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CONNECTORS, SUBMINIATURE, ELECTRICAL, RECTANGULAR, CENTRAL JACKSCREW COUPLING, CRIMP-TYPE, REMOVABLE CONTACTS, BASED ON TYPE U.R.

ESA/SCC Detail Specification No. 3401/011

SCC

space components
coordination group

Issue/Rev.	Date	Approved by	
		SCCG Chairman	ESA Director General or his Deputy
Issue 4	August 2001		

DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	CHANGE Reference Item	Approved DCR No.
		This issue supersedes Issue 3 and incorporates the changes agreed in the following DCR's: Specification entirely rewritten to align with ESA/SCC Detail Specification No. 3401/002	 21191

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1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Connectors, Subminiature, Electrical, Central Jackscrew Coupling, Crimp-type, Removable Contacts based on Type U.R.

It shall be read in conjunction with:-

ESA/SCC Generic Specification No. 3401, Connectors, Electrical, Non-Filtered, Circular and Rectangular.

ESA/SCC Detail Specification No. 3401/012, Contacts, Electrical, Crimp-type, for 3401/011 Connectors.

the requirements of which are supplemented herein.

1.2 RANGE OF COMPONENTS

The different sizes of connectors specified herein, which are also covered by this specification, together with their mechanical characteristics, are given in Table 1(a).

1.3 MAXIMUM RATINGS

The maximum ratings, which shall not be exceeded at any time during use or storage, applicable to the connectors specified herein, are scheduled in Table 1(b).

1.4 PARAMETER DERATING INFORMATION

The applicable derating information for the connectors specified herein is shown in Figure 1.

1.5 PHYSICAL DIMENSIONS

The physical dimensions of the connectors specified herein are shown in Figure 2.

2. APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:-

(a) ESA/SCC Generic Specification No. 3401 for Connectors, Electrical, Non-Filtered, Circular and Rectangular.

(b) ESA/SCC Detail Specification No. 3401/012, Contacts, Electrical, for 3401/011 Connectors.

(c) MIL-STD-202, Test Methods for Electronic and Electrical Component Parts.

(d) MIL-STD-1344, Test Methods for Electrical Connectors.

3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESA/SCC Basic Specification No. 21300 shall apply.

TABLE 1(a) - RANGE OF COMPONENTS (MALE)

SHELL TYPE	SHELL SIZE	TYPE OF CONTACT	MAXIMUM WEIGHT (g) (1)	JACKSCREW COUPLING TORQUE (N.Max.)
Receptacle	2	P	6.90	-
Receptacle	3	P	10.10	-
Receptacle	4	P	11.40	-
Receptacle	6	P	14.90	-
Receptacle	7	P	18.50	-
Plug	2	P	6.10	0.006
Plug	3	P	9.50	0.006
Plug	4	P	11.20	0.006
Plug	6	P	14.30	0.006
Plug	7	P	18.60	0.006

TABLE 1(a) - RANGE OF COMPONENTS (FEMALE)

SHELL TYPE	SHELL SIZE	TYPE OF CONTACT	MAXIMUM WEIGHT (g) (1)	JACKSCREW COUPLING TORQUE (N.Max.)
Receptacle	2	S	6.30	-
Receptacle	3	S	9.20	-
Receptacle	4	S	10.90	-
Receptacle	6	S	14.50	-
Receptacle	7	S	18.80	-
Plug	2	S	5.60	0.006
Plug	3	S	8.70	0.006
Plug	4	S	10.20	0.006
Plug	6	S	14.20	0.006
Plug	7	S	17.10	0.006

