	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
	TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles	PAGE 1 of 1	REVISION B
		AUTHORIZED BY Ray Doutrich	DATE 07 Aug 00
CLASSIFICATION UNRESTRICTED			

1.0 OBJECTIVE

To provide information on available product features and customer application considerations for Metral™ right angle solder to board power receptacles.

2.0 SCOPE

This application spec provides regarding product features, customer application machines (CAM's), and customer use.


3.0 GENERAL

3.1 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.

3.2 This document contains the following sections:

<u>Paragraph</u>	<u>Title</u>	<u>Page</u>
1.0	Objective	1
2.0	Scope	1
3.0	General	1
4.0	Procedure	2
4.1	Introduction	2
4.2	General Information	3
4.3	Part Information	5
4.4	Materials	5
4.5	PCB Requirements	6
4.6	Customer Design Considerations	8
4.7	CAM's (Customer Application Machines)	9
4.7.1	Receptacle Insertion Tooling	9
4.7.2	Heat Stake Tooling	12
4.8	Order Forms	13
5.0	Reference Documents	14
6.0	Record Retention	14
7.0	Notes	14

4.0 PROCEDURE

	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
	TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles	PAGE 2 of 2	REVISION B
		AUTHORIZED BY Ray Doutrich	DATE 07 Aug 00
CLASSIFICATION UNRESTRICTED			

4.1 Introduction

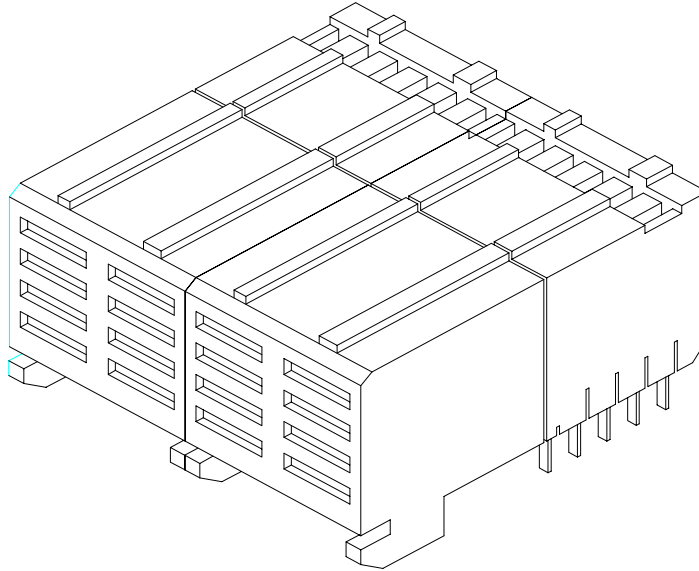



Figure 1 - Isometric view of right angle solder to board receptacle.

The right angle solder to board Metral™ receptacle may be soldered to the PCB by a number of different processes. These soldering processes include wave, IR, and vapor phase soldering. On the underside of the connector are two locating pegs. These pegs serve a dual purpose. First, they help to locate the connector to the PCB, as well as to adjacent connectors. Second, they serve as a retention feature during the heatstaking process.

The right angle solder to board receptacle has two options for board retention. These methods include using a press peg or a heatstake peg as shown in Figure 2. The press peg is designed to provide an interference fit with the corresponding hole in the PCB. The designed interference provides the retention of the connector to the board. The heatstake peg is designed so that it can be hand inserted to the PCB. Once placed on the PCB, the peg must be heatstaked. Figure 3 shows an example of what the heatstake peg should look like after hot riveting. After the hot riveting process, the peg is riveted such that it is larger than the hole in the PCB. Therefore, holding the receptacle in position. These retention designs have two purposes. First, the pegs provide retention to the PCB during the board assembly processes. Secondly, these pegs absorb the loading from mating and handling, thus protecting the solder joints from being exposed to forces.

