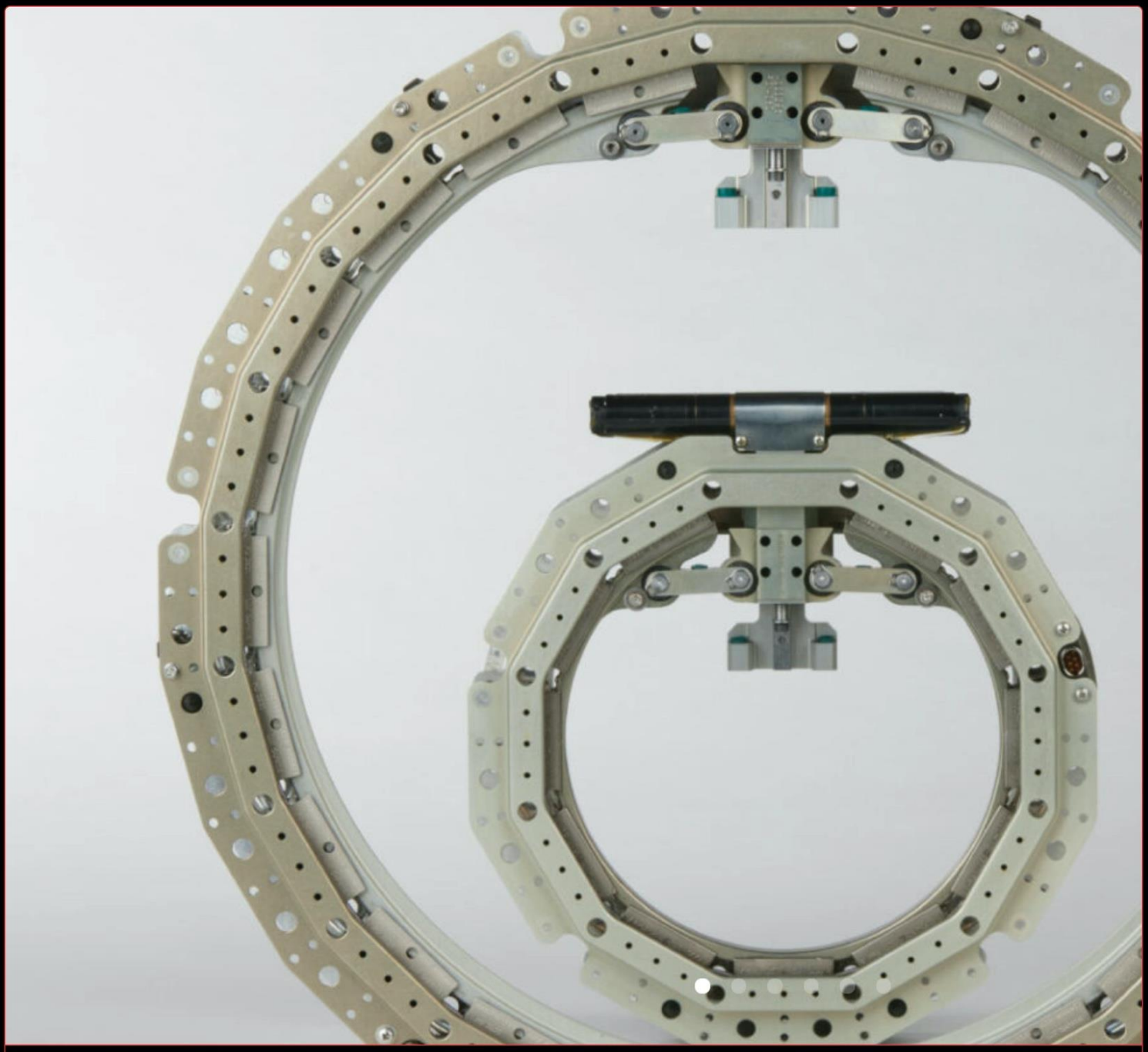

MOTORIZED LIGHTBAND MKII

Pack-Unpack Procedure | 2000827J

READ THIS PROCEDURE BEFORE REMOVING MLB FROM THE SHIPPING CONTAINER

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2000827J MkII MLB Pack-Unpack Procedure

Sales Order	
MLB Assembly Number & Revision	
MLB Serial Number	

READ THIS PROCEDURE BEFORE REMOVING MLB FROM THE SHIPPING CONTAINER

Instructions:
To pack the MLB:
Read Section 2 and proceed to Section 3.

To unpack the MLB:
Read Section 2 and proceed to Section 4.

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1. Revision History

Rev	Issued	Created By	Released By	Change Description
- to I	27Apr07 To 2Dec22	Various	Various	See prior revisions for change details.
J	15Feb24	RJB	MT	• Revised to switch from using 2000844 to using 2004174. • Added a step to confirm no damage to Part Markings

2. Introduction

This procedure describes the steps to pack and unpack a Mark II Motorized Lightband (MLB) into and out of a shipping container, respectively. This procedure shall be completed each time the MLB is packed or unpacked.

The typical shipping container used is a custom hard case with foam insert (PSC PN: 2002200). MLBs shall only be shipped in these containers unless otherwise approved by PSC. Doing otherwise without PSC's approval will void the MLB warranty. The intent of this procedure is to demonstrate how to properly pack and unpack the MLB to prevent damage during shipping and handling.