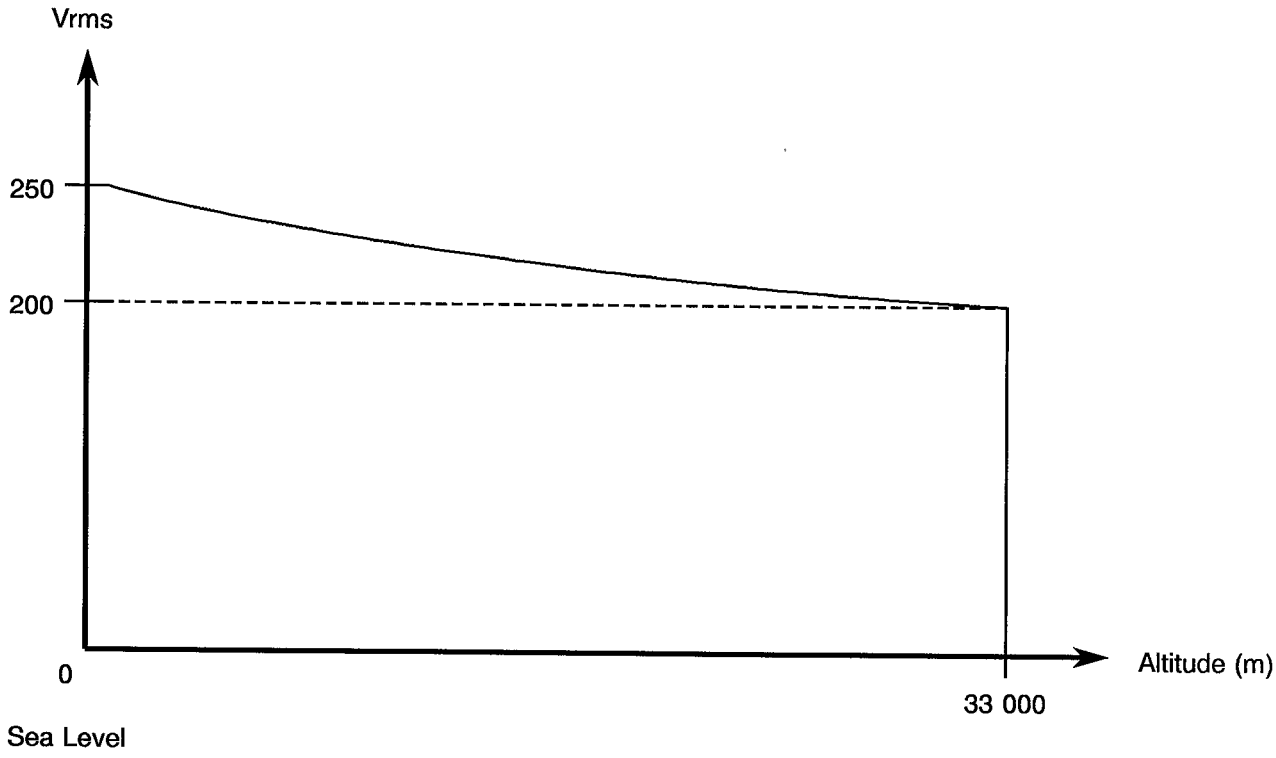
NOTES

1. Weights shown are for connector less contact.

TABLE 1(b) - MAXIMUM RATINGS

No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATING		UNIT
			MIN.	MAX.	
1	Working Voltage Sea Level	U_R	-	250	Vrms
2	Operating Temperature Range	T_{op}	−55	+125	°C
3	Storage Temperature Range	T_{stg}	−65	+125	°C

