



NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 1 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

1. PURPOSE	4
2. SCOPE	5
3. GENERAL	5
3.1. Method of Specifying	5
3.2. Workmanship.....	5
3.3. Usage.....	5
3.4. Visual	5
3.5. Band Substances.....	5
3.6. Manufacturing Processability.....	5
4. PRODUCT DESCRIPTIONS.....	6
4.1. General Information on Headers and Shrouds.....	6
4.2. Electrical Performance of Metral™ 1000 & 2000 Systems	6
4.2.1. Differential Signal Applications	6
4.2.2. Single Ended Signal Applications	6
4.3. 5-row Metral™ 1000 Headers	7
4.4. 5-row Metral™ 1000 Shrouds.....	7
4.5. 5-row Metral™ 2000 Headers	8
4.6. 5-row Metral™ 2000 Shrouds.....	8
4.7. 5-row Metral™ Extended 1000 Headers	9
4.8. 5-row Metral™ Extended 1000 Shrouds	9
4.9. 5-row Metral™ Extended 2000 Headers	10
4.10. 5-row Metral™ Extended 2000 Shrouds	10
4.11. 8-row Metral™ Standard Headers	11
4.12. 8-row Metral™ Standard Shrouds	11
4.13. 8-row Metral™ 1000 Headers	12
4.14. 8-row Metral™ 1000 Shrouds.....	12
4.15. 8-row Metral™ 2000 Headers	13
4.16. 8-row Metral™ 2000 Shrouds.....	13
5. PRODUCT VARIATIONS.....	14
5.1. Pin Variations Available for Metral 1000 and 2000 Headers.....	14
5.2. Pin Variations Available for Metral standard 8-row Headers.....	14
5.3. General Information on Headers and Shrouds.....	15
5.3.1. Mating with Metral™ 1000 Receptacles	15
5.3.2. Mating with Metral™ 4000 Receptacles	15
5.4. Restrictions on Circuit Board Thickness.....	16
5.4.1. Mating with Metral 1000 Receptacles	16
5.4.2. Mating with Metral 4000 Receptacles	17
5.4.3. Metral™ standard 8-row Headers.....	18
5.5. Plating Options.....	18
5.6. Circuit Board Via Hole Requirements.....	18

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 2 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

6. OTHER DESIGN CONSIDERATIONS ON HEADER CIRCUIT BOARDS	18
6.1. Multiple size Headers on same Circuit Board	18
6.2. Guide Pin Modules	18
6.3. Keying Modules	18
6.4. Header End Wall.....	19
6.5. Circuit path routing on Circuit Boards.....	20
6.6. Defining the Header and Shroud Outline on the Circuit Board	20
7. INSTALLATION TOOLING	20
7.1. Brief Summary	20
7.2. Insertion Press	21
7.3. Press Blocks and Press Block Holders	23
7.3.1. 5-row 1000 & 2000 Headers and Shrouds	23
7.3.2. 8-row standard, 1000 & 2000 Headers and Shrouds	25
7.3.3. Bottom Tooling - Headers	26
7.3.4. Bottom Tooling - Shrouds	26
8. INSTALLATION PROCEDURE	27
9. POST-INSTALLATION INSPECTION PROCEDURES.....	27
9.1. Header and Shroud to Board Clearance	27
9.2. Visual	27
9.3. Pin Tip Variations.....	27
10. REMOVAL TOOLING AND REPAIR PROCEDURES	28
10.1. Replacement Pins.....	28
10.2. Individual Pin Pushout Tool – MT330.....	28
10.3. Individual Pin Pullout Tool – MT340	29
10.4. 6x6 Pin Pushout Tool – MT0537	29
10.5. 8x12 Pin Pushout Tool – HT-0538 & HT-0540	30
10.6. Repairing Bent Pins	31
11. NOTES.....	32
12. REFERENCE DOCUMENTS	32
REVISION RECORD	33



NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 3 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

Figure 1	5-row 1000 Headers	7
Figure 2	5-row 1000 Shrouds	7
Figure 3	5-row 2000 Headers	8
Figure 4	5-row 2000 Shrouds	8
Figure 5	5-row Extended 1000 Headers.....	9
Figure 6	5-row Extended 1000 Shrouds.....	9
Figure 7	5-row Extended 2000 Headers.....	10
Figure 8	5-row Extended 2000 Shrouds.....	10
Figure 9	8-row Standard Headers	11
Figure 10	8-row Standard Shrouds	11
Figure 11	8-row 1000 Headers	12
Figure 12	8-row 1000 Shrouds	12
Figure 13	8-row 2000 Headers	13
Figure 14	8-row 2000 Shrouds	13
Figure 15	'GND' Pin Height and Board Thickness Restrictions	15
Figure 16	Header End Walls.....	19
Figure 17	Header and Shroud Repair Outline.....	20
Figure 18	MT-301 Hand Press P/N 194205-002.....	21
Figure 19	5-row Press Block and Press Block Holder.....	23
Figure 20	8-row Press Block and Press Block Holder.....	25
Figure 21	MT-330 Pushout Tool.....	28
Figure 22	MT-340 Pullout Tool	29
Figure 23	MT-0537 Pushout Tool.....	30
Figure 24	HT-0538 & HT-540 Pushout Tool.....	31

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 4 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

1. PURPOSE

This specification covers end product and workmanship requirements for insertion into circuit boards of Metral™ 1000/2000 headers and shrouds along with general product information. Additional sizes of selectively loaded headers may exist than those currently listed here. Contact your local FCI representative for information

Standard product


84817-type 5-Row Metral™ 1000 Headers
74977-type 5-Row Metral™ 2000 Headers
84818-type 5-Row Metral™ 1000 Shrouds
84621-type 5-Row Metral™ 2000 Shrouds
73983-type 5x6 Metral™ 1000 Headers
73993-type 5x6 Metral™ 1000 Shrouds
84881-type 5-Row Metral™ 1000 Extended Headers
84809-type 5-Row Metral™ 2000 Extended Headers
84882-type 5-Row Metral™ 1000 Extended Shrouds
84811-type 5-Row Metral™ 2000 Extended Shrouds
74771-type 8-Row Metral™ Standard Headers
98173-type 8-Row Metral™ Standard Shrouds
74983-type 8-Row Metral™ 1000 Headers
74978-type 8-Row Metral™ 2000 Headers
74993-type 8-Row Metral™ 1000 Shrouds
84625-type 8-Row Metral™ 2000 Shrouds

Selectively Loaded Product

74817-type 5x6 Metral™ 1000 Headers
63743-type 5x12 Metral™ 1000 Headers
60066-type 5x18 Metral™ 1000 Headers
63779-type 5x24 Metral™ 1000 Headers
55499-type 5x6 Metral™ 2000 Headers
10035400-type 5x24 Metral™ 2000 Headers
98122-type 5x6 Metral™ 1000 Extended Headers
58392-type 5x6 Metral™ 2000 Extended Headers
98030-type 8x12 Metral™ Standard Headers
84965-type 8x12 Metral™ Standard Headers
63784-type 8x12 Metral™ 1000 Headers
63741-type 8x12 Metral™ 2000 Headers

Hybrid products

58542-type 5-Row Metral™ 2000 Headers with 4000 style Ground Springs
58543-type 5-Row Metral™ 2000 Shrouds with 4000 style Ground Springs
10043968 type 5x6 Metral™ 1000/4000 Header with 4000 Ground Springs and mixed mode pins

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 5 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

2. SCOPE

- Product description
- Define possible product variations
- Define connector outline for circuit board designs.
- Recommended application equipment
- Recommended requirements and procedure for board insertion
- Recommended repair procedures

3. GENERAL

3.1. ***Method of Specifying***

The header and shroud drawings should reference this specification when applicable. All exceptions to the requirements of this specification should be clearly described in the notes of the board assembly drawing. We do not recommend any exceptions unless approval is obtained in advance from the FCI engineering design group. If there is a conflict between the product drawings and this specification, the product drawings shall take precedence.

3.2. ***Workmanship***

Workmanship shall be of a level that indicates controlled conditions of manufacture such that subsequent operations, functionality and performance are not degraded.

3.3. ***Usage***

The headers and shrouds covered by this instruction are intended for use in a wide variety of environments and are designed to meet the conditions specified in Bellcore GR-1217-CORE and IEC-1076-4.

3.4. ***Visual***


Visual examinations shall be performed with a magnification of up to 10x. (8 to 10x recommended)

3.5. ***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.

3.6. ***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.

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 6 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

4. Product Descriptions

4.1. **General Information on Headers and Shrouds**

This information applies only to product covered by this specification. The following figures only show the smallest module of each product. The 5-row product is designed in increments of 12mm or 6 pin positions up to a maximum of 24 pin positions. The 8-row product design is 24mm or 12 pin positions. Check with your local FCI representative for the availability of each size and the pin variations.


4.2. **Electrical Performance of Metra™ 1000 & 2000 Systems**

4.2.1. **Differential Signal Applications**

See FCI publication 950511-028 for “Electrical Performance Data for Differential Applications”.

