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## 1.0 OBJECTIVE

This specification provides information and requirements regarding customer application of Metral™ B series right angle solder to board receptacles. This specification is intended to provide general guidance for process development. It is recognized that no single process will work under all customer applications and that customers will develop their processes to meet their needs. However, FCI cannot guarantee results if these processes vary from the recommendations.

## 2.0 SCOPE

This specification provides information and requirements regarding customer application of Metral™ B series right angle solder to board receptacles.

## 3.0 REFERENCE DOCUMENTS

Any applicable product drawing  
 GS-12-002, Metral™ Connector System  
 GS-20-001, Attachment Specification for Metral™ Connectors

## 4.0 GENERAL

This document is meant to be an application guide. If information varies from that in the product drawings and specifications, the drawings and specifications take precedence.

This document contains the following sections:


<u>Paragraph</u>	<u>Title</u>	<u>Page</u>
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### 4.1 Banned/Restricted Substances

All product where the part number ends in 'LF' meet the European Union directives and other country regulations as described in GS-22-008. The part numbers that do not end in 'LF' meet all regulations except for Pb in SnPb plating.

### 4.2 Manufacturing Processability

All products covered by this specification will withstand exposure to 260°C for 60 seconds in a convection, infra-red or vapor phase reflow oven.

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## 5.0 APPLICATION INFORMATION

### 5.1 General Product Information

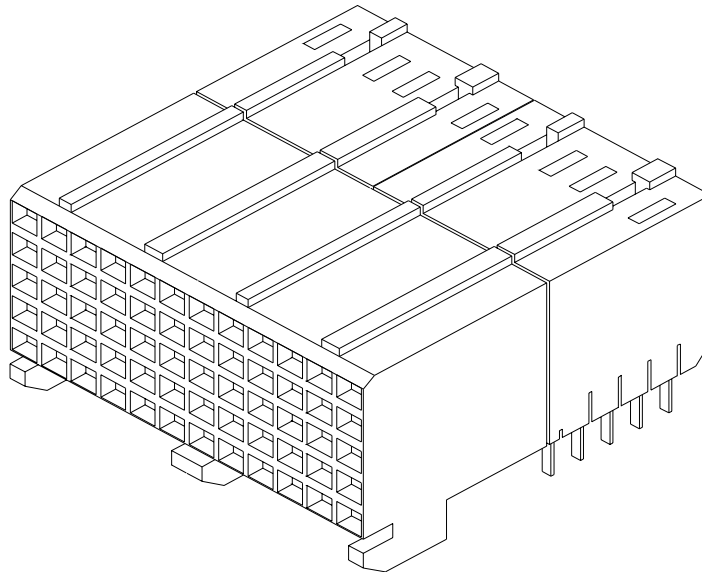


Figure 1: 5 row right angle solder to board signal receptacle

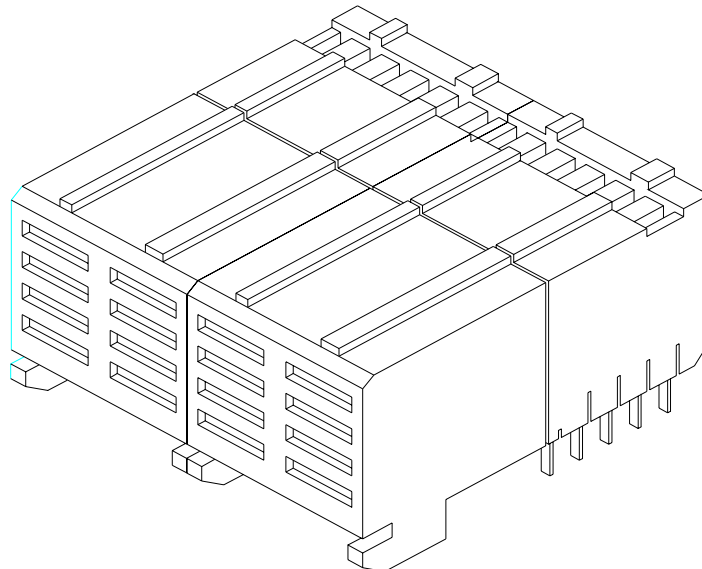



Figure 2: 4 row right angle solder to board power receptacle

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**5.1.1 Press peg, heat stake peg, and location peg information**