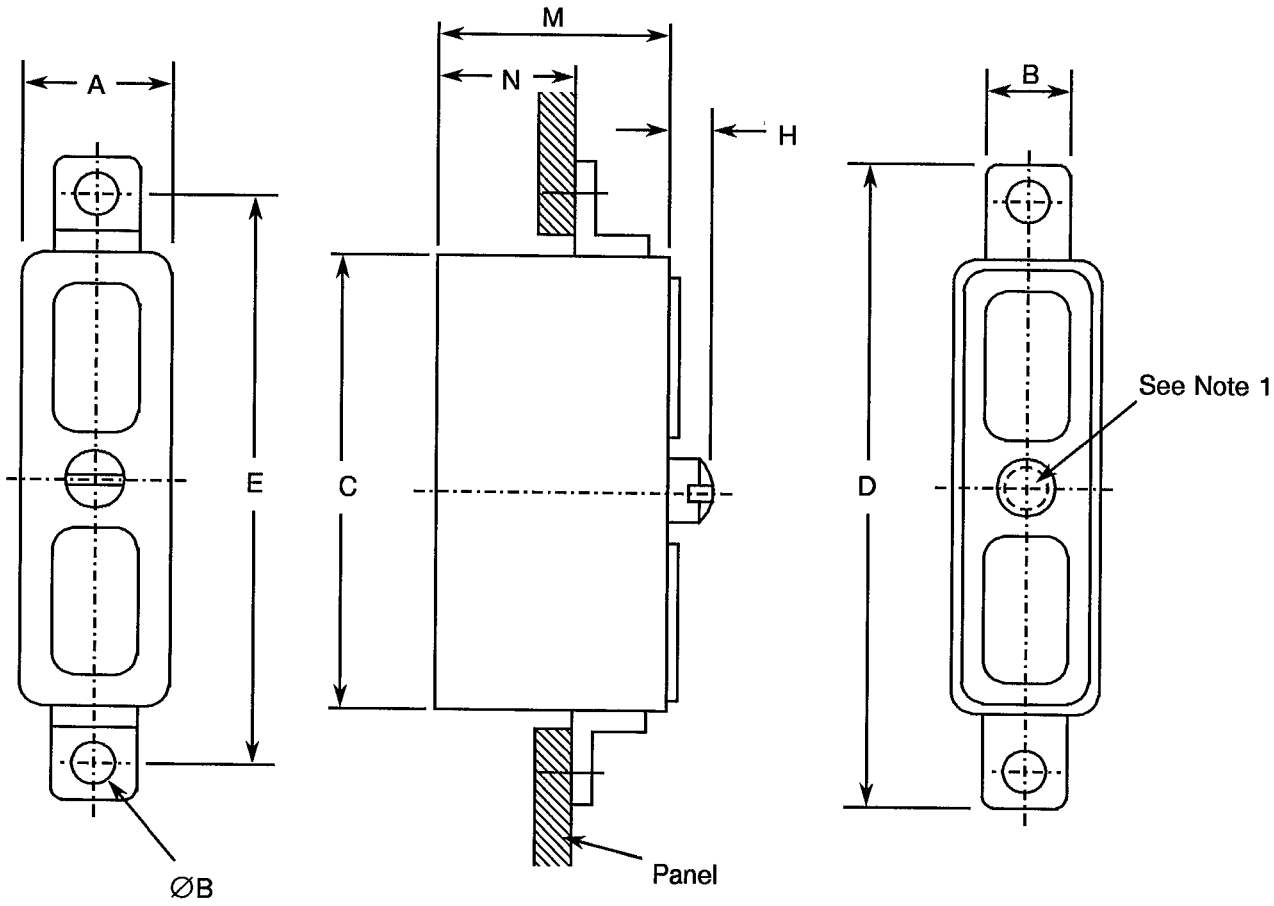
FIGURE 1 - PARAMETER DERATING INFORMATION



