

**NOTE**



All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters. Unless otherwise specified, dimensions have a tolerance of  $\pm 0.13$  and angles have a tolerance of  $\pm 2^\circ$ . Figures and illustrations are for identification only and are not drawn to scale.

**1. INTRODUCTION**

This specification covers the requirements for application of STRADA Mesa high-speed Mezzanine press-fit pc board connectors used to provide high bandwidth with low cross-talk for high-speed differential, single-ended, power, and coaxial electrical connection between two parallel pc boards.

When corresponding with personnel, use the terminology provided in this specification to facilitate your inquiries for information. Basic terms and features of this product are provided in Figure 1.

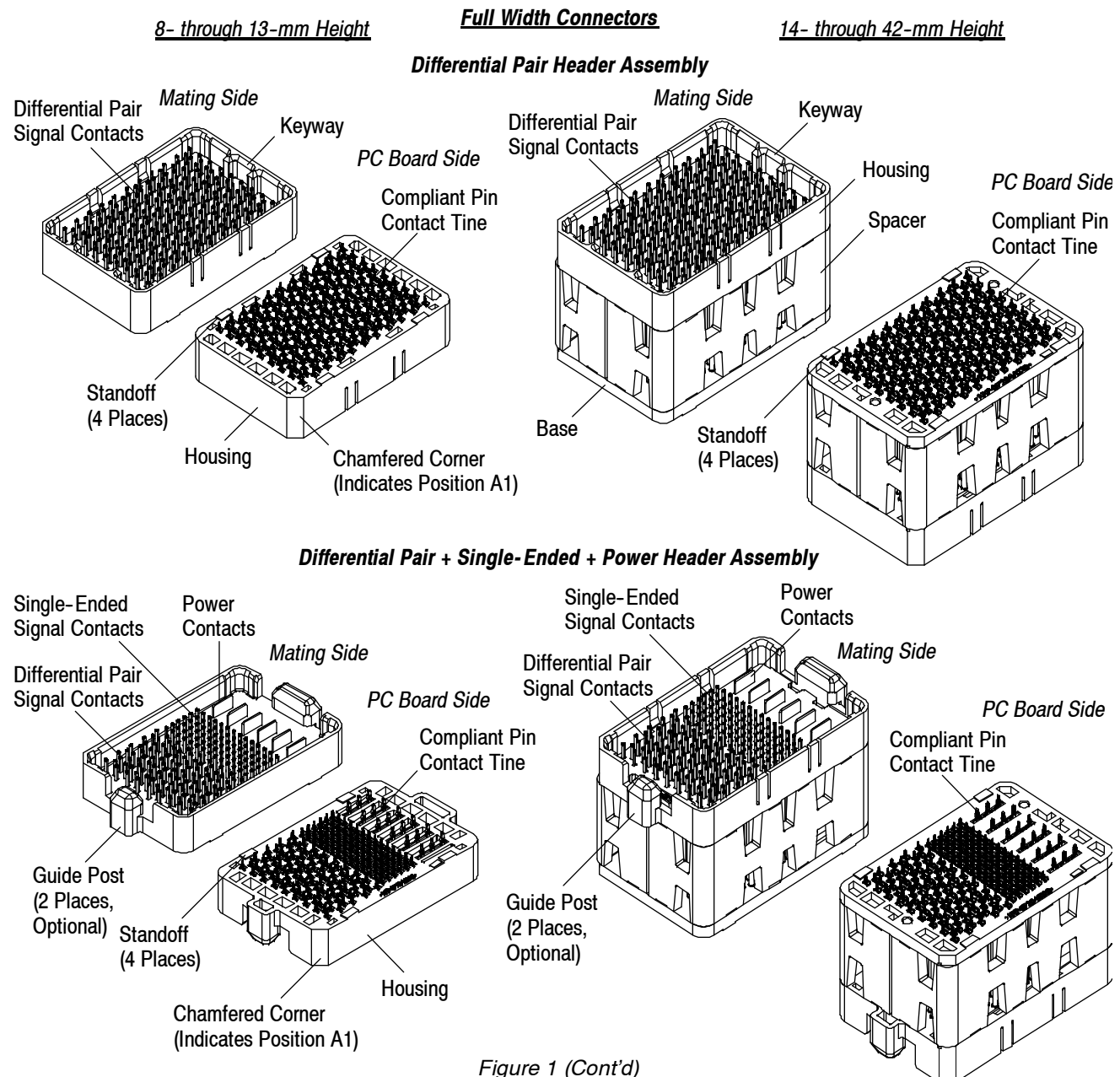
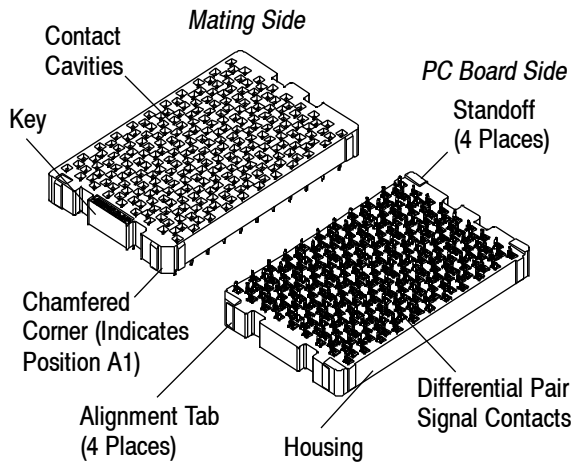


Figure 1 (Cont'd)

