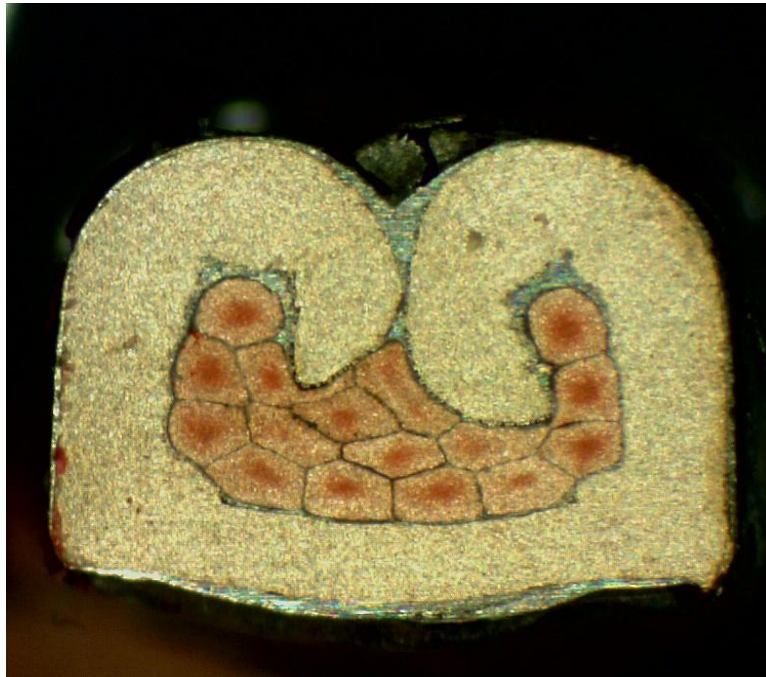




Project Number: Crimp Characterization Testing		Tracking Code: 184908	
Requested by: Bryon Saylor		Date: 4/26/2012	Product Rev:
Part #: C-169-03-CRIMP-18-DWC		Lot #:	Tech: Troy Cook Eng: Eric Mings
Part description: Individual Crimp Contacts with Wire Attached			Qty to test:
Test Start: 02/18/2012	Test Completed: 02/28/2012		

## CRIMP HEIGHT CHARACTERIZATION SUMMARY REPORT



**C-169-03-CRIMP-18-DWC**  
**Used In: PMSD**

**REVISION HISTORY**

<b>DATE</b>	<b>REV. NUM.</b>	<b>DESCRIPTION</b>	<b>ENG</b>
04/26/2012	1	Initial Issue	TC

## CERTIFICATION

All instruments and measuring equipment were calibrated to National Institute for Standards and Technology (NIST) traceable standards according to ISO 10012-1 and ANSI/NCSL 2540-1, as applicable.

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### SCOPE

To characterize initial mechanical and electrical crimp performance vs. crimp height.

### APPLICABLE DOCUMENTS

Standards: EIA Publication 364  
USCAR2-5  
USCAR FCLT

### TEST SAMPLES AND PREPARATION

- 1) All materials were manufactured in accordance with the applicable product specification.
- 2) All test samples were identified and encoded to maintain traceability throughout the test sequences.
- 3) Test samples were not cleaned prior to testing.
- 4) Any additional preparation will be noted in the individual test sequences.
- 5) Two hundred and twenty (220) contacts with wires crimped were submitted for this evaluation. (see flow chart for sample distribution)

## FLOWCHARTS

### Wire Crimp Height Verification - LLCR / Pull Test

TEST STEP	GROUPS A1 - A11 10 Crimps
01	Visual Inspection
02	Measure crimp height via crimp micrometers
03	LLCR
04	Pull-out force

