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 ±0.13 and angles have a tolerance of ±2° . Figures and illustrations are for identification only and are not drawn to scale.*

1. INTRODUCTION

This specification covers AMP* CHAMP .050 Series I Blindmate SCA–2 Plug and Receptacle Connectors. These connectors 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 press–fit vertical, and extended height vertical. These connectors are fully compatible with CHAMP .050 Series I SCA–1 board–to–board connectors.

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

When corresponding with Tyco personnel, use the terminology provided on this specification to help facilitate your inquiry for information. Basic terms and features of components are provided in Figure 1.

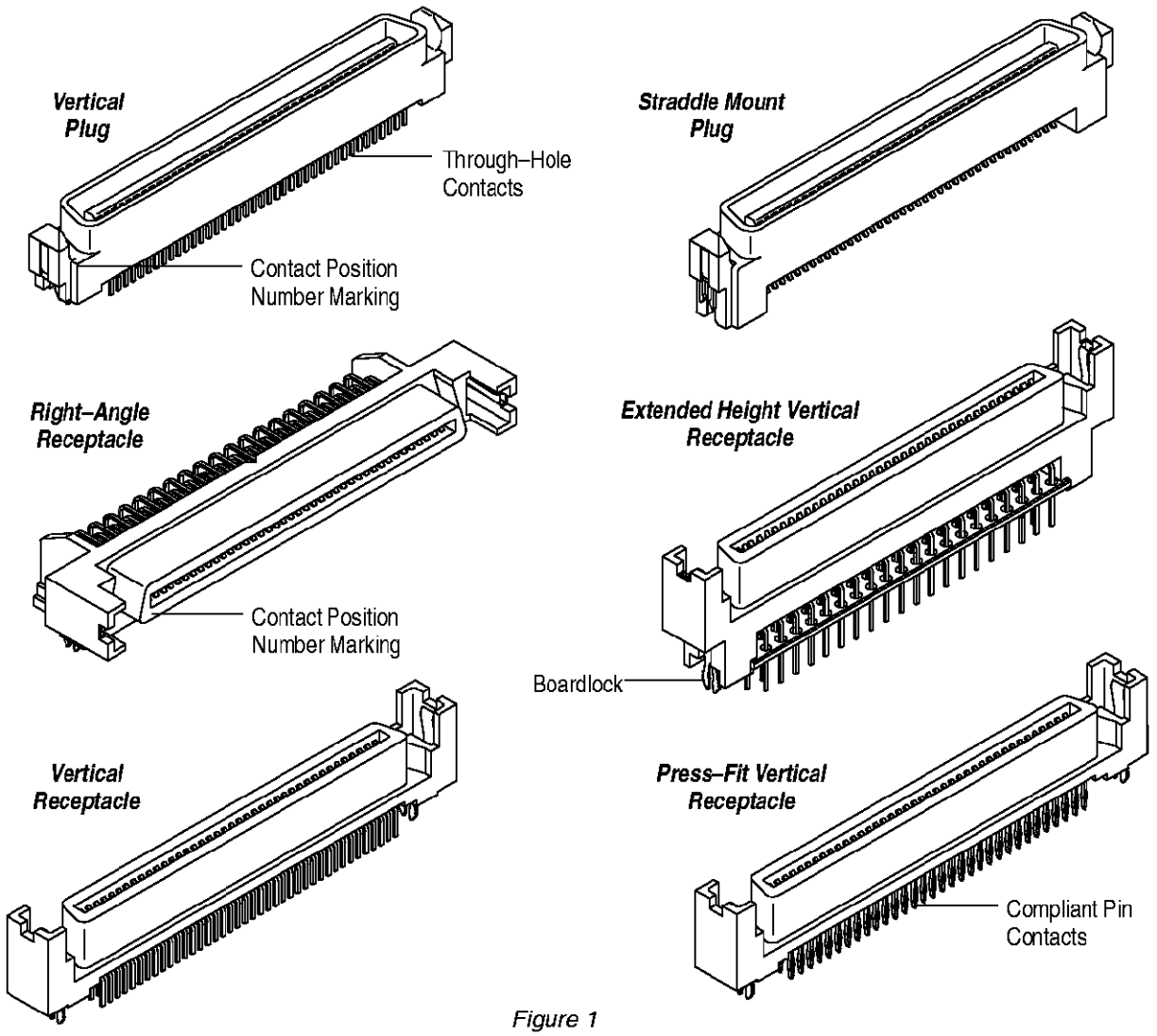


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

Revisions to this application specification per EC 0990–1172–00 include:

- Updated document to corporate requirements
- Changed dimension from 0.03 to 0.13 in Figure 13
- Changed incorrect tooling part number 35618–2 to 356198–2 in Figure 15

2.2. Customer Assistance

Product Part Number 787311 and Product Code 7427 are representative of CHAMP .050 Series I Blindmate SCA–2 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 Tyco Representative (Field Service Engineer, Field Applications Engineer, etc.) or, after purchase, by calling the Product Information Center 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 by Tyco, call product information at the number at the bottom of page 1.

2.4. Manuals

Manual 402–40 is available upon request and 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 performance test information and quality requirements for these connectors.

2.6. Instructional Material

Instruction Sheets (408–series) provide assembly instructions, and Customer Manuals (409–series) provide machine setup and operation 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 connector housings.

B. Shelf Life

The connectors should remain in the shipping containers until ready for use to prevent deformation to the connectors. The connectors 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 connectors 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

3.2. Connector Size

These connectors are available in the following positions as shown in Figure 2.

▪ Trademark of Greenerd Press & Machine Co., Inc.

CONNECTOR TYPE		NUMBER OF CONNECTOR 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. Printed Circuit Boards

A. Material and Thickness

The pc board material shall be glass epoxy (FR-4, G-10). These connectors are designed for pc boards with a variety of thicknesses as listed in Figure 3.

