

**molex<sup>®</sup>**

**154 Way PCB Insertion Tool**

**Operation Manual**

**Order No. 62203-0500**

**For 154 Way CMC Headers™ Series 34763**

- Description
- Operation
- Maintenance

## Safety Warnings and Information

	<p><b>Read and understand</b> all of the instructions and safety information in this manual before operating or servicing this tool.</p> <p style="text-align: center;"><u>Keep this manual available when using this tool.</u></p> <p>Replacement manuals are available for download at no charge at <a href="http://www.molex.com">www.molex.com</a>.</p>
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<b>SAFETY ALERT SYMBOL</b>	
<p>This symbol is used to call your attention to hazards or unsafe practices which could result in an injury or property damage. The signal word, defined below, indicates the severity of the hazard. The message after the signal word provides information for preventing or avoiding the hazard.</p>	
 <b>DANGER</b>	<p><b>DANGER:</b> Indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury.</p>
 <b>WARNING</b>	<p><b>WARNING:</b> Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.</p>
 <b>CAUTION</b>	<p><b>CAUTION:</b> Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. <b>CAUTION</b> may also be used to alert against unsafe practices associated with events that could lead to personal injury.</p>

	<p> <b>WARNING</b></p> <p><b>Always</b> wear proper eye protection when Operating or servicing this tool.</p> <p>Failure to wear eye protection could result in serious eye injury from flying debris.</p>		<p> <b>WARNING</b></p> <p>Excessive noise levels. <b>Always</b> wear proper ear protection when operating or servicing this tool.</p>
	<p> <b>WARNING</b></p> <p><b>Never</b> wear clothing or jewelry that is loose or That Could potentially hang into the equipment And get caught.</p> <p>Failure to observe this warning could result in Severe Injury or death.</p>		<p> <b>WARNING</b></p> <p><b>Never</b> install or service this tool while connected to any electrical power source. Disconnect power by unplugging the press from its power source.</p> <p>Failure to observe this warning could result In severe injury or death.</p>
	<p> <b>WARNING</b></p> <p><b>Never</b> operate, service, install, or adjust this Tool without proper instruction and without first reading and understanding the instructions in this manual and all applicable press and/or wire processing machine manuals.</p>		<p> <b>WARNING</b></p> <p><b>Never</b> use this tool without guards or safety devices That are intended to prevent hands from remaining in the fixture.</p> <p>Failure to observe this warning could result in severe injury or death.</p>

	<b>WARNING</b>
	<b>Do not use</b> compressed air to clean the equipment. The forces created by compressed air can force debris into the tool.  Failure to observe these precautions may result in injury or property damage.
	<b>CAUTION</b>
	<b>Never</b> perform any service or maintenance other than as described in this manual. <b>Never</b> modify, alter or misuse the equipment Molex specifications are valid only when used with Molex tooling.  Failure to observe this precaution may result in injury and property damage.

## Tooling Technical Assistance

Molex offers tooling technical assistance for customers who may need some guidance for tooling adjustments. This support can be obtained by calling either of the two numbers listed below and asking for the Molex Tooling Group.  
Call Toll Free 1-800-786-6539 (US) 1-630-969-4550 (Global).

This assistance is limited to the operation and set-up of a customer's Molex tool. Questions with regard to Molex products or how to identify the proper tooling and/ or tooling documentation should be directed to your local Molex personnel or Customer Service Representative.

When calling for service on this tool it is recommended to have the following: a copy of the Tooling Manual, the Specific Tooling Specification Sheet and a person familiar with the tool should be present. The following information is also recommended to supply:

1. Customer name
2. Customer address
3. Person to contact such as (name, title, e-mail, and telephone number)
4. Order number (Lease number also if applicable)
5. Serial number (Lease number also if applicable)
6. Molex product order number
7. Urgency of request
8. Nature of problem

**Molex Application Tooling Group**  
2200 Wellington Court  
Lisle, IL 60532, USA  
Tel: +1 (630) 969-4550  
Fax: +1 (630) 505-0049

Visit our Web site at <http://www.molex.com>

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## Section 1

### General Description

#### 1.1. Description

The Molex 62203-0500 154 Way CMC Header Assembly PCB Insertion Fixture is used to press a PCB onto the compliant pin interface of the CMC Header Assembly. The header assembly is loaded into a tooling nest and the PCB is placed onto the adjustable rails of fixture. Once the PCB is aligned to compliant pins, insertion occurs with the assistance of a customer supplied press.