Figure 2-1: Typical shipping containers

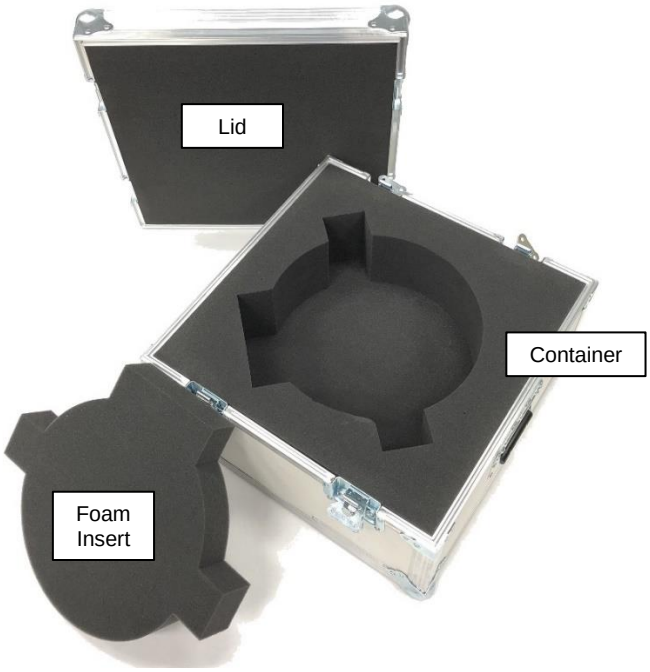

Figure 2-2: Shipping container components (11.732 size shown)

3. Packing the MLB

The operator shall be familiar with PSC documents 2000785 MkII MLB User Manual and 2000781 MkII MLB Operating Procedure prior to executing this procedure.

3.1 Required Equipment

Table 3-1: Required Equipment

Item	Approximate Quantity	Actual Total Qty.
Lightband (MLB)	1	
2002200 MkII Shipping Container (or equivalent; approved by PSC)	1	
Plastic resealable bag for documentation, 9 x 12 inch suggested	1	
Plastic resealable bags for Separation Connectors and Switches (if necessary)	AR	
Antistatic Bag	1	
Kapton Tape	AR	
Torque screwdriver w/ 3 in·lb capability and #1 Phillips driver	1	
2004174- MLB Shipping Boss	AR	
7/64 inch hex key with ball driver (to rotate Ball Screw)	1	
10-24 UNC truss head screw, McMaster-Carr PN 91770A240 or similar (to attach Shipping Bosses)	2 per Boss	
Bubble wrap (to protect Separation Connectors and Switches if removed)	AR	

3.2 Packing Procedure

Step	Description	Date & Initials		Notes
		Tech	QA	
1	Complete cover page.		--N/A--	
2	Ensure the MLB is in the deployed state and removed from adjoining structures per PSC Operating Procedure 2000781 (available on the Rocket Lab Website). The user must be trained to operate the MLB.		--N/A--	
3	Place the Upper Ring on the Lower Ring, ensuring proper alignment per PSC Operating Procedure 2000781. The MLB has exposed lubricated surfaces. Avoid lubricant when handling.		--N/A--	
4	Manually rotate the Ball Screw with a 7/64 inch hex key until the Sliding Tube makes contact with the Motor Bracket. Rotation direction is counter-clockwise when looking along the Y_{LB} axis from the origin towards the Motor Bracket. Maximum torque shall not exceed 1.0 in·lb. Gently pushing outward on the $-Y_{LB}$ side of the Retaining Ring during rotation helps the Retaining Ring properly seat against the Leaf Assemblies. See Figure 3-1 and Figure 3-2. Upon completion of Ball Screw rotation, the Sliding Tube shall remain firmly against the Motor Bracket and not back-drive.		--N/A--	