The right angle solder to board receptacle has two options for board retention. These options include a press peg or a heat stake peg as shown in Figure 2. The press peg is designed to provide an interference fit with the corresponding hole in the PCB. This designed interference provides the retention of the connector to the board. The heat stake peg initially has no interference with the corresponding hole in the PCB. After it is properly applied to the PCB, the heat stake peg must be hot riveted so it will function properly. Figure 3 shows an example of what the heat stake peg should look like after the hot riveting process.

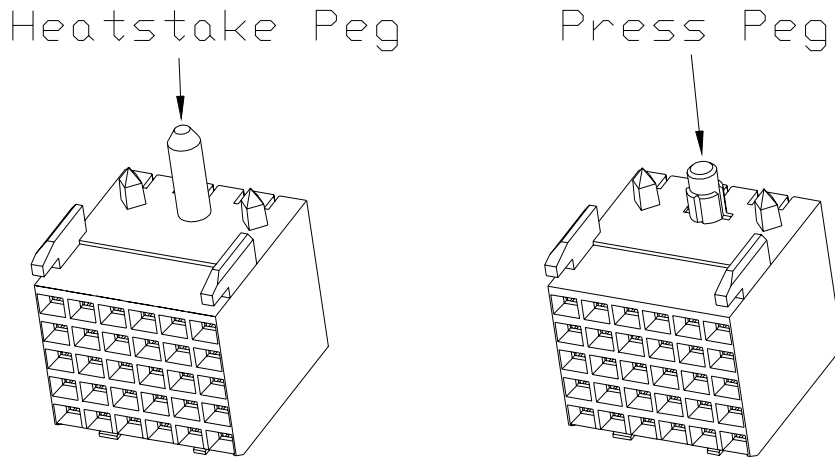


Figure 2: Press peg and heat stake peg for the right angle solder to board receptacle

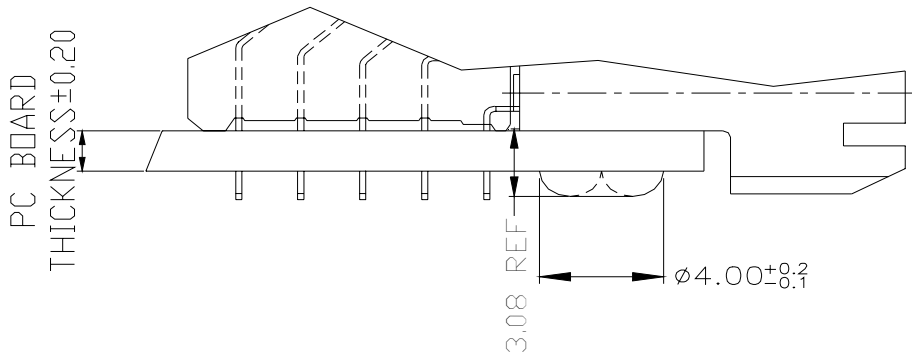



Figure 3: Heat stake peg after hot riveting process

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The heat stake pegs and press pegs have two purposes. First, the pegs provide retention to the PCB during subsequent board assembly processes. Secondly, these pegs absorb the loading from mating and handling, thus protecting the solder joints from being exposed to forces.

Adjacent to the heat stake or press peg are two location pegs. These pegs serve a dual purpose. First, they help to locate the connector to the PCB as well as adjacent connectors. Second, they serve as a retention feature during the heat staking process.

