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**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 CHAMP .050 Series I Blindmate plug and receptacle SCA-2 for printed circuit (pc) board application. These plug and receptacles are available in 20, 40, and 80 positions and contain through-hole contacts or compliant pin contacts on 1.27 centerline spacing. The plugs are available in vertical and straddle mount; and the receptacles are available in right-angle, vertical, press-fit vertical, extended height vertical, and extended height vertical. These connectors are fully compatible with CHAMP .050 Series I SCA-1 board-to-board connectors.

The plugs and receptacles contain boardlocks to provide additional stability when placed on the pc board. End cavities are marked with a number to provide circuit identification. The plug and receptacles may be placed on the pc board by hand or automatic application tooling.

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.

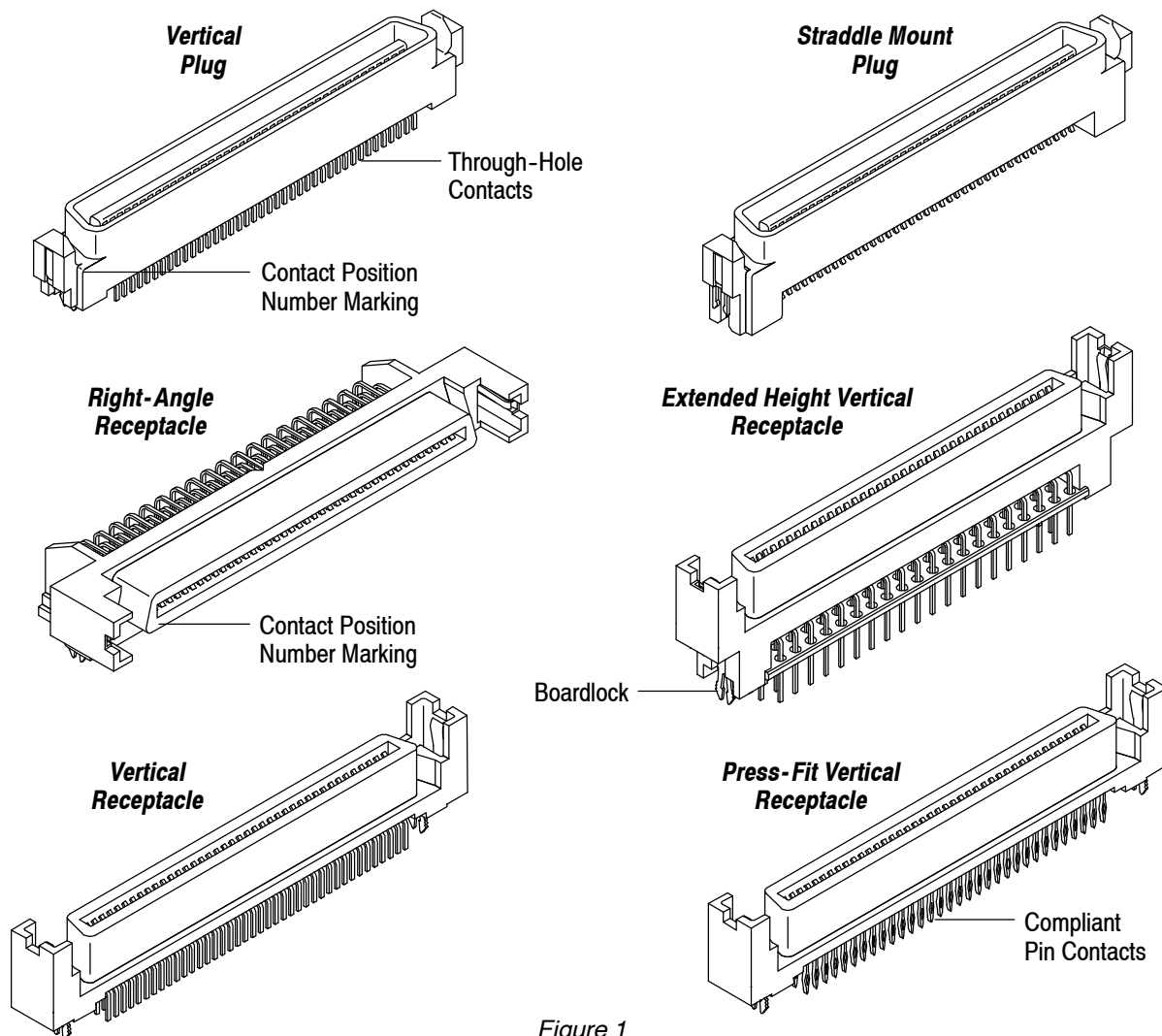


Figure 1

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## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

Revisions to this application specification include:

- Changed company logo

### 2.2. Customer Assistance

Reference Product Base Part Number 787311 and Product Code 7427 are representative of CHAMP .050 Series I Blindmate SCA-2. 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 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, call PRODUCT INFORMATION at the number at the bottom of page 1.

### 2.4. Manuals

Manual 402-40 can be used as a guide to soldering. This manual provides information on various flux types and characteristics with the commercial designation and flux removal procedures. A checklist is included in the manual as a guide for information on soldering problems.

### 2.5. Specifications

Product Specification 108-1548 provides product performance and test information.

### 2.6. Instructional Material

Instruction Sheets (408-series) provide product assembly instructions or tooling setup and operation procedures and Customer Manuals (409-series) provide machine setup and operating procedures. Documents available which pertain to this product are:

- 408-6927 Design Recommendations for PC Board Support Fixture
- 408-4328 Seating Tool Assemblies 1320142-[ ] and 356198-[ ]
- 408-9027 Adapter Kit for Greenerd Frame Assembly
- 409-5626 SM-3 Machine 814700-2

## 3. REQUIREMENTS

### 3.1. Storage

#### A. Ultraviolet Light

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

#### B. Shelf Life

The plugs and receptacles should remain in the shipping containers until ready for use to prevent deformation to the plugs and receptacles. The plugs and receptacles should be used on a first in, first out basis to avoid storage contamination that could adversely affect signal transmissions.

#### C. Chemical Exposure

Do not store the plugs and receptacles near any chemicals 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        |

Greenerd is a trademark.

### 3.2. Plug and Receptacle Size

These plugs and receptacles are available in the positions stated in Figure 2.

| TYPE           |                                    | NUMBER OF POSITIONS |
|----------------|------------------------------------|---------------------|
| PLUG           | RECEPTACLE                         |                     |
| Straddle Mount | —                                  | 20, 40, and 80      |
| Vertical       | Vertical                           | 20, 40, and 80      |
| —              | Extended Height Vertical           | 40 and 80           |
| —              | Right-Angle                        | 20 and 80           |
| —              | Press-Fit Vertical                 | 20, 40, and 80      |
| —              | Extended Height Press-Fit Vertical | 40 and 80           |

Figure 2

### 3.3. PC Board

#### A. Material and Thickness

The pc board material shall be glass epoxy (FR-4, G-10). The pc board thickness is given in Figure 3.