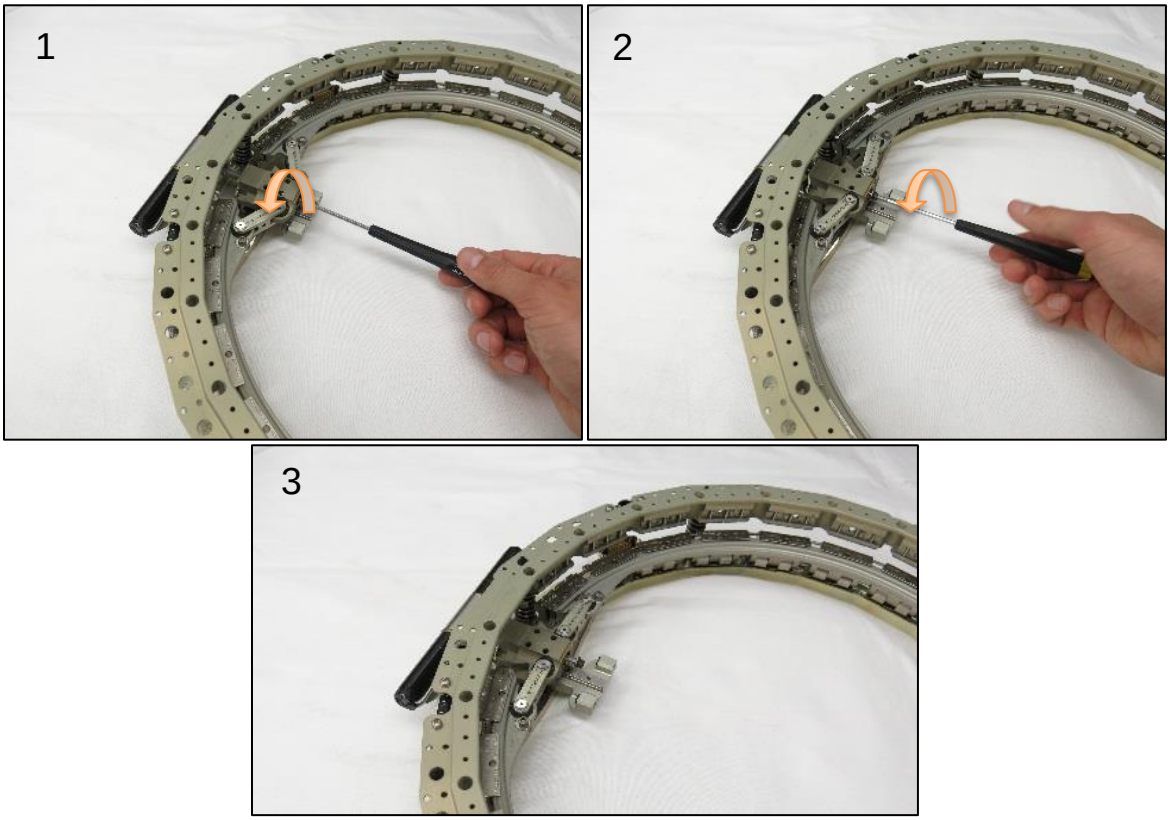

Figure 3-1: Manually rotating the Ball Screw until the Sliding Tube contacts the Motor Bracket

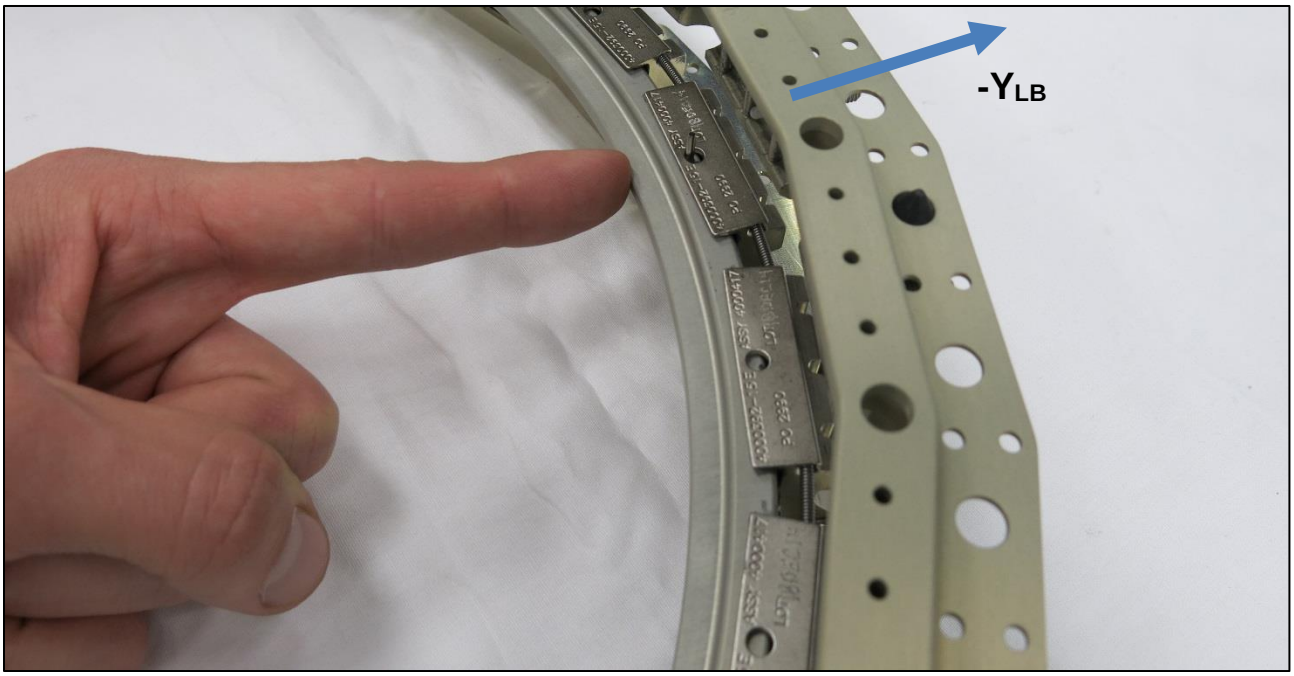

Figure 3-2: Applying force to Retaining Ring in radially outward direction during Ball Screw rotation

Step	Description	Date & Initials		Notes
		Tech	QA	
5	Determine the total number of shipping bosses to be attached to the MLB using Table 3-2. Select the locations for the shipping bosses, ideally evenly spaced and near springs. These shipping bosses are attached through the bolt circle holes, not on the flanges. See Figure 3-3. Ensure the shipping bosses will not contact the Leaf Retaining Cord in the selected locations. See Figure 3-4.		--N/A--	

Table 3-2: MLB Shipping Boss Quantity

MLB Size	MLB Shipping Boss Quantity
8	4
11	4
13	4
15	4
18	6
19	6
23	6
24	6
31	8
38	8