Working Voltage Versus Altitude

FIGURE 2 - PHYSICAL DIMENSIONS

FIGURE 2(a) - RECEPTACLE



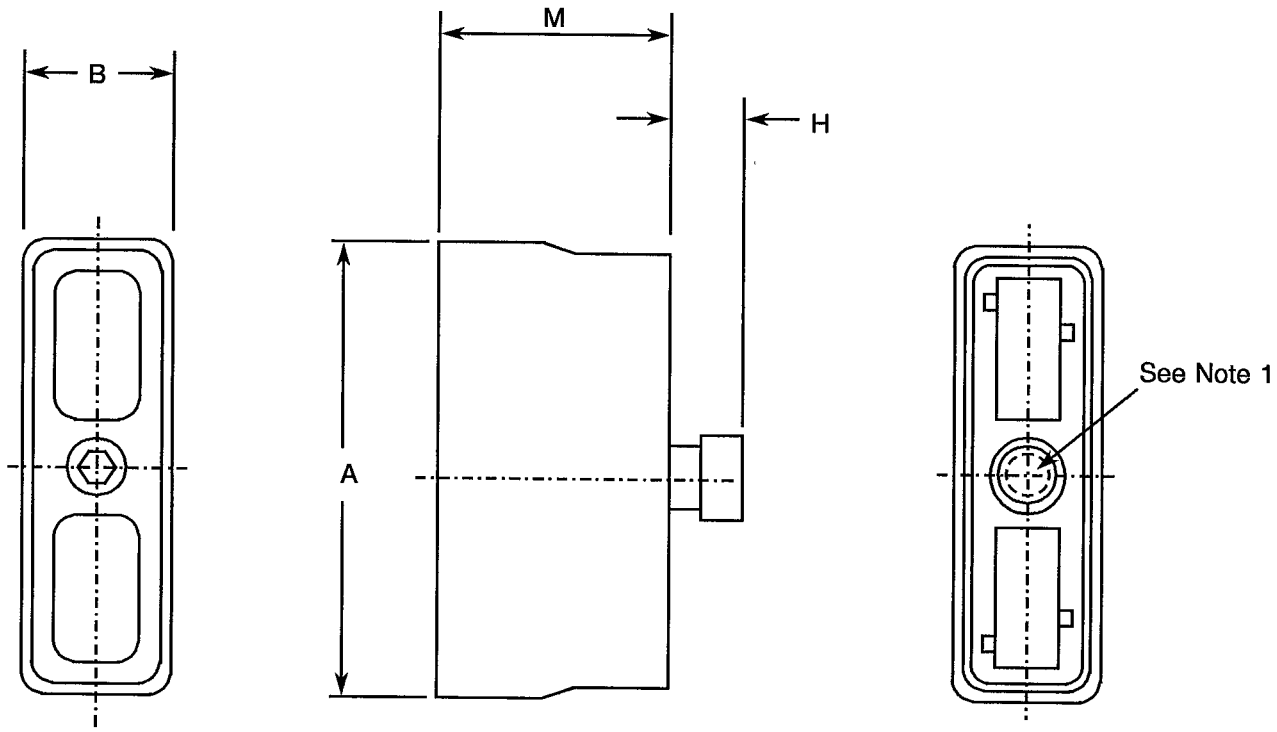
SHELL SIZE	A Max.	B Max.	ØB	C Max.	D Max.	E		G		H Max.	M Max.	N Max.
						Min.	Max.	Min.	Max.			
2	8.35	6.50	3.05	23.60	38.80	32.23	32.43	9.95	10.15	3.60	17.90	11.90
3	8.35	6.50	3.05	39.85	55	48.52	48.72	9.95	10.15	3.60	17.90	11.90
4	10.40	6.50	3.05	39.85	55	48.52	48.72	12.00	12.20	3.60	17.90	11.90
6	14.45	6.50	3.05	39.85	55	48.52	48.72	16.05	16.25	3.60	17.90	11.90
7	14.45	6.50	3.05	52.00	67.20	60.53	60.73	16.05	16.25	3.60	17.90	11.90

NOTES

1. Thread:3-48 UNC-2A.
2. All dimensions in millimetres.

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

FIGURE 2(a) - PLUG



SHELL SIZE	A Max.	B Max.	H Max.	M Max.
2	24.85	9.60	6.35	17.90
3	41.10	9.60	6.35	17.90
4	41.10	11.65	6.35	17.90
6	41.10	15.70	6.35	17.90
7	53.15	15.70	6.35	17.90

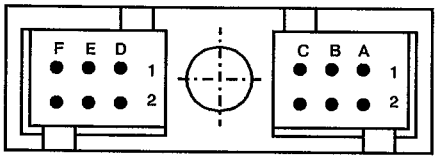
NOTES

1. Thread:3-48 UNC-2A.
2. All dimensions in millimetres.

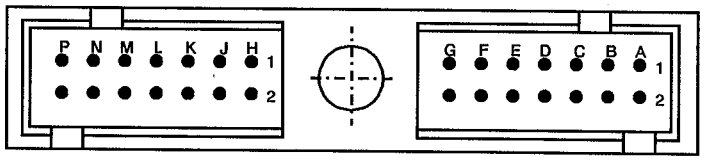
FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

