




**INTERNAL VISUAL INSPECTION OF  
ELECTROMECHANICAL SWITCHES  
ESCC Basic Specification No. 2043701**

**ISSUE 1  
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	ESCC Basic Specification		PAGE ii ISSUE 1
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**INTERNAL VISUAL INSPECTION OF  
ELECTROMECHANICAL SWITCHES**

**ESA/SCC Basic Specification No. 2043701**



**space components  
coordination group**

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PAGE 2

ISSUE 1

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**TABLE OF CONTENTS**

	<u>Page</u>
<b>1. <u>SCOPE</u></b>	<b>4</b>
<b>2. <u>GENERAL REQUIREMENTS</u></b>	<b>4</b>
2.1 Applicability	4
2.2 Procedure	4
2.3 Magnification	4
2.4 Mounting Fixtures	4
<b>3. <u>DETAILED REQUIREMENTS</u></b>	<b>4</b>
3.1 General	4
3.2 Toggle Switches	4
3.2.1 Moveable Contacts	4
3.2.2 Contact on Terminal	5
3.2.3 Terminal Assembly	5
3.2.4 Housing	5
3.3 Sensitive Switches	7
3.3.1 Contacts	7
3.3.2 Contacts to Terminal Assembly	7
3.3.3 Contact Alignment	7
3.3.4 Header	8
3.3.5 Housing	8
<b><u>FIGURES</u></b>	
I Tool Marks	5
II Contact Position	6
III Misalignment of Header Assembly	6
IV Housing: Cracks in Crimping of Bushing	6
V Housing: Insulator on Internal Lever	7
VI Contact Alignment	9
VII Header: Bubbles	9
VIII Eccentricity	9
IX Glass Seal Protuberance	10
X Spring Position	10
XI Lever Misalignment in Sensitive Switch Housings	10

**1. SCOPE**

This specification, to be read in conjunction with ESA/SCC Basic Specification No. 20400, 'Internal Visual Inspection', contains additional requirements for Electromechanical Switches. They shall apply to each device inspected.

**2. GENERAL REQUIREMENTS****2.1 APPLICABILITY**

The following criteria may not be varied or modified after commencing any inspection stage. Any ambiguity or proposed minor deviation shall be referred to the Qualifying Space Agency for resolution and approval.

**2.2 PROCEDURE**

All components shall be submitted to examination immediately prior to sealing or encapsulation, or immediately after decapping, in an area where the standard of cleanliness is not less than that of the assembly area.

All items shall be examined in such a manner that a minimum of handling and movement of the component is involved. During handling of components, lint free gloves/finger cots shall be used.

**2.3 MAGNIFICATION**

All items shall be examined with a binocular or stereoscopic microscope under a magnification of X1 to X10.

**2.4 MOUNTING FIXTURES**

Suitable fixtures may be used to assist in the inspection process. They must not themselves cause damage to the device.

**3. DETAILED REQUIREMENTS****3.1 GENERAL**

A component shall be rejected if it exhibits one or more of the defects listed in any of the following paragraphs of this specification. Where applicable, drawings are included to provide additional explanatory material, but they shall be considered as examples only.

The lot inspected shall be homogeneous. A component shall therefore also be rejected if it exhibits a significant deviation, within the limits of this specification, from the rest of the lot. However, such components shall not be counted as a failure in any other lot definition.

**3.2 TOGGLE SWITCHES****3.2.1 Moveable Contacts**

(a) Tool marks on the active area of the contact (see Figure I).

(b) Scratches or visible damage.

(c) Corrosion.

(d) Loosening of contact rivet.

(e) Contact position (see Figure II)

3.2.2 Contact on Terminal

- (a) Tool marks.
- (b) Scratches or visible damage.
- (c) Corrosion.
- (d) Loosening of contact rivet,
- (e) Contact position (see Figure II).
- (f) Excessive deformation of terminals.