	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
	TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles	PAGE 3 of 3	REVISION B
		AUTHORIZED BY Ray Doutrich	DATE 07 Aug 00
CLASSIFICATION UNRESTRICTED			

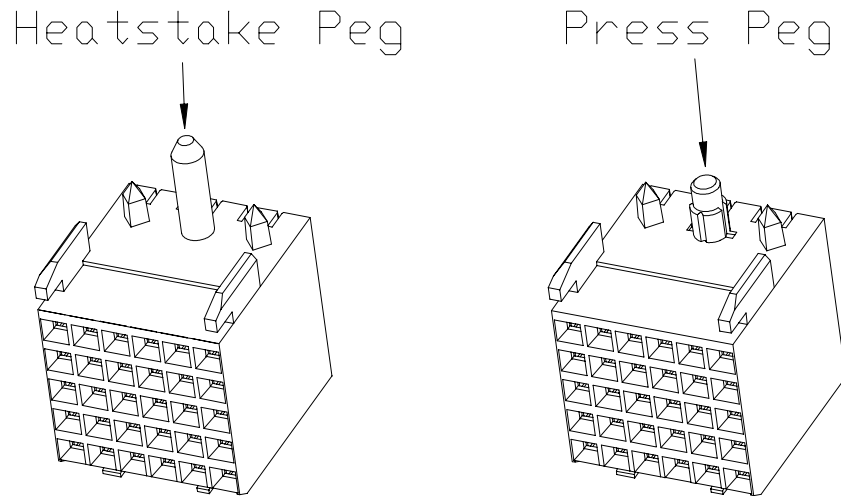


Figure 2 - Press Peg and Heat stake Peg for the right angle solder to board receptacle.

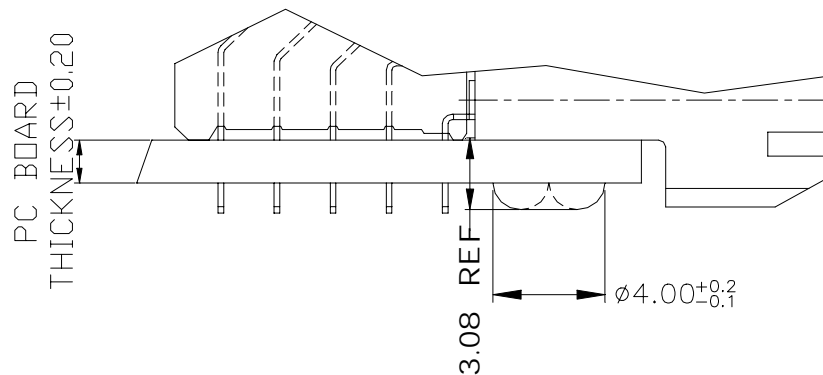



Figure 3 - Example of heat stake peg after heat staking.

4.2 General Information

The right angle solder to board Metral™ power receptacle is available in 4 and 5 row configurations. The features of this connector are:

- Modular building block based off 12 mm standard modular size (e.g. 4 x 2 & 5 x 2 modules are 12 mm long).
- The contacts are located on a 2 mm x 2 mm grid for high signal density.

	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
	TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles	PAGE 4 of 4	REVISION B
		AUTHORIZED BY Ray Doutrich	DATE 07 Aug 00
CLASSIFICATION UNRESTRICTED			

- Sizes available in 1 module size (12 mm).
- Stackable with other Metral™ products (e.g., signal, coax, guide pin).
- Customer specific select load. See tables 6 & 7.
- Current Rating
 - 8 A for a single contact.
 - 3 A when all contacts are powered.
- Dielectric Withstanding Voltage of 1000 V rms (at sea level).
- Insulation Resistance of 5000 MW minimum initially; 1000 MW after environmental testing.

Table 1 - Length and part numbers for all of the available right angle solder to board receptacles.

Number of Modules	Length (mm)	4 Row PN Std Load		4 Row PN Select Load	5 Row PN Std Load		5 Row PN Select Load
		Heatstake Peg	Press Peg		Heatstake Peg	Press Peg	
1	12	70231-XY2	89039-XY2	85871-X0Z	85810-XY2	85876-XY2	85788-XYZ


- The X & Y in the suffix stand for the following:
 - X – Contact Area Finish (Plating)
 - Y – Tail Length After Assembly

Table 2 - The plating thickness with its specification and the suffix for ordering.

Plating Thickness	Suffix	Specification
30 μ in (0.8 μ m) Gold	- 1YY	IEC class II
50 μ in (1.3 μ m) Gold	- 3YY	IEC class I
80 μ in (2.0 μ m) Gold	- 2YY	Telecom class
30 μ in (0.8 μ m) GXT	- 9YY	IEC class II

Table 3 - Suffix's for right angle solder to board standard loaded receptacles.