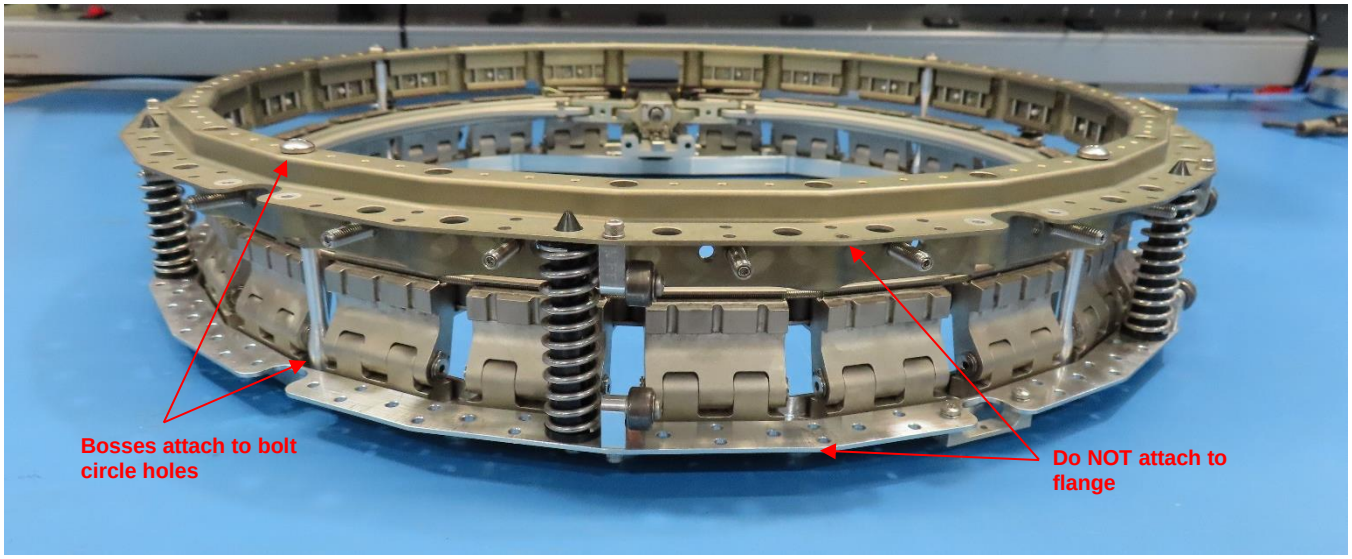

Figure 3-3: Bosses in Bolt Circle Holes

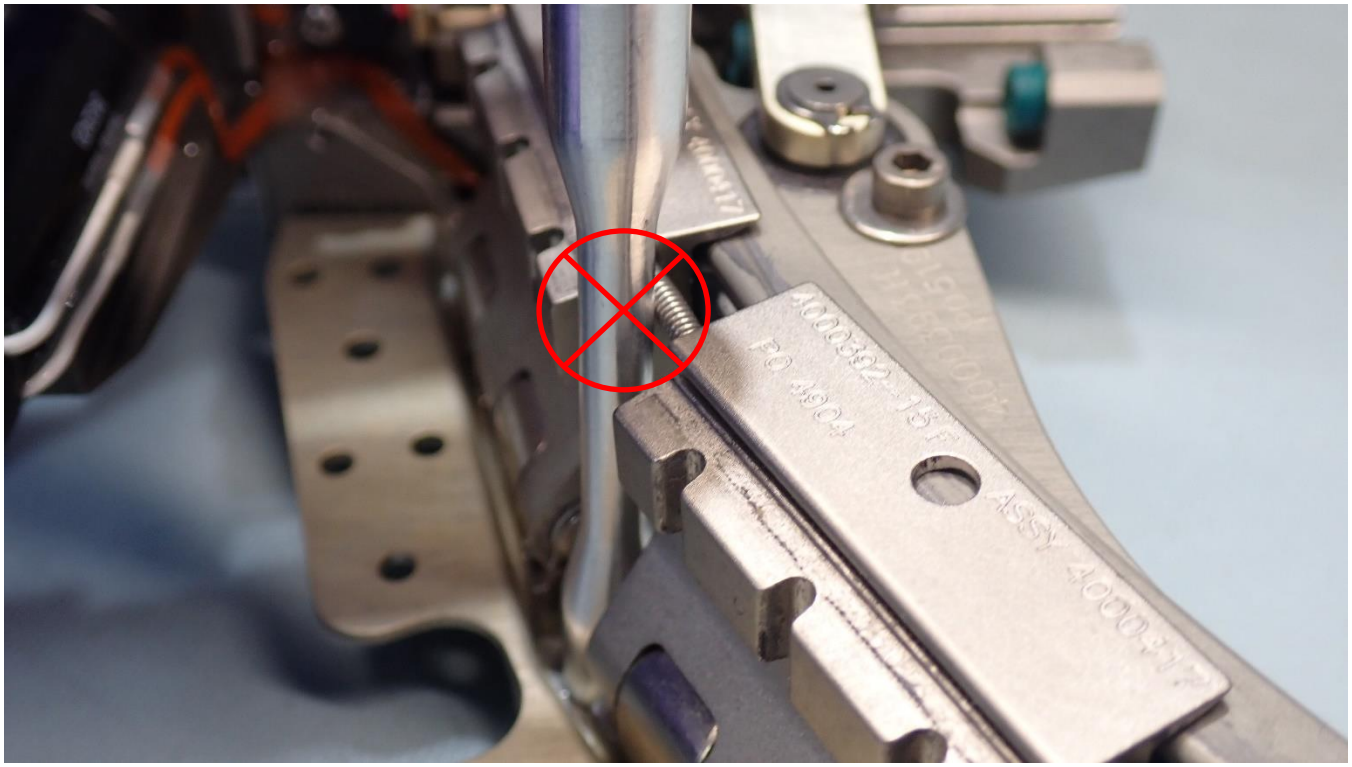

Figure 3-4: Boss Contacting Leaf Retaining Cord

Step	Description	Date & Initials		Notes
		Tech	QA	
6	Remove Upper Ring from Lower Ring. Slightly lift the Lower Ring and insert 10-24 UNC truss head screw through one of the bolt circle holes selected in step 5. See Figure 3-5. While continuing to lift the Lower Ring, fasten 2004174 MLB Shipping Boss to the 10-24 UNC truss head screw until bottomed. See Figure 3-6. Repeat this process until all MLB Shipping Bosses are installed. Do not torque fastener and do not contact Leaf Retaining Cord or greased surfaces on Leaf Assemblies. See Figure 3-6.		--N/A--	