4.2.2. **Single Ended Signal Applications**

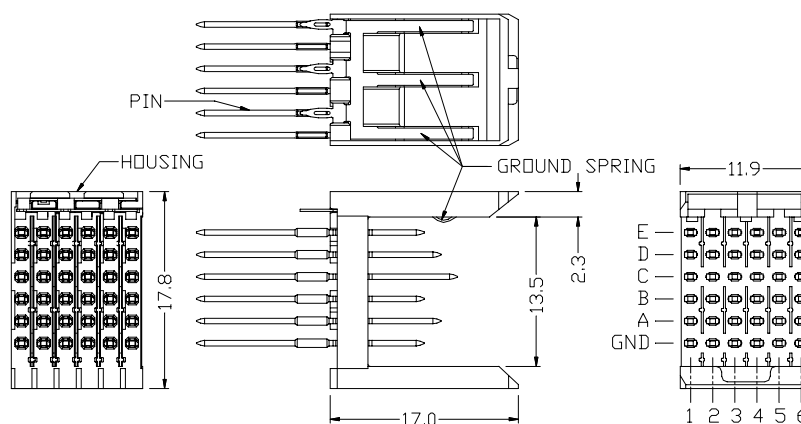
See FCI publication 950511-029 for “Electrical Performance Data for Single-Ended Applications”.

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 7 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
CLASSIFICATION UNRESTRICTED			

4.3. 5-row Metra™ 1000 Headers

This header shown is a 5x6. You can mount the mating receptacle on a 2.5mm maximum thickness board without interference with the header. If thicker boards are used with the receptacle you must machine away the area of the board entering the header to 2.5mm or below. You can use rows A, B, C, D & E for signal or ground pins.

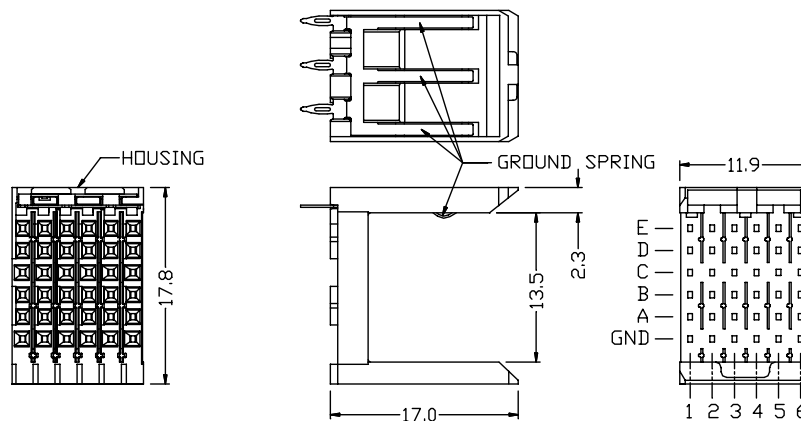
Figure 1 5-row 1000 Headers




4.4. 5-row Metra™ 1000 Shrouds

This shroud shown is a 5x6. You can mount the mating receptacle on a 2.5mm maximum thickness board without interference with the shroud. If thicker boards are used with the receptacle you must machine away the area of the board entering the shroud to 2.5mm or below.

Figure 2 5-row 1000 Shrouds

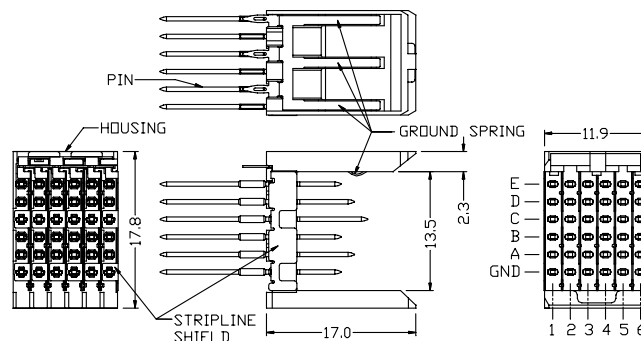


NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 8 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

4.5. 5-row Metra™ 2000 Headers

The header shown is a 5x6. You can mount the mating receptacle on a 2.5mm maximum thickness board without interference with the header. If thicker boards are used with the receptacle you must machine away the area of the board entering the header to 2.5mm or below. You can use rows A, B, D & E for signal, power or ground pins. These headers have stripline shield between columns. The stripline shields connects the GND and C row pins together in the odd numbered rows and also makes contact to the ground spring. For front plug-up applications, the even numbered pins in row 'C' can be used for power as well as for ground. If the surrounding pins are not used for power, then each pin can carry 3 amps. If the surrounding pins are used for power, then each pin can carry 1 amp. When the surrounding pins are used only for low speed signals, then the even numbered 'C' row pins can also be used for low speed signals. This is not true for rear plug-up applications using a Metra 2000 shroud as in this case all 'C' row pins are common to ground.

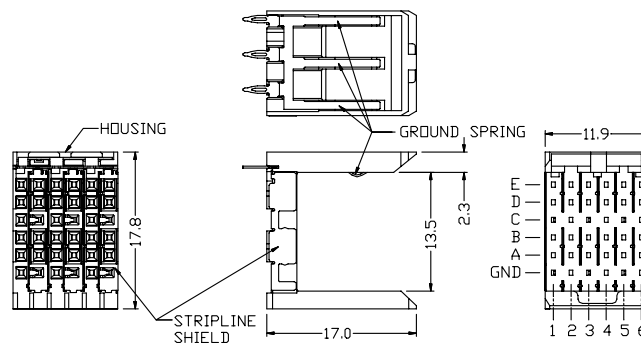
Figure 3 5-row 2000 Headers




4.6. 5-row Metra™ 2000 Shrouds

This shroud shown is a 5x6. You can mount the mating receptacle on a 2.5mm maximum thickness board without interference with the shroud. If thicker boards are used with the receptacle you must machine away the area of the board entering the shroud to 2.5mm or below.

Figure 4 5-row 2000 Shrouds

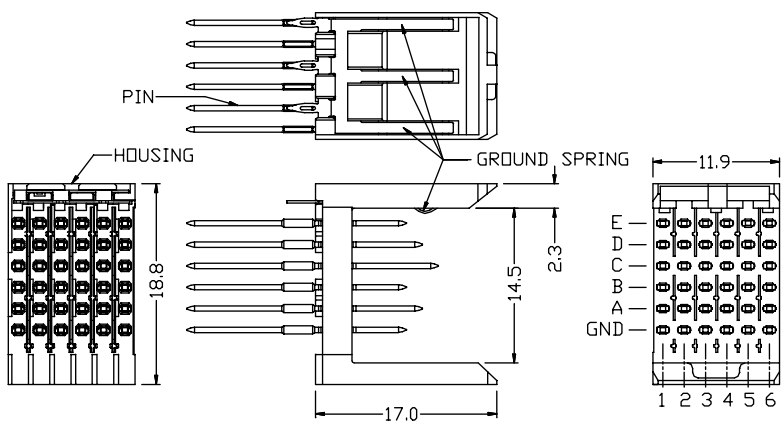


NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 9 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
CLASSIFICATION UNRESTRICTED			

4.7. 5-row Metra™ Extended 1000 Headers

The header shown is a 5x6. You can mount the mating receptacle on a 3.5mm maximum thickness board without interference with the header. If thicker boards are used with the receptacle you must machine away the area of the board entering the header to 3.5mm or below. You can use rows A, B, C, D & E for signal or ground pins.

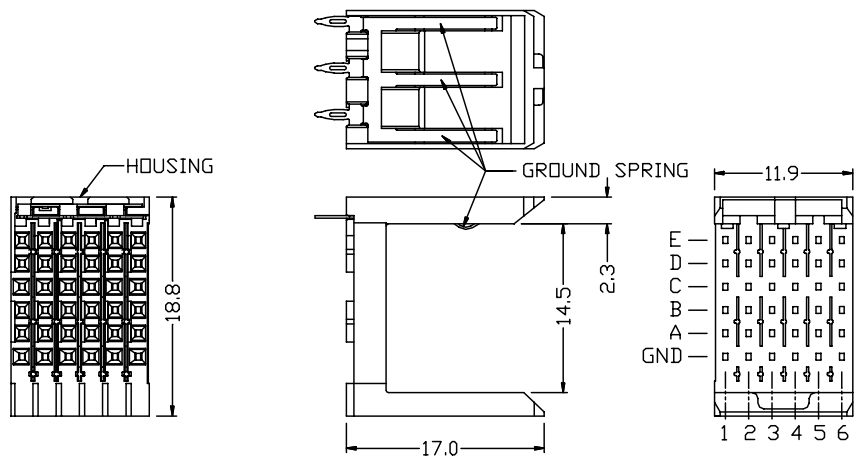
Figure 5 5-row Extended 1000 Headers




4.8. 5-row Metra™ Extended 1000 Shrouds

The shroud shown is a 5x6. You can mount the mating receptacle on a 3.5mm maximum thickness board without interference with the shroud. If thicker boards are used with the receptacle you must machine away the area of the board entering the shroud to 3.5mm or below.

Figure 6 5-row Extended 1000 Shrouds

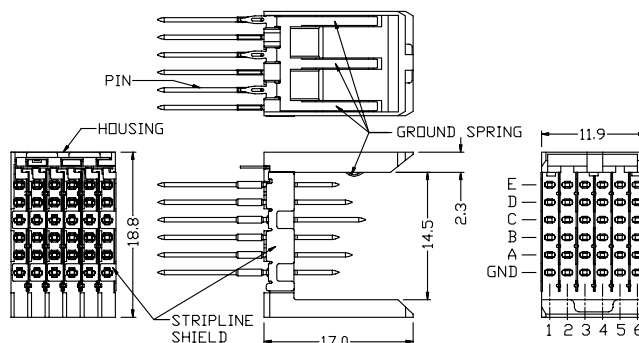


NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 10 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

4.9. 5-row Metra™ Extended 2000 Headers

The header shown is a 5x6. You can mount the mating receptacle on a 3.5mm maximum thickness board without interference with the header. If thicker boards are used with the receptacle you must machine away the area of the board entering the header to 3.5mm or below. You can use rows A, B, D & E for signal, power or ground pins. These headers have stripline shield between columns. The stripline shields connects the GND and C row pins together in the odd numbered rows and also makes contact to the ground spring. For front plug-up applications, the even numbered pins in row 'C' can be used for power as well as for ground. If the surrounding pins are not used for power, then each pin can carry 3 amps. If the surrounding pins are used for power, then each pin can carry 1 amp. When the surrounding pins are used only for low speed signals, then the even numbered 'C' row pins can also be used for low speed signals. This is not true for rear plug-up applications using a Metra 2000 shroud as in this case all 'C' row pins are common to ground.