#### Crimp Manufacturing Instructions:

Cable length to be 6" minimum  
Insulation crimp to not constrain jacket

Pull-out Force: EIA-364-38C

LLCR: EIA-364-23

20 mV Max, 100 mA Max  
Use Keithley 580 or 3706 in 4 wire dry circuit mode

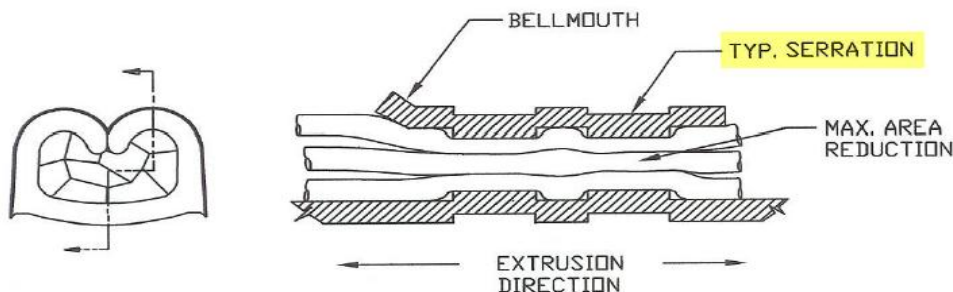
### Wire Crimp Height Verification - Cross Section

TEST STEP	GROUPS A1 - A11 3 Crimps
01	Visual Inspection
02	Measure crimp height via crimp micrometers
03	** Cross Section
04	Photos of Crimps
05	Count / Verify # of Strands
06	*** Examine for compliance with Pass/Fail criteria

#### Crimp Manufacturing Instructions:

Cable length to be 6" minimum  
Insulation crimp to not constrain jacket

\* Cross section to be performed through the serration area shown below



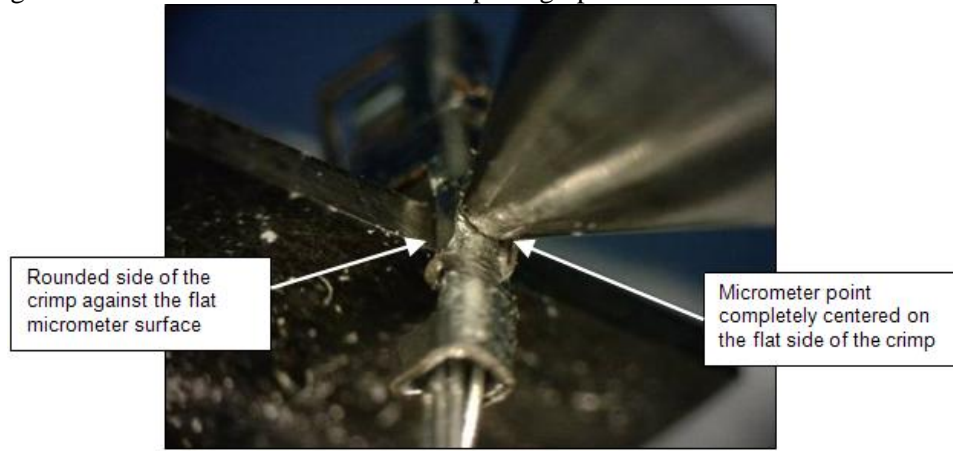
\*\* Examine for compliance with PASS/FAIL criteria: No broken/missed wires, voids, cracks in the contact material or other applicable defects shall be allowed.

## ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

### CRIMP HEIGHT:

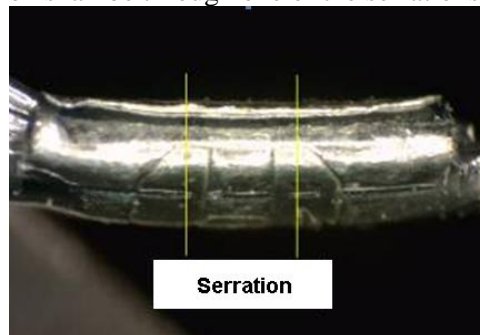
- 1) Crimp heights shall be measured as shown in the photograph below:



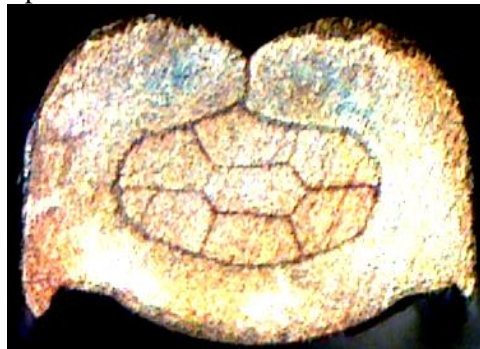
- 2) The crimp heights shall be measured on samples that have not been cross-sectioned. The above photograph was used to provide a clear view of the measurement point without the rest of the sample impeding the view.