#### 1.2. Features

- The 154 Way CMC Header Assembly PCB Insertion Fixture has die set action that supports upper tooling for PCB insertion and springs to a return position after cycling.
- Designed for the insertion of PCB thicknesses that range from 1.50mm to 2.40mm.
- The header assembly is placed into a housing nest and right angle bend compliant terminals are combed to ensure pin tip position left to right. Front TPA retainer plate ensures front to back positioning of header assembly.
- The terminal comb tooling ensures header orientation, pin tip position, and supports right angle bend terminal shoulders during the PCB insertion to compliant pin geometry.
- The upper tooling contacts PCB during insertion cycle and supports the PCB holes during insertion.
- The housing spring plunger located in upper tooling to support housing and prevent forward rocking during the insertion cycle.
- The PCB rails support the PCB with four spring plungers for initial PCB placement, through insertion, and assist in removal after insertion.
- The PCB rail spacing is adjustable for PCB widths up to 210mm.
- Spacer plates are provided to accommodate for various PCB thicknesses thicker than 1.5mm.

#### 1.3. Technical Specification

##### Dimensions

Height	250mm (9.85")
Width	350mm (13.80")
Depth	220mm (8.70")
Weight	24.9kgf (55.0lbs.)

##### Production Rate:

This 154 Way CMC Header Assembly PCB Insertion Fixture assembles up to 40 header assembly/ PCB's per hour depending on the operator's skill.

#### 1.4. Delivery Check

Carefully remove the 154 Way CMC Header Assembly PCB Insertion Fixture and PCB rails from its shipping container. Check to see that following items are included in this package:

<u>Description:</u>	<u>Quantity</u>
62203-0500	PCB Insertion Fixture 1
TM-622030500	Instruction Manual 1

#### 1.5. Tools

The following tools are recommended for setup and adjustments to the tool:

1. Metric and standard hex wrench sets
2. 6 inch Adjustable wrench
3. Metric Deep Socket Set

### 1.6. Installation

Before attempting to operate the 154 Way CMC Header Assembly PCB Insertion Fixture, make sure it is in a well-lighted area and ample room around the fixture to allow easy loading and operation.

### 1.7 Products

Order No.		Description
34763-0001	34763-0005	Header Assembly 154 Way
34763-0006	34763-0008	
34763-0010	34763-0011	
34763-0012	34763-0013	
34763-0014	34763-0016	
34763-0017		
34763-0002		Header Assembly 106 Way
34763-0004		Header Assembly 101 Way
34763-0003	34763-0007	Header Assembly 53 Way
34763-0009	34763-0015	

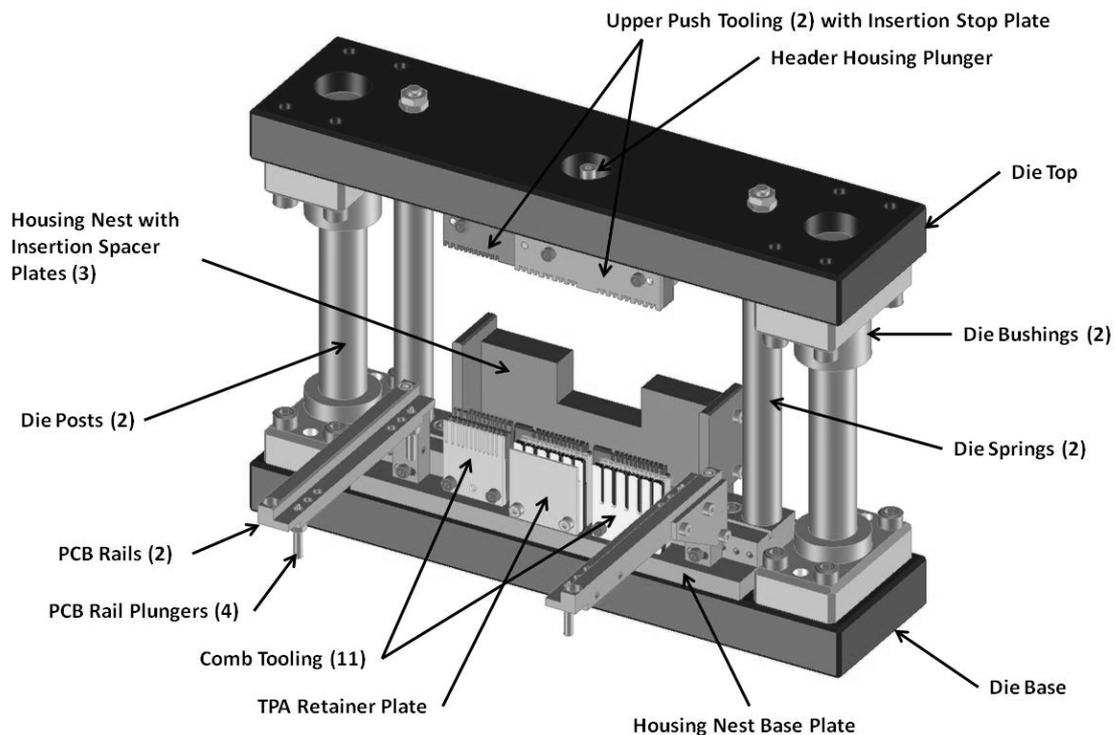
## Section 2

### Set-Up and Operation



Read the following instructions before attempting to operate this fixture.

