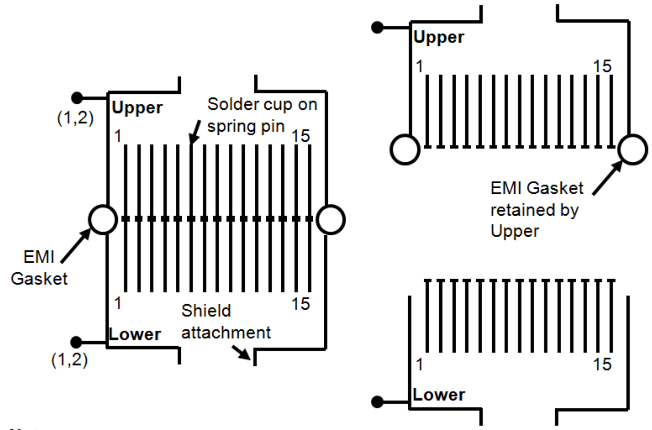
FEATURES

- Spring pins complete electrical junction
- Negative insertion force
- Spaceflight qualified
- EMI Gasket
- Vibration resistant
- Debris resistant
- Keyed
- Compact and low mass

Figure 1: Upper (left) and Lower (right) Separation Connector



Notes
(1) The metal shell conducts to the Lightband via conductive surface treatments.
(2) Rmc is the resistance across a mated connector pair from upper housing to lower housing

Figure 2: Schematic

CONTENTS

REVISION HISTORY

Table 1: Revision History

Rev	Date	By	QA	Notes
See previous revisions for detailed history				
C	22-Jul-13	RW	WH	Added recommended cleaning procedure
D	21-May-18	AZ	RW	Added Mated Resistance Measurement, Spring Pin Compression and Elongation sections. Table 2: R_{mc} changed, P_{ID} and P_{depth} added

RATINGS

Table 2: Ratings

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	Source Document
I_{SSV}	Current through each pin, steady state	Pressure <10^{-5} Torr, Temperature = +110°C and -40°C, all 15 pins at I_{SSV}, all pins simultaneously conducting current	-	-	3.0	A	2001025-
I_{SSA}	Current through each pin, steady state	Pressure 760 Torr, Temperature = +23°C all 15 pins at I_{SSV}, all pins simultaneously conducting current	-	-	5.0	A	2001025-
I_{PV}	Pulsed current through pin	Pressure <10^{-5} Torr, Temperature = +23°C all 15 pins at I_{SSV}, duration < 10.0 s, all pins simultaneously conducting current	-	-	5.0	A	2001025-
R_P	Pin pair resistance		0.02	0.04	0.06	Ω	Proprietary
R_{mc}	Mated connector resistance	Refer to figure 2	-	0.024	0.140	Ω	2003168D
V_{ISO}	Isolation, pin to pin or pin to housing	Pressure = 760 Torr, Temperature = +23°C	1000	-	-	V	2001025-
T_O	Operating temperature	Pressure <10^{-5} Torr	-35	+23	+111	°C	2002029A
T_S	Survival temperature	Pressure <10^{-5} Torr	-35	-	+111	°C	2002029A
T_i	Soldering temperature	Duration less than 3.0 s	310	315.5	321	°C	NASA-STD-8739.3
-	Wire Size		20	22	-	AWG	
W_l	Weight of 4000106 Rev C Lower Separation Connector		-	0.025	-	Lb_f	2001025-
W_U	Weight of 4000107 Rev C Upper Separation Connector		-	0.025	-	Lb_f	2001025-
F_I	Initial separation force		2.1	2.3	2.5	Lb_f	2001025-
D_S	Height of stowed Connector		1.326	1.333	1.353	Inch	2001025-
D_e	Height at electrical separation		1.434	1.441	1.461	Inch	2001025-
Dm	Height at mechanical separation		1.559	1.566	1.586	Inch	2001025-
TML	Total mass loss		-	0.58	-	%	NASA Ref Publication 1124 Updated 2/1/11
CVCM	Collected Volatile Condensable Materials		-	0.01	-	%	NASA Ref Publication 1124 Updated 2/1/11
P	Life		-	5,000	-	cycles	2001025-
A	Allowable Lateral Mis-Alignment		-	-	0.009	Inch	2001025-
P_{ID}	Spring Contact Solder Interface Internal Diameter		-	0.046	-	Inch	Vendor drawings, Rev 6
P_{Depth}	Spring Contact Solder Interface Internal Depth		-	0.100	-	Inch	Vendor drawings, Rev 6

