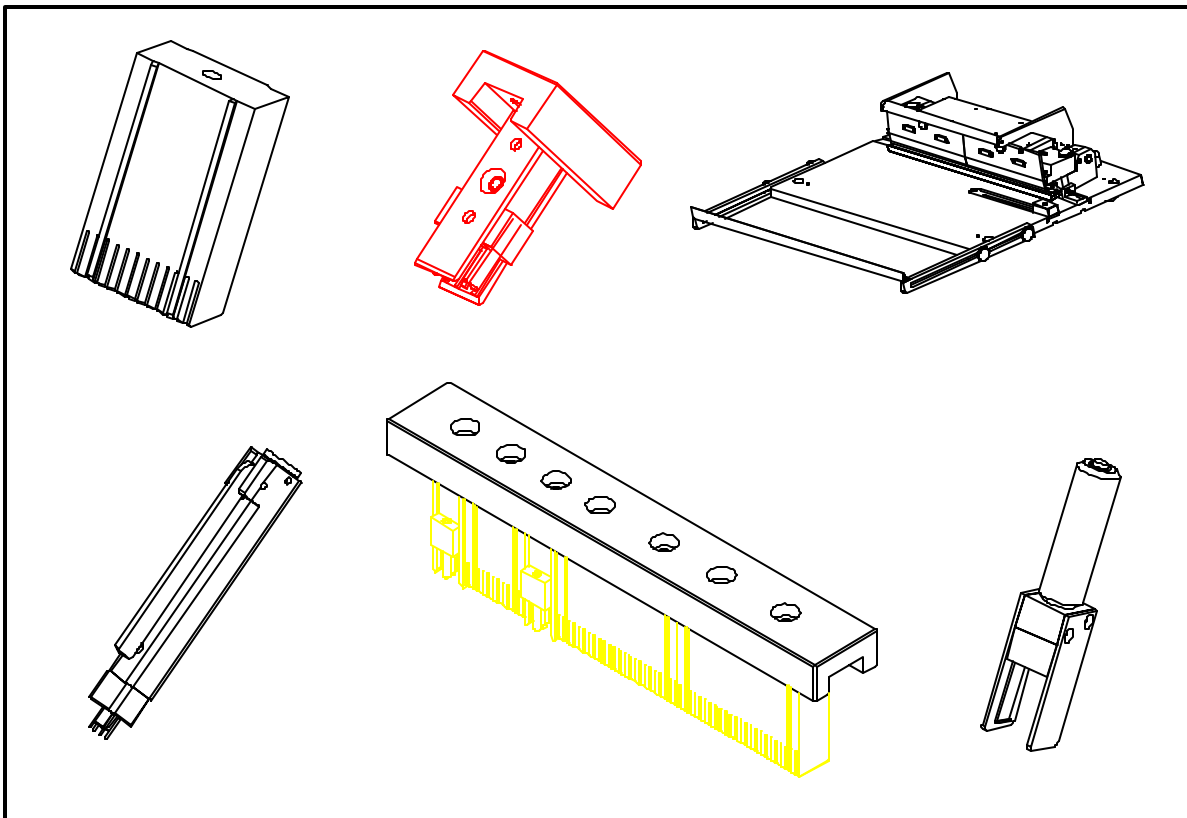




Tooling Manual

HDM INSTALLATION TOOLING

For HDM Connector Series 73656, 73642, 73643, 73644, 73769,
73770, 73797, 73798, 73799, 73800, 73801, 73802 & 73087



***DESCRIPTION**

***OPERATION**

***MAINTENANCE**

Doc. No. 62200-9999
Release Date 2000/10/26
Revision: Initial Release
Revision Date:

WARNING

NEVER

OPERATE, SERVICE OR ADJUST THIS DEVICE WITHOUT PROPER INSTRUCTION AND WITHOUT FIRST READING AND UNDERSTANDING THE INSTRUCTIONS IN THIS MANUAL.

WORK SAFELY AT ALL TIMES

**FOR SERVICE, CONTACT YOUR
LOCAL MOLEX SALES OFFICE**

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HDM PRESS TOOLING

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SECTION 1

GENERAL DESCRIPTION & AVAILABLE TOOLING,

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1 GENERAL DESCRIPTION

1.1 DESCRIPTION

This manual covers the tooling available to press Molex HDM Backplane Power Modules, Backplane Connectors, Daughtercard Power Modules and Daughtercard Connectors into printed circuit boards. Also covered is the tooling to press an HDM shroud over the contacts of an HDM connector mounted on the other side of the pc board. See Table below for list of applicable connectors and shrouds. The pressin tooling is designed to go into a flat platen press. Operation is simple: Position a printed circuit board on the customer supplied support. Then hand start a connector into the pc board. Position the loading head in to the connector. Actuate the press to press the connector pins into the board. See individual instruction sheets (Appendix B) for operation of repair tools

1.2 FEATURES

The press-in tooling is designed so that one block will press in one connector or several different blocks can be mounted into a custom mounting rail for pressing in any combination of connectors in one operation.

1.3 TECHNICAL SPECIFICATIONS

1.3.1 Dimensions & Weight

See the individual tool sheet and instruction sheets in the appendixes for measurements and weight of individual tools.

1.3.2 Rate

90 connectors pressed in (one at a time) per hour depending on operator skill.

1.4 DELIVERY CHECK

Carefully remove the tooling from its shipping container and check to confirm that the tooling matches the purchase order and no damage has occurred.

1.5 TOOLS

A metric hex wrench will be required to assemble and/or install the press-in tools.

1.6 PRESS REQUIREMENTS

1.6.1 Basic Press Requirements

The press-in tools are designed to be used in a flat platen press meeting the following requirements (Reference Fig. 1-1):

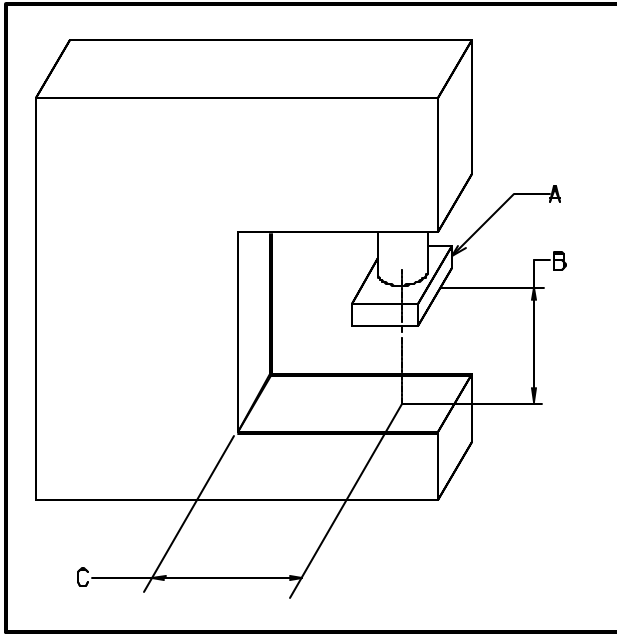
Letter	Description	Dimension*
A	Upper Platen	51 mm X 102 mm X 25.4 mm 2 in. X 4 in. X 1 in.
B	Opening	89 mm (3.5 in.)
C	Throat	150 mm (6 in.)
	Force	66N (15 lbs) per pin

1.6.2 Molex Presses

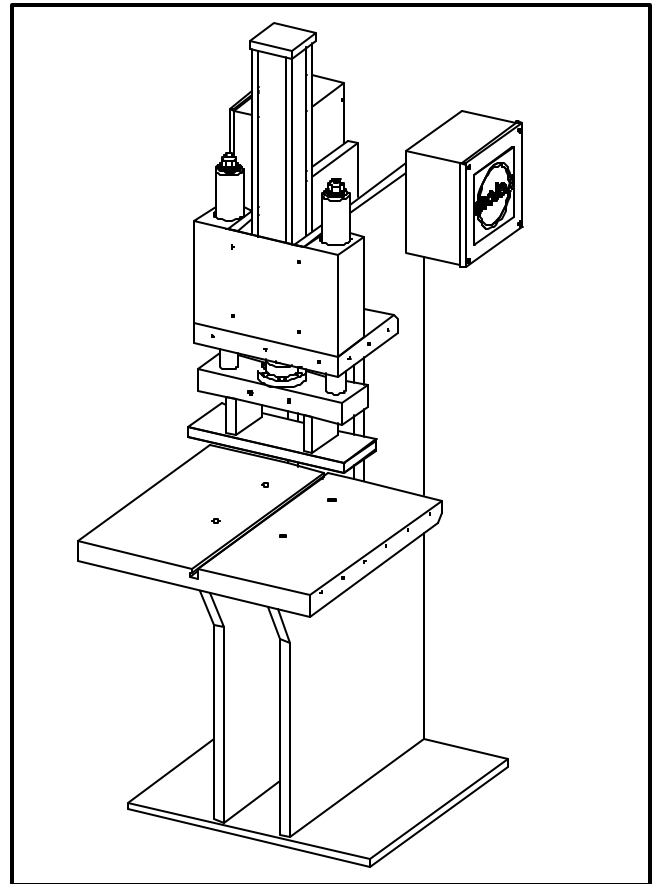
Molex offers two (2) presses suitable for this application (See Fig. 1-2 & 1-3).

They are:

(con't. on page 1-3)



**Fig. 1-1
PRESS DIMENSIONS**

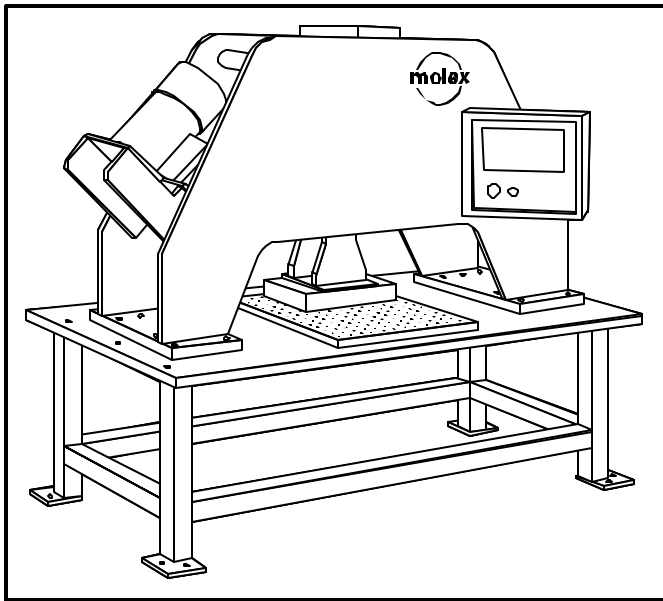


**Fig. 1-3
MOLEX STANDARD (8-TON) FLAT
PLATEN PNEUMATIC PRESS
62201-3800**

(con't. from page 1-2)

62200-6400 16-ton Electric Flat Platen Press.