Principal Mechanical Parts of the 154 Way CMC Header Assembly PCB Insertion Fixture.

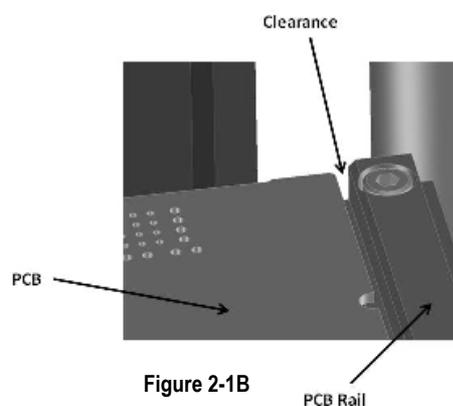
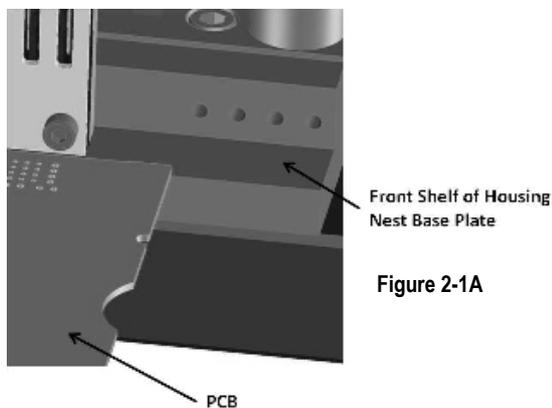


The 154 Way CMC Header Assembly PCB Insertion Fixture has been factory set with the exception of adjustments for PCB width and thickness more than 1.60mm. These adjustments need to be setup and are dependent on the PCB width and thickness. However, over time there may be some adjustments needed. Follow the steps below for initial setup and adjustments.

### 2.1 Initial Setup

#### PCB Rails

The PCB rail spacing position is dependent on the width of the PCB being inserted onto the header assembly. To setup PCB rail spacing:



1. Place PCB on front shelf of housing nest base plate and center PCB to tapped hole pattern on front face. The tapped holes on each side edge of the PCB are the selected holes for PCB rail mounting. See Figure 2-1A.
2. Attach the PCB rails to the selected tap holes of housing nest base plate using (2) M4x20 SHCS; but do not tighten.
3. Place the housing assembly into housing nest and fully seat. See Figure 2-3.
4. Place the PCB onto plungers of the PCB rails and onto compliant pin tips of header assembly.
5. Assess clearance between PCB and inside edges of PCB rails. This clearance should be approximately 2mm minimum to allow for adequate PCB float during PCB insertion. See Figure 2-1B.
6. Verify all (4) plunger positions for contact to underside of PCB. Avoid plunger contact with PCB components and cut out areas.

**PCB Insertion Seat Height**

The PCB insertion seat height is dependent on the thickness of the PCB being inserted onto the header assembly. The 154 Way CMC Header Assembly PCB Insertion Fixture has been factory set for PCB thicknesses of 1.50mm to 1.60mm. Reference Molex sales drawing SD-78007-012 for adequate compliant pin tip protrusion. To adjust the PCB insertion height for thicker PCB's:

1. The Insertion spacer plates (3) of 0.30mm thickness have been provided to account for thicker PCB's up to 2.40mm thick. These insertion spacer plates are attached to the back of the housing nest for storage purposes. See Figure 2-1C.
2. Remove appropriate number of spacer plates from back of housing nest to account for difference in PCB thickness from 1.50mm.
3. Remove insertion stop plate from upper tooling. Stack appropriate number of spacer plates onto top of insertion stop plate and reattach to upper tooling. Store any unused spacer plates on the back of the housing nest. See Figure 2-1C.
4. If no adjustments are necessary, proceed to Operation Section 2.4 and verify adequate compliant pin tip protrusion from PCB on first sample and ongoing desired sample frequency. If adjustments are necessary, complete adjustments and assess minimum pin tip protrusion afterwards.

