CONTACTS, ELECTRICAL, MALE/FEMALE TYPE,

FOR 3401/020 CONNECTOR SAVERS

ESCC Detail Specification No. 3401/021

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FOR 3401/020 CONNECTOR SAVERS

ESA/SCC Detail Specification No. 3401/021

space components
coordination group

Issue/Rev.	Date	Approved by	
		SCCG Chairman	ESA Director General or his Deputy
Issue 2	February 1996		
Revision 'A'	September 1996		
Revision 'B'	February 2000		

DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		This Issue supersedes Issue 1 and incorporates all modifications defined in Revision 'A' to Issue 1 and the changes agreed in the following DCR's:-		
		Cover Page	: Title amended	23797
		DCN		None
		Para. 1.1	: Text and specification references amended	221321/ 23797
		Para. 1.2	: Existing text deleted and new text added	221321
		Para. 1.4	: Text deleted and "Not applicable." added	221321
		Para. 1.6	: Deleted in toto	221321
		Para. 2	: Specification references amended	221321
		Table 1(a)	: Table restructured	221321
			: Variant 02 added	221321
		Table 1(b)	: Table enlarged	221321
		Figure 1	: Title amended	221321
			: Table deleted and "Not applicable." added	221321
		Figure 2	: Detail A added	221321
			: Variant 02 added to Table	221321
			: Notes added	221321
		Para. 4.2.2	: Deviation deleted and "None" added	221321
		Para. 4.2.3	: Title amended	221321
		Para. 4.2.4	: Title amended	221321
			: Existing text deleted and deviations added	221321
		Para. 4.2.5	: Existing text deleted and deviations added	221321
		Para. 4.3.1	: Existing text deleted and new text added	221321
		Para. 4.3.3	: Title and text amended	221321
		Para. 4.3.4	: Deleted and replaced by renumbered 4.3.6	221321
			: Title and text amended	221321
		Para. 4.3.5	: Existing paragraph renumbered as 4.3.7	221321
			: New paragraph added	221321
		Para. 4.3.6	: New paragraph added	221321
		Para. 4.3.7	: Renumbered as 4.3.11 with amended Title and text	221321
		Para. 4.3.8	: Title and text amended	221321
		Para. 4.3.9	: Renumbered as 4.3.10 with amended Title and text	221321
			: New paragraph added	221321
		Para. 4.3.12	: New paragraph added	221321
		Para. 4.4.1	: Renumbered as 4.4.3 with amended Title and text	221321
			: New paragraph added	221321
		Para. 4.4.2	: New paragraph added	221321
		Para's 4.4.4 to 4.4.6	: New paragraphs added	221321
		Figure 3	: Deleted in toto	221321
		Para. 4.5.1	: Text amended	221321
		Para. 4.5.2	: "(See Table 1(a))" added to Type Variant and ", as applicable" deleted	221321
		Para. 4.6.3	: Text deleted and "Not applicable" added	221321
		Para. 4.7	: Title amended	221321
		Para. 4.8.1	: Title and text amended	221321
		Para. 4.8.2	: Title amended	221321
		Para. 4.8.3	: Title and text amended	221321
		Para. 4.8.6	: "Not applicable" deleted and text added	221321
		Table 2	: Reformatted and resequenced	221321

DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		Tables 3, 4 and 5 Figures 4 and 5 Table 6	: Entry added : Deleted in toto : Table added	221321 221321 221321/ 23797
'A'	Sept. '96	P1. Cover page P2A. DCN P10. Para. 4.4.3	: Gold plating thickness corrected	None None 23812
'B'	Feb. '00	P1. Cover page P2A. DCN P10. Para. 4.4.3	: Existing text amended and extended	None None 221544

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES (Applicable to specific Manufacturers only)
None.

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Contacts, Electrical, Male/Female Type, Gauge 20 and 22, for 3401/020 Connector Savers.

These contacts shall be packed separately from the connector savers and may be procured either with the connector savers or separately.

This specification shall be read in conjunction with:

- ESA/SCC Generic Specification No. 3401, Connectors, Electrical, Non-Filtered, Circular and Rectangular,
- ESA/SCC Detail Specification No. 3401/020, Connector Savers, Electrical, Rectangular, Miniature, Removable Contacts, Based on Type D*BMA,

the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS

The different sizes of contacts specified herein, which are also covered by this specification are scheduled 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 contacts specified herein, are scheduled in Table 1(b).

1.4 PARAMETER DERATING INFORMATION (FIGURE 1)

Not applicable.