NOTE *Contact the Product Information Center number listed at the bottom of page 1 for suitability of other board materials and thicknesses.*

CONNECTOR TYPE	NO. OF CONNECTOR POSITIONS	PC BOARD THICKNESS
Straddle Mount Plug	40 and 80	1.32 (Max)
	20	1.83 (Max)
Vertical Plug with Through-Hole Contacts	40 and 80	0.76-1.27
Vertical Receptacle with Through-Hole Contacts	20, 40, and 80	2.16-2.67
Extended Height Vertical Receptacle with Through-Hole Contacts	40 and 80	2.16-4.06
Right-Angle Receptacle with Through-Hole Contacts	80	1.52-2.03
	20	1.52-2.54
Press-Fit Vertical Receptacle with Compliant Pin Contacts	20, 40, and 80	2.16-3.81
Extended Height Press-Fit Vertical Receptacle with Compliant Pin Contacts	40 and 80	2.16-3.81

Figure 3

B. Tolerance

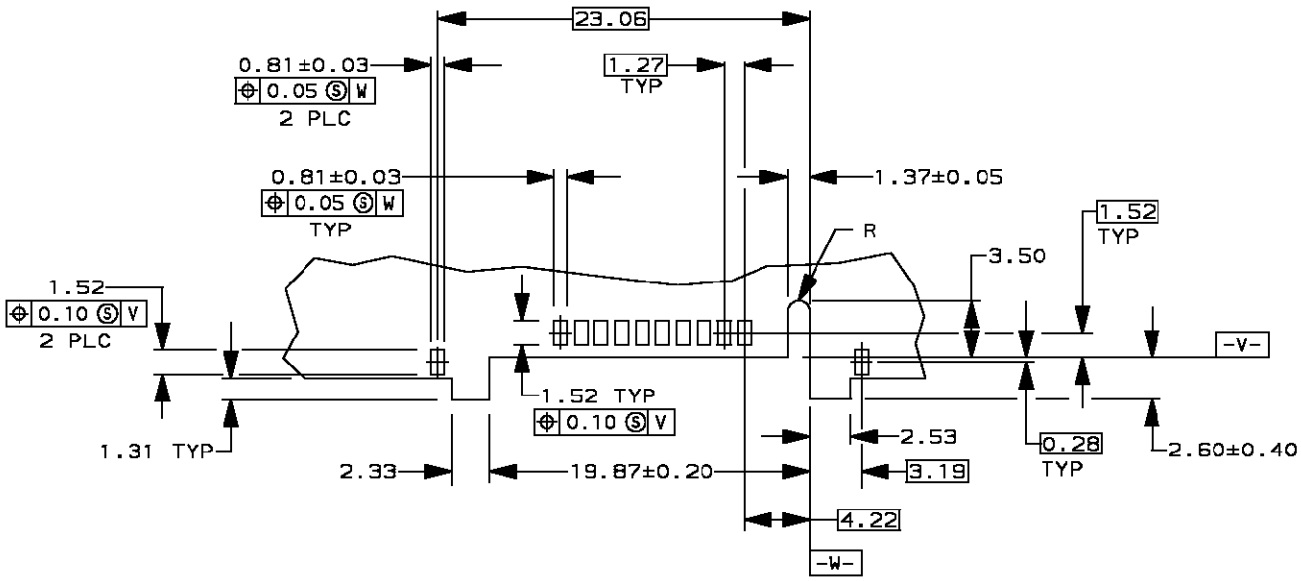
The maximum bow of the pc board shall be 0.03 over the length of the connector.

C. Recommended PC Board Layout

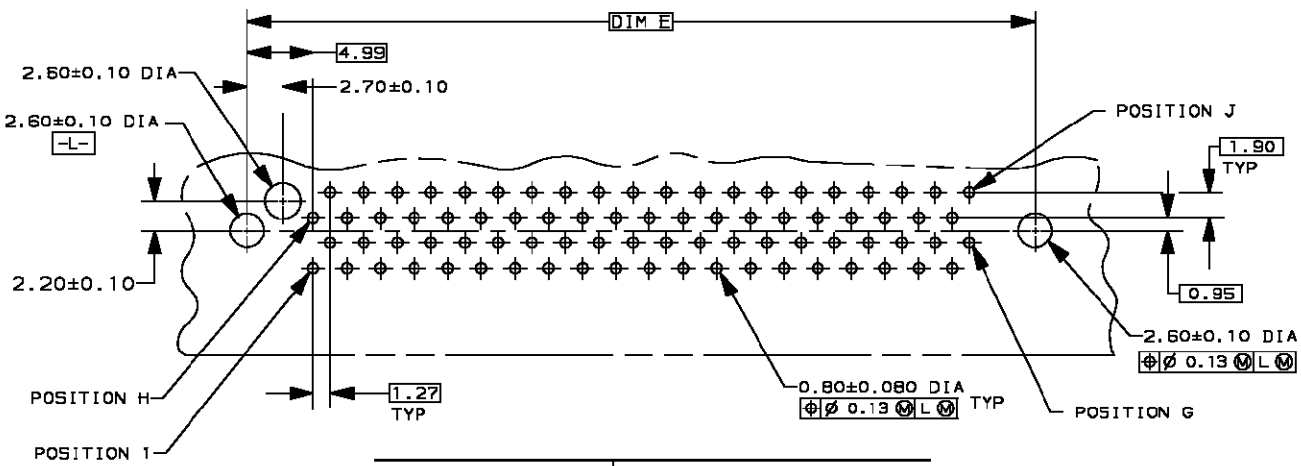
The boardlock holes and contact holes in the pc board must be precisely located to ensure proper placement and optimum performance of the connector. The "X" and "Y" symbols on the pc board layout represent customer established datums. They are the origin for the basic dimension (XXX and YYY datum), the point from which ALL hole positions must be located. Design the pc board using the dimensions provided in Figure 4.