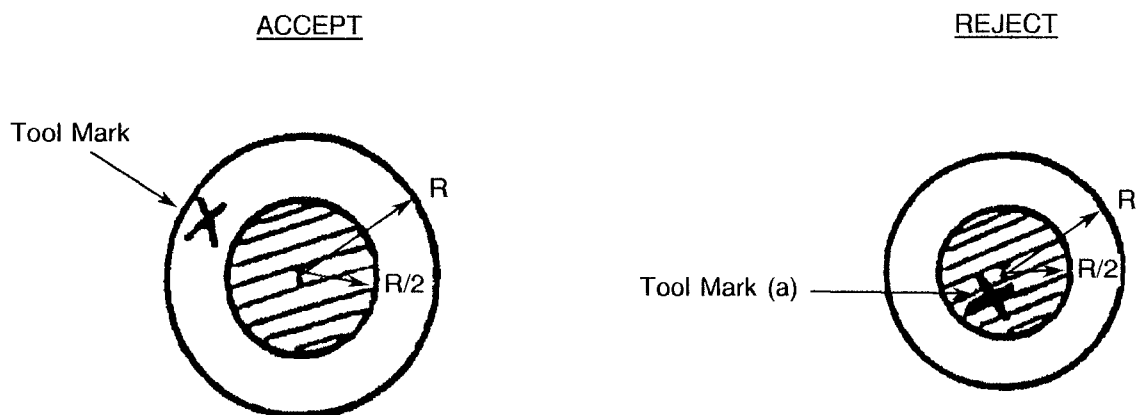
3.2.3 Terminal Assembly

- (a) Internal misalignment of terminals greater than 1.0mm (see Figure III).

3.2.4 Housing

- (a) Uncleanliness of housing.
- (b) Dust or rust particles on inside surfaces.
- (c) Marks, burrs on edges.
- (d) Deformation by dents.
- (e) Incorrect position of mounting bushing.
- (f) Incorrect crimping of bushing (see Figure IV).
- (g) Incorrect assembly of insulator on lever (see Figure V).

**FIGURE I - TOOL MARKS**



**Cause for rejection**

- (a) Tool marks on the active (shaded) area of the contact.



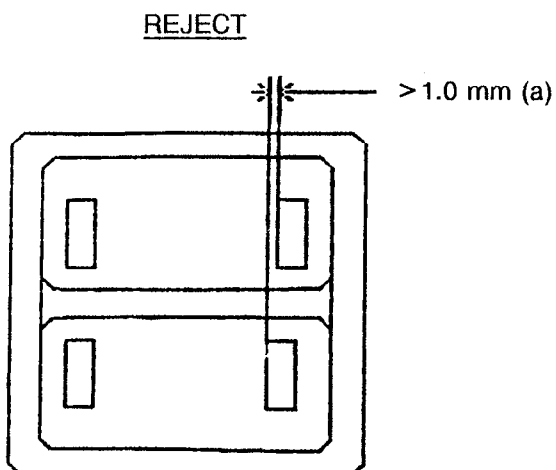
**FIGURE II - CONTACT POSITION**



**Cause for rejection**

(a) Inadequate contact setting.

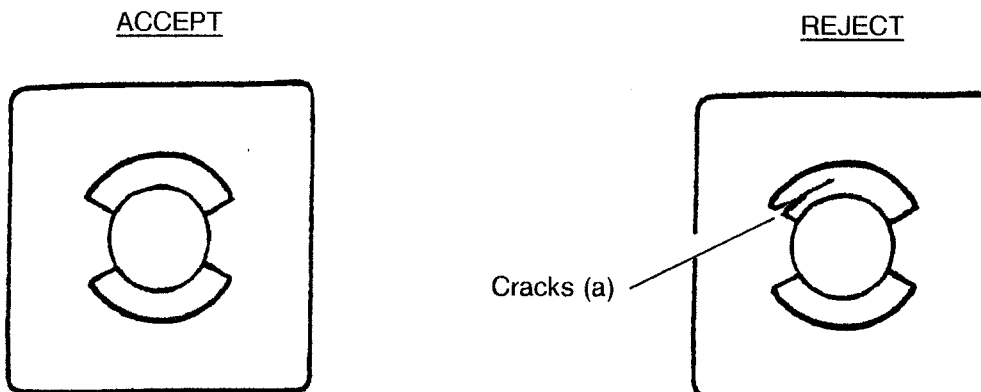
**FIGURE III - MISALIGNMENT OF HEADER ASSEMBLY**



**Cause for rejection**

(a) Internal misalignment of terminals.