**NOTE**



Contact *PRODUCT INFORMATION* at the number at the bottom of page 1 for suitability of other board materials and thicknesses.

| PLUG AND RECEPTACLE  |   |                     | PC BOARD THICKNESS RANGE |
|--|---|---------------------|--------------------------|
| TYPE   |   | NUMBER OF POSITIONS |                          |
| PLUG   | RECEPTACLE  |                     |                          |
| Straddle Mount   | —   | 40 and 80           | 1.32 (Max)               |
|  |   | 20                  | 1.83 (Max)               |
| Vertical with Through-Hole Contacts                            | —   | 40 and 80           | 0.76-1.27                |
| —  | Vertical with Through-Hole Contacts                 | 20, 40, and 80      | 2.16-2.67                |
|  | Extended Height Vertical With Through-Hole Contacts | 40 and 80           | 2.16-4.06                |
|  | Right-Angle with Through-Hole Contacts              | 80                  | 1.52-2.03                |
|  |   | 20                  | 1.52-2.54                |
|  | Press-Fit Vertical with Compliant Pin Contacts      | 20, 40, and 80      | 2.16-3.81                |
| Extended Height Press-Fit Vertical With Compliant Pin Contacts | 40 and 80   | 2.16-3.81           |                          |

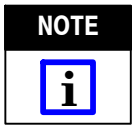
Figure 3

#### B. Tolerance

The maximum bow of the pc board shall be 0.03 over the length of the plug or receptacle.

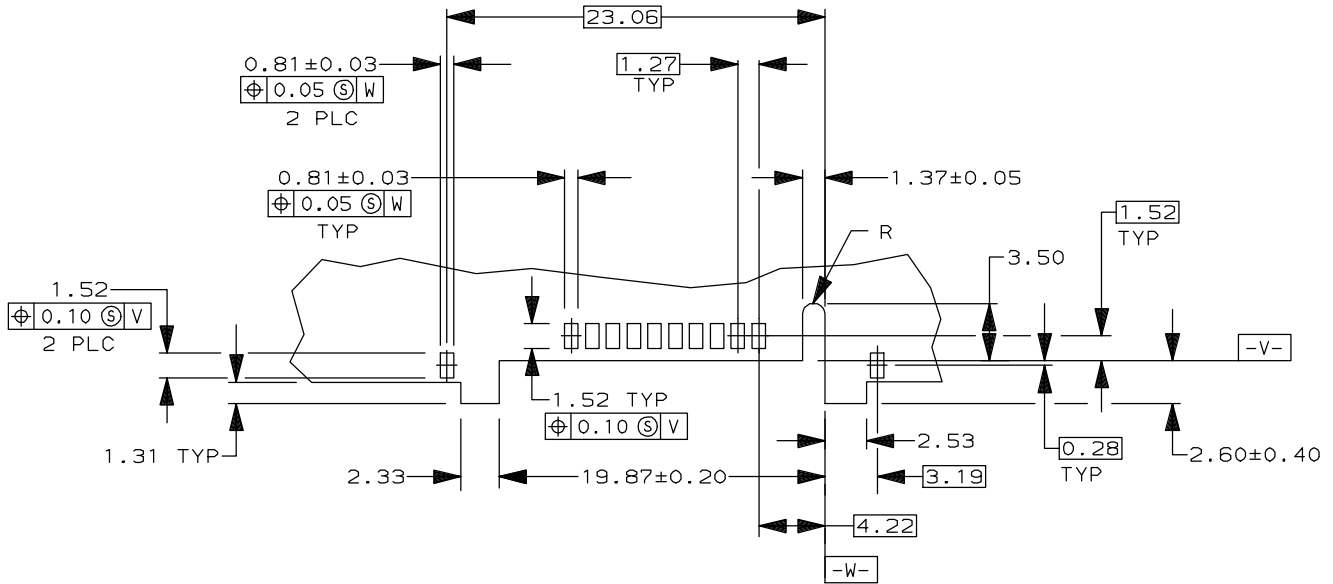
### C. Recommended Layout

The boardlock holes and contact holes in the pc board must be precisely located to ensure proper placement and optimum performance of the plug or receptacle. The pc board must be designed using the dimensions provided in Figure 4.

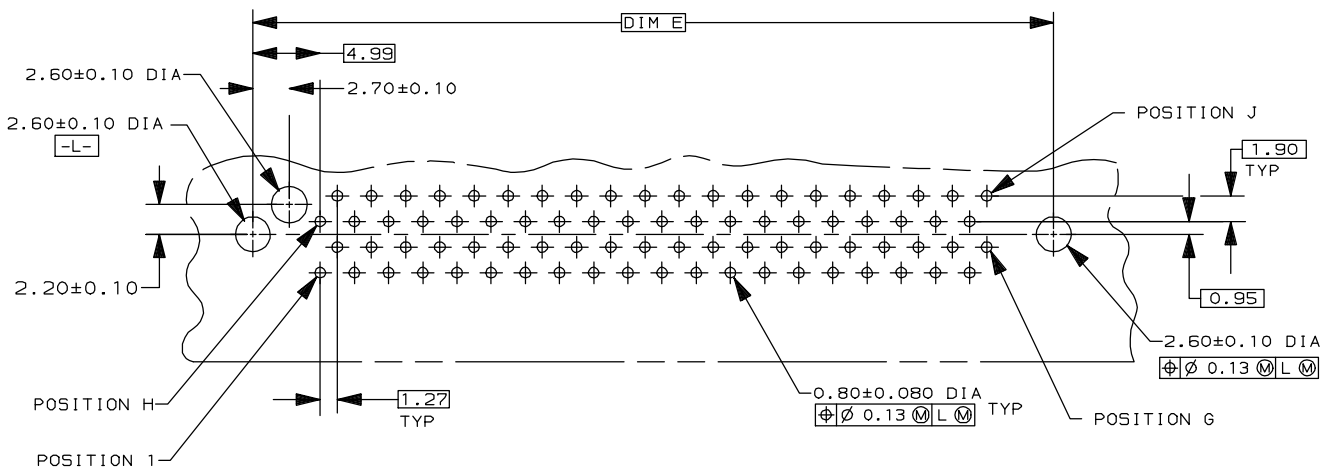


The "X" and "Y" symbols on the pc board layout represent customer established datums. They are the origin for the basic dimension (XXX and YYY datum), the point from which ALL hole positions must be located. The layout dimensions apply to either side of the pc board.