NOTE *The layout dimensions apply to either side of the pc board.*

20–Position Straddle Mount Plug



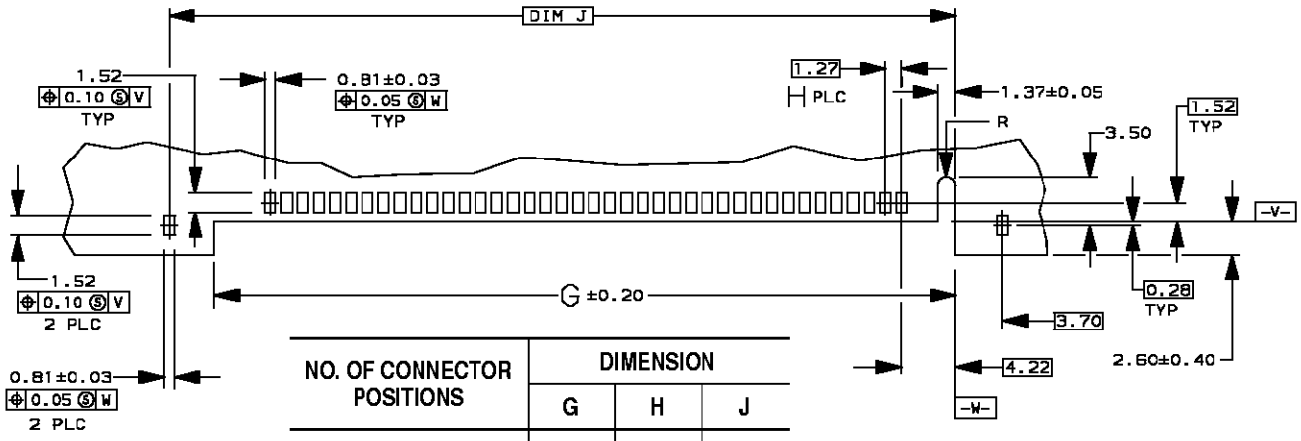
40– and 80–Position Vertical Plug



NO. OF CONNECTOR POSITIONS	DIMENSION			
	E	G	H	J
40	34.11	20	21	40
80	59.51	40	41	80

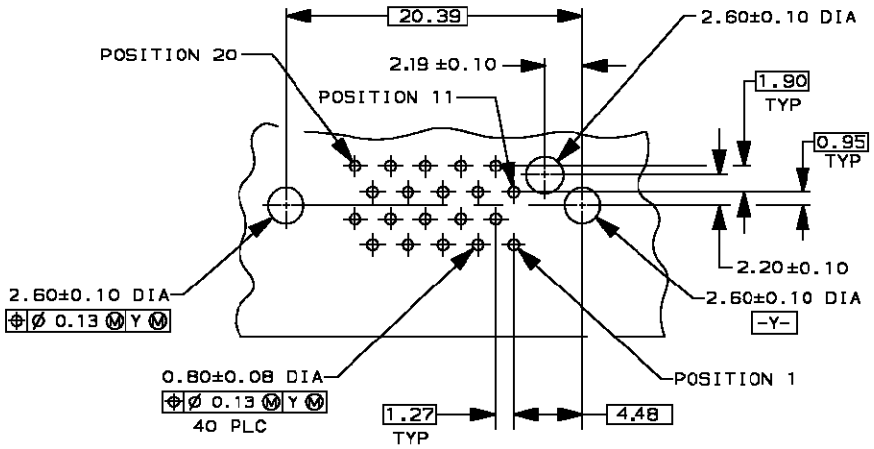
Figure 4 (cont'd)

40- and 80-Position Straddle Mount Plug



NO. OF CONNECTOR POSITIONS	DIMENSION		
	G	H	J
40	32.77	19	36.27
80	58.17	39	61.67

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



20-Position Right-Angle Receptacle

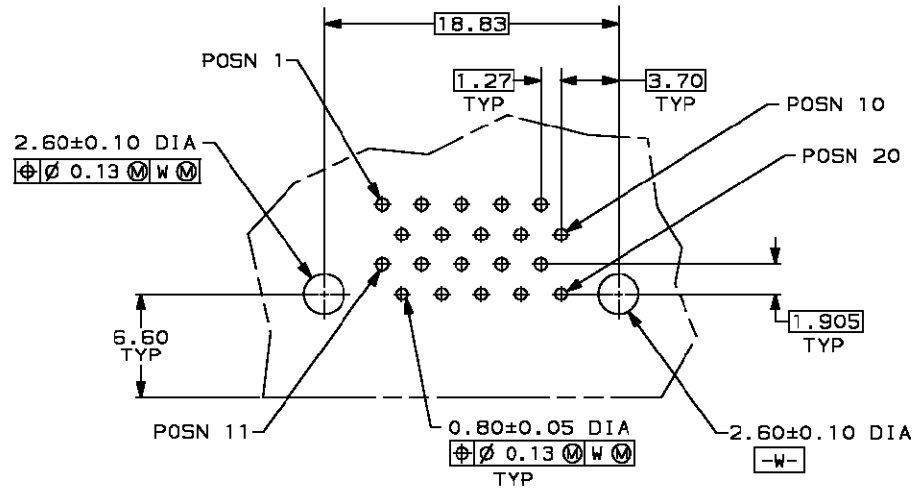
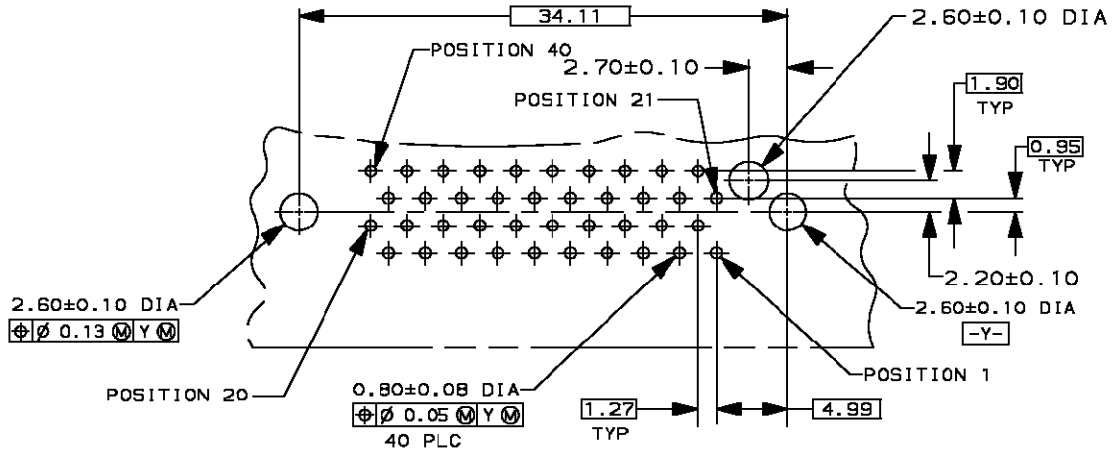
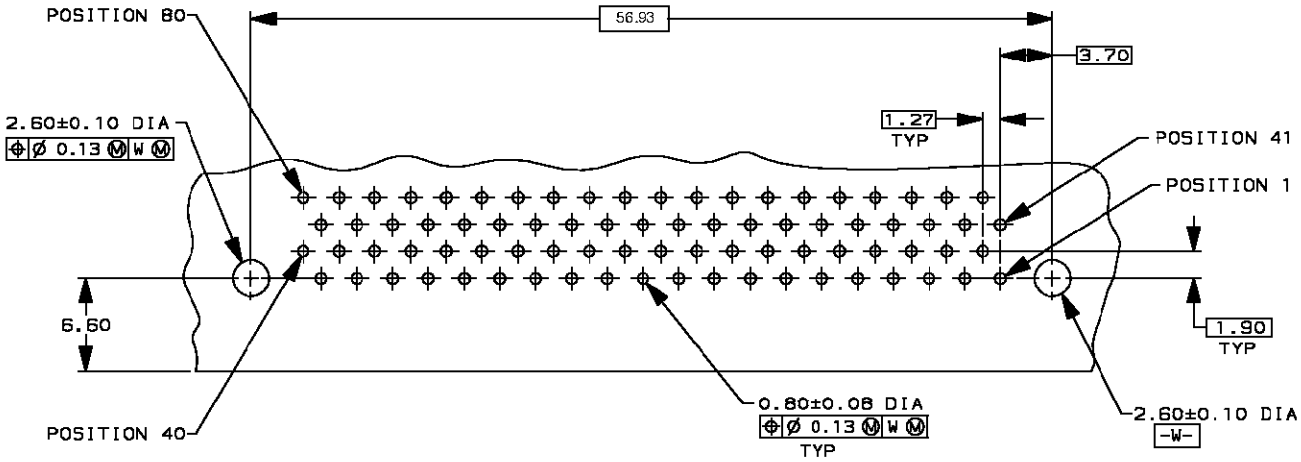