MECHANICAL INTERFACE

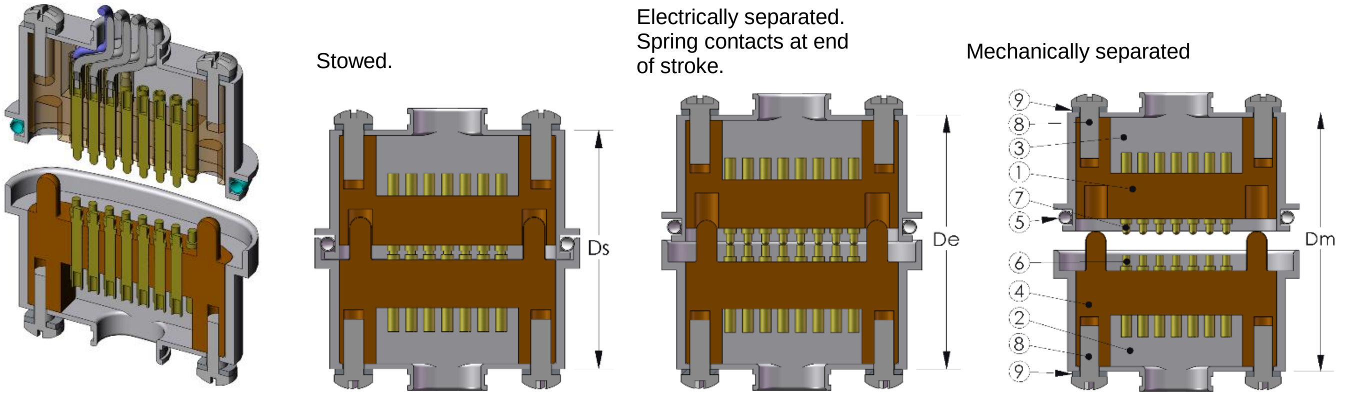
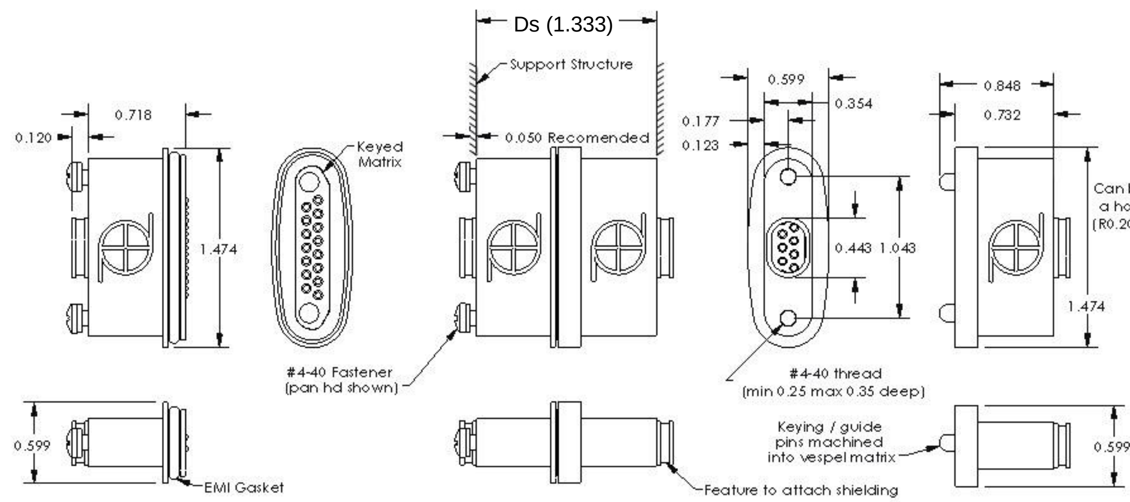


Figure 3: Mechanical interface

Table 3: Bill of materials

9	0.115 x 0.209 x 0.032 Washer	Stainless Steel	None	4
8	0.112-40 x 0.31 Screw (PNH Shown)	Stainless Steel	None	4
7	Spring Contact Round Plunger	Brass	Gold	15
6	Spring Contact Flat Plunger	Brass	Gold	15
5	EMI Gasket	Berylium Copper Alloy	Electro Deposited Nickel Per AFTM-QQ-N-290	1
4	Lower Matrix	Vespel SP-1	None	1
3	Upper Housing	6061 Aluminum Alloy	Electroless Nickel Per AMS-C-26074, Class 4, Grade B	1
2	Lower Housing	6061 Aluminum Alloy	Electroless Nickel Per AMS-C-26074, Class 4, Grade B	1
1	Upper Matrix	Vespel SP-1	None	1
Item	Part Description	Material	Surface Finish	QTY



All Dimensions are in inches
Tolerances:
x.xxxx +/- 0.001
x.xxx +/- 0.005
x.xx +/- 0.010
x.x +/- 0.030

Figure 4: Dimensions

IDENTIFICATION AND MARKINGS

The part marking is opposite the logo.