#### 20-Position Straddle Mount Plug



#### 40- and 80-Position Vertical Plug



| NUMBER OF POSITIONS | DIMENSION |    |    |    |
|---------------------|-----------|----|----|----|
|                     | E         | G  | H  | J  |
| 40                  | 34.11     | 20 | 21 | 40 |
| 80                  | 59.51     | 40 | 41 | 80 |

Figure 4 (Cont'd)

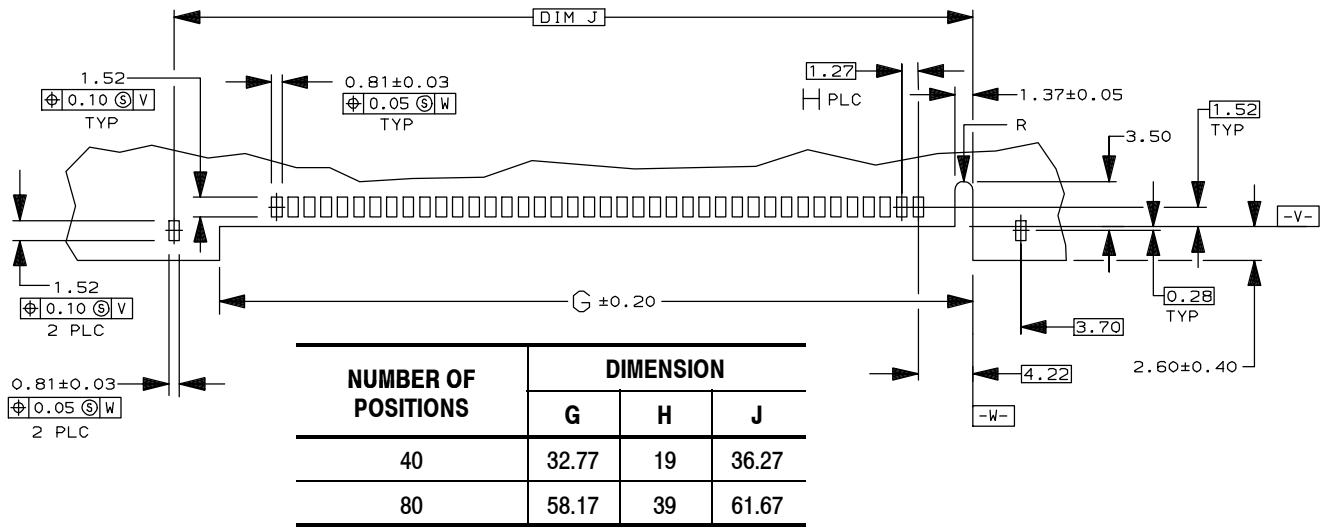
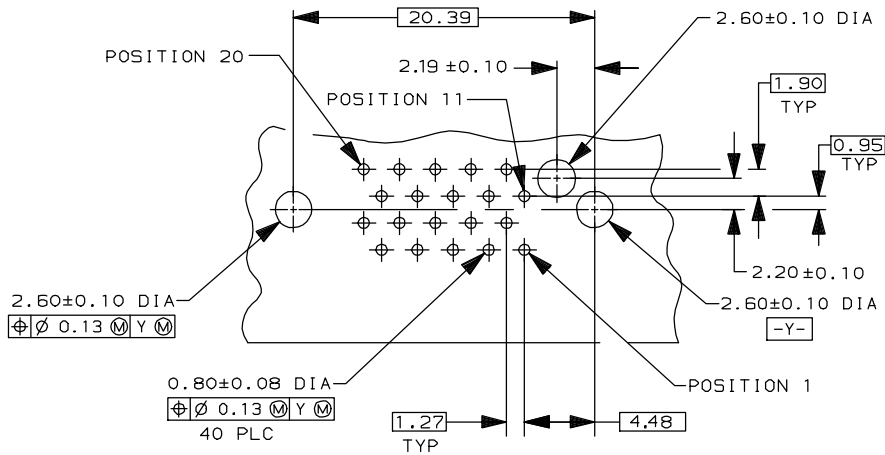
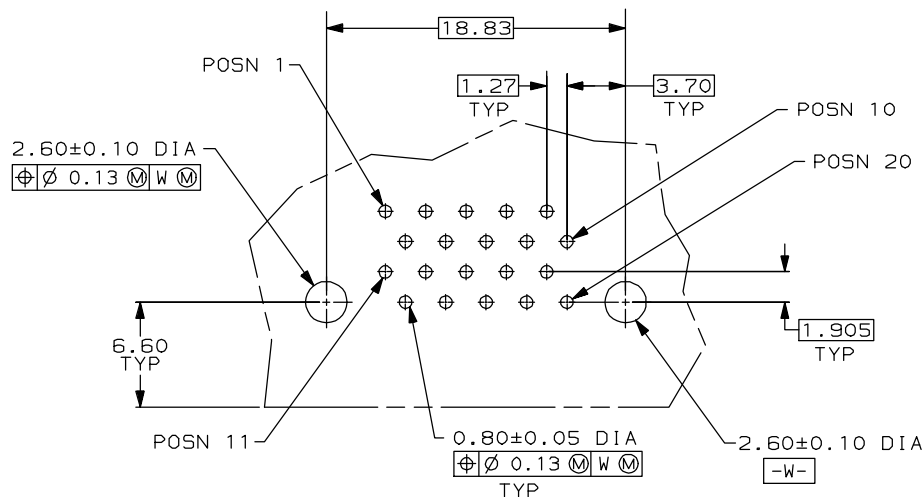
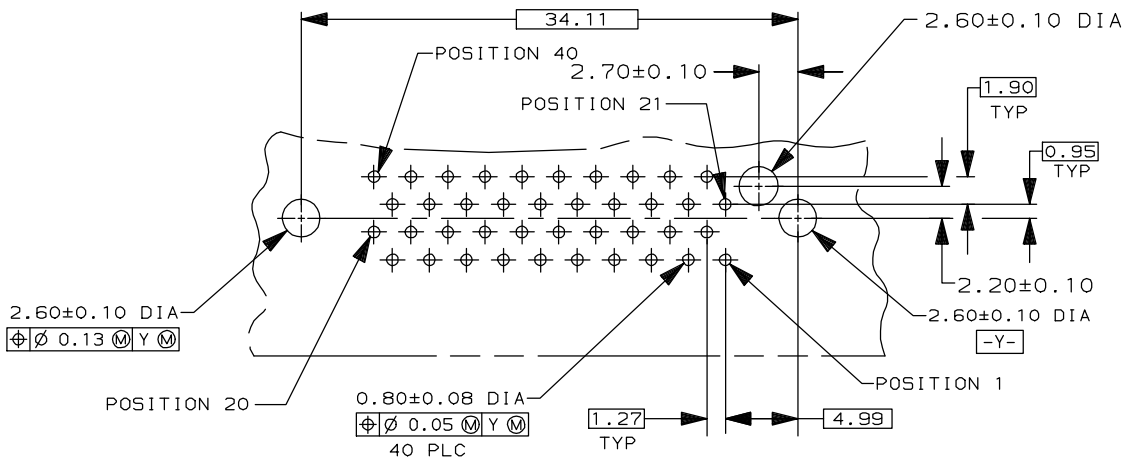
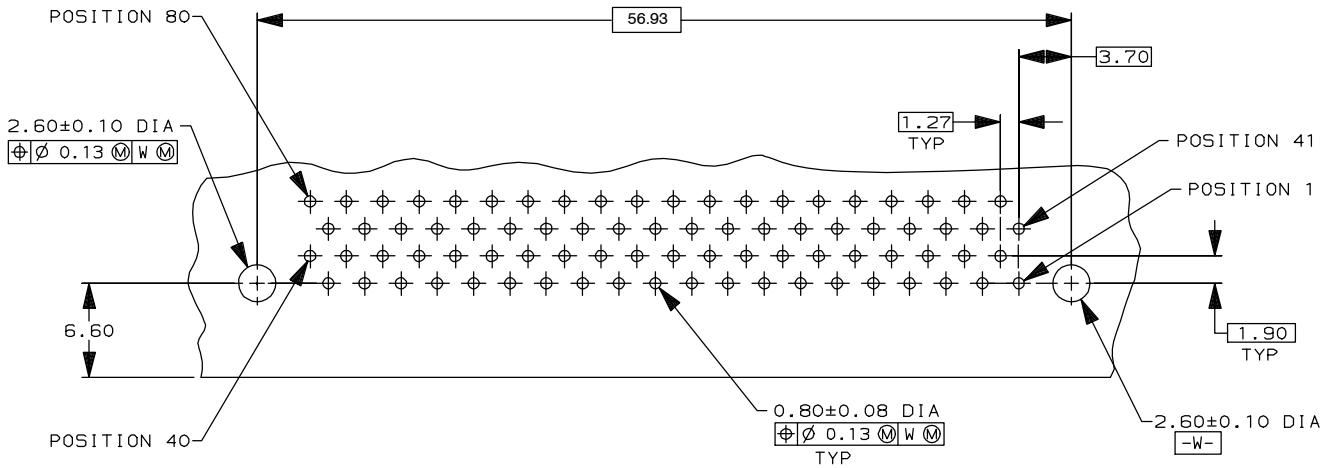
**40- and 80-Position Straddle Mount Plug**