Figure 4 (cont'd)

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

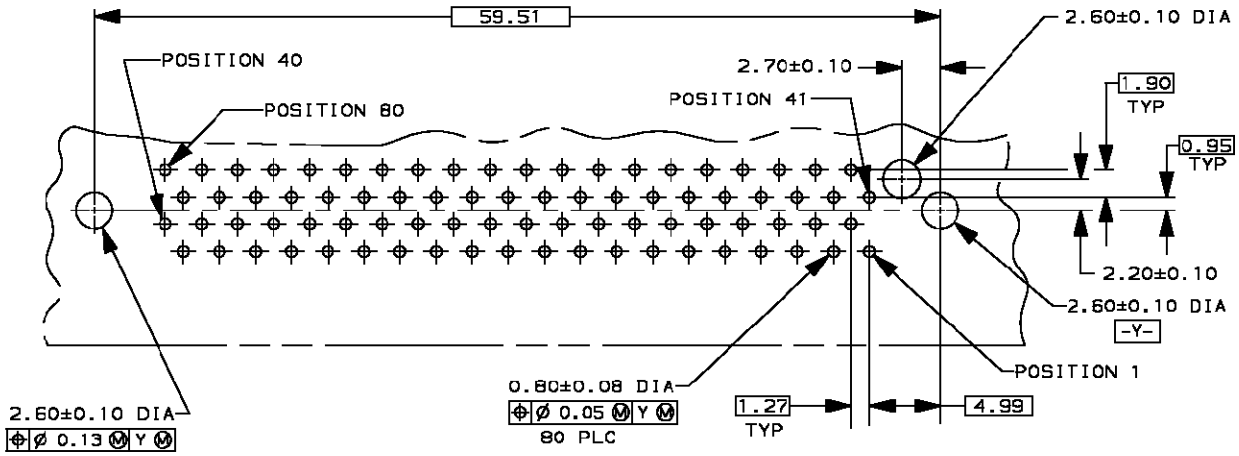


Figure 4 (end)

3.4. PC Board 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. See Figure 5.

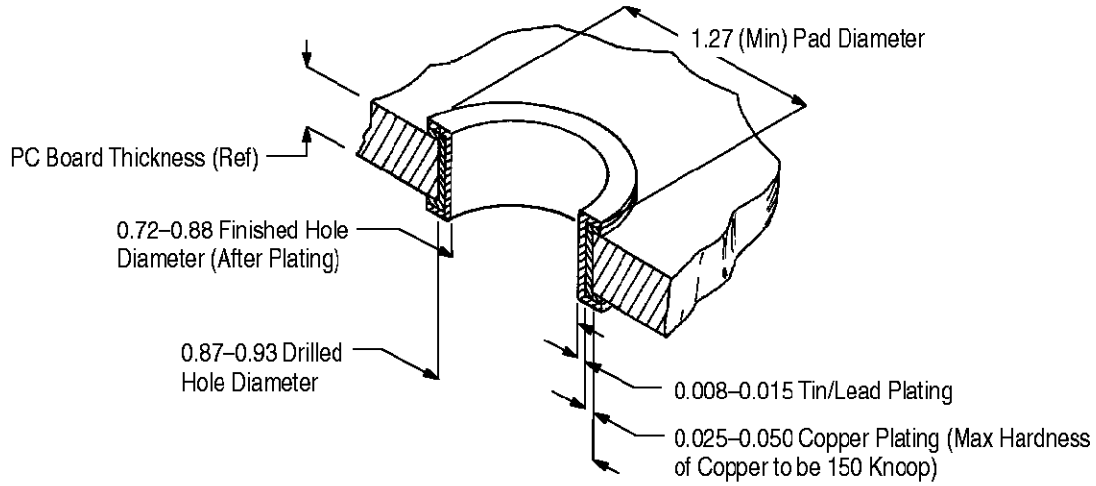


Figure 5

3.5. Mating Configurations

Various typical mating combinations for these connectors are shown in Figure 6.