### 5.1.2 Component masses:


Table 1: Approximate mass of components (in grams)

<b>4 row</b>	<b>1 mod</b>	<b>2 mod</b>	<b>4 mod</b>	<b>8 mod</b>
Housing (plastic)	1.18	2.36	4.72	9.44
Press block (plastic)	0.91	1.82	3.64	7.28
Total assembly	3.56	7.12	14.24	28.48
<b>5 row</b>	<b>1 mod</b>	<b>2 mod</b>	<b>4 mod</b>	<b>8 mod</b>
Housing (plastic)	1.37	2.74	5.48	10.96
Press block (plastic)	1.35	2.70	5.40	10.80
Total assembly	4.58	9.16	18.32	36.64

### 5.1.3 Application forces:

For a press peg connector assembly the number press pegs will determine the force required to properly apply the assembly to the board before soldering. The recommended insertion force for each press peg is 267 N (60 lbf).

For a heat stake peg connector assembly the number location pegs will determine the force required to properly apply the assembly to the board before hot riveting. The recommended insertion force for each location peg is 53 N (12 lbf).

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## 5.2 Available Product Features

The features of right angle solder to board B-style Metral™ receptacle connectors include:

- Standard module size is 12 mm.
- 4 row and 5 row configurations are available.
- Each 4 row 12mm module contains 24 signal terminals or 8 power terminals.
- Each 5 row 12mm module contains 30 signal terminals or 10 power terminals.
- Signal terminals are located on a 2 mm x 2 mm grid for high signal density.
- 1, 2, 4, and 8 module connectors are standard. Other sizes are available.
- Standard tail lengths include 2.73mm (for use with a 1.6mm nominal thickness PCB) and 3.53mm (for use with a 2.4mm nominal thickness PCB)
- Terminals may be selectively loaded.
- Available accessories which are end-to-end stackable include guide, keying, DIN power, and Din coax.

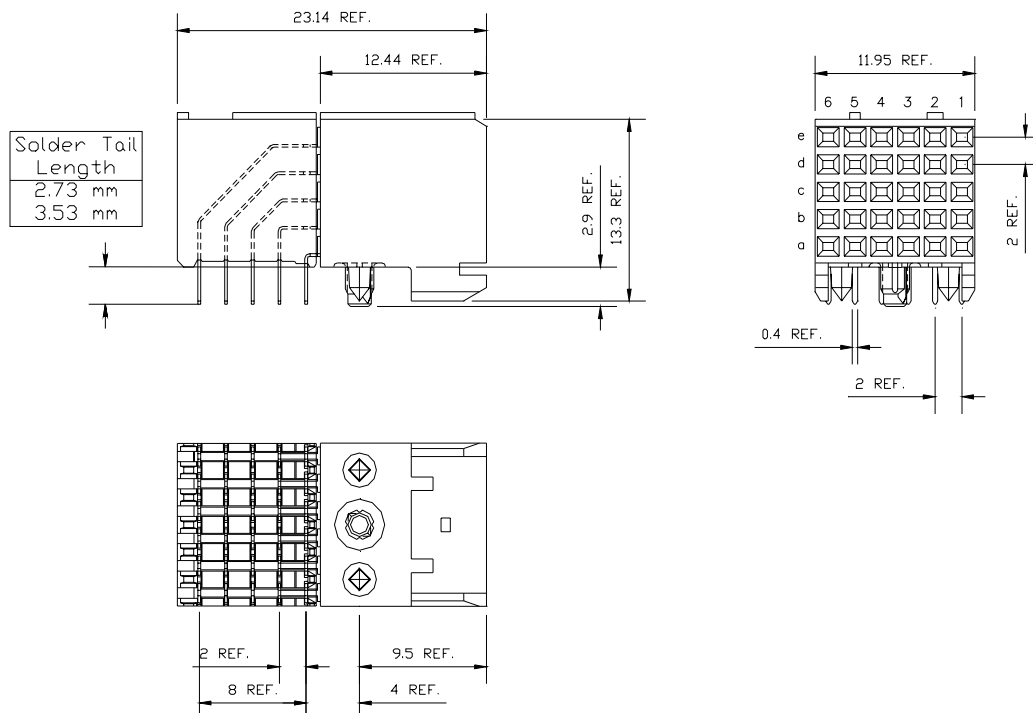



Figure 4: Right angle solder to board 5-row signal receptacle (all dimensions in mm)