Suffix	Tail Length	PCB Thickness
- X02	2.73	1.6 mm
- X12	3.53	2.4 mm

	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
	TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles	PAGE 5 of 5	REVISION B
		AUTHORIZED BY Ray Doutrich	DATE 07 Aug 00
CLASSIFICATION UNRESTRICTED			

4.3 Part Information

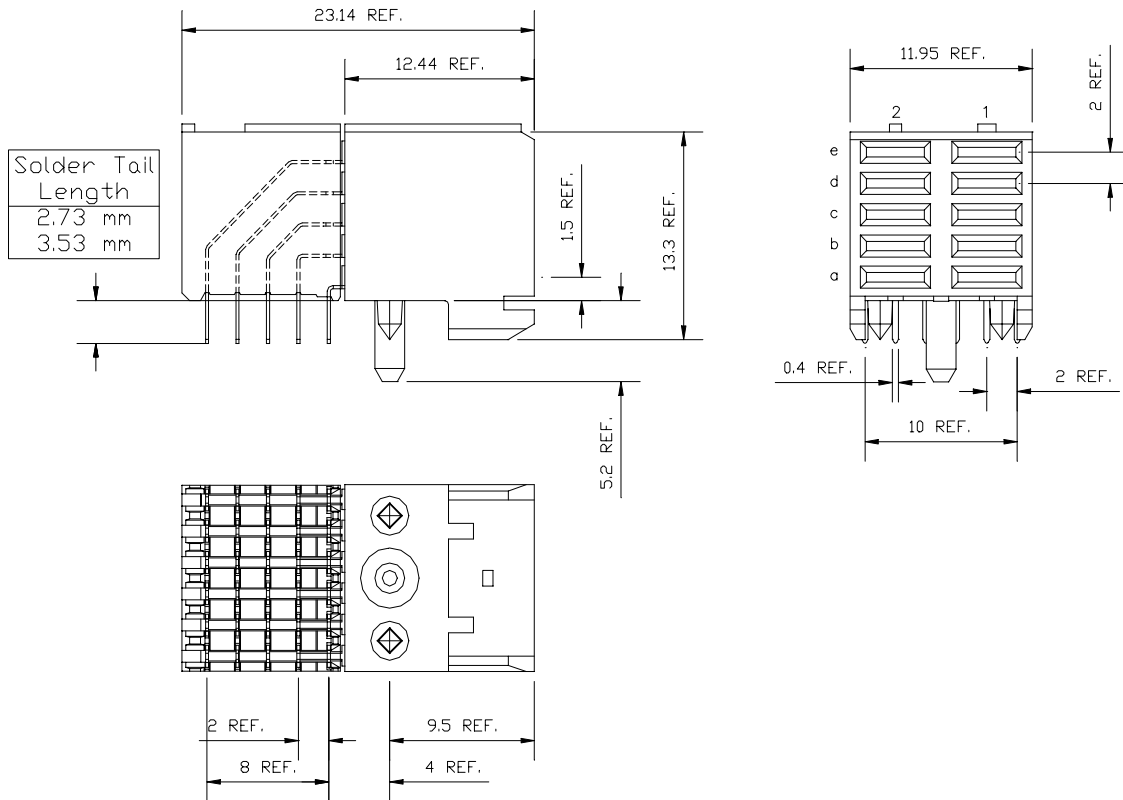


Figure 4 - Right angle solder to board 5-row power receptacle. (All dimensions in mm)

- Mating and Unmating Forces
- The maximum mating force required to plug a receptacle into a header is 1.5 N/contact (0.35 lbf). For example, part number 70231, which has a 4 x 2 pin matrix, has a maximum mating force of 12 N (2.7 lbf) (1.5 N/contact * 8 contacts).
- The minimum unmating force required to unplug a receptacle from a header is 0.30 N/contact (0.034 lbf). For example, part number 70231 has a minimum retention force of 7.2 N (1.62 lbf) (0.30 N/contact * 24 contacts).
- Board Application Forces
- The press peg product requires a maximum of 267 N/peg (60 lbf/peg) to seat the connector to the PCB. Typical forces range from 200 N to 220 N (45 lbf to 50 lbf). The press peg has a minimum retention force of 90 N/peg (20 lbf).

4.4 Materials

- Housing material is 30% glass filled LCP (Liquid Crystal Polymer). It has an oxygen index of 38. The mass for the receptacle is shown in Table 4.


	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
	TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles	PAGE 6 of 6	REVISION B
		AUTHORIZED BY Ray Doutrich	DATE 07 Aug 00
CLASSIFICATION UNRESTRICTED			

Table 4 - Mass of right angle power receptacles.

