.3	X	X
Connector Mating & Unmating Forces	3.5.6	X	X
Contact Engaging & Separation	3.5.5	X	X
Durability	3.5.7	X	X
Corrosion	3.5.9	X	
Humidity	3.5.11		X
Vibration	3.5.4	X	X
Shock	3.5.10	X	X
Contact Retention in Cavity	3.5.12	X	X
Insert Retention	3.5.13	X	X
Examination of Product	4.4.1	X	X

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