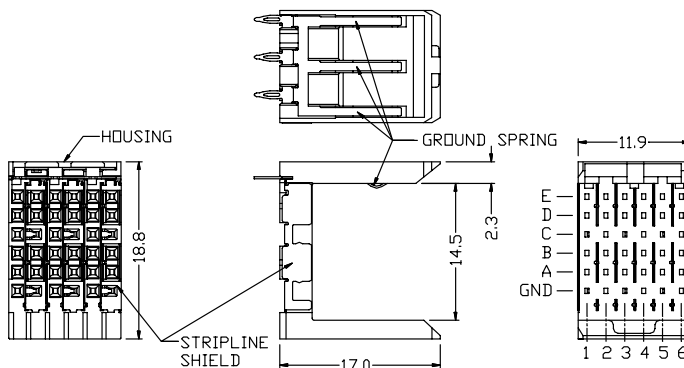
Figure 7 5-row Extended 2000 Headers




4.10. 5-row Metra™ Extended 2000 Shrouds

The shroud shown is a 5x6. You can mount the mating receptacle on a 3.5mm maximum thickness board without interference with the shroud. If thicker boards are used with the receptacle you must machine away the area of the board entering the shroud to 3.5mm or below.

Figure 8 5-row Extended 2000 Shrouds

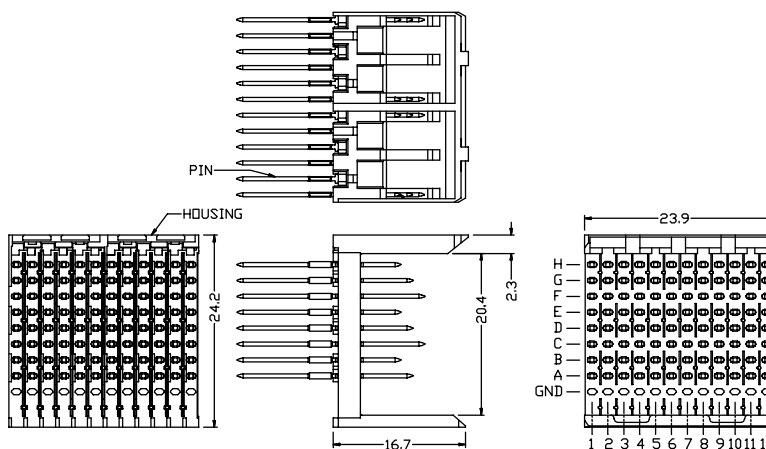


NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 11 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

4.11. 8-row Metra™ Standard Headers

The header shown is an 8x12. You can mount the mating receptacle on a 3.4mm maximum thickness board without interference with the header. If thicker boards are used with the receptacle you must machine away the area of the board entering the header to 3.4mm or below. You can use rows A, B, C, D, E, F, G & H for signal or ground pins. There are no pins in the 'GND' positions and no ground springs. These headers are not intended for high speed applications

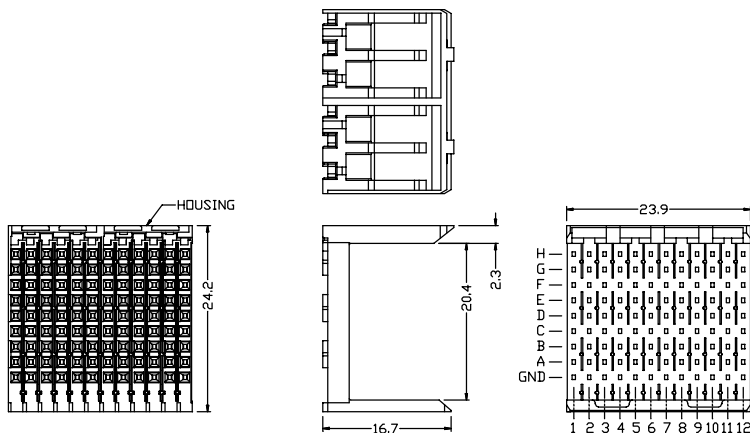
Figure 9 8-row Standard Headers




4.12. 8-row Metra™ Standard Shrouds

The shroud shown is an 8x12. You can mount the mating receptacle on a 3.4mm maximum thickness board without interference with the shroud. If thicker boards are used with the receptacle you must machine away the area of the board entering the shroud to 3.4 mm or below. There are no ground springs. These shrouds are not intended for high speed applications

Figure 10 8-row Standard Shrouds

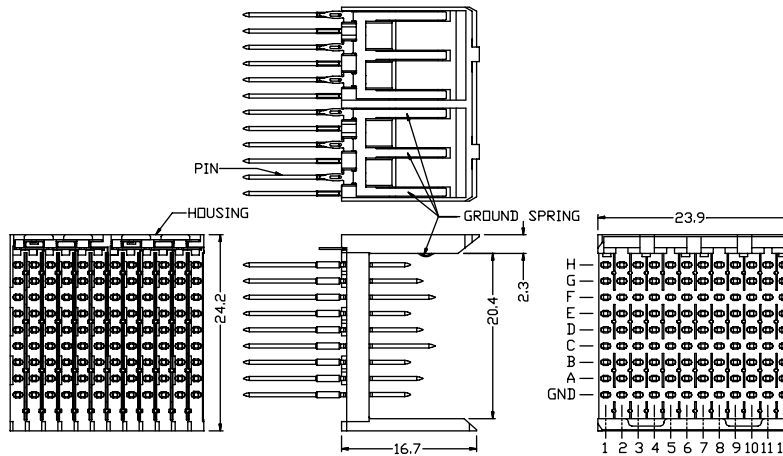


NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 12 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

4.13. 8-row Metra™ 1000 Headers

The header shown is an 8x12. You can mount the mating receptacle on a 3.4mm maximum thickness board without interference with the header. If thicker boards are used with the receptacle you must machine away the area of the board entering the header to 3.4mm or below. You can use rows A, B, C, D, E, F, G & H for signal or ground pins.

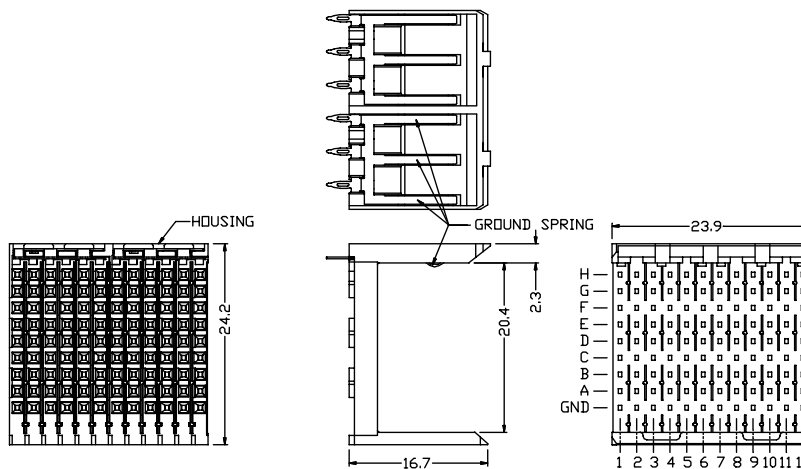
Figure 11 8-row 1000 Headers




4.14. 8-row Metra™ 1000 Shrouds

The shroud shown is an 8x12. You can mount the mating receptacle on a 3.4mm maximum thickness board without interference with the shroud. If thicker boards are used with the receptacle you must machine away the area of the board entering the shroud to 3.4 mm or below.

Figure 12 8-row 1000 Shrouds

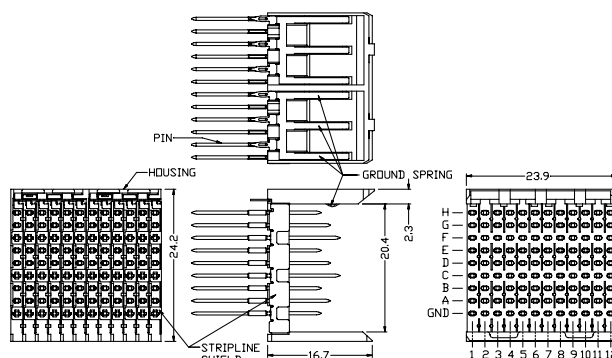


NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 13 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

4.15. 8-row Metra™ 2000 Headers

The header shown is a 8x12. You can mount the mating receptacle on a 3.4 mm maximum thickness board without interference with the header. If thicker boards are used with the receptacle you must machine away the area of the board entering the header to 3.4mm or below. You can use rows A, B, D, E, G and H for signal, power or ground pins. These headers have stripline shield between columns. The stripline shields connects the GND, C and F row pins together in the odd numbered rows and also makes contact to the ground spring. For front plug-up applications, the even numbered pins in rows 'C' and 'F' can be used for power as well as for ground. If the surrounding pins are not used for power, then each pin can carry 3 amps. If the surrounding pins are used for power, then each pin can carry 1 amp. When the surrounding pins are used only for low speed signals, then the even numbered 'C' and 'F' row pins can also be used for low speed signals. This is not true for rear plug-up applications using a Metra 2000 shroud as in this case all 'C' row pins are common to ground.