FIGURE 2(b) - STANDARD CONTACT ARRANGEMENTS

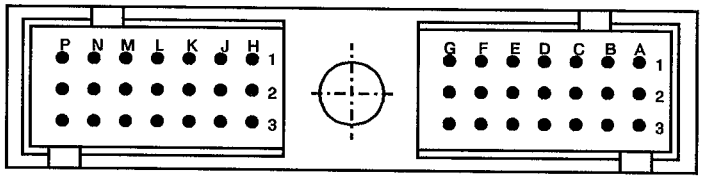
FRONT VIEW MALE INSERT



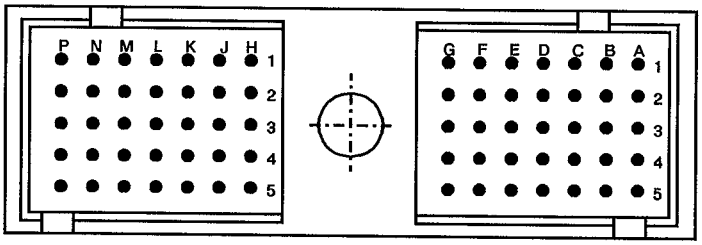
212
12 Contacts Gauge 22



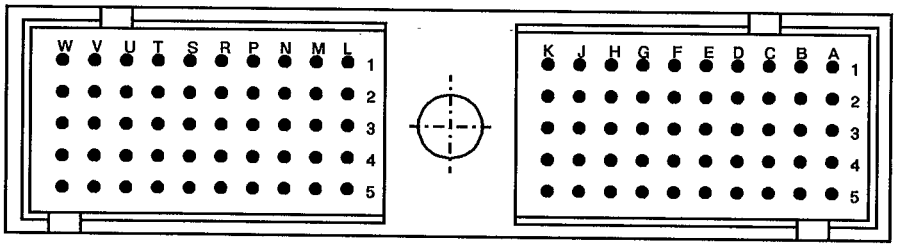
328
28 Contacts Gauge 22



442
42 Contacts Gauge 22



670
70 Contacts Gauge 22



700
100 Contacts Gauge 22

NOTES
1. See Para. 4.5.4 for definition of numbers.

4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the connectors specified herein are stated in this specification and ESA/SCC Generic Specification No. 3401. Deviations from the Generic Specification, applicable to this specification only, are listed in Para. 4.2.

Deviations from the applicable Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESA/SCC requirements and do not affect the component's reliability, are listed in the appendices attached to this specification.

4.2 DEVIATIONS FROM GENERIC SPECIFICATION

4.2.1 Deviations from Special In-process Controls

Not applicable.

4.2.2 Deviations from Final Production Tests (Chart II)

(a) Para. 9.5, Magnetism Level: Not applicable.

For information: The magnetism level is of the order of 2 000 gammas for a mated connector set after testing, in compliance with Para. 9.5 of ESA/SCC Generic Specification No. 3401.

4.2.3 Deviations from Burn-in and Electrical Measurements (Chart III)

Not applicable.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.12.1, Shock: 100g; 11ms; ½sine wave.

(b) Para. 9.18, Endurance: For shell size 7 (100 contacts), the 500 engagements and separations shall be performed as follows:

- 150 engagements and separations with the jackscrew.
- 350 remaining engagements and separations without jackscrew, manually.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.18, Endurance: For shell size 7 (100 contacts), the 100 engagements and separations shall be performed with the jackscrew.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the connectors specified herein shall be verified in accordance with the requirements set out in Para. 9.6 of ESA/SCC Generic Specification 3401 and shall conform to those shown in Figure 2 of this specification.

4.3.2 Weight

The maximum weight of the connectors specified herein, without contacts, shall be as specified in Table 1(a).

4.3.3 Contact Capability

As specified in ESA/SCC Detail Specification No. 3401/012.

4.3.4 Contact Retention (In Insert)

As specified in ESA/SCC Detail Specification No. 3401/012.

4.3.5 Mating and Unmating Forces

Refer to the jackscrew coupling torque in Table 1(a).

4.3.6 Insert Retention (In Shell)

Connector inserts shall withstand a pressure of 42.8N/cm^2 without being dislodged from the shell.

4.3.7 Jackscrew Retention

An axial load shall be applied to the jackscrew from the engagement end of the connector. The load shall be gradually increased at a rate not exceeding 0.45N per second up to 20N and maintained for a period of 15 seconds. The jackscrew shall not be dislodged from the connector.

4.3.8 Contact Insertion and Withdrawal Forces

As specified in ESA/SCC Detail Specification No. 3401/012.

4.3.9 Engagement and Separation Forces

As specified in ESA/SCC Detail Specification No. 3401/012.

4.3.10 Oversize Pin Exclusion

As specified in ESA/SCC Detail Specification No. 3401/012.

4.3.11 Probe Damage

As specified in ESA/SCC Detail Specification No. 3401/012.

4.3.12 Solderability

As specified in ESA/SCC Detail Specification No. 3401/012.

4.4 MATERIALS AND FINISHES

The materials and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the connectors specified herein to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material does not guarantee acceptance of the finished product.

4.4.1 Shells

Shells shall be made of aluminium alloy conductive anodise.

4.4.2 Inserts

Bonded sandwich: Silicone/phenolic/silicone.

4.4.3 Contacts

As specified in ESA/SCC Detail Specification No. 3401/012.

4.4.4 Contact Retaining Clip

Not applicable.

4.4.5 Guiding and Locking Devices

Not applicable.