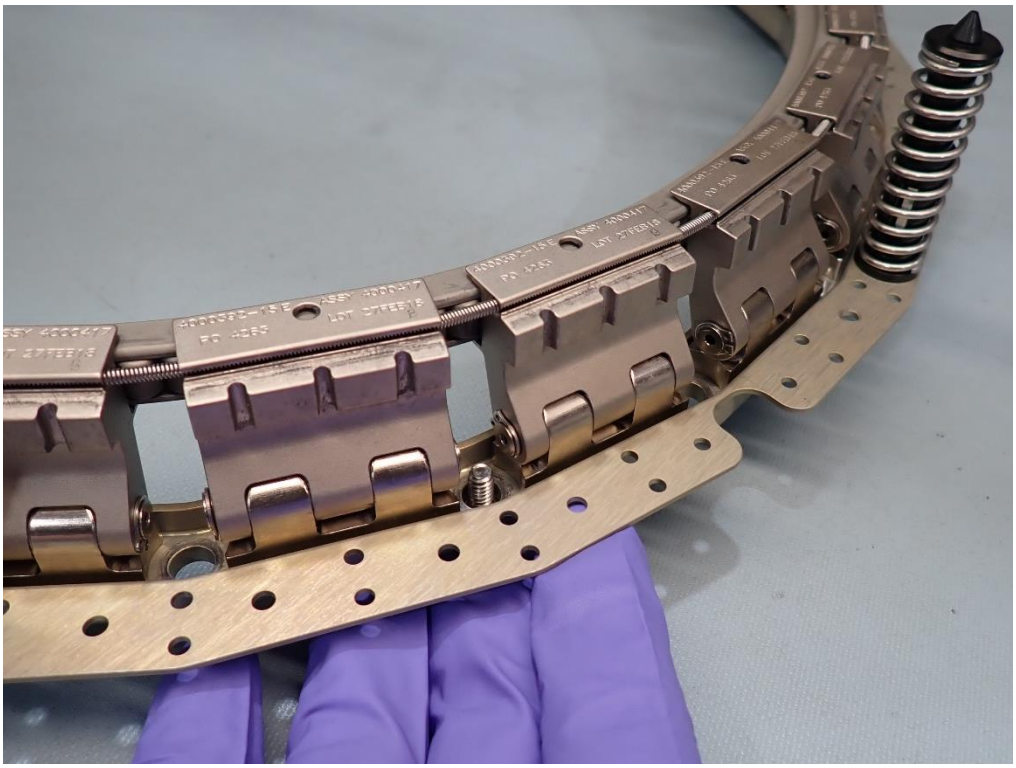

Figure 3-5: Inserting Fastener into Lower Ring

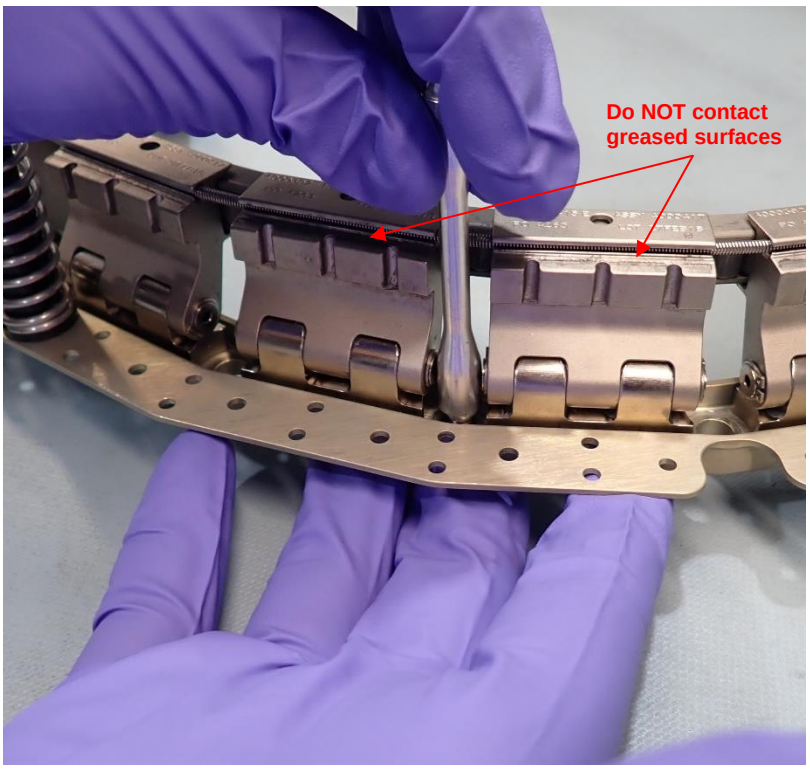

Figure 3-6: Attaching Boss to Lower Ring

Step	Description	Date & Initials		Notes
		Tech	QA	
7	Place Upper Ring on Lower Ring, ensuring proper alignment per PSC Operating Procedure 2000781. Ensure Bosses are inserted into bolt hole locations in Upper Ring and they do not contact accessories on Upper Ring. Loosely fasten Bosses to the available bolt circle holes of the Upper Ring using 10-24 UNC truss head screws. Stop once the head of fastener contacts the Upper Ring. Do not compress Separation Springs. See Figure 3-7.		--N/A--	