1.5 PHYSICAL DIMENSIONS

The physical dimensions of the contacts 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, Connectors, Electrical, Non-Filtered, Circular and Rectangular.

(b) ESA/SCC Detail Specification No. 3401/020, Connector Savers, Electrical, Rectangular, Miniature, Removable Contacts, Based on Type D*BMA.

(c) MIL-G-45204, Gold Plating, Electro-deposited.

(d) MIL-C-14550, Copper Plating, Electro-deposited.

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) - TYPE VARIANTS

VAR-IANT	TYPE	MATING END SIZE	RATED CUR-RENT	MAX WEIGHT	ENGAGEMENT & SEPARATION		CONTACT CAPABILITY				CON-TACT RETENT. FORCE MAX	CONTACT INSERT WITHDR FORCES MAX	PROBE DAMAGE			OVERSIZE PIN EXCL.		
							TEST PINS DIA mm		WEIGHT				MO-MENT	PROBE DIA mm		FORCE MAX	TEST PIN DIA mm	
					ENGAG. FORCES N (1)	SEPAR. FORCES N (1)	min.	max.	Pick-up (2) g	Drop (3) g	N	N	N.cm	min	max	N	min	max
01	Male/Female	20	7.5	0.25	3.33 -	2.22 0.28	1.039 0.990	1.040 0.993	- 28.35	226.80 -	40	18.50	5.65	1.007	1.033	3.33	1.166	1.170
02	Male/Female	22	5.0	0.16	3.33 -	2.22 0.20	0.773 0.749	0.775 0.751	- 19.84	226.80 -	40	18.50	1.30	0.749	0.774	2.43	0.905	0.907

NOTES

1. 1st line, maximum values with maximum diameter test pin.
   2nd line, minimum values with minimum diameter test pin.
2. With minimum diameter test pin and minimum insertion depth of 4.0mm.
3. With maximum diameter test pin and minimum insertion depth of 4.0mm.

TABLE 1(b) - MAXIMUM RATINGS

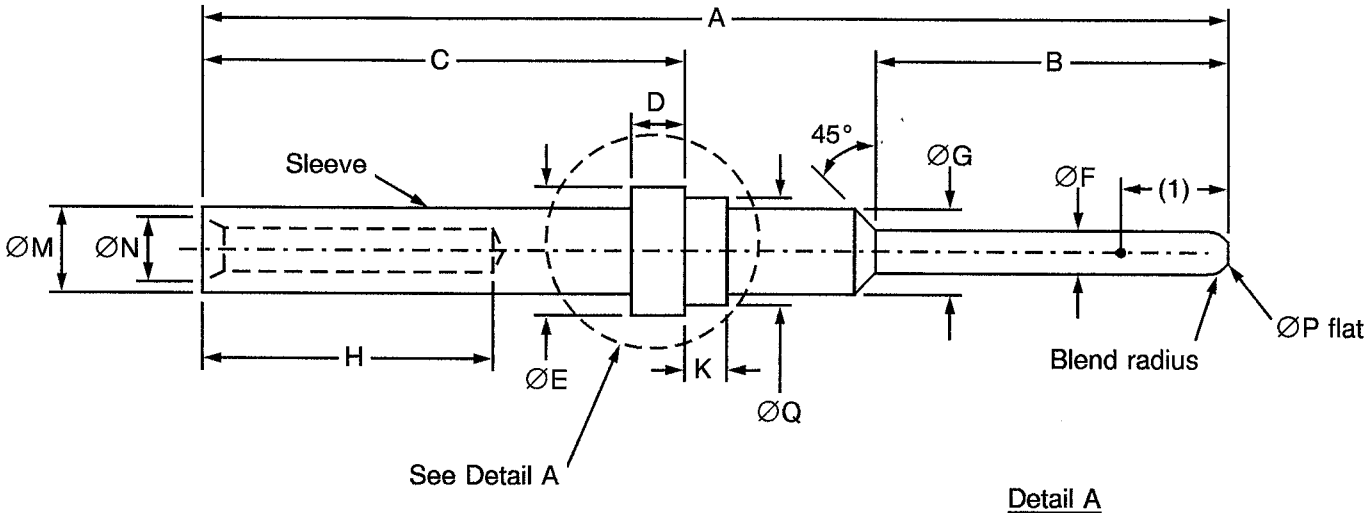
No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATING	UNIT	REMARKS
1	Rated Current	I_{CR}	See Table 1(a)	A	
2	Operating Temperature Range	T_{op}	−55 to +125	°C	T_{amb}
3	Storage Temperature Range	T_{stg}	−65 to +125	°C	

