TB-2327

Paladin™ RIGHT ANGLE MODULE REMOVAL AND REPLACEMENT

Revision "D"

Specification Revision Status

Revision	SCR No.	Description	Initial	Date
A	S4456	Initial Release	M. Sloban	5/25/16
B	S5834	Updated DO Module Keepout Zone and Re-titled to Include DO	M.Osbourne	5/30/17
C	S6699	Updated Z4 values in Table 16	S.Yoeuth	01/17/18
D	S10719	Updated wording to be inclusive of all right angle configurations Added RAM tools to Section 3.4 Updated Keep Out Zones in Section 5.1	T. Nierendorf	08/16/23

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1.0 SCOPE

1.1 Content

1.1.1 This technical bulletin describes the procedure for module removal and replacement for the Paladin right angle connector products, including RAF (Right Angle Female), RAM (Right Angle Male), and DO (Direct Orthogonal).

1.2 Application

1.2.1 This technical bulletin applies to Paladin right angle product derivatives as covered above.

2.0 REFERENCE DOCUMENTS

2.1 Amphenol Documents

2.1.1 TB-2326 Paladin Daughtercard Press-Fit Installation Process

3.0 TOOLING

3.1 Handheld Stiffener Tools

600-2575-000 – RAF/DO Stiffener Removal/Installation Tool 2" Long (DO top installation requires different tool)

640-0085-000 – RAM Stiffener Removal/Installation Tool 2" Long

600-2577-000 – Back Stiffener Installation Tool 2" Long (all configurations)

600-2614-000 – DO Top Stiffener Installation Tool 2" Long

3.2 RAF Module Removal Tools

3.2.1 RAF 4 Position Module Removal Tool Assembly and Sub-Components

Table 1. Paladin RAF 4 Position Module Removal Tool and Component P/Ns

Product Size	Tool Assembly Part Number	Leg Part Number	Body Part Number
2 pair	600-2604-000	626-2169-000	626-2203-000
3 pair	600-2604-000	626-2170-000	626-2204-000
4 pair	600-2604-000	626-2171-000	626-2205-000
5 pair	600-2604-000	626-2172-000	626-2206-000
6 pair	600-2604-000	626-2173-000	626-2207-000
7 pair	600-2604-000	626-2174-000	626-2208-000
8 pair	600-2604-000	626-2175-000	626-2209-000

3.2.2 RAF 5 Position Module Removal Tool Assembly and Sub-Components

Table 2. Paladin RAF 5 Position Module Removal Tool and Component P/Ns

Product Size	Tool Assembly Part Number	Leg Part Number	Body Part Number
2 pair	600-2603-000	626-2169-000	626-2193-000
3 pair	600-2603-000	626-2170-000	626-2194-000
4 pair	600-2603-000	626-2171-000	626-2195-000
5 pair	600-2603-000	626-2172-000	626-2196-000
6 pair	600-2603-000	626-2173-000	626-2197-000
7 pair	600-2603-000	626-2174-000	626-2198-000
8 pair	600-2603-000	626-2175-000	626-2199-000

3.2.3 RAF 6 Position Module Removal Tool Assembly and Sub-Components

Table 3. Paladin RAF 6 Position Module Removal Tool and Component P/Ns

Product Size	Tool Assembly Part Number	Leg Part Number	Body Part Number
2 pair	600-2600-000	626-2169-000	626-2162-000
3 pair	600-2600-000	626-2170-000	626-2163-000
4 pair	600-2600-000	626-2171-000	626-2164-000
5 pair	600-2600-000	626-2172-000	626-2165-000
6 pair	600-2600-000	626-2173-000	626-2166-000
7 pair	600-2600-000	626-2174-000	626-2167-000
8 pair	600-2600-000	626-2175-000	626-2168-000

3.2.4 RAF 8 Position Module Removal Tool Assembly and Sub-Components

Table 4. Paladin RAF 8 Position Module Removal Tool and Component P/Ns

Product Size	Tool Assembly Part Number	Leg Part Number	Body Part Number
2 pair	600-2602-000	626-2169-000	626-2183-000
3 pair	600-2602-000	626-2170-000	626-2184-000
4 pair	600-2602-000	626-2171-000	626-2185-000
5 pair	600-2602-000	626-2172-000	626-2186-000
6 pair	600-2602-000	626-2173-000	626-2187-000
7 pair	600-2602-000	626-2174-000	626-2188-000
8 pair	600-2602-000	626-2175-000	626-2189-000

3.3 DO Module Removal Tools

3.3.1 DO 4 Position Module Removal Tool Assembly

Table 5. Paladin DO 4 Position Module Removal Tool P/Ns

Product Size	Tool Length	Tool Part Number
2 – 8 Pair	4 position	600-2605-000

3.3.2 DO 8 Position Module Removal Tool Assembly

Table 6. Paladin DO 8 Position Module Removal Tool P/Ns

Product Size	Tool Length	Tool Part Number
2 – 8 Pair	8 position	600-2606-000

3.3.3 DO 10 Position Module Removal Tool Assembly

Table 7. Paladin DO 10 Position Module Removal Tool P/Ns

Product Size	Tool Length	Tool Part Number
2 – 8 Pair	10 position	600-2607-000

3.3.4 DO 12 Position Module Removal Tool Assembly

Table 8. Paladin DO 12 Position Module Removal Tool P/Ns

Product Size	Tool Length	Tool Part Number
2 – 8 Pair	12 position	600-2608-000

3.3.5 DO 14 Position Module Removal Tool Assembly

Table 9. Paladin DO 14 Position Module Removal Tool P/Ns

Product Size	Tool Length	Tool Part Number
2 – 8 Pair	14 position	600-2609-000

3.3.6 DO 16 Position Module Removal Tool Assembly

Table 10. Paladin DO 16 Position Module Removal Tool P/Ns

Product Size	Tool Length	Tool Part Number
2 – 8 Pair	16 position	600-2610-000

3.4 RAM Module Removal Tools

3.4.1 RAM 3-4 Pair/8 Position Module Removal Tool Assembly

Table 11. Paladin RAM 3-4 Pair/8 Position Module Removal Tool P/Ns

Product Size	Tool Length	Tool Part Number
3 – 4 Pair	8 position	640-0086-000

3.4.2 RAM 14 Position Module Removal Tool Assembly

Table 12. Paladin RAM 6 Pair 8 Position Module Removal Tool P/Ns

Product Size	Tool Length	Tool Part Number
6 Pair	8 position	640-0088-000

3.4.3 RAM 16 Position Module Removal Tool Assembly

Table 13. Paladin RAM 6 Pair 16 Position Module Removal Tool P/Ns

Product Size	Tool Length	Tool Part Number
6 Pair	16 position	640-0110-000

4.0 PROCEDURE

4.1 Stiffener Removal

4.1.1 RAF – Loose Connectors (Before Pressing onto PCB)

Step 1. Prior to removing stiffener, verify the stiffener removal tool is in proper working order and condition:

- Stiffener engagement pins are all present and protruding at least 0.030” from the face of the pin block. If any pins are missing, bent, or broken, remove and replace them (see Figure 1).
- Stiffener engagement pins are free of any damage that could potentially cause harm to a connector.
- Stiffener removal tool has a full range of motion.

Figure 1: Stiffener removal pins protruding from the bottom of the pin block.

Step 2. Ensure that the stiffener removal tool is in the fully closed position for the stiffener - top or back - which you wish to remove. Tighten handle clockwise (for top stiffener removal) or counter clockwise (for back stiffener removal) until the hard stop.

Figure 2. Pin locations for RAF back stiffener removal

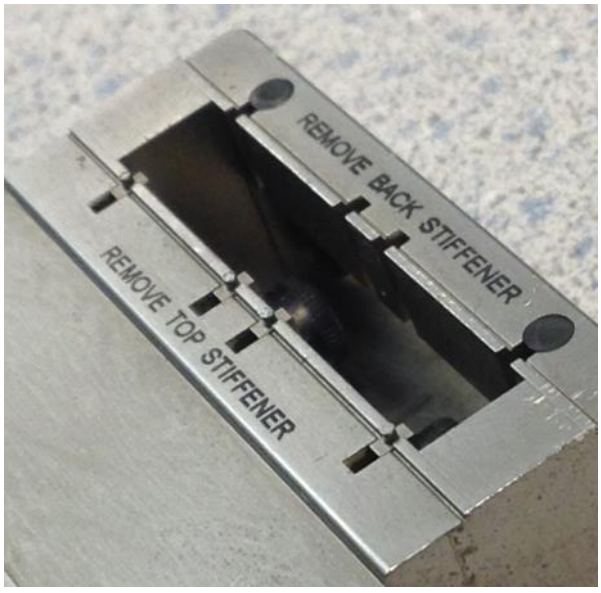


Figure 3. Pin locations for RAF top stiffener removal

Step 3. Orient the tool above the stiffener you wish to remove so that the pins are facing towards the connector.