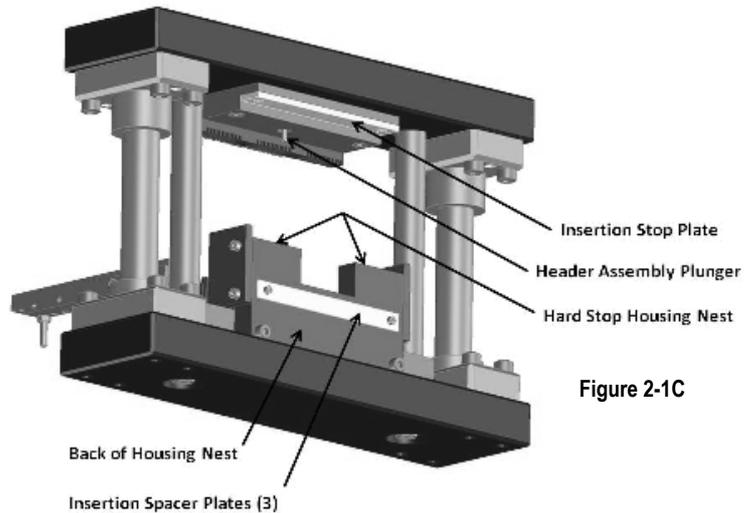


Figure 2-1C

**2.2 Adjustments**

**PCB Rail Plungers**

Each of the four PCB rail plungers can be installed in three different positions to accommodate variations in PCB geometry and components. To relocate a PCB rail plunger to another position:

1. Loosen the M5 nut on plunger from the PCB rail and select a new location.
2. Place plunger in new location and tighten the M5 nut. The Plunger tip should protrude approximately 4mm high from the rail surface. Since the plungers contact the bottom side of PCB, no adjustments are required due to PCB thickness.

**Header Housing Plunger**

The Header assembly plunger has been factory installed at approximately 8mm below upper tooling surface. The purpose of the plunger is to prevent any forward rocking of the header assembly during PCB insertion. To adjust plunger height:

1. Loosen the M10 nut on the plunger (located in hole of the top plate of fixture) using a deep metric socket. See Figure 2-1C and 2-2.
2. Rotate plunger to desired height and re-tighten the M10 nut.
3. Ensure end of plunger does not protrude higher than the top of the top plate surface, since this is the push surface for the press ram.

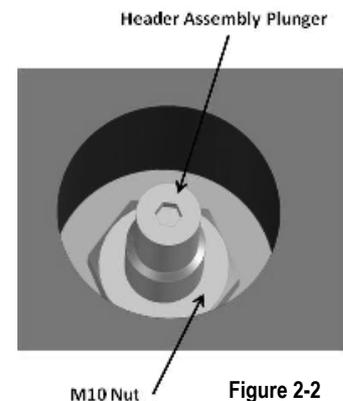


Figure 2-2

**2.3 Press Equipment Recommendations**

Many types of presses can be used with this fixture, but to assure consistent PCB insertion Molex recommends the following press criteria for optimum results:

1. The capability to detect force variations as low as 4.5kg (10 lb) during the press-in cycle; excessive force measurements should stop the press-in cycle.

2. The rate of pressing can be regulated as low as 0.13mm (0.005 in) per second.
3. Press stroke control to within 0.25mm (0.010 in).
4. Minimum force output of 20KN or 4500lbf.
5. Total press stroke must be at least 100mm (4.0 in).
6. For statistical purposes, automatic collection of force and distance data.

### 2.4 Operation

The 154 Way CMC Header Assembly PCB Insertion Fixture is intended to be used with a suitable press. See Press Equipment Recommendations Section 2.3.

1. Place the 154 Way CMC Header Assembly PCB Insertion Fixture with ram of press centered and biased to front of top plate of fixture.
2. Orient 154 Way Header Assembly in hand with compliant pin tips up and closest to operator.
3. Place header assembly bay openings against back stop of housing nest and slide header assembly downward to engage initial row of right angle bend compliant terminals to comb tooling. The housing nest has center area relief for fingers during initial header assembly loading. With two hands apply light pressure to fully seat header assembly into final position. When header assembly reaches final position, comb tooling will support all right angle compliant terminal shoulders and TPA retainer plate will cover header assembly TPA by approximately 5-6mm. This ensures header assembly position front to back. See Figure 2-4A.