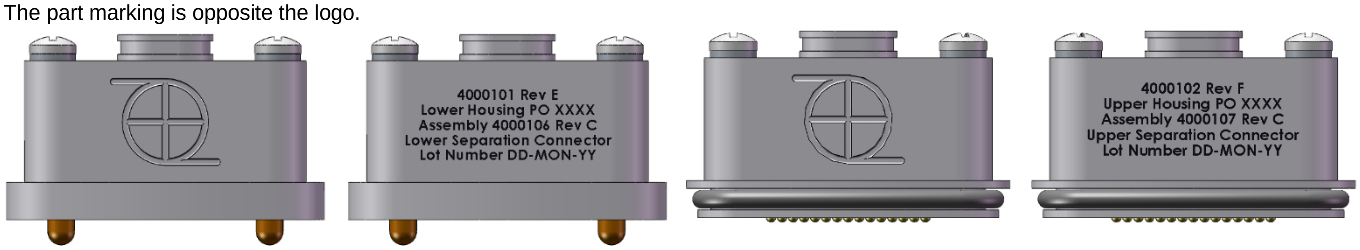


Figure 5: Identification and markings

TYPICAL APPLICATION

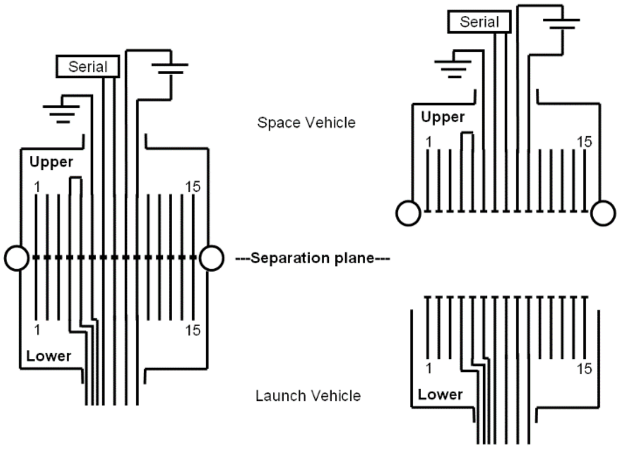


Figure 6: Separation connectors are typically used on space vehicle separation systems like Lightband.

SUSCEPTIBILITY TO INTERMITTENCY

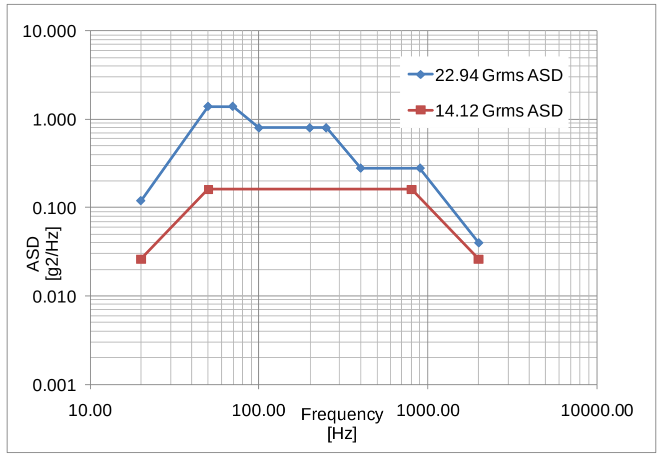


Figure 7: Intermittency and vibration

Test level [Grms]	Axis	Sample rate [Hz]	Comments
14.10	X, Y, Z	100000	No Intermittencies
14.1-22.94	X, Y, Z	N/A	Intermittencies may occur
22.94	X, Y, Z	10000	Intermittencies

1) At greater than 18.4 Grms, with all 15 pins wired in series, intermittency duration can be as much as 0.0076 sec. This is the worst case since it captures overlapping intermittencies
2) Use multiple pins to reduce/eliminate intermittency.

RECOMMENDED PROCEDURE

Notes:
1) Practice this process especially if access and/or volume is limited.
2) If installing on a Lightband the feature in the Upper and Lower Rings is not much larger than the connector opening. The shield termination described here is designed to take a minimum of space around the opening.
3) Once this procedure is completed; the separation connectors will be constrained to the other alignment features of the Lightband. Consequently the separation connectors always align properly when the Lightband is mated.
5) Connectors may be added to Lightband before or after it has been stowed.
6) When attaching to structures other than Lightband this section may be used as a guideline for proper installation.