62201-3800 8-ton Pneumatic Flat Platen Press.



**Fig. 1-2
MOLEX STANDARD (15-TON) FLAT
PLATEN ELECTRICAL PRESS
62200-6400**

TABLE 1 APPLICABLE CONNECTORS

Connector No.	Description
73656-0000	Backplane Power Module (Standard)
73656-5000	Backplane Power Module (Custom)
73642-0000	72 Circuit Vertical Backplane Header (5mm Pin Height*)
73642-0200	72 Circuit Vertical Backplane Header (6mm Pin Height*)
73642-1000	144 Circuit Vertical Backplane Header (5mm Pin Height*)
73642-1200	144 Circuit Vertical Backplane Header (6mm Pin Height*)
73643-0000	72 Ct. Vertical Backplane Header w/End Wall (5mm Pin Height*)
73643-0200	72 Ct. Vertical Backplane Header w/End Wall (6mm Pin Height*)
73643-1000	144 Ct. Vertical Backplane Header w/End Wall (5mm Pin Height*)
73643-1200	144 Ct. Vertical Backplane Header w/End Wall (6mm Pin Height*)
73644-00XX**	72 Ct. Vertical Backplane Header w/Key & Guidance (5mm Pin Height*)
73644-02XX**	72 Ct. Vertical Backplane Header w/Key & Guidance (6mm Pin Height*)
73644-10XX**	144 Ct. Vert. Backplane Hdr. w/ Key & Guidance (5mm)*

TABLE 1 APPLICABLE CONNECTORS (Con't.)

Connector No.	Description
73644-12XX* *	144 Ct. Vert. Backplane Hdr. w/ Key & Guidance (6mm)*
73642-1000 (2)	288 Circuit Vertical Signal Module (5mm)* (2 Conn. End-to-End)
73642-1200 (2)	288 Circuit Vertical Signal Module (6mm)* (2 Conn. End-to-End)
73769-0100	72 Circuit High Rise Vertical Stacking Header (15mm SH)
73769-0300	72 Circuit High Rise Vertical Stacking Header (10mm SH)
73769-1100	144 Ct. High Rise Vertical Stacking Header (15mm SH)
73769-1300	144 Ct. High Rise Vertical Stacking Header (10mm SH)
73770-0100	72 Ct. H. R. Vert. Stacking Hdr. w/Closed End (15mm SH)
73770-0300	72 Ct. H. R. Vert. Stacking Hdr. w/Closed End (10mm SH)
73770-1100	144 Ct. H. R. Vert. Stacking Hdr. w/Closed End (15mm)
73770-1300	144 Ct. H. R. Vert. Stacking Hdr. w/Closed End (10mm)
73797-0000	72 Ct. Vertical Duckpin Midplane Header (5mm Pin)*
73797-0200	72 Ct. Vertical Duckpin Midplane Header (6mm Pin)*
73797-1000	144 Ct. Vertical Duckpin Midplane Header (5mm Pin)*
73797-1200	144 Ct. Vertical Duckpin Midplane Header (6mm Pin)*

TABLE 1 APPLICABLE CONNECTORS (Con't.)

Connector No.	Description
73798-0000	72 Ct. Vert. Duckpin Midplane Hdr. w/Closed End (5mm)*
73798-0200	72 Ct. Vert. Duckpin Midplane Hdr. w/Closed End (6mm)*
73798-0000	72 Ct. Vert. Duckpin Midplane Hdr. w/Closed End (5mm)*
73798-0200	72 Ct. Vert. Duckpin Midplane Hdr. w/Closed End (6mm)*
73798-1200	144 Ct. Vert. Duckpin Midplane Hdr. w/Closed End (6mm)
73799-00XX**	72 Circuit Vertical Duckpin Midplane Header, w/Key and Guidance (5mm)*
73799-02XX**	72 Circuit Vertical Duckpin Midplane Header w/Key and Guidance (6mm pin height)*
73799-10XX**	144 Circuit Vertical Duckpin Midplane Header w/Key and Guidance (5mm pin height)*
73799-12XX**	144 Circuit Vertical Duckpin Midplane Header w/Key and Guidance (6mm pin height)*
73800-0000	72 Ct. Long Pin Vertical Midplane Header (5mm Pin)*
73800-0200	72 Ct. Long Pin Vertical Midplane Header (6mm Pin)*
73800-1000	144 Ct. Long Pin Vertical Midplane Header (5mm Pin)*

TABLE 1 APPLICABLE CONNECTORS (Con't.)

Connector No.	Description
73800-1200	144 Ct. Long Pin Vertical Midplane Header (6mm Pin)*
73801-0000	72 Ct. L. P. Vert. Midplane Hdr. w/Closed End (5mm Pin)*
73800-1000	144 Ct. Long Pin Vertical Midplane Header (5mm Pin)*
73800-1200	144 Ct. Long Pin Vertical Midplane Header (6mm Pin)*
73801-0000	72 Ct. L. P. Vert. Midplane Hdr. w/Closed End (5mm Pin)*
73801-1000	144 Ct. L. P. Vert. Midplane Hdr. w/Closed End (5mm)*
73801-1200	144 Ct. L. P. Vert. Midplane Hdr. w/Closed End (6mm)*
73802-00XX**	72 Ct. Long Pin Vertical Midplane Header w/Key and Guidance (5mm Pin Height)*
73802-02XX**	72 Ct. Long Pin Vertical Midplane Header w/Key and Guidance (6mm Pin Height)*
73802-10XX**	144 Ct. Long Pin Vertical Midplane Header w/Key and Guidance (5mm Pin Height)*
73802-12XX**	144 Ct. Long Pin Vertical Midplane Header w/Key and Guidance (6mm Pin Height)
73087-0001	48 Circuit No End Wall Shroud

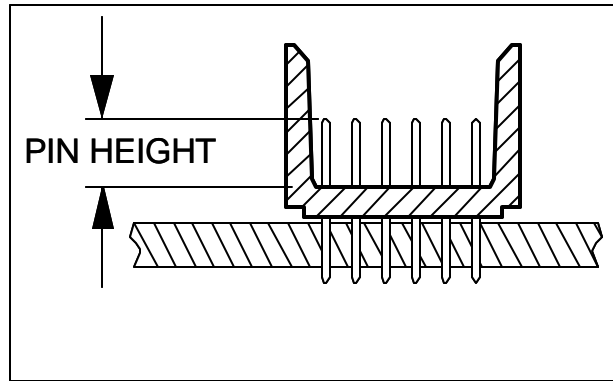
TABLE 1 APPLICABLE CONNECTORS (Con't.)

Connector No.	Description
73087-0101	48 Circuit Dual End Wall Shroud
73087-0201	48 Circuit Left End Wall Shroud
73087-0301	48 Circuit Right End Wall Shroud
73087-0002	72 Circuit No End Wall Shroud
73087-0102	72 Circuit Dual End Wall Shroud
73087-0202	72 Circuit Left End Wall Shroud
73087-0302	72 Circuit Right End Wall Shroud
73656-0000 or 73656-5000	4 Power Modules Stacked
73656-0000 or 73656-5000	5 Power Modules Stacked

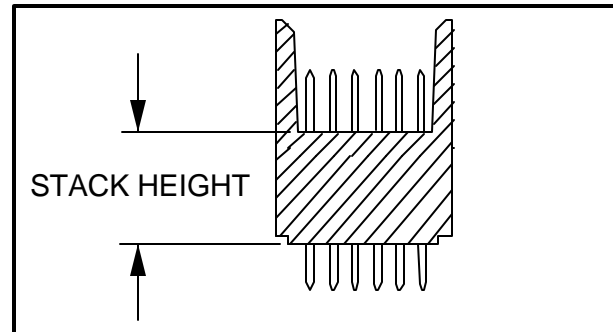
* See Fig. 1-4 for explanation of "Pin Height".

** The XXs represent the digits that identify the connector key combination.

SH Stack Height-- See Fig. 1-5 for explanation.



**Fig. 1-4
CROSS SECTION OF CONNECTOR SHOWING PIN HEIGHT**



**Fig. 1-5
CROSS SECTION OF HIGH RISE CONNECTOR SHOWING STACK HEIGHT**

SECTION 2
INSTALLATION & OPERATION

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2.2 PRESS STROKE ADJUSTMENT	2-2
2.3 MULTIPLE INSERTION TOOL ASSEMBLIES	2-2
2.4 OPERATION	2-5

2 INSTALLATION & OPERATION

2.1 PRINTED CIRCUIT BOARD BACKUP (or SUPPORT) PALLET

When an HDM connector is pressed into a printed circuit board, considerable force is required. Therefore the printed circuit board needs to be adequately supported to prevent damage to the board, and to insure consistent press-ins. The customer must supply the support fixture.

A printed circuit board backup pallet can easily be made. The following procedure is a simple method of making one.

1. Locate a suitable piece of material for the backup. It should be approximately $\frac{3}{4}$ inch thick and the same size or a little larger than the printed circuit board to be used. While aluminum could be used, a rigid nonconductive material such as a phenolic is preferred. (A stack of scrap pc boards of suitable size could be fastened together and used.)
2. Obtain a scrap pc board like the ones to be assembled. Attach this board to the material from step 1.
3. Using an oversize drill bit, drill through each hole where a pin from the connector(s) will go. Drill deep enough into the lower material to be certain the pins do not bottom out when inserted (at least 5mm [0.20in] deep).
4. Locate two (2) holes on the pc board to use as locating points. Drill for and mount suitably sized dowel pins in these two locations on the support fixture.

2.2 PRESS STROKE ADJUSTMENT

Most presses have some means of adjusting the stroke, please refer to the appropriate manual, for the press being used, for press stroke adjustments. The stroke should be adjusted so that when the press ram stops in the down position, the bottom of the connector is flush to 0.155mm (.006 in.) above the surface of the pc board (See Fig. 2-).