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### 5.3 PCB Requirements

The features that are important to define on the printed circuit board when using press fit technology are:

- Drilled hole diameter
- Plated hole diameter
- Plating type in thru hole
- Printed circuit board thickness
- Land/pad size

The recommended values are shown on customer drawing 58351, and a sketch showing these features is shown in Figure 5.

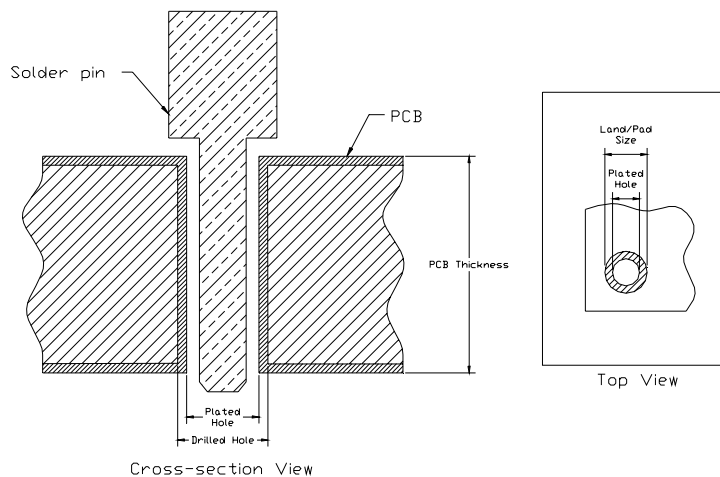



Figure 5: Critical features of PCB design for Metral™ Connectors.

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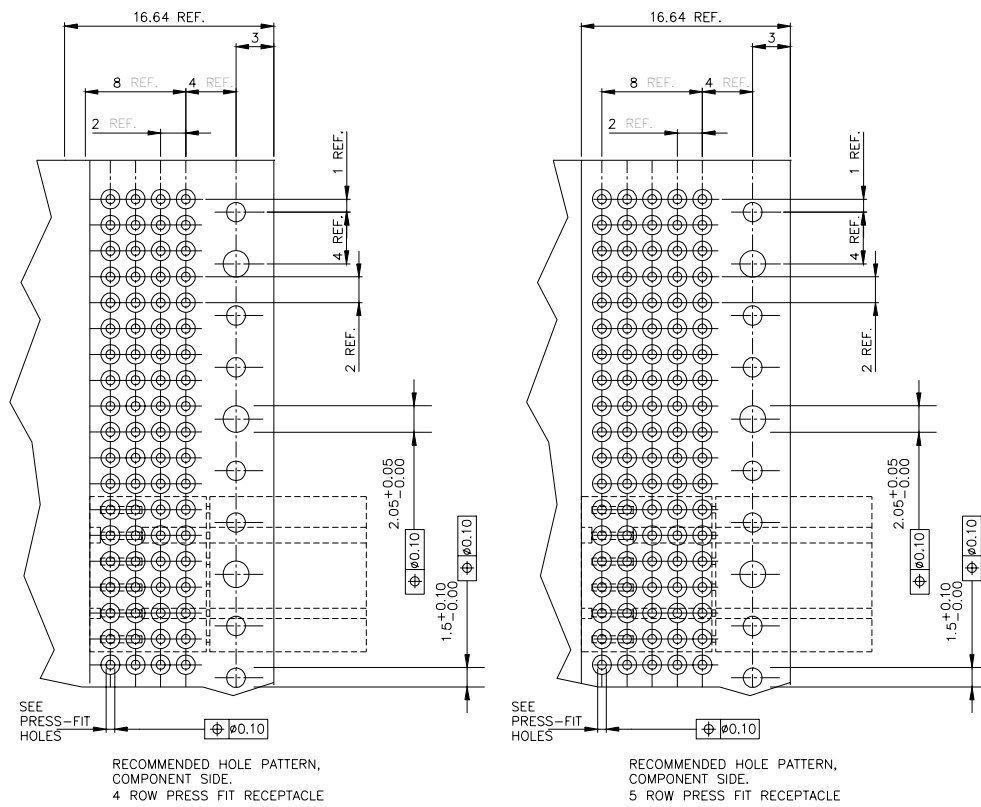