Step 1 Tin the wire(s) and solder cup(s). Use Type RMA soldering flux and SN60PB40 solder. Set soldering iron temperature to 600 degrees F (315.5 C). Apply heat no longer than 3 seconds.

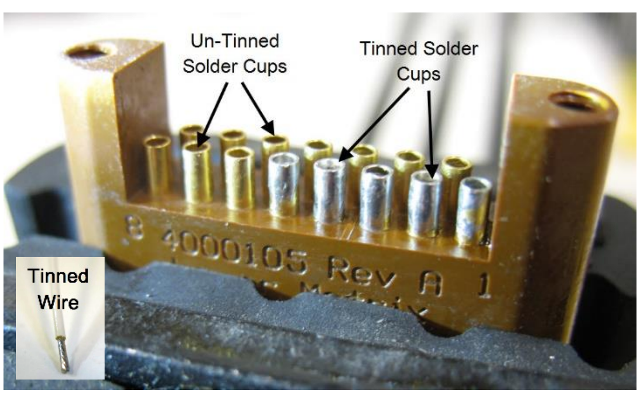


Figure 8: Tinning the hardware

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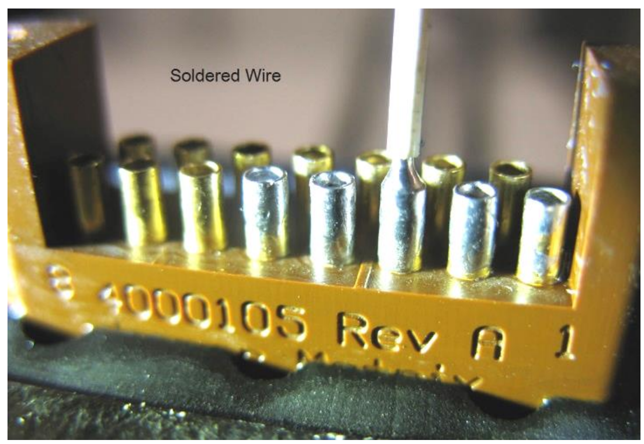

Figure 9: Typical solder fillet on installed wire (shown cleaned)

Step 2 Solder wire to pins. Note: It may be helpful to pre-form some of the wires to allow them to properly exit the housing.

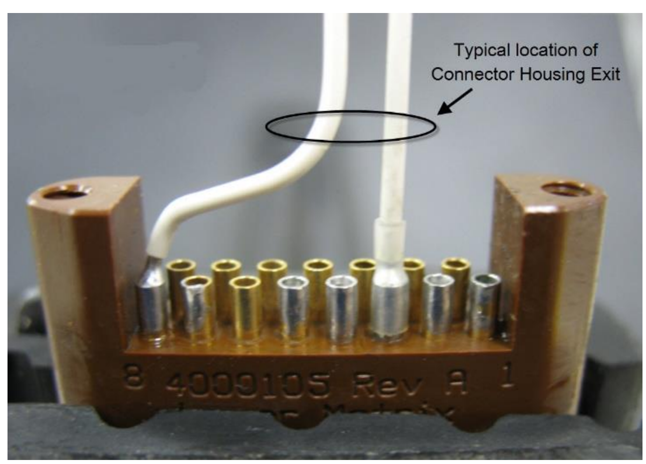

Figure 10: Location of pre-formed wire installation

Step 3 Clean the solder flux, with 99% pure Isopropanol alcohol. Do this several times. Removing all solder flux residues is paramount.

Step 4 Add clear heat-shrink (Kynar 1/16 inch diameter) and apply heat to shrink. The heat will tend to evaporate any retained alcohol. Some customers may want add potting to the connector. Use caution! Depending on viscosity potting may seep between the housing and matrix and onto pins, which could be detrimental to performance.