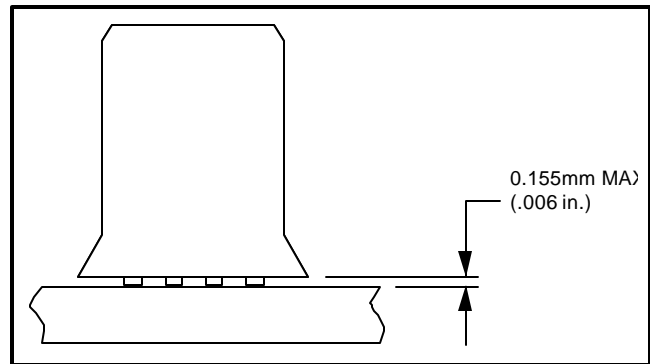


Fig. 2-1
**MAXIMUM CLEARANCE BETWEEN PC
BOARD AND CONNECTOR**

2.3 MULTIPLE INSERTION TOOL ASSEMBLIES

The various insertion modules can be assembled into a custom mounting rail to insert a line of connectors. Fig. 2-3 shows a typical multiple tool setup. A custom rail must be designed and made.

2.3.1 Design of Custom Mounting Rail

Molex will design and make these special mounting rails to the customer's requirements. However, should the customer desire to make his own, the procedure is described below.

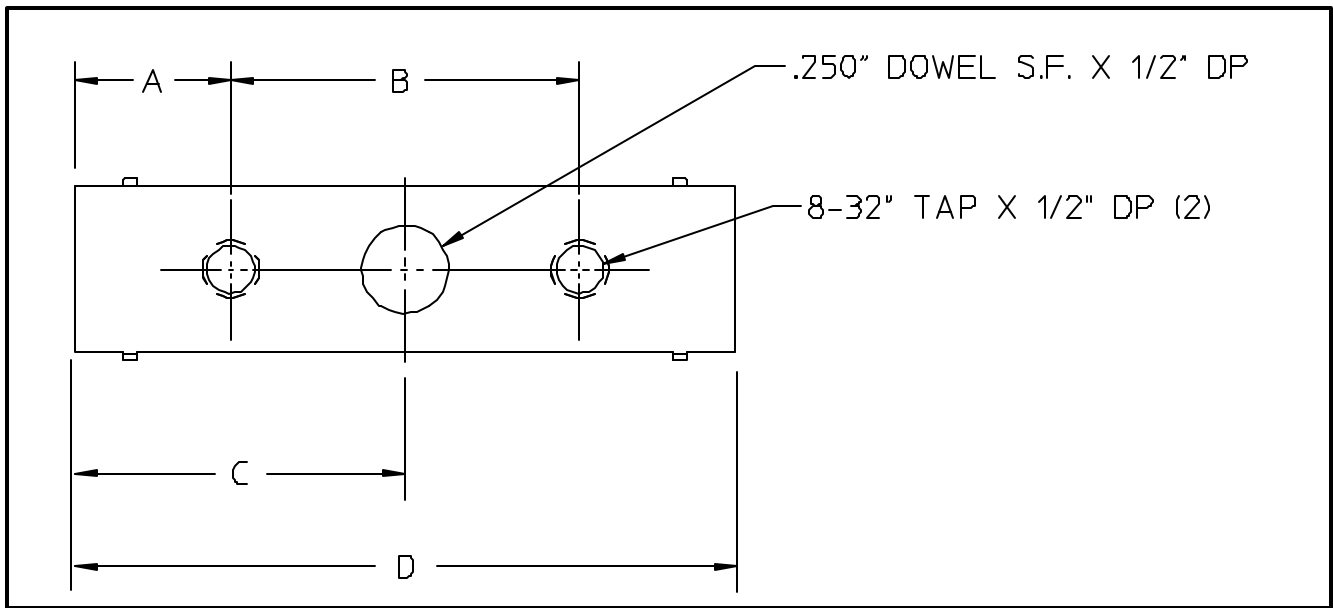


Fig. 2-2
DIMENSIONS FOR DESIGNING CUSTOM RAILS
TABLE 2-1 DIMENSIONS

Tool No.	"A"	"B"	"C"	"D"
62200-5711	6.00 +.05 -.10	NA	NA	12.17 ±.02
62200-8502	11.99 ±.13	NA	NA	23.98 +0 -.03
62200-5703	11.30 ±.13	25.40 ±.13	24.00 ±.13	47.98 ±.02

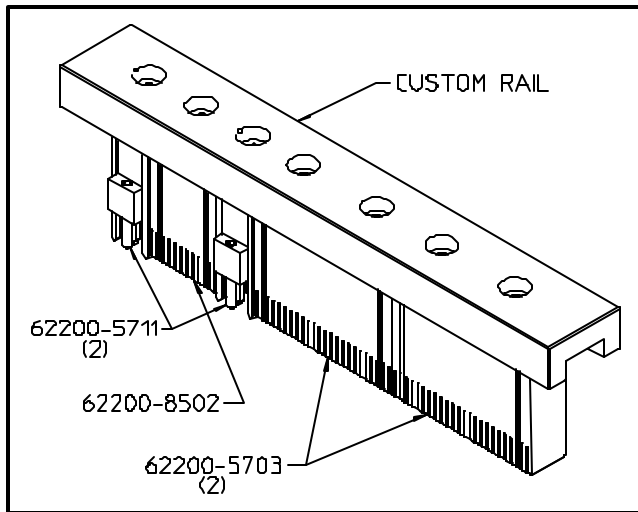


Fig. 2-3
TYPICAL MULTIPLE TOOL SETUP

Fig. 2-2 and Table 2-1 show the insertion module dimensions necessary to design a mounting rail

for your application.

- Determine the connectors to be installed and the order of each connector in the line. Using the example for the tool in Fig. 2-3, this would be, from left to right,
 - 73656-0000 power module;
 - 73642-0000 72 pos. module;
 - 73656-0000 power module;
 - 73642-1000 144 pos. module;
 - 73642-1000 144 pos. module.
- Referring to Section 4.1, determine the modules necessary to insert the line of connectors from step 1. For the example, this would require the following insertion modules
 - 62200-5711 power ins. module;
 - 62200-8502 72 pos. ins. mod.;
 - 62200-5711 power ins module;

- 4) 62200-5703 144 pos. ins mod.;
- 5) 62200-5703 144 pos. ins. mod.
3. From Table 2-1 determine the lengths ("E" Dims.) for each insertion module. For our example, this would be:
 - 1) 62200-5711 = 12.17 ±.02 mm;
 - 2) 62200-8502 = 23.98 +0 -.05 mm
 - 3) 62200-5711 = 12.17 ±.02 mm;
 - 4) 62200-5703 = 47.98 ±.02 mm;
 - 5) 62200-5703 = 47.98 ±.02 mm.
4. Total these dimensions. For our example this would be 144.28 mm
5. Obtain a length of aluminum bar that is 25 mm by 12.7 mm by T + >25 mm where "T" is the total from step 4. In our example this would be 144.28 + 25+ =170 mm
6. Machine cross section of this bar per Fig. 2-4.

- L₄ = B (for second module)
- L₅ = (S÷2) + E (for first module) + E (for second module) + A (for third module).
- ETC.
- For our example:
- L₁ = (25÷2) + 6 = 18.5 ±.13
- L₂ = NA
- L₃ = (25÷2) + 11.99 + 11.99 = 36.48
- L₄ = NA
- L₅ = (25÷2) + 11.99 + 23.98 + 6.00 = 54.47 (round to 54.50)
- L₆ = (25÷2) + 11.99 + 23.98 + 11.99 + 11.30 = 71.76 (71.80)
- L₇ = 25.40
- L₈ = (25÷2) + 11.99 + 23.98 + 11.99 + 47.98 + 11.30 = 119.74
8. Once the holes are calculated, drill and counterbore for an M4 SHCS.

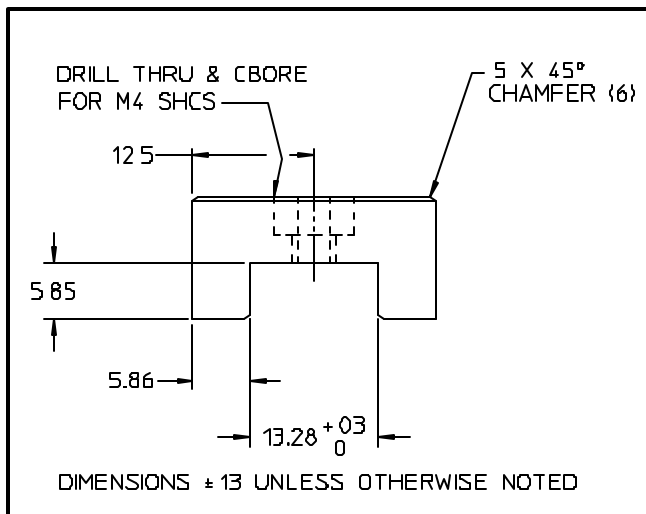


Fig. 2-4
MOUNTING RAIL DETAILS

7. Taking dimensions from Table 2-1 and Fig. 2-2, calculate the locations for the bolt holes (Ref. to Fig. 2-5).
 - L₁ = (S÷2) + A (for first module) .
 - L₂ = B (for first module)
 - L₃ = (S÷2) + E (for first module) + A (for second module)

2.3.2 Assembling Multiple Insertion Tool Assemblies

1. Once the new rail is completed, simply locate the various insertion modules in their proper location and install the necessary M4 X 12 socket head cap screws. **Do not tighten at this time.**
2. Take a sample pc board with the correct combination of connectors mounted to it and carefully set the insertion tool assembly into the connectors.
3. When the insert modules are set properly in the connectors, tighten the socket head cap screws.