**20-Position Vertical Receptacle and 20-Position Press-Fit Vertical Receptacle**

**20-Position Right-Angle Receptacle**


Figure 4 (Cont'd)

**40-Position Vertical Receptacle, 40-Position Extended Height Vertical Receptacle,  
40-Position Press-Fit Vertical Receptacle, and 40-Position Extended Height Press-Fit Vertical Receptacle**



**80-Position Right-Angle Receptacle**



**80-Position Vertical Receptacle, 80-Position Press-Fit Vertical Receptacle,  
80-Position Extended Height Press-Fit Vertical Receptacle, and 80-Position Extended Height Vertical Receptacle**

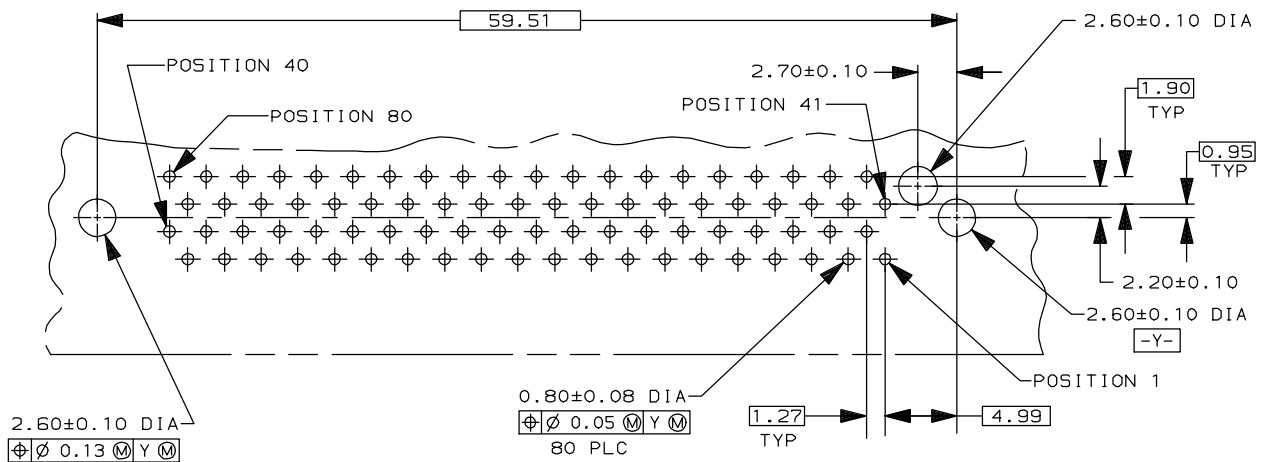


Figure 4 (End)

## D. Contact Holes

The holes in the pc board for compliant pin and through-hole contact tines must be drilled and plated through to specific dimensions given in Figure 5.

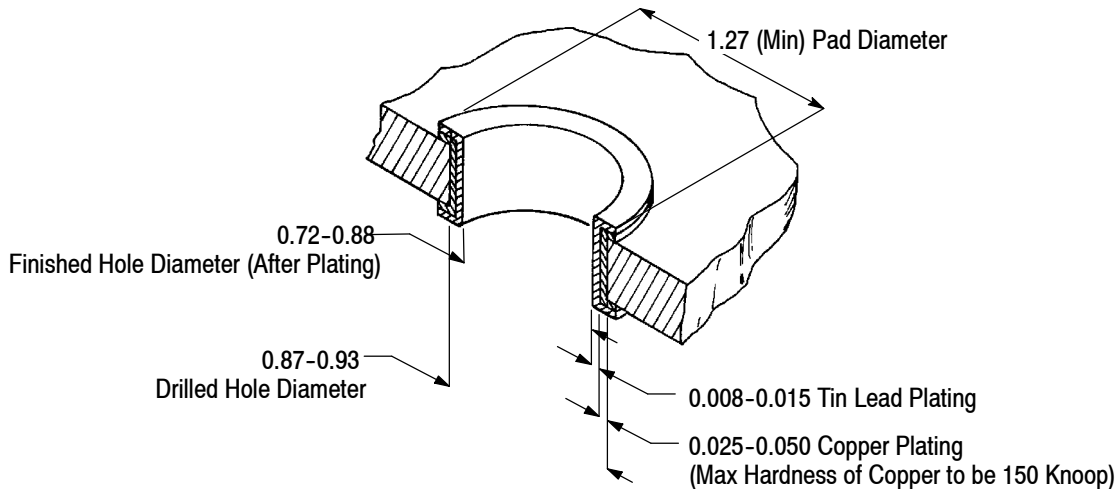


Figure 5

## 3.4. Spacing

Plug and receptacle clearance zones and spacing must be considered regarding the backward compatibility with CHAMP .050 Series I SCA-1 plugs when mated to CHAMP .050 Series I Blindmate SCA-2 receptacles and SCA-1 receptacles when mated to SCA-2 plugs. See Figure 6.

## 3.5. Plug and Receptacle Placement



*The plug and receptacle should be handled only by the housing to avoid deformation, contamination, or other damage to the contact tines.*

### A. Manual

The plug or receptacle number one contact tine must align with the number one contact tine hole in the pc board. All contact tines must start into the pc board; then, when the boardlocks start to engage the pc board, the plug or receptacle can be pressed until it seats on the pc board.