### CROSS-SECTION:

- 1) Contacts shall be cross-sectioned and polished without being potted.
- 2) The location of the cross-section shall be through one of the serrations designated in the below photograph.

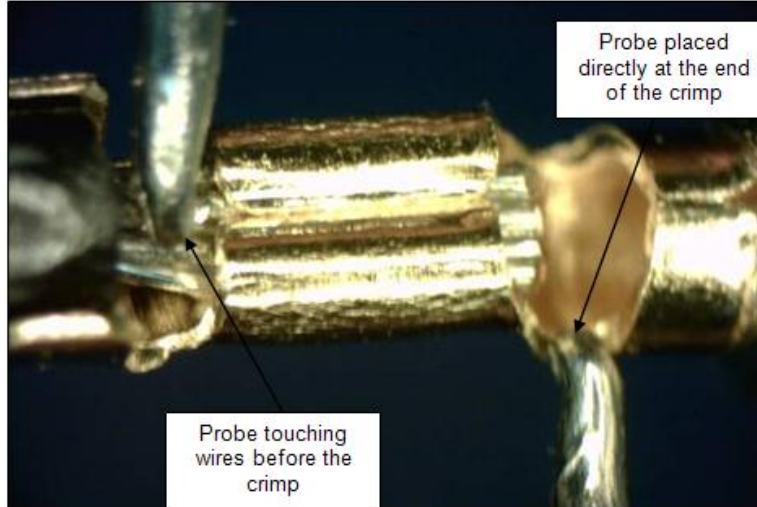


- 3) Polished crimp contact cross-sections shall be etched in a mild etchant to provide contrast for the microscopic examination.
- 4) Etched samples shall be examined under 40X magnification.
- 5) The final cross-section shall be presented as follows:



**LOW LEVEL CONTACT RESISTANCE (LLCR):**

- 1) The LLCR shall be measured and recorded in accordance with EIA-364-23A, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
- 2) A four wire, Kelvin measurement shall be made at the probe locations indicated in the below photograph:



- 3) Test Conditions:
  - a. Maximum Open Circuit Voltage: 20 mV
  - b. Maximum Test Current: 100 mA