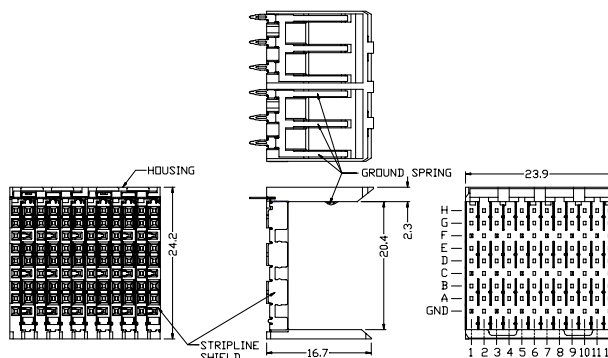
Figure 13 8-row 2000 Headers




4.16. 8-row Metra™ 2000 Shrouds

The shroud shown is an 8x12. You can mount the mating receptacle on a 3.4mm maximum thickness board without interference with the shroud. If thicker boards are used with the receptacle you must machine away the area of the board entering the shroud to 3.4 mm or below.

Figure 14 8-row 2000 Shrouds



NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 14 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

5. Product Variations

The following two table lists the various pin sizes that can be used in the headers covered by this application specification. Please check with your local FCI representative on pin availability. Dimensions are in millimeters.

5.1. **Pin Variations Available for Metral 1000 and 2000 Headers**

This table lists the various pin sizes that can be used in the headers covered by this application specification. Please check with your local FCI representative on pin availability. Dimensions are in millimeters.

DIMENSION "A"	PIN CODES								
5.00	01*	22	30	05	35	48	40	65	09
5.75	02*	44	31	06	36	49	25	66	10
6.50	03*	45	32	07	37	50	41	24	11
7.25	04*	46	33	08	38	51	42	67	12
8.00	19*	47	34	20	39	52	43	68	21
	4.30	12.20	12.95	13.70	14.45	15.20	15.70	16.40	17.10
	DIMENSION "B"								


* STUB PINS – NO REAR PLUG-UP

5.2. **Pin Variations Available for Metral standard 8-row Headers**

This table lists the various pin sizes that can be used in the headers covered by this application specification. Please check with your local FCI representative on pin availability. Dimensions are in millimeters.

DIMENSION "A"	PIN CODES									
5.00	01*	54	22	30	05	35	48	40	65	09
5.75	02*	55	44	31	06	36	49	25	66	10
6.50	03*	56	45	32	07	37	50	41	24	11
7.25	04*	57	46	33	08	38	51	42	67	12
8.00	19*	58	47	34	20	39	52	43	68	21
	4.30	11.55	12.20	12.95	13.70	14.45	15.20	15.70	16.40	17.10
	DIMENSION "B"									

* STUB PINS – NO REAR PLUG-UP

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 15 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

5.3. General Information on Headers and Shrouds

Pins in the 'GND' row when present make contact with the bottom shield of the mating receptacle. Due to possible interference with the receptacle circuit board you can only use the dim "A" 5.0mm and 5.75mm internal pin lengths in the 'GND' row of the headers. For shrouds, the 'GND' pin from the headers must not stick up any higher than 6.3mm nor less than 4.6mm from the inside bottom of the shroud housing. If you use a pin with dim "A" of 5.00mm or 5.75mm length in the 'E' position of the header, the pin tip will be below the protruding section of the ground spring. Thus if the pin is accidentally bent toward the ground spring, it should not make contact and short. Unfortunately, for rear plug-up applications, due to variation in circuit pack thickness you may not be able to control dim "B" of row 'E' to be between 5.00mm and 5.75mm. You may still want to specify the shortest rear pin length that assures you meet the 5.00mm minimum. The ground spring, when present, makes contact to the top shield of the mating receptacle. See the product customer drawings for more detailed dimensional information and the size and layout of circuit board holes. The minimum board thickness required to use shrouds is 2.9mm if either the shroud and/or opposing header have ground springs. All product described below are on a 2mm pitch.

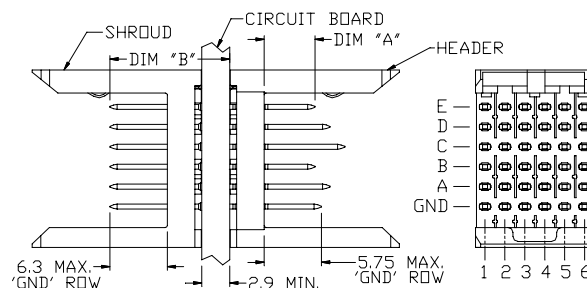
5.3.1. Mating with Metral™ 1000 Receptacles


For shrouds and headers all other pin positions require a dim "A" 5.0mm min., 8.0mm max. height.

5.3.2. Mating with Metral™ 4000 Receptacles

For 5-row shrouds and headers pin positions A, B, D and E require a dim "A" 5.0mm min., 6.5mm max. and pin position C requires a dim "A" 5.0mm min., 8.0mm max. height. For 8-row shrouds and headers pin positions A, B, D, E, G and H require a dim "A" 5.0mm min., 6.5mm max. and pin positions C and F require a dim "A" 5.0mm min., 8.0mm max. height.

Figure 15 'GND' Pin Height and Board Thickness Restrictions



NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 16 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

5.4. Restrictions on Circuit Board Thickness

This section details the restrictions on circuit board thickness per pin size. The minimum and maximum board thickness stated are actual thickness not a range of average board thickness. For Metral™ 1000 and 2000 headers in rear plug-up applications, the maximum range occurs when the pin 'B' dimension for the 'GND' positions is one to two sizes shorter than the remaining pins.

5.4.1. Mating with Metral 1000 Receptacles

5.4.1.1. Metral™ 1000 & 2000, 5-row & 5-row Extended Headers


CIRCUIT BOARD THICKNESS	PIN "B" DIMENSION								
	4.30	12.20	12.95	13.70	14.45	15.20	15.70	16.40	17.10
MINIMUM	1.60	2.95	2.95	2.95	3.05	3.80	4.30	5.00	5.70
MAXIMUM	NONE	3.80	4.55	5.30	6.05	6.80	7.30	8.00	8.70
FOR PIN POSITIONS A, B, C, D & E									
MINIMUM	1.60	2.95	3.25	4.00	4.75	5.50	6.00	6.70	7.40
MAXIMUM	NONE	4.20	4.95	5.70	6.45	7.20	7.70	8.40	9.10
FOR PIN POSITION 'GND'									

5.4.1.2. Metral™ 2000, 58542 and 58543 Header and Shroud

CIRCUIT BOARD THICKNESS	PIN "B" DIMENSION									
	4.30	11.55	12.20	12.95	13.70	14.45	15.20	15.70	16.40	17.10
MINIMUM	1.60	2.25	2.25	2.25	2.30	3.05	3.80	4.30	5.00	5.70
MAXIMUM	NONE	3.15	3.80	4.55	5.30	6.05	6.80	7.30	8.00	8.70
FOR PIN POSITIONS A, B, C, D & E										
MINIMUM	1.60	2.25	2.50	3.25	4.00	4.75	5.50	6.00	6.70	7.40
MAXIMUM	NONE	3.55	4.20	4.95	5.70	6.45	7.20	7.70	8.40	9.10
FOR PIN POSITION 'GND'										

5.4.1.3. Metral™ 1000 & 2000, 8-row Headers

CIRCUIT BOARD THICKNESS	PIN "B" DIMENSION								
	4.30	12.20	12.95	13.70	14.45	15.20	15.70	16.40	17.10
MINIMUM	1.60	2.95	2.95	2.95	3.05	3.80	4.30	5.00	5.70
MAXIMUM	NONE	3.80	4.55	5.30	6.05	6.80	7.30	8.00	8.70
FOR PIN POSITIONS A, B, C, D, E, F, G & H									
MINIMUM	1.60	2.95	3.25	4.00	4.75	5.50	6.00	6.70	7.40
MAXIMUM	NONE	4.20	4.95	5.70	6.45	7.20	7.70	8.40	9.10
FOR PIN POSITION 'GND'									

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 17 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
CLASSIFICATION UNRESTRICTED			

5.4.2. Mating with Metral 4000 Receptacles

5.4.2.1. Metral™ 1000 & 2000, 5-row & 5-row Extended Headers


CIRCUIT BOARD THICKNESS	PIN "B" DIMENSION									
	4.30	12.20	12.95	13.70	14.45	15.20	15.70	16.40	17.10	
MINIMUM	1.60	2.95	2.95	3.30	4.05	4.80	5.30	6.00	6.70	
MAXIMUM	NONE	3.80	4.55	5.30	6.05	6.80	7.30	8.00	8.70	
FOR PIN POSITIONS A, B, D & E										
MINIMUM	1.60	2.95	2.95	2.95	3.05	3.80	4.30	5.00	5.70	
MAXIMUM	NONE	3.80	4.55	5.30	6.05	6.80	7.30	8.00	8.70	
FOR PIN POSITION C										
MINIMUM	1.60	2.95	3.25	4.00	4.75	5.50	6.00	6.70	7.40	
MAXIMUM	NONE	4.20	4.95	5.70	6.45	7.20	7.70	8.40	9.10	
FOR PIN POSITION 'GND'										