### B. Robotic

The robotic equipment must be adjusted to feed, pick up, and place the plugs and receptacles on the pc board with an accuracy of 0.25.

### C. Stability on PC Board

The plug and receptacle boardlocks have gripping shoulders that pass through the pc board at the same time the contact tines are inserted through the pc board. They lock into position when the housing is seated on the pc board. The initial forces are 62 N maximum for insertion and 13 N minimum for extraction. See Figure 7.



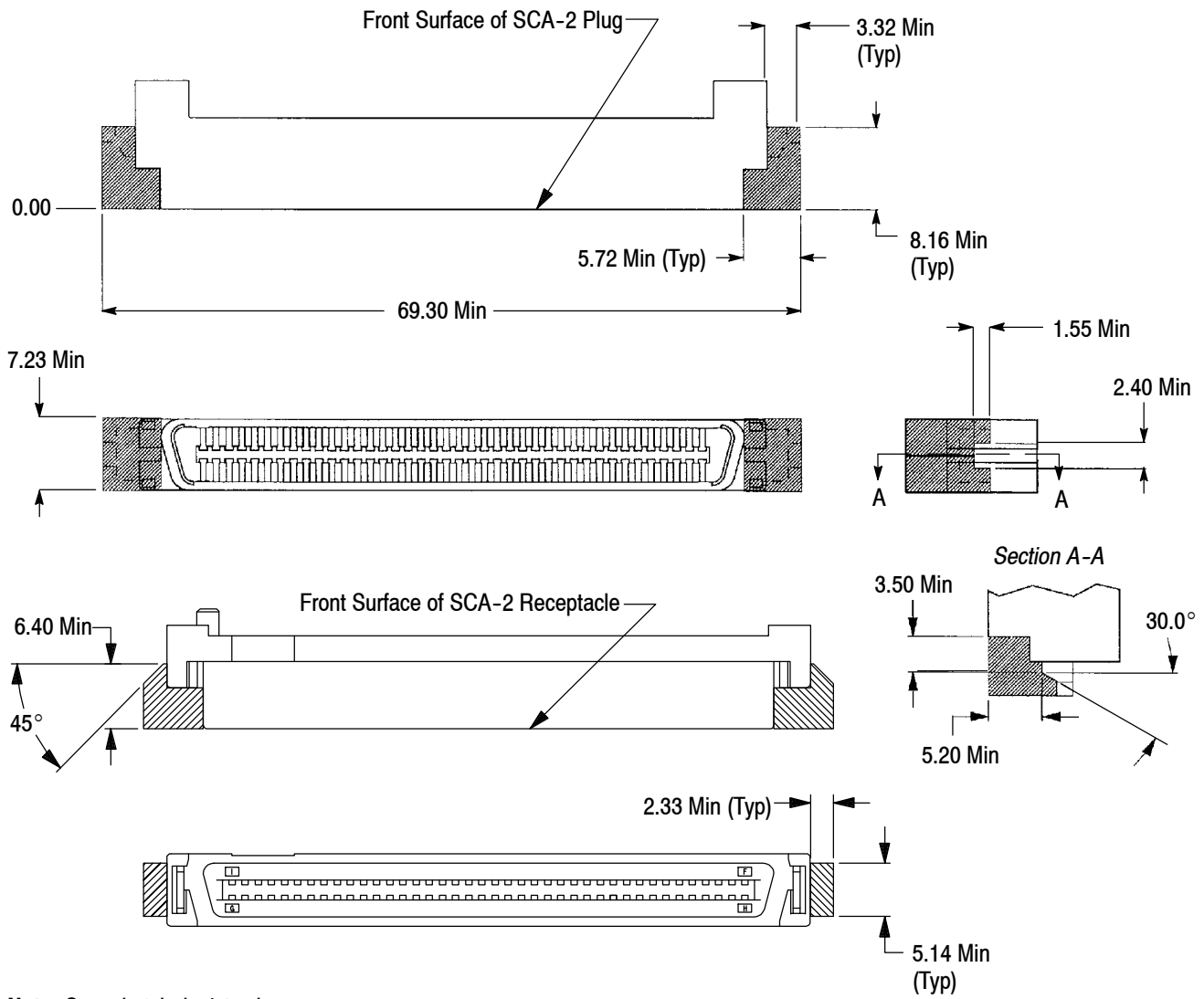


Figure 6

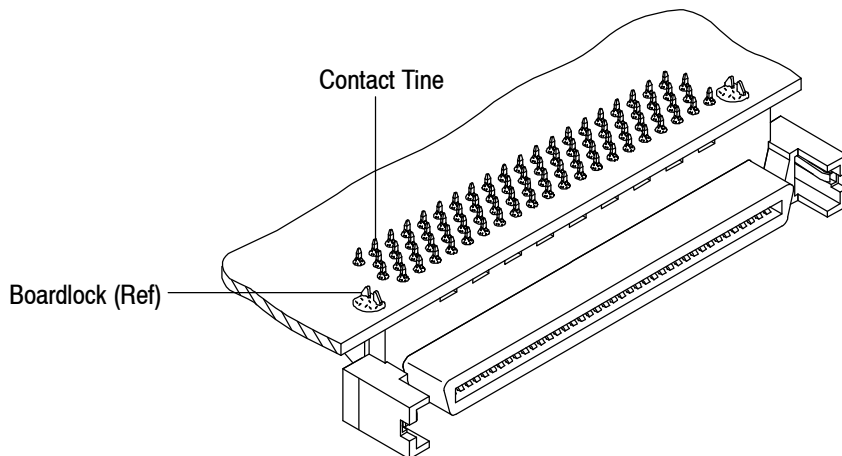


Figure 7

### 3.6. Soldering



After the plug or receptacle is snapped into the pc board, the boardlocks must be soldered at the same time as the contact tines during the soldering process.

It is recommended using SN60 or SN62 solder. Refer to Paragraph 2.4 for instructional material that is available for establishing soldering guidelines. These plugs and receptacles can be soldered with wave process provided the temperatures and exposure time meet the requirements given in Figure 8.

| SOLDERING PROCESS | WAVE TEMPERATURE | TIME<br>(At Max Temp) |
|-------------------|------------------|-----------------------|
| Wave Soldering    | 260°C [500°F]    | 5 Seconds             |

Figure 8

#### A. Flux Selection

Contact tines must be fluxed prior to soldering with a mildly active, rosin base flux. Selection of the flux will depend on the type of pc board and other components mounted on the board. Additionally, the flux must be compatible with the wave solder line, manufacturing, health, and safety requirements. Call PRODUCT INFORMATION at the number at the bottom of page 1 for consideration of other types of flux. Flux that is compatible with these plugs and receptacles are provided in Figure 9.

| FLUX TYPE | ACTIVITY | RESIDUE      | COMMERCIAL DESIGNATION |       |
|-----------|----------|--------------|------------------------|-------|
|           |          |              | KESTER                 | ALPHA |
| RMA       | Mild     | Noncorrosive | 186                    | 611   |