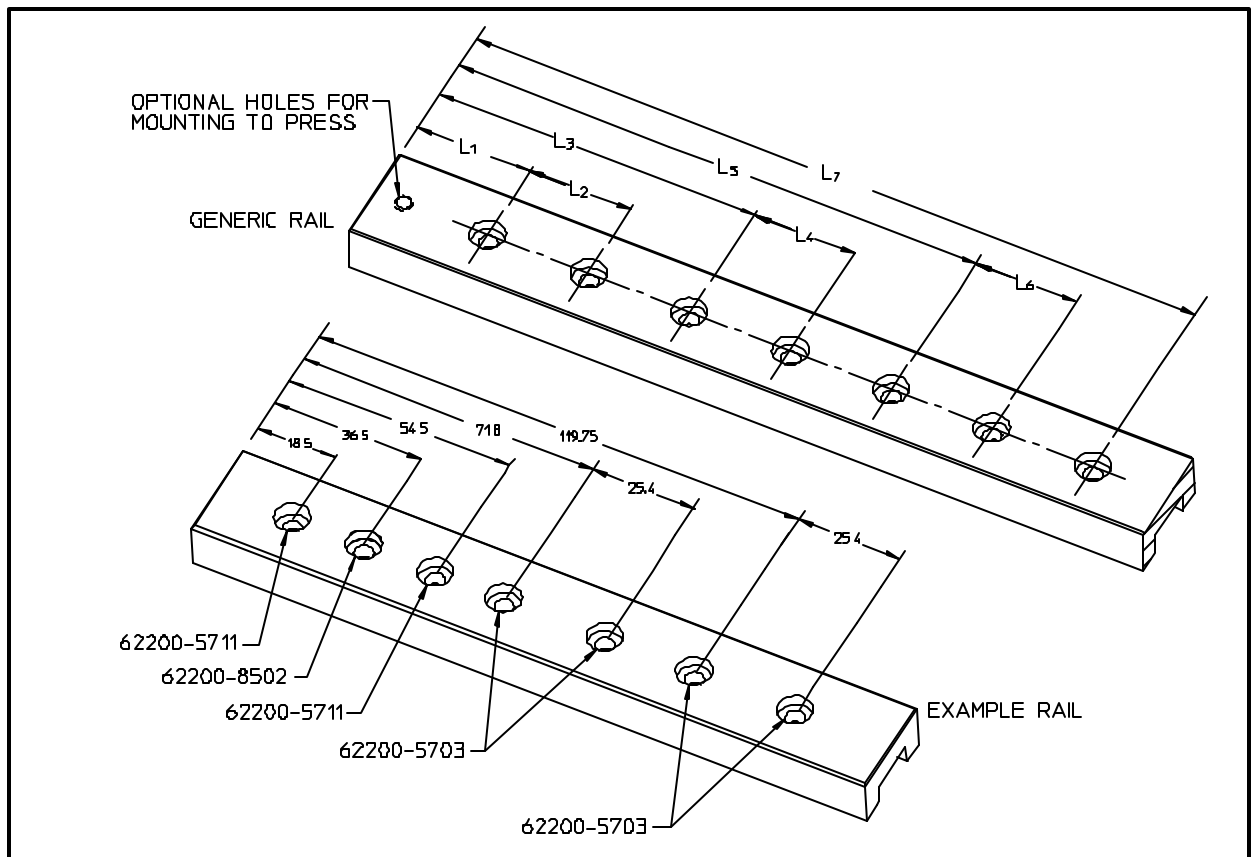


Fig. 2-5
RAIL MOUNTING HOLE DIMENSIONS

2.4 OPERATION

2.4.1 Operation of Pressin Tools

1. Carefully locate the connector(s) on the printed circuit board and start in by hand. Make sure pin 1 is in the correct position on all connectors. (See Fig. 2-6 and 2-7)
2. Locate the pre loaded board into the support pallet. (See Fig. 2-8)
NOTE: This tooling could be mounted to the upper platen of the press. If this is the case, jump to step 9.
3. Locate the proper tool in each connector, carefully checking alignment. (See Fig. 2-9)

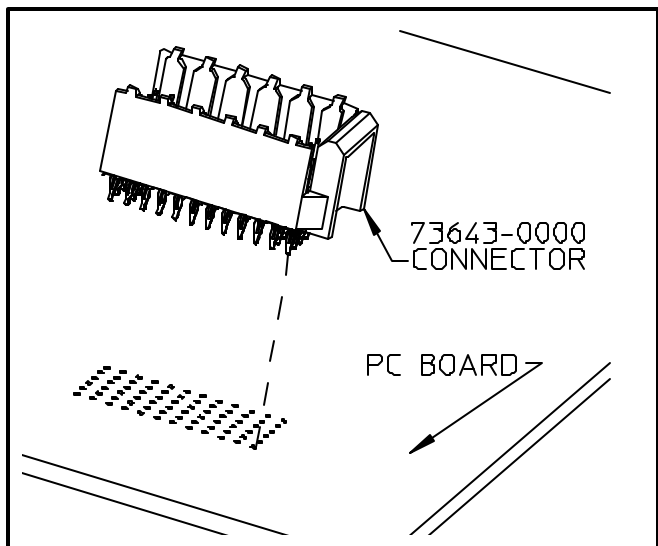


Fig. 2-6
TYPICAL LOADING STEP 1a

4. Position the pre loaded support pallet under the press platen.
5. Cycle the press.
6. Remove the loaded support pallet.

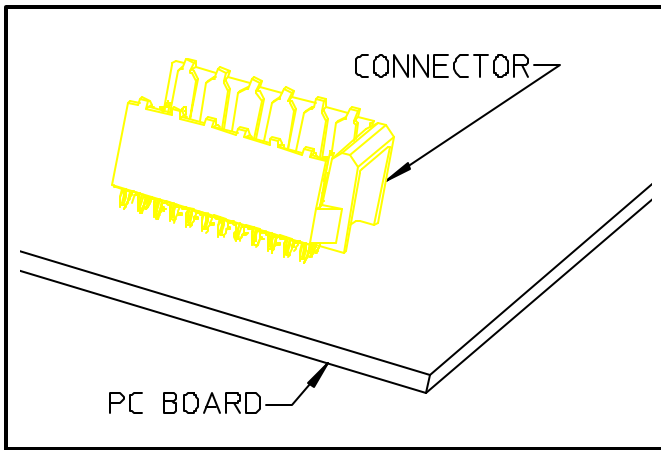


Fig. 2-7
TYPICAL LOADING STEP 1b

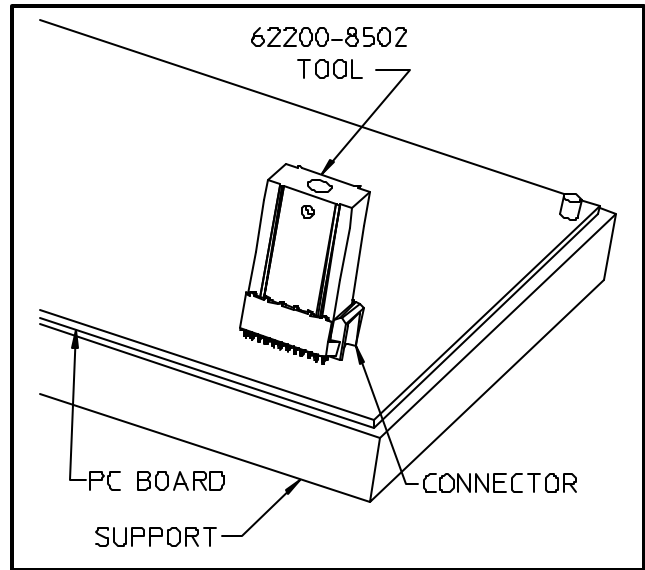


Fig. 2-9
TYPICAL LOADING STEP 3

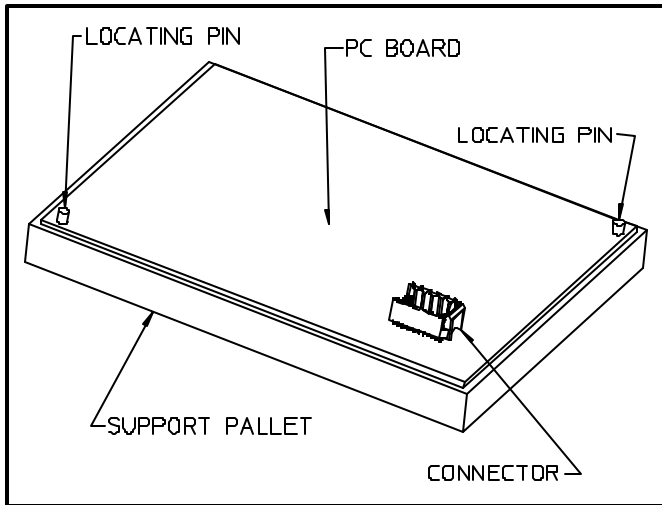


Fig. 2-8
TYPICAL LOADING STEP 2

7. Carefully remove the insertion tool(s).

8. Remove the printed circuit board.

NOTE: Proceed with the following steps only if the tooling is attached to the press.

9. Locate the loaded support pallet under the tooling in the press.

10. Slowly lower the press to be sure the tooling lines up with the connectors.

11. Cycle the press.

12. Remove the support fixture from under the press.

13. Remove the pc board from the support fixture.

2.4.2 Operation of Other Tools

Fig. 2-10 & 2-11 shows a typical multiple power module installation.

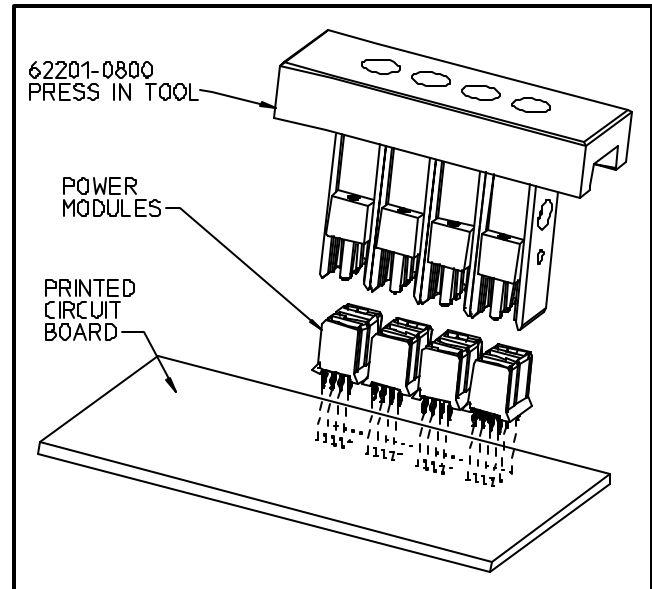


Fig. 2-10
STARTING A TYPICAL MULTIPLE POWER MODULE INSTALLATION

The operation of these tools is found in the individual instruction sheets for these tools. (See Appendix B & C.)