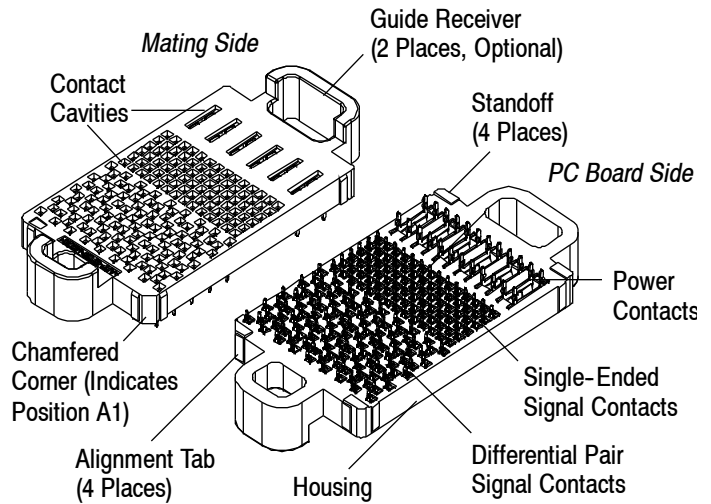
**Full Width Connectors**

*Receptacle Assembly Available in One Height*

**Differential Pair Receptacle Assembly**



**Differential Pair + Single-Ended + Power Receptacle Assembly**

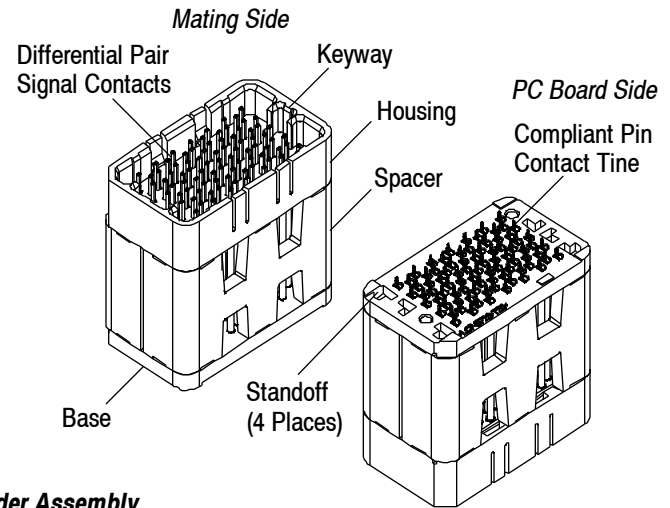
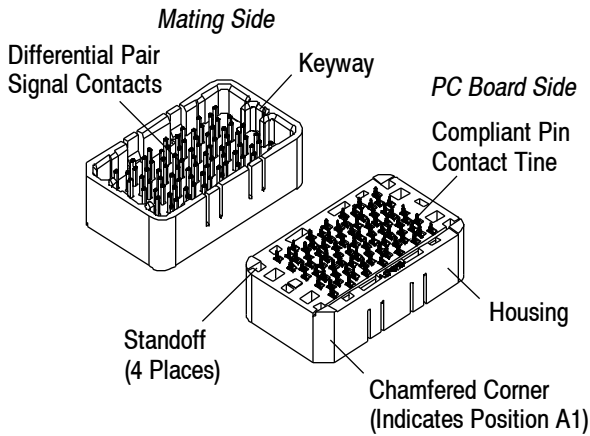


**Half Width Connectors**

9-mm Height Shown

28-mm Height Shown

**Differential Pair Header Assembly**



**Power Header Assembly**

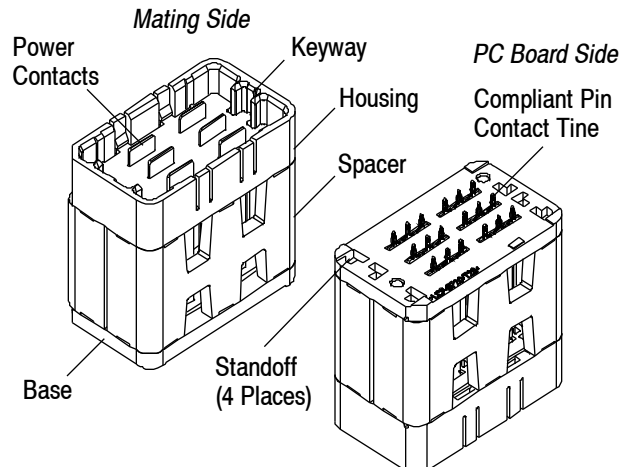
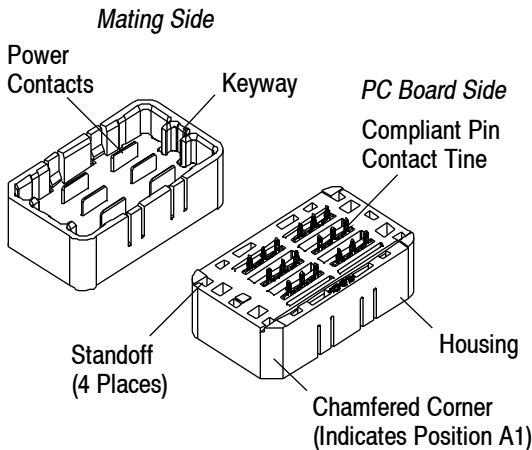
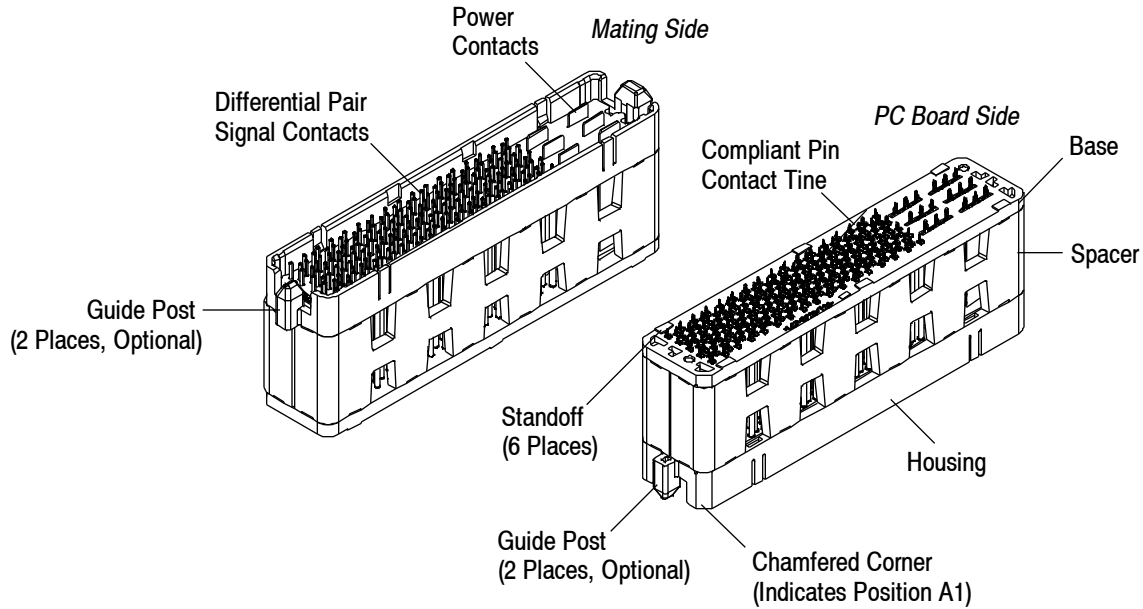


Figure 1 (Cont'd)