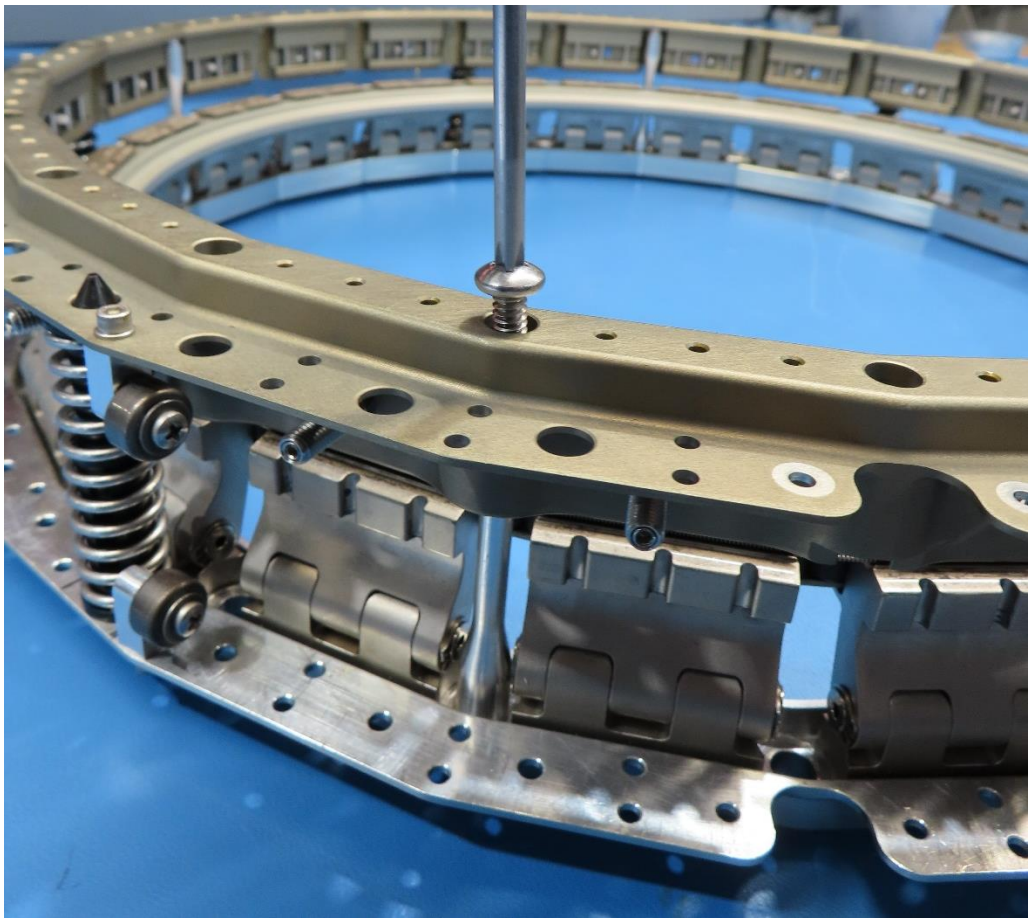

Figure 3-7: Installing screw through Upper Ring

Step	Description	Date & Initials		Notes
		Tech	QA	
8	Gradually fasten the 10-24 screws ½ turn at a time on the Upper Ring, working around the MLB, until all are bottomed out. Use caution as each Separation Spring will compress ~0.1 inch and generate ~3 lbf. May have to restrain MLB Shipping Boss by hand while fastening. Then torque all 10-24 screws on the Upper Ring 2 to 3 in·lb.		--N/A--	
9	Carefully flip the MLB so that the Upper Ring is now on the bottom and the Lower Ring is now face up. Torque all 10-24 screws on the Lower Ring 2 to 3 in·lb.		--N/A--	
10	Verify all MLB Shipping Bosses are fastened and torqued to the Upper and Lower Ring. Record total qty. of screws and MLB Shipping Bosses used in Table 3-1 .			

Step	Description	Date & Initials		Notes
		Tech	QA	
11	Take pictures of MLB and save them to a secure location. Ensure all MLB Shipping Boss locations are visible in pictures.		--N/A--	
12	Place the MLB in an appropriately sized antistatic bag (or wrap in antistatic roll). Close and seal the bag with Kapton tape as needed. Leave courtesy strips at the end of each piece of tape to assist unpacking.		--N/A--	
13	Place bagged MLB inside foam cutout in the lower half of Shipping Container. The MLB shall be above the foam insert. Ensure Motor Bracket aligns with large rectangular cutout in foam. See Figure 3-8.		--N/A--	
14	If Connectors or Switches are not attached to MLB, tape bag(s) of accessories to the top center of the MLB bag or wrap in bubble wrap and place in hand cutouts. See Figure 3-9.		--N/A--	Are Connectors or Switches on MLB or in cutouts? If so record qty:
15	If LCT's are shipping not attached to MLB, tape bag to top center of MLB bag or wrap in bubble wrap and place in hand cutouts. See Figure 3-9.		--N/A--	Are LCTs taped to MLB or in cutouts? If so record qty:
16	Print this Procedure and then place it and all additional documentation required per PSC Shipping Procedure 3000208 in a resealable plastic bag on top of the MLB.		--N/A--	
17	Place the lid on the Shipping Container and close all 4 latches.		--N/A--	