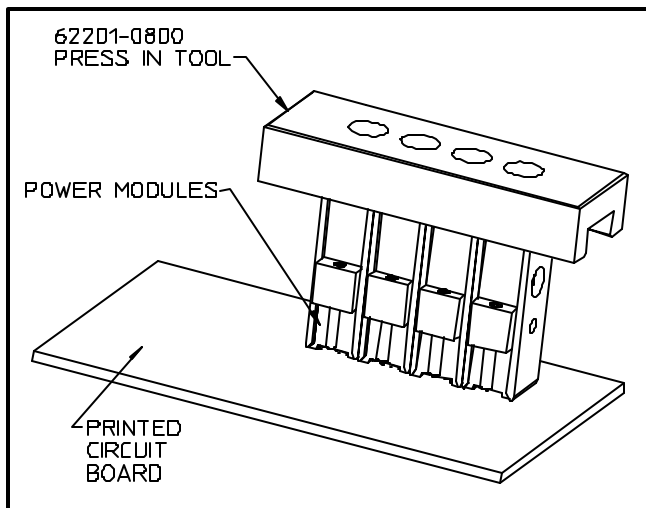


Fig. 2-11
MODULES PRESSED IN

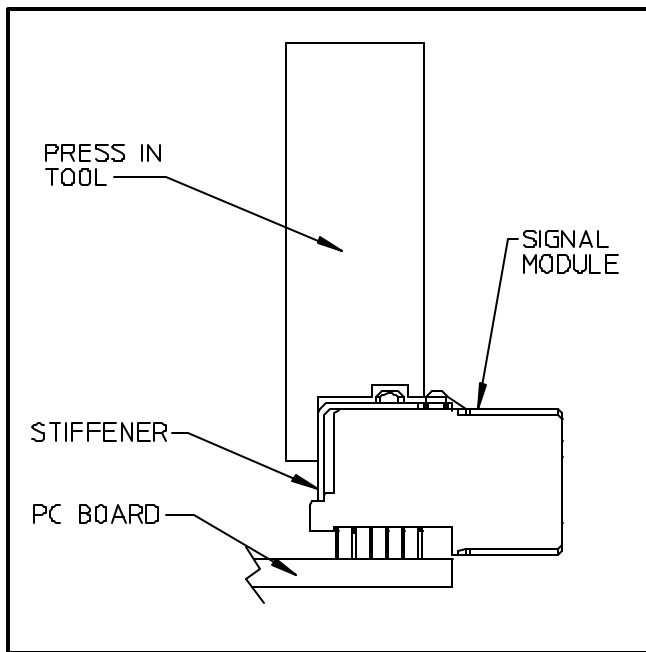


Fig. 2-12
RIGHT ANGLE DAUGHTER CARD
ASSEMBLY INSTALLATION

Figure 2-12 shows how a right angle daughter card press in tool is located on a right angle daughter card signal and power module assembly with stiffener rail.

There are a variety of other tools, repair tools, specialty tools, custom tools, etc.

SECTION 3

MAINTENANCE, SPARE PARTS, PERISHABLE PARTS AND PROBLEM CHECKLIST

	Page
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3.2 SPARE PARTS	3-2
3.3 PERISHABLE PARTS	3-2
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PROBLEM CHECKLIST	3-4

SECTION 3 MAINTENANCE, SPARE PARTS, PERISHABLE PARTS AND PROBLEM CHECKLIST

3.1 Maintenance

3.1.1 Cleaning

Once a day the support fixture should be cleaned of dust and plating particles and other debris. Compressed air may be necessary to remove debris from the pin clearance holes.

CAUTION: Use extreme caution when using compressed air for cleaning as it can cause debris to get lodged in the tooling or come flying out at the operator. **USE** of proper safety glasses by the operator and onlookers is required.

3.1.2 Lubrication

There is no lubrication required on any of the HDM tooling. However, the presses each have their own requirements for lubrication and maintenance. The instruction manual for the specific press being used should be referred to. Molex provides a sheet for logging routine preventive maintenance in this section.

3.2 SPARE PARTS

Spare parts are parts that are available to support the HDM Tooling in service. They are moving or otherwise functioning parts that could be damaged or malfunction. Molex Application Tooling Group

recommends that the customer keep some or all of these parts on hand to reduce down time. These parts are identified in the Parts Lists in Appendices A, B & C.

3.3 PERISHABLE PARTS

Perishable parts make contact with the product and can wear over time. The customer is responsible for maintaining these parts and Molex recommends that they keep at least one spare set on hand at all times. These parts are identified in the Parts Lists in Appendices A, B & C.

CHART 3.1 PREVENTIVE MAINTENANCE

DAILY: Clean, See Section 3.1.1

MONTHLY: Lubricate, See Section 3.1.2

CHECK SHEET **MONTH** _____ **YEAR** _____

		MON	TUE	WED	THU	FRI	SAT	SUN
Daily Clean (Check box when done)	WEEK 1							
	WEEK 2							
	WEEK 3							
	WEEK 4							
	WEEK 5							
Monthly Lubricate								

Chart may be copied for mounting.

Schedules should be adjusted up or down depending on usage.

Molex Application Tooling Group recommends that a log of preventive maintenance be kept with the machine.

PROBLEM CHECKLIST

PROBLEM	POSSIBLE CAUSE	SOLUTION
<p>1. Connector being damaged.</p>	<p>1. Press stroke set too low.</p> <p>2. Something not properly aligned.</p> <p>3. "Blades" on tooling bent or damaged.</p>	<p>1. Refer to the appropriate press manual and adjust the stroke. See Section 2.2.</p> <p>1. Check fixturing and repair as required.</p> <p>2. Check alignment of fixturing in press.</p> <p>3. Check to be sure the press platen is pressing squarely on the tooling block.</p> <p>1. Replace tool.</p>

SECTION 4

AVAILABLE TOOLS

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4.2 REPAIR TOOLS	1-3
4.3 CUSTOMER SPECIALS	1-4

SECTION 4.1 AVAILABLE STANDARD ASSEMBLY TOOLS

These are the Molex standard tools for pressing in the various HDM connectors. Most can be stacked in any combination on a custom mounting rail to assemble a strip of connectors. See Section 2.3 for details. See also the tooling sheets in Appendix A.

CONNECTOR	TOOL ORDER NO.	CONNECTOR	TOOL ORDER NO.
73642-0000	62200-8502	73769-1100	62200-5703
73642-0200		73769-1300	
73643-0000		73770-1100	
73643-0200		73770-1300	
73644-00XX		73797-1000	
73644-02XX		73797-1200	
73769-0100		73798-1000	
73769-0300		73798-1200	
73770-0100		73799-10XX	
73770-0300		73799-12XX	
73797-0000		73800-1000	
73797-0200		73800-1200	
73798-0000		73801-1000	
73798-0200		73801-1200	
73799-00XX		73802-10XX	
73799-02XX		73802-12XX	
73800-0000		73087-0001	62200-9800
73800-0200		73087-0101	
73801-0000		73087-0201	
73801-0200		73087-0301	
73802-00XX	73087-0002	62200-9900	
73802-02XX	73087-0102		
73642-1000	73087-0202		
73642-1200	73087-0302	62200-5705	
73643-1000	73642-1000 (2)		
73643-1200	73642-1200 (2)	62200-5711	
73644-10XX	73656-0000		
73644-12XX	73656-1000	62201-4400	

SECTION 4.2 REPAIR TOOLS

There are a variety of tools designed for repairing printed circuit boards with damaged or incorrectly installed HDM connectors. Instruction sheets for these tools can be found in Appendix B, except as noted.

Connector No. or Contact No.	Description	Tool Order No.
73645 series	The Backplane Single Contact Knockout Tool is a simple hand tool designed to remove a single backplane contact from a Connector and pc board.	62100-1000
73656 series	The Backplane Power Module Removal Tool is a hand tool used to remove the backplane power module insulator. Use in conjunction with 62100-1200 Contact Removal Tool.	62100-1100
	The Backplane Power Contact Removal Tool is a hand tool for removing backplane power contacts from a pc board. Use with Power Module Removal Tool P.N. 62100-1100.	62100-1200
	The Daughter Card Removal Tool is a hand tool used for removing the stiffener from a daughter card module.	62100-1300
73645 series	The Single Contact Insertion Tool is a hand tool for inserting a single HDM backplane signal contact into a backplane module mounted to a pc board.	62100-1400
73087-0001, 73087-0101, 73087-0201, & 73087-0301	These two shroud removal tools are used to remove the Hdm shrouds that have been pressed over the contacts of a connector located on the other side of the pc board.	62100-3300 (48 position)
73087-0002, 73087-0102, 73087-0202 & 73087-0302		62100-3400 (72 position)
	HDM & VHDM Joiner/ground Insertion tool	62100-3800
	Stiffener rail removal/installation tool is for removing and reinstalling an HDM stiffener rail so that damaged connectors can be repaired.	62201-5600*

* See separate instruction manual for details, picture of tool is on the cover in the upper right corner.

SECTION 4.3 CUSTOMER SPECIAL TOOLS

These assembly tools are designed for a specific customer's custom application. See Appendix C for tooling sheets and instruction sheets for these tools.