**Half Width Connectors**

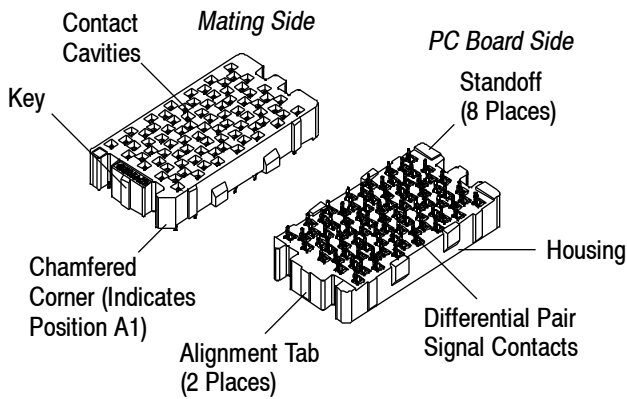
**28-mm Height Shown**

**Differential Pair + Power Header Assembly**

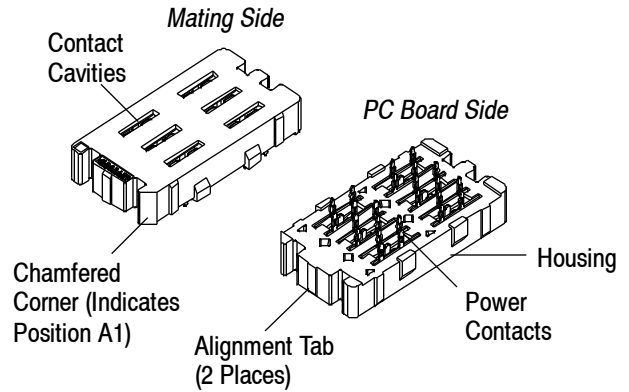


**Receptacle Assembly Available in One Height**

**Differential Pair Receptacle Assembly**



**Power Receptacle Assembly**



**Differential Pair + Power Receptacle Assembly**

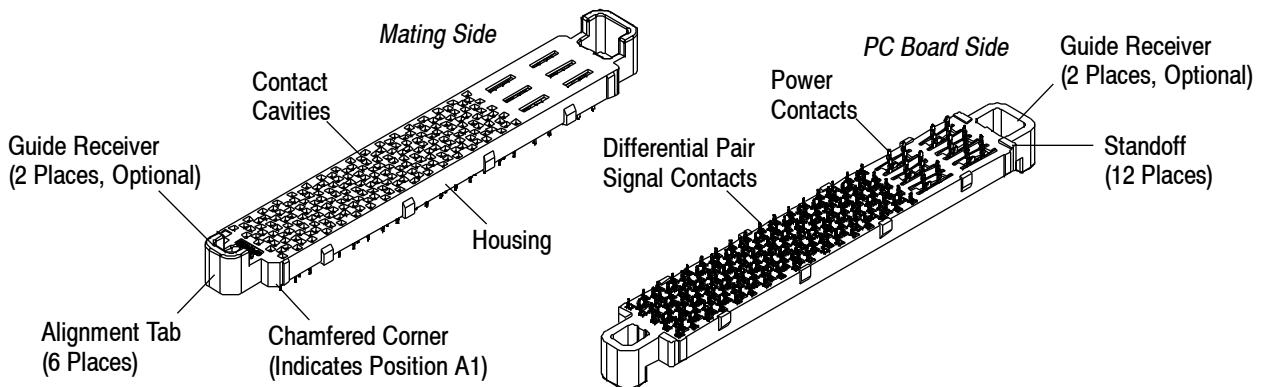



Figure 1 (End)

The connectors consist of a header assembly (available with keyways or keyed guide posts) and receptacle assembly (available with keys or keyed guide receivers). These connectors are available in standard width, defined as 8 differential pairs per column; and half width, defined as 4 differential pairs per column.

The connectors are available in three housing sizes: for standard width, they are 1 (40 differential pairs), 2 (80 differential pairs), and 3 (120 differential pairs) and for half width, they are 1 (24 differential pairs), 2 (48 differential pairs), and 3 (88 differential pairs). The header assemblies are available in heights from 8 to 42 mm. The receptacle assembly is available in one height. Various combinations of differential pair signal contacts, single-ended signal contacts, power contacts, and in addition, for half width connectors, 50-ohm coaxial contacts, can be configured. The half width connectors are also available having all power contacts in Size 1 (6 power contacts) and Size 2 (12 power contacts). Each coaxial contact is a signal contact surrounded by 8 ground contacts; the differential pair signal contacts have dedicated ground contacts, and the single-ended signal contacts have customer-assigned ground contacts. The ground contacts provide impedance matching and low cross-talk; thereby, freeing the signal contacts so they can be configured to the application requirements while limiting any impact on performance.

**NOTE** *Not all connectors are tooled. Call PRODUCT INFORMATION at the number at the bottom of page 1 for availability.*



Each header assembly has a housing which contains compliant pin press-fit contacts; in addition, header assemblies with a larger height (14 to 42) have a spacer and base—the housing is on the mating side of the connector, the base is on the pc board side of the connector, and the spacer is between the housing and the base. The housing or base (for larger height connectors) features standoffs to provide seating surfaces on the pc board.

For these connectors, it is strongly recommended that commercially-available pc board standoffs be mounted to the pc board. The pc board standoffs will provide load support and intermate retention for the connectors. Paragraph 3.8 provides important information using pc board standoffs with these connectors.

Position A1 is identified by a chamfered corner. To assure proper mating orientation, the connectors are keyed. For initial alignment during mating, the chamfered lead-in around the perimeter of the header captures and guides the housing of the receptacle assembly. The receptacle assembly also features alignment tabs to provide ease of alignment during mating. Connectors are available with or without guide posts and guide receivers molded onto the ends of the housing. Connectors without the optional guides can accommodate up to +/-0.6 initial offset in the X and Y directions for blind mating, and connectors with optional guides can accommodate up to +/- 1.3 initial offset in the X and Y directions for improved blind mating.

The connectors are supplied in anti-static plastic packaging trays. These connectors can be seated on the pc board using an automatic machine or manual application tooling.

Connectors are available having some or all power, single-ended, or RF signal patterns instead of the differential-pair contact pattern. Specifications and pin count for connectors having a differential-pair contact pattern are given in Figure 2.

CONNECTOR SPECIFICATION AND PIN COUNT	HOUSING SIZE											
	STANDARD WIDTH						HALF WIDTH					
	1		2		3		1		2		3	
	Hdr	Rcpt	Hdr	Rcpt	Hdr	Rcpt	Hdr	Rcpt	Hdr	Rcpt	Hdr	Rcpt
Housing Length: Without Guide Posts or Receivers	24.75	21.50	40.25	37.00	55.75	52.50	27.85	24.60	46.45	43.20	77.45	74.20
With Guide Posts or Receivers	30.15	34.95	45.65	50.45	61.15	65.95	33.25	37.05	51.85	55.65	82.85	86.65
Contact Array Length	15.50		31.00		46.50		18.60		37.20		68.20	
Total Pin Count of: Signal Contacts	134		259		384		83		161		291	
Ground Contacts	54		99		144		35		65		115	
Differential Pairs	40		80		120		24		48		88	

**Note:** Hdr is Header Assembly, Rcpt is Receptacle Assembly

Figure 2

These connectors are designed with close edge coupling to the dedicated ground contacts on each side of the differential pair signal contacts matching the impedance between contact pairs. Typical electrical performance is given in Figure 3.

TEST	HIGH SPEED SIGNAL CONTACTS (DIFFERENTIAL) Typical at 50 ps (20-80%)
Impedance	85-110 Ohms
Bandwidth (3 dB)	17 GHz
Multi-Active Near End Cross Talk (NEXT)	0.5% (Adjacent 8 Pairs)

Figure 3

## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

Revisions to this application specification include:

- Removed “drilled hole diameter” from Paragraph 3,3.C.
- Removed “drilled” from hole diameter, changed copper plating thickness, added tolerance to finished hole diameter, and added note to table in Figure 5
- Changed pc board layout in Figure 6

### 2.2. Customer Assistance

Reference Product Base Part Number 2057360 and Product Code L304 (headers) and 2057361 and L303 (receptacles) are representative of STRADA Mesa Mezzanine pc board connectors. Use of these numbers will identify the product line and expedite your inquiries through a service network established to help you obtain product and tooling information. Such information can be obtained through a local Representative, by visiting <http://www.te.com/products/STRADAMESA> or, after purchase, by calling PRODUCT INFORMATION at the number at the bottom of page 1.

### 2.3. Drawings

Customer Drawings for product part numbers are available from the service network. If there is a conflict between the information contained in the Customer Drawings and this specification or with any other technical documentation supplied, the Customer Drawing takes precedence.

### 2.4. Specifications

Design Objective (status at time of publication) 108-2375 provides expected product performance and test information.

### 2.5. Instructional Material

Instruction Sheets (408-series) provide product assembly instructions or tool setup and operation procedures. There are no documents available that pertain to this product.

### 2.6. Report

Report 29GC003, “STRADA Mesa Connector Routing Guide,” provides pc board wiring patterns and routing information. To obtain this report, visit the Electronic Components Documents website at: <http://www.te.com/documentation/spiceelectricalmodels/documents.asp>

## 3. REQUIREMENTS

### 3.1. Safety

Do not stack product shipping containers so high that the containers buckle or deform.

