AEROSPACE STANDARD

AS81714	REV. B

Issued 2004-04
Revised 2014-09

Superseding AS81714A

Terminal Junction System (TJS), Environment Resistant
General Specification For

FSC 5940

RATIONALE

Limited Scope revision required to address AS81714-A1 contact resistance limits for wire size 28 in Table 2.

1. SCOPE

This specification covers Terminal Junction System (TJS) components which are used for interconnection of wiring and incorporation of passive components (see 6.1). These environment resistant components have in common the use of crimp type external pin contacts in accordance with AS39029/1 for Series I or crimp type external socket contacts in accordance with AS39029/22 for Series II. This family of TJS components is designed to operate continuously over a temperature range of -65 to 200 °C, using any combination of temperatures generated by the electrical load and ambient temperature so that the maximum internal hot spot, combined temperature, will not exceed the maximum specified for the class of TJS component, unless otherwise specified (1.2, 3.1). The components making up the system and covered by this specification include:

a. Terminal junction bussing blocks (6.8.2)

   (1) Feedback type (6.8.2.1)

   (2) Feedthrough type (6.8.2.2)

b. Racks (mounting holders) for blocks (6.8.3)

c. Brackets, block mounting (6.8.4)

d. Wire in-line junctions (6.8.5)

e. Grounding terminal (6.8.6)

f. Grounding blocks (6.8.7)

g. Electronic blocks (6.8.8)

h. Electronic in-line junctions (6.8.9)

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http://www.sae.org/technical/standards/AS81714B

1.1.1 CTS

The TJS components conform to the requirements of MIL-HDBK-1277 and MIL-HDBK-454.

1.2 Classification

1.2.1 Terminal junction components fabricated to this specification are classified as follows:

a. Series. The Series I and II TJS components are not interchangeable or intermateable.

Series I. External pin contact crimped on wire.

Series II. External socket contact crimped on wire.

b. Classes. Terminal junction components described herein are Class D. Classes A, B, and C components are inactive for new design. Class D components shall be used for direct Government acquisition. Appendix A provides performance tests and other information relating to Classes A, B, and C. Appendix A indicates the relationship between Class D part numbers and the superseded part numbers of Classes A, B, and C. Series II components of AS81714 meet Class D environmental requirements.

1.3 Marking Identification

The components covered by this specification shall be identified by a part number, as shown by the applicable detail specification. Series I components shall be identified as in the following examples, or as otherwise specified (3.1).

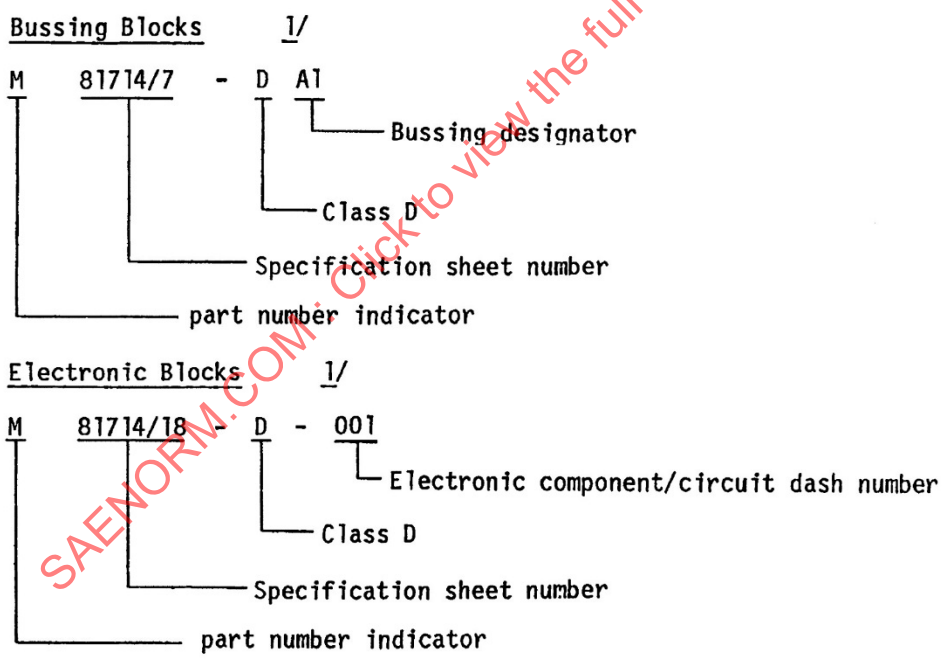


FIGURE 1 – SERIES I COMPONENT MARKING STRUCTURE (SEE 3.1)

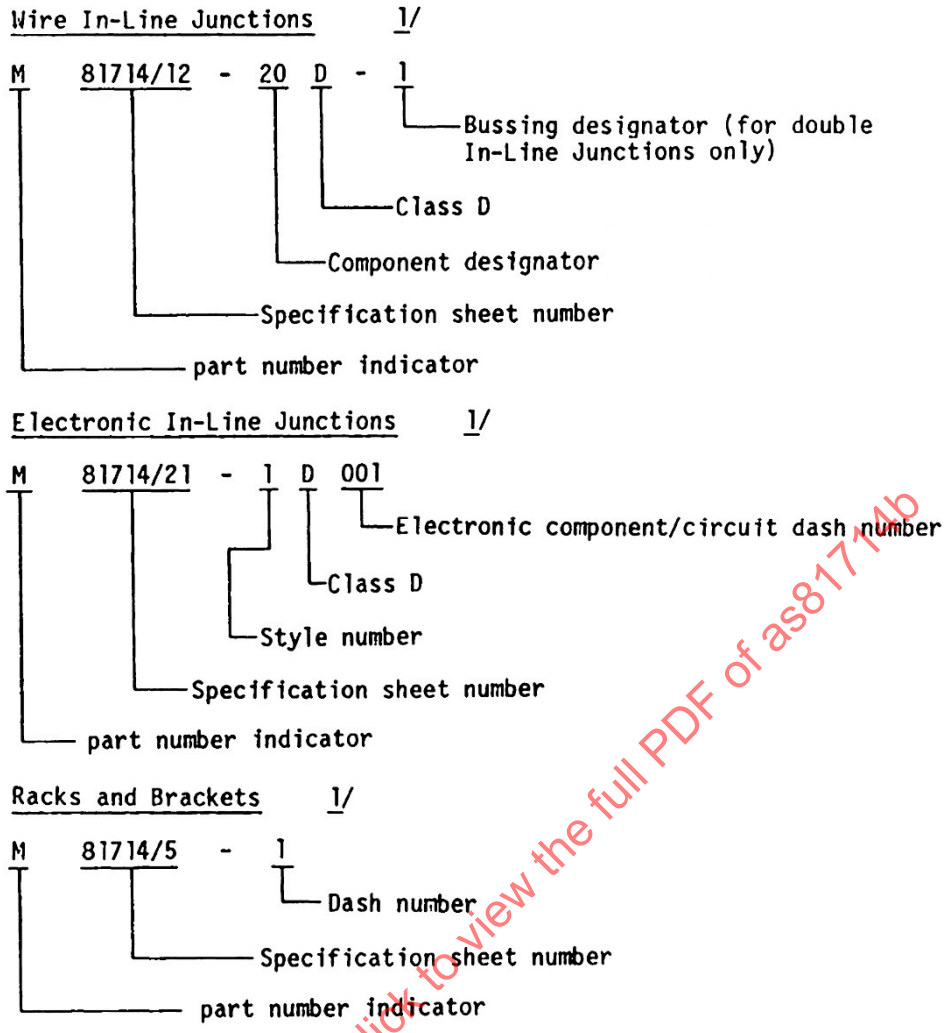


FIGURE 1 (CONTINUED) – SERIES I COMPONENT MARKING STRUCTURE (SEE 3.1)

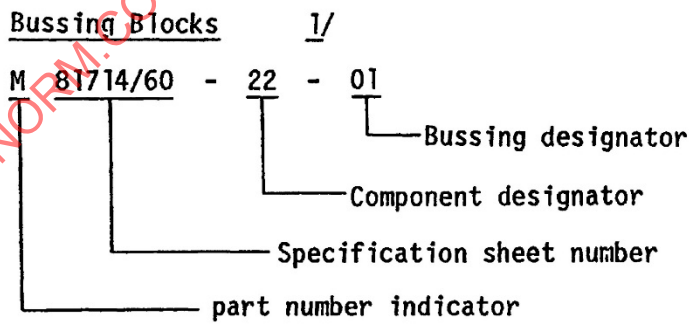
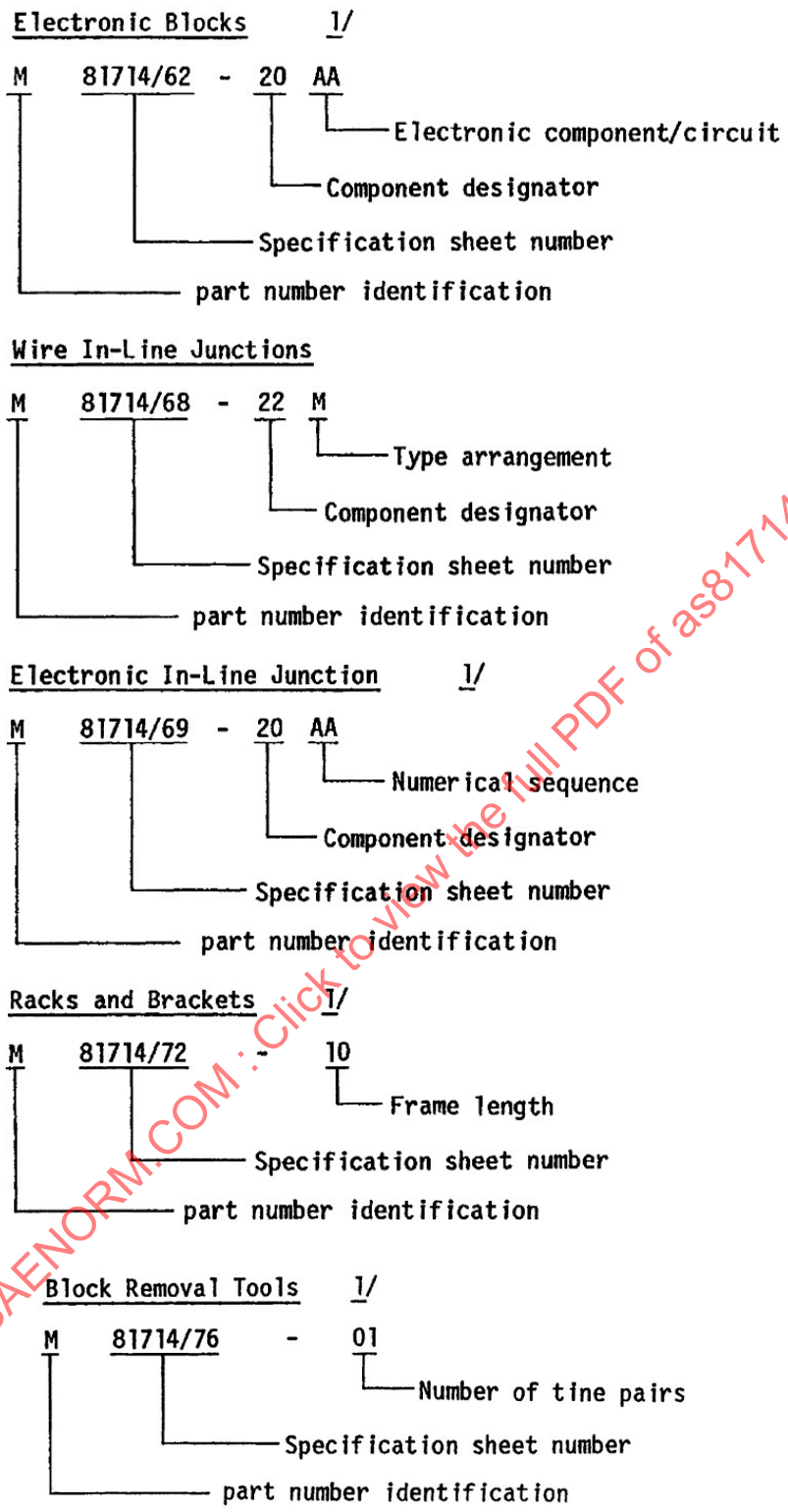


FIGURE 2 – SERIES II COMPONENT MARKING STRUCTURE (SEE 3.1)



1/ The part number shall be printed as shown in the above examples, but without the spaces shown.