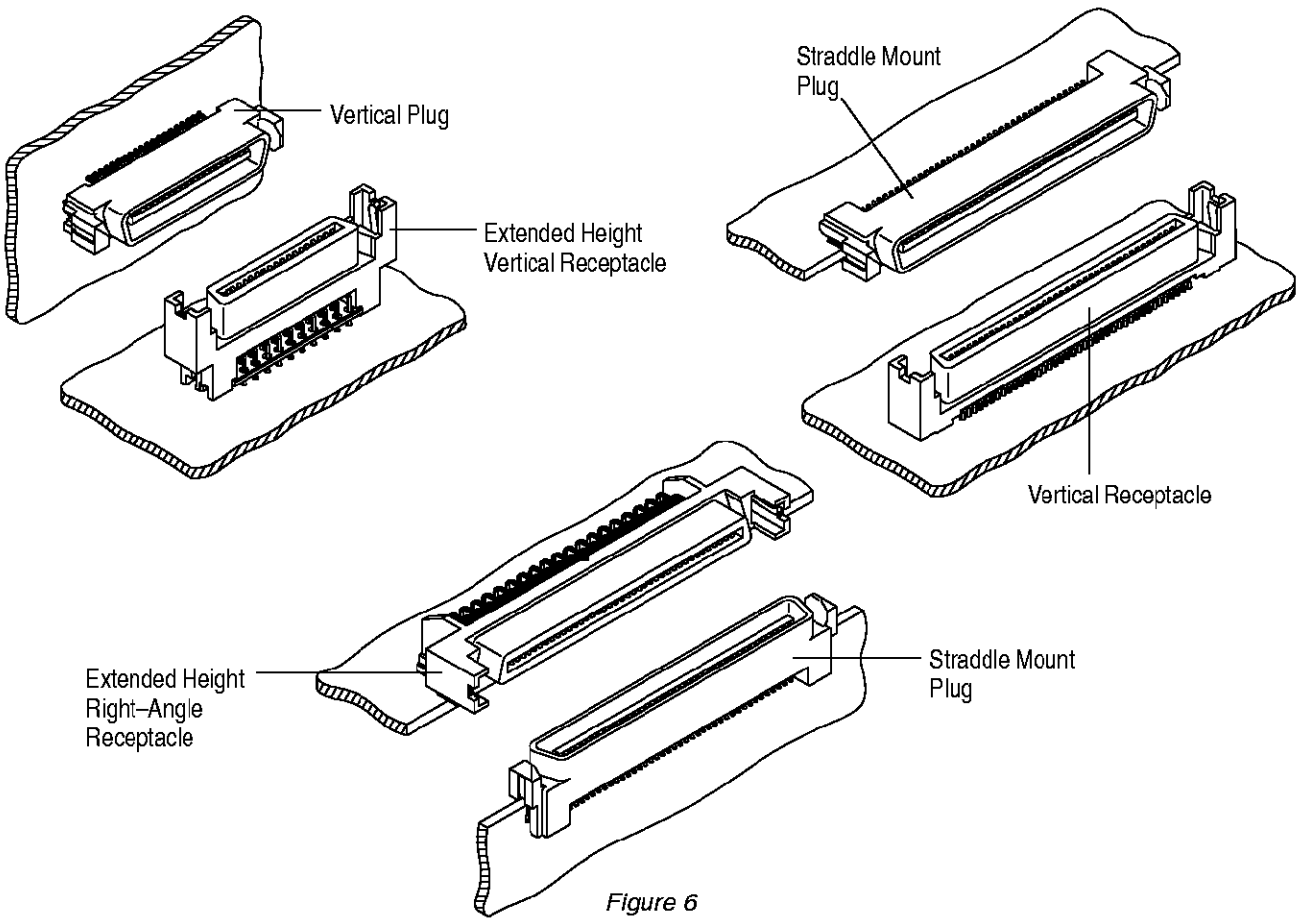


Figure 6

3.6. Mating Dimensions

The dimensions are required to ensure full mating of connectors with a minimum contact wipe of 1.48. This dimension must be considered when determining the method of mounting the connector and the thickness of the pc board. These dimensions apply *only* when using Tyco plugs and receptacles. If other plugs or receptacles are used, refer to industry specifications for SCA–2 from the Small Form Factor Committee and EIA (Electronic Industries Alliance). See Figure 7.