### 3.2. Storage

#### A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the connector material.

**B. Shelf Life**

These connectors should be stored in a cool, dry location. The connectors should remain in the protective anti-static packaging trays until ready for use to prevent damage to the housings and contacts. The connectors should be used on a first in, first out basis to avoid storage contamination that could adversely affect performance.


**C. Chemical Exposure**

Do not store connectors near any chemical listed below as they may cause stress corrosion cracking in the contacts.

Alkalies	Ammonia	Citrates	Phosphates	Citrates	Sulfur Compounds
Amines	Carbonates	Nitrites	Sulfur Nitrites		Tartrates

**3.3. PC Board**


**NOTE** *The design of the pc board affects connector reliability and performance.*



**A. Material and Thickness**

The pc board material shall be glass epoxy (FR-4 or G-10). The minimum pc board thickness for connectors containing only signal contacts is 1.25, and the minimum pc board thickness for connectors containing power contacts is 1.50.

**NOTE** *The thickness of the pc board determines whether or not the contacts will protrude from pc board after the connector is seated and; therefore, will determine whether or not a pc board support fixture is required for seating the connector; and if required, whether or not the pc board fixture requires holes for seating the connector. Requirements for use of a pc board support fixture are given in Paragraph 3.6; design requirements and recommendations of a pc board support fixture are given in Paragraph 5.1.*



**B. Length**

The minimum required length of the pc board according to the housing size is given in Figure 4.


STANDARD WIDTH CONNECTOR SIZE	MINIMUM PC BOARD LENGTH	HALF WIDTH CONNECTOR SIZE	MINIMUM PC BOARD LENGTH
1 (40-Pair)	30.75	1 (24-Pair)	33.65
2 (80-Pair)	46.25	2 (44-Pair)	51.45
3 (120-Pair)	61.75	3 (88-Pair)	83.45

Figure 4

**C. Contact Holes**

The contact holes must be plated through to specific diameters. To provide unrestricted insertion of the contacts, the plating type and thickness and hole size after plating must be as stated in Figure 5.

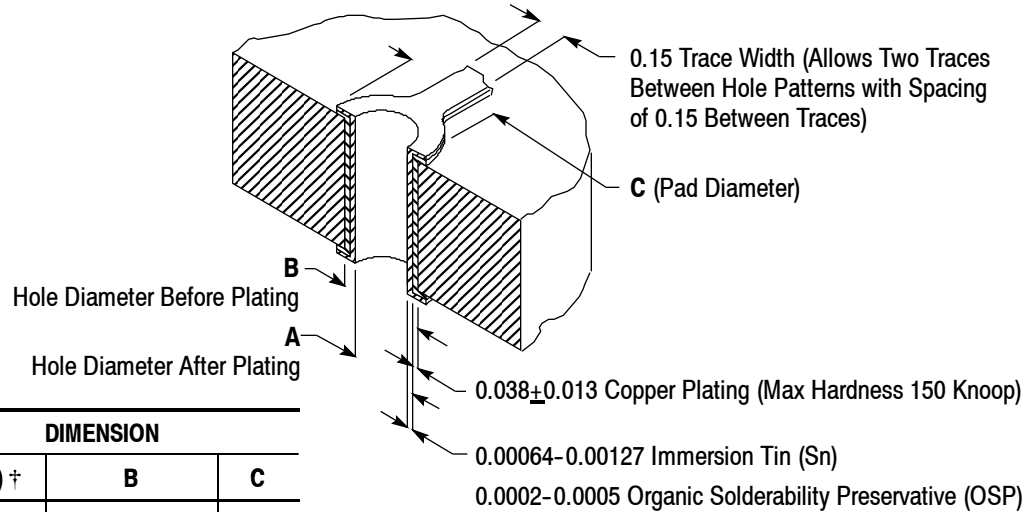
**NOTE** *Contact PRODUCT INFORMATION at the number at the bottom of page 1 for suitability of other plating types and thicknesses.*



**D. PC Board Standoff Holes**

The hole for each pc board standoff must be drilled using a diameter of 0.40 larger than the nominal screw diameter (these holes are not shown on the pc board layout).

### PC Board Contact Hole Dimensions



CONTACT TYPE	DIMENSION		
	A (Ref) †	B	C
Signal	0.344±0.039	0.420±0.013 ■	0.67
Power	0.624±0.051	0.700±0.025	0.96

† The hole diameter and tolerance after plating were determined using the hole diameter before plating and copper thickness. Tolerances specified apply to the top 1.25 (signal) or 1.50 (power) of the pc board from the connector side; beyond that, standard tolerances apply.

■ For this contact, the hole diameter before plating, along with the drill bit size specified in Section 5, MUST be used.

Figure 5

### E. Layout

All holes in the pc board must be precisely located to ensure proper placement and optimum performance. The pc board layout must be designed using the dimensions provided on the customer drawing for the connector. The hole dimensions and tolerances must be held from the top surface of the pc board to a minimum depth of 1.25. Centerlines shown on the pc board layout must be used to provide pc board alignment between mated connectors in system designs. Reference *sample* of a recommended pc board layout is shown in Figure 6.

### 3.4. Wiring Pattern

See Paragraph 2.6 for reference documents.

### 3.5. Connector Spacing

For applications with multiple connectors on a pc board, connector-to-connector pc board hole array spacing must be manufactured within 0.20 diameter true position. It is recommended that a minimum spacing of 6.0 between connectors be maintained in all directions.

A keep-out area around the connector perimeter of 3.0 is generally recommended for clearance of equipment used for possible rework; however, the equipment manufacturer's recommended clearance specifications must be used.

### 3.6. Connector Seating



Headers and receptacles must NOT be mated until they are installed onto the pc board; otherwise, damage to the connectors could result.

### A. Consideration of Other Components on PC Board

It is imperative that components requiring soldering be installed and soldered onto the pc board *before* the STRADA Mesa pc board connectors are installed. These STRADA Mesa pc board connectors should not be exposed to a soldering process.





### B. PC Board Support Fixture

A pc board support fixture is used to provide proper support for the pc board and to protect the pc board and connector from damage when seating a connector. The thickness of the pc board determines whether or not a pc board support fixture is required; and if required, whether or not the pc board fixture requires holes for seating the connector. Refer to Figure 7.

**NOTE**

Refer to Paragraph 5.1 for design requirements and recommendations of the pc board support fixture.



CONNECTOR HAVING	PC BOARD THICKNESS		
	Minimum	Using PC Board Support Fixture With Holes If Required	Using PC Board Support Fixture If Not Required
Only Signal Contacts	1.25	1.25-1.61	More than 1.61
Power Contacts	1.50	1.50-2.25	More than 2.25

Figure 7

### C. Force

Seating force is dependent on pc board thickness, hole size, and plating finish. The approximate seating force per contact required to seat the connector onto the pc board is given in Figure 8.

**CAUTION**

Over-seating of a connector can cause damage to the connector and/or pc board.



CONNECTOR	APPROXIMATE FORCE (N [lb])	
	Per Signal Contact	Per Power Contact
Header	9.34 [2.1]	71.2 [16]
Receptacle	8.00 [1.8]	57.8 [13]

Figure 8

### D. Using Manual Application Tooling

A seating tool (for a header assembly) or seating block (for a receptacle assembly) must be used to seat the connectors using manual application tooling. Available seating tools, requirements for seating tool design, and requirements for seating block design are given in Section 5.