Figure 6: Board layout for right angle solder to board receptacles (all dimensions in mm)

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The preferred spacing for Metral™ connectors is on 12 mm centerlines. This enables the use of standard tooling for applying the receptacles to the PCB. There is also a recommended keep-out zone for other components to allow room for application tooling as shown in Figure 9. This keep-out zone applies to both the top and bottom sides of the PCB.

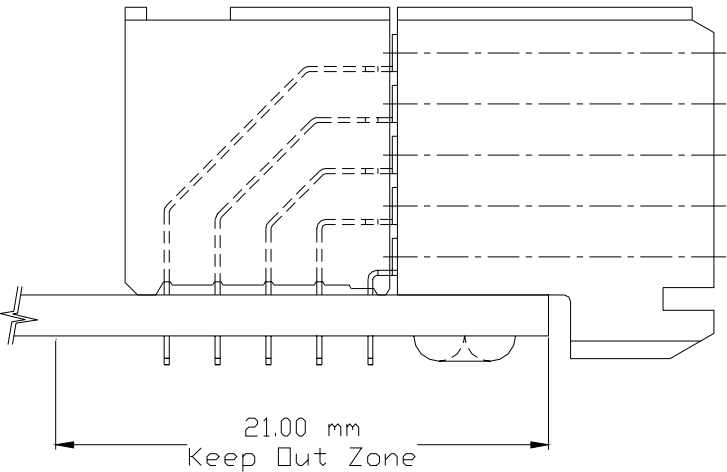



Figure 7: Recommended keep-out zone for components around receptacles



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5.4 Customer Application Machines (CAMS)

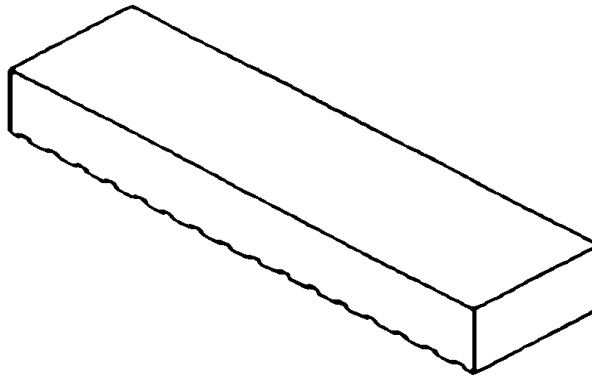
**5.4.1 Insertion Tooling**

All Metral™ 4 and 5 row right angle receptacles (power and signal) can be installed with the same type of tooling. The top tool is a modified “flat rock” press bar. The bottom tool serves as a board support during insertion and is cleared out in the areas that the tails protrude through the PCB.


**TOP TOOL (PRESS BAR), P/N 162325-XXX**

If all Metral™ modules to be inserted are located on 12mm centerlines, a standard press bar can be used. Spacing between Metral™ connectors other than an even increment of 12 mm requires a custom top tool.