Connector No.	Description	Tool Order No.
	"Grand" connector left half press in tool	62200-8500
	"Grand" connector right half press in tool	62200-8600
	Daughter card press in tool	62200-8700
	Mating half press in tool	62200-8800
	Right angle daughter card press in tool	62200-9100
	288 shroud press tool with pins "Grand" center to	62200-9600
	Power mod/72 pos./power mod. tool "Grand"	62200-9700
	Power module press in tool (Intel)	62201-0100
	Stiffener removal/installation tool (Intel)	62201-0500
	5 position HDM power module press in tool (SCI)	62201-0700
	4 position HDM power module press in tool (SCI)	62201-0800
	Custom daughter card press in fixture (HDM & Omnigrid mix)	62201-8400

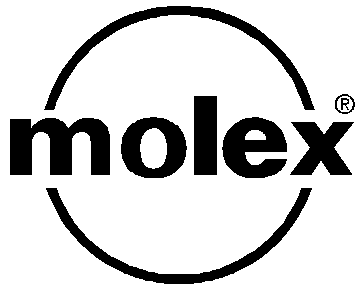
SECTION 5

GLOSSARY OF TERMS

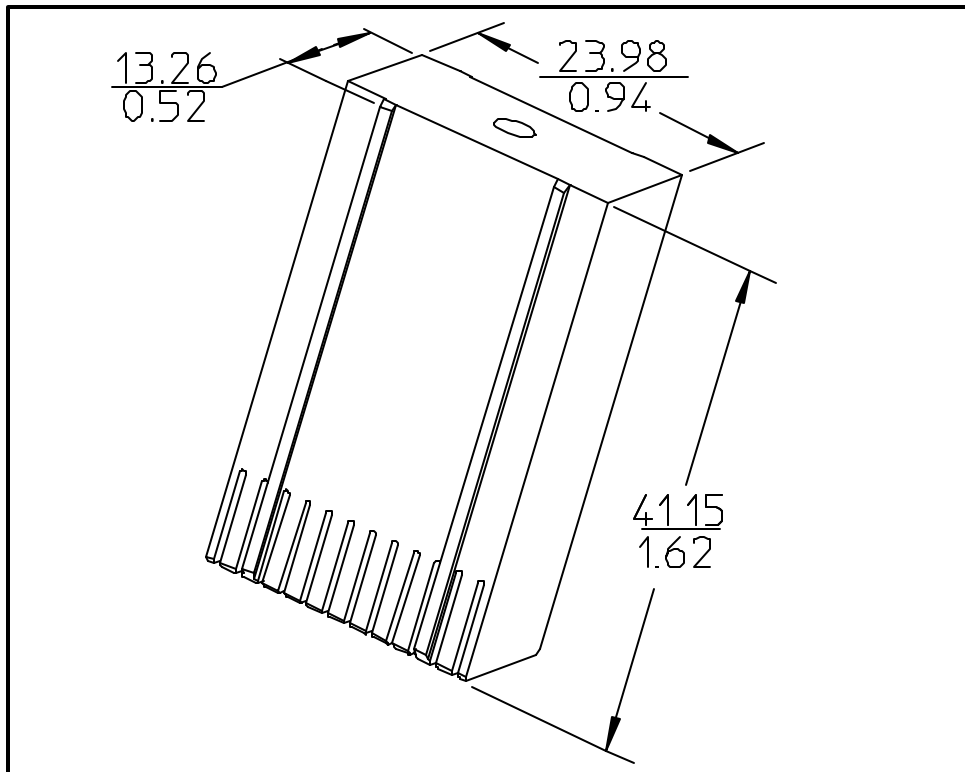
Backup Pallet	A simple fixture used to locate and support a printed circuit while a compliant pin connector is being pressed into the pc board. Considerable force is required to press one of these connectors into a pc board, thus the pc board must be adequately supported to avoid being damaged. It must have adequate clearance for the terminals when they protrude through the pc board.
Compliant Pin Connector	A connector which has terminals that are designed to give slightly when pressed into a hole in a pc board so that the terminal (pin) makes solid electrical contact with the printed circuit board, alleviating the need for soldering.
Flat Platen Press	A press in which the upper tooling or die set is not attached to the press ram. The ram has a simple flat plate (or platen) attached to it. For this application, the upper tooling is positioned in the connector(s). The press ram comes down on top this tooling and presses on it. When the press ram goes back up, the upper tooling stays with the connector.
HDM HDM+	High Density Metric connector system: A 2mm pitch module-to-backplane connector system designed for applications requiring high interconnect density and high-speed signal integrity. HDM+ have internal ground contacts. <small>Both HDM & HDM+ are registered trade marks of Teradyne, Inc.</small>
PC Board	Abbreviation for printed circuit board
Support Pallet	Same as backup pallet
Upper Tooling	The tooling that goes on top of the connector. It contains the mounting block and dies (or tools) necessary to properly apply pressure where required to push the connector terminals and locking posts into the holes in the printed circuit board.

APPENDIX A

**TOOL SHEETS, ASSEMBLY DRAWINGS & BILLS
OF MATERIALS FOR STANDARD VERTICAL AND
RIGHT ANGLE PRESS IN TOOLS**



62200-8502 72 POSITION HDM BACKPLANE INSERTION HEAD

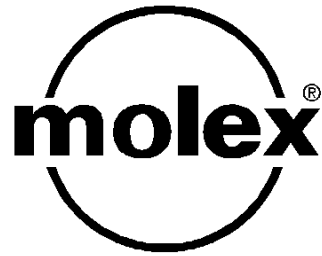


This tool weights about 0.1 kg (0.2 lbs) and will do about 200 assemblies an hour depending on operator skill and press speed. See the main manual, Section 2, for installation and operating instructions.

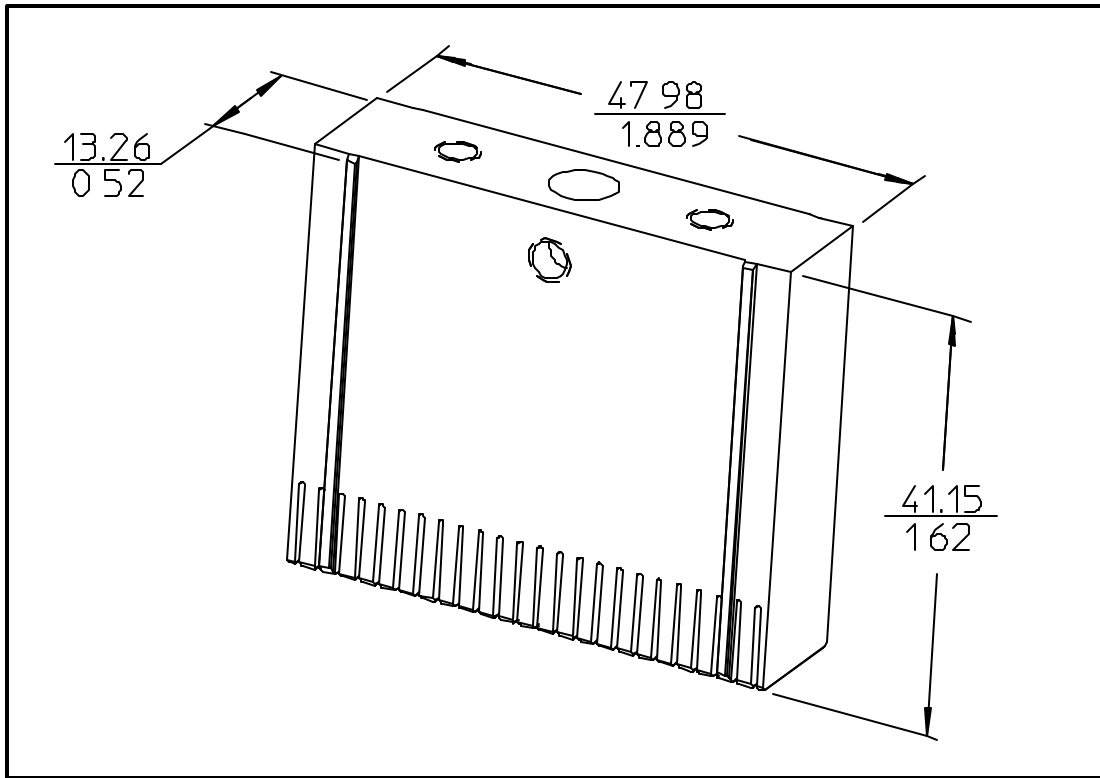
There is an M6 drilled and taped hole in the top for mounting to a custom rail (See Note) or mounting to the press upper plate, if desired.

A support fixture of some sort is highly recommended due to the high forces required to press in the connectors. See Section 2.1 for instructions for making a support.

NOTE: This tool can be stacked together with the 144 position tool (P.N. 62200-5703) and/or the 288 position tool (P.N. 62200-5705) and/or the power module tool (P.N. 62200-5711) and/or custom tools in any combination to load a custom combination of HDM connectors. These tools are mounted in a custom designed mounting rail. See Section 2.3 for detailed information on designing the rails and mounting these special combinations.



62200-5703 144 POSITION HDM BACKPLANE INSERTION HEAD

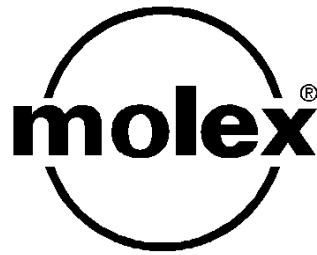


This tool weights about 0.2 kg (0.4 lbs) and will do about 200 assemblies an hour depending on operator skill and press speed. See the main manual, Section 2, for installation and operating instructions.

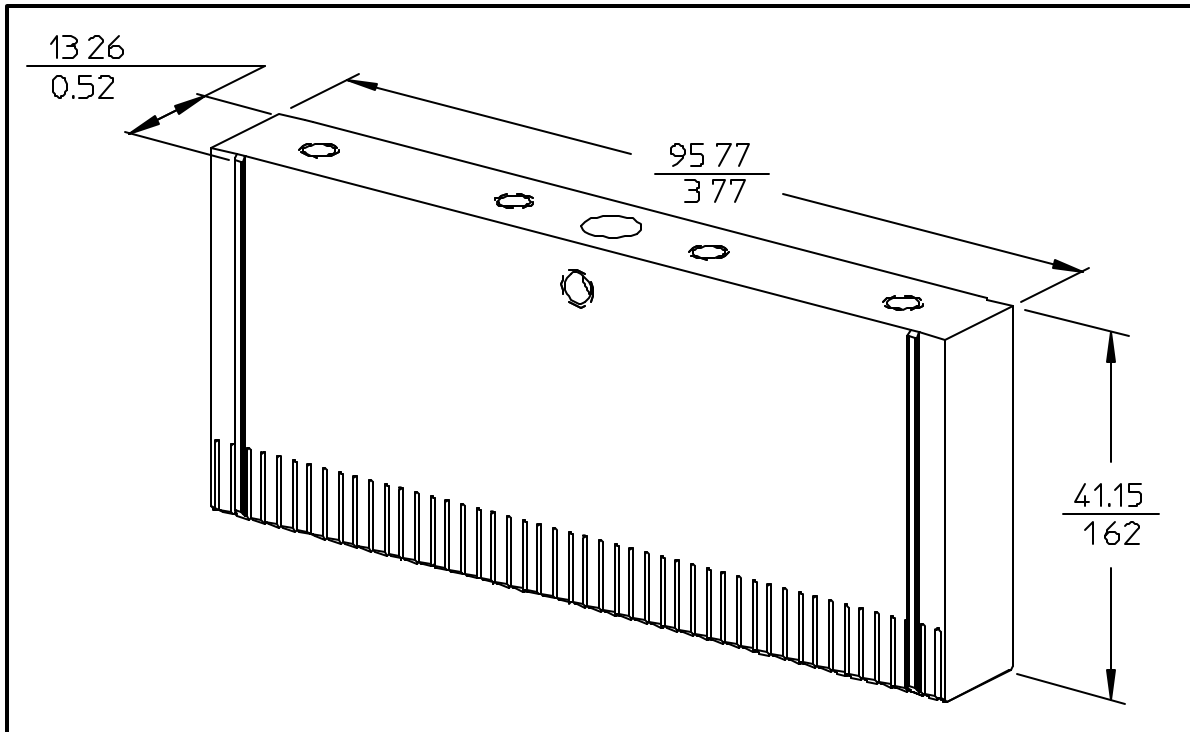
There are two (2) #8-32 drilled and tapped holes in the top for mounting to a custom rail (See Note) or mounting to the press upper plate, if desired. A ¼ in. dowel hole is also provided with an #8-32 tapped hole for locking the dowel.