FIGURE 2 (CONTINUED) – SERIES II COMPONENT MARKING STRUCTURE (SEE 3.1)

1.3.1 Component Designator

A different component designator is required for each component having identical external contacts and for each combination of different contacts used in a block.

1.3.2 Bussing and Circuit Designator

The bussing and circuit designators shall be as shown on the applicable detail specification (3.1).

1.3.3 Voltage Rating

The maximum working voltages shall be as shown in Table 13.

1.4 External Contact Conductor Size Range

Each external contact with the indicated dash number accommodates the range of conductor sizes specified in Table 1.

1.4.1 Grommet Wire Sealing Ranges

For TJS components, each grommet aperture for a specified contact dash number seals on the O.D. range of smooth finished wires specified in Table 1.

CAUTION: WHEN SELECTING WIRE REQUIRING SEALING, THE FINISHED DIAMETER SHALL BE WITHIN THE O.D. RANGE SHOWN IN TABLE 1.

TABLE 1 – WIRE RANGE ACCOMMODATIONS

Contact M39029/1	Mating End Size	Wire Barrel Size	Conductor Size	O.D. Range of Finished Wires (inch)
-507	20	22D	28 26 24 22	0.030-0.054
-100	16	22	26 24 22	0.034-0.060
-101	16	20	24 22 20	0.040-0.083
-102	14	16	20 18 16	0.065-0.109
-103	12	12	14 12	0.097-0.142
Contact M39029/22	Mating End Size	Wire Barrel Size	Conductor Size	O.D. Range of Finished Wires (inch)
-191	22	22	26 24 22	0.030-0.060
-192	20	20	24 22 20	0.040-0.083
-193	16	16	20 18 16	0.065-0.109
605	12	12	14 12	0.097-0.142

2. REFERENCES

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of the other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references 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.

The components requirements shall be as specified herein and in accordance with the applicable detail specification. In the event of any conflict between the requirements of this specification and the detail specification, the latter shall govern (see 2.4.2).

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AIR1351	Manufacturers' Identification of Aerospace Electrical and Electronic Wiring Devices and Accessories
AS22759	Wire, Electrical, Fluoropolymer-Insulated, Copper or Copper Alloy
AS39029	Contacts, Electrical Connector, General Specification For
AS39029/1	Contacts, Electrical Connector, Pin, Crimp Removable (for AS81714 Terminal Junction System)
AS39029/22	Contacts, Electrical, Connector, Socket, Crimp Removable (for AS81714 Terminal Junction System Series II and MIL-C-81511 Series 3 and 4 Class L Connectors)
AS50881	Wiring Aerospace Vehicle
AS81044	Wire, Electrical, Crosslinked Polyalkene, Crosslinked Alkane-Imide Polymer, or Polyarlyene Insulated, Copper or Copper Alloy
AS85049/143	Connector Accessories, Backshell, Strain Relief, Category 4C, for AS81714, Size 22, 20 and 16 Terminal Junction Blocks
AMS1424	Fluid, Deicing/Anti-Icing, Aircraft, SAE Type I

AS81714 Detail Specifications:

AS81714/1	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Size 22, Series I
AS81714/2	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Size 20, Series I
AS81714/3	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Size 16, Series I
AS81714/4	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Size 12, Series I
AS81714/5	Terminal Junction System, Rack Assembly, Track Feedback Type, Series I
AS81714/6	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedthru Type, Size 22, Series I

AS81714/7	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedthru Type, Size 20, Series I
AS81714/8	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedthru Type, Size 16, Series I
AS81714/9	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedthru Type, Size 12, Series I
AS81714/10	Terminal Junction System, Rack Assembly, Track, Feedthru Type, Series I
AS81714/11	Terminal Junction System, Terminal Junction Blocks, Sectional, Wire In-Line Junctions, Series I
AS81714/12	Terminal Junction System, Terminal Junction Blocks, Sectional, Wire In-Line Junctions, Double, Series I
AS81714/14	Terminal Junction System, Rack Assembly, Track, Feedthru Type, Light Weight, Series I
AS81714/15	Terminal Junction System, Grounding Stud, Series I
AS81714/16	Terminal Junction System, Rack Assembly, Track, Feedback Type, Light Weight, Series I
AS81714/17	Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Size 22D, Series I
AS81714/18	Terminal Junction System, Terminal Junction Blocks, Sectional, Modules, Electronic, Feedback Type, Size 20, Series I
AS81714/19	Terminal Junction System, Terminal Junction Blocks, Sectional, Modules, Electronic, Feedback Type, Size 16, Series I
AS81714/20	Terminal Junction System, Terminal Junction Blocks, Sectional, Modules, Electronic, Feedback Type, Size 12, Series I
AS81714/21	Terminal Junction System, Terminal Junction Blocks, Electronic, In-Line Junctions, Integral Diode, Series I
AS81714/22	Terminal Junction System, Terminal Junction Blocks, Electronic, In-Line Junction, Integral Resistor, Series I
AS81714/23	Terminal Junction System, Terminal Junction Blocks, Electronic, In-Line Junctions, Integral Fuse, Series I
AS81714/24	Terminal Junction System, Terminal Junction Blocks, Sectional, Electronic, In-Line Junctions, Double, Integral Diode(s), Series I
AS81714/25	Terminal Junction System, Terminal Junction Blocks, Sectional, Modules, Electronic, Feedback Type, Size 20-1, Series I
AS81714/26	Terminal Junction System, Terminal Junction Blocks, Sectional, Modules, Electronic, Feedback Type, Size 20-2, Series I
AS81714/27	Terminal Junction System, Terminal Junction Blocks, Sectional, Grounding Modules, Stud Type Mounting, Series I
AS81714/28	Terminal Junction System, Terminal Junction Blocks, Grounding Modules, Integral Bracket Mounting, Series I

AS81714/29 Terminal Junction System, Bracket, Block Mounting, Series I

AS81714/30 Terminal Junction System, Terminal Junction Blocks, Modules, Electronic, Feedback Type, Sizes 20-3, 20-4, 20-5 Vertical Mounting with Integral Bracket, Block Mounting, Series I

AS81714/31 Terminal Junction System, Terminal Junction Blocks, Modules, Feedback Type, Sizes 20-6, 20-7, 20-8 Horizontal Mounting with Integral Bracket, Series I

AS81714/60 Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Series II

AS81714/61 Terminal Junction System, Terminal Junction Blocks, Sectional, Bussing Modules, Feedback Type, Series II

AS81714/63 Terminal Junction System, Terminal Junction Blocks, Sectional, Grounding Modules, Stud and Flange Type Mounting, Series II

AS81714/65 Terminal Junction System, Terminal Junction Blocks, Sectional, Wire In-Line Junctions, Series II

AS81714/67 Terminal Junction System, Rack Assembly, Track, Feedback Type, Series II

AS81714/69 Terminal Junction System, Block Removal Tools, Series II

2.2 ASQ Publications

Available from American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203, Tel: 800-248-1946 (United States or Canada)), 001-800-514-1564 (Mexico) or +1-414-272-8575 (all other locations), www.asq.org.

ASQC Z1.4 Sampling Procedures and Tables for Inspection by Attributes

2.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D3951 Commercial Packaging

2.4 ECA Publications

Available from Electronic Component Association (ECA), 2500 Wilson Boulevard, Arlington, VA 22201-3834, Tel: 703-907-7500, www.eia.org.

ECA EIA-364-03 Altitude Immersion Test Procedure for Electrical Connectors

ECA EIA-364-06 Contact Resistance Test Procedure for Electrical Connectors

ECA EIA-364-10 Fluid Immersion Test Procedure for Electrical Connectors

ECA EIA-364-14 Ozone Exposure Test Procedure for Electrical Connectors

ECA EIA-364-20 Withstanding Voltage Test Procedure for Electrical Connectors, Sockets and Coaxial Contacts

ECA EIA-364-21 Insulation Resistance Test Procedure for Electrical Connectors, Sockets, and Coaxial Contacts

ECA EIA-364-23 Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets

ECA EIA-364-26 Salt Spray Test Procedure for Electrical Connectors, Contacts and Sockets

ECA EIA-364-27 Mechanical Shock (Specified Pulse) Test Procedure for Electrical Connectors

ECA EIA-364-28 Vibration Test Procedure for Electrical Connectors and Sockets

ECA EIA-364-29 Contact Retention Test Procedure for Electrical Connectors

ECA EIA-364-31 Humidity Test Procedure for Electrical Connectors and Sockets

ECA EIA-364-32 Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors and Sockets

ECA EIA-364-54 Magnetic Permeability Test Procedure for Electrical Connectors, Contacts, and Sockets

2.5 NCSL Publications

Available from NCSL International, 2995 Wilderness Place, Suite 107, Boulder, CO 80301, Tel: 303-440-3339, www.ncsli.org.

NCSL Z540-1 General Requirements for Calibration Laboratories and Measuring and Test Equipment

2.6 U.S. Government Publications

Available from DLA Document Services, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6396, http://quicksearch.dla.mil/.

