CONTACTS, ELECTRICAL, TRIAX, CRIMP

FOR 3401/056 CONNECTORS

ESCC Detail Specification No. 3401/066

ISSUE 1

October 2002

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FOR 3401/056 CONNECTORS

ESA/SCC Detail Specification No. 3401/066

space components
coordination group

Issue/Rev.	Date	Approved by	
		SCCG Chairman	ESA Director General or his Deputy
Issue 1	February 2000		

DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.

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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, Triax, Crimp, for 3401/056 Connectors. The crimps on inner, intermediate and outer contacts shall be made at equidistant points around the circumference of the contacts.

These contacts shall be procured and packed separately from the connectors.

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. 3401/056, Connectors, Electrical, Circular, Triple-Start Self-Locking Coupling, Scoop-Proof, Removable Crimp Contacts, based on MIL-C-38999 Series III.

the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS

Variants of the basic type 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

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

1.5 PHYSICAL DIMENSIONS

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

1.6 FUNCTIONAL DIAGRAM

Not applicable.

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. 3401/056, Connectors, Electrical, Circular, Triple-Start Self-Locking Coupling, Scoop-Proof, Removable Crimp Contacts, based on MIL-C-38999 Series III.

(c) MIL-C-17/176, Cables, Radio Frequency, Flexible, Twin.

(d) SSQ21655, Cable, Electric, MIL-STD-1553 Data Bus, Space Quality, General Specification for.

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

VARIANTS	TYPE	MAX. WEIGHT (g)	ACCEPTED CABLES
01	Male	4.6	M17-176-00002
02	Female	6.9	SSQ-21655 (NDBC-TFE-2452SJ-75-1 P512296-C)

NOTES

1. Contacts fitted in 09-01 arrangement shall be used only with backshells ESA/SCC No. 3401/062, Variants 65 to 67.
2. Contacts fitted in other triax arrangements shall be used only with backshells ESA/SCC No. 3401/062, Variants 41 to 45.

TABLE 1(b) - MAXIMUM RATINGS

No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATINGS	UNIT	REMARKS
1	Working Voltage Sea Level	U_R	500	V	
2	Rated Current	Icr	1.0	A	
3	Frequency Range	f	0 to 20	MHz	Note 1
4	Operating Temperature Range	T_{op}	− 65 to + 200	°C	
5	Storage Temperature Range	T_{stg}	− 65 to + 200	°C	

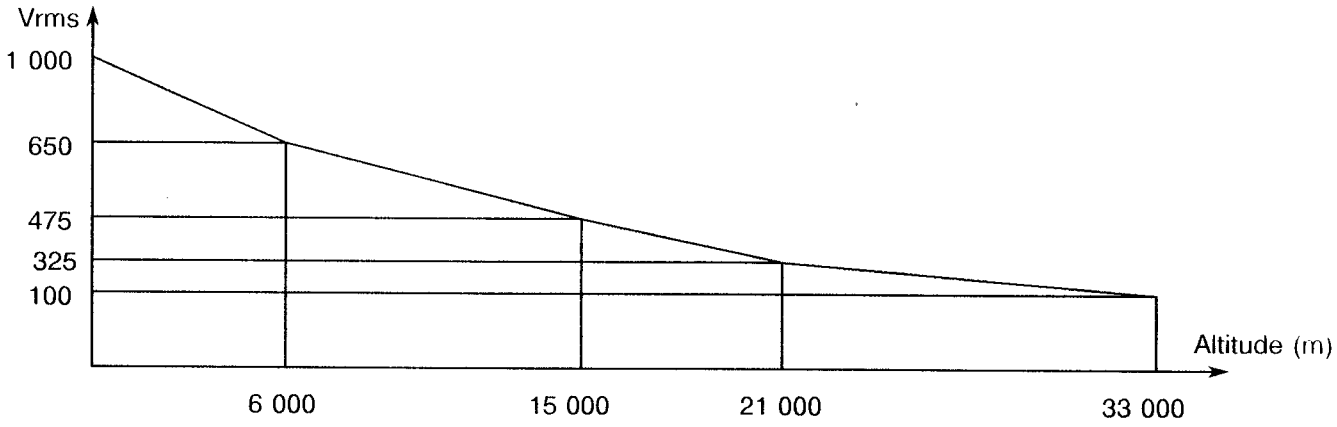
NOTES

1. Compatible with 1553 Bus Line.

FIGURE 1 - PARAMETER DERATING INFORMATION

VOLTAGE PROOF VERSUS ALTITUDE

(Inner/Intermediate)