STANDARD TOP TOOL PART NUMBERS:

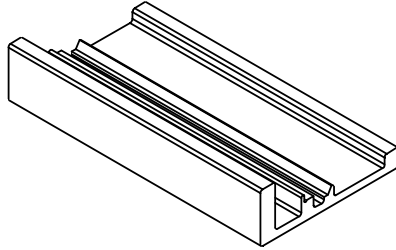


- 162325-001** (8 modules max)
- 162325-002** (12 modules max)
- 162325-003** (21 modules max)

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**BOTTOM TOOLS (BOARD SUPPORT), P/N 162383-XXX**

Board insertion options include customer developed board supports, PCB's with oversized holes, or FCI produced bottom tools. The bottom tools can be cut to the length needed.

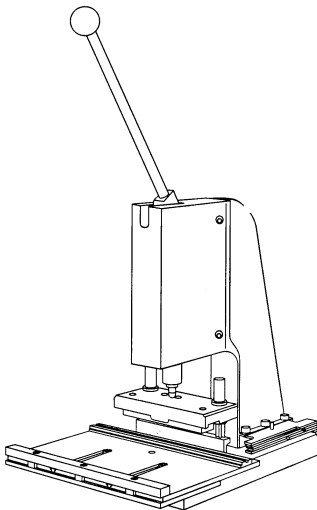



STANDARD BOTTOM TOOL PART NUMBERS:

	<u>LENGTH (mm)</u>	<u>LENGTH (in)</u>
<b>162383-001</b>	146.8	5.780
<b>162383-002</b>	194.8	7.669
<b>162383-003</b>	302.8	11.921
<b>162383-004</b>	457.2	18.000
<b>162383-005</b>	609.6	24.000

**MT-510 MANUAL PRESS, P/N 162452-001**

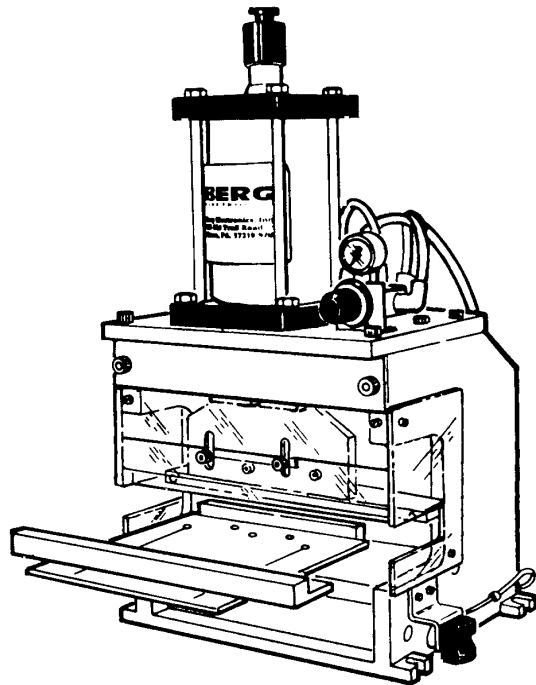
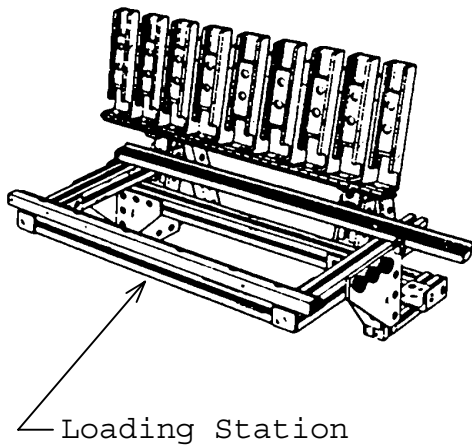
The MT-510 press can insert up to 128 press-fit pins in one stroke.




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**MT-511 PNEUMATIC PRESS, P/N 166380-001 & LOADING STATION, P/N 166505-001**

The MT-511 is a pneumatic press that can terminate up to 21 modules per machine cycle. The optional loading station is used to stage the connectors prior to insertion.