MIL-PRF-5606 Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance

MIL-DTL-5624 Turbine Fuel, Aviation, Grades JP-4 and JP-5

MIL-PRF-7808 Lubricating Oil, Aircraft Turbine Engine, Synthetic Base

MIL-DTL-22520 Crimping Tools, Terminal, Hand, Wire Termination, General Specification for

MIL-PRF-23699 Lubricating Oil, Aircraft Turbine Engines, Synthetic Base

MIL-DTL-45204 Gold Plating (Electrodeposited)

MIL-DTL-55330 Connectors, Electrical and Fiber Optic, Packaging of

MIL-DTL-81381 Wire, Electric, Polyamide Insulated, Copper or Copper Alloy

MIL-I-81969/8 Installing and Removal Tools, Connector Electrical Contacts

MIL-I-81969/14 Installing and Removal Tools, Connector Electrical Contacts

MIL-I-81969/16 Installing and Removal Tools, Connector Electrical Contacts

MIL-PRF-87937 Cleaning Compound, Aerospace Equipment

STANDARDS

Military

SD-6	Provisions Governing Qualification
MIL-STD-129	Military Marking for Shipment and Storage
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MIL-HDBK-454	Standard General Requirements for Electronic Equipment
MIL-STD-889	Dissimilar Metals
MIL-HDBK-1277	Splices, Chips, Terminals, Terminal Boards, Binding Posts, Terminal Junction System, Wire Caps, Electrical
MIL-STD-1285	Marking of Electrical and Electronic Parts
MS27488	Plug, End Seal, Electrical Connector

2.7 Order of Precedence

In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Detail Specification

The individual part requirements shall be as specified herein and in accordance with the applicable detail specification.

3.1.1 Precedence

In the event of conflict between this specification and the detail specification, the latter shall govern.

3.2 Qualification

TJS components furnished under this specification and the applicable detail specification shall be products which are qualified for listing on the applicable QPL (Qualified Products List).

3.3 Materials

Materials shall be as specified herein, however, when a definite material is not specified, materials used shall meet the performance requirements of this specification. Materials shall be fungus resistant meeting the recommended requirements of MIL-HDBK-454, Guideline 4. Approval of any constituent material shall not be construed as a guarantee for acceptance of the finished product.

3.3.1 Dissimilar Metals

When dissimilar metals are employed in intimate contact with each other, protection against electrolytic corrosion shall be provided as specified in MIL-STD-889.

3.3.2 Nonmagnetic Materials

All parts, including the racks, shall be made from materials which are classed as nonmagnetic (3.5.15).

3.3.3 Internal Contact Plating

Internal contacts shall be gold plated in accordance with MIL-DTL-45204, Type I, Grade C, Class 1 (50 µin (minimum)), over a Nickel underplating. Accessory members of the internal contact assembly need not be plated, but shall comply with the requirements for dissimilar metals (3.3.1). Silver plate or silver underplate shall not be used.

3.3.4 Internal Current Carrying Members

Internal current carrying members shall be copper alloy.

3.3.5 Housing

Housing shall be constructed of hard dielectric material.

3.3.6 Sealing Grommet

Sealing grommet shall be silicone or silicone blend elastomer bonded to the housing and shall seal the specified wire diameter ranges.

3.3.7 Cadmium Material

This document includes cadmium as a plating material in various detail specifications. The use of cadmium has been restricted and/or banned for use in many countries due to environmental and health concerns. The user should consult with local officials on applicable health and environmental regulations regarding its use.

3.4 Design and Construction

TJS components shall be designed and constructed to withstand normal handling incident to installation and maintenance in service. Controlled dimensions shall be as specified (3.1).

3.4.1 Contacts

External contacts shall be qualified to AS39029/1 or AS39029/22. The design of the internal contact and the housing in which it is installed shall be such that it assures a minimum of 0.035 inch of electrical engagement with the installed external contact.

3.4.2 Contact Retention Design

The contact retention system shall be designed to provide positive retention of the external contact to meet the minimum contact retention requirement (see 3.5.4). Inserting and removal of an external contact from these components shall be by the applicable MIL-I-81969 installing and removal tool for the entire range of wire outside diameters as specified in Table 1.

3.4.3 TJS Component Design (Current Carrying Devices)

These components shall comply with the applicable detail specification. Separate cavities shall be provided for all contacts and contact interconnections which are not electrically interconnected. Wire sealing grommets shall be bonded or molded to the housing. There shall be no air paths through the walls of the housing, either to the outside or between contacts which are not electrically interconnected.

3.4.4 Grommet Construction

The design of the grommet shall accommodate and seal on insulated wires having a smooth outside jacket and outside diameters within the range specified in Table 1. The openings in the grommets for the entrance of the contacts shall not be covered or closed by a solid membrane. The design of the external component shall permit installing and removal of individual contacts without damage to the sealing member, using the applicable installing and removal tools.

3.4.5 End Seal Plugs

The grommets shall be designed to accept sealing plugs in accordance with MS27488 in lieu of wire and contacts. When installing sealing plugs in the module grommets, the head of the sealing plug shall be inserted first. The sealing plug is designed for use with an unwired contact installed in module applications. The sealing plug shall be pushed into the grommet until the head is positioned against the end of the unwired contact.

3.4.6 Bussing Arrangement

The arrangement of internal contacts, bussing and circuitry shall be as specified (3.1 and 1.3).

3.4.7 Interchangeability

All TJS components having the same part number shall be completely interchangeable with each other with respect to installation (physical) and performance (function) as specified herein.

3.4.8 Internal Electronic Components

Ratings and characteristics of electronic components shall be in accordance with the electronic component specification (3.1). Class designator in the TJS part housing electronic components applies to the basic TJS parts (bussing block and wire in-line junctions) only. Electronic junctions shall be rated at the electronic component level or the basic TJS part level, whichever has the lesser requirement (4.4.1.1.5).

3.4.9 Pin Bus (Series II)

The pin bus shall be one piece construction or equivalent assembly.

3.5 Performance

TJS components with specified AS39029 contacts installed with the applicable MIL-I-81969 tool shall be designed to meet the performance requirements stated herein when tested in accordance with the specified methods of Section 4.

3.5.1 Resistance to Probe Damage (Series I)

When tested in accordance with 4.6.2, Series I internal contacts shall withstand the bending moment and depth of test probe insertion without evidence of damage that would interfere with mechanical performance and shall then comply with the contact resistance of 3.5.16 and low signal level contact resistance (3.5.17). Probe damage tests are not applicable to Series II components.

3.5.2 Maintenance Aging

Applicable TJS components shall conform to this specification after maintenance aging testing in accordance with 4.6.3 and shall meet the requirements of Table 8.

3.5.3 Contact Insertion and Removal Forces

The contact insertion and removal forces shall comply with the requirements of Table 8 while being subjected to the maintenance aging test in accordance with 4.6.3.

3.5.4 Contact Retention

When tested in accordance with 4.6.4, the axial displacement of the contacts with respect to the applicable component shall not exceed 0.012 inch.

3.5.5 Thermal Shock

When tested in accordance with 4.6.5, there shall be no damage detrimental to operation of the TJS components after being subjected to the temperature extremes of Table 10. There shall be electrical continuity on all contacts when measured at the high and low temperature extremes. The blocks shall meet the insulation resistance requirements of 3.5.11.

3.5.6 Dielectric Withstanding Voltage (DWV)

When tested in accordance with 4.6.6, components shall show no evidence of breakdown or flashover when subjected to the test voltages and altitude of Table 11. During application of test voltage the leakage current shall not exceed 2 mA. Corona shall not be considered as breakdown.

3.5.7 Fluid Immersion

After being subjected to fluid immersion in accordance with 4.6.7, components furnished hereunder shall comply with contact insertion and removal forces (3.5.3), and insulation resistance at ambient temperature (3.5.11.1). Nonmetallic parts shall show no evidence of cracking, chipping, swelling or loosening of bonds or seams which will adversely affect their performance.

3.5.8 Vibration

Items furnished under this specification shall not be damaged and there shall be no loosening of parts due to vibration. Blocks shall remain firmly fixed with relation to each other and the rack or bracket. There shall be no interruption of electrical continuity longer than 1 µs in duration during the vibration test, when performed in accordance with 4.6.8.

3.5.9 Mechanical Shock

Items shall not be damaged and there shall be no loosening of parts due to shock. Blocks shall remain firmly fixed with relation to each other and the rack or bracket. There shall be no interruption of electrical continuity longer than 1 µs during the exposure to mechanical shock, when performed in accordance with 4.6.9.

3.5.10 Humidity

When exposed to humidity in accordance with 4.6.10, the insulation resistance shall be a minimum of 100 MΩ measured at the completion of the tenth cycle of test while at 20 °C ± 5 °C and 95% relative humidity (R.H.).

3.5.11 Insulation Resistance

Insulation resistance shall be measured at room and elevated temperatures in accordance with 4.6.11.

3.5.11.1 At Room Condition

The insulation resistance at room temperature shall be not less than 5000 MΩ, when tested in accordance with 4.6.11.1.

3.5.11.2 At Elevated Temperature

The insulation resistance shall be not less than 50 MΩ at the specified high temperature, when tested in accordance with 4.6.11.2.

3.5.12 Salt Spray

Components with exterior metal parts and racks shall show no exposure of basis metal due to corrosion that will affect performance, when tested in accordance with 4.6.12.

3.5.13 Temperature Life

The TJS components shall perform satisfactorily after exposure to the temperature life test (4.6.13), and shall comply with insulation resistance at elevated temperature (3.5.11.2) and low signal level contact resistance (3.5.17) measured at room temperature.

3.5.14 Ozone Exposure

After being subjected to ozone in accordance with 4.6.14, there shall be no evidence of cracking of dielectric material or other damage which will adversely affect their performance.

3.5.15 Relative Magnetic Permeability

When tested in accordance with 4.6.15, the relative magnetic permeability shall not exceed 2.

3.5.16 Contact Resistance (for other than electronic components)

When tested in accordance with 4.6.16, the resistance across a series circuit of two external contacts of the same size and with same wire gage while they are carrying test current shall not exceed the values specified in Table 2.

3.5.16.1 Electronic Components

The resistance of electronic components shall be as specified in the internal passive component specification, taking into account the added resistance of the contacts (3.4.8).

3.5.17 Low Signal Level Contact Resistance (size 16 wire barrel and smaller)

When tested in accordance with 4.6.17, the low signal level resistance of a series circuit of two external contacts of the same size and with the same wire gage shall not exceed the applicable values specified in Table 3.