Requirements for the connector seating procedure are as follows:

1. The shut height of the application tooling must be set to the dimension described in Figure 9. After the connector is seated, a gap of no more than 0.08 between the connector standoffs and the pc board is allowed.

**NOTE**

The seating height must be used as a reference starting point. This height may need to be adjusted to obtain the amount allowed (maximum of 0.08) between the connector standoffs and the pc board.



2. For applications using a pc board support fixture, the pc board must be secured to the support fixture to prevent movement of the pc board during seating, and the support fixture should be secured to a flat and stable surface. For applications *not* using a pc board support fixture, the pc board should be placed on a flat and stable surface. Refer to Figure 10.
3. The connector must be placed on the pc board so that the contacts are aligned and started into the matching holes in the pc board.
4. The seating tool must be oriented over the header assembly:
  - *without* guide posts so that the polarization holes of the seating tool align with the edges of the keyways as shown in Figure 10, Detail A.

### Set Up of Manual Application Tooling for Seating Connector

Note: Not to Scale

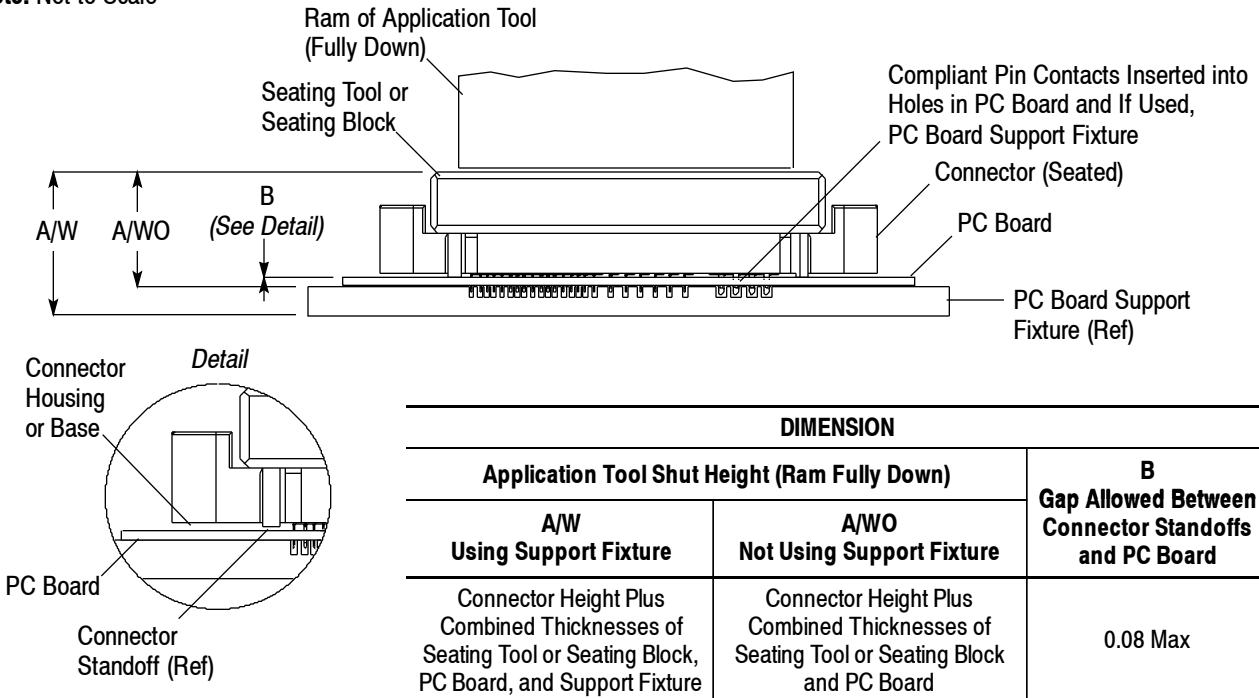


Figure 9

— *with* guide posts so that the polarization pins of the seating tool align with the slots on each side of the guide posts as shown in Figure 10, Detail B.

The seating block must be oriented over the receptacle assembly:

— *without* guide receivers so that the seating block covers the entire area of contacts as shown in Figure 10, Detail C.

— *with* guide receivers so that the seating block covers the entire area of contacts and fits between the guide receivers as shown in Figure 10, Detail D.

5. The seating tool or seating block must be carefully lowered onto the connector.

6. The seating tool or seating block (with the connector) must be centered under the ram of the application tooling. Then the ram must be slowly lowered until it just meets the seating tool or seating block. Alignment of the support fixture (if used), pc board, connector, and seating tool or seating block must be verified.



**CAUTION** Damage to the pc board or connector may occur if the seating tool or seating block is not properly aligned before cycling the application tool.

7. The application tooling must be cycled to seat the connector onto the pc board.

#### E. Using Automatic Machine (Packaging Tray)

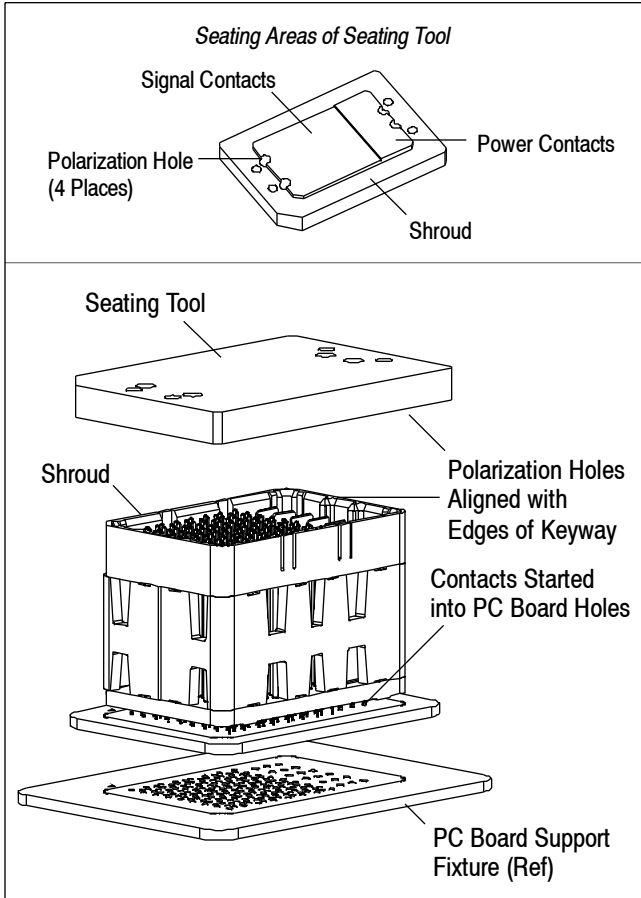
The connector packaging trays are designed for automatic machine seating. The trays can be used individually or stacked. Prior to stacking the trays, shipping covers (not shown) must be removed. The trays have visual indicators and orientation keys to assure tray and connector orientation. Specifications of the packaging tray were not available at the time of publication of this document.

For applications using a pc board support fixture, the pc board must be secured to the support fixture to prevent movement of the pc board during seating, and the support fixture should be secured to a flat and stable surface.