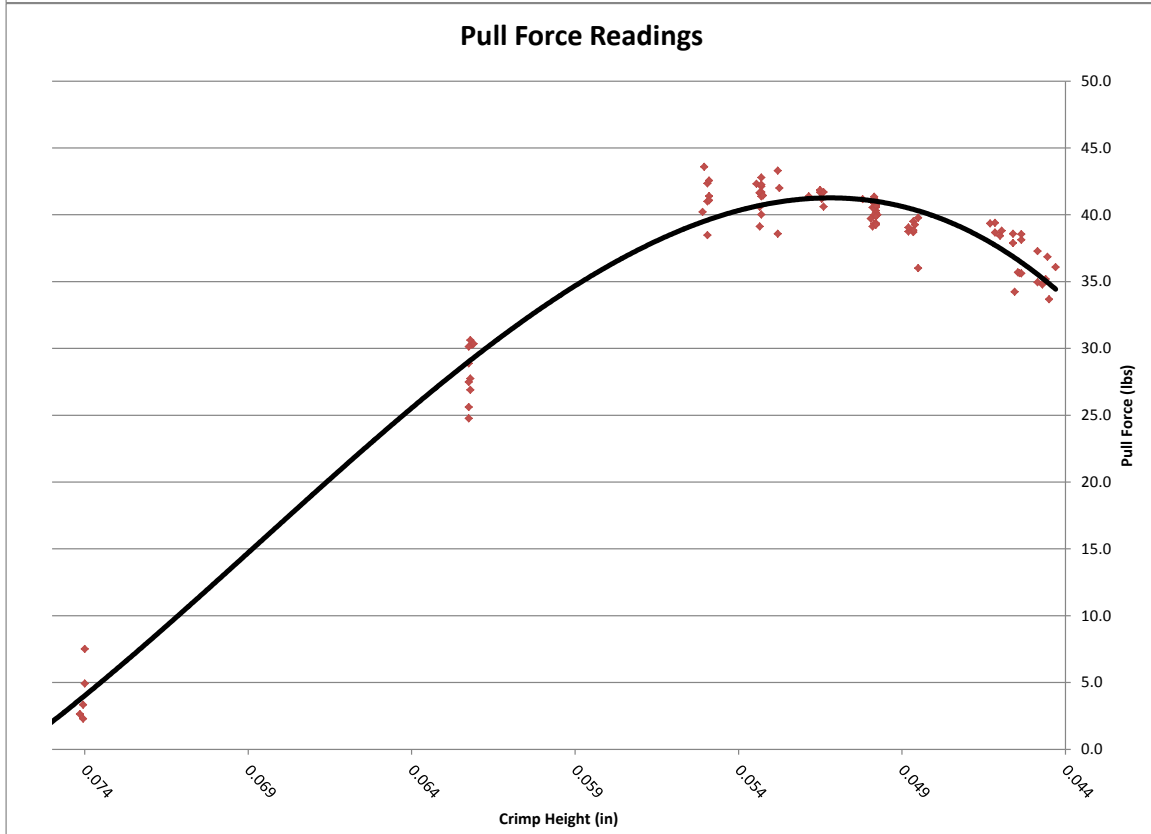
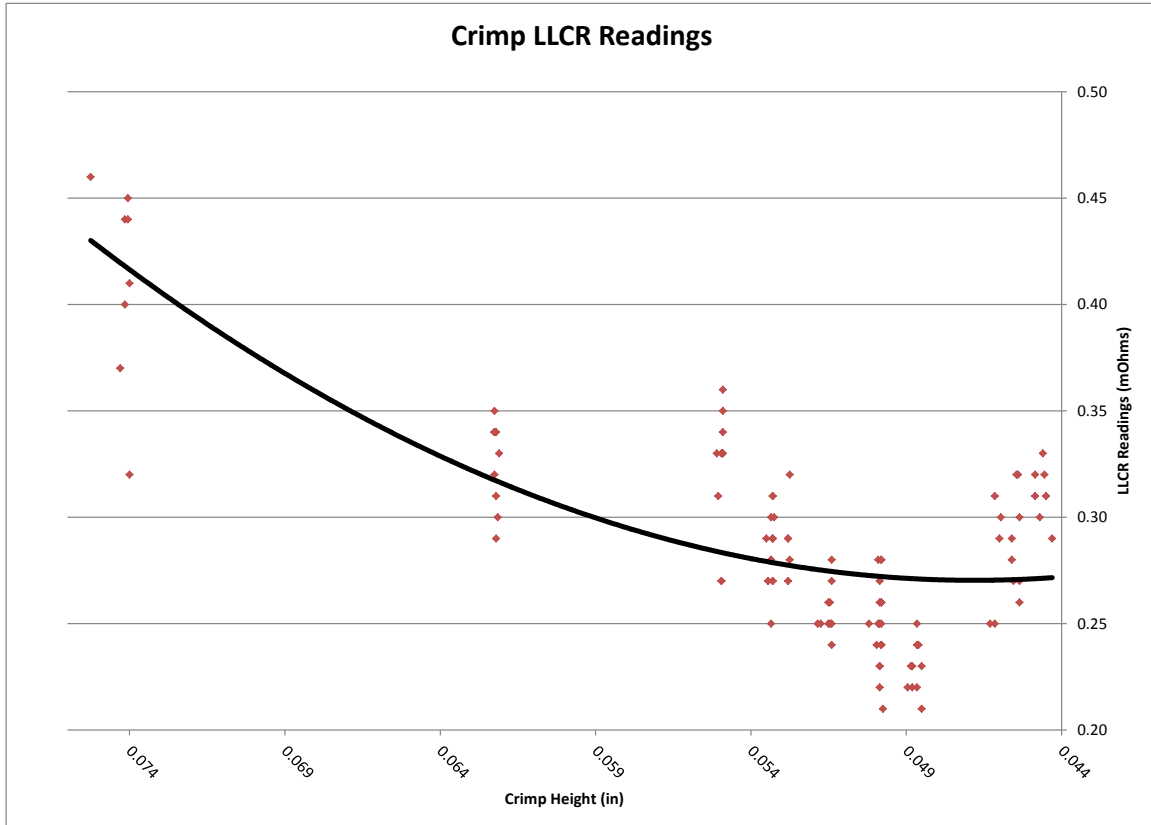
**CRIMP PULL FORCE:**