A support fixture of some sort is highly recommended due to the high forces required to press in the connectors. See Section 2.1 for instructions for making a support.

NOTE: This tool can be stacked together with the 72 position tool (P.N. 62200-8502) and/or the 288 position tool (P.N. 62200-5705) and/or the power module tool (P.N. 62200-5711) and/or custom tools in any combination to load a custom combination of HDM connectors. These tools are mounted in a custom designed mounting rail. See Section 2.3 for detailed information on designing the rails and mounting these special combinations.



62200-5705 288 POSITION HDM BACKPLANE INSERTION TOOL

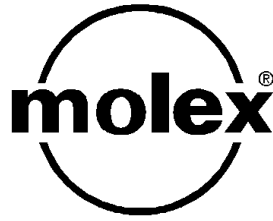


This tool is for inserting two (2) 144 position connectors. It weights about 0.2 kg (0.4 lbs) and will do about 200 assemblies an hour depending on operator skill and press speed. See the main manual, Section 2, for installation and operating instructions.

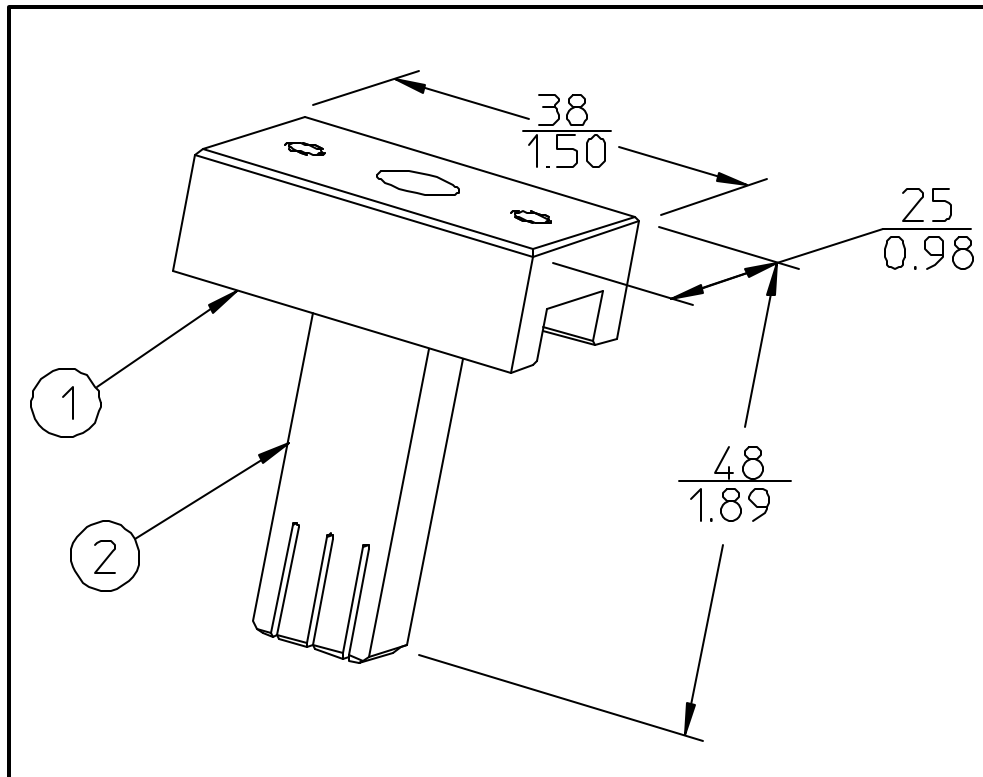
There are four (4) #8-32 drilled and tapped holes in the top for mounting to a custom rail (See Note) or mounting to the press upper plate, if desired. A ¼ in. dowel hole is also provided with an #8-32 tapped hole for locking the dowel.

A support fixture of some sort is highly recommended due to the high forces required to press in the connectors. See Section 2.1 for instructions for making a support.

NOTE: This tool can be stacked together with the 72 position tool (P.N. 62200-8502) and/or the 144 position tool (P.N. 62200-5703) and/or the power module tool (P.N. 62200-5711) and/or custom tools in any combination to load a custom combination of HDM connectors. These tools are mounted in a custom designed mounting rail. See Section 2.3 for detailed information on designing the rails and mounting these special combinations. In multiple tool assemblies, two (2) 144 position tools (P.N. 62200-5703) are often used in place of this tool.



62201-4400 HDM VERTICAL POWER MODULE INSERTION HEAD



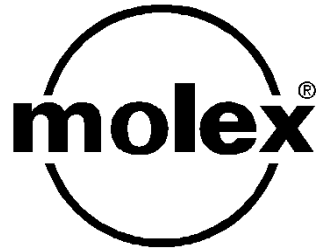
BILL OF MATERIALS FOR 62201-4400

Item	Order No.	Description	Req'd.
1	62200-5712	Plate, Mounting	1
2	62201-4401	Tool, Vertical Power	1

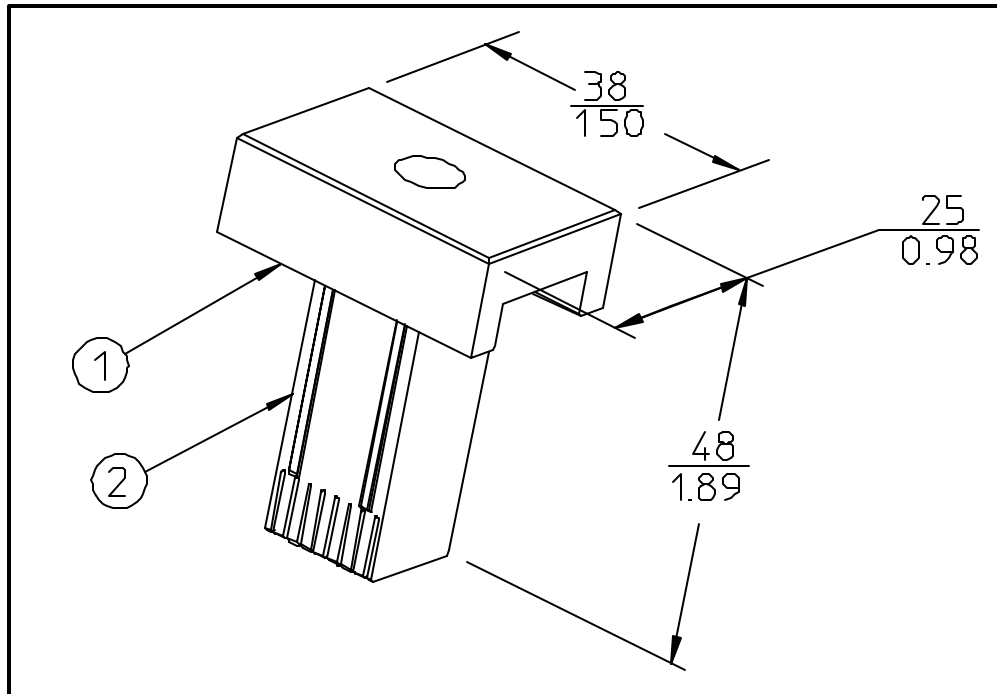
This tool weights about 0.2 kg (0.4 lbs) and will do about 200 assemblies an hour depending on operator skill and press speed. See the main manual, Section 2, for installation and operating instructions.

There are two (2) #8-32 drilled and taped holes in the top for mounting to the press upper plate, if desired.

A support fixture of some sort is highly recommended due to the high forces required to press in the connectors. See Section 2.1 for instructions for making a support.