5.4.2.2. Metral™ 2000, 58542 and 58543 Header and Shroud

CIRCUIT BOARD THICKNESS	PIN "B" DIMENSION										
	4.30	11.55	12.20	12.95	13.70	14.45	15.20	15.70	16.40	17.10	
MINIMUM	1.60	2.25	2.25	2.55	3.30	4.05	4.80	5.30	6.00	6.70	
MAXIMUM	NONE	3.15	3.80	4.55	5.30	6.05	6.80	7.30	8.00	8.70	
FOR PIN POSITIONS A, B, D & E											
MINIMUM	1.60	2.25	2.25	2.25	2.30	3.05	3.80	4.30	5.00	5.70	
MAXIMUM	NONE	3.15	3.80	4.55	5.30	6.05	6.80	7.30	8.00	8.70	
FOR PIN POSITION C											
MINIMUM	1.60	2.25	2.50	3.25	4.00	4.75	5.50	6.00	6.70	7.40	
MAXIMUM	NONE	3.55	4.20	4.95	5.70	6.45	7.20	7.70	8.40	9.10	
FOR PIN POSITION 'GND'											

5.4.2.3. Metral™ 1000 & 2000, 8-row Headers

CIRCUIT BOARD THICKNESS	PIN "B" DIMENSION									
	4.30	12.20	12.95	13.70	14.45	15.20	15.70	16.40	17.10	
MINIMUM	1.60	2.95	2.95	2.95	3.05	3.80	4.30	5.00	5.70	
MAXIMUM	NONE	3.80	4.55	5.30	6.05	6.80	7.30	8.00	8.70	
FOR PIN POSITIONS A, B, D, E, G & H										
MINIMUM	1.60	2.95	2.95	2.95	3.05	3.80	4.30	5.00	5.70	
MAXIMUM	NONE	3.80	4.55	5.30	6.05	6.80	7.30	8.00	8.70	
FOR PIN POSITIONS C & F										
MINIMUM	1.60	2.95	3.25	4.00	4.75	5.50	6.00	6.70	7.40	
MAXIMUM	NONE	4.20	4.95	5.70	6.45	7.20	7.70	8.40	9.10	
FOR PIN POSITION 'GND'										

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 18 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
CLASSIFICATION UNRESTRICTED			

5.4.3. Metral™ standard 8-row Headers

CIRCUIT BOARD THICKNESS	PIN "B" DIMENSION									
	4.30	11.55	12.20	12.95	13.70	14.45	15.20	15.70	16.40	17.10
MINIMUM	1.60	1.60	1.60	1.60	2.30	3.05	3.80	4.30	5.00	5.70
MAXIMUM	NONE	3.15	3.80	4.55	5.30	6.05	6.80	7.30	8.00	8.70
FOR PIN POSITIONS A, B, C, D, E, F, G & H										

5.5. *Plating Options*

See the product customer drawings for contact area plating options.

5.6. *Circuit Board Via Hole Requirements.*

See the product customer drawings for requirements on generating circuit board via holes for mounting the header and shrouds covered by this application spec.

6. Other Design Considerations on Header Circuit Boards

6.1. *Multiple size Headers on same Circuit Board*

When using multiple size receptacles on the same circuit board side-by-side, mating thus to multiple size headers on the header board, use a guide pin to locate the two boards to each other before the receptacles enter the headers. If the receptacles are not located to the headers the larger receptacle may hit the top of the smaller header next to the larger header intended for mating. The receptacle will hit the top of the smaller header before the lead-in features of the larger header are engaged. The use of the guide pin should bring the various size components in close enough alignment for mating. This is not a problem if the various size headers are not side-by-side. So another way to prevent this problem is to space different size headers 2mm apart.

When using multiple size and product variation of standard Metral, Metral 1000, Metral 2000, Metral 3000 and/or Metral 4000 headers on the same daughter board be sure the associated headers on the mother board are lined up on the "A" row of pins. This will ensure that all parts are in the right alignment for plug-up of the daughter board to the mother board.

6.2. *Guide Pin Modules*


The modules are the same size as the 5-row product except the header housing has no side walls. They can be used in line with any size headers. See the following customer drawings for information

- 63735 for header housing
- 70295 for header guide pins
- 73474 for receptacle

6.3. *Keying Modules*

The modules are the same size as the 5-row product except the header housing has no side walls. They can be used in line with any size headers. See the following customer drawings for information

- 98099 for header housing
- 88914 for header keying pins
- 63730 for receptacle

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 19 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

6.4. Header End Wall

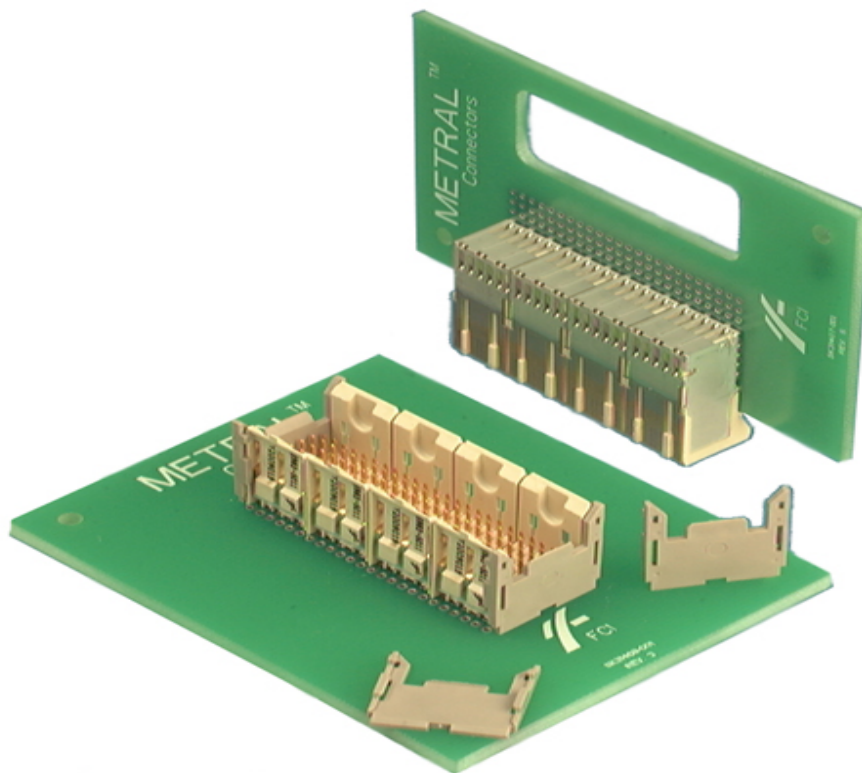
Header end walls are available for the 5-row headers.


- 73996-011 for 5-row headers
- 73996-012 for 5-row extended headers

The end wall easily slips and locks in place after the header is inserted into the board. They can be removed just as easily. The end walls are symmetric and fit on either end of the header. The end walls offer the following advantages.

- They protect the pins at the ends of a row of headers from handling damage
- They help align a daughter card into a card slot
- They prevent air flow from building up dust on the exposed end pins.
- They strengthen the header side walls by tying them together.
- They greatly increase the resistance to daughter card being insert off position.

Figure 16 Header End Walls



NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 20 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

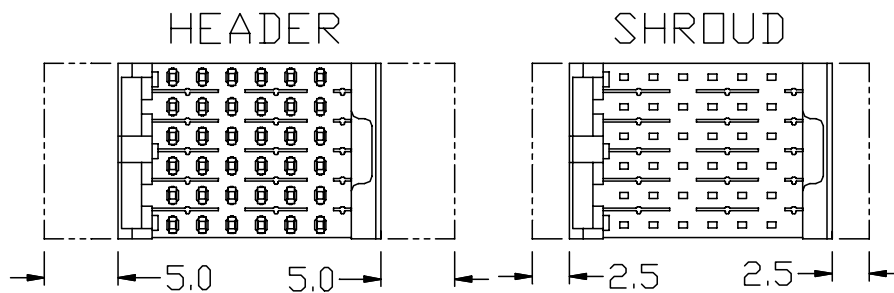
6.5. **Circuit path routing on Circuit Boards**

On Metral 2000 headers the stripline ground shields are very close to the surface of the circuit board. We do not recommend routing any signal or power paths on the top surface because of the potential of shorts. Only the power and signal via holes should be on the top surface. There are several potential problems. If the header is over inserted resulting in the partial crushing of the plastic standoffs, the stripline shields may touch the surface. While the header may still be functional, a short will occur if a signal or power path has been routed through that area. Another problem may be that the routing of the path may create a locally high feature reducing the actual clearance between the stripline shields and that area of the board.

6.6. **Defining the Header and Shroud Outline on the Circuit Board**

The minimum space or outline that is required for header and shrouds covered by this application spec. is shown on the individual customer drawings. Additional space is required to allow for various repair operations. Generally no additional space is required for individual pin replacement. To allow support tooling for replacement of the whole header or shroud we recommend as shown on the following figure.

Figure 17 Header and Shroud Repair Outline




7. **Installation Tooling**

Installation tooling needed for 5 & 8-row 1000 & 2000 headers and shrouds consist of the following.

7.1. **Brief Summary**

In order to properly insert press fit headers and shroud onto a circuit board you need two items:

- A press
- Insertion tooling

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 21 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

7.2. Insertion Press

The tooling can work in a variety of presses. Each header needs 100 Newtons or 22.5 pounds of force per pin for insertion. Each shroud needs 20 Newtons or 4.5 pounds of force per pin for insertion. The press ram should be long enough to cover the tooling to prevent any flexing in the tool. The important thing to remember is that you need to have a press with enough force to insert the specific configuration you are working with and that the press table can properly hold the your circuit board size.