Step 4. Align and engage the tool’s pins with the pilot holes in the stiffener to be removed.

Step 5. While applying enough pressure to ensure that the stiffener removal tool’s pins remain engaged with the metal stiffener’s holes, begin turning the knob clockwise (if removing the back stiffener) or counterclockwise (if removing the top stiffener) until a force is felt. The metal stiffener should start to separate from the connector module(s). Continue to turn the knob for one full rotation and the metal stiffener should begin to disengage from the stiffener hats of the connector module(s). If the connector is greater than 2” in length proceed to Step 6. If the connector is no greater than 2” in length, continue to turn the knob until the stiffener is completely separated from the connector module(s) (typically 2-3 full turns) and proceed to Step 7.

Note: If the top stiffener is being removed from a connector that is pressed into a board, be cautious during removal to not partially unseat the compliant pins from the board. Adding pressure to the top of the connector will help prevent this.

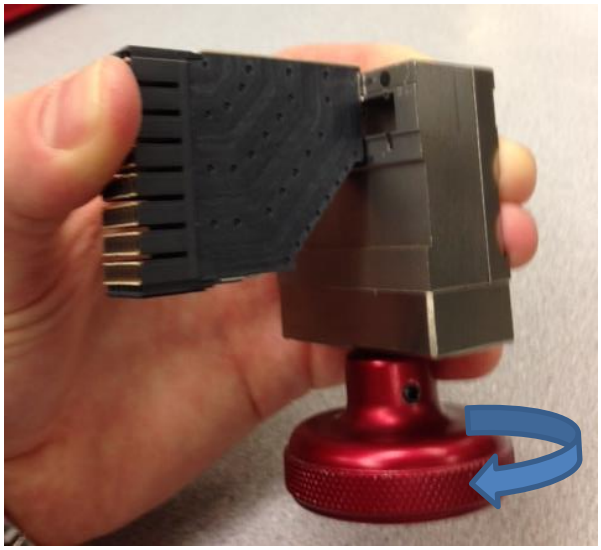


Figure 4. RAF Back Stiffener Removal on Loose Connector

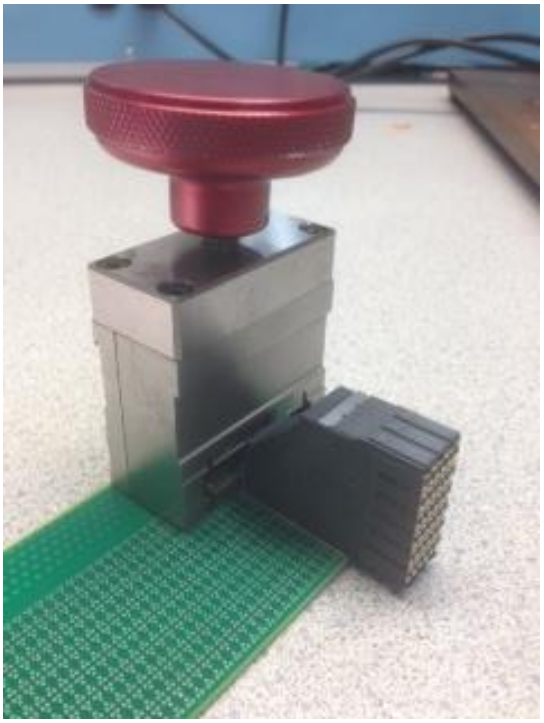


Figure 5. RAF Back Stiffener Removal on Pressed Connector

Figure 6. RAF Top Stiffener Removal on Loose Connector

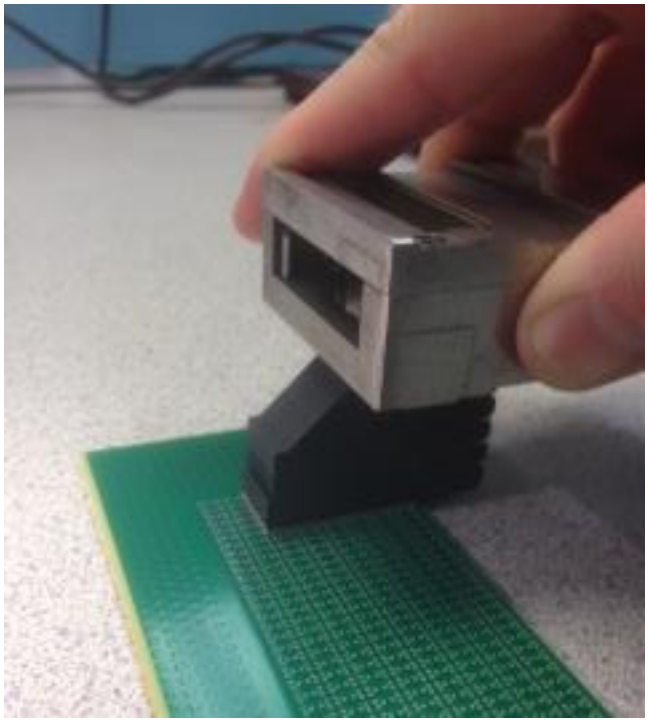


Figure 7. RAF Top Stiffener Removal on Pressed Connector

Note: Use extreme caution during stiffener removal to not touch any of the compliant pins while handling the connector. This can cause damage to the compliant pins, resulting in scrapping the entire connector.

Step 6. Turn the knob in the clockwise direction (if removing the top stiffener) or counterclockwise (if removing the back stiffener) to return the tool to its original “closed” position. Disengage the stiffener removal tool from the stiffener and reengage the tool ~1.0 – 2.0 inches further down the length of the connector (See Figure 10 through Figure 11). Repeat Steps 5 and 6, working back-and-forth across the length of the connector, carefully “walking” the metal stiffener off of the connector plastic.

Step 7. Remove the stiffener from the connector assembly, and set aside.

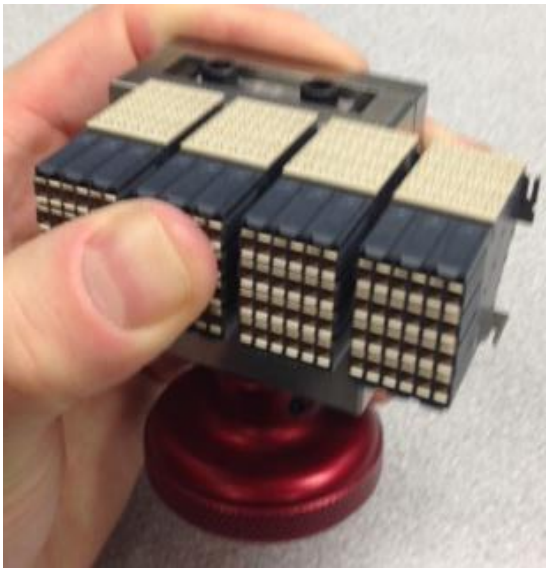
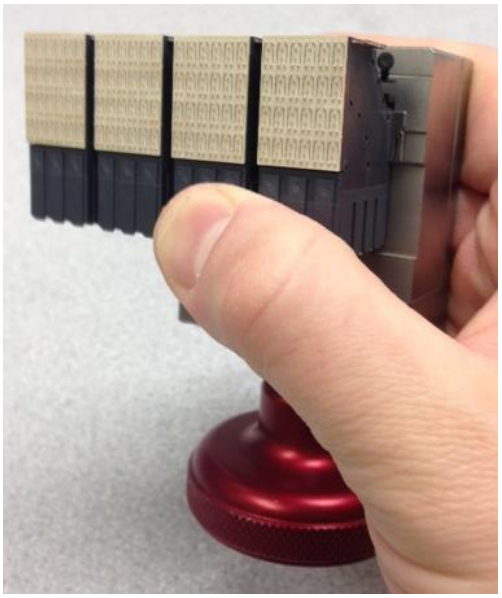


Figure 8. Back stiffener removal on loose Paladin RAF connectors greater than 2” in overall length (50.8mm)



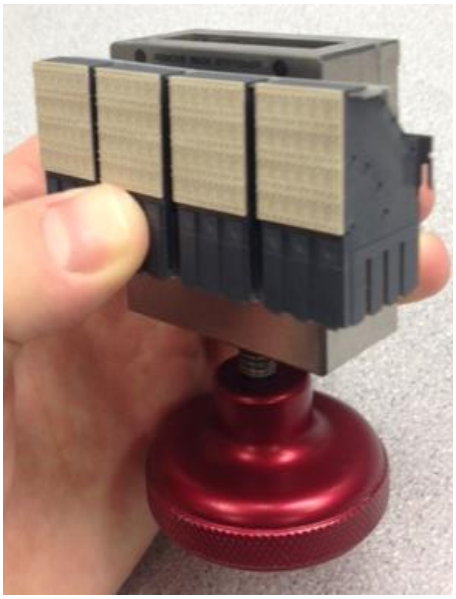


Figure 9. Top stiffener removal on loose Paladin RAF connectors greater than 2" in overall length (50.8mm)