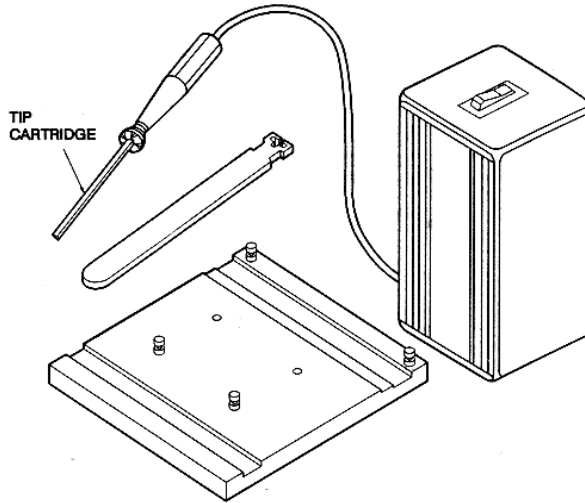


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### 5.4.2 Heat Stake Tooling

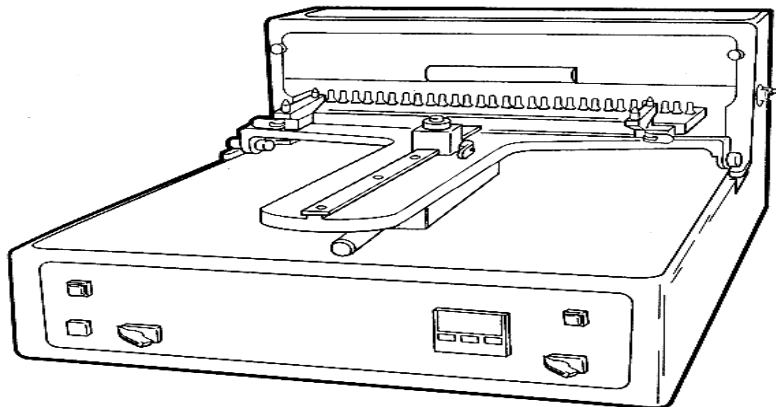
#### MT-120 HEAT STAKE HANDTOOL, P/N 160508-001


The MT-120 is a hand held single heat stake tool.



#### MT-130 MULTIPLE HEAT STAKE BENCH TOOL, P/N 160509-001

The MT-130 terminates up to 32 heat stake pegs per cycle.



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### 5.5 Post-Installation Inspection Criteria

#### **Missing or non-conforming heat stake or press pegs:**


On any connector, press pegs may be missing or not conforming to the requirements provided that they are bounded on either side by two press pegs that are conforming. The outer two press pegs on either end of the connector must conform to production requirements.

#### **Gap between bottom surface of receptacle housing and top surface of PCB:**

In order to decrease the risk of interference between mating connector parts during insertion of the circuit board into the shelf system, it is desirable to not have a gap larger than 0.2mm (.008in) between the bottom surface of the connector receptacle housing and the top surface of the PCB.

#### **Mixed Connectors:**

In applications where this Metral connector system is positioned on a PCB adjacent to another Metral connector system (Metral 1000, Metral 2000, Metral EE, etc.), the allowable vertical misalignment between the housing windows of the two products is 0.3mm (.012in) maximum.

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**REVISION RECORD**

REV	PAGE	DESCRIPTION	EC #	DATE
A	All	New Release	V90701	03/19/99
B	All	Revised format to be consistent with GS-01-001, and change BERG, Dupont, etc. references to FCI.	V01922	08/07/00
C	All	Extensive revisions including removal of performance specifications, part number tables, and order forms; added location peg force requirement of 12 lb; added post-installation inspection criteria	V11863	12/28/01
D	All	Add lead free options	V05-0936	10/31/05