Typical types of presses are:

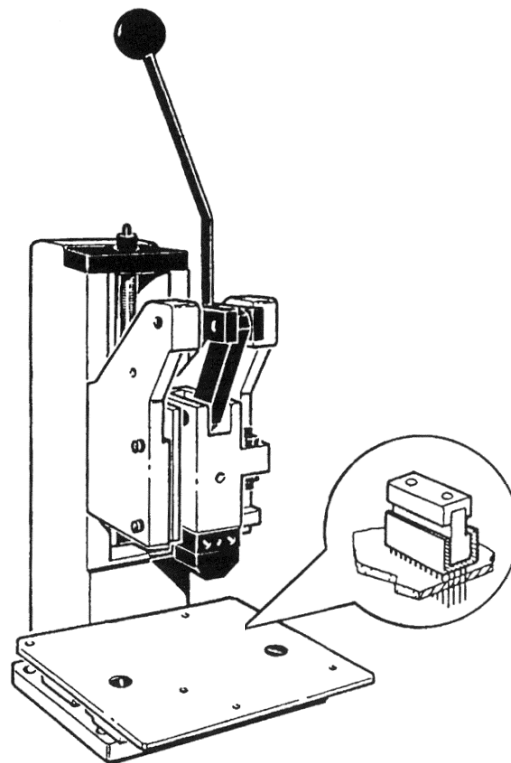
- * Manual arbor press
- * Pneumatic press
- * Hydraulic press
- * Servo driven electronic press


You also need to decide the type of frame you want

- * "C" frame
- * "H" frame

The preferred type of press to insert the headers and shrouds is the servo driven electronic press. This press gives you the best control during the insertion process and offers the most flexibility. FCI offers arbor, pneumatic and electronic presses. For more information contact us at USA (800)-843-6911 or (717)-938-7439. The hand press is shown below.

Figure 18 MT-301 Hand Press P/N 194205-002



NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 22 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

By means of the IMPRESS family, FCI provides a range of state-of-the-art press-fit insertion machines. The IMPRESS family covers:

IMPRESS 2000 : is a modular based fully automated pick-and-place insertion machine.

IMPRESS 1000 : is a semi-automatic step-and-repeat press with motor driven xy-table.


IMPRESS 500E : is a hand-operated servo driven C-frame press.

Baby IMPRESS : is a flat-bed servo motor driven bench-press.

IMPRESS 500M+ : is a hand-operated C-frame bench-press.

Please refer to the following table for the relevant key specifications:

Type	2000 XL	1000 XXL	500E	Baby IMPRESS	500M+
Cat. No.	PAH13302	PAH156	PAY284A2	PAY326	PAY479
Press force	40 kN	80 kN	80 kN	20 ... 50 kN	15 kN
Board size (1)	950 x 635 mm	1200 x 625 mm	720 x 580 mm	600 mm between posts of the H-bridge	270 mm throat depth
Max. tool size	160 mm	255 mm	255 mm	255 mm	150 mm
Press cycle per hour (2)	900	700 ... 900	600	500	300
Tool exchange	automatically	manually or automatically (option)	manually	manually	manually
Board stuffing	Automatic pick-and-place	manually	manually	manually	manually
Board positioning	automatically	automatically	manually (LMT-system optionally)	manually	manually
Board support	rising post	rising post	rising post	Flat bed	Fixed anvil or flat bed
Force controlled press stroke	provided	provided	provided	provided	not provided

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 23 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

7.3. Press Blocks and Press Block Holders

The press blocks fit inside the headers and shrouds. In the headers the press block presses on both the pin shoulders and the inside bottom of the header housing. In the shrouds the press block presses only on the inside bottom of the shroud housing. The press block holder allows multiple blocks to be held at one time.

EX: Perhaps you need to have a tool that is 12 modules in length. You can use two 6 module tools and the holder will keep the tooling in one piece.

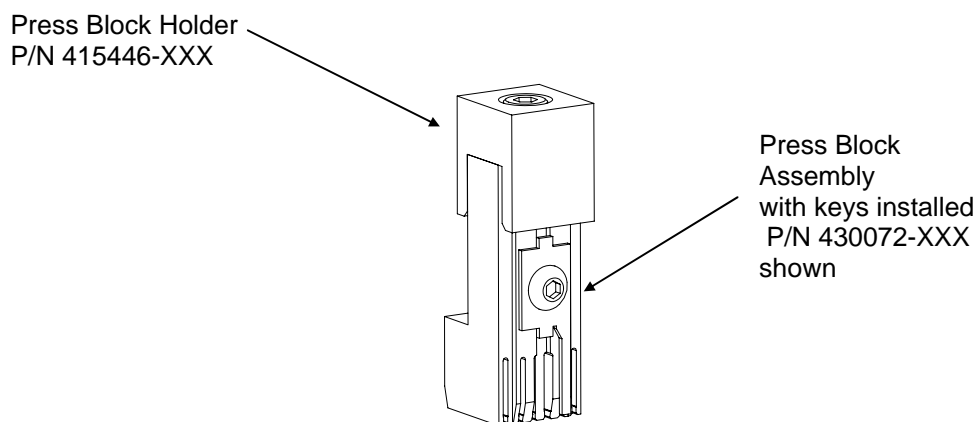
For IMPRESS related insertion tooling, please contact your local Customer Service Representative'.


7.3.1. 5-row 1000 & 2000 Headers and Shrouds

FEATURES

- Inserts Metral 5 Row 1000 & 2000 Series headers & shrouds onto PCB.
- End-to-End stackable.
- Use manually or in an automatic insertion machine.
- Polarization keys insure proper tooling-to-connector alignment.
- End web design allows tooling to fit within length of connector & prevents end wall damage.
- Press block can be used as bottom PCB support.

Figure 19 5-row Press Block and Press Block Holder



NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 24 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	


PRESS BLOCK HOLDER SIZE	PRESS BLOCK HOLDER ORDERING INFORMATION	
	5-ROW	5-ROW EXTENDED
1 – 12mm modules	415446-001	415446-001
2 – 12mm modules	415446-002	415446-002
3 – 12mm modules	415446-006	415446-006
4 – 12mm modules	415446-003	415446-003
5 – 12mm modules	415446-007	415446-007
6 – 12mm modules	415446-008	415446-008
7 – 12mm modules	415446-009	415446-009
8 – 12mm modules	415446-004	415446-004
9 – 12mm modules	415446-010	415446-010
10 – 12mm modules	415446-011	415446-011
11 – 12mm modules	415446-012	415446-012
12 – 12mm modules	415446-013	415446-013
13– 12mm modules	415446-014	415446-014
14 – 12mm modules	415446-015	415446-015
15 – 12mm modules	415446-016	415446-016
16 – 12mm modules	415446-017	415446-017
17 – 12mm modules	415446-018	415446-018
18 – 12mm modules	415446-019	415446-019
19 – 12mm modules	415446-020	415446-020
20 – 12mm modules	415446-021	415446-021
21 – 12mm modules	415446-101	415446-101

Current Tooling

PRESS BLOCK SIZE	PRESS BLOCK ORDERING INFORMATION	
	5-ROW	5-ROW EXTENDED
12mm modules	430072-001	430075-001
24mm modules	430072-002	430075-002
48mm modules	430072-003	430075-003
96mm modules	430072-004	430075-004

Previous Tooling - No Longer Available

PRESS BLOCK SIZE	PRESS BLOCK ORDERING INFORMATION	
	5-ROW	5-ROW EXTENDED
12mm modules	415718-001	415987-001
24mm modules	415718-002	415987-002
48mm modules	415718-003	415987-003
96mm modules	415718-004	415987-004

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 25 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

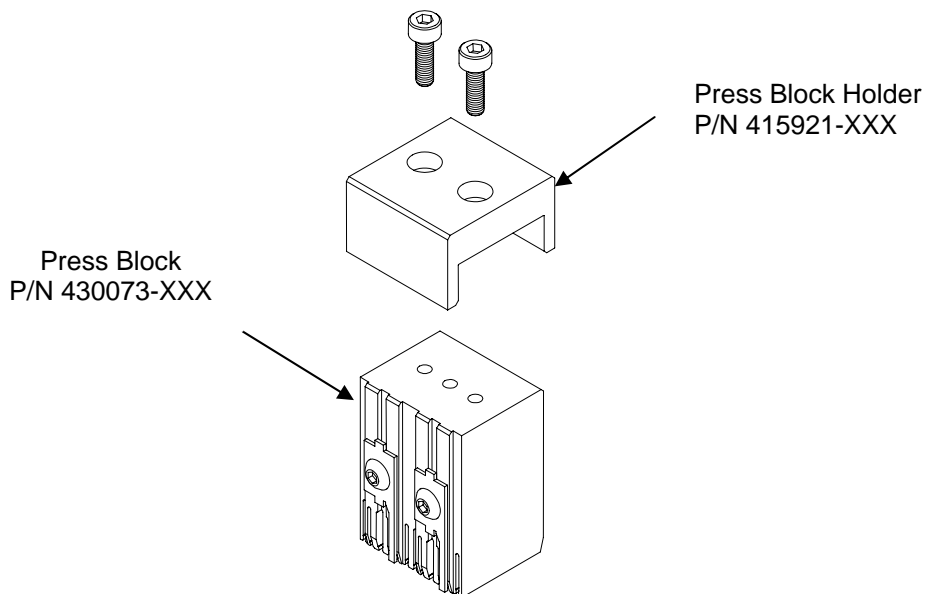
7.3.2. 8-row standard, 1000 & 2000 Headers and Shrouds

8-row standard headers and shrouds use the same tooling as the 8-row 1000 & 2000 product.


FEATURES

- Inserts Metral 8 Row standard, 1000 & 2000 Series headers & shrouds onto PCB.
- End-to-End stackable.
- Use manually or in an automatic insertion machine.
- Polarization keys insure proper tooling-to-connector alignment.
- End web design allows tooling to fit within length of connector & prevents end wall damage.
- Press block can be used as bottom PCB support.