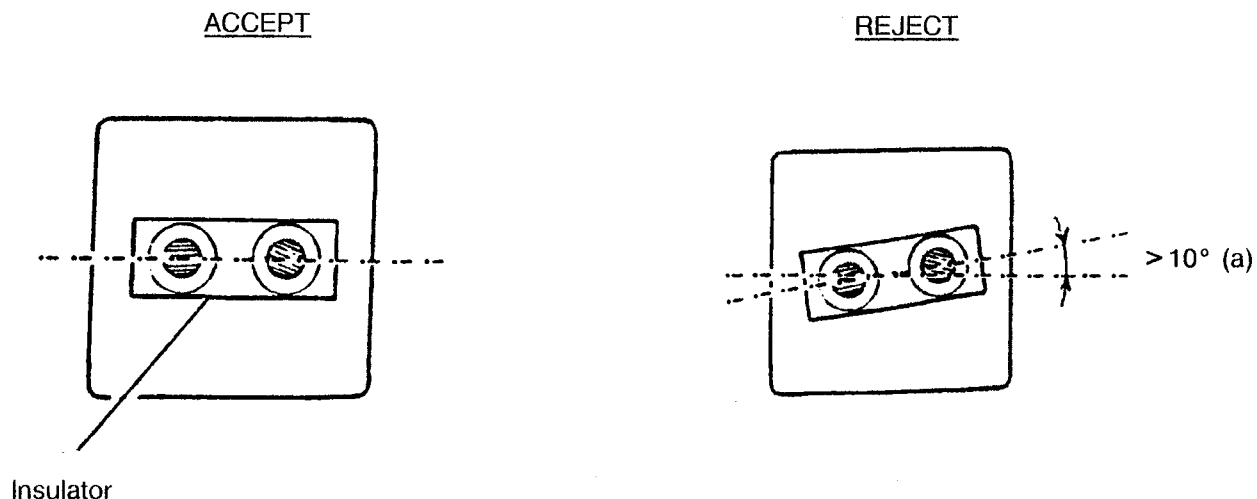
**FIGURE IV - HOUSING: CRACKS IN CRIMPING OF BUSHING**



**Cause for rejection**

(a) Cracks - it should be noted that tool marks are acceptable.



**FIGURE V - HOUSING: INSULATOR ON INTERNAL LEVER****Cause for rejection**

- (a) Incorrect assembly of insulator on internal lever.

**3.3 SENSITIVE SWITCHES****3.3.1 Contacts**

- (a) Tool marks on the active area of the contact (see Figure I).  
(b) Scratches or visible damage.  
(c) Corrosion.  
(d) Loosening of contact rivet.  
(e) Contact position (see Figure II).

**3.3.2 Contacts to Terminal Assembly**

- (a) Unflattened weld projections.  
(b) Burnt weld.  
(c) Weld flash.  
(d) Excessive deformation of contacts.  
(e) Excessive deformation of terminal.

**3.3.3 Contact Alignment**

- (a) Incorrect contact alignment (see Figure VI).



### 3.3.4 Header

- (a) Wicks, dents on periphery of header, where the can is tungsten-inert gas, electron beam, laser beam or spot-welded.
- (b) Blistering or flaking of gold or nickel plating.
- (c) Metal shavings on the flange or side of the header longer than the width of the flange.
- (d) Bent or deformed flanges.
- (e) Grease, varnish, ink or similar stain on the flange or side of the header.
- (f) Any conductive material overlapping the glass seal.
- (g) Cracked or chipped glass seal, except meniscus cracks located within one-half of the distance between the lead and the header.
- (h) Non-uniformity of finish of lead or pillar, particularly at the glass seal.
- (i) Nicks or bulges in the wire diameter outside stated lead tolerance.
- (j) Bubbles or an area of adjacent bubbles in the seal area larger than 12.5% of the seal area (see Figure VII).
- (k) Foreign particles embedded in the glass seal.
- (l) Eccentricity of lead passing through the centre of the glass-to-metal seal greater than 10% of the seal diameter (see Figure VIII).
- (m) Terminal bent by more than 5°.
- (n) Glass seal, or other non-conducting material, protruding above header along terminal by more than 0.5mm (see Figure IX).
- (o) Incorrect spring position (see Figure X).
- (p) Re-entrant seals which exhibit nonuniform wicking (negative meniscus) at the lead or header interface, or both.
- (q) Evidence of corrosion.