RA Power Receptacles	4 x 6	4 x 12	4 x 24	4 x 48
Housing (plastic)	1.07	2.14	4.28	8.56
Press Block (plastic)	0.91	1.82	3.64	7.28
Total Ass'y	3.69	7.38	14.76	29.52
	5 x 6	5 x 12	5 x 24	5 x 48
Housing (plastic)	1.13	2.26	4.52	9.04
Press Block (plastic)	1.35	2.70	5.40	10.80
Total Ass'y	4.72	9.44	18.88	37.76

- Contacts are made out of Phosphor Bronze.
- The mating area on the contact can be plated with gold or GXT (Palladium-Nickel alloy with gold flash). Refer to Table 2 for the various plating options.

4.5 PCB Requirements

The features that are important to define on the printed circuit board are:


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

For Metral™, the recommended features are shown in Table 5.

Table 5 - Recommended features for Metral™ PCB.

Feature	Dimension	
	mm	in
Drilled hole diameter	0.81 - 0.86	0.0319 - 0.0339
Recommended drill	0.85	0.0335
Plated hole diameter	0.65 - 0.80	0.0256 - 0.0315
Min. copper plating	0.025	0.00098
Tin/Lead plating (optional)	0.005 - 0.015	0.00019 - 0.00059
Min PCB thickness	1.57 ±10%	0.0618 ±10%
Max PCB thickness	2.4 ±10%	0.0945 ±10%
Land/Pad size	1.17	0.0461

- The recommended drill will enable the PF header to be used in the same hole size as the STB header.
- Figure 5 shows the important features of the PCB.
- Refer to Figure 6 for PCB layout.

	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
	TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles	PAGE 7 of 7	REVISION B
		AUTHORIZED BY Ray Doutrich	DATE 07 Aug 00
CLASSIFICATION UNRESTRICTED			

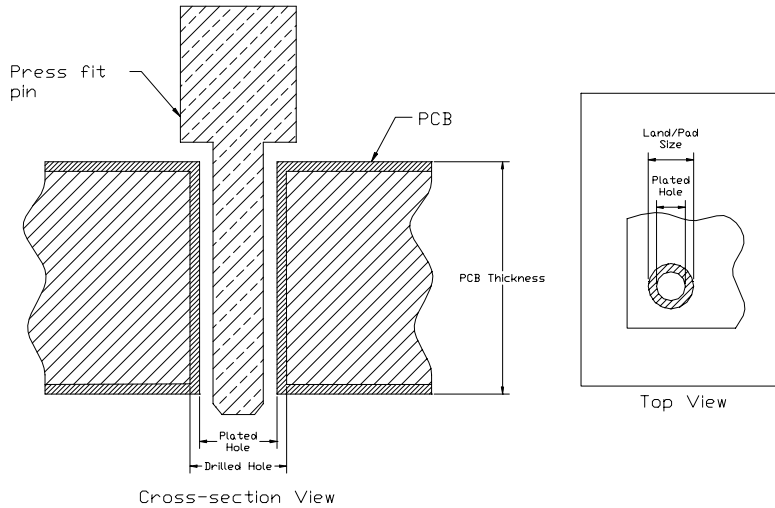


Figure 5 - Important features of PCB design for Metral™ Connectors.