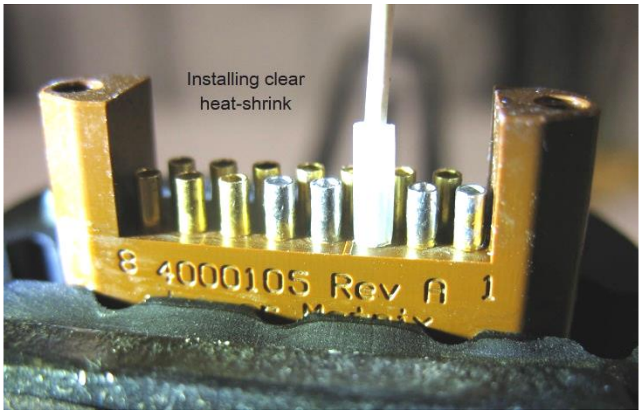

Figure 11: Heat shrink slipped over solder cup and ready for heat

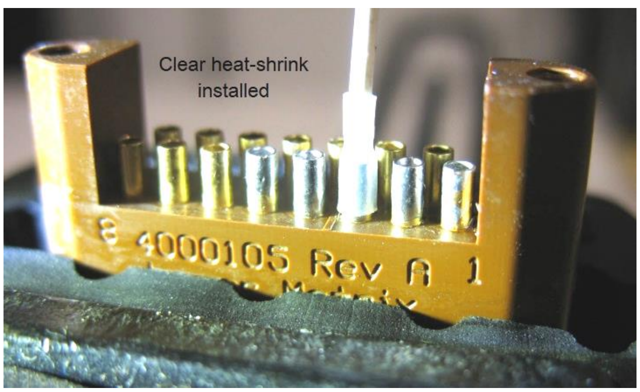

Figure 12: Heat shrink installed

Step 5 Install matrix to housing. Slip the housing over the wire bundle and slide over matrix. Matrix is keyed to ensure proper alignment. The fasteners can be temporarily installed at this step. They constrain the matrix inside the housing. Do not torque the fasteners more than 3.0 in lb. Note: the accepting thread is no more than 0.35 inches deep. May substitute socket head cap screw or hex head screw.

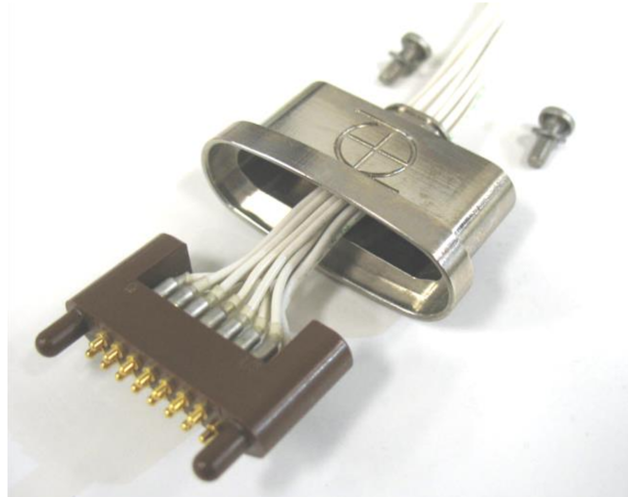

Figure 13: Before Assembly

Figure 14: After Assembly

Step 6 Wrap harness with tape to provide additional abrasion protection.

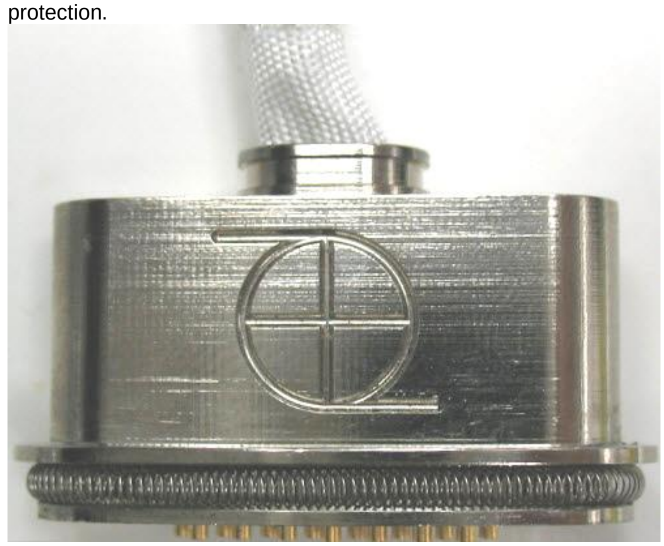

Figure 15: Taped wires exiting Connector.

Step 7 If required, attach shielding. Use 0.020 inch CRES lock-wire. Several loops may be required. Trim excess. The shielding and lock-wires should not exceed the housing by more than 0.010 inches.

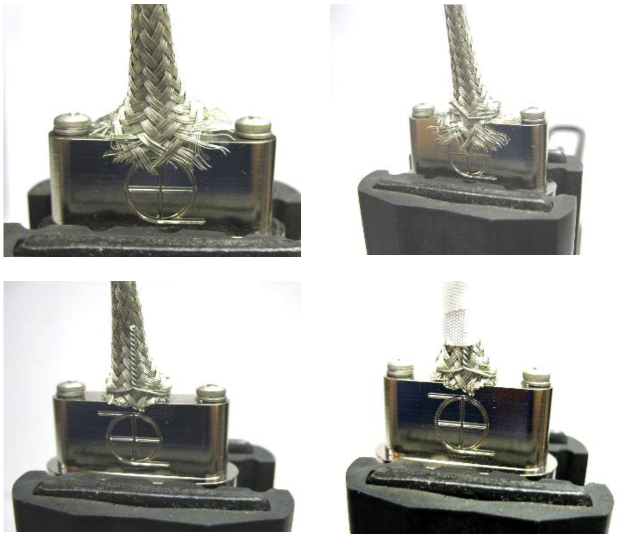

Figure 16: Shielding installation on Connector.