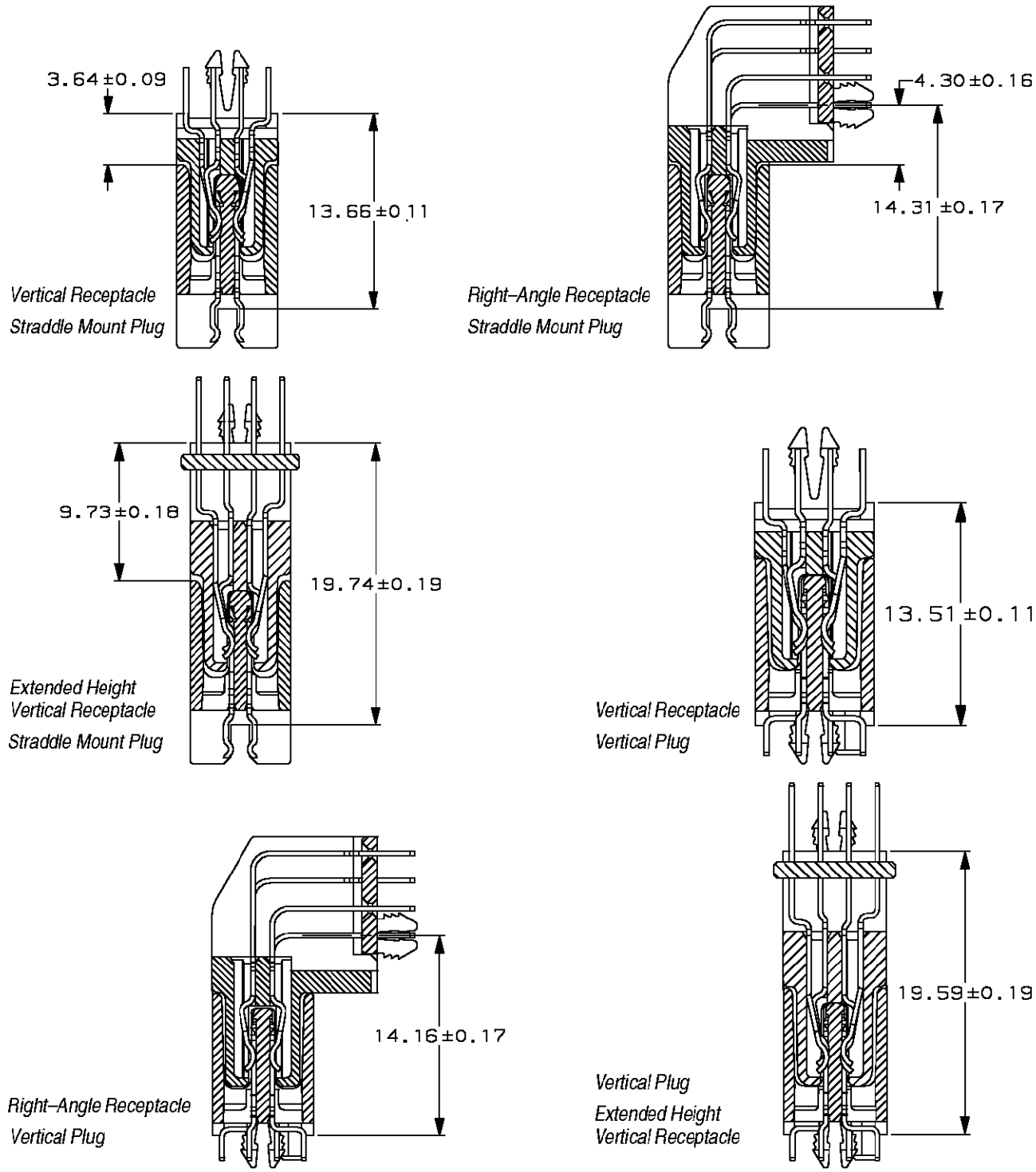
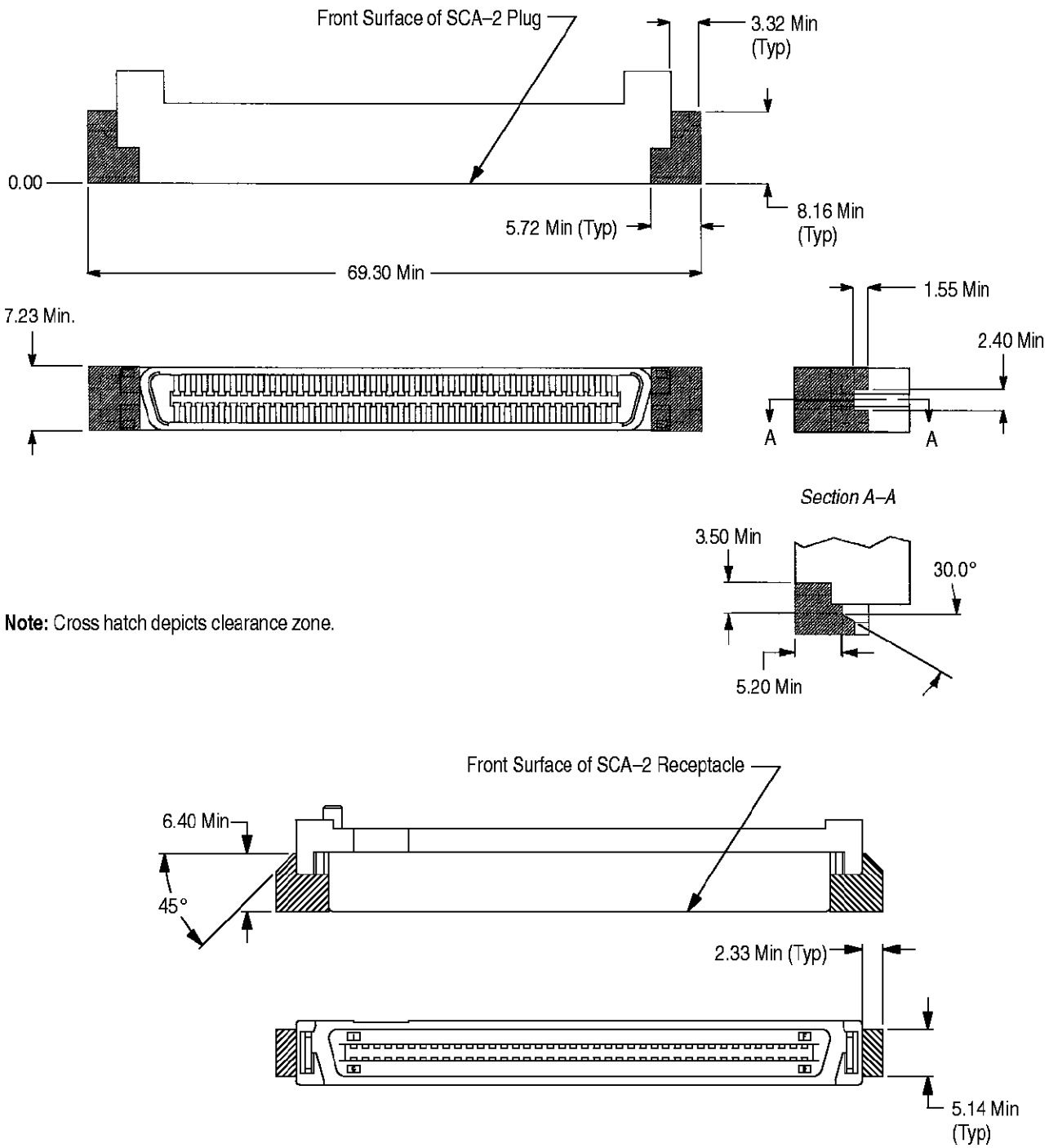


Figure 7

3.7. PC Board Spacing

Connector clearance zones and spacing that 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 8.



Note: Cross hatch depicts clearance zone.

Figure 8

3.8. Polarizing

The connector is inherently polarized. The keystone configuration of each connector mating face prohibits the accidental inversion of mating connectors. See Figure 9.

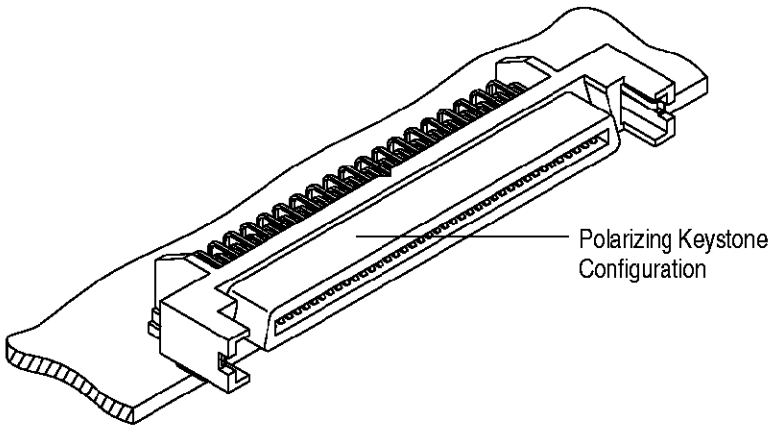


Figure 9

3.9. Boardlocks

Boardlocks have gripping shoulders that pass through the pc board at the same time the contact tines are inserted through the board. They lock into position when the housing is seated on the board. The initial forces are: 62 N maximum for insertion and 13 N minimum for extraction. See Figure 10.