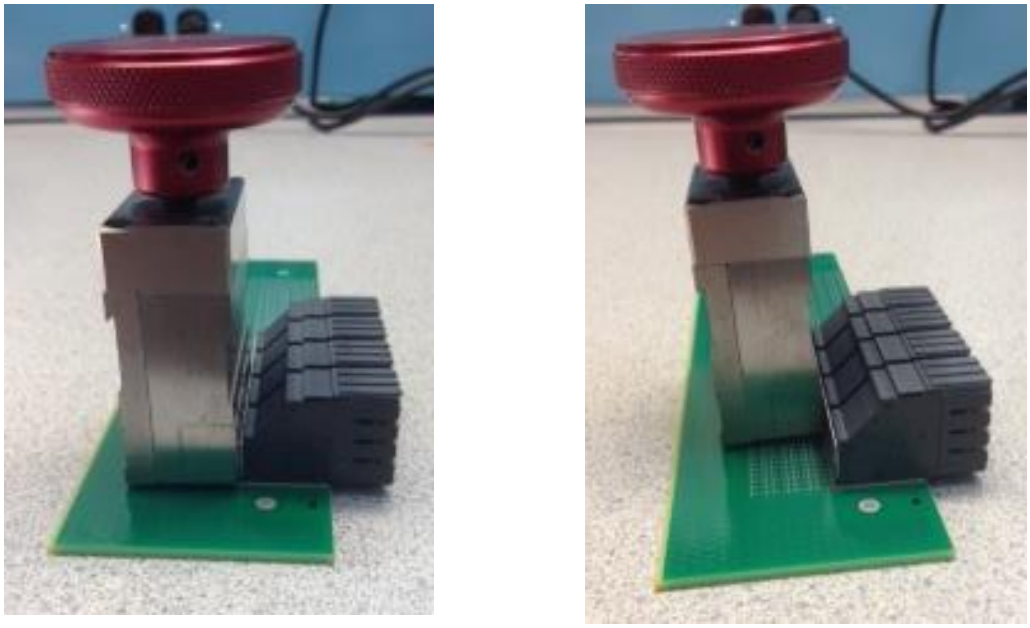


Figure 10. Back stiffener removal on pressed Paladin RAF connectors greater than 2" (50.8mm) in overall length

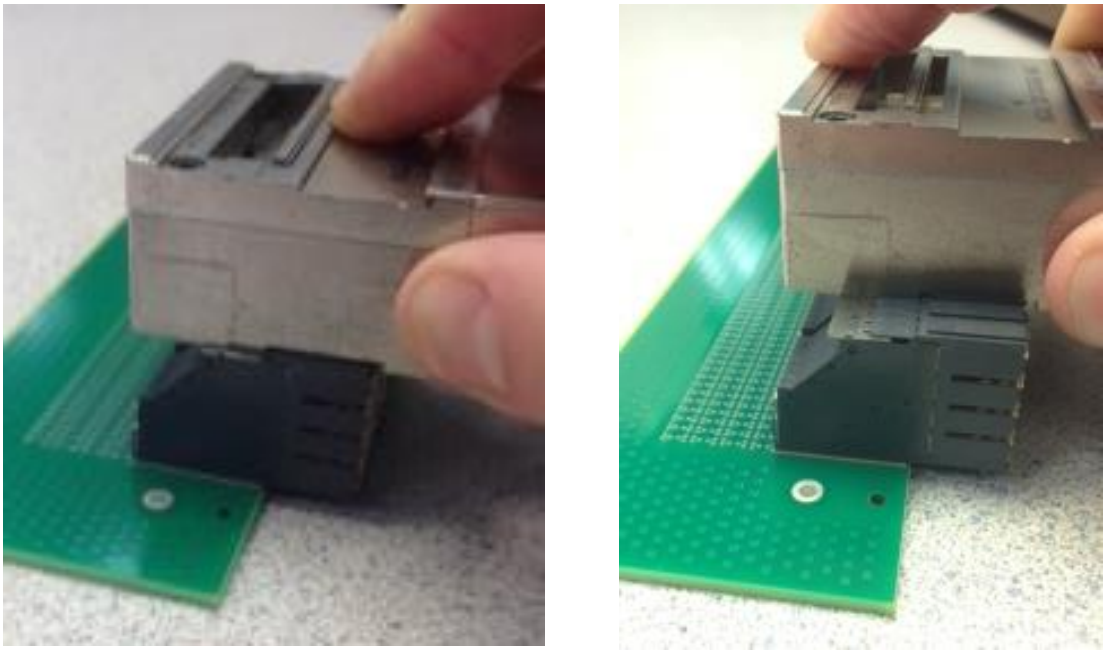


Figure 11. Top stiffener removal on pressed Paladin RAF connectors greater than 2" (50.8mm) in overall length

4.2 Daughtercard Module Removal

Step 1. Prior to removing modules, remove the stiffeners and confirm that the correct tool Part Number or Part Numbers are being used for the product being removed.

Note: The procedure for the RAF, RAM, and DO Module Removal Tool are exactly the same; however, these tools are not interchangeable. The DO Module Removal Tool should not be used to remove a RAF module, and vice versa.

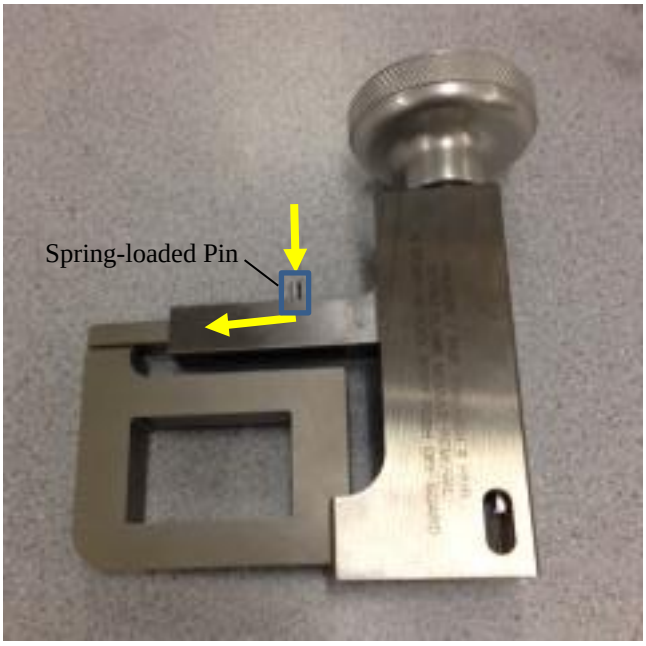


Figure 12. Paladin RAF Module Removal Tool

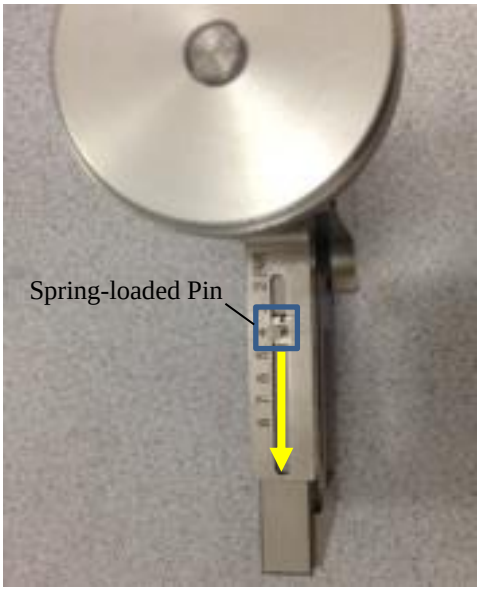


Figure 13. Paladin RAF Module Removal Tool Spring Loaded Pin.

Step 2. Push down on the pin to release the sliding arm, and pull the sliding arm until it is in the full open position. Slide the tool around the module to be removed and push the sliding arm until it is flush with the module to be removed. The spring-loaded pin should lock in place once the sliding arm makes contact with the module. Ensure that the tool is not overlapping any adjacent modules, or other connector components.