4.4.6 Magnetism Level

Not applicable.

4.4.7 Jackscrew

Stainless steel, passivated

4.5 MARKING

4.5.1 General

The marking of all components delivered to this specification shall be in accordance with with the requirements of ESA/SCC Basic Specification No. 21700 and the following paragraphs. When the component is too small to accommodate all of the marking specified, as much as space permits shall be marked and the marking information, in full, shall accompany the component in its primary package.

The information to be marked and the order of precedence, shall be as follows:-

(a) Contact identification.

(b) The SCC Component Number.

(c) Characteristics.

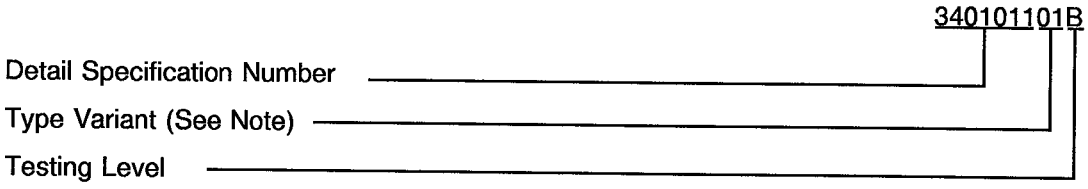
(d) Traceability information.

4.5.2 Contact Identification

Contact identification shall be marked in accordance with Figure 2(b).

4.5.3 The SCC Component Number

Each component shall bear the SCC Component Number which shall be constituted and marked as follows:



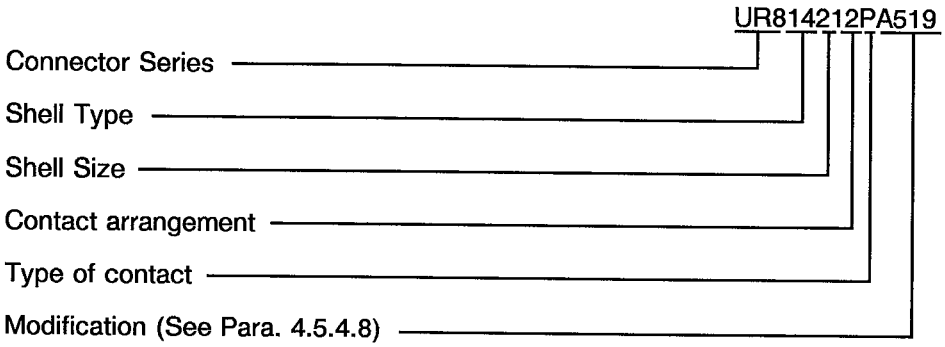
N.B.
Marking of the Type Variant Number is mandatory. No further reference to type variants is made in this specification.

4.5.4 Characteristics

The characteristics to be marked in the following order of precedence are:-

(a) Series.
(b) Shell size.
(c) Insert type.
(d) Alternative designs.
(e) Contact arrangement.
(f) Type of contact.
(g) Magnetism Level.
(h) Contact information.

The information shall be constituted and marked as follows:-



4.5.4.1 Connector Series

This connector series shall be designated by the Code UR8.

4.5.4.2 Shell Types

The shell types shall be designated by the following code numbers:-

Code No.	Shell Type
14	Plug Shell
64	Receptacle Shell

4.5.4.3 Insert Type

Not applicable.

4.5.4.4 Shell Sizes and Contact Arrangement

Shell sizes and contact arrangements are closely interrelated and shall be indicated by the following codes.

Code		Number of Contacts
Shell Size	Contact Arrangement	
2	12	Number of contacts and contact sizes are as shown in Figure 2(b)
3	28	
4	42	
6	70	
7	100	

4.5.4.5 Type of Contact

The contact types shall be indicated by the following code letters.

CODE LETTER	CONTACT TYPE
P	Male
S	Female

4.5.4.6 Magnetism Level

Not applicable.

4.5.4.7 Contact Information

Not applicable.

4.5.4.8 Modification Codes

Modification codes shall be expressed in letters or numbers, or both. They shall be defined by the Manufacturer who shall keep a code register for reference purposes. These high reliability connectors are ordered separately from the contacts and this is specified by code 090. This code shall never appear on the connector itself, but be used in paperwork only.

The Plug shell is to be marked A519 and the Receptacle shell is to be marked A520.