TABLE 2 - CONTACT RESISTANCE LIMITS

Contact			Wire Size	Test Current (amperes)	Resistance (millivolts drop maximum)	
Part No.	Mating End Size	Wire Barrel Size			Initial	After Condition
M39029/1 -507	20	22D	22 28	5.0 1.5	55 50	65 55
-100	16	22	22 26	5.0 2.0	45 40	50 45
-101	16	20	20 24	7.5 3.0	45 40	50 45
-102	14	16	16 20	13.0 7.5	50 45	55 50
-103	12	12	12 14	23.0 17.0	40 35	45 40
M39029/22 -191	22	22	22 26	5.0 2.0	70 60	80 70
-192	20	20	20 24	7.5 3.0	55 45	65 55
-193	16	16	16 20	13.0 7.5	50 45	60 55
605	12	12	12 14	23.0 17.0	60 45	70 65

TABLE 2A - CONTACT RESISTANCE
(BETWEEN BUSSED CONTACTS OF DIFFERENT GAGES)

Mating End Smaller Gage	Mating End Larger Gage	Wire Size Smaller Gage	Wire Size Larger Gage	Test Current (amperes)	Resistance (millivolts maximum)	
					Initial	After Conditioning
20	16	24	16	3.0	45	55
20	16	20	16	7.5	55	65
16	12	20	12	7.5	45	55
16	12	16	12	13.0	50	60

TABLE 3 - LOW SIGNAL LEVEL CONTACT RESISTANCE

Part No.	Contact Mating End Size	Wire Barrel Size	Wire Size	Contact Resistance (milliohms maximum)	
				Initial	After Conditioning
M39029/1 -507	20	22D	22 26 28	15 31 50	17 38 60
-100	16	22	22 26	15 31	17 38
-101	16	20	20 24	9 20	11 23
-102	14	16	16 20	5 13	8 16
M39029/22 -191	22	22	22 26	15 31	17 38
-192	20	20	20 24	9 20	11 23
-193	16	16	16 20	5 9	6 10

TABLE 3A - LOW SIGNAL LEVEL RESISTANCE
(BETWEEN BUSSED CONTACTS OF DIFFERENT GAGES)

Mating End Smaller Gage	Mating End Larger Gage	Wire Size Smaller Gage	Wire Size Larger Gage	Contact Resistance (milliohms maximum)	
				Initial	After Conditioning
20	16	24	16	20	23
20	16	20	16	9	11
16	12	20	12	9	10
16	12	16	12	5	6

3.5.18 Voltage Stability

The difference between the highest and lowest resistance values during the voltage stability test shall not exceed 4 mV, when tested in accordance with 4.6.18. The highest value shall not exceed the values specified in Table 2.

3.5.19 Internal Contact Durability

When tested in accordance with 4.6.19, Series I components shall be capable of 100 insertions and withdrawals of a probe without damage. After being subjected to durability testing, the components shall comply with contact resistance (3.5.16) and contact retention (3.5.4). When tested in accordance with 4.6.19.1, Series II components shall be capable of 100 insertions and withdrawals of a qualified AS39029/22 contact. After durability testing, the components shall comply with the contact resistance requirements per 3.5.16 and contact retention (3.5.4).

3.5.20 Oversize External (Series I) Contact Protection

When tested in accordance with 4.6.20, Series I components shall be designed to prevent the entrance of an oversize external contact.

3.5.21 Altitude Immersion

TJS components shall maintain a dielectric withstanding voltage at sea level as specified in Table 11 when tested in accordance with 4.6.21.

3.5.22 Contact Walkout

When tested in accordance with 4.6.22, contacts shall not become dislodged from their normal position and contact retention system shall suffer no functional damage and continue to meet the requirements of 4.6.4.

3.5.23 Retention System Fluid Immersion

When tested in accordance with 4.6.23, components shall meet the requirements of contact retention in 3.5.4. Effects of fluids on resilient sealing members shall not be a consideration during this test.

3.6 Marking

3.6.1 Identification Marking

The TJS components shall be marked in accordance with MIL-STD-1285 as specified. All markings shall be clear, sharply defined, and of a color which contrasts sharply with the background. Markings shall be legible at the end of all specified tests (3.1).

3.6.1.1 Classes A, B, and C (Series I)

Classes A, B, and C (Series I) part numbers which have been superseded and are inactive for new design may be included on the marking of a new component (see Appendix A).

3.6.1.2 Additional marking is permitted and shall meet the requirements herein.

3.6.2 Functional Marking

Top marking, cavity and circuit identification shall be as specified. All markings shall be clear, sharply defined and of a color which contrasts sharply with the background. Functional marking on bussed components shall be white and on electronic components shall be yellow. The bussing indicator line shall not be less than 0.010 inch width. Markings shall be legible at the end of all specified tests. SKT shall be marked on the face of the grommet to indicate the block accepts socket contact on the wire for Series II components.

3.6.3 Color Code

For Series I components, the color of the grommet shall be blue. For Series II components, the color of the grommet shall be reddish brown.

3.6.4 Manufacturer's Identification

Manufacturer's identification shall be in the form of a name, symbol or federal supply code for manufacturers (FSCM) and shall be located in the area specified in the detail specification (see 3.1). If an identification symbol is used, it shall be specified in AIR1351.

3.7 Workmanship

When examined in accordance with 4.6.1, all items furnished hereunder shall be free of foreign matter. Molded parts shall be free of cracks and sharp edges. Metal parts shall be free of burrs, sharp edges and cracks. Sealing members shall be free of tears and mold flash that will affect performance. TJS components shall be so designed that the contact openings for the entrance of the external contact and the contact retention system shall be free of foreign material, adhesive or any obstruction that would prevent smooth entrance and positive retention of the external contact.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

Unless otherwise specified herein, the contract or purchase order, the supplier is responsible for the performance of all contract inspection requirements. Except as otherwise specified herein, the contract or purchase order, the supplier may use any facilities suitable for the performance of the inspection requirements. The Qualifying Activity has the right to perform any of the inspections set forth in the standard where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for Compliance

All items must meet all technical requirements of the product standard. The inspection set forth in this standard shall become a part of the supplier's overall inspection system or quality program. The absence of any inspection requirements in the standard shall not relieve the supplier of the responsibility of assuring that all products comply with all requirements of the contract or purchase order. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the purchaser to acceptance of defective material.

4.1.2 Test Equipment and Inspection Facility

Test and measuring equipment and inspection facilities of sufficient accuracy, quality and quantity to permit performance of the required inspection shall be established and maintained by the supplier. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with ANSI/NCSL Z540-1 or equivalent standard.

4.1.3 Inspection Conditions

The conditions for the inspections are specified as applicable and all test data shall be compiled in accordance with SD-6.

4.1.4 Preparation of Samples

Items specified herein shall be wired with approximately 3 feet of wire, as applicable, from Table 1 and 4.4.1.1.1. Termination of wires to contacts shall be accomplished by using the appropriate MIL-DTL-22520 crimping tool. Contacts used to test TJS components shall have been qualified to AS39029. For bussing blocks, one contact cavity shall have the specified sealing plug. When installed, these end seal plugs shall have the knob end protruding in the grommet wire hole (see 3.4.5).

4.2 Classification of Inspection

The inspection of items procured under this specification shall be classified as follows:

a. Materials and design inspection (4.3)

b. Initial Qualification inspection (4.4)

c. Quality conformance inspection (4.5)

(1) Inspection of product for delivery (4.5.1)

(2) Inspection of preparation for delivery (4.5.2)

d. Retention of qualification (4.5.1.5.2)

4.3 Materials and Design Inspection

Materials and design inspection shall consist of certification that the materials and design used in fabricating the TJS components, as listed in 3.3 through 3.4.8, are in accordance with the applicable referenced standards, specifications or requirements prior to such fabrication. This certification shall be supported by verifying data and shall be furnished for initial and retention of qualification submittals.

4.4 Inspection

4.4.1 Initial Qualification Inspection

Initial qualification inspection shall consist of the examinations and tests performed in the sequence listed in Table 4 on the specified qualification test samples (4.4.1.1). The qualifying activity shall perform Group 1 and the suppliers shall perform Groups 2, 3, and 4. A request for qualification shall be made to the qualifying activity prior to initiating testing (see 6.5). Testing cannot begin until the supplier has received an authorization letter. The supplier is recommended to provide the qualifying activity a test plan based on the authorization letter to ensure the supplier and qualifying activity maintain communication and document changes as needed. The qualifying activity has the authority to modify the specification test requirements to resolve test failures/discrepancies and to wave testing to verify specific product manufacturing changes or qualifications by similarity. For each component tested the supplier shall use the same materials, manufacturing procedures, and methods of inspection as would be used to provide the component to a purchaser. Any change in the supplier's process control inspections, quality conformance inspections, or manufacturing control drawings (editorial changes are acceptable) without the express approval of the qualifying activity may result in loss of qualification for that product.

4.4.1.1 Qualification Test Samples

Samples for the qualification tests shall be as specified herein and in the authorization letter. Qualification by similarity samples shall be justified by the supplier. Blocks with racks or brackets may be qualified together provided the specified sampling requirements are met.

4.4.1.1.1 Wire Preparation

Two sets of wires shall be provided. One set, for electrical testing, shall include the smallest and largest conductor wire permitted by each qualified AS39029 contact size within the allowable O.D. range as specified in Table 1. The second set shall be maximum and minimum diameter wires used for environmental testing. Minimum diameter wire shall be qualified to MIL-W-81381/7, /8, /9, /10, or /21 or AS22759/32, /33, /44, /45, or /46. The maximum diameter wire shall be qualified to AS22759/16 or /17 for size 22D, AS22759/9, /10, /20, or /21 for size 22, or AS22759/7 or /8 for sizes 20, 16, and 12. The maximum and minimum wire shall be the largest and smallest outside diameter, respectively, within the wire range accommodations of Table 1, for each contact size. The contact shall be crimped on the wire with a qualified MIL-DTL-22520 tool.

4.4.1.1.2 Bussed Blocks

Bussing arrangements C1 or 38 of each basic Series I part number (3.1) will qualify all the bussing arrangements within that basic part number by similarity. Qualification of the most complicated bussing arrangement of each basic Series II part number will qualify all bussing arrangements within that basic part number by similarity.

4.4.1.1.2.1 Blocks, Group 1 and 2

For each group, two blocks mounted in racks or brackets shall be subjected sequentially to the Group 1 and 2 tests. One block shall be assembled with minimum wire and the other with maximum wire (4.4.1.1). One cavity in each block shall contain one MS27488 sealing plug.

NOTE: The racks used for the qualification of the blocks shall be qualified or shall be identical to those submitted for qualification under 4.4.1.1.3. Suppliers not producing racks shall submit substantiating certification data that the racks are qualified. For those blocks which require insulation resistance testing, an unplated or plated rack with conductive finish shall be used.

4.4.1.1.2.2 Blocks, Group 3

One block for each fluid specified (4.6.7), shall be subjected sequentially to the Group 3 tests. Half the contact cavities in each block shall be assembled with minimum diameter wire and half with maximum diameter wire (4.4.1.1.1).

4.4.1.1.3 Racks and Brackets, Group 4

Racks and brackets shall be subjected sequentially to the Group 4 tests. A minimum of two blocks shall be included in each rack and one block in each bracket. All finishes shall be tested.

NOTE: The blocks shall be qualified or shall be identical to those submitted for qualification under 4.4.1.1.2. Suppliers not producing blocks shall submit certifications that qualified blocks were tested.

4.4.1.1.3.1 Racks

Two racks of the basic part number (3.1), one to be the smallest and one to be the largest the supplier wishes to qualify, shall be tested. Approval of the two sizes shall qualify all the rack sizes within the range submitted.

4.4.1.1.3.2 Brackets

Two brackets of each style the supplier wishes to qualify under the basic part number (3.1) shall be tested.

4.4.1.1.4 Wire In-line Junctions

Each in-line junction type the supplier wishes to qualify shall be subjected sequentially to the qualification inspection tests specified in Table 4. Qualifying each size unbussed type AS81714/12 will qualify corresponding bussed type by similarity.

4.4.1.1.4.1 Wire In-line Junctions, Groups 1 and 2

Two in-line junctions for each group shall be tested. One shall be assembled with minimum diameter wire and the other with maximum diameter wire (4.4.1.1.1).