Figure 9

#### B. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Cleaning methods depend on the type of flux used. Consult the supplier of solder and flux for recommended cleaning solvents. Common cleaning solvents and related temperatures that can be used without any adverse effects on contacts or housing are listed in Figure 13. For any solvent not listed, contact PRODUCT INFORMATION at the number at the bottom of page 1 for suitability.

| CLEANER                |         | TIME<br>(Minutes) | TEMPERATURE<br>(Maximum) |
|------------------------|---------|-------------------|--------------------------|
| NAME                   | TYPE    |                   |                          |
| ALPHA 2110             | Aqueous | 1                 | 132°C [270°F]            |
| BIOACT EC-7            | Solvent | 5                 | 100°C [212°F]            |
| Butyl CARBITOL Solvent | Solvent | 1                 | Ambient Room             |
| Isopropyl Alcohol      | Solvent | 5                 | 100°C [212°F]            |
| KESTER 5778            | Aqueous |                   |                          |
| KESTER 5779            | Aqueous |                   |                          |
| LONCOTERGE 520         | Aqueous |                   |                          |
| LONCOTERGE 530         | Aqueous |                   |                          |
| Terpene Solvent        | Solvent |                   |                          |

Figure 10



Consideration must be given to toxicity and other safety requirements recommended by the solvent manufacturer. Refer to the manufacturer's Material Safety Data Sheet (MSDS) for characteristics and handling of cleaners. Trichloroethylene and Methylene Chloride is not recommended because of harmful occupational and environmental effects. Both are carcinogenic (cancer-causing).

ALPHA, BIOACT, CARBITOL, KESTER, and LONCOTERGE are trademarks.

**C. Drying**

When drying cleaned assemblies and pc boards, make certain that temperature limitations of -48.4 to 40.5°C [-55 to 105°F] are not exceeded.



*Excessive temperatures may cause housing degradation.*

**3.7. Checking Installed Plug and Receptacle**

All solder joints should conform to those specified in Workmanship Specification 101-21. The housing must seat on the pc board not exceeding the dimension given in Figure 14.

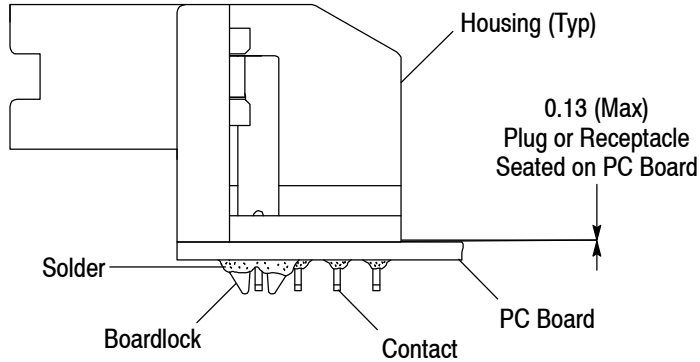


Figure 11

**3.8. Mating**

**A. Combinations**

Various typical mating combinations for these plugs and receptacles are shown in Figure 12.

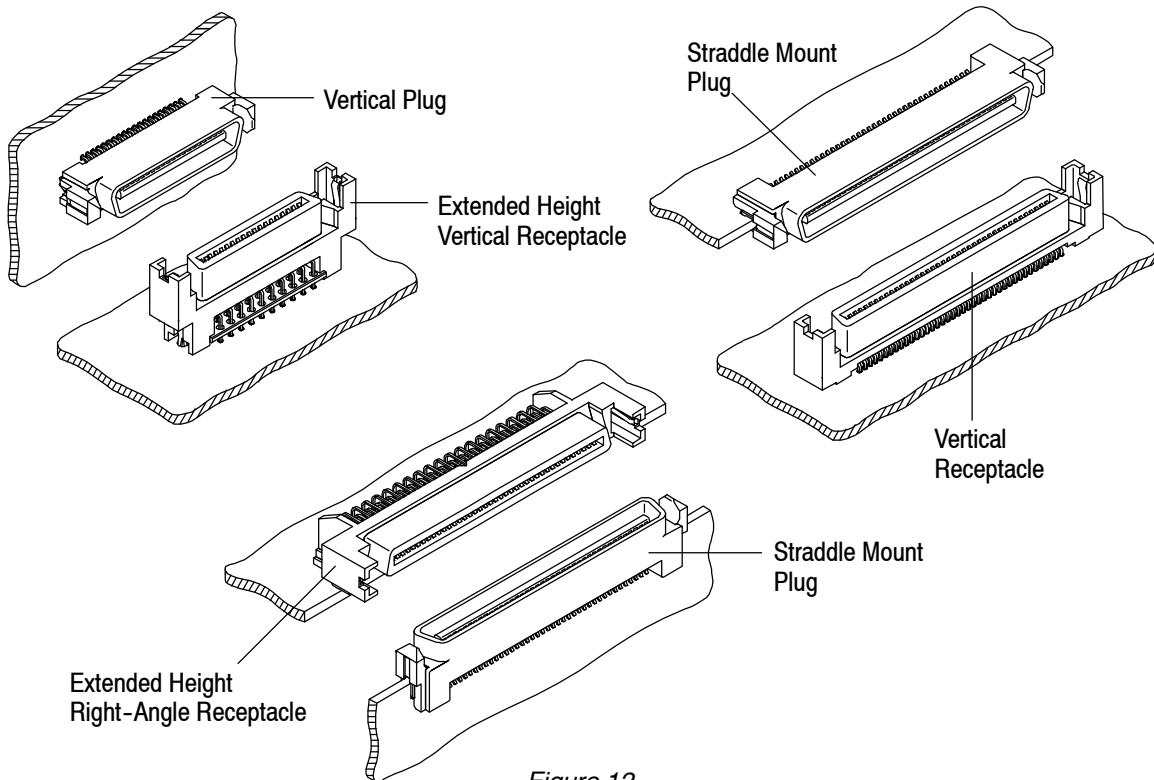


Figure 12

## B. Dimension

Mating dimensions are required to ensure full mating of plugs and receptacles with a minimum contact wipe of 1.48. The mating dimensions must be considered when determining the method of mounting the plug or receptacle and the thickness of the pc board. These dimensions apply *only* when using TE Connectivity plugs and receptacles. If other plugs or receptacles are used, refer to industry specifications for SCA-2 from the Small Form Factor Committee and Electronic Industries Alliance (EIA). See Figure 13.