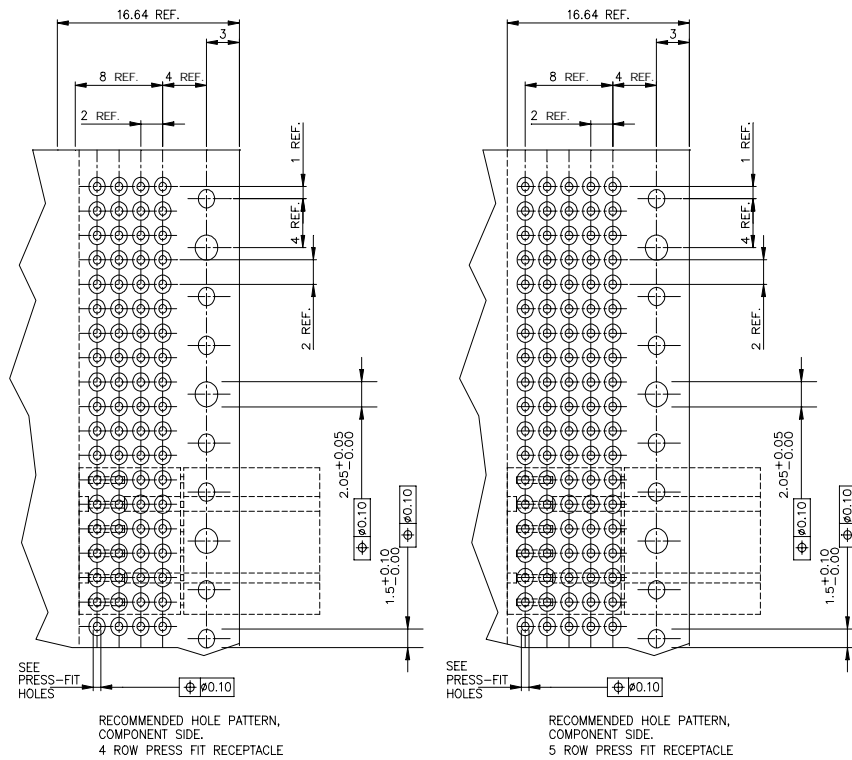



Figure 6 - Required board layout for right angle solder to board signal receptacle. (All dimensions in mm)

4.6 Customer Design Considerations

	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066		
	TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles	PAGE 8 of 8	REVISION B	
		AUTHORIZED BY Ray Doutrich	DATE 07 Aug 00	
		CLASSIFICATION UNRESTRICTED		

- Preferred receptacle placement is on 12 mm centers. This enables the use of standard tooling for applying receptacles to the PCB.
- The bulk resistance will vary from row to row. The maximum bulk resistance is 10 mW/contact. The typical values of bulk resistance is given in the table in Figure 7.

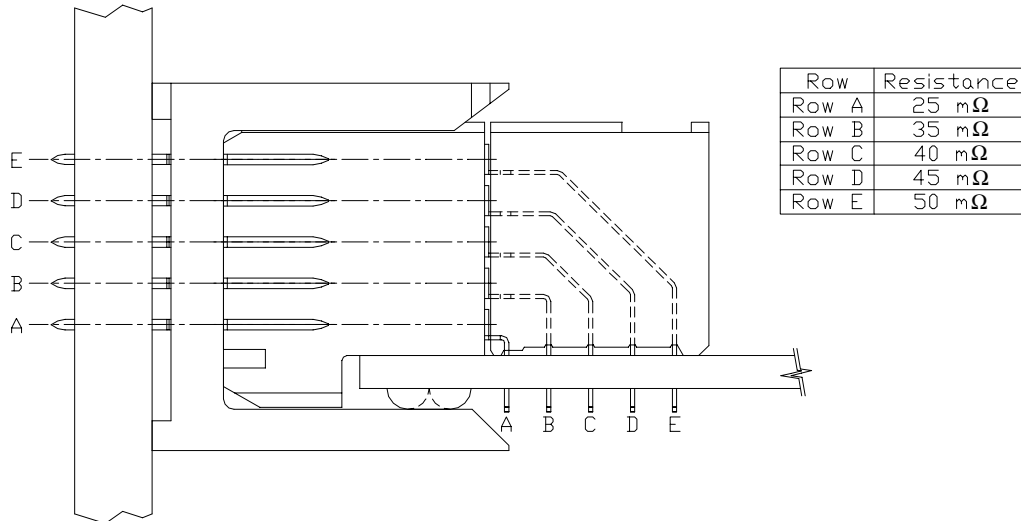


Figure 7 - Mated header and receptacle showing maximum bulk resistance per row.

- To enable the application of receptacles, there is a recommended keep out zone for components. Refer to Figure 8 for the recommended keep out zone.

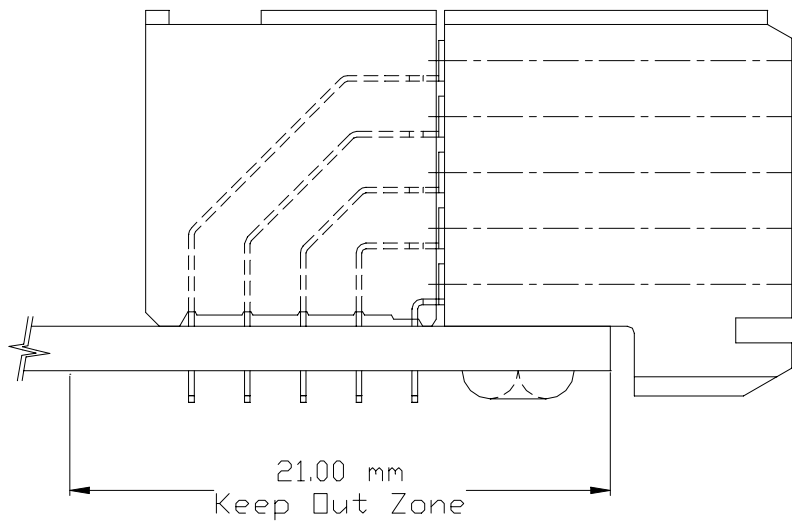



Figure 8 - Keep out zone for components around receptacles.