4.4.1.1.4.2 Wire In-line Junctions, Group 3

One in-line junction for each fluid specified for each class (4.6.7) shall be tested. One end shall be assembled with minimum diameter wire and the other end with maximum diameter wire (4.4.1.1.1).

TABLE 4 - QUALIFICATION TESTS

Title	Requirement Paragraph	Test Paragraph	Test Groups			
			1 1/	2	3	4 2/
Visual and Mechanical Examination	3.1, 3.3, 3.4	4.6.1	X	X	X	X
Maintenance Permeability	3.5.15	4.6.15	X			X
Maintenance Aging	3.5.2	4.6.3	X	X	X	
Contact Insertion/Removal Forces	3.5.3	4.6.3	X	X		
Contact Retention	3.5.4	4.6.4	X	X		
Low Signal Level Contact Resistance	3.5.17	4.6.17	X	X		
Contact Resistance	3.5.16	4.6.16	X			
Dielectric Withstanding Voltage (sea level)	3.5.6	4.6.6.1	X		X	
Altitude Immersion	3.5.21	4.6.21	X			
Dielectric Withstanding Voltage (altitude)	3.5.6	4.6.6.2	X			
Thermal Shock	3.5.5	4.6.5	X			X
Sine Vibration 3/	3.5.8	4.6.8	X			X
Random Vibration 3/	3.5.8	4.6.8		X		X
Mechanical Shock	3.5.9	4.6.9	X	X		X
Temperature Life	3.5.13	4.6.13		X		X
Insulation Resistance (elev. temp.)	3.5.11.2	4.6.11.2		X		
Low Signal Level Contact Resistance	3.5.17	4.6.17		X		
Ozone	3.5.14	4.6.14		X		
Salt Spray	3.5.12	4.6.12		X		X
Humidity	3.5.10	4.6.10	X			
Insulation Resistance	3.5.11.1	4.6.11.1	X	X		
Fluid Immersion	3.5.7	4.6.7			X	
Contact Insertion/Removal Forces	3.5.3	4.6.3			X	
Dielectric Withstanding Voltage	3.5.6	4.6.6	X	X	X	
Probe Damage (Series I)	3.5.1	4.6.2	X			
Contact Resistance	3.5.16	4.6.16	X			
Low Signal Level Contact Resistance	3.5.17	4.6.17	X	X		
Retention System Fluid Immersion	3.5.24	4.6.23	X			
Contact Retention	3.5.4	4.6.4	X			
Internal Contact Durability	3.5.19	4.6.19	X			
Voltage Stability	3.5.18	4.6.18	X	X		
Contact Resistance	3.5.16	4.6.16	X	X		
Contact Retention	3.5.4	4.6.4	X			
Oversize Test External Contact (Series I)	3.5.20	4.6.20	X			
Contact Walkout	3.5.23	4.6.22	X			
Visual & Mechanical Examination	3.1	4.6.1	X	X	X	X

1/ Group 1 tests shall be performed or directly witness by the qualifying activity. The qualifying activity will provide the Group 1 results as a certified data package to supplier.
2/ For Group 4 half the sample shall be subjected to the Sine and half the samples to the Random Vibration.
3/ Vibration required for initial qualification only.

4.4.1.1.5 Electronic Junctions (electronic blocks and electronic in-line junctions)

a. Qualification of an electronic junction with the maximum number of passive electronic components (resistors, semi-conductors, diodes, etc.) shall qualify similar electronic components containing the same types of passive components.

b. Qualification of dimensional and material requirements may be by similarity to a qualified bussed component (bussed block or in-line junction.

c. When passive electronic components are qualified parts the only additional tests required are physical shock and vibration of the electronic component specification or AS81714, whichever has the lesser requirement.

d. If the passive electronic components are not qualified parts, certification acceptable to the qualification activity shall be furnished with the test report.

e. Electronic junctions shall be rated at the electronic component level or the bussed junction level whichever has the lesser requirement.

f. Sample sizes for each group of electronic blocks shall be the same as for bussed blocks (4.4.1.1.2). Sample sizes for each group of electronic in-line junctions shall be the same as for wire in-line junctions (4.4.1.1.4).

g. Assembly preparation shall be as specified in 4.1.2.1.

4.4.1.1.6 Grounding Terminals and Grounding Blocks

Qualification of a grounding component may be by similarity to qualified bussed components designed with the same materials. The only additional tests which shall be performed when qualifying by similarity are those listed in Group 4. If not by similarity, the component shall be subjected to the full test sequence as specified in Table 4. Sampling size for grounding terminals shall be one terminal assembled with minimum wire and one assembled with maximum wire for Groups 1 and 2. For Group 3, one terminal shall be tested for each fluid. Half the terminals shall be assembled with minimum wire and half with maximum wire. Grounding blocks shall have the same sample size and shall be assembled the same as bussed blocks for testing (4.4.1.1.2). Assembly preparation shall be as specified in 4.1.2.1. The components shall be mounted during Groups 1 and 2 test sequences.

4.4.2 Samples for Qualification Activity (6.5)

Sufficient samples shall be provided to perform the Group 1 tests specified in Table 4.

4.4.3 Qualification Failure

Any failures during examination or tests specified in Tables 4 shall be reported to the supplier by the qualifying activity or to the qualification activity by the supplier before continuing testing. Based on corrective action, authorization to complete the qualification tests will be granted. The supplier's products shall pass all requirements of this specification.

4.4.4 Initial Qualification Test Report

The supplier shall furnish the qualifying activity one certified test report containing the following information.

a. The quantitative results for tests specified in Table 4 Group 2, 3, 4, and the authorization letter. The supplier may (not required) include, the qualifying activity certified Table 4 Group 1 test results for the test report (see Table 4 footnote 1/).

b. The manufacturing control drawing numbers for components with the latest revision designators and drawing dates.

c. A tabulated comparison of the dimensions specified herein and each manufacturing control drawing for components qualified by similarity.

d. Material certifications as specified.

All test report data shall be kept by the supplier for six years and made available to the qualifying activity upon request.

4.5 Quality Conformance Inspection

4.5.1 Inspection of Product for Delivery

Inspection of product for delivery shall consist of Groups A and B.

4.5.1.1 Inspection Lot

An inspection lot, as far as practicable, shall consist of terminal junction components covered by one detail specification, produced under essentially the same conditions, and offered for inspection at one time.

4.5.1.2 Disposition of Sample Units

Sample units which have been subjected to the Group A inspection may be delivered on the contract or order. Sample units which have been subjected to the Groups B inspection shall not be delivered on the contract or order.

4.5.1.3 Group A Inspection

Group A inspection shall consist of the examinations and tests specified in Table 5 and shall be made on the same set of sample units in the order shown. In-process control of component parts, unrelated to lot sizes of finished terminal junction assemblies, may be used in lieu of examination and test of these components in the finished terminal junction assemblies to assure performance of these component parts.

TABLE 5 - GROUP A INSPECTION

Title	Terminal Junction Assemblies			Requirement Paragraph	Test Paragraph
	Blocks	In-Line Junctions	Racks & Brackets		
Visual and Mechanical Examination	X	X	X	3.1	4.6.1
Dielectric Withstanding Voltage	X	X		3.5.6	*4.6.6.1
Insulation Resistance	X	X		3.5.11.1	*4.6.11.1
Contact Resistance	X	X		3.5.16	*4.6.16

*Simulated contacts may be used for this test (4.6.11).

4.5.1.3.1 Sampling Plan

Statistical sampling and inspection shall be in accordance with ANSI/ASQC Z1.4 for general inspection Level II. The acceptable quality level (AQL) shall be 1.0 for major and 4.0 for minor defects (see 6.10).

4.5.1.4 Group B Inspection

Group B inspection shall consist of the examinations and tests shown in Table 6, performed in the order shown, and shall be made on sample units which have passed the Group A inspection.

TABLE 6 - GROUP B INSPECTION

Title	Blocks	In-Line Junctions	Requirement Paragraph	Test Paragraph
Maintenance Aging	X	X	3.5.2	4.6.3
Contact Resistance	X	X	3.5.16	4.6.16
Voltage Stability	X	X	3.5.18	4.6.18

4.5.1.4.1 Sampling Plan

The sampling plan shall be in accordance with ANSI/ASQC Z1.4, inspection level S-3 and the AQL shall be 4.0 (see 6.10).

4.5.1.5 Retention of Qualification Inspection

At 36 month intervals, the qualifying activity shall authorize the supplier to begin Retention of Qualification. The qualifying activity may established an alternate due date to accommodate testing schedules. The supplier shall provide a retention of qualification test report (see 4.5.1.5.2). The qualifying activity shall perform or witness the Table 7 tests in sequence on samples which have passed the Group A inspection. The qualifying activity shall provide certified Table 7 test data to the supplier. Failure to submit to Retention of Qualification shall result in loss of qualification for that product.

4.5.1.5.1 Retention of Qualification Test Samples

Retention of Qualification test samples shall be the same as for the Initial Qualification test requirements for Group 1 of Table 4 (see 4.4.1.1.2). The supplier qualified racks and brackets shall be used. Samples types may be provided from those lots produced during the retention period. Those sample types not produced during retention period are not required to be submitted, but shall be submitted at the next retention period. To retain qualification the supplier's products shall pass all requirements of Groups A, B and Retention of Qualification tests.

4.5.1.5.2 The supplier shall furnish the qualifying activity one certified test report containing the following information:

a. A summary of the results of Group A and B tests, including corrective actions performed during the retention period indicating as a minimum, the number of lots that passed and the number that failed.

b. The manufacturing control drawing numbers for each component with the latest revision designators and drawing dates.

c. Material certifications as specified.

All test report data shall be kept by the supplier for six years and made available to the qualifying activity upon request.

4.5.2 Inspection of Preparation for Delivery

Sample packages and packs and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with requirements of Section 5 and the documents specified therein.