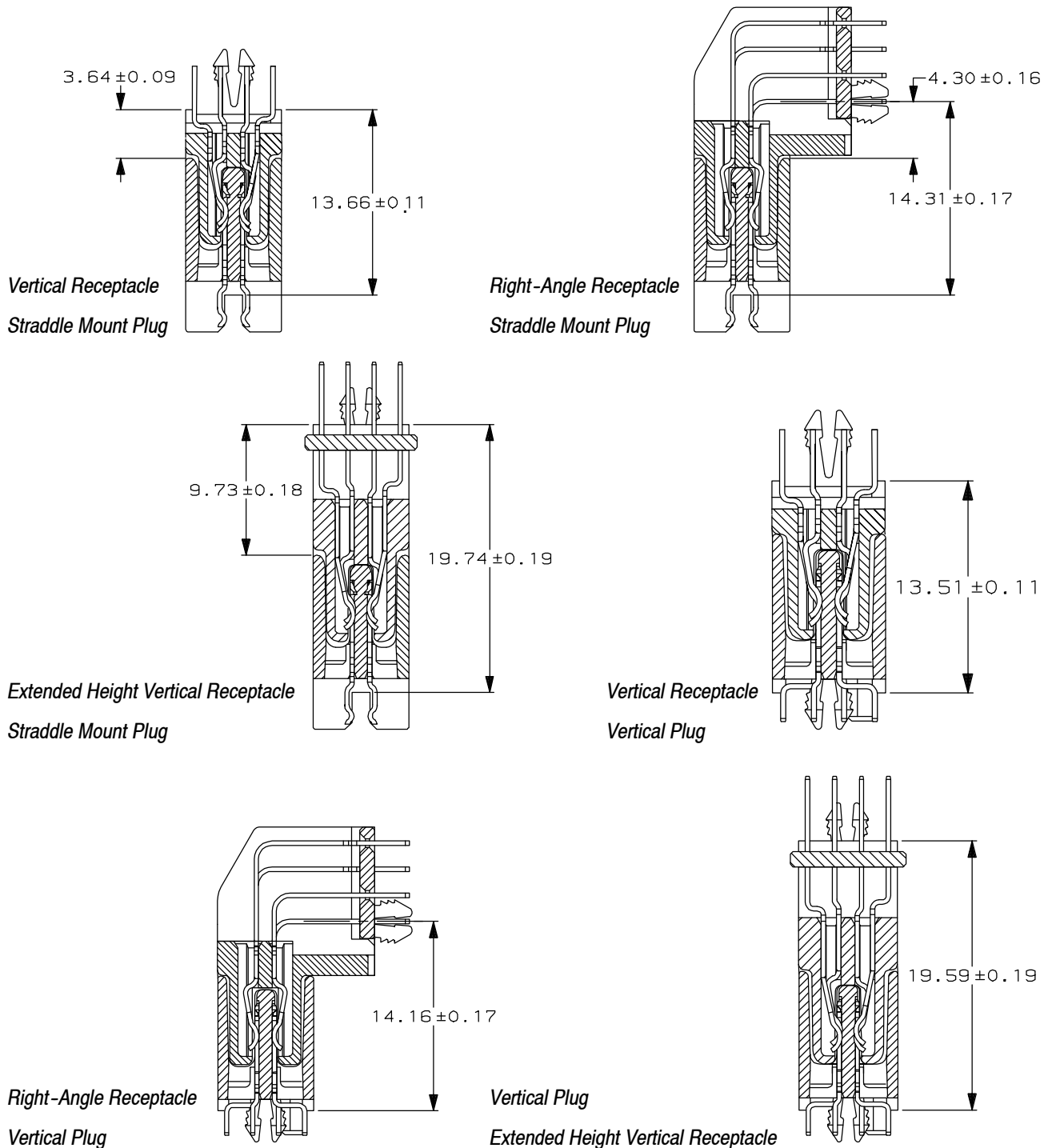


Figure 13

### C. Polarization

The plug and receptacle are inherently polarized for mating. The keystone configuration of each plug or receptacle mating face prohibits the accidental inversion of mating plugs and receptacles. See Figure 14.

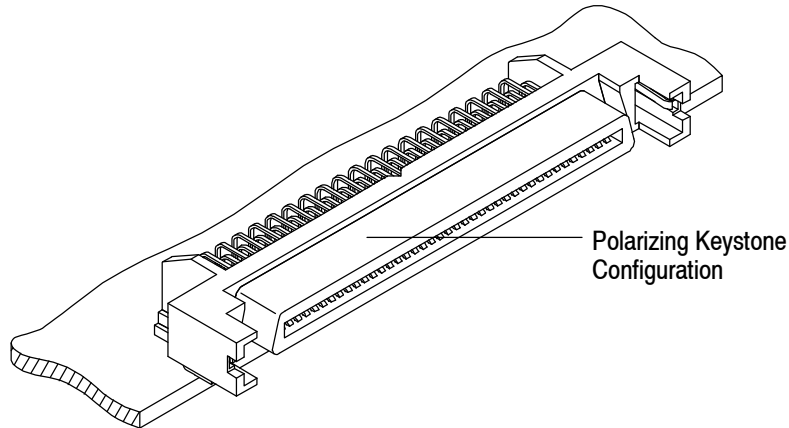


Figure 14

### 3.9. Unmating Plugs and Receptacles

The plug and receptacle must be unmated by rocking them apart. One end should be free, but should not be pulled more than 5° before rocking the same end back. This will release the opposite end, and the two will be freed or separated. See Figure 15.

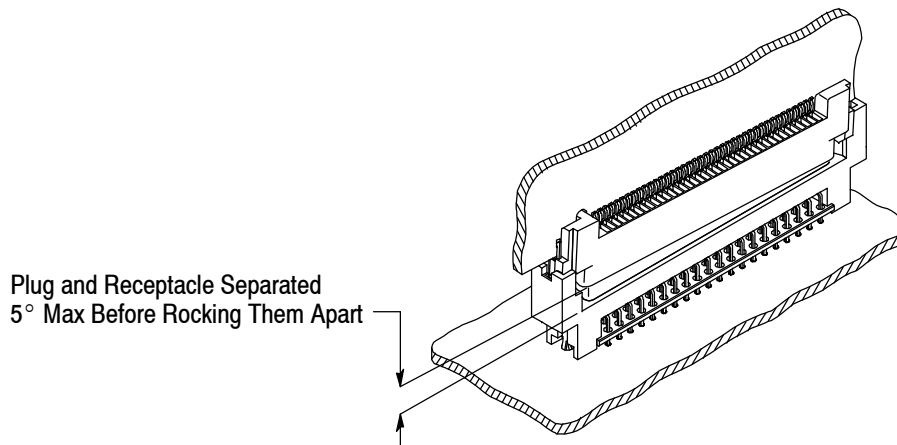


Figure 15

### 3.10. Repair

Damaged plugs and receptacles must be removed, discarded, and replaced with new ones.

Plugs and receptacles with soldered contacts may be removed from the pc board by standard desoldering methods.

For plugs and receptacles with compliant pin contacts, if pins are protruding from the pc board, pins must be pushed from the back with a flat rock, and if pins are buried, the housing must be pulled off of the top, then the contacts can be pulled from the pc board.

## 4. QUALIFICATION

CHAMP .050 Series I Blindmate SCA-2 are Component Recognized by Underwriters Laboratories Inc. (UL) under File E81956, and Certified by the Canadian Standards Association (CSA) under File LR 7189.

## 5. TOOLING

For pc board applications where solder is used, no special tooling is required for hand placement of these plugs and receptacles on the pc board, however the following information should be considered. Tooling part numbers and instructional material packaged with the tooling are shown in Figure 16.