4.5.5 Traceability Information

Traceability information shall be marked in accordance with the requirements of ESA/SCC Basic Specification No. 21700.

4.6 ELECTRICAL MEASUREMENTS

4.6.1 Electrical Measurements at Room Temperature

The parameters to be measured in respect of electrical characteristics are scheduled in Table 2. Unless otherwise specified, these measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.6.2 Electrical Measurements at High and Low Temperatures (Table 3)

Not applicable.

4.6.3 Circuit for Electrical Measurements (Figure 4)

Not applicable.

4.7 BURN-IN AND ELECTRICAL MEASUREMENTS (TABLES 4 AND 5)

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS

4.8.1 Measurements and Inspections on Completion of Environmental Tests

The parameters to be measured and inspections to be performed on completion of environmental testing shall be those specified in Table 6. Unless otherwise specified, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.8.2 Measurements and Inspections at Intermediate Points during Endurance Tests

Not applicable.

4.8.3 Measurements and Inspections on Completion of Endurance Tests

The parameters to be measured and inspections to be performed on completion of endurance tests shall be those specified in Table 6. Unless otherwise specified, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.8.4 Conditions for Operating Life Test (Part of Endurance Testing)

Not applicable.

4.8.5 Electrical Circuits for Operating Life Test

Not applicable.

4.8.6 Conditions for High Temperature Storage Test (Part of Endurance Testing)

The requirements for the high temperature storage test are specified in Section 9 of ESA/SCC Generic Specification No. 3401. The conditions for high temperature storage testing shall be the maximum storage temperature specified in Table 1(b) of this specification.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	CHARACTERISTIC	SYMBOL	SPECIFICATION AND TEST METHOD	TEST CONDITION	LIMITS		UNIT
					MIN.	MAX.	
1	Insulation Resistance	Ri	ESA/SCC 3401 Para. 9.1.1.1	Para. 9.1.1.1	10 000	-	MΩ
2	Voltage Proof Leakage Current	I_L	ESA/SCC 3401 Para. 9.1.1.2	1 000Vrms	-	2.0	mA

TABLES 3, 4 AND 5

Not applicable.

TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL AND ENDURANCE TESTING

NO.	ESA/SCC GENERIC NO. 3401		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN	MAX	
01	Wiring	Para. 9.10	ESA/SCC 3401/012			-	-	
02	Vibration	Para. 9.11	**Initial Measurements**	-				
			Coupling Screw(s)					
			Unlocking Torque		-	Record Values		
			Final Measurements					
			Full Engagement	-				
			Coupling Screw(s)					
			Unlocking Torque Drift	-	Δ	-25	+25	%
			Visual Examination	-	-	-	-	
03	Shock or Bump	Para. 9.12	Full Engagement	-		-	-	
			Visual Examination	-		-	-	
04	Climatic Sequence	Para. 9.13	**Dry Heat**					
			Insulation Resistance	Table 2 Item 1	Ri	500	-	MΩ
			Low Air Pressure					
			Voltage Proof Leakage Curr.	Figure 1	I_L	Table 2 Item 2		
			Damp Heat	**Immediately after test**				
			Insulation Resistance	Table 2 Item 1	Ri	100	-	MΩ
				After 1-24 hrs Recovery				
			External Visual Inspection	ESA/SCC 3401 Para. 9.7	-	ESA/SCC 3401 Para. 9.7		
			Insulation Resistance	Table 2 Item 1	Ri	500	-	MΩ
			Voltage Proof Leakage Curr.	Table 2 Item 2	I_L	Table 2 Item 2		
05	Seal Test	Para. 9.9	ESA/SCC 3401 Para. 9.9			Not applicable		
06	Plating Thickness	Para. 9.14	Thickness			ESA/SCC 3401/012		
07	Joint Strength	Para. 9.15	ESA/SCC 3401 Para 9.15			ESA/SCC 3401 Para. 9.15		
08	Rapid Change of Temperature	Para. 9.16	Visual Examination	-	-	-	-	
			Insulation Resistance	Table 2 Item 1	Ri	500	-	MΩ
			Voltage Proof Leakage Curr.	Table 2 Item 2	I_L	Table 2 Item 2		
09	Contact Retention (In Insert)	Para. 9.17 & Para. 4.3.4 of this spec.	Contact Displacement			ESA/SCC 3401 Para. 9.17		
10	Endurance	Para. 9.18	**Initial Measurements**					
			Mating/Unmating Forces		F	Para. 4.3.5 of this spec.		
			Low Level Contact Resist	ESA/SCC 3401/012	Rcl	Record Values		
			Mated Shell Conductivity	Table 2 Item 3	Vd	Not applicable		
			Final Measurements					
			Visual Examination	-	-	-	-	
			Mating/Unmating Forces		F	Para. 4.3.5 of this spec.		
			Low Level Contact Resistance Drift	ESA/SCC 3401/012	ΔRcl	ESA/SCC 3401/012		
			Mated Shell Conductivity	Table 2 Item 3	Vd	Not applicable		
			Insulation Resistance	Table 2 Item 1	Ri	500	-	MΩ
			Voltage Proof Leakage Curr.	Table 2 Item 2	I_L	Table 2 Item 2		