4.7 CAM's

4.7.1 Receptacle Insertion Tooling

	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
	TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles	PAGE 9 of 9	REVISION B
AUTHORIZED BY Ray Doutrich		DATE 07 Aug 00	
CLASSIFICATION UNRESTRICTED			

All Metral™ 4 and 5 row right angle receptacles (power and signal) can be installed with the same type of tooling.

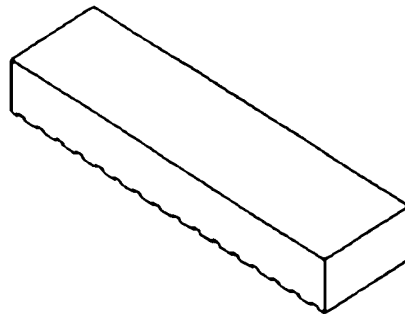
The top tool is a modified “flat rock” press bar. The bottom tool serves as a board support during insertion and is cleared out in the areas that the tails come thru the PCB.

TOP TOOL PRESS BAR 162325-XXX

If all of the Metral™ modules that are to be inserted are stacked end to end, you can use a standard press bar. If you have groups of Metral™ connectors and then a space other than an even increment of 12 mm then you will need a custom top tool.


STANDARD TOP TOOLS

- 162325-001** 8 (12 mm) Modules
- 162325-002** 12 (12 mm) Modules
- 162325-003** 21 (12 mm) Modules



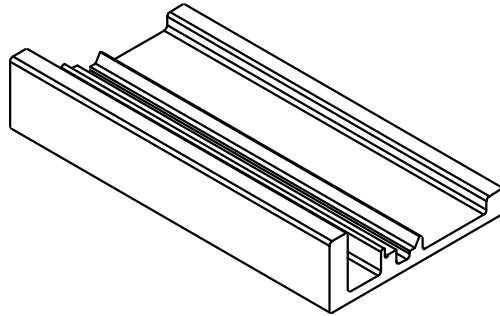
BOARD SUPPORTS (BOTTOM TOOLS) 162383-XXX

Some Metral™ users prefer to develop their own board supports or use a PCB with oversized holes. Either of these practices is acceptable, but FCI also offers bottom tools for those customers who prefer factory tooling. The bottom tools can be cut to the length needed.

	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles		PAGE 10 of 10	REVISION B
		AUTHORIZED BY Ray Doutrich	DATE 07 Aug 00
CLASSIFICATION UNRESTRICTED			

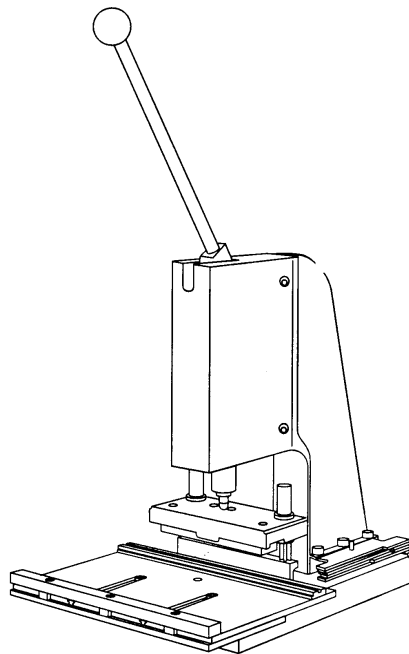
STANDARD BOTTOM TOOLS


	LENGTH (mm)	LENGTH (in)
162383-001	146.8 mm	5.780 in.
162383-002	194.8 mm	7.669 in.
162383-003	302.8 mm	11.921 in.
162383-004	457.2 mm	18.000 in.
162383-005	609.6 mm	24.000 in.