TABLE 7 - RETENTION OF QUALIFICATION TESTS

Title	Requirement Paragraph	Test Paragraph
Maintenance Aging	3.5.2	4.6.3
Contact Insertion/Removal Forces	3.5.3	4.6.3
Contact Retention	3.5.4	4.6.4
Low Signal Level Contact Resistance	3.5.17	4.6.17
Contact Resistance	3.5.16	4.6.16
Altitude Immersion	3.5.21	4.6.21
Dielectric Withstanding Voltage (sea level)	3.5.6	4.6.6.1
Thermal Shock	3.5.5	4.6.5
Salt Spray	3.5.12	4.6.12
Insulation Resistance	3.5.11.1	4.6.11.1
Contact Retention	3.5.4	4.6.4
Internal Contact Durability	3.5.19	4.6.19
Voltage Stability	3.5.18	4.6.18
Contact Resistance	3.5.16	4.6.16
Contact Retention	3.5.4	4.6.4
Visual & Mechanical Examination	3.1	4.6.1

4.6 Methods of Examination and Test

4.6.1 Visual and Mechanical

TJS components shall be examined to insure conformance with this specification and the applicable detail specification. For Group A inspection, in-process control of component parts, unrelated to lot sizes of finished items, may be utilized in lieu of examination of these component parts. Examination in a continuing manner shall be performed to assure compliance with the following requirements:

a. Applicable detail specification (3.1)

b. Materials (3.3)

c. Design and construction (3.4)

d. Marking (3.6)

e. Workmanship (3.7)

4.6.2 Probe Damage (Series I)

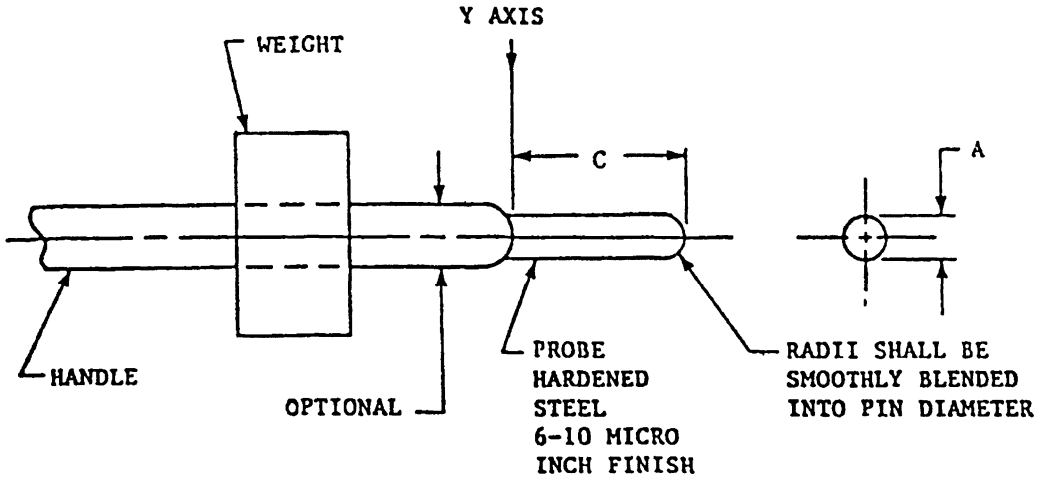
Items subjected to this test shall have the wire sealing member removed. The housing containing the internal contacts shall be held its full length in such a manner that the axis of the internal contacts shall be horizontal throughout the test. A minimum of four internal contacts shall be tested, each at three different depths, as follows:

a. Full insertion depth

b. Full insertion minus 0.040 inch ± 0.003 inch

c. Full insertion minus 0.110 inch ± 0.003 inch

The test probe for each contact size shall comply with Figure 1. The test probes shall be inserted into the internal contact to the specified depth, and the applicable bending moment, selected from Figure 1, shall be applied to the test probe, perpendicular to the major axis of the contact. With the bending moment force applied, the internal contact shall be rotated 360 degrees by turning the housing in the plane perpendicular to the horizontal axis of the probe. This test shall be repeated for each insertion depth required. Following the probe test, the internal contacts shall comply with contact resistance (3.5.16) and low signal contact resistance (3.5.17) (3.5.1).



Internal contact mating end size	A ± .0005 dia (inch)	C ± 0.010 (inch)	Bending moment ±10% (lb - inch) about 'Y' axis
12	0.094	0.615	2.00
14	0.077	0.615	2.00
16	0.062	0.615	0.50
20	0.040	0.615	0.50

FIGURE 1 - TEST PROBE

4.6.3 Maintenance Aging (except racks and brackets)

Inserting and removal of a contact shall be considered one cycle. For qualification only, all cavities shall be considered one cycle. For qualification only, all cavities shall be subjected to one cycle of inserting and removal. A minimum of 20%, but not less than three contacts, shall be then subjected to nine additional cycles of inserting and removal, using the specified military tools. The contact inserting and removal forces (3.5.3) shall be measured during the first and tenth cycle as specified in Table 8 (3.5.2).

TABLE 8 - CONTACT INSERTION AND REMOVAL FORCES

Contact Size			Insertion and Removal Force (pounds max)
Contact	Mating End	Wire Barrel End	
M39029/1 -507	20	22D	10
-100	16	22	10
-101	16	20	10
-102	14	16	15
-103	12	12	15
M39029/22 -191	22	22	10
-192	20	20	15
-193	16	16	15
605	12	12	15

4.6.4 Contact Retention

Contact retention shall be tested in accordance with EIA-364-29, under the tensile load of Table 9.

TABLE 9 - AXIAL TENSION LOADS FOR CONTACT RETENTION

Contact Size			Axial Tension Load (pounds – minimum)
Contact	Mating End	Wire Barrel End	
M39029/1 -507	20	22D	10
-100	16	22	12
-101	16	20	20
-102	14	16	25
-103	12	12	30
M39029/22 -191	22	22	10
-192	20	20	15
-193	16	16	25
605	12	12	30

4.6.5 Thermal Shock

Wired components shall be tested in accordance with EIA-364-32 Test Condition 'A' except applying temperature extremes in Table 10 in lieu of steps 1 and 3. Components shall be mounted in racks. Following the fifth cycle, a minimum of three contacts shall be mated and unmated five times at ambient temperature. Electrical continuity shall be determined at the low and high temperature extremes. Insulation resistance at ambient temperature shall be measured at the completion of the final cycle.

TABLE 10 - TEMPERATURE EXTREMES

Temperature Extremes		
Extremes	Degrees C	Degrees F
Low	-65 +0 -5	-85
High	200 +3 -0	392

4.6.6 Dielectric Withstanding Voltage

4.6.6.1 Dielectric Withstanding Voltage, Sea Level

Wire components shall be tested in accordance with EIA-364-20, Test Condition I. The applicable test voltages of Table 11 shall be applied between all adjacent contacts not common and between the housing and each contact closest to the housing and the rack. Blocks shall be mounted in a rack during this test and the conductive plated or unplated rack shall be connected to one test lead of the transformer during the housing/contact phase of the test. In-line junctions shall be closely wrapped in metal foil which shall be connected to one test lead of the transformer (3.5.6).

4.6.6.2 Dielectric Withstanding Voltage (DWV), Altitude

Wired components shall be tested in accordance with EIA-364-20, Test Condition IV. After 30 minutes at the simulated altitude, the samples shall be tested as specified in 4.6.6.1 (3.5.6).

TABLE 11 - DWV TEST VOLTAGE
(THESE ARE NOT WORKING VOLTAGES)

Series I and II		
Altitude Conditions	Test Voltages (RMS)	
	For Sizes 12, 16, 20, 22	22D
Sea Level	1500	1000
50 000 feet	800	525
70 000 feet	600	325
100 000 feet	200	110

4.6.7 Fluid Immersion

Components shall be subjected to fluids in accordance with EIA-364-10 and Table 12. Safety precautions shall be taken for flammable fluids when performing electrical requirements after fluid immersion (3.5.7).

TABLE 12 - TEST FLUIDS

Sample Number	EIA-364-10 Test Fluid
1	a
2	b
3	c
4	d
5	e
6	f
7	g
8	h
9	i
10	j
11	k
12	l

4.6.8 Vibration

4.6.8.1 Sine Vibration

TJS components shall be subjected to the test specified in Method 204, Test Condition G, of MIL-STD-202. Duration of vibration at specified temperatures shall be as follows:

a. 4 hours at -50 °C.

b. 4 hours at +200 °C.

c. 4 hours at ambient temperature.

4.6.8.2 Random Vibration

TJS components shall be subjected to the test specified in EIA-364-28. The following details shall apply:

a. Test Condition VI - Letter “J” at ambient temperature.

b. Vibration shall be performed at ambient temperature.

c. Duration shall be 8 hours in the longitudinal direction and 8 hours in a perpendicular direction for a total of 16 hours.

4.6.8.3 Block Mounting

The blocks shall be mounted in racks or brackets during the vibration test. The rack shall have a minimum of two and a maximum of X-1 blocks, where X represents the maximum number of blocks accommodated by the rack. The rack or bracket shall be firmly attached to the vibration table. A suitable sensor shall monitor the vibration of the block(s) at a point near the blocks. The wire bundles shall be clamped to nonvibrating points a minimum of 8 inches from the blocks. Feed through blocks shall be wired at both faces. The clamping length of the wires shall be chosen to avoid resonance of the wire bundles.

4.6.8.4 In-line Junction Mounting

In-line junctions shall be firmly attached to the vibration table. A suitable sensor shall monitor the vibration at a point near the junctions. The wires shall be clamped to nonvibrating members a minimum of 8 inches from the junctions, and the clamping length of the wires shall be chosen to avoid resonance of the wires.

4.6.9 Mechanical Shock

Wired components shall be subjected to the test specified in EIA-363-27. Components shall be mounted by normal means, with 100 mA maximum current flow through the series circuit during shock. Components shall be monitored for any discontinuities. A detector capable of detecting all discontinuities in excess of 1 µs shall be used. The following details shall apply:

a. Test condition D.

b. The wire bundle shall be clamped to fixed points at least 8 inches from the rear of the TJS component.

4.6.10 Humidity

TJS components shall be subjected to the humidity test specified in EIA-364-31, Type II, omitting subcycle step 7b. The following details and exceptions shall apply:

a. Step 7a shall be performed during the last cycle.

b. Three hours minimum after the start of step 7a, during the final cycle and while the devices are still subjected to high humidity, the insulation resistance (4.6.11) shall be measured when the chamber temperature reaches 20 °C ± 5 °C and condensation is observed on the devices.

4.6.11 Insulation Resistance

An insulation resistance measurement in accordance with EIA-364-21 (3.5.11) shall be made on wired blocks mounted in an unplated or plated conductive aluminum rack. The resistance shall be measured between all but not more than three pairs of adjacent contacts which are not common and between all but not more than six contacts closest to the housing and the rack. For in-line junctions, the resistance shall be measured between the conductor of the wire and metallic foil wrapped around the main body of the junction (3.5.11.1). Simulated contacts may be used for performing this test, in lieu of actual contacts. Any other variations from specified procedures shall be approved by the qualifying activity.

4.6.11.1 Insulation Resistance at Room Condition

When tested at room condition, the component shall meet the requirement of 3.5.11.1.

4.6.11.2 Insulation Resistance at Elevated Temperature

When tested at elevated temperatures, the component shall meet the requirements of 3.5.11.2. The measurement shall be made at the end of the temperature life test (4.6.13) while the devices are at elevated temperature.

4.6.12 Salt Spray (corrosion)

TJS components shall be subjected to a salt spray test in accordance with EIA-364-26, Test Condition C. The salt concentration shall be 5%. The specimens shall then be dried in a circulating air oven at a temperature of 38 °C ± 3 °C (100 °F ± 5 °F) for a period 12 hours maximum, after which they shall be removed (blocks shall be taken out of the racks) and inspected. Wiring type components shall be filled with contact wire assemblies or end seal plugs (3.5.12).

4.6.13 Temperature Life

Wired blocks mounted in racks, and in-line junctions shall be subjected to the 200 °C +3 -0 for a period of 1000 hours. For electronic components, the test conditions shall not exceed the specified performance of the passive component(s) (3.4.8) (3.5.13).

4.6.14 Ozone Exposure

Components shall be subjected to the test specified in EIA-364-14 (3.5.14).