(Intermediate/Outer)

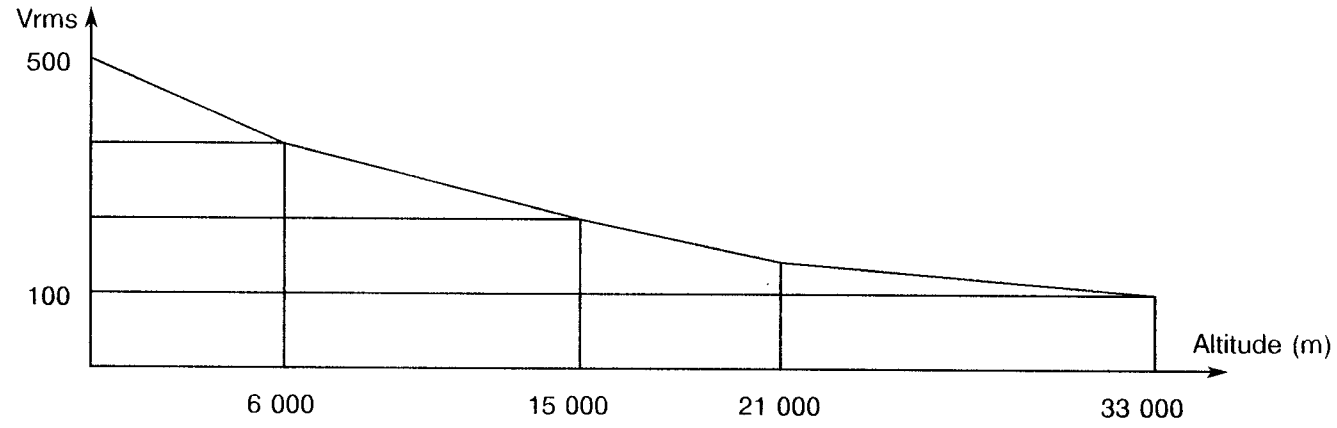
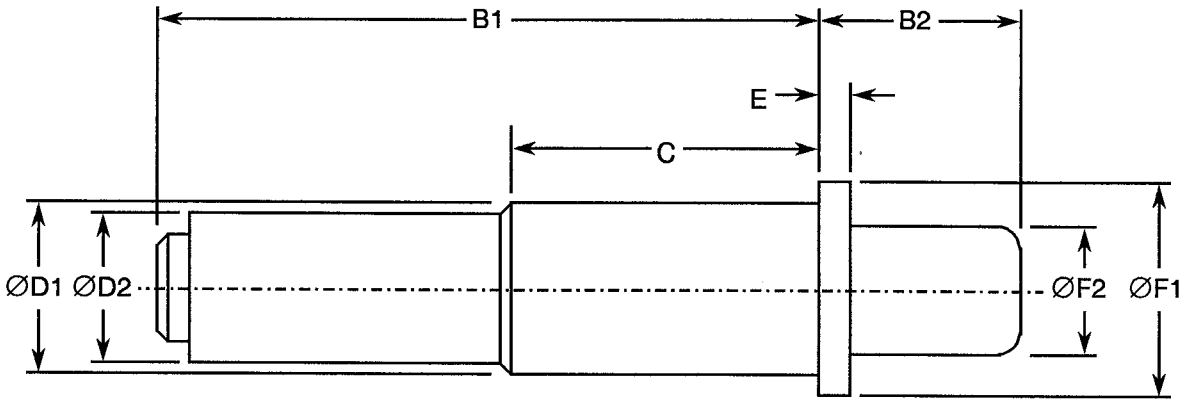