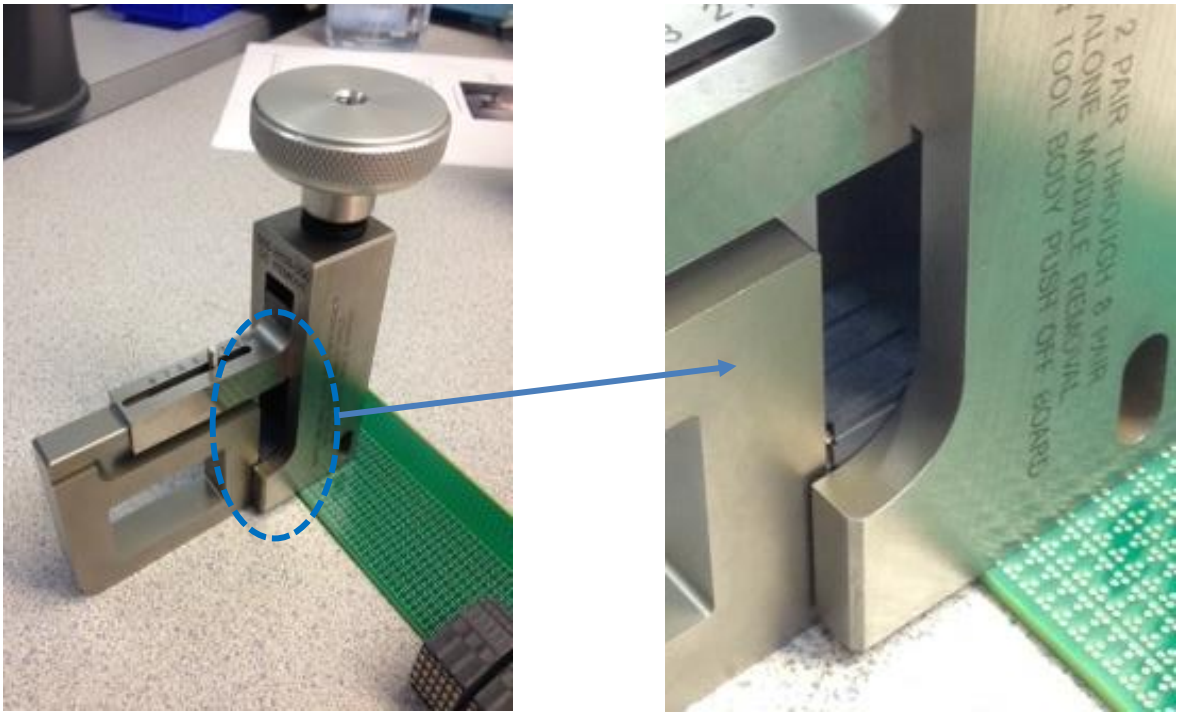


Figure 14. RAF Module Removal Tool (front view).

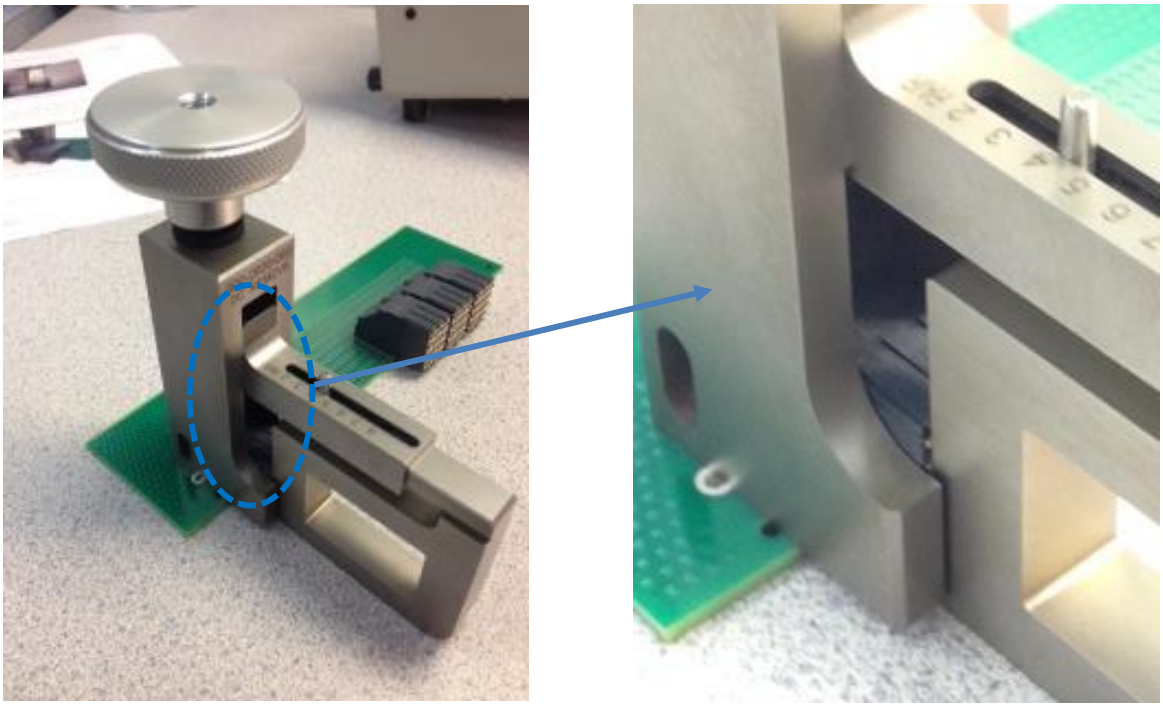


Figure 15. RAF Module Removal Tool (rear view).

Step 3. Turn the knob of the removal tool counterclockwise until the module is fully unseated from the board. To release the module from the tool, turn the knob clockwise or push the spring -loaded pin to extend the arm.

Step 4. If removing a single module from a connector that is made of several modules, use the push body attachment for the pair size of the module you wish to remove. Repeat Step 2 and Step 3 to remove the module. If the module to be removed is on the end of the connector, use a leg support component with the push body attachment.