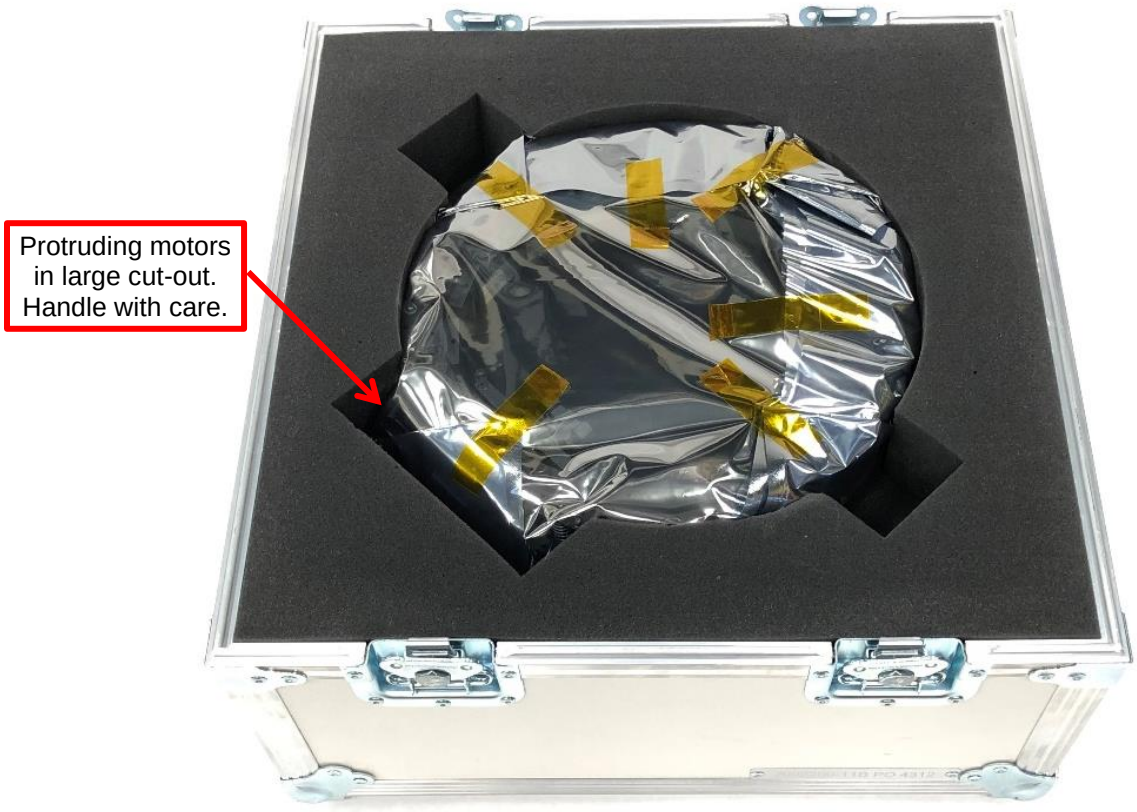

Figure 3-8: MLB installed in shipping container

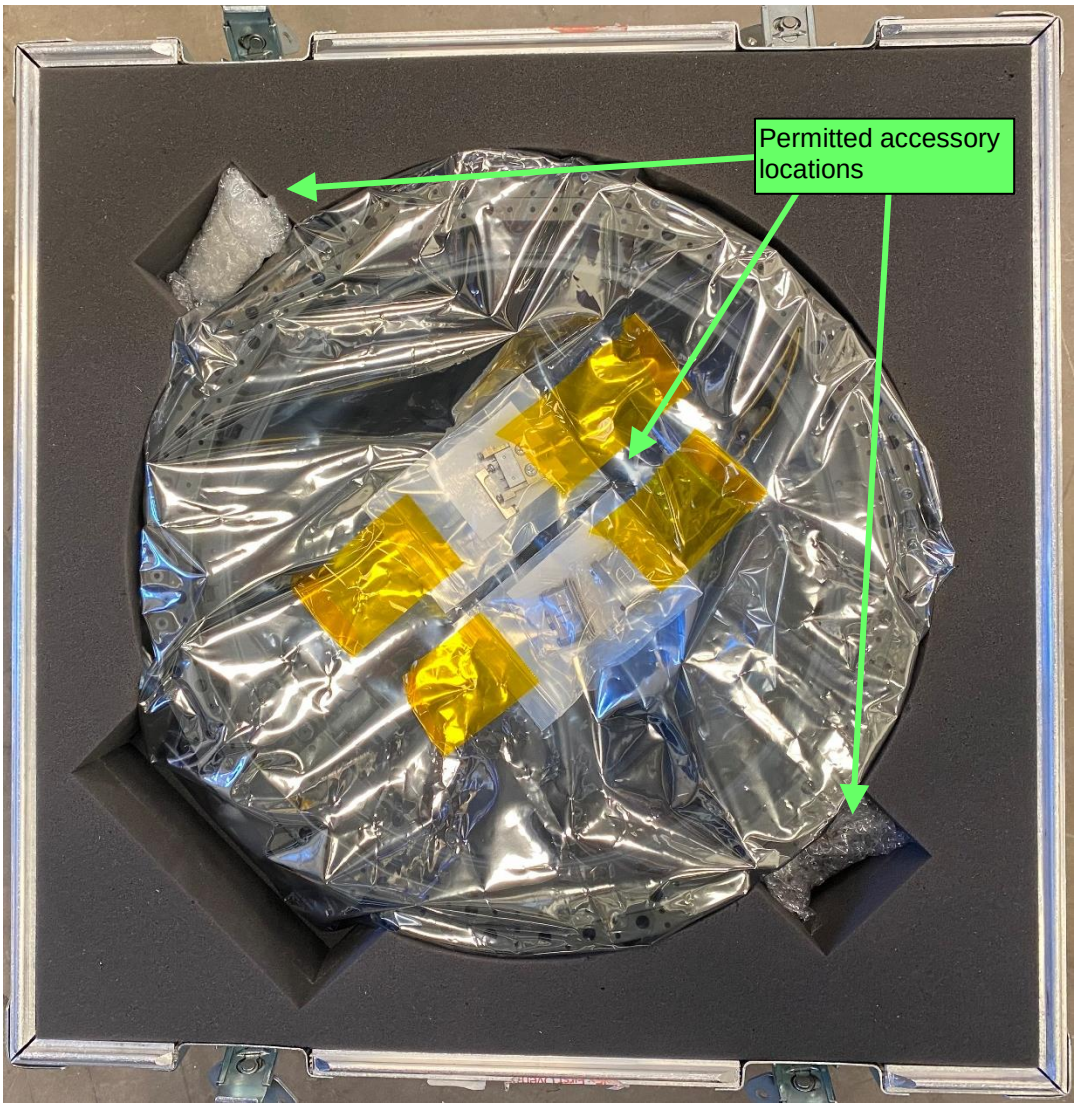

Figure 3-9: MLB with removed accessories

4. Unpacking the MLB

The operator shall be familiar with PSC documents 2000785 MkII MLB User Manual and 2000781 MkII MLB Operating Procedure prior to performing this procedure.