Figure 20 8-row Press Block and Press Block Holder



PRESS BLOCK HOLDER SIZE	PRESS BLOCK HOLDER ORDERING INFORMATION 8-ROW
2 – 12mm modules	415921-002
4 – 12mm modules	415921-004
6 – 12mm modules	415921-006
8 – 12mm modules	415921-008
10 – 12mm modules	415921-010
21 – 12mm modules	415921-101

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 26 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

Current Tooling

PRESS BLOCK SIZE	PRESS BLOCK ORDERING INFORMATION 8-ROW
24mm modules	430073-001
48mm modules	430073-002
72mm modules	430073-003
96mm modules	430073-004

Previous Tooling – No Longer Available

PRESS BLOCK SIZE	PRESS BLOCK ORDERING INFORMATION 8-ROW
24mm modules	415920-002
48mm modules	415920-004
72mm modules	415920-006
96mm modules	415920-008
120mm modules	415920-010


7.3.3. Bottom Tooling - Headers

Bottom tooling can be a board with oversize holes or tooling supplied by the user. A press block will also work for bottom support. For all the 8-row headers, board support P/N 416070-001 is available.

For IMPRESS related bottom tooling, please contact your local Customer Service Representative'.

7.3.4. Bottom Tooling - Shrouds

Use press blocks on both the header side of the board to support the board and on the shroud side to press on the shroud.

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 27 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

8. Installation Procedure

The installation procedure for the headers and shrouds cover by this application specification can be summarized as follows:

- Properly place header or shroud in desired location on PC board. Check to see compliant sections line up with holes in board.
- Place appropriate top and bottom tooling in their correct locations. See manual on insertion tooling for correct locations of top and bottom tooling for press being used.
- To insure proper insertion into the board, **HEADERS AND SHROUDS MUST BE CENTERED BENEATH RAM OF PRESS.** Offset loading may result in improper seating of headers or shrouds and lead to bending of pins.
- Actuate insertion press and then remove assembly from press after press returns.
- On Metral 2000 headers we recommend that headers that are side-by-side be assembled so that the exposed stripline shield of the next header to be inserted faces the side of the last inserted header. If the headers are assembled in the opposite order, there is a catching to top of the shield in the assembled header, and bending that portion of the shield under the header being inserted.

FCI recommends that the insertion force for headers to be between 100 to 120 Newtons (22.5 to 27 pounds) per pin and for shrouds to be between 20 to 24 Newtons (4.5 to 5.4 pounds) per pin.

EXAMPLE: For each 5-row 1000 straight press fit headers there are 36 straight pins and 3 Eye-of Needle pins on the ground spring for a total of 39 pins. The insertion force is an average force that has been determined to yield the best results for insertion.

Minimum Press Requirements
(39 pins)x(100 Newtons/pin)=3900N (876lb)

Maximum Press Requirements
(39 pins)x(120 Newtons/pin)=4680N (1052lb)

Actuation of Insertion Press should be slow and controlled at a speed of 1.27mm/sec. (.05inch/sec.). Pressing to a certain pressure or to a change in slope will yield more consistent results than pressing to a set distance due to variances in board thickness.

9. Post-Installation Inspection Procedures

9.1. **Header and Shroud to Board Clearance**


The headers and shroud should be seated flush to the board but in no instance be more than .1mm (.004 inch) off the board

9.2. **Visual**

All pins inserted into circuit board via holes. Pins and plastic not damaged.

9.3. **Pin Tip Variations**

The pin tips shall be within .50mm true position (\pm .25mm) of location after insertion of the header on the header side and should be within the same tolerance on the back side of the board after shroud insertion.

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 28 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
CLASSIFICATION UNRESTRICTED			

10. Removal Tooling and Repair Procedures

The removal procedures vary depending on your board layout, the pin length and the board thickness. There are also cases in which a single pin repair is the best action to take. There are manuals supplied with the tooling that is shown below to help you through the pin removal process. If you are not sure what type of repair process is best for your application, please call 1-800-843-6911.

10.1. *Replacement Pins*

When removing and replacing individual pins use a pin from a spare header of the same product number. Pins may be replaced twice.

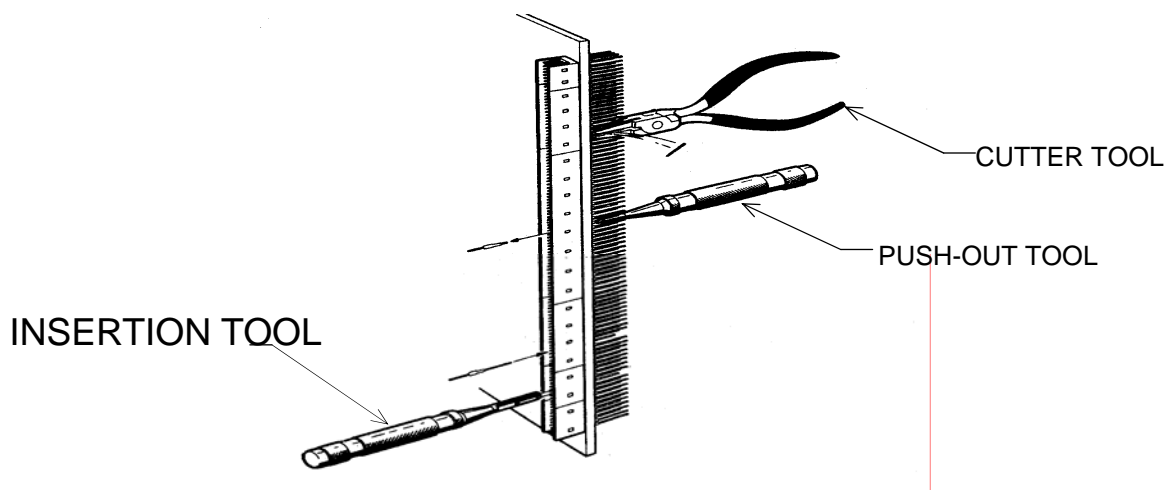
Note:


On Metral 4000 headers there are ground connections between the stripline shields and the even number ground pin positions. On all 5-row product the even pin positions in are the 'C' and 'GND' rows. On the 8-row product the even pin positions are the 'C', 'F' and 'GND' rows. We have not run qualification testing on the connections of repaired pin to stripline shield. However each stripline shield has multiple connections to ground pins and an additional connection to the ground spring so there is no chance of electrically isolating the stripline shield.

10.2. *Individual Pin Pushout Tool – MT330*

The MT-330, P/N 194208-001, pushes the pins out of the circuit board from the opposite side of the header one at a time. After all the pins have been removed you can then pull the header or shroud off the board with a pair of pliers. The tool kit comes with the three tools shown. Individual pin repair can be accomplished by removing the defective pin and inserting a replacement pin.

Figure 21 MT-330 Pushout Tool

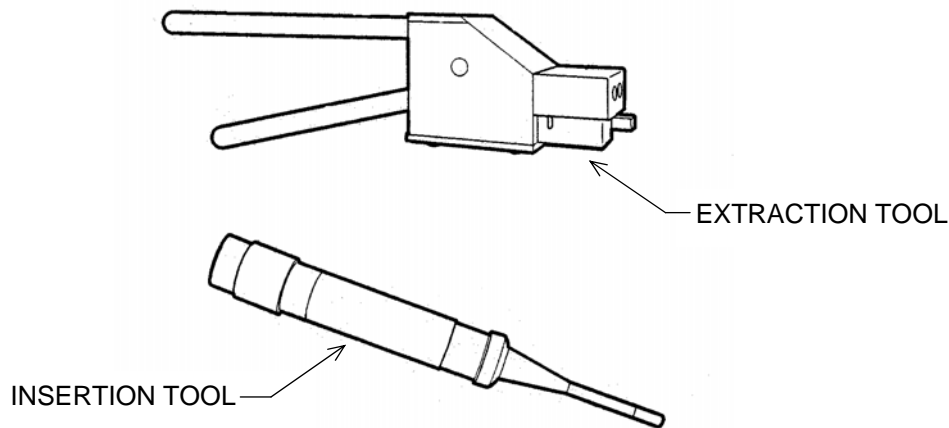


NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 29 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

10.3. Individual Pin Pullout Tool – MT340

The MT-340 , P/N 194204-001, pulls the pins out of the circuit board from the same side as the header one at a time. After all the pins have been removed you can then pull the header or shroud off the board with a pair of pliers. The tool kit comes with the two tools shown. Individual pin repair can be accomplished by removing the defective pin and inserting a replacement pin.

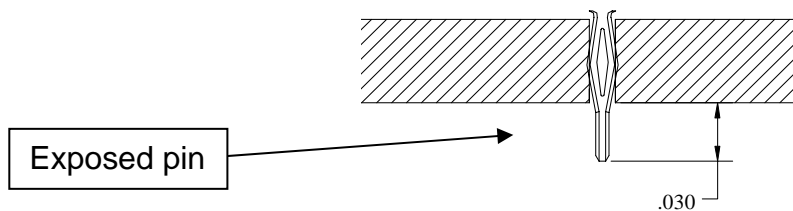
Figure 22 MT-340 Pullout Tool



10.4. 6x6 Pin Pushout Tool – MT0537

The removal tooling will remove Metral 5-row and 5-row extended 1000, and 2000 Series Headers with varying tail lengths. The 6 x 6-grid pin removal tool kits are hand tools used to remove Metral signal pins from the tail side of the circuit board. A hand operated arbor press, not included, is required to actuate the hand tool. The 6 x 6-grid tool kit removes 6 columns by 6 rows of pins at one time. The kit includes top tooling, bottom support tooling, and pliers for plastic & ground spring removal.