**Seating Connector Using Manual Application Tooling**

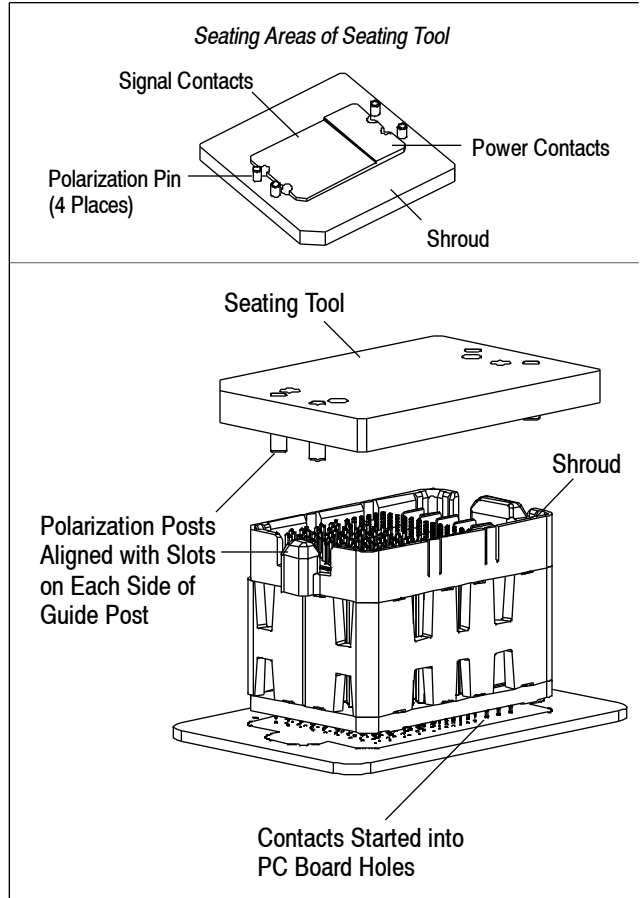
**Detail A**

**Header Assembly Without Guide Posts**



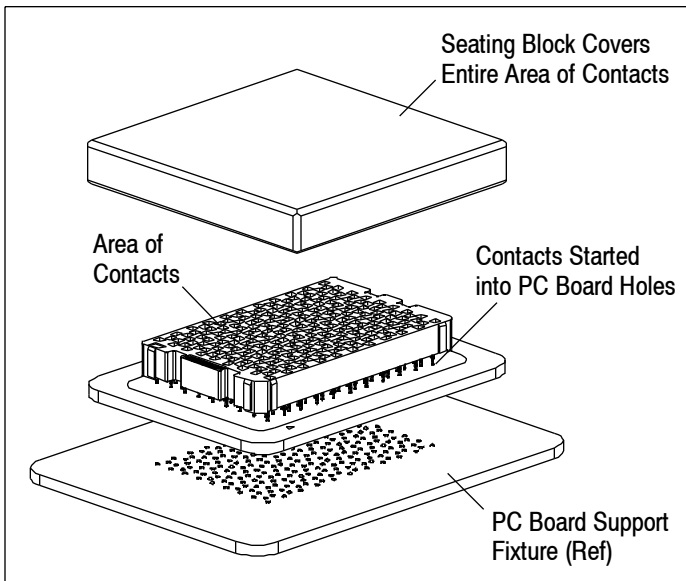
**Detail B**

**Header Assembly With Guide Posts**



**Detail C**

**Receptacle Assembly Without Guide Receivers**



**Detail D**

**Receptacle Assembly With Guide Receivers**

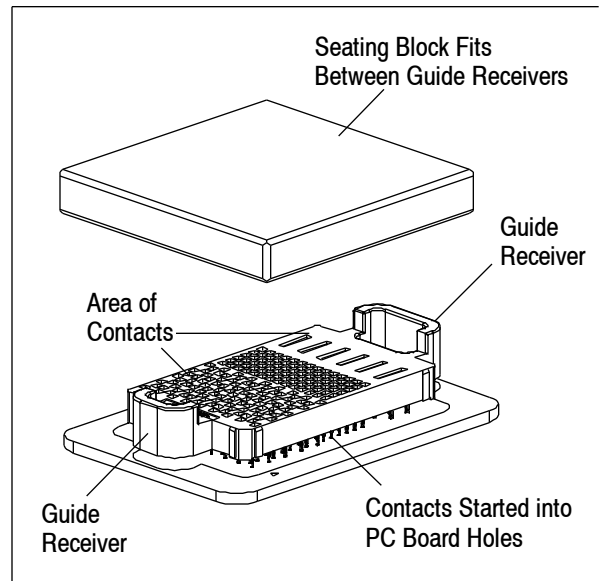


Figure 10



### 3.9. Mating



Headers and receptacles must NOT be mated until they are installed onto the pc board; otherwise, damage to the connectors could result.

#### A. Method

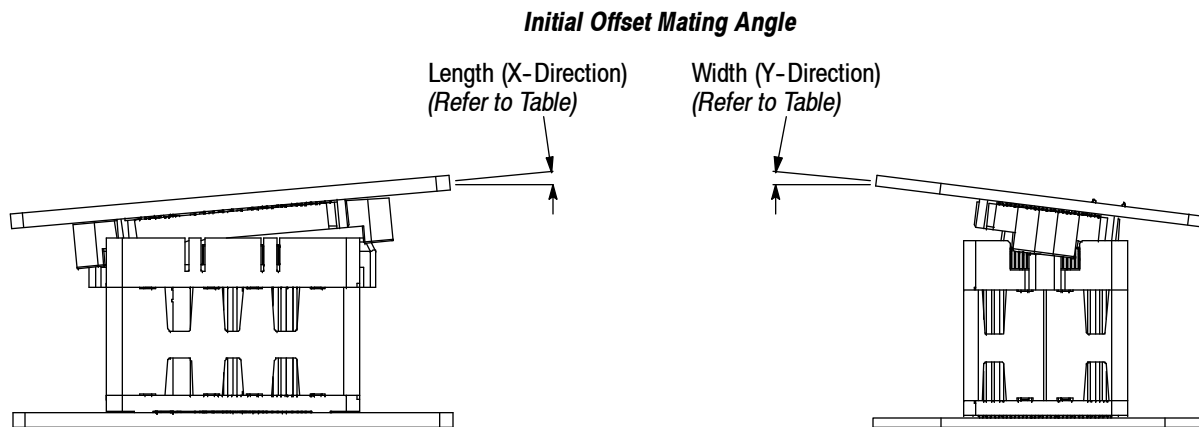
A connector can start mating from either end of the connector. The connectors must be aligned and, when the keys start to enter the keyways, one end of the connector pushed into the mating connector. The other end of the connector must be pushed into the mating connector until the the connectors are fully mated.

Because of the asymmetric keying, reverse mating is impossible (the key end of the receptacle cannot be inserted into the non-keyway end of the header). Both connectors have a lead-in around the perimeter that will allow blind mating.

A parallel mating angle is preferred; however, the connectors can accommodate an initial offset mating angle to the maximum degrees given in Figure 13.



The initial offset mating angle is defined as the point where the header assembly contacts begin to enter the receptacle assembly contact cavities. As the mating cycle continues toward the fully mated condition, the angle must progressively flatten out until it is 0 degree. In systems having an external fixed hinge point or other external guide features between pc boards, the maximum value must be no more than the fixed hinge point given in Figure 13 in order to prevent damage to the connectors.