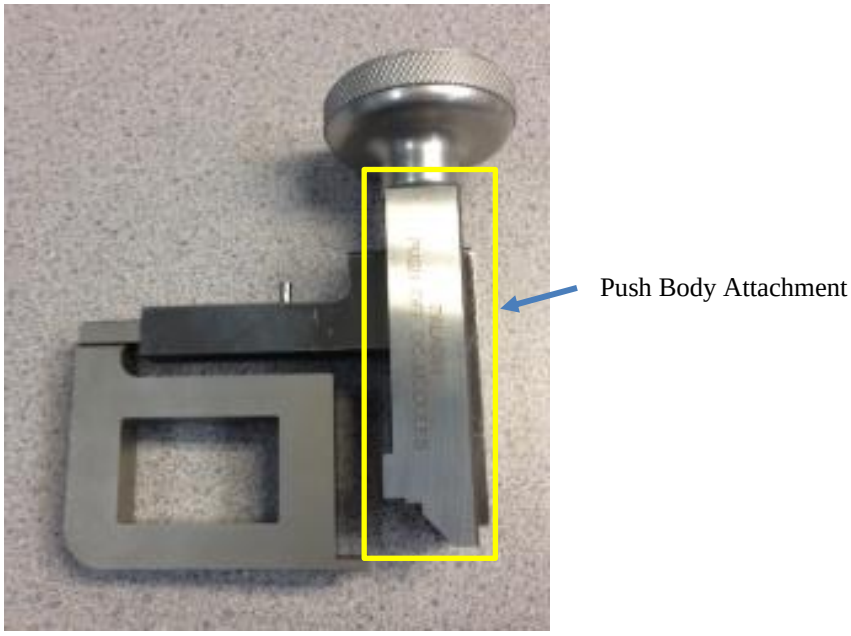


Figure 16. Paladin RAF Module Removal Tool with Push Body Attachment

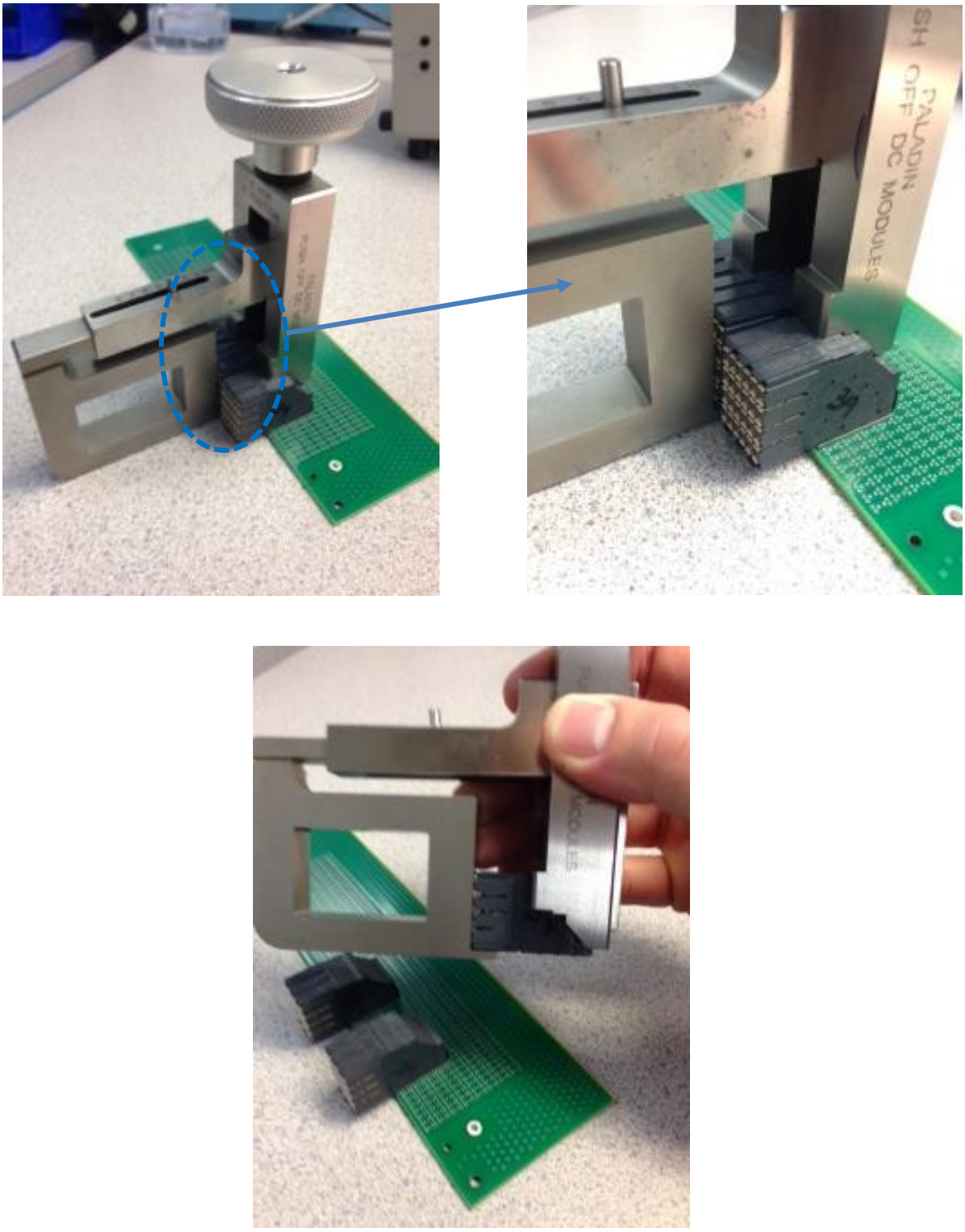


Figure 17. Paladin RAF Module Removal Tool with Push Body Attachment.

4.3 Module Replacement

Step 1. Follow installation process described in TB-2326.

4.4 Replacing Stiffener

4.4.1 RAF/RAM (using Handheld Stiffener Removal/Installation Tool)

Step 1. Pre-load the top and back stiffeners on to the module/connector by hand. Ensure that the stiffener slots are properly aligned with the stiffener hats of the module/connector.

Step 2. The Handheld Stiffener Removal/Installation Tool that was used to remove the stiffeners can also be used for installing or reinstalling the stiffeners.

Note: This is recommended for replacing stiffeners on reworked connectors that have already been pressed into a PCB. Please use extreme caution so not to damage the connector during stiffener installation while using the Handheld Stiffener Removal/Installation Tool.

Step 3. Verify that the stiffener tool is in the full open position for the stiffener that is to be installed. Turn the knob clockwise (for top stiffener installation) or counterclockwise (for back stiffener installation) until the hard stop is achieved.

Figure 18. Jaw location for RAF back stiffener installation

Figure 19. Jaw location for RAF top stiffener installation

Step 4. Properly orient the connector to the fixture (or the fixture to the connector) depending on what stiffener is to be installed and whether the connector is loose or pressed onto a board.

- The connector and stiffener must fall within the shelf and jaws of the stiffener installation tool.

Step 5. While applying enough pressure to ensure that the connector and unseated stiffener remain flush against the body of the tool to ensure the jaws are able to establish contact with the stiffener, begin turning the knob clockwise (if installing the top stiffener) or counterclockwise (if installing the back stiffener) until a force is felt. The metal stiffener should start to engage with the stiffener hats of the connector module(s). Continue to turn the knob for a half rotation and the metal stiffener should continue to engage with the stiffener hats of the connector module(s). If the connector is greater than 2” in length proceed to Step 6. If the connector is no greater than 2” in length, continue to turn the knob until the stiffener is completely seated to the connector module(s) (typically no more than 1-1.5 full turns) and proceed to Step 7.

Figure 20. Top Stiffener Installation (Loose Connector)

Figure 21. Back Stiffener Installation (Loose Connector)

Note: Be extremely careful during stiffener installation on loose connectors to not touch any of the compliant pins while handling the connector. This can cause damage to the compliant pins, resulting in scrapping the entire connector.

Step 6. Turn the knob in the clockwise direction (if installing the top stiffener) or counterclockwise (if installing the back stiffener) to return the tool to its original “closed” position. Disengage the stiffener removal tool from the stiffener and reengage the tool ~1.0 – 2.0 inches further down the length of the connector (See Figure 22 through Figure 24). Repeat Steps 5 and 6, working back-and-forth across the length of the connector, carefully “walking” the metal stiffener onto the connector stiffener hats.

Step 7. To install the back stiffener of a connector that has been pressed into a board, the Handheld Stiffener Removal/Installation Tool cannot be used. Instead, use a hammer and the Handheld Top Stiffener Installation Tool. Line up the edge of the installation tool with the edge of the stiffener and tap the installation tool with a hammer. Gradually guide the stiffener onto the stiffener hats along the length of the connector to prevent from warping the connector or damaging the stiffener hats. Continue tapping the stiffener installation tool, working back and forth across the length of the connector until the stiffener is fully seated (when the Top Stiffener Installation Tool bottoms out on the board).

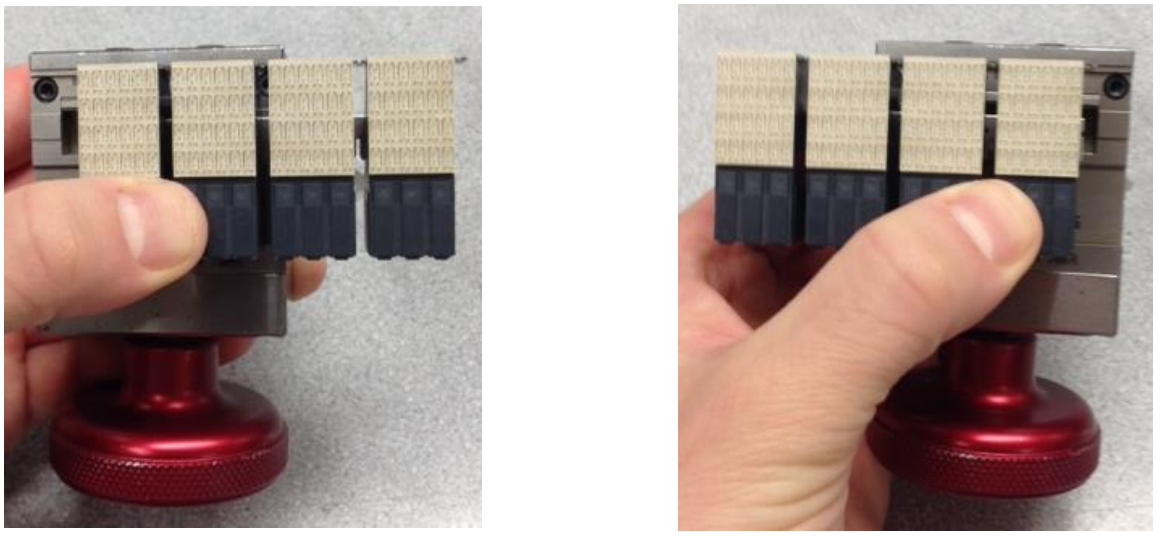


Figure 22. Top stiffener installation on Paladin loose connectors greater than 2" (50.8mm) in overall length