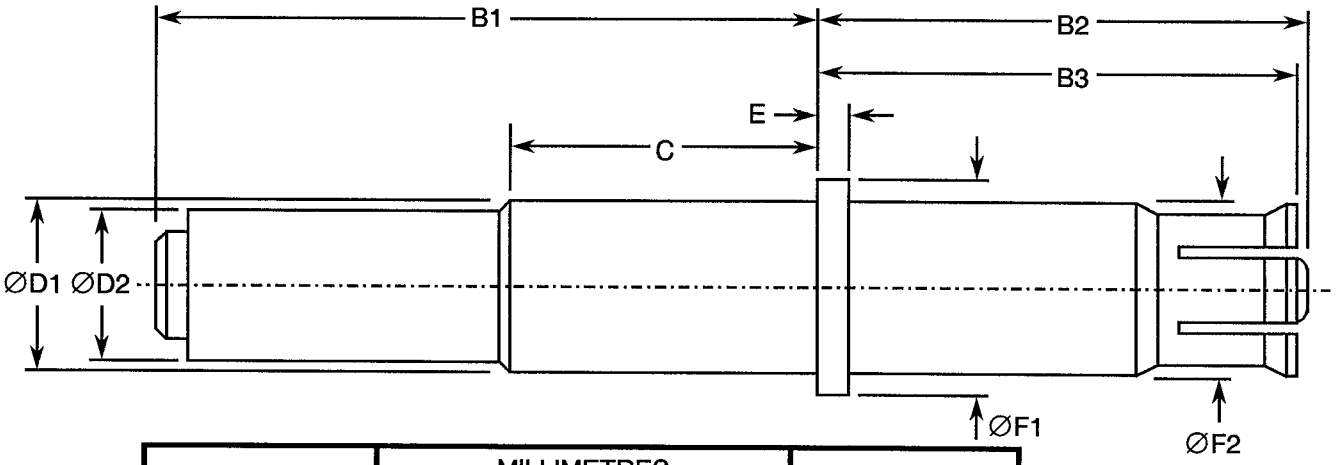
FIGURE 2 - PHYSICAL DIMENSIONS

VARIANT 01, MALE CONTACT



SYMBOL	MILLIMETRES		REMARKS
	MIN.	MAX.	
B1	21.34	22.86	
B2	7.49	7.74	
C	10.00	11.00	
ØD1	6.93	7.01	
ØD2	-	6.53	After crimping
E	0.74	0.84	
ØF1	7.95	8.03	
ØF2	5.515	5.565	

VARIANT 02, FEMALE CONTACT



SYMBOL	MILLIMETRES		REMARKS
	MIN.	MAX.	
B1	21.34	22.86	
B2	15.80	16.43	
B3	15.88	16.03	
C	10.00	11.00	
ØD1	6.93	7.01	
ØD2	-	6.53	After crimping
E	0.74	0.84	
ØF1	7.95	8.03	
ØF2	7.22	7.32	

4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the contacts specified herein shall be as 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 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

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. 9.15, Joint Strength: Shall be performed as specified in Para. 4.3.13 of this specification.

(b) Para. 9.26, Overload Test: Not applicable.

(c) Para. 9.29, Oversize Pin Exclusion: Not applicable.

(d) Para. 9.30, Probe Damage: Not applicable.

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

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.15, Joint Strength: Shall be performed as specified in Para. 4.3.13 of this specification.

(b) Para. 9.29, Oversize Pin Exclusion: Not applicable.

(c) Para. 9.30, Probe Damage: 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 given in Table 1(a).

4.3.3 Contact Capability

For the purpose of this test, the pick-up and drop weights shall be as follows.

4.3.3.1 Inner Contact

	PICK-UP WEIGHT	DROP WEIGHT	UNITS
WEIGHT PIN DIAMETER INSERTION DEPTH	11 0.594 to 0.596 3.0	180 0.619 to 0.622 3.0	g mm mm

4.3.3.2 Intermediate Contact

	PICK-UP WEIGHT	DROP WEIGHT	UNITS
WEIGHT PIN DIAMETER INSERTION DEPTH	11 2.844 to 2.847 3.0	350 2.887 to 2.895 3.0	g mm mm

4.3.3.3 Outer Contact

	PICK-UP WEIGHT	DROP WEIGHT	UNITS
WEIGHT PIN DIAMETER INSERTION DEPTH	56 5.511 to 5.514 4.0	450 5.559 to 5.562 4.0	g mm mm

4.3.4 Contact Retention (In Insert)

The contact retention within the insert shall be 111N. There shall be no displacement of the contact in excess of 0.3mm.

4.3.5 Mating and Unmating Forces

As specified in ESA/SCC Detail Specification No. 3401/056.

4.3.6 Insert Retention (In Shell)

As specified in ESA/SCC Detail Specification No. 3401/056.

4.3.7 Jackscrew Retention

Not applicable.

4.3.8 Contact Insertion and Withdrawal Forces

Insertion and withdrawal forces of the contacts shall be as specified in ESA/SCC Detail Specification No. 3401/058 for size 8 contacts.

Not applicable to arrangement 09-01.

4.3.9 Engagement and Separation Forces

4.3.9.1 Inner Contact

The contact engagement and separation forces shall be as follows.