### 5.1. Application Tooling

Application tooling provides the force required to insert the plug or receptacle contacts into pc board holes. For low-volume production, commercial hand-operated arbor presses, such as Greenerd 3A or 3B manual frame assembly are available. The arbor presses must be fitted with an adapter kit as described in 408-9027. Power units are designed for high-volume production. SM-3 machine is a pneumatic bench-mounted power unit controlled manually with pc board sensing or pressure sensing operation.

### 5.2. Seating Tool

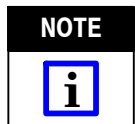
The seating tool must be used with application tooling for seating vertical receptacles with compliant pin contacts. During seating, the tool aligns the plug or receptacle to ensure proper insertion into the pc board and prevents damage to the contacts. Each tool is specifically designed for the number of rows in a plug or receptacle.

### 5.3. PC Board Support

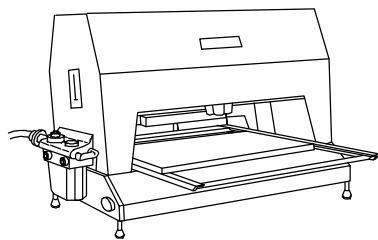
A pc board support should be used to prevent bowing of the pc board during the placement of a plug or receptacle on the board. It should have flat surfaces with holes or a channel wide enough and deep enough to receive the contact tines and boardlocks during installation of the plug or receptacle onto the board.

### 5.4. Robotic Equipment

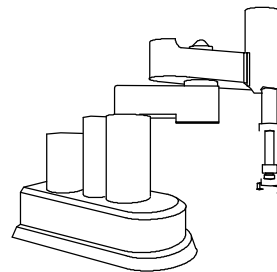
The robotic equipment must have a true position accuracy tolerance of 0.25 to properly locate the plug or receptacle for insertion. This includes gripper and fixture tolerances as well as equipment repeatability.



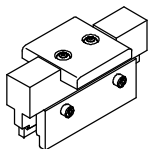
*For assistance in setting up prototype and production line equipment, contact the TOOLING ASSISTANCE CENTER at the number at the bottom of page 1.*



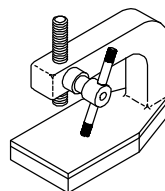
SM-3 Machine 814700-2  
(409-5626)



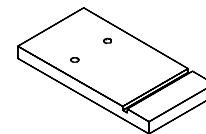
Robotic Equipment  
(Designed Upon Request)



Seating Tools 1320142-1 and 1320142-2  
for Extended Height Press-Fit Vertical  
Receptacles with Compliant Pin Contacts



Typical Arbor Frame Press  
(Refer to 408-9027 to  
Assemble Adapter Kit)



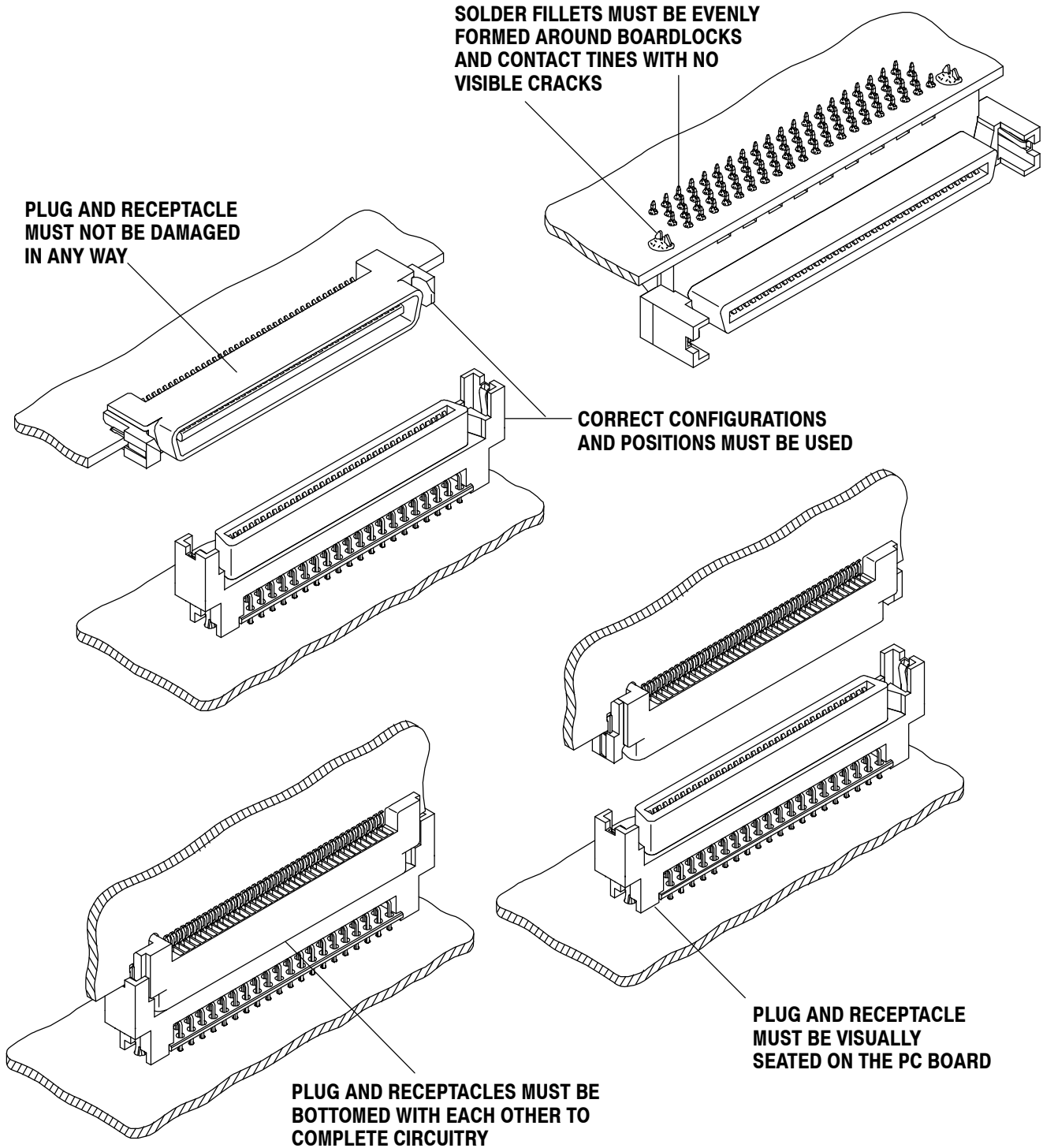
PC Board Support Fixture  
(Customer Supplied)  
(408-6927)

Seating Tools 356198-1 and 356198-2  
for Press-Fit Vertical Receptacles with  
Compliant Pin Contacts  
(408-4328)

Figure 16

## 6. VISUAL AID

The illustration below shows a typical application of CHAMP .050 Series I Blindmate SCA-2. 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**