4.6.15 Magnetic Permeability

The permeability of the TJS components shall be tested in accordance with EIA-364-54. The components shall not be carrying current during the measurement (3.5.15).

4.6.16 Contact Resistance

Measurements shall be made at 25 °C ± 3 °C in accordance with EIA-364-06 using the test current specified in Table 2. The resistance shall be measured at a point 3 inches ± 0.12 inches from the tip of each external contact shown in Figures 2 and 3. No tension shall be applied to the wires or contact. A minimum of four pairs of each contact size shall be tested (3.5.16).

4.6.16.1 Bussing Blocks

For feedback blocks, the resistance across a mated pair of adjacent contacts that are interconnected within the block shall be measured. For feedthrough blocks, the measurement shall be taken across a mated pair of contacts having the same identification on both faces of the block.

4.6.16.2 Wire In-line Junctions

Measurement(s) shall be made across all mated pairs of contacts.

4.6.16.3 Electronic Components

Resistance measurements shall be made in accordance with the internal passive component(s) specification.

4.6.17 Low Signal Level Contact Resistance (size 16 wire barrel and smaller)

Measurements shall be made at 25 °C ± 3 °C in accordance with EIA-364-06 and Figures 2 and 3. The resistance shall be measured at a point 3 inches ± 0.12 inches from the tip of each external contact. No tension shall be applied to the wires or contact. A minimum of four pairs of each contact size shall be tested (3.5.17).

4.6.17.1 Bussing Blocks

For feedback blocks the resistance across a mated pair of adjacent contacts that are interconnected within the block shall be measured. For feedthrough blocks the measurement shall be taken across a mated pair of contacts having the same identification on both faces of the block.

4.6.17.2 Wire In-line Junctions

Measurement(s) shall be made across all mated pairs of contacts.

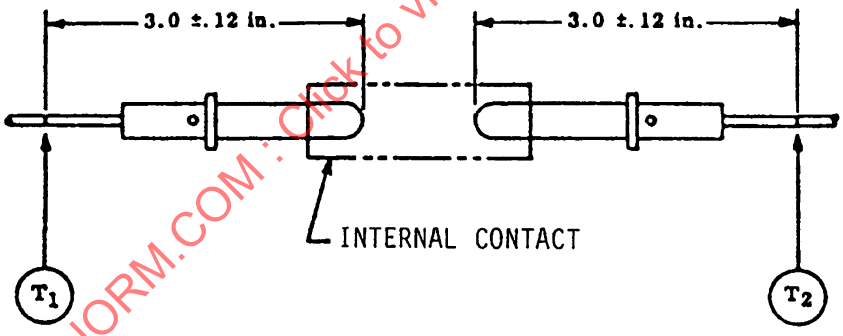


FIGURE 2A - TEST SAMPLE CONNECTIONS FOR FEEDTHROUGH BLOCKS AND IN-LINE JUNCTIONS (SERIES I)

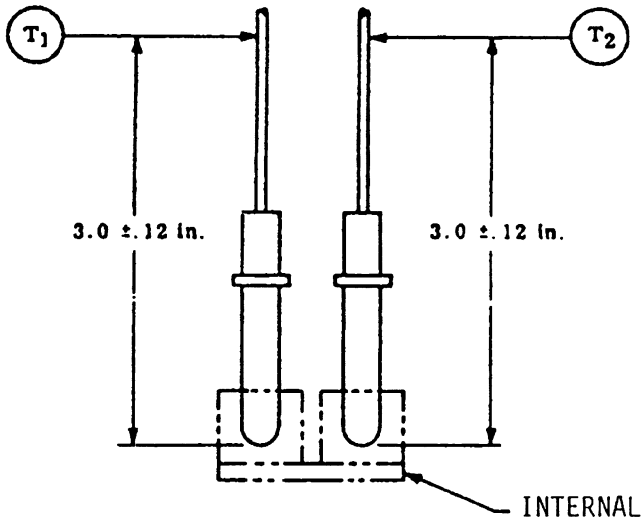


FIGURE 2B - TEST SAMPLE CONNECTIONS FOR FEEDBACK BLOCKS (SERIES I)

FIGURE 2 - CONNECTIONS FOR CONTACT RESISTANCE AND LOW SIGNAL LEVEL CONTACT RESISTANCE MEASUREMENTS

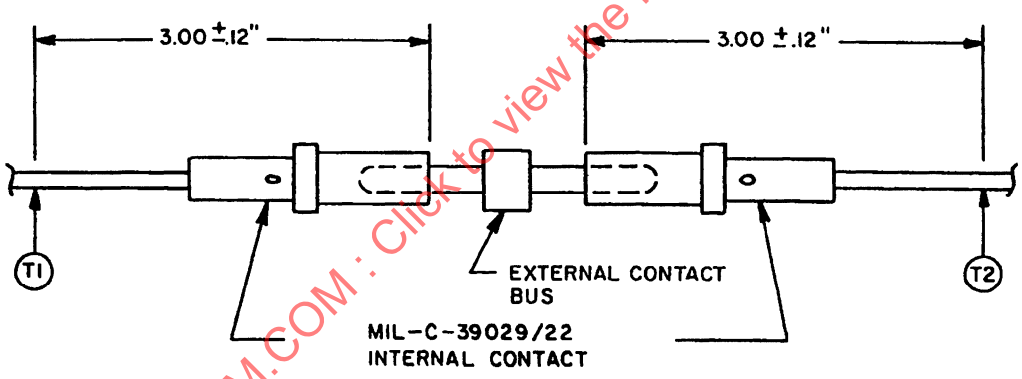


FIGURE 3A - TEST SAMPLE CONNECTIONS FOR IN-LINE JUNCTIONS (SERIES II)

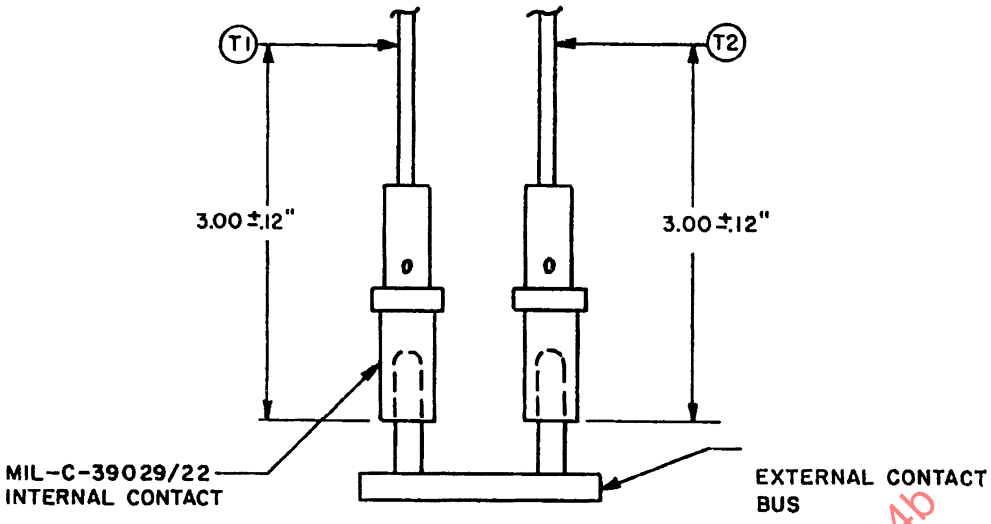


FIGURE 3B - TEST SAMPLE CONNECTIONS FOR FEEDBACK BLOCKS (SERIES II)

FIGURE 3 - CONNECTIONS FOR CONTACT RESISTANCE AND LOW SIGNAL LEVEL CONTACT RESISTANCE MEASUREMENTS

4.6.18 Voltage Stability

An external force of 0.5 pounds ± 0.1 pounds shall be applied axially to the wire during the potential drop measurements performed in accordance with 4.6.16. A minimum of four contacts for each contact size shall be tested. A total of ten potential drop readings, being the high and low readings for each of the following steps during and following bending of the wire of each contact tested shall be recorded. Do not rotate the wire from one position to the next. Any discontinuity or interruption of the applied current shall be noted (3.5.18).

Preliminary - Position the TJS component so that one side points North while its top is horizontal. All five tests shall be made on one external contact mated to a socket contact.

Step One - Position the wire attached to a mated contact so that its axis is 90 degrees from the top surface of the component.

Step Two - Bend the wire so that its axis is parallel to the surface of the component and its free end points North. The bend shall occur at the point where the wire exits from the component.

Step Three - Bend the wire 180 degrees so that its free end points South.

Step Four - Straighten the bend in the wire. Now bend the wire so that its free end points West.

Step Five - Bend the wire 180 degrees so that its free end points East.

4.6.19 Internal Contact Durability (Series I)

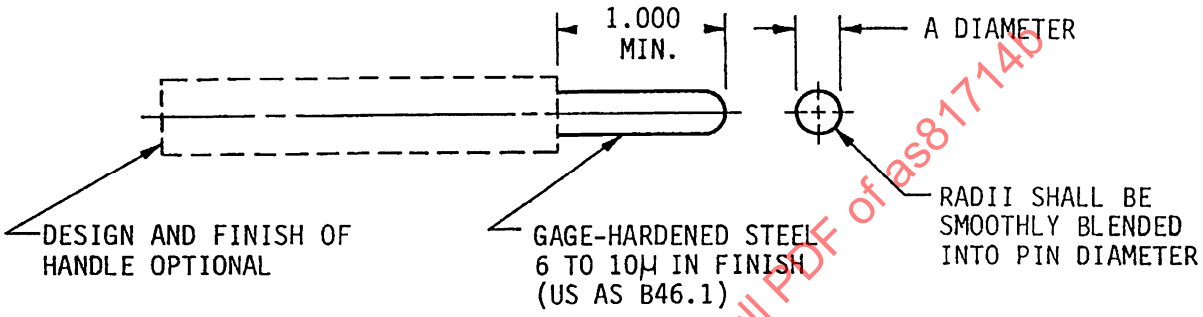
TJS component to be tested shall be held in a position wherein the center axis of the internal contact is vertical. A minimum of four of each size contact shall be tested. The gage pin shown in Figure 4 shall be inserted into the internal contact with a force not exceeding 15 pounds until it comes up against a positive stop, and then be completely withdrawn. A cycle consists of one insertion and one withdrawal. The internal contact durability test shall consist of 100 cycles (3.5.19).

4.6.19.1 Internal Contact Durability Testing (Series II)

The Series II component shall be held in a position wherein the center axis of the internal contact is vertical. A minimum of four of the contacts shall be tested. A wired qualified AS39029/22 contact shall be used for each of the tested internal contacts. The wired contacts shall be inserted onto the internal pins with a force not to exceed 15 pounds until it comes up against a positive stop, then withdrawn. A cycle consists of one insertion and withdrawal. The durability test shall consist of 100 cycles. The subsequent contact resistance testing may utilize an unused qualified AS39029/22 contact and contact retention.

4.6.20 Oversize External Contact Protection (Series I)

At least four installed internal contacts of each size shall be tested by attempting to axially insert into the internal contact the applicable oversize gage pin contact defined in Figure 4. The test gage shall be positioned for insertion in the internal contact and a force of 3 pounds ± 2 ounces shall be applied to the gage pin in the direction of the internal contact (3.5.21).