Product Style	Hole Pattern	For exposed pins of at least .030"	**For hidden, or less than .030" exposed pins.
1000 & 2000	6 x 6 Grid	HT-0537 415878-005	HT-0537A 415878-006



** If the pins are exposed, but are less than .030" in length, you will have to use both tools. Ex: You are using 5 row headers and the pin length exposed is .020". You will have to use HT-0537 to press the pins slightly into the board. You will then have to use HT-0537A to finish pressing the connector from the board.


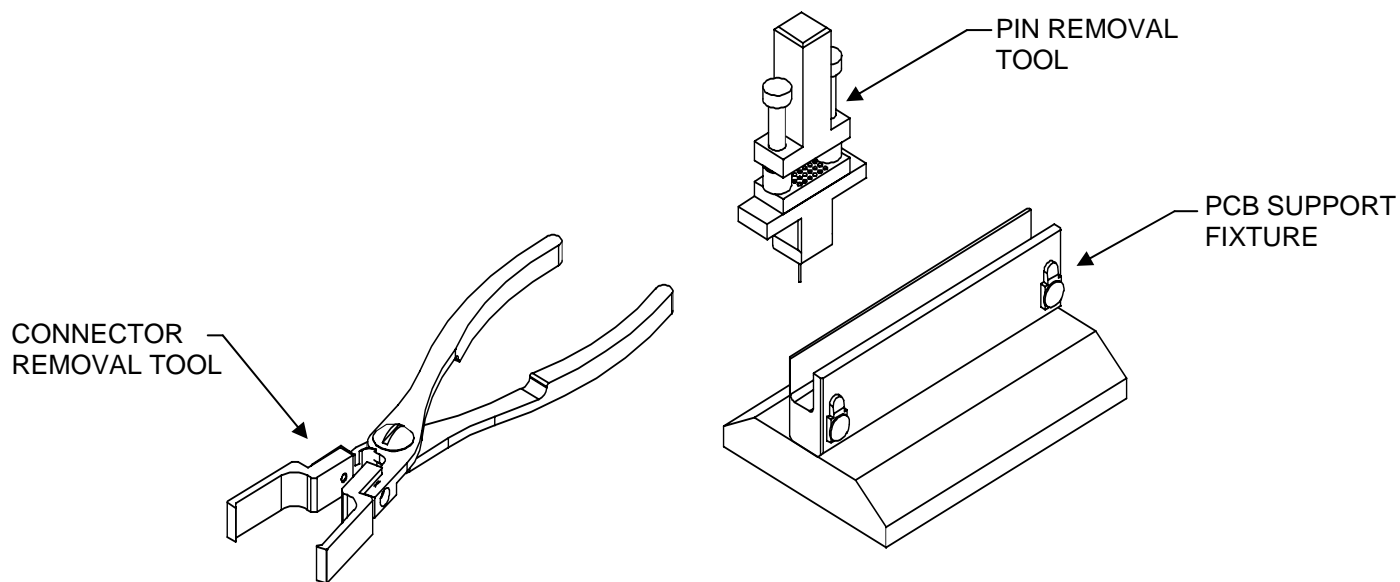
NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 30 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

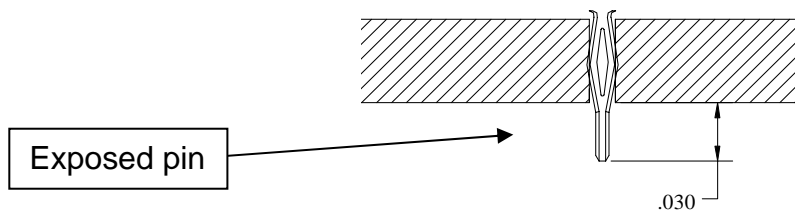
Figure 23 MT-0537 Pushout Tool




10.5. 8x12 Pin Pushout Tool – HT-0538 & HT-0540

FCI offers two removal tool styles for 8 row series headers. The removal tooling will remove Metral Standard, 1000, and 2000 Series Headers with varying tail lengths. The 8 x 12-grid (standard), and 9 x 12-grid (1000& 2000 series) pin removal tool kits are hand tools used to remove Metral signal pins from the tail side of the circuit board. A hand operated arbor press, not included, is required to actuate the hand tool. The 8 x 12-grid tool kit removes 8 columns by 12 rows and the 9 x 12 grid tool kit removes 9 columns by 12 rows of pins at one time. The kit includes top tooling, bottom support tooling, and pliers for plastic & ground spring removal.

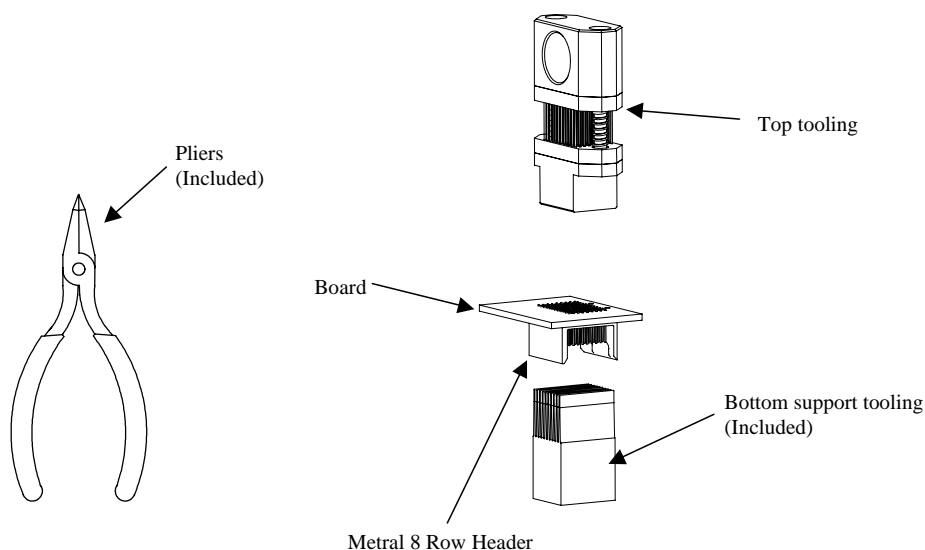
Product Style	Hole Pattern	For exposed pins of at least .030"	**For hidden, or less than .030" exposed pins.
Standard	8 x 12 Grid	HT-0538 416270-003	HT-0538A 416270-004
1000 & 2000	9 x 12 Grid	HT-0540 416270-001	HT-0540A 416270-002



NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 31 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
		CLASSIFICATION UNRESTRICTED	

** If the pins are exposed, but are less than .030" in length, you will have to use both tools. Ex: You are using 8 row standard headers and the pin length exposed is .020". You will have to use HT-0538 to press the pins slightly into the board. You will then have to use HT-0538A to finish pressing the connector from the board.

Figure 24 HT-0538 & HT-540 Pushout Tool




Shroud removal:

The header is pressed off the board using this method. Once the header is pressed free, the shroud is not longer attached except by the ground spring and can be pulled off with a pliers. (The header pins are what hold the shroud.)

10.6. Repairing Bent Pins

Bent pins must either be straightened or replaced. We recommend that if the pin is bent more than 45° it be replaced. If the pin is bent equal to or less than 45°, it can be straightened with a pliers or equivalent tool that has a smooth surface on the inside jaws. The repair shall be considered a success if the repaired pin is not 'kinked' nor the contact surface scraped. Burnish marks on the contact surface of the pins are acceptable. Do not use any pliers or tools made of aluminum as they could contaminate the contact surface.

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 32 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
CLASSIFICATION UNRESTRICTED			


11. NOTES

The following table lists the cad files imported into this document.

Figure	Autocad File
1	G20010_A
2	G20010_B
3	G20010_C
4	G20010_D
5	G20010_E
6	G20010_F
7	G20010_G
8	G20010_H
9	G20010_J
10	G20010_K
11	G20010_L
12	G20010_M
13	G20010_N
14	G20010_P
15	G20010_R
17	G20010_S

12. REFERENCE DOCUMENTS

Telcordia GR-1217-CORE
IEC-61076-4-104

NUMBER GS-20-010	TYPE APPLICATION SPECIFICATION		
TITLE For 5-Row 1000 & 2000 Headers and Shrouds 8-Row Std., 1000 & 2000 Headers and Shrouds		PAGE 33 of 33	REVISION L
		AUTHORIZED BY D. Horchler	DATE 2 Jun 08
CLASSIFICATION UNRESTRICTED			

REVISION RECORD

REV	PAGE	DESCRIPTION	EC #	DATE
A	ALL	NEW DOCUMENT	V02759	11/14/00
B	ALL	ADD INFO ON PRELOADED GROUND SPRING	V11692	06/14/01
C	ALL	ADD METRAL 2000 SHROUDS	V12265	09/25/01
D	ALL	MODIFY NOTE IN SECTION 10.1	V12837	12/17/01
E	ALL	CHANGE PRESS BLOCK NUMBERS AND PICTURES. ADD IMPRESS MACHINE INFORMATION	V03-0363	03/31/03
F	ALL	CHANGE SECTIONS 4.5, 4.9 AND 4.15 TO ADD INFO ON POWER	V03-0451	04/21/03
G	ALL	ADD NEW HEADER DRAWING. ADD INFORMATION ON MATING TO METRAL 4000 RECEPTACLES	V03-1159	10/24/03
H	ALL	ADD LEAD FREE INFORMATION	V05-0928	9/30/05
J	All	Change logo	V06-0405	4/26/06
K	26	Change 43073-002, -004, -006, -008 to -001, -002, -003, - 004 respectively. Delete 430073-010	V06-0974	9/20/06
L	28	Revise Section 10.1, remove replacement pin table.	V08-0239	6/2/08