TEST PIN DIAMETER (mm)	ENGAGEMENT MAXIMUM (g)	SEPARATION MINIMUM (g)
0.594 to 0.596 0.619 to 0.622	- 396	11 -

4.3.9.2 Intermediate Contact

The contact engagement and separation forces shall be as follows.

TEST PIN DIAMETER (mm)	ENGAGEMENT MAXIMUM (g)	SEPARATION MINIMUM (g)
2.844 to 2.847	-	11
2.887 to 2.895	623	-

4.3.9.3 Outer Contact

The contact engagement and separation forces shall be as follows.

TEST PIN DIAMETER (mm)	ENGAGEMENT MAXIMUM (g)	SEPARATION MINIMUM (g)
5.511 to 5.514	-	56
5.559 to 5.562	1 700	-

4.3.10 Oversize Pin Exclusion

Not applicable.

4.3.11 Probe Damage Test

Not applicable.

4.3.12 Solderability

Not applicable.

4.3.13 Joint Strength

(a) The contact shall be assembled to its test cable as specified in Table 1(a) with a thermoshrink sleeve between cable and back shell.

(b) Testing shall be performed in accordance with ESA/SCC Generic Specification No. 3401, Para. 9.15.5 with electrical continuity of the 3 contacts being maintained during testing.

(c) On completion of the testing, Contact Resistance at Low Level shall be measured and shall not exceed the values specified in Table 6 of this specification.

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 Insert

Teflon.

4.4.2 Inner, Intermediate and Outer Contacts

The contacts shall be made of copper base alloy selected from raw materials with a minimum of impurities. The contacts shall be plated as follows:

- 2.0µm ± 20% nickel underplate.
- 1.27µm minimum gold plate over 3.0µm minimum of copper.

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. These components being too small to accommodate the marking, the marking requirements, in full, shall accompany each lot of components in its primary package.

Such marking shall comprise:-

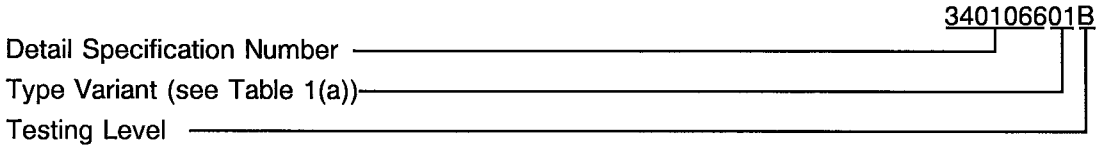
(a) The SCC Component Number.

(b) Traceability Information.

(c) Quantity of Components.

4.5.2 The SCC Component Number

The SCC Component Number 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 listed in Table 2. Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ± 3 °C.

Contact resistance shall be measured on the engaged outer, intermediate and inner conductor contacts.

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

Not applicable.

4.6.3 Circuits for Electrical Measurements

A circuit for measuring Contact Resistance is shown in Figure 4 of this specification.

4.7 SCREENING TESTS (TABLES 4 AND 5)

Not applicable.

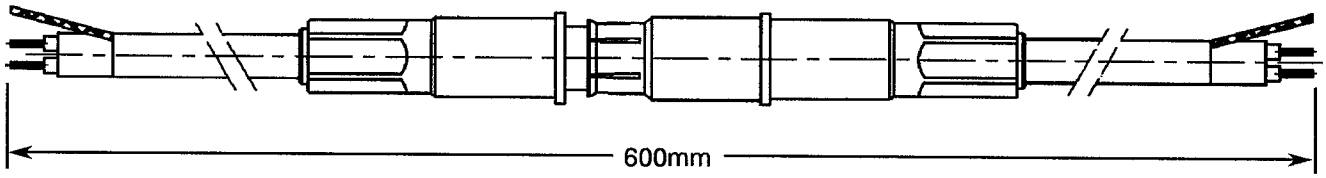
TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	CHARACTERISTICS	SYMBOL	ESA/SCC 3401 TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
1	Insulation Resistance (Inner, Intermediate and Outer Contacts)	Ri	Para. 9.1.1.1	Para. 9.1.1.1	5 000	-	MΩ
2	Voltage Proof Leakage Current 1 (Inner to Intermediate Contact)	I_{L1}	Para. 9.1.1.2	Para. 9.1.1.2 VP = 1 000Vrms	-	2.0	mA
3	Voltage Proof Leakage Current 2 (Intermediate to Outer Contact)	I_{L2}	Para. 9.1.1.2	Para. 9.1.1.2 VP = 500Vrms	-	2.0	mA
4	Contact Resistance (Low Level Current) (Inner and Intermediate Contacts) (Outer Contact)	Rcl	Para. 9.1.1.3	Para. 9.1.1.3 and Figure 4 100mA	- -	8.5 2.0	mΩ
5	Contact Resistance (Rated Current)	Rcr	Para. 9.1.1.3	Para. 9.1.1.3 and Figure 4 1.0A	-	8.5	mΩ

TABLES 3, 4 AND 5

Not applicable.