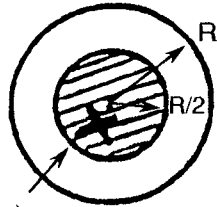
### 3.3.5 Housing

- (a) Uncleanliness of housing.
- (b) Dust or rust particles on inside surfaces.
- (c) Marks, burrs on edges.
- (d) Dents.
- (e) Deformation exceeding 0.2mm, except on membranes.
- (f) Any deformation by shock on the membranes.
- (g) Granular brazing alloy.
- (h) Internal lever misalignment, if applicable (see Figure XI).
- (i) Evidence of corrosion



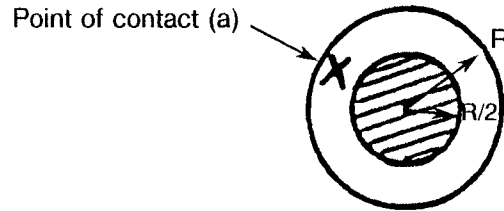
**FIGURE VI - CONTACT ALIGNMENT**

ACCEPT



Point of contact (a)

REJECT

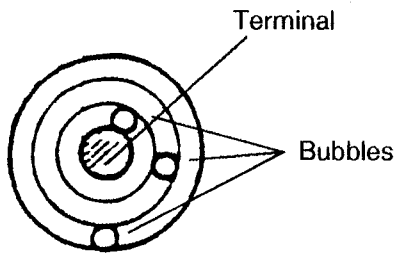


**Cause for rejection**

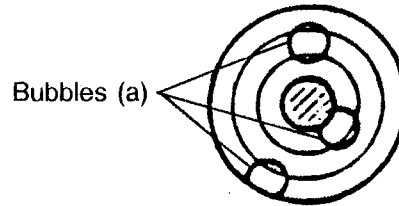
(a) Point of contact out of the active area.

**FIGURE VII - HEADER: BUBBLES**

ACCEPT



REJECT

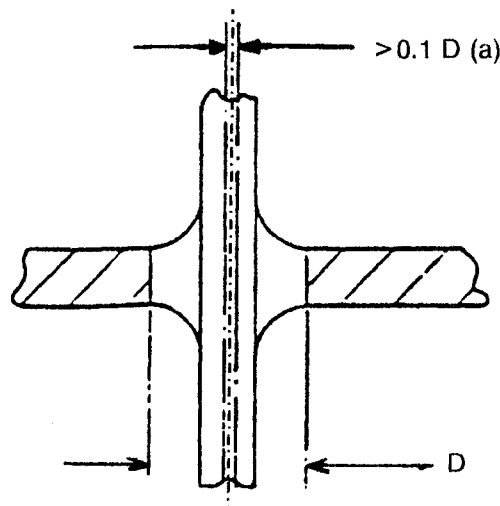


**Cause for rejection**

(a) Bubbles or an area of adjacent bubbles in a glass seal whose area exceeds 12.5% of the seal area.