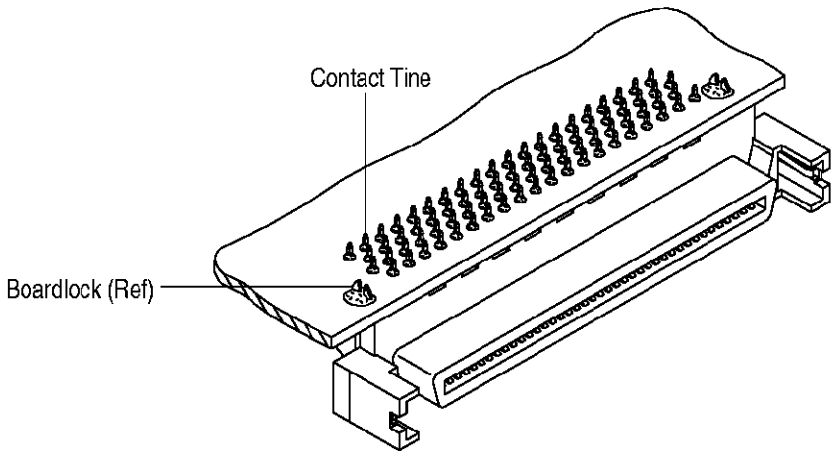


Figure 10

3.10. Connector Placement

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

A. Manual Placement

The connector 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 connector can be pressed until it seats on the pc board.

B. Robotic Placement

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

3.11. Soldering

NOTE *After the connector is snapped into the pc board, the boardlocks must be soldered with the connector contact tines during the soldering process.*

These connectors can be soldered with wave processes, provided the temperatures and exposure time are within the ranges specified. Tyco recommends using SN60 or SN62 solder for the connectors. Refer to Paragraph 2.4 for instructional material that is available for establishing soldering guidelines. See Figure 11.

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

Figure 11

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 connectors are provided in Figure 12.

FLUX TYPE	ACTIVITY	RESIDUE	COMMERCIAL DESIGNATION	
			KESTER⊞	ALPHA■
RMA	Mild	Noncorrosive	186	611

⊞ Product of Kester Solder Co. ■ Product of Alphametals Inc.

Figure 12

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. The following are common cleaning solvents that can be used on these connectors at the temperatures listed without any adverse effects on contacts or housing. See Figure 13.

CLEANER		TIME (Minutes)	TEMPERATURES (Maximum)	
NAME	TYPE		CELSIUS	FAHRENHEIT
Alpha 2110■	Aqueous	1	132	270
Bioact EC-7◆	Solvent	5	100	212
Butyl Carbitol●	Solvent	1	Room Ambient	
Isopropyl Alcohol	Solvent	5	100	212
Kester 5778⁘	Aqueous	5	100	212
Kester 5779⁘	Aqueous	5	100	212
Loncoterge 520●	Aqueous	5	100	212
Loncoterge 530●	Aqueous	5	100	212
Terpene Solvent	Solvent	5	100	212

■ Product of Fry's Metals, Inc. ◆ Product of Petroferm, Inc. ● Product of Union Carbide Corp. ⁘ Product of Litton Systems, Inc.

Figure 13

DANGER *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. Tyco does not recommend using Trichloroethylene and Methylene Chloride because of harmful occupational and environmental effects. Both are carcinogenic (cancer-causing).*

NOTE *If you have a particular solvent that is not listed, contact Product Information at the number at the bottom of page 1.*

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.

CAUTION *Excessive temperatures may cause housing degradation.*

3.12. Checking Installed Connector

All solder joints should conform to those specified in Workmanship Specification 101–21. The housing must seat on the pc board. See Figure 14.

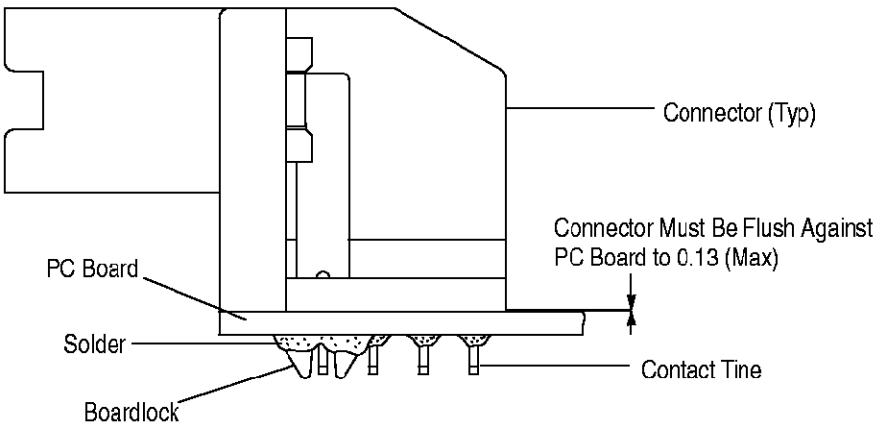


Figure 14

3.13. Repair

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

A. Soldered Contacts

Contacts may be removed from the pc board by standard desoldering methods.

B. Compliant Pin Contacts

If pins are protruding from the pc board, push pins from back with flat rock, if pins are buried, pull housing off top, and then pull contacts from pc board.

3.14. Unmating Connectors

The connectors must be unmated by rocking them apart. Tyco recommends that 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 connectors will be freed or separated. See Figure 15.

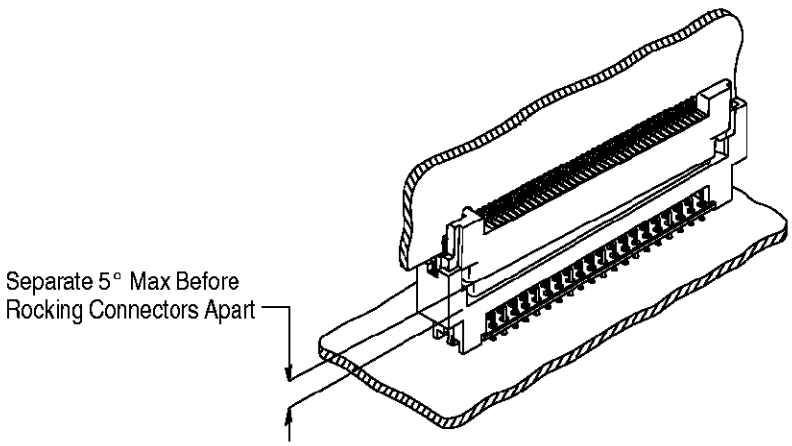


Figure 15

4. QUALIFICATION

CHAMP .050 Series I Blindmate SCA–2 connectors 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 connectors 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 connector 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 connector 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 connector.