FIGURE 4 - TEST CIRCUIT FOR CONTACT RESISTANCE MEASUREMENTS



1. Contact Resistance shall be measured at the distance specified above and shall be calculated as the difference between this value and the pre-measured value of the cable used, i.e:

   Rc = Rt − Rw.

   Where:
   Rc = Contact resistance.
   Rt = Total measured resistance.
   Rw = Total wire resistance.

2. The current shall be applied for an average of 5 seconds in both directions and the resulting values shall be averaged to obtain the measured value.

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, 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 Tests

Not applicable.

4.8.5 Electrical Circuit for Operating Life Tests (Figure 5)

Not applicable.

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

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	Seal Test	Para. 9.9	Not applicable					
02	Wiring	Para. 9.10 and Table 1(a) of this spec.	Visual Examination Low Level Contact Resistance	Table 2 Item 4	Rcl	Table 2 Item 4		
03	Vibration	Para. 9.11	ESA/SCC 3401/056					
04	Shock or Bump	Para. 9.12	ESA/SCC 3401/056					
05	Climatic Sequence	Para. 9.13	ESA/SCC 3401/056					
06	Plating Thickness	Para. 9.14	Thickness	-	-	Para. 4.4.2 of this spec		
07	Joint Strength	Para. 9.15 and Paras. 4.2.4 and 4.2.5 of this spec.	Para. 4.3.13 of this spec. **Final Measurements** Low Level Contact Resistance	Force = 50N (Min.) Table 2 Item 4	 Rcl	Continuity Table 2 Item 4		
08	Rapid Change of Temperature	Para. 9.16	ESA/SCC 3401/001					
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** Insulation Resistance Voltage Proof Leak Current Voltage Proof Leak Current Low Level Contact Resistance Drift	 Table 2 Item 4 Table 2 Item 1 Table 2 Item 2 Table 2 Item 3 Table 2 Item 4	 Rcl Ri I_{L1} I_{L2} ΔRcl	 Record Values Table 2 Item 1 - - -20	 2.0 2.0 +20	 mA mA %
11	Permanence of Marking	Para. 9.19	Not applicable					
12	Mating/Unmating Forces	Para. 9.20	ESA/SCC 3401/056					

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 (CONT'D)

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	
13	High Temperature Storage	Para. 9.21	**Initial Measurements**					
			Low Level Contact Resist	Table 2 Item 4	Rcl	Record Values		
			Final Measurements					
			Insulation Resistance	Table 2 Item 1	Ri	Table 2 Item 1		
			Voltage Proof Leak Current	Table 2 Item 2	I_{L1}	-	2.0	mA
			Voltage Proof Leak Current	Table 2 Item 3	I_{L2}	-	2.0	mA
			Low Level Contact Resistance Drift	Table 2 Item 4	ΔRcl	-20	+20	%
			Rated Current Contact Resistance	Table 2 Item 5	Rcr	-	11	mΩ
			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.	ESA/SCC 3401/056					
16	Jackscrew Retention	Para. 9.24 & Para. 4.3.7 of this spec.	Not applicable					
17	High Temperature Measurements	Para. 9.25	ESA/SCC 3401/056					
18	Overload Test	Para. 9.26 and Para. 4.2.4 of this spec.	Not applicable					
19	Maintenance Aging	Para. 9.27	Visual Examination	-	-	-	-	
			Contact Retention (In Insert)	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		
20	Engage/Separation Forces	Para. 9.28 & Para. 4.3.9 of this spec.	Force		F	Para. 4.3.9		
21	Oversize Pin Exclusion	Para. 9.29 and Paras. 4.2.4 and 4.2.5 of this spec.	Not applicable					
22	Probe Damage	Para. 9.30 and Paras. 4.2.4 and 4.2.5 of this spec.	Not applicable					
23	Solderability	Para. 9.31 and Para. 4.2.4 of this spec.	Not applicable					

NOTES: See Page 15.