- 1) The test was performed in accordance with EIA-364-08B.
- 2) Secure contact near center and pull wire at 0°, in-line with contact.
- 3) The test stand speed shall be 25 ±6 mm.

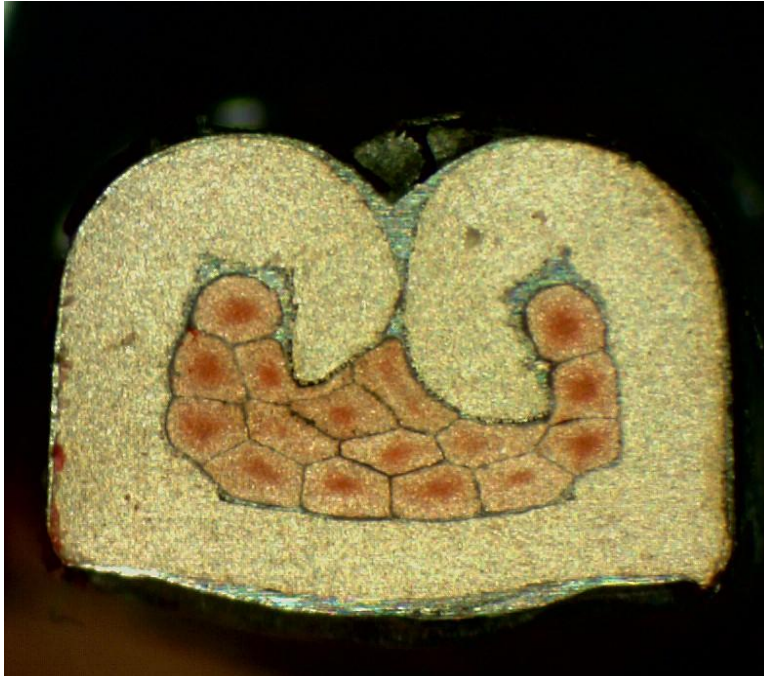
EIA-364-08B defines the types of separation resulting from this test as follows:

- 1) Slip (pull out).
- 2) Conductor broken in crimp area (some or all).
- 3) Contact broke in crimp area (some or all).
- 4) Conductor broken outside crimp area.
- 5) Contact broken outside crimp area.

# TEST RESULTS



**CROSS-SECTION PHOTO:**



Typical sample at nominal height

**EQUIPMENT AND CALIBRATION SCHEDULES****Equipment #:** MC-41**Description:** Crimp Micrometer**Manufacturer:** Mitutoyo**Model:** 342-371**Serial #:** 05020827**Accuracy:** See Manual

... Last Cal: 06/10/2011, Next Cal: 06/10/2012

**Equipment #:** MO-01**Description:** Micro-Ohmmeter**Manufacturer:** Keithley**Model:** 580**Serial #:** 0772740**Accuracy:** See Manual

... Last Cal: 08/29/2011, Next Cal: 08/29/2012

**Equipment #:** TCT-04**Description:** Dillon Quantrol TC21 25-1000 mm/min series test stand**Manufacturer:** Dillon Quantrol**Model:** TC2 I series test stand**Serial #:** 04-1041-04**Accuracy:** Speed Accuracy: +/- 5% of indicated speed

... Last Cal: 05/20/2011, Next Cal: 05/20/2012

**Equipment #:** LC-500N-02 TCT-04**Description:** 500 Newton Load Cell**Manufacturer:** Mecmesin**Model:** ILC – Load Cell**Serial #:** 07-0192-12**Accuracy:** See Manual

... Last Cal: 1/11/2012, Next Cal: 7/11/2012