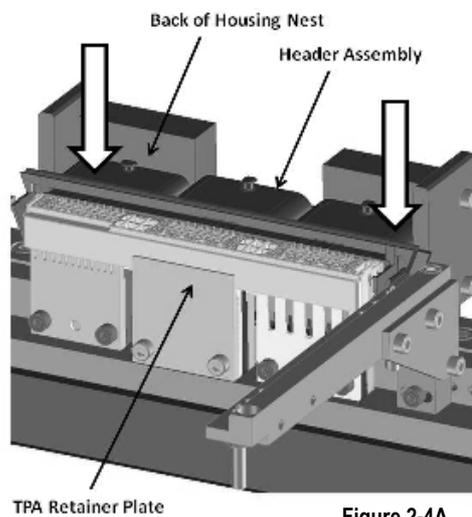


Figure 2-4A

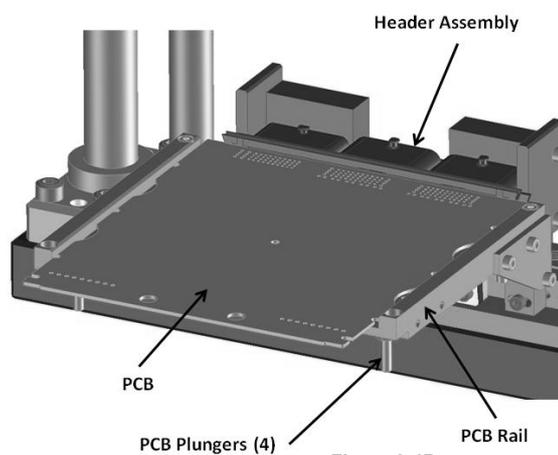


Figure 2-4B

4. Place PCB on plungers of PCB rails and all compliant pin tips. See Figure 2-4B.

**Note:** Visually verify compliant pin tips are in PCB holes to verify alignment of PCB to header assembly.

5.  Cycle the press so that the upper tooling contacts the top of hard stop of the housing nest. Failure to contact the hard stop will result in PCB insertion depth variation. See Figure 2-1C.
6. Verify the press and die set are fully up.
7. Remove the assembled PCB and header assembly by applying even upward force on the underside of PCB with fingers on each side of the header assembly until all rows of right angle bend compliant terminals have exited the comb tooling.



**Note:** The operator should use gloves during operation to protect all components on PCB and header assembly from contamination and discharge static.

## Section 3

### 3.1 Cleaning

For efficient operation, this tool should be cleaned daily with a soft bristle brush to remove any debris and plating dust from the comb tooling and housing nest area. For continuous operation this may have to be done several times throughout the day.

See Section 3.4 for recommended Preventive Maintenance Schedule.

When it is necessary to change tooling, care should be taken to remove any debris from tapped holes or mounting surfaces.



**Do not use** compressed air to clean the equipment.

The forces created by compressed air can force debris into the tool or fly at an operator.

Failure to observe these precautions may result in injury or property damage.

### 3.2 Lubrication

1. Lubricate the die bushings with multipurpose synthetic lubricant with Teflon or an equivalent. Molex recommends Permatex multi-purpose synthetic grease with Teflon No. 82329.



**WARNING:** Never use a penetrant such as WD40 for any lubrication on this tool.

2. Lubricate all points shown in Figures 3-1 with the specified grease (or equivalent).

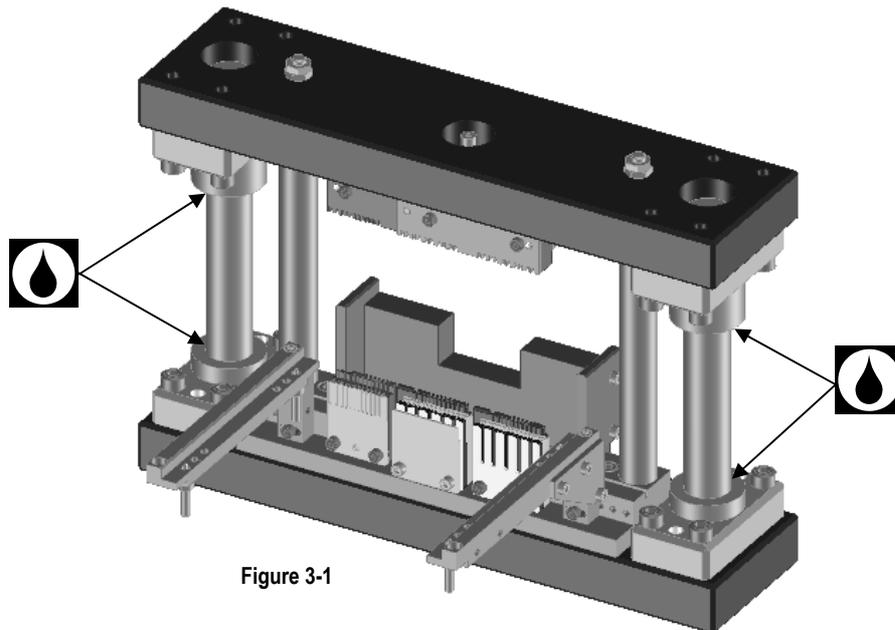


Figure 3-1

### 3.3 Perishable Parts

Customers are responsible for maintaining this tool. Perishable parts are those parts that come in contact with the product and will wear out over time. Molex recommends that all customers keep at least one set of the perishable tool kit in stock at all times. This will reduce the amount of production down time. These parts are identified in the parts list in Section 4.