62200-9800 HDM 48 POSITION SHROUD INSERTION TOOL



BILL OF MATERIALS FOR 62200-9800

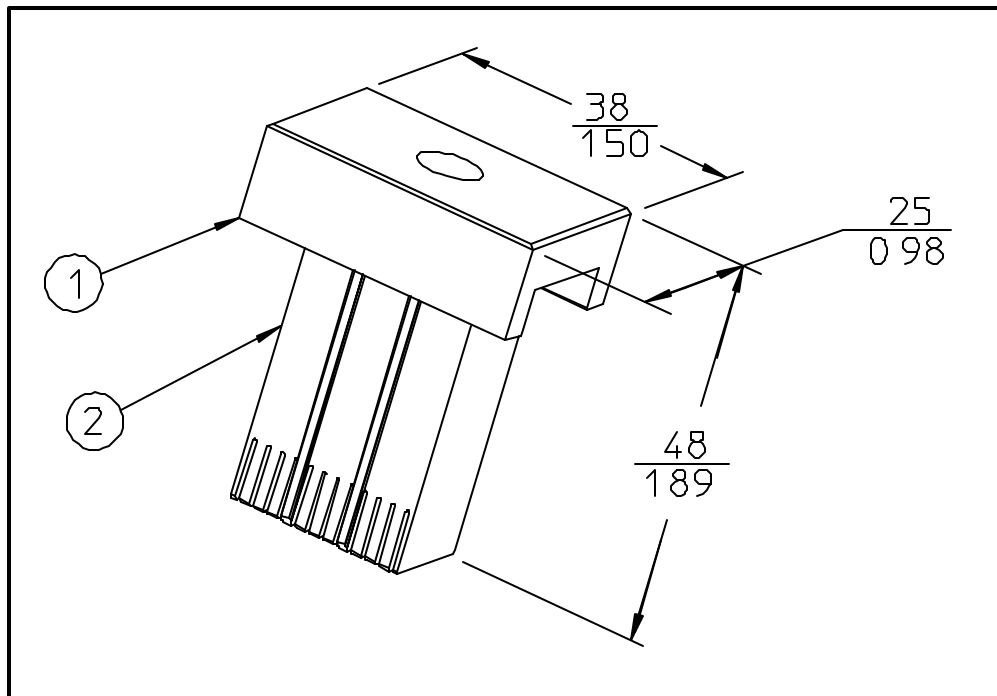
Item	Order No.	Description	Req'd.
1	62201-0001	Plate, Mounting	1
2	62200-9801	Tool, 48 Position Press	1

This tool weights about 0.2 kg (0.4 lbs) and will do about 200 assemblies an hour depending on operator skill and press speed. See the main manual, Section 2, for installation and operating instructions.

A support fixture of some sort is highly recommended due to the high forces required to press in the connectors. See Section 2.1 for instructions for making a support.



62200-9900 HDM 72 POSITION SHROUD INSERTION TOOL



BILL OF MATERIALS FOR 62200-9900

Item	Order No.	Description	Req'd.
1	62201-0001	Plate, Mounting	1
2	62200-9901	Tool, 72 Position Press	1

This tool weights about 0.2 kg (0.4 lbs) and will do about 200 assemblies an hour depending on operator skill and press speed. See the main manual, Section 2, for installation and operating instructions.

A support fixture of some sort is highly recommended due to the high forces required to press in the connectors. See Section 2.1 for instructions for making a support.

APPENDIX B

Instruction sheets for Repair & Speciality Tooling



INSTRUCTION SHEET

HDM BACKPLANE SINGLE CONTACT KNOCKOUT TOOL

Order No. 62100-1000

The HDM Backplane Single Contact Knockout Tool is a simple hand tool designed to remove a single backplane contact (73645 Series) from an HDM connector and printed circuit board. It is 66mm (2.6 in.) long by 8mm (.31 in.) diameter, and weights about 0.03kg (1 oz.). (Fig. 1)

WARNING: Great care must be taken when removing contacts from an HDM connector and printed circuit board. It is very easy to damage the plating on a through-plated hole.

OPERATION:

A terminal to be removed from an HDM connector can be in four different conditions. (See Fig. 2) Each condition requires a different removal technique. Some may require additional tooling.

Case #1 -- Contact is intact. Use Removal Option #1 or #2.

Case #2 -- Contact mating post is broken off. Use Removal Option #1 or #2.

Case #3 -- Contact flag is broken off, but part of the contact is above board surface. Use Removal Option #1 or #2.

Case #4 -- Contact flag is broken off, but remainder of contact is below the board surface. Use Removal Option #3.

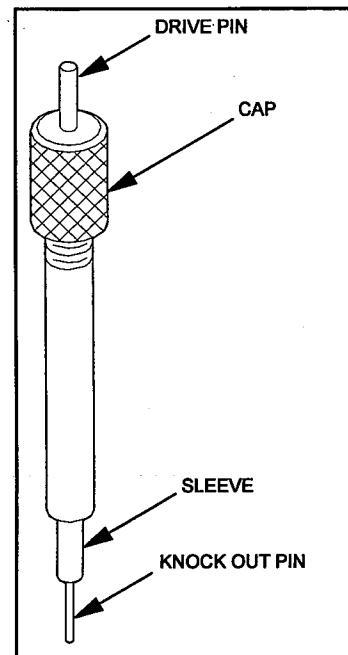


Fig. 1

REMOVAL TECHNIQUE OPTIONS

Option #1 If the printed circuit board is so thick that the pin does not stick out the back, use the 62100-1000 Knockout Tool by placing the knockout pin into the contact hole from the back of the printed circuit board. Drive the contact out by hitting the drive pin with a small hammer. (See Fig. 3)

WARNING: Eye protection should be used when using a hammer.

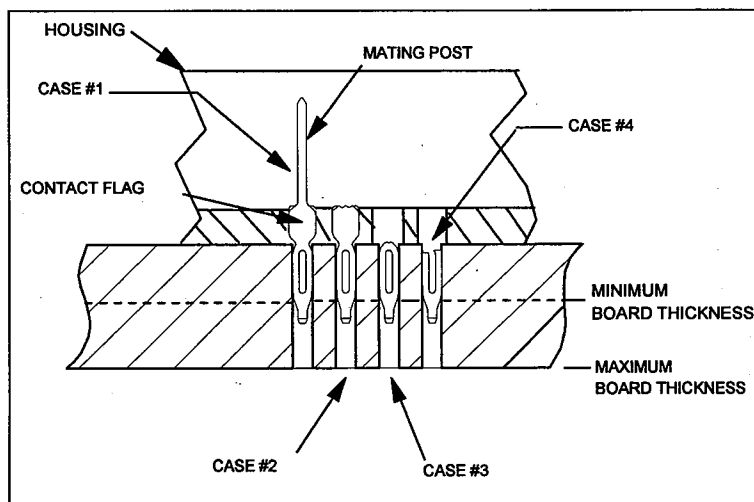


Fig. 2

Option #2 If the printed circuit board is thin enough that the pin sticks out the back, use the 62100-1000 Knockout Tool by placing the sleeve over the protruding pin on the back of the printed circuit board. Drive the contact out by hitting the drive pin with a small hammer. (See Fig. 4)

Option #3 Using the 62100-1000 Knockout Tool, place the knockout pin into the contact hole from the top side of the printed circuit board. Drive the contact out by hitting the drive pin with a small hammer. (See Fig. 5)

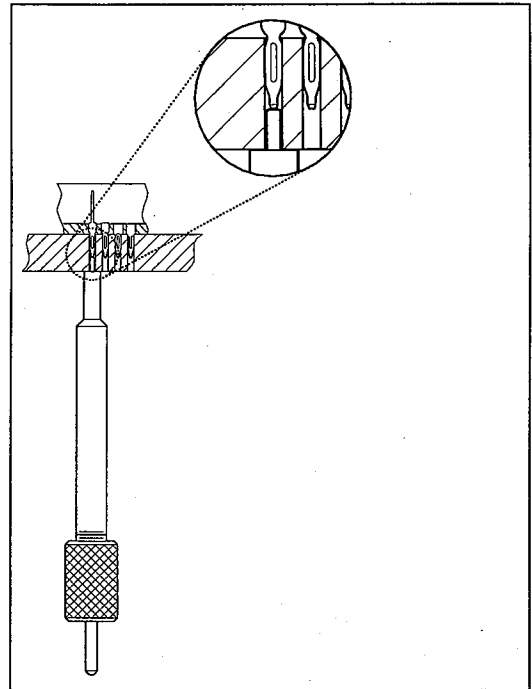


Fig. 3

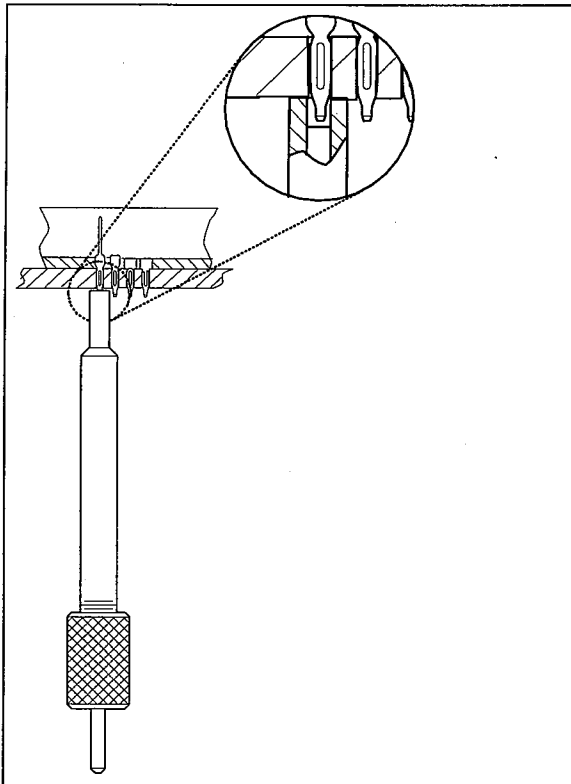


Fig. 4

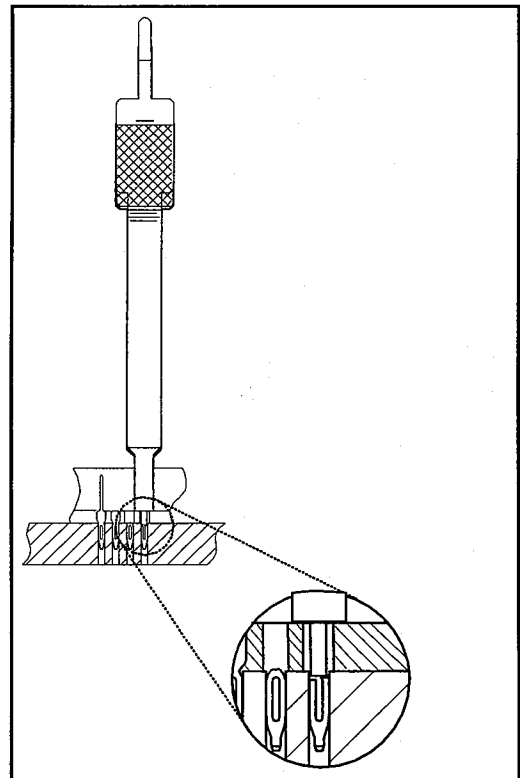


Fig. 5

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1150 E. Diehl Road
Naperville, IL 60532
(630) 969-4550; FAX (630)505-0049



INSTRUCTION SHEET

HDM BACKPLANE POWER MODULE REMOVAL TOOL