Step 8 Form wires at shell exit (to avoid interference with adjoining structure when harness is fastened to adjoining structure)

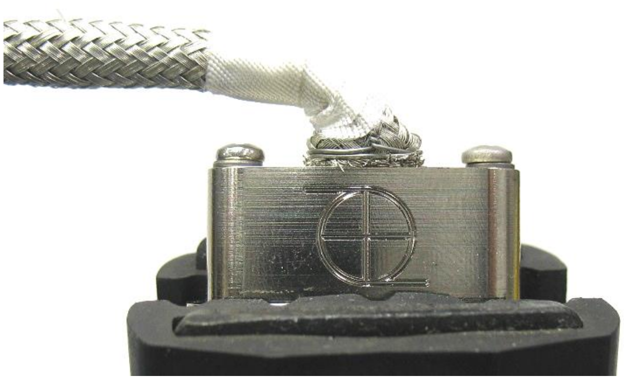

Figure 17: A Complete harness.

Step 9 If installing on a stowed Lightband mate the two halves of the connector assembly together. They should not have fasteners attached. Slide the mated pair into cut out on Lightband. Once it is aligned with the fastener through-holes use 4-40 fasteners to attach to Lightband. Torque the 4-40 fasteners to 3.0 +/- 1.0 in lb. The accepting thread is no more than 0.35 inches deep.

Step 10 If installing on a deployed Lightband each connector half will be fastened to the Upper and Lower Ring respectively. With the PSC logo facing outward, slide the Connector half into cut out on Lightband. Once it is aligned with the fastener through-holes use 4-40 fasteners to attach to Lightband. The fasteners should be backed-off by one turn so the connectors are free to align themselves when Lightband is stowed. Do not constrain the harness, if assembled, to any adjoining structures. The connectors will align themselves if the shielding termination does not interfere with the aforementioned cut-out in the Lightband and the wire bundle is not imposing a torque on the connector assembly. Once the Lightband has been stowed, torque the 4-40 fasteners to 3.0 +/- 1.0 in lb. The accepting thread is no more than 0.35 inches deep.

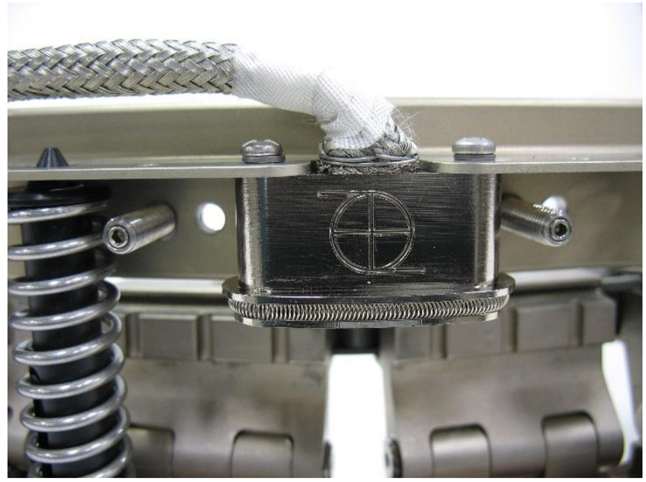

Figure 18: Upper Connector installed on Upper Ring. Harness is taped and formed.

Step 11 Fasten the harness to the adjoining structure. Ensure harness will not interfere with mating plane to adjoining structures.

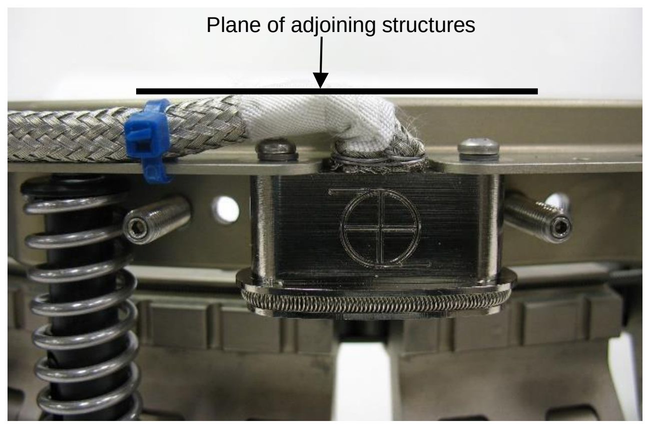

Figure 19: Example of Upper Connector installed on Upper Ring. Harness is constrained to adjoining structure with 4 inch Tefzel cable tie.