PLANE	MAXIMUM INITIAL OFFSET MATING ANGLE		
	SIGNAL CONTACTS	POWER CONTACTS	FIXED HINGE POINT
Length (X-Direction)	7 Degrees	5 Degrees	2 Degrees
Width (Y-Direction)	8 Degrees	7 Degrees	

Figure 13

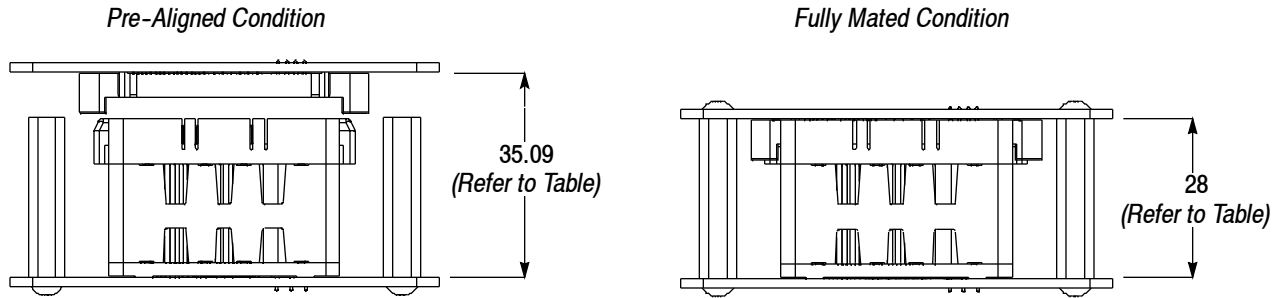
#### B. Fully Mated Connector Board-to-Board Height

The fully mated connector board-to-board height is given in Figure 14.

#### C. Mating Sequence

The mating sequence as related to the distance between the surfaces of pc boards for connectors having a board-to-board nominal height of 28 is given in Figure 14.

**Mating Sequence Board-to-Board Height**



**MATING SEQUENCE**

CONDITION	DESCRIPTION	BOARD-TO-BOARD HEIGHT
Guide Posts (If Present) Pre-Aligned	Guide Posts (If Present) Begin to Engage	+7.09
Guide Posts (If Present) Aligned	Guide Posts (If Present) Fully Engage	+4.74
Housings Pre-Aligned	Housings Begin to Engage	+4.29
Housings Fully Aligned	Housings Fully Engage	+3.36
Contacts Pre-Aligned	Signal Contacts Begin to Enter Receptacle Lead-In	+3.16
Power Contacts (If Present) Pre-Aligned	Power Contacts Begin to Enter Receptacle Lead-In	+2.77
Signal Contacts Engaged	Signal Contacts Begin to Engage Receptacle Contacts	+1.95
Power Contacts (If Present) Engaged	Power Contacts Begin to Engage Receptacle Contacts	+1.86
Fully Mated	Receptacle Housing Bottoms on Header Housing	Nominal

Figure 14

**3.10. Unmating Connectors**

The screws of the pc board standoffs (not the pc board standoffs) on one of the pc boards must be removed before the connectors can be unmated.

These connectors can be unmated by using the pc boards to pull them straight apart or by “rocking” the pc boards slightly from side-to-side or end-to-end while pulling them apart. The pulling force must be applied to the pc boards, NOT any part of the connectors. Refer to Figure 15.



*The connectors must not be torqued or twisted relative to each other during unmating; otherwise, damage to the connectors could result.*

**Unmating Connectors**

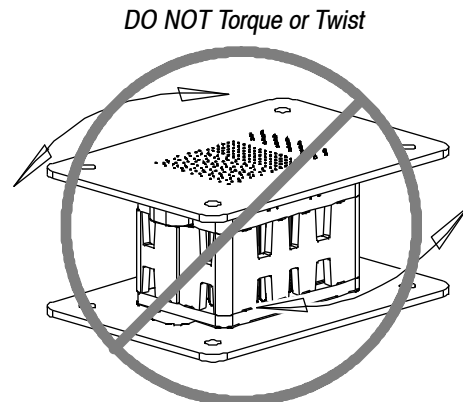
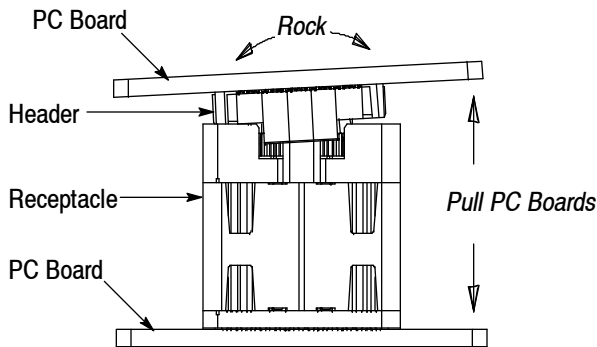


Figure 15

### 3.11. Rework, Replacement, and Repair

These connectors do not allow single-contact repair. If damage is detected to a contact or contacts, the connector must be removed from the pc board and replaced with a new connector. The connector can be removed by carefully pulling it off of the pc board with pliers or similar tool. Care must be taken to support the pc board during the extraction and not to damage the traces of the pc board. After the connector is removed, any contacts remaining on the pc board must be carefully pulled straight out of the pc board holes; then a new connector can be carefully aligned and pressed onto the pc board.

A total of three pc board installations are allowed (initial plus two rework cycles). After three installations, the pc board holes will be worn excessively and the pc board is no longer usable.

## 4. QUALIFICATION

No qualifying support for STRADA Mesa Mezzanine pc board connectors was defined at the time of publication of this document.

## 5. TOOLING

Tooling part numbers and customer supplied tooling are shown in Figure 16.

### 5.1. PC Board Support Fixture (Customer Supplied)

A pc board support fixture must be used when seating connectors onto the pc board and removing connectors from the pc board. Requirements for using a pc board support fixture when seating connectors are given in Paragraph 3.6. The pc board support fixture must be designed using the following requirements and recommendations:

- it must have clearance holes drilled in a pattern identical to the pc board layout for the connector configuration being used (the clearance holes can be approximately 0.5 larger than the recommended diameters given on the pc board layout to provide clearance for the tips of the contacts and must be deep enough to receive the contacts)
- it should have a flat surface
- it should be at least 25.4 wider than the pc board

### 5.2. Drill Bit

Drill bits are available to drill a 0.42 diameter signal contact hole in the pc board from:

Drill Bit DSP0165L05A  
Carbide Related Technologies (CRT)  
355 Sackett Point Road Unit 5  
North Haven, CT 06473 USA  
Phone: 203-281-1266  
[www.carbiderelatedtech.com](http://www.carbiderelatedtech.com)

Drill Bit H0420-DUS40055  
Shanghai Topoint Precision Technology Company  
No. 58, Fengdeng Road, Malu Industrial Park,  
Jiading District, Shanghai, 201801 CHINA  
Phone: 86 21 59157365 Fax: 86 21 59157367  
kelly@topoint.tw or SALES@topoint.tw  
<http://www.topoint.tw/en/>

### 5.3. Seating Tool (for Header Assemblies)

A seating tool must be used to provide a surface that accepts the force applied by the application tooling to seat the header assembly onto the pc board. The seating tool must be customer supplied. Customer drawings for seating tool design are available. For consultation on obtaining seating tools, call PRODUCT INFORMATION at the number at the bottom of page 1.



*The specifications provided on the customer drawing must be adhered to in order to prevent damage to the header assembly during seating. The seating tool must be configured to accommodate the guide features (if present) and contact areas and match the signal and power contact combination of the specific header assembly being seated.*

Seating procedure for the header assembly is described in Paragraph 3.6.