NOTES 1. The tests in this table refer to either Chart IV or V and shall be used as applicable.

TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL AND ENDURANCE TESTING (CONTINUED)

NO.	ESA/SCC GENERIC NO. 3401		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN	MAX	
11	Permanence of Marking	Para. 9.19	As applicable		-	-	-	
12	Mating/Unmating Forces	Para. 9.20	Force		F	Para. 4.3.5 of this spec.		
13	High Temperature Storage	Para. 9.21	**Initial Measurements**					
			Low Level Contact Resis.	ESA/SCC 3401/012	Rcl	Record Values		
			Mated Shell Conductivity	Table 2 Item 3	Vd	Not applicable		
			Final Measurements					
			Visual Examination	-	-	-	-	
			Mating/Unmating Forces		F	Para. 4.3.5 of this spec.		
			Low Level Contact Resistance Drift	ESA/SCC 3401/012	ΔRcl	ESA/SCC 3401/012		
			Rated Current Contact Resis.	ESA/SCC 3401/012	Rcr	ESA/SCC 3401/012		
			Mated Shell Conductivity	Table 2 Item 3	Vd	Not applicable		
			Insulation Resistance	Table 2 Item 1	Ri	500	-	MΩ
			Voltage Proof Leakage Curr.	Table 2 Item 2	I_L	Table 2 Item 2		
			Contact Retention (In Insert)	Para. 4.3.4 of this spec.		ESA/SCC 3401 Para. 9.17		
14	Corrosion	Para. 9.22	Visual Examination	-	-	-	-	
15	Insert Retention (In Shell)	Para. 9.23 & Para. 4.3.6 of this spec.	Visual Examination	ESA/SCC 3401 Para. 9.23.1	-	Para. 4.3.6		
16	Jackscrew Retention	Para. 9.24 & Para. 4.3.7 of this spec.	Visual Examination	ESA/SCC 3401 Para. 9.24	-	Para. 4.3.7		
17	High Temperature Measurements	Para. 9.25	Insulation Resistance	Table 2 Item 1	Ri	500	-	MΩ
18	Overload Test	Para. 9.26	Internal Temperature		T	-	+100	°C
			Rated Current Contact Resis.	ESA/SCC 3401/012	Rcr	ESA/SCC 3401/012		
			Mated Shell Conductivity	Table 2 Item 3	Vd	Not applicable		
			Insulation Resistance	Table 2 Item 1	Ri	500	-	MΩ
			Voltage Proof Leakage Curr.	Table 2 Item 2	I_L	Table 2 Item 2		
19	Maintenance Aging	Para. 9.27	Visual Examination	-	-	-	-	
			Contact Retention	Para. 4.3.4 of this spec		ESA/SCC 3401 Para. 9.17		
			Contact Insertion & Withdrawal Forces	Para. 4.3.8 of this spec		Para. 4.3.8		

NOTES

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.

TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL AND ENDURANCE TESTING (CONTINUED)

NO.	ESA/SCC GENERIC NO. 3401		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN	MAX	
20	Engage/Separation Forces	Para. 9.28 & Para. 4.3.9 of this spec.	Force			Para. 4.3.9		
21	Oversize Pin Exclusion	Para. 9.29 & Para. 4.3.10 of this spec.				ESA/SCC 3401 Para. 9.29		
22	Probe Damage	Para. 9.30 & Para. 4.3.11 of this spec.	Contact Separation Force	Para. 4.3.9 of this spec.		Para. 4.3.9		
23	Solderability	Para. 9.31 & Para. 4.3.12 of this spec.				Para. 4.3.12		

NOTES

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.