FIGURE 1 - PARAMETER DERATING INFORMATION

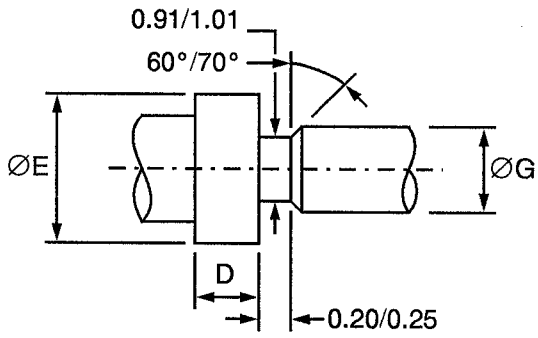
Not applicable.

FIGURE 2 - PHYSICAL DIMENSIONS

MALE/FEMALE CONTACT - VARIANTS 01 AND 02



Detail A



Variant 02 only

Variant \ Dimensions		A	B	C	D	ØE	ØF	ØG	H	K	ØM	ØN	P	ØQ
01	Min.	19.76	5.27	9.45	0.72	2.08	0.99	1.65	7.00	1.01	1.70	1.07	-	1.73
	Max.	20.12	6.05	9.65	0.86	2.16	1.04	1.73	-	1.25	1.85	1.14	0.30	1.80
02	Min.	19.50	5.95	7.10	0.79	1.52	0.749	1.17	4.22	-	-	0.78	-	-
	Max.	19.95	6.05	7.35	0.89	1.56	0.775	1.21	-	-	1.57	-	0.20	-

NOTES

1. Measurement point for plating thickness: 4.0 ± 1.0.
2. All dimensions are in millimetres (angles in degrees).
3. Underlined dimensions, in Table, are critical to ensure intermateability.

4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the contacts specified herein are stated in this specification and ESA/SCC Generic Specification No. 3401. Deviations from the Generic Specification, applicable to this Detail 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 components' 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

None.

4.2.2 Deviations from Final Production Tests (Chart II)

None.

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. 9.10, Wiring: Not applicable.

(b) Para. 9.15, Joint Strength: Not applicable.

(c) Para. 9.31, Solderability: Not applicable.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.10, Wiring: Not applicable.

(b) Para. 9.15, Joint Strength: Not applicable.

(c) Para. 9.31, Solderability: Not applicable.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the contacts specified herein shall be verified in accordance with the requirements set out in Para. 9.6 of ESA/SCC Generic Specification No. 3401 and shall conform to those shown in Figure 2 of this specification.

4.3.2 Weight

The maximum weight of the contacts specified herein shall be as specified in Table 1(a).

4.3.3 Contact Capability

For the purpose of this test, the pick-up and drop weights shall be as specified in Table 1(a).

4.3.4 Contact Retention (in Insert)

The contact retention force shall be as specified in Table 1(a).

4.3.5 Mating and Unmating Forces

As specified in ESA/SCC Detail Specification No. 3401/020.

4.3.6 Insert Retention (in Shell)

As specified in ESA/SCC Detail Specification No. 3401/020.

4.3.7 Jackscrew Retention

Not applicable.

4.3.8 Contact Insertion and Withdrawal Forces

The contact insertion and withdrawal forces shall be as specified in Table 1(a).

4.3.9 Engagement and Separation Forces

The diameter of the test pin and the engagement and separation forces of the female contacts shall be as specified in Table 1(a).

4.3.10 Oversize Pin Exclusion

The diameter of the test pin and the force applied to it shall be as specified in Table 1(a).

4.3.11 Probe Damage

The probe diameter and the moment at the end of the probe shall be as specified in Table 1(a).

4.3.12 Solderability

Not applicable.

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 contacts 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

As specified in ESA/SCC Detail Specification No. 3401/020.

4.4.2 Inserts

As specified in ESA/SCC Detail Specification No. 3401/020.

4.4.3 Contacts

The contact body shall be made of copper alloy with an underplate of 1.0µm minimum of copper to MIL-C-14450, gold plated with 1.27µm minimum of gold, Type 2 Grade C of MIL-G-45204.

The female contact spring element shall be made of copper alloy with an underplate of 1.0µm minimum of nickel or copper to MIL-C-14450, gold plated with 1.27µm minimum of gold, Type 2 Grade C of MIL-G-45204.

4.4.4 Contact Retaining Clip

As specified in ESA/SCC Detail Specification No. 3401/020.

4.4.5 Guiding and Locking Devices

As specified in ESA/SCC Detail Specification No. 3401/020.