**FIGURE VIII - ECCENTRICITY**

REJECT

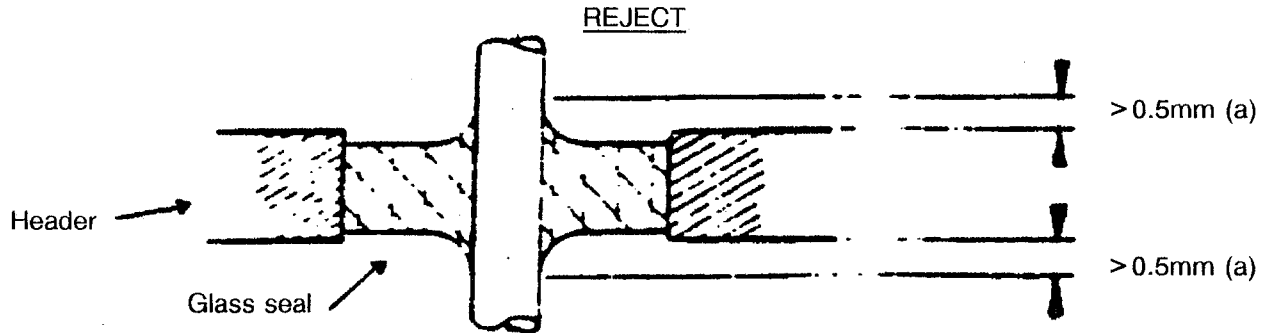


**Cause for rejection**

(a) Eccentricity of terminal, passing through center of seal, greater than 10% of the seal diameter.



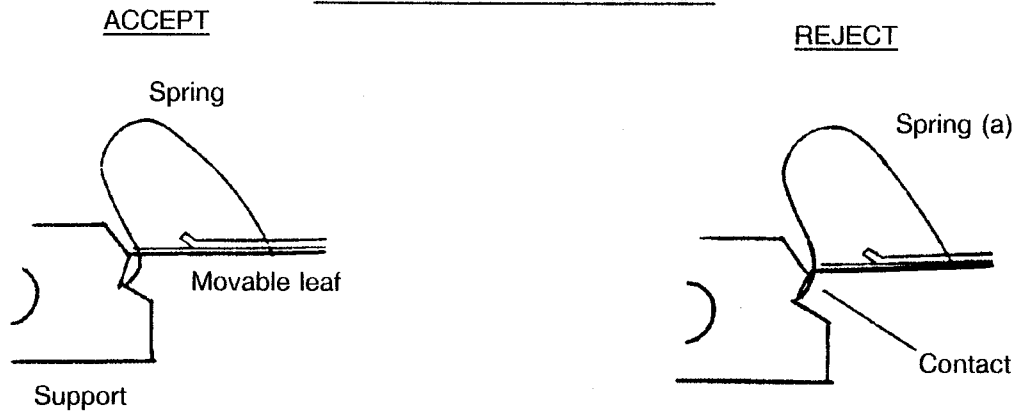
**FIGURE IX - GLASS SEAL PROTUBERANCE**



**Cause for rejection**

- (a) Non-conductive material on the terminal beyond a distance of 0.5mm from surface of the case.

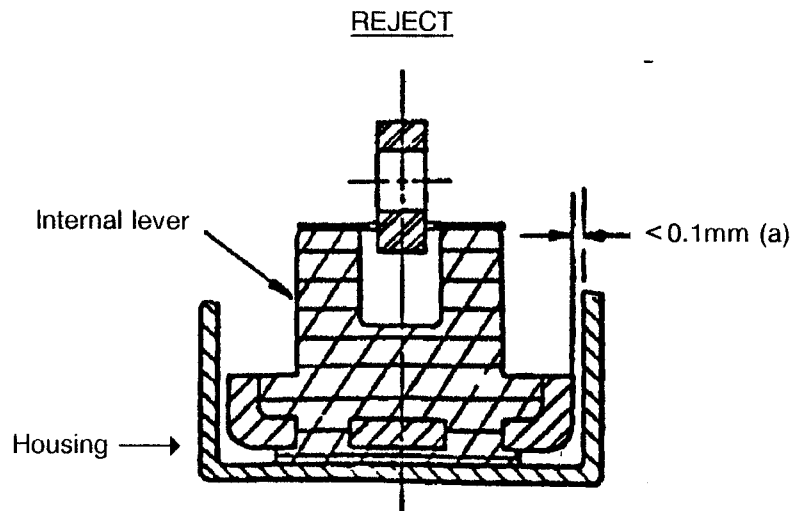
**FIGURE X - SPRING POSITION**



**Cause for rejection**

- (a) Incorrect spring position.

**FIGURE XI - LEVER MISALIGNMENT IN SENSITIVE SWITCH HOUSINGS**



**Cause for rejection**

- (a) Internal lever misalignment.