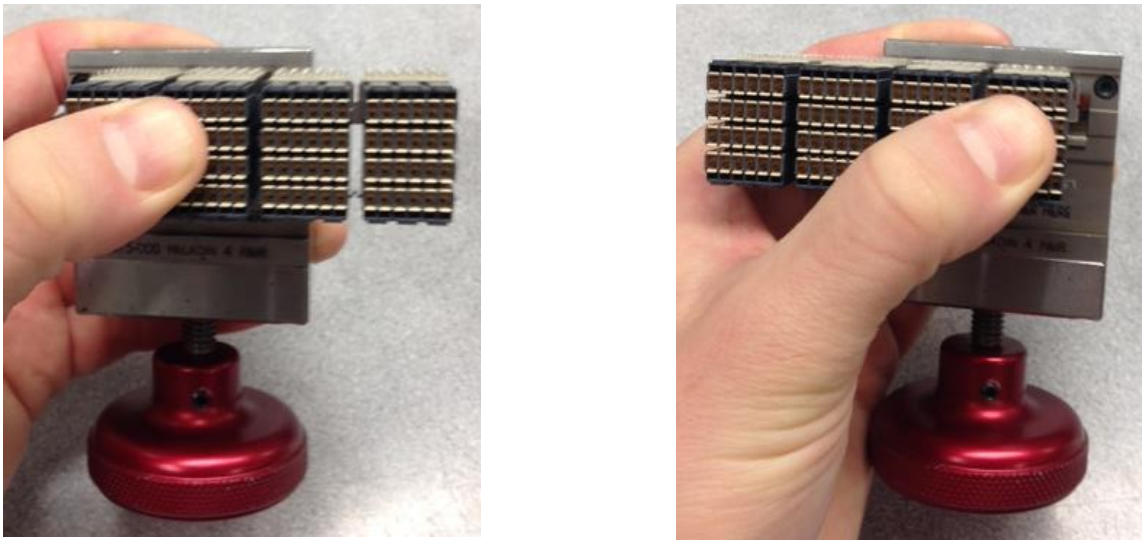


Figure 23. Back stiffener installation on Paladin loose connectors greater than 2" (50.8mm) in overall length

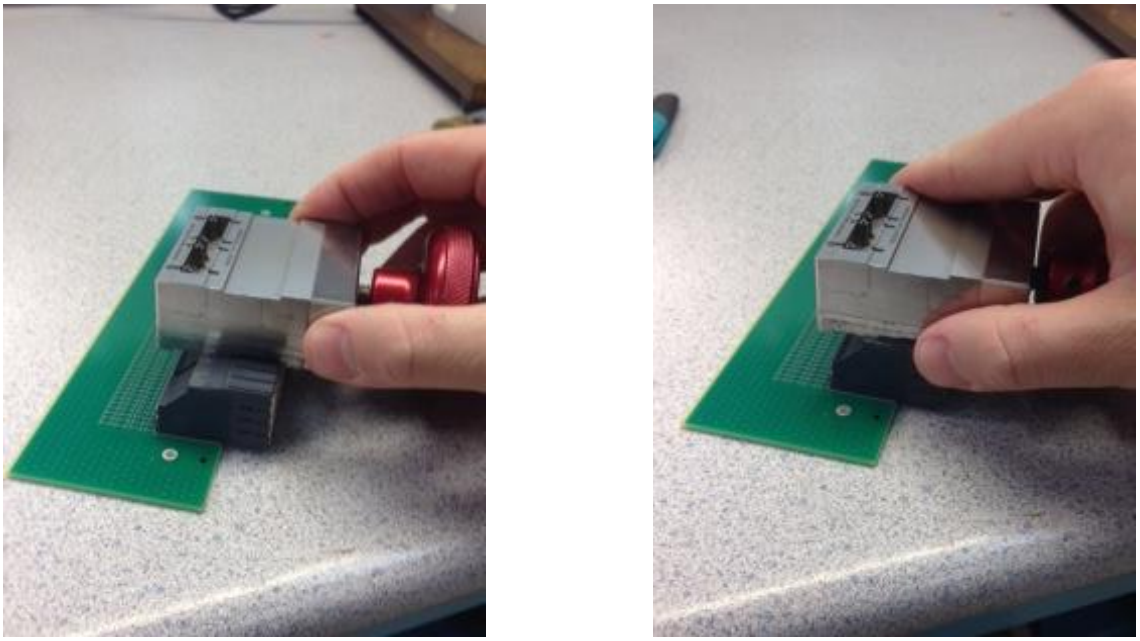


Figure 24. Top stiffener installation on Paladin connectors pressed into a board

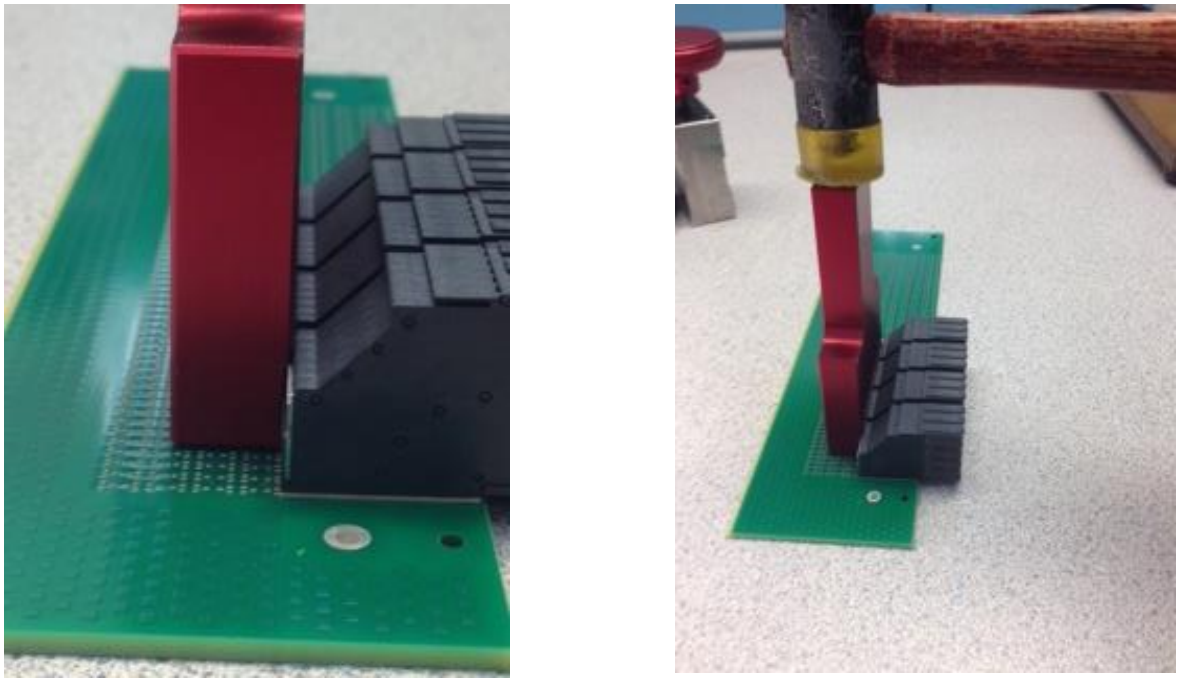


Figure 25. Back stiffener installation on Paladin connectors pressed into a board

5.0 KEEP OUT ZONES

5.1 Reparability and Rework

5.1.1 RAF & RAM Product

The recommended keep out zones for Paladin RAF & RAM are shown below in **Error! Reference source not found.**. The values for X_1, X_2, Y_1, and Y_2 are listed in Table 14. X_1 and Y_1 represent the outline of the connector body. X_2 and Y_2 represent the rework and reparability keep out zones, to allow for the use of proper Amphenol application tooling.

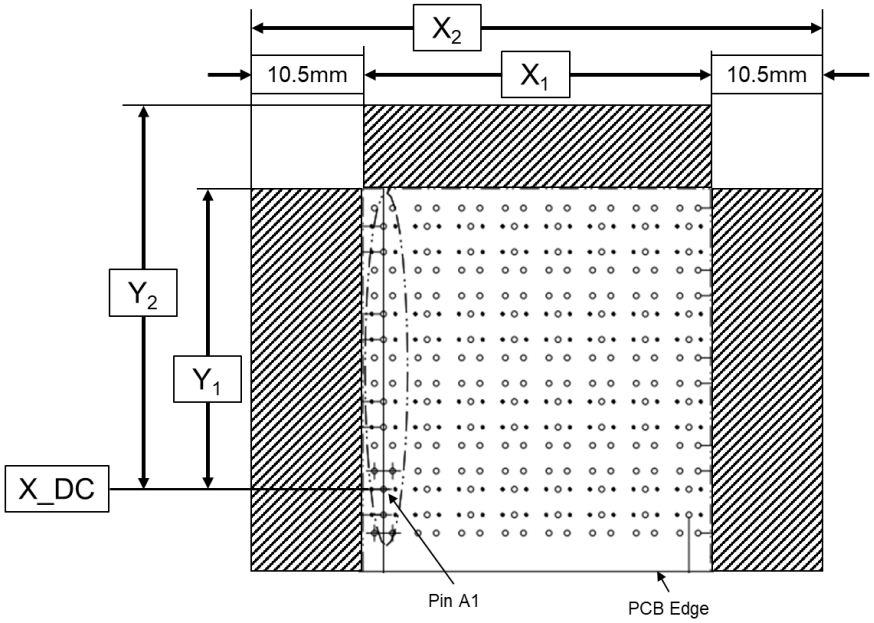


Figure 26. Keep out zones for Paladin RAF & RAM connectors

Table 14: Keep out zones for RAF & RAM connectors

Keep Out Zones for Paladin RAF & RAM Connectors				
	X_1	**X_2**	**Y_1**	**Y_2**
All Pairs	(NOTE 1)	**X_1** + 21.0mm (NOTE 2)	(NOTE 1)	**Y_1** + 32.9mm

Note 1: Connector outline dimensions obtained from the customer configurable (e.g. C-JP) drawing.