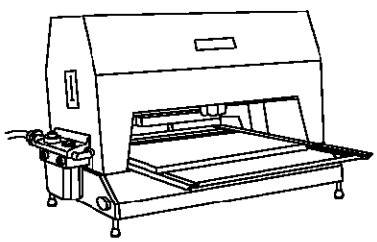
5.3. PC Board Support

A pc board support should be used to prevent bowing of the pc board during the placement of a connector 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 connector onto the board.

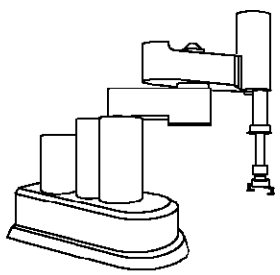
5.4. Robotic Equipment

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

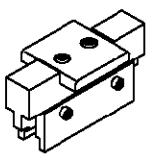
NOTE *Tyco Tool Engineers have designed machines for a variety of application requirements. For assistance in setting up prototype and production line equipment, contact the Tooling Assistance Center number listed at the bottom of page 1 or your local Tyco Representative.*



SM–3 Machine 814700–2 (409–5626)



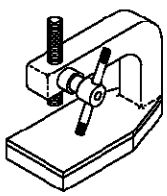
Robotic Equipment (Designed Upon Request)



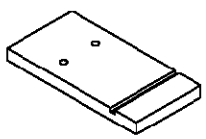
Seating Tools 1320142–1 and 1320142–2 for Extended Height Press–Fit Vertical Receptacles with Compliant Pin Contacts

Seating Tools 356198–1 and 356198–2 for Press–Fit Vertical Receptacles with Compliant Pin Contacts

(408–4328)



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



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

Figure 16

6. VISUAL AID

Figure 17 shows a typical application of CHAMP .050 Series I Blindmate SCA–2 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.

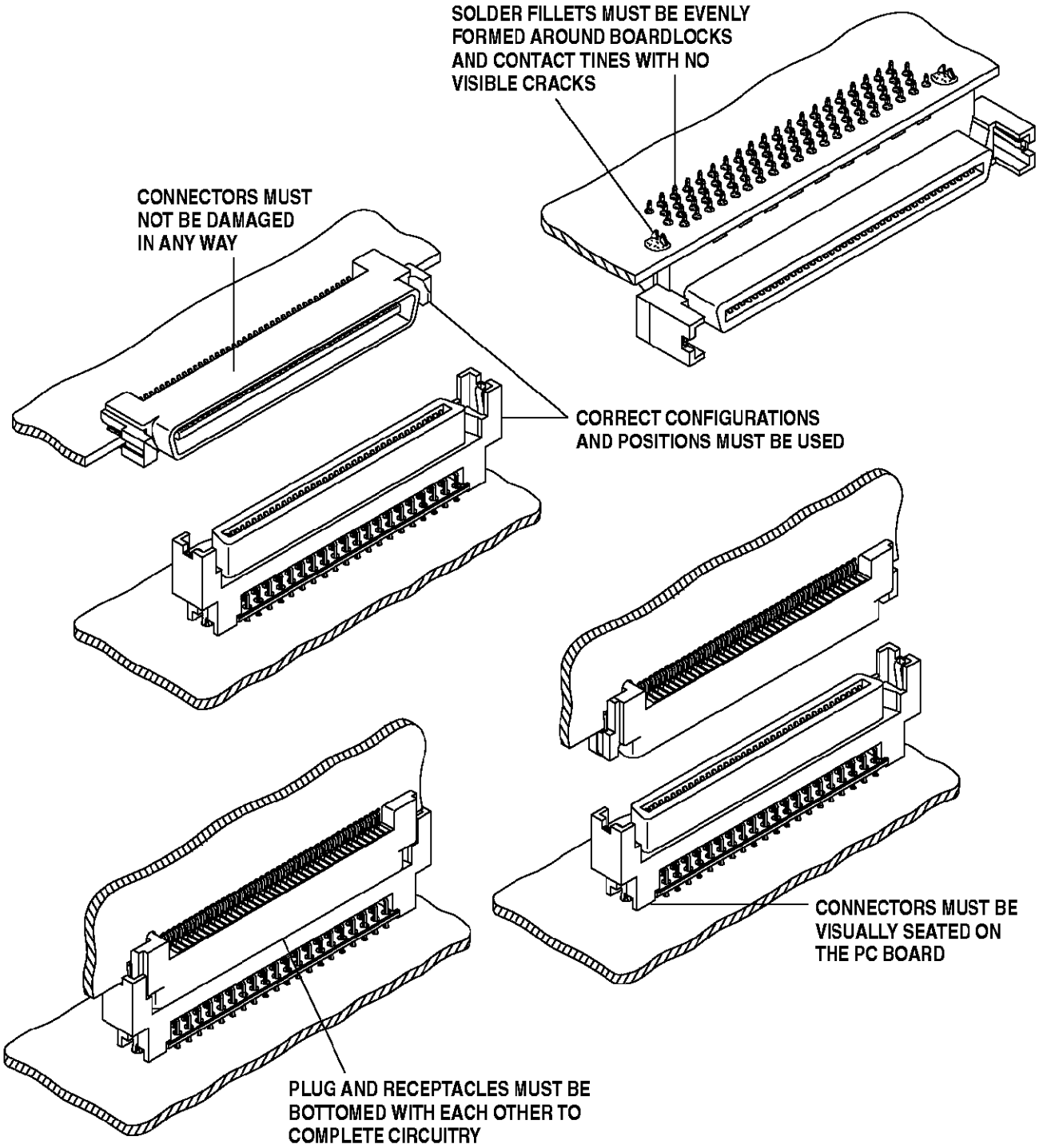


FIGURE 17. VISUAL AID