### 3.4 Preventive Maintenance Chart

An example of a maintenance chart is shown below. Copy and use this chart to track the maintenance of your Press or use this as a template to create your own schedule or use your company's standard chart, if applicable.

**Daily:** Clean. See Section 3.1.

**Monthly:** Clean as necessary, See Section 3.1.

Lubricate sliding parts, See Section 3.2.

**CHECK SHEET** MONTH \_\_\_\_\_ YEAR \_\_\_\_\_

Week	Daily Clean	Days of the Week							Solution
		MON	TUE	WED	THU	FRI	SAT	SUN	
1									
2									
3									
4									
Cleaning Reapply grease	Yes								Soft Brush Industrial Degreaser
Inspect all tooling for wear	Yes								Replace if signs of wear.

Schedule should be adjusted up or down depending on usage. Molex recommends that a log of preventive maintenance be kept with the press.

### 3.5 Troubleshooting

Symptom	Cause	Solution
<b>Minimum Compliant Pin Protrusion Not Meet</b>	• Press not cycling completely to downward position.	Press not able to produce necessary downward force. See Press Equipment Recommendations Section 2.3.
	• Press not completely cycling to downward position.	Verify upper tooling is contacting hard stop of top of housing nest back stop. See Operation Section 2.4.
	• PCB too thick.	PCB thickness outside of range for fixture. Features Section 1.2.
	• Too many spacer plates in upper tooling.	Remove spacer(s) based on PCB thickness. See Initial Setup Section 2.1.
	• Debris in PCB Rails.	See Cleaning Section 3.1.
<b>Damage to Header Housing or PCB</b>	• PCB too thick.	Remove spacer plate(s) based on PCB thickness. See Initial Setup Section 2.1.
	• Header Assembly not fully seated in housing nest.	See Operation Section 2.4 Debris in comb tooling. See Cleaning Section 3.1.
	• Compliant pin(s) not in PCB holes.	Header Assembly to PCB Alignment incorrect. See Operation Section 2.4.
	• Damaged Comb Tooling.	See Perishable Parts Section 3.3.

## Section 4

## 4.1 Parts List

62203-0500 154 Way CMC Header Assembly PCB Insertion Fixture					
Item	Order No.	Engineering No.	Description	Perishable	Qty
1	62203-0501	62203-0501	Housing Nest Base Plate		1
2	62203-0502	62203-0502	Pin Combing Plate Bay YZ Row 1	Perishable	2
3	62203-0503	62203-0503	Pin Combing Plate Bay YZ Row 2-3	Perishable	2
4	62203-0504	62203-0504	Pin Combing Plate Bay-YZ Row 4	Perishable	2
5	62203-0505	62203-0505	Pin Combing Plate Bay-YZ Row 5	Perishable	2
6	62203-0506	62203-0506	TPA Retainer Plate		1
7	62203-0507	62203-0507	Pin Combing Plate Bay-X Row 1	Perishable	1
8	62203-0508	62203-0508	Pin Combing Plate Bay-X Row 2-3	Perishable	1
9	62203-0509	62203-0509	Pin Combing Plate Bay-X Row 4	Perishable	1
10	62203-0510	62203-0510	Push Plate Row 1-4		1
11	62203-0511	62203-0511	Push Plate Row 5		1
12	62203-0512	62203-0512	Housing Nest Back Stop		1
13	62203-0513	62203-0513	Housing Side Guide		2
14	62203-0514	62203-0514	Upper Mounting Block		1
15	62203-0515	62203-0515	PCB Rail Upright		2
16	62203-0516	62203-0516	PCB Rail		2
17	62203-0517	62203-0517	Brace		2
18	62203-0518	62203-0518	Insertion Stop Plate		1
19	62203-0519	62203-0519	Spacer Plate		3
20	62203-0521	62203-0521	Die Top		1
21	62203-0522	62203-0522	Die Base		1
22	63600-3988	63600-3988	Spring Plunger M5		4
23	63600-3989	63600-3989	Housing Spring Plunger M10		1
24	63600-3990	63600-3990	Threaded Rod M8 by 250 Long		2
25	63600-3991	63600-3991	Guide Post Set		2
26	63700-6016	63700-6016	Compression Spring		2
Hardware					
27	N/A	N/A	M3 by 6 Long SHCS		2**
28	N/A	N/A	M3 by 8 Long SHCS		2**
29	N/A	N/A	M4 by 12 Long SHCS		6**
30	N/A	N/A	M4 by 14 Long SHCS		6**
31	N/A	N/A	M4 by 20 Long SHCS		9**
32	N/A	N/A	M4 by 25 Long SHCS		2**
33	N/A	N/A	M6 by 25 Long SHCS		2**
34	N/A	N/A	M6 by 30 Long SHCS		4**
35	N/A	N/A	4mm by 10 Long Dowel		1**
36	N/A	N/A	4mm by 12 Long Dowel		2**
37	N/A	N/A	4mm by 18 Long Dowel		3**
38	N/A	N/A	6mm by 16 Long Dowel		4**
39	N/A	N/A	M5 Hex Nut		4**
40	N/A	N/A	M8 Hex Nut		6**
41	N/A	N/A	M10 Hex Nut		1**
** Available from an industrial supply company such as MSC (1-800-645-7270).					