Note 2: X_2 must be 50.8mm minimum to accommodate stiffener removal/installation tool.

Note 3: 10.5mm keep out on either end of connector required for module end position removal.

5.1.2 DO Product

The recommended keep out zones for the Paladin DO product family are shown below in Figure 27. The values for X_1, X_2, Y_1, and Y_2 are listed in Table 15. X_1 and Y_1 represent the outline of the connector body. X_2 and Y_2 represent the rework and reparability keep out zones, to allow for the use of proper Amphenol application tooling.

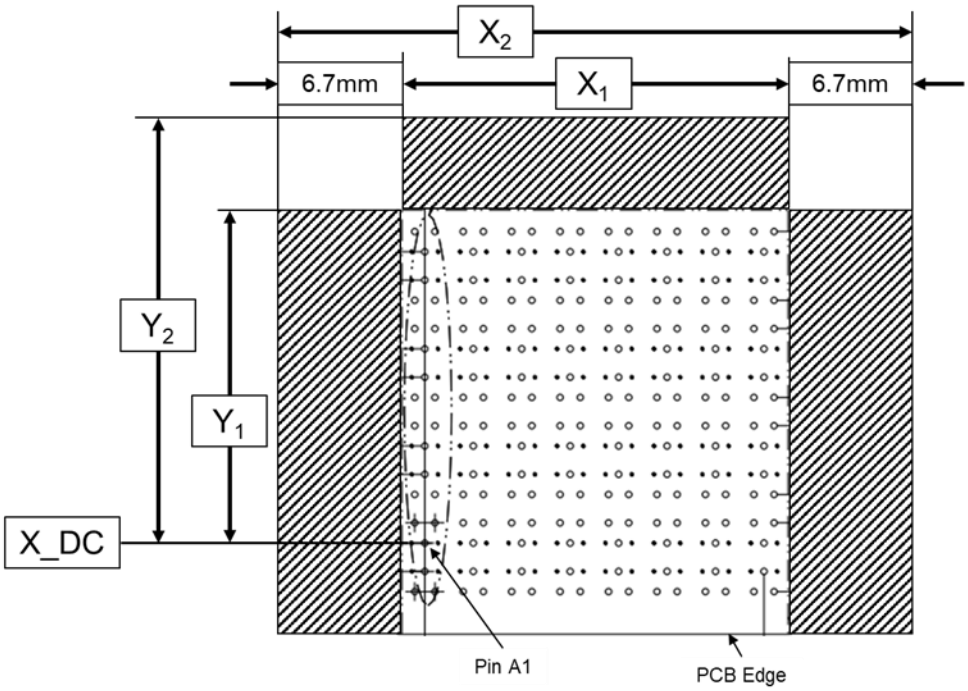


Figure 27. Keep out zones for Paladin DO connectors

Table 15: Keep out zones for DO connectors

Keep Out Zones for Paladin DO Connectors				
	X_1	**X_2**	**Y_1**	**Y_2**
All Pairs	(NOTE 1)	**X_1** + 13.4mm (NOTE 2)	(NOTE 1)	**Y_1** + 6.75mm

Note 1: Dimension(s) obtained from the C-AP and C-JP drawings.

Note 2: X_2 must be 50.8mm minimum to accommodate stiffener removal/installation tool.

Note 3: 6.7mm keep out on either end of connector required for module end position removal.

5.2 Progressive Z – Height Keep Out Zones

To allow for proper use of Amphenol rework and reparability tooling, progressive Z keep out zones are implanted. Avoiding board component placement in these keep out zones will ensure that tooling does not damage or affect other components.

5.2.1 RAF Product

Progressive Z – Height keep out zones are the heights from the lowest surface of the back stiffener [Z1] Figure 28, the height for back stiffener reinsertion [Z2] Figure 29, the back stiffener seating tool [Z3] Figure 30, and the stiffener removal tool from the surface of the PCB [Z4] Figure 31. Table 16, listed below, are the measurements for top stiffener re-insertion [X1] Figure 32, stiffener seating tool [X2] Figure 33 and the stiffener removal tool from the surface of the PCB [X3] Figure 34 are listed in Table 17.

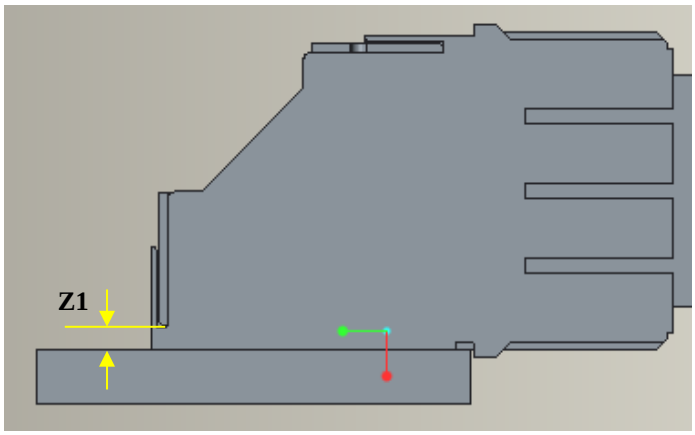


Figure 28. Height from the lowest surface of the stiffener to the PCB surface [Z1]

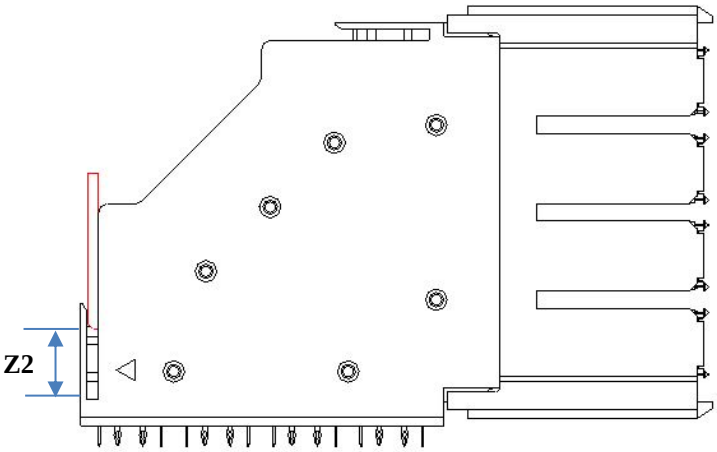


Figure 29. Z height for back stiffener re-insertion [Z2]

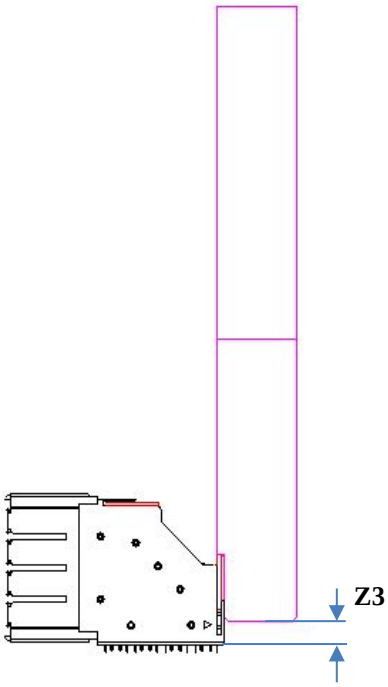


Figure 30. Z Dimension for back stiffener re-insertion [Z3]

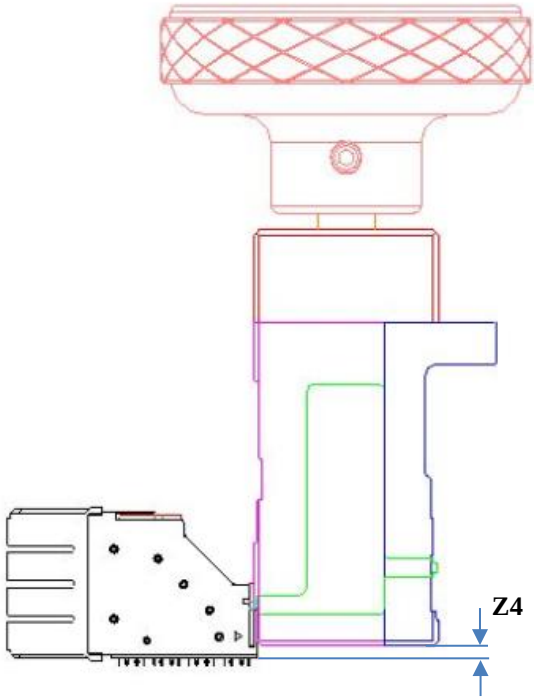


Figure 31. Z Dimension for stiffener removal [Z4]