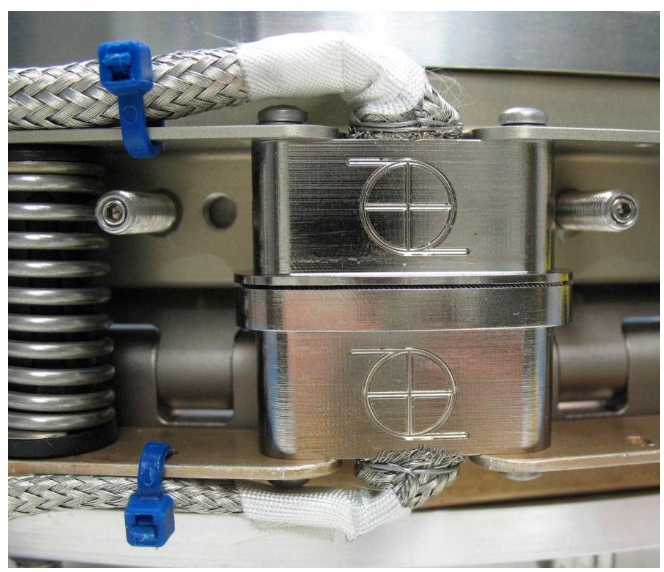

Figure 20: Completed assembly on stowed Lightband

RECOMMENDED CLEANING PROCEDURE

Notes:
1) Practice this process. Procedure applies to both Upper and Lower Assembly.
2) Cleaning can be performed at any time Separation Connectors are not joined.

Step 1 Perform 10X magnification inspection of connector noting any debris that may inhibit performance, or open circuits.

Figure 21: 10x magnification inspection

Step 2 Remove the EMI gasket, if present, and clean with 99% pure Isopropanol alcohol (IPA). Rinse swirl and gently blow dry with clean compressed gas. Set aside.

Figure 22: EMI gasket in clean IPA bath

Step 3 Spray manual tooth brush bristles with clean compressed gas. Ensure brush is free from oil and debris.

Step 4 Brush the connector spring pins and connector face with a clean manual tooth brush for 30 seconds. Hold vacuum to connector during the brushing operation.

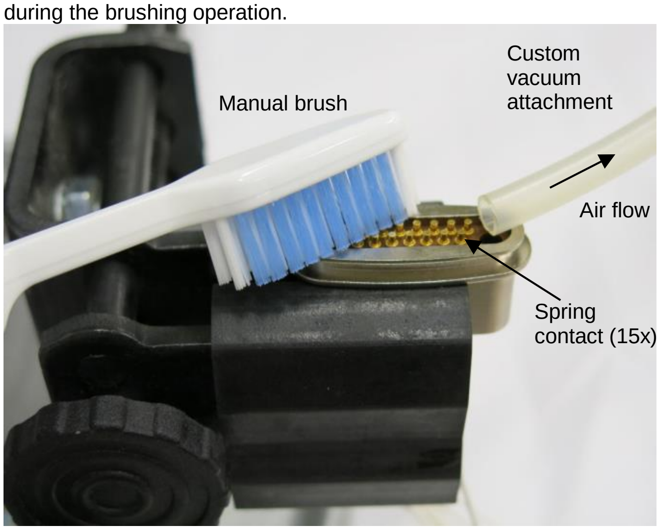

Figure 23: Manual brushing with custom vacuum attachment for debris collection

Step 5 Squirt the connector spring contacts with IPA.

Figure 24: Squirting the spring contacts with IPA

Step 6 Spray electric tooth brush bristles with clean compressed gas.

Step 7 Brush the pins and connector face with the electric tooth brush and IPA to dislodge any debris. Pay careful attention to anything noted in step 1.