MT-510 P/N 162452-001

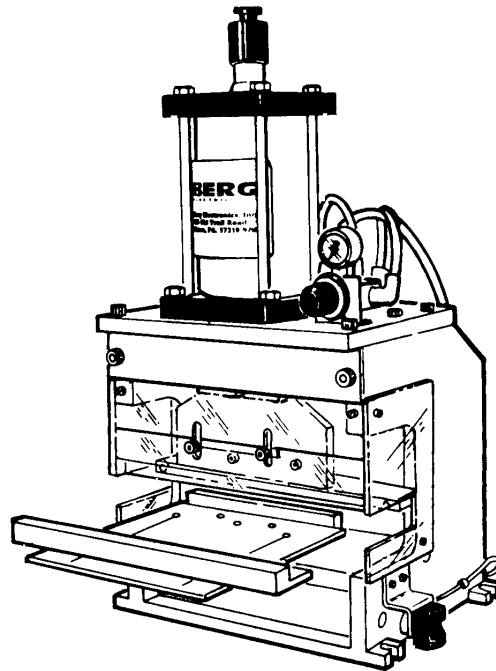
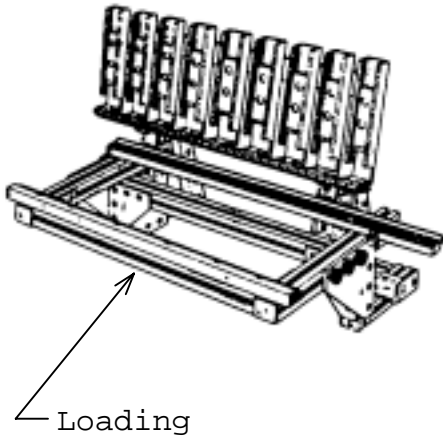
The MT-510 is a manual press that can insert up to 128 press fit pins in one stroke. It can also be used for solder tail parts that have press pegs. The MT-510 can be used for all Metral™ right angle receptacles and right angle headers.




	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
	TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles	PAGE 11 of 11	REVISION B
		AUTHORIZED BY Ray Doutrich	DATE 07 Aug 00
		CLASSIFICATION UNRESTRICTED	

MT-511 INSERTION PRESS P/N 166380-001
LOADING STATION P/N 166505-001

The MT-511 is a pneumatic machine that can terminate up to (21) 12 mm modules per machine cycle. It can be used for all right angle receptacles and right angle headers. The optional loading station is used to stage the connectors prior to insertion.

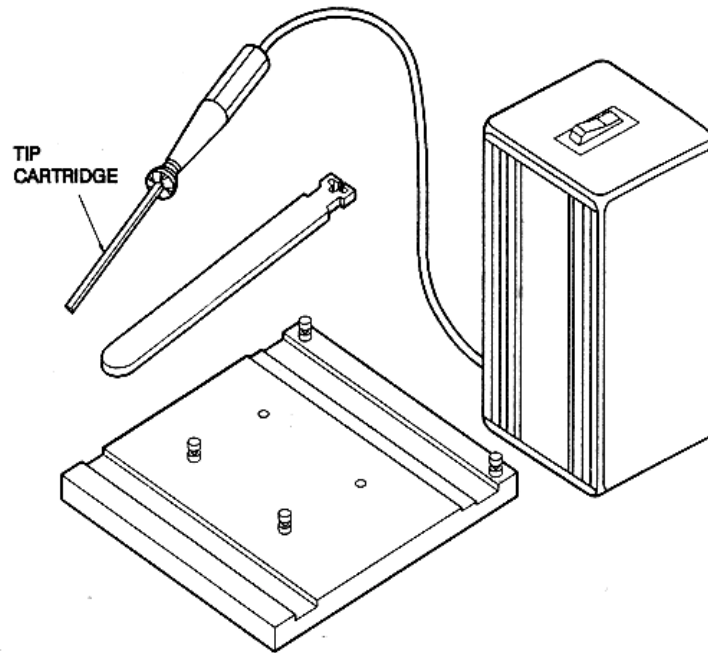


	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles	PAGE 12 of 12	REVISION B	
	AUTHORIZED BY Ray Doutrich	DATE 07 Aug 00	
CLASSIFICATION UNRESTRICTED			