Table 16: Progressive Z – Height RAF Keep Out Zones

Progressive Paladin RAF Keep Out Zones				
	[Z1]	[Z2]	[Z3]	[Z4]
2 Pair	1.60mm 0.063in	4.10mm 0.161in	0.00mm 0.00in	1.78mm 0.07in
3 Pair	1.60mm 0.063in	4.10mm 0.161in	0.00mm 0.00in	1.78mm 0.07in
4 Pair	1.60mm 0.063in	4.10mm 0.161in	0.00mm 0.00in	1.78mm 0.07in
5 Pair	1.60mm 0.063in	4.10mm 0.161in	0.00mm 0.00in	1.78mm 0.07in
6 Pair	1.60mm 0.063in	4.10mm 0.161in	0.00mm 0.00in	1.78mm 0.07in
7 Pair	1.60mm 0.063in	4.10mm 0.161in	0.00mm 0.00in	1.78mm 0.07in
8 Pair	1.60mm 0.063in	4.10mm 0.161in	0.00mm 0.00in	1.78mm 0.07in

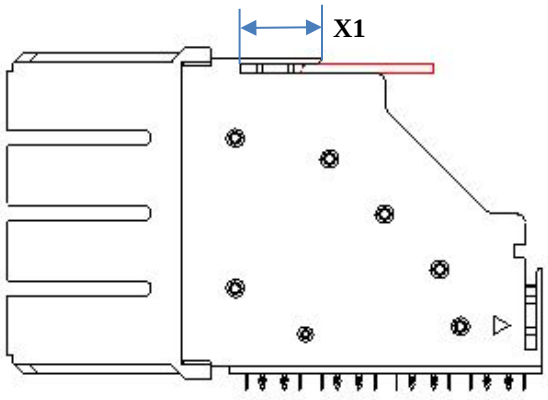


Figure 32. X dimension for top stiffener re-insertion [X1]

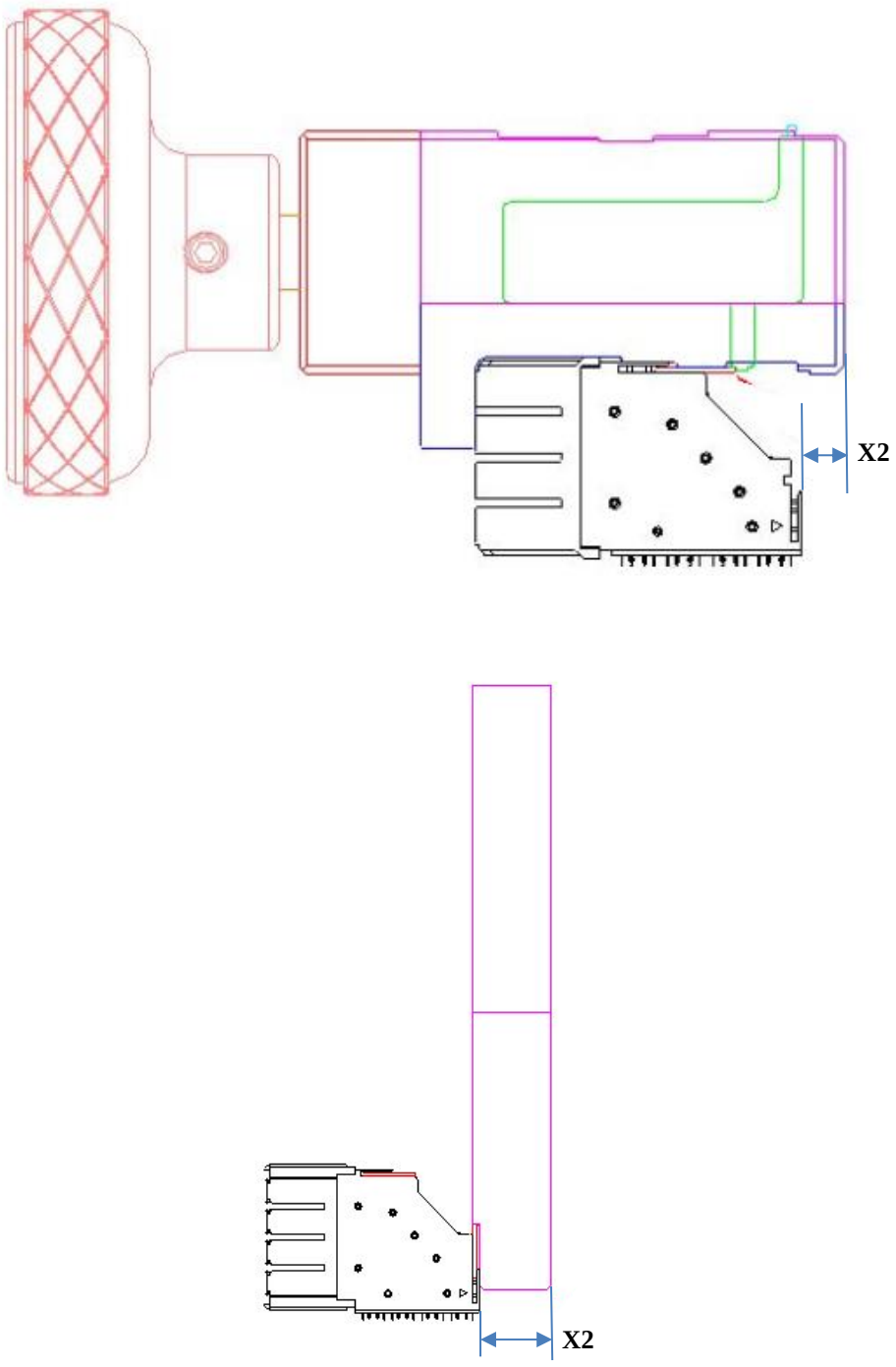


Figure 33. X dimension for stiffener seating tools [X2]

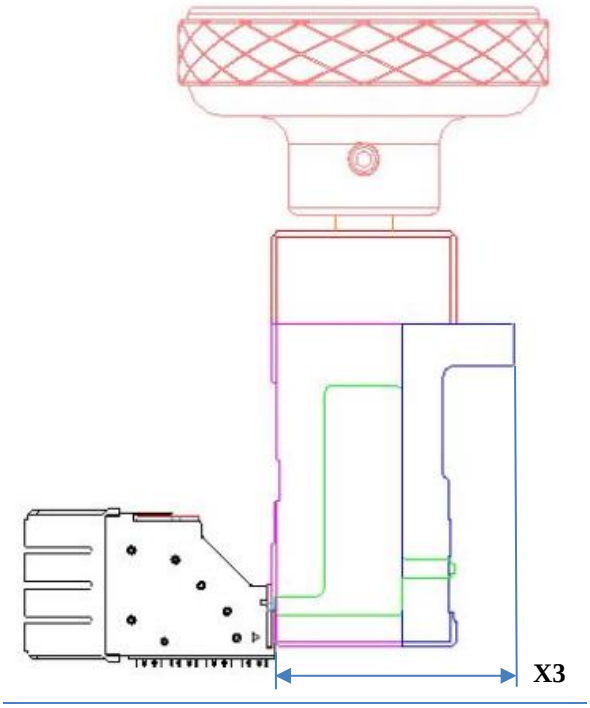


Figure 34. X dimension for stiffener removal tool from the surface of the PCB [X3]

Table 17: Paladin RAF Stiffener Installation/Removal Tool X-direction Measurements

Progressive Paladin RAF Keep Out Zones			
	[X1]	[X2]	[X3]
2 Pair	4.10mm 0.161in	14.04mm 0.553in	32.87mm 1.294in
3 Pair	4.10mm 0.161in	11.70mm 0.46in	32.87mm 1.294in
4 Pair	4.10mm 0.161in	11.70mm 0.46in	32.87mm 1.294in
5 Pair	4.10mm 0.161in	11.70mm 0.46in	32.87mm 1.294in
6 Pair	4.10mm 0.161in	11.70mm 0.46in	32.87mm 1.294in
7 Pair	4.10mm 0.161in	11.70mm 0.46in	32.87mm 1.294in
8 Pair	4.10mm 0.161in	11.70mm 0.46in	32.87mm 1.294in