### 4.2 Assembly

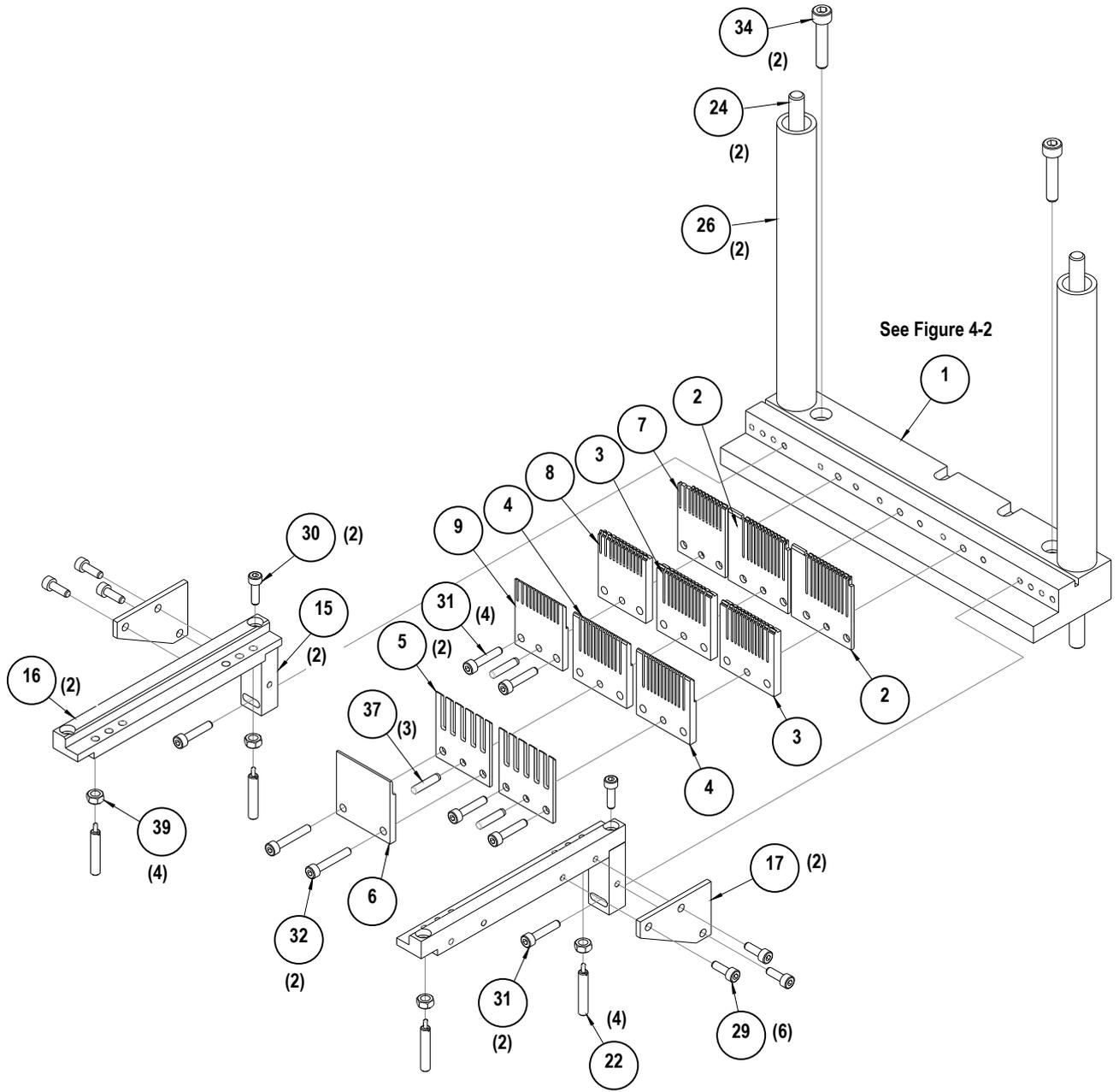
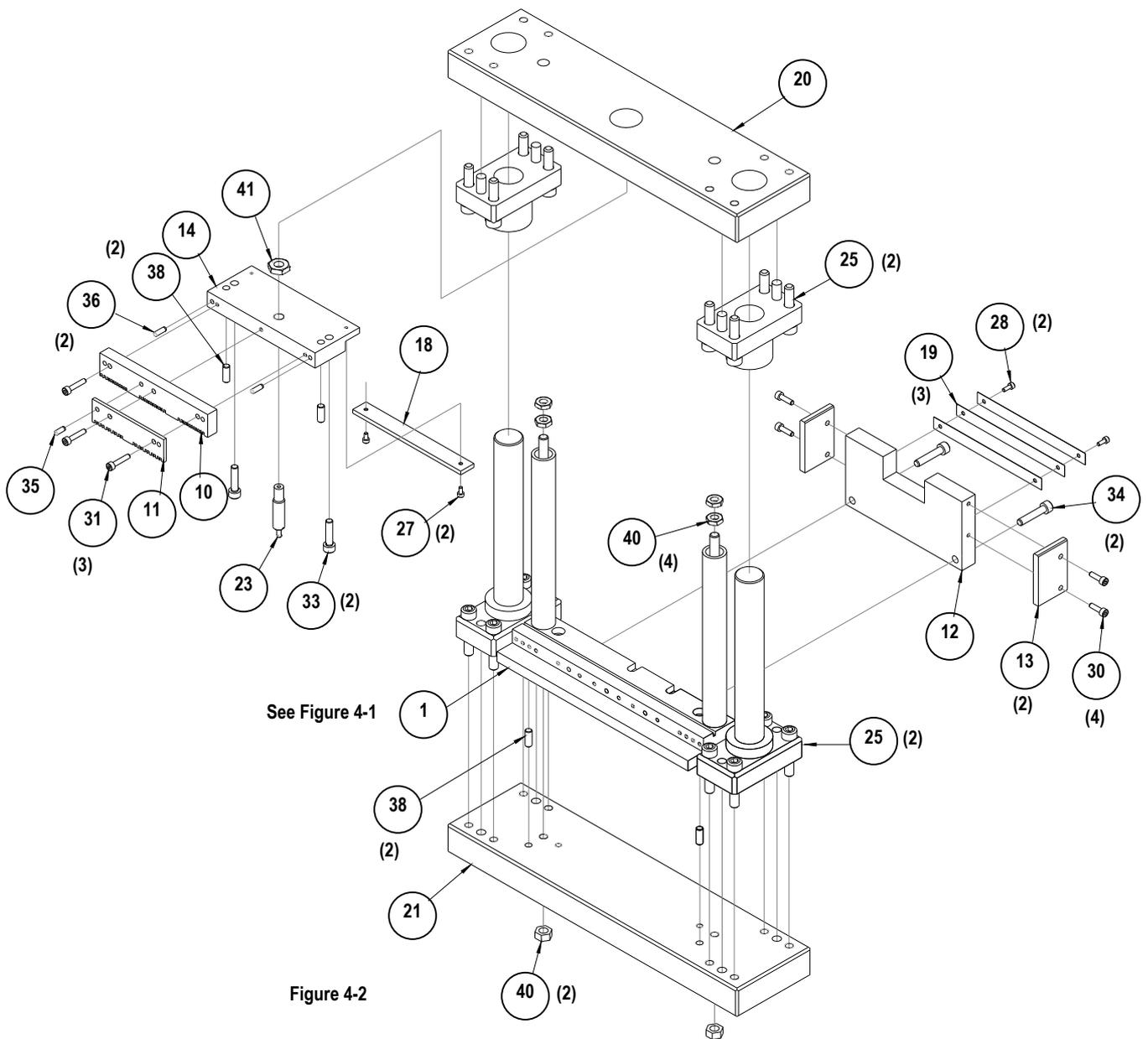


Figure 4-1

4.2 Assembly (Cont.)



<http://www.molex.com>