4.7.2 Heat Stake Tooling

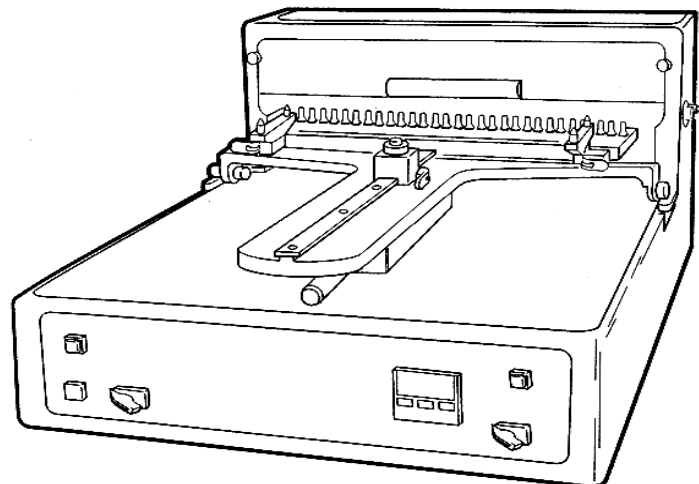
MT-120 HEAT STAKE HANDTOOL P/N 160508-001


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.



	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
	TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles	PAGE 13 of 13	REVISION B
		AUTHORIZED BY Ray Doutrich	DATE 07 Aug 00
CLASSIFICATION UNRESTRICTED			

4.8 Order Forms

Table 6 - Order form for 4 row vertical power headers.

4 row
Base PN:

ROW	Col 2	Col 1
D		
C		
B		
A		

+	Contact Position
-	Empty Position

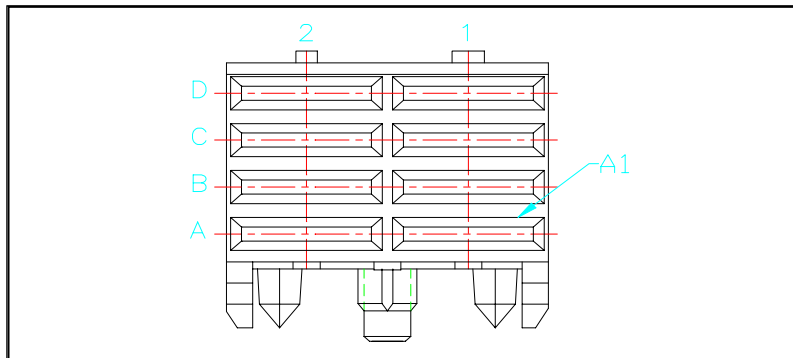
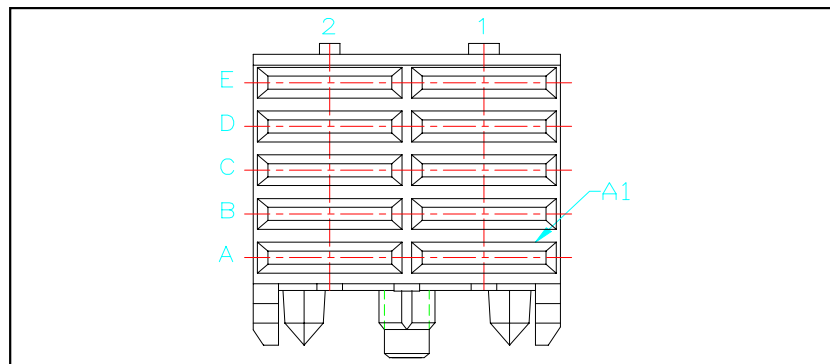



Table 7 - Order form for 5 row vertical power headers.

5 row
Base PN:

ROW	Col 2	Col 1
E		
D		
C		
B		
A		

+	Contact Position
-	Empty Position



	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles		PAGE 14 of 14	REVISION B
		AUTHORIZED BY Ray Doutrich	DATE 07 Aug 00
		CLASSIFICATION UNRESTRICTED	

5.0 REFERENCE DOCUMENTS


Any applicable product prints.

GES-12-002 -- Metral™ Connector System

GES-20-001 -- Attachment Specification for Metral™ Connectors

6.0 RECORD RETENTION N/A

7.0 NOTES – N/A

	TYPE SET-UP APPLICATION SPECIFICATION	NUMBER BUS-20-066	
	TITLE Application Guide for Metral™ Right Angle Solder to Board Power Receptacles	PAGE 15 of 15	REVISION B
AUTHORIZED BY Ray Doutrich		DATE 07 Aug 00	
CLASSIFICATION UNRESTRICTED			

REVISION RECORD

REV	PAGE	DESCRIPTION	EC#	DATE
A	All	New Release	V90706	03/19/99
B	All	Revised format to be consistent with GS-01-001, and change BERG, Dupont, etc. references to FCI.	V01922	08/08/00