### 5.4. Seating Blocks (for Receptacle Assemblies)

The seating block must be used to provide a surface that accepts the force applied by the application tooling to seat the receptacle assembly onto the pc board. The seating block is customer supplied. The seating block must be designed with a flat surface on the top and bottom that covers the entire contact area of the receptacle assembly. For receptacle assemblies with guide receivers, the seating block must be sized to fit between the guide receivers.

Seating procedure for the receptacle assembly is described in Paragraph 3.6.

### 5.5. Application Tooling

The application tooling used to seat the connectors must provide sufficient amount of downward force (refer to Paragraph 3.6.C) to drive the seating tool or seating block to insert the contacts into the pc board holes.

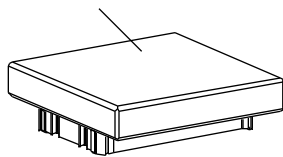
#### A. Manual Arbor Frame

Arbor frames are manually-operated and actuated by a handle. They are designed to be bench mounted and provide for low to medium volume production.

#### B. Automatic Machine

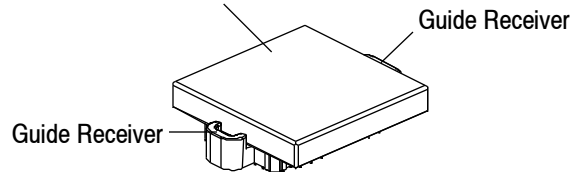
The available machines provide for high volume, heavy duty production requirements. Each is designed as a stand-alone power unit.

- Flat Surface on Top and Bottom
- Covers Entire Area of Contacts

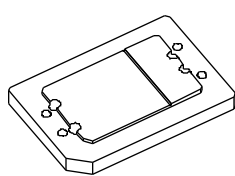


Design for Seating Block (Customer Supplied) for Receptacle Assembly Without Guide Receivers

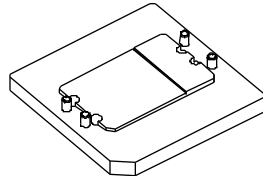
- Flat Surface on Top and Bottom
- Covers Entire Area of Contacts
- Sized to Fit Between Guide Receivers



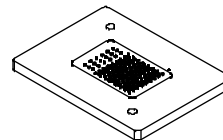
Design for Seating Block (Customer Supplied) for Receptacle Assembly With Guide Receivers



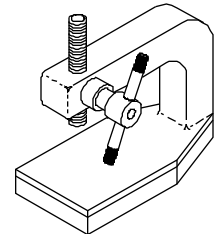
For Header Assemblies Without Guide Posts (Customer Supplied)



For Header Assemblies With Guide Posts (Customer Supplied)



PC Board Support Fixture (Customer Supplied)



Typical Manual Arbor Frame (Commercially Available)

Standard Width Header Assembly Seating Tool Customer Drawing 2057827

Half Width Header Assembly Seating Tool Customer Drawing 2143544

**Note:** Refer to Seating Tool Customer Drawing for Cross-Reference of Header Assembly-to-Seating Tool Design Specifications (No Instructional Material Available, Refer to Paragraph 3.6)



BMEP-5T Benchtop Manual Press 1585696-1 (No Instructional Material Available)



MEP-6T Manual Press 1585699-1 (No Instructional Material Available)



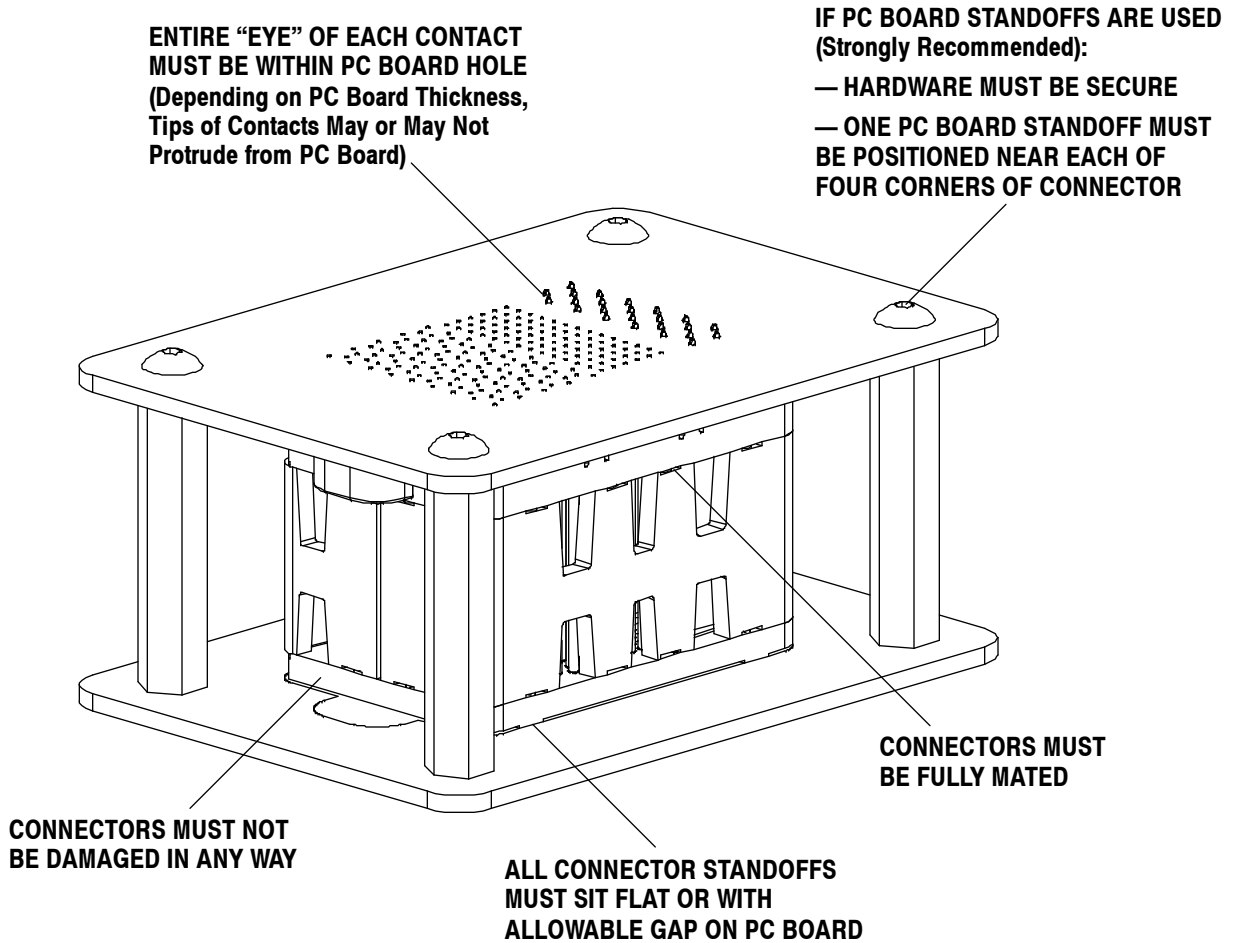
AP3 Main Assembly 1585280-1 (No Instructional Material Available)

Figure 16



**6. VISUAL AID**

The illustration below shows a typical application of STRADA Mesa Mezzanine pc board connectors. This illustration should be used by production personnel to ensure a correctly applied product. Applications which DO NOT appear correct should be inspected using the information in the preceding pages of this specification and in the instructional material shipped with the product or tooling.



**FIGURE 17. VISUAL AID**