4.1 Required Equipment

Item	Quantity	Check
#1 Phillips screwdriver (to remove 10-24 UNC truss head screws)	1	
Bag or tray (to store removed hardware)	1	
Small tweezers (to assist in removing fasteners.	1	

4.2 Unpacking Procedure

Step	Description	Date & Initials	Notes
1	Record name of person executing procedure.		Name:
2	Read the entirety of section 3.2 to familiarize with how this specific MLB was packaged.		
3	Remove Separation Connectors, Separation Switches, and LCTs from Shipping Container if present. See section 3.2, steps 14 and 15.		
4	Remove the bagged MLB from the Shipping Container. Take care not to contact or bump the Motors which protrude from the MLB Rings.		
5	Remove tape securing the antistatic bag, open bag, and remove the MLB from the antistatic bag.		
6	The Upper and Lower rings are secured with between 4 and 8 2004174 MLB Shipping Bosses based on the size of MLB. See Table 3-2: MLB Shipping Boss Quantity. Remove them by performing the following. 1) Loosen each Shipping Boss screw contacting the Upper Ring about ½ turn, working around the MLB. 2) Repeat the ½ turns until all screws gap from the Upper Ring. 3) Remove each screw and place into storage bag or tray. 4) With the Upper Ring on the Lower Ring, carefully flip the MLB so that the Lower Ring is now facing upward. 5) Remove the Bosses from the Lower Ring by loosening the 10-24 screws holding the bosses to the Lower Ring. 6) Remove Lower Ring from Upper Ring and place bosses and screws into storage bag or tray.		
7	Take inventory of every Shipping Boss and screw. The quantities shall match 'Actual Total Qty.' in Table 3-1 .		
8	Confirm that there is no damage to the Part Marking (may be engraving, sticker, ink, etc. - see Figure 4-1 and Figure 4-2). Contact PSC if there is any visible damage.		
9	The MLB is now ready for operation per PSC Document 2000781 MkII MLB Operating Procedure (available at https://www.rocketlabusa.com/space-systems/separation-systems/motorized-lightband/). **Operating the MLB before receiving training from PSC shall void the MLB warranty.**	[redacted]	

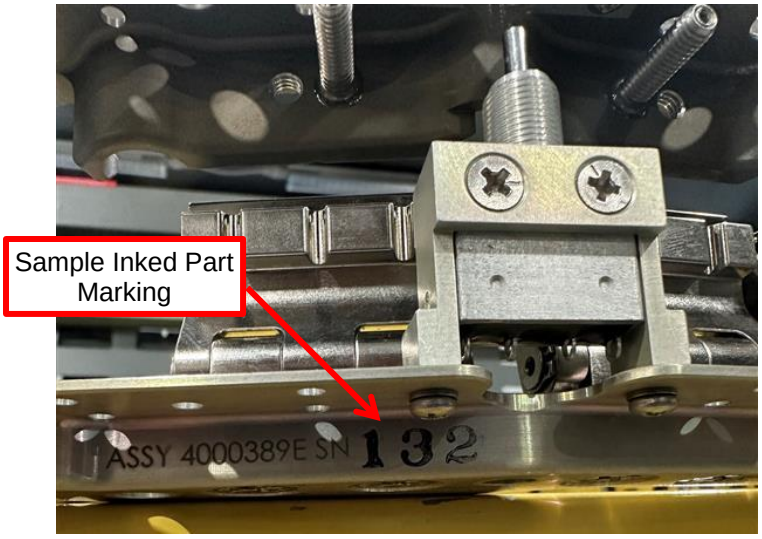

Figure 4-1 Part Marking Location on Lower Ring

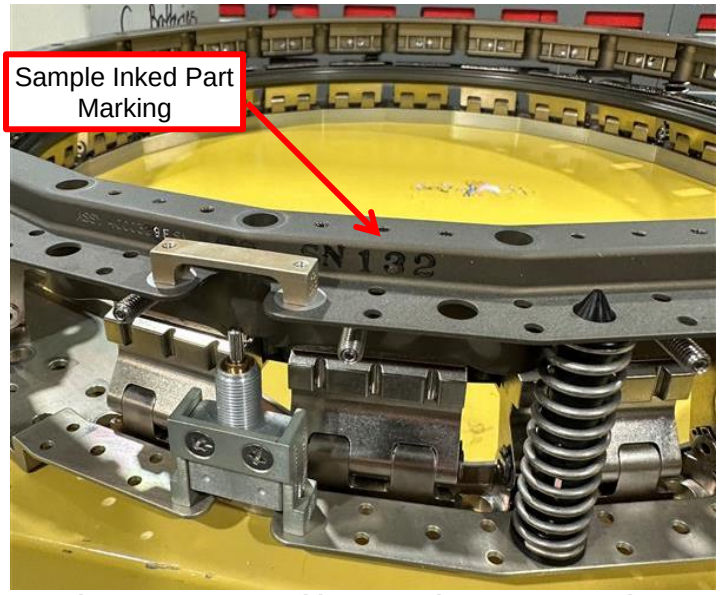

Figure 4-2 Part Marking Location on Upper Ring