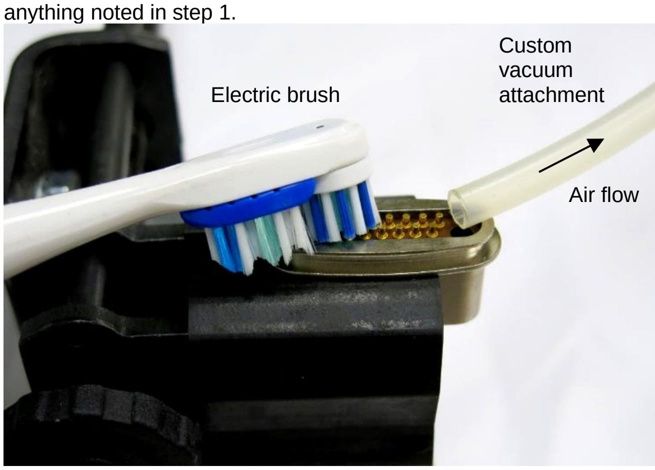

Figure 25: Electric brushing with custom vacuum attachment for debris collection

Step 8 Squirt the connector surface (spring contacts) with IPA to flush out any dislodged debris. (See figure 24 in step 5)

Step 9 Vacuum the connector spring contacts.

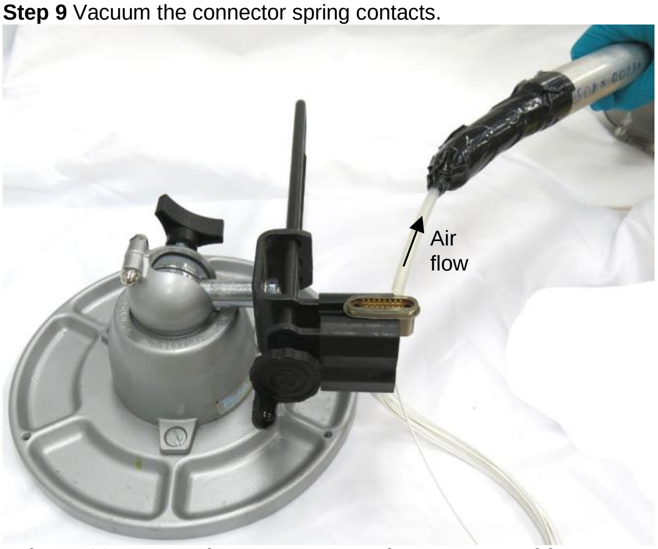

Figure 26: Vacuuming connector spring contacts with custom vacuum attachment

Step 10 While inspecting with 10X magnification, press each connector spring contact to pump the IPA out of the pin housing.

Figure 27: Use clean blunt edged plastic pick to compress spring contacts

Step 11 Vacuum the connector. (see figure 26 in Step 9)

Step 12 Re-install the clean EMI gasket, if present, on the connector.

Step 13 Squirt the connector surface with IPA to flush out any dislodged debris. (See figure 24 in step 5)

Step 14 Spray the connector spring contacts with clean compressed gas and vacuum.

Figure 28: Spraying with clean compressed air and vacuuming connector

Step 15 Heat the connector back shell until hot to the touch.

Figure 29: Heating the connector back shell to evaporate any remaining IPA

Step 16 Inspect the connector via 10X magnification. If clean, the connector can be temporarily covered with clean aluminum foil or other non-debris producing option such as clean small plastic bag.

Figure 30: Final 10X inspection

MATED RESISTANCE MEASUREMENT

Mated Connector electrical resistance (R_{mc}) shall be measured in the mated condition IAW 2003202 Electrical Resistance Measurement Method.

Figure 31: Example electrical resistance measurement

Note: electrical resistance measurements can be highly variable and dependent upon many unique factors. The resistance defined in Table 2 represents a range that can be affected by many factors including but not limited to probe type, material surface finish, material age, machine tolerances, and contact surface area. Customers are encourage to minimize variability of all contributing factors.

SPRING CONTACT COMPRESSION AND ELONGATION

The Spring Contacts of the Pins may, in rare instances, not return to the nominally fully-elongated state after compression. When this occurs, the most common cause is foreign object debris (FOD). This can be address by the following procedure

1) Examine the pin in question under the maximum allowable magnification for visible debris that can be removed.
2) If debris is found, remove with a clean non-metal tweezers or filtered compressed air.
3) If debris is not found, compress the Spring Contact tip 50% to 100% of maximum compression depth with a clean non-metal probe and no more than 12 ounces of force. (100% compression depth occurs when the tip of the Spring Contact is coincident with the plane of the Housing Collar)

Figure 32: Spring Contact Housing Collar

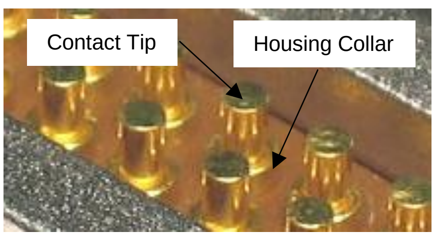

Figure 33: Spring Contact Housing Collar

If the Spring Contact still does not elongate, contact PSC