		"A" Diameter +0.0000 -0.0002	
M39029/1	Contact size	Internal contact durability test gage pin diameter	Oversize
-507	20-22D	0.041	0.046
-100	16-22	0.063	0.070
-101	16-20	0.063	0.070
-102	14-16	0.078	0.088
-103	12-12	0.095	0.105

FIGURE 4 - GAGE PINS FOR: INTERNAL CONTACT DURABILITY AND OVERSIZE PROTECTION TEST (SERIES I)

4.6.21 Altitude Immersion

TJS components shall be tested in accordance with EIA-364-03. The following details shall apply (see 6.3.1):

Chamber pressure shall be 75 000 feet.

b. All wire ends shall be located within the chamber and exposed to the chamber atmosphere but not submerged or sealed.

c. At the end of the third cycle while the devices are still submerged in the solution at ambient temperature, the dielectric withstanding voltage test (4.6.6.1) shall be performed.

4.6.22 Contact Walkout

For all contact sizes two contact specimens for each TJS component of similar construction shall be tested. The contacts shall be crimped to stranded steel cable of an appropriate size and installed in the part. The TJS component shall be mounted in a test fixture and a 3 pound load shall be applied to the cable. One 360 degrees rotation of the fixture as shown in Figure 5 with the TJS component mounted shall constitute one cycle. The TJS component shall be subjected to 100 cycles at a rate of 10 to 20 cycles per minute.

4.6.23 Retention System Fluid Immersion

For all contact sizes the TJS component of similar construction, with external contacts removed, shall be immersed in the fluids listed in Table 12 (one sample per fluid) for 2 hours at room temperature. After removal, excess fluid shall drain from the components for 4 hours and the contacts reinstalled. The components then shall be subjected to contact retention as specified in 4.6.4.

5. PACKAGING (FOR DIRECT GOVERNMENT PROCUREMENT)

5.1 Preservation

Preservation shall be Level A or commercial.

5.1.1 Level A

Level A shall be in accordance with MIL-DTL-55330.

5.1.2 Commercial

Commercial shall be in accordance with ASTM D3951.

5.2 Packing

Packing shall be in Level A or commercial.

5.2.1 Level A

Level A shall be in accordance with MIL-DTL-55330.

5.2.2 Commercial

Commercial shall be in accordance with ASTM D3951.

5.3 Marking

Marking shall be in accordance with MIL-STD-129.

5.3.1 Component Packaging Marking (Series I)

Class D component packages shall be identified with the Class D part number and the word “supersedes” followed by the superseded Class A, B, and C part numbers.

5.3.2 Component Packaging Marking (Series II)

Series II component packages shall be identified with the part number in accordance with 1.3 for the specific component.

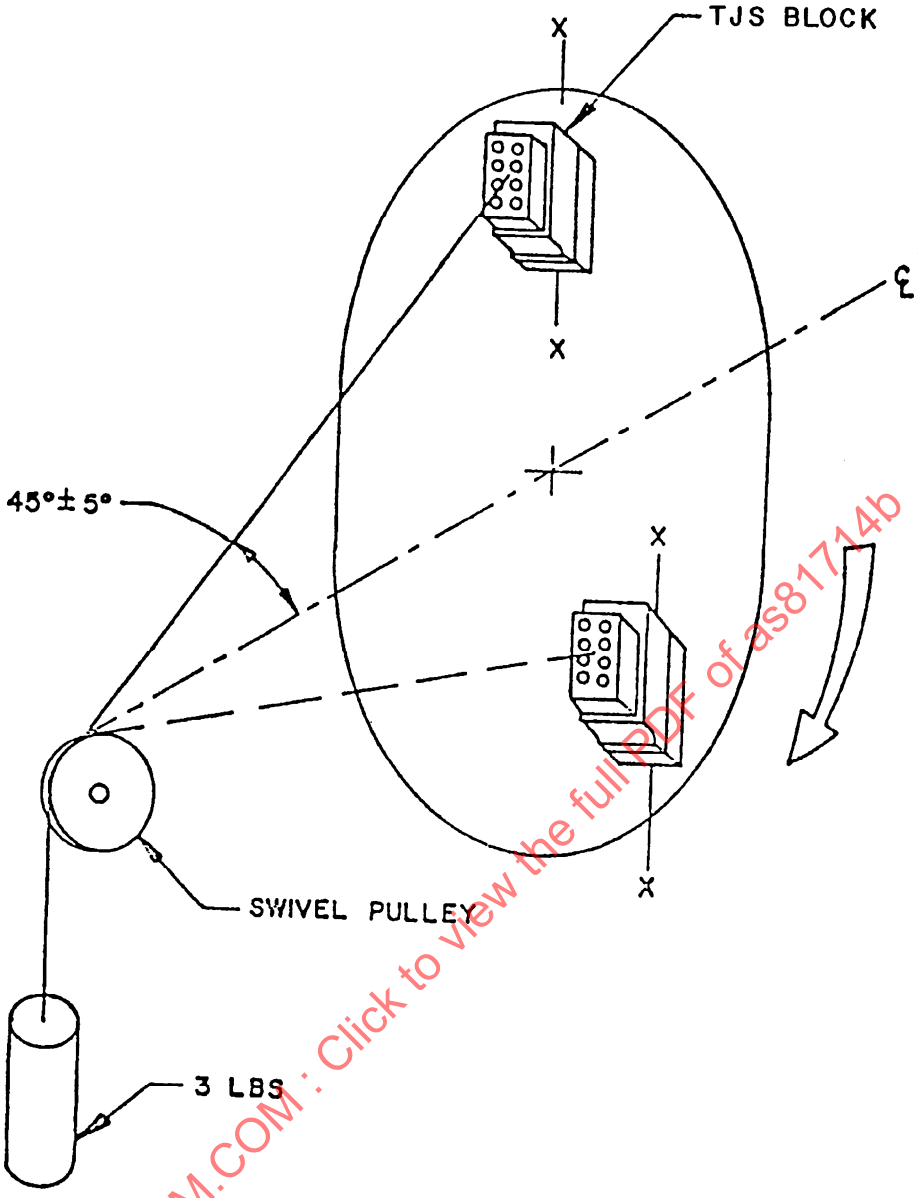


FIGURE 5 - CONTACT WALK-OUT TEST SETUP

5.4 Contacts and End Seal Plugs

The number of contacts supplied with blocks and in-line junctions shall be a minimum of one more for feedback and two more for feedthrough blocks than the number of cavities specified. For feedback blocks, two end seal plugs and for feedthrough, four end seal plugs shall be provided.

6. NOTES

6.1 Intended Use

TJS components are intended for electrical distribution use. They are suitable for use in Integrated Wire Termination System (IWTS), and environment resistant wiring, in accordance with AS50881.

6.2 End Seal Plugs

End seal plugs should be installed by the user in all contact holes in the grommet when no wired contact assembly is used. Sealing the holes will prevent the entrance of moisture, dust or other contaminants. When installed, sealing plugs shall have the knob end protruding in the grommet wire hole.

6.3 Wire Diameters

The components of this specification are not designed for wire diameters outside of the limits specified in Table 1. Caution should be exercised when using wires having diameters greater or less than specified in Table 1. Wires having diameters exceeding the specified maximum distorts the grommet, and if enough oversized wires are used, may prevent the insertion of other contacts in the blocks. Wires having diameters smaller than specified will not be properly sealed by the grommet and will permit the entrance of moisture or other contaminants. In addition, the wiring guidelines of AS50881 should be followed for proper installation of TJS components.

6.3.1 Wire Sealing

AS81714 module wire seals may open when wires are pulled to side of the module. Whenever possible wire leads need to be maintained vertically a few inches outside the top of the module. To assist with this problem AS85049/143 accessories are available for some modules types.

6.4 Ordering Data

Acquisition documents should specify:

a. Title, number and date of this specification.

b. Title, number and date of the applicable detail specification and the complete part number (see 1.3 and 3.1).

c. Levels of preservation-packaging and packing (see 5.1).

d. For indirect shipment of blocks and in-line junctions, whether contacts or end seal plugs are not to be furnished.

e. Special marking required (3.6).

f. Whether contact installing and removal tools are to be furnished.

g. For direct government acquisition, Class D Series I components shall be acquired in lieu of Classes A, B, and C (see Appendix A, paragraph A.6.1).

h. Whether Series II block removal tools are to be furnished.

6.4.1 Contacts

Crimp external contacts in accordance with AS39029/1 or AS39029/22 may be ordered in bulk.

6.4.2 End Seal Plugs

End seal plugs may be ordered in bulk in accordance with MS 27488.

6.4.3 Indirect Shipments

For indirect shipments, blocks and in-line junctions may be supplied without contacts.

6.4.4 End Seal Plugs

For indirect shipments, TJS components may be supplied without grommet end seal plugs.

6.5 Qualification

With respect to products requiring qualification by the government, awards will be made only for products, which are at the time set for opening of bids, qualified for inclusion in the applicable Qualified Products List (QPL), whether or not such products have actually been so listed by that date. The attention of the contractors (purchasers) is called to these requirements, and manufacturers (suppliers) are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts for the products delineated in this specification. Qualification is required for U.S. Government procurement.

6.6 QPL Evaluating Activity

The QPL Evaluating Activity (qualifying activity), for U.S. Department of Defense procurement purposes, is the Naval Air Systems Command (Code 4.4.5.3), 22229 Elmer Road, Bldg. 2360, Patuxent River, MD 20670. Application for qualification tests shall be made in accordance with provisions governing qualification in SD-6 (see 2.2).

6.7 QPL Publication

The qualifying activity is required to provide a summarized list of all qualified sources on a public accessible electronic site. The summary shall include but is not limited to the supplier approved part number and related specification part number, a dedicated approval reference number, a supplier location where purchases maybe requested and the manufacturing location of the component. The suppliers and products qualified to this specification are available on the qualifying activity website (http://www.navair.navy.mil/qpl/).

6.8 Indirect Shipments

The preservation, packaging, packing and marking specified in Section 5 apply only to direct purchases by or direct shipment to the Government and are not intended to apply to contracts between the supplier and contractor.

6.9 Maximum Working Voltages

TABLE 13 - MAXIMUM WORKING VOLTAGE

Condition	Voltage (volts rms)
Sea Level	600
70 000 feet	300

6.10 Definitions

These definitions are applicable to this specification.

6.10.1 Terminal Junction System

The terminal junction system consists of bussing blocks, racks, brackets, wire in-line junctions, grounding terminals, grounding blocks, electronic blocks and electronic in-line junctions that are used for interconnecting electrical components and equipment in an electrical or electronic system.

6.10.2 Terminal Junction Bussing Blocks

A terminal junction bussing block is a receptacle having multiple internal contacts interconnected in parallel to form one or more circuits. Blocks are normally contained and retained in a rack or mounting bracket. Blocks may be of the feedback or feedthrough type.

6.10.2.1 Feedback Bussing Blocks

A feedback bussing block has one face containing contact cavities and is used for general purpose interconnection and bussing.