4.4.6 Magnetism Level

As specified in ESA/SCC Detail Specification No. 3401/020.

4.5 MARKING

4.5.1 General

The marking of all components delivered to this specification shall be in accordance 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.

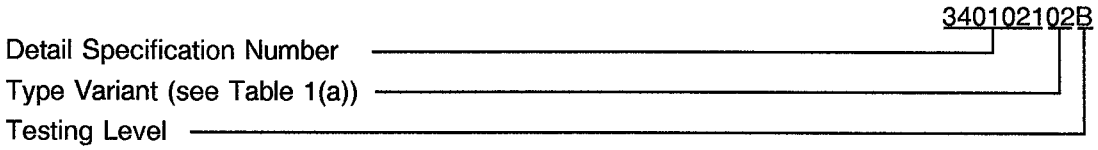
The information to be marked and the order of precedence, shall be as follows:-

(a) The SCC Component Number.

(b) Traceability information.

4.5.2 The SCC Component Number

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



4.5.3 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.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	CHARACTERISTICS	SYMBOL	ESA/SCC 3401 TEST METHOD	TEST CONDITION	VARIANTS	LIMITS		UNIT
						MIN.	MAX.	
1	Contact Resistance (Low Level Current)	Rcl	Para 9.1.1.3	Para 9.1.1.3	01 and 02	-	17	mΩ
2	Contact Resistance (Rated Current)	Rcr	Para 9.1.1.3	Para 9.1.1.3 7.5A 5.0A	 01 02	 - -	 14.7 16	 mΩ mΩ

TABLES 3, 4, 5 AND 6

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION NO. 3401)

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 are scheduled in Table 6. Unless otherwise specified, these 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, these 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 Tests (Figure 5)

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 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL AND ENDURANCE TESTS

NO.	ESA/SCC GENERIC SPEC. NO. 3401		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
01	Seal Test	Para. 9.9	ESA/SCC 3401/020					
02	Wiring	Para. 9.10	Not applicable					
03	Vibration	Para. 9.11	ESA/SCC 3401/020					
04	Shock or Bump	Para. 9.12	ESA/SCC 3401/020					
05	Climatic Sequence	Para. 9.13	ESA/SCC 3401/020					
06	Plating Thickness	Para. 9.14	Thickness	-	-	Para. 4.4.3 of this spec		
07	Joint Strength	Para. 9.15	Not applicable					
08	Rapid Change of Temperature	Para. 9.16	ESA/SCC 3401/020					
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** Low Level Contact Resistance **Final Measurements** Low Level Contact Resistance Drift	 Table 2 Item 1 Table 2 Item 1	 Rcl ΔRcl	 Record Values -	 3.0	 mΩ
11	Permanence of Marking	Para. 9.19	As applicable	-	-	-	-	-
12	Mating/Unmating Forces	Para. 9.20	ESA/SCC 3401/020					
13	High Temperature Storage	Para. 9.21	**Initial Measurements** Low Level Contact Resistance **Final Measurements** Low Level Contact Resistance Drift Rated Current Contact Resistance Contact Retention (in Insert)	 Table 2 Item 1 Table 2 Item 1 Table 2 Item 2 Para. 4.3.4 of this spec.	 Rcl ΔRcl Rcr	 Record Values - Table 2 Item 2 ESA/SCC 3401 Para. 9.17	 3.0	 mΩ
14	Corrosion	Para. 9.22	Visual Examination	-	-	-	-	-
15	Insert Retention (in Shell)	Para. 9.23 & Para. 4.3.6 of this spec.	ESA/SCC 3401/020					
16	Jackscrew Retention	Para. 9.24 & Para. 4.3.7 of this spec.	ESA/SCC 3401/020					
17	High Temperature Measurements	Para. 9.25	ESA/SCC 3401/020					
18	Overload Test	Para. 9.26	Rated Current Contact Resistance	Table 2 Item 2	Rcr	Table 2 Item 2		
19	Maintenance Aging	Para. 9.27	Visual Examination Contact Retention Contact Insertion & Withdrawal Forces	- Para. 4.3.4 of this spec. Para. 4.3.8 of this spec.	-	- ESA/SCC 3401 Para. 9.17 Para. 4.3.8	-	-
20	Engage/Separation Forces	Para. 9.28 & Para. 4.3.9 of this spec.	Force			Para. 4.3.9		

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 TESTS (CONT'D)

NO.	ESA/SCC GENERIC SPEC. NO. 3401		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
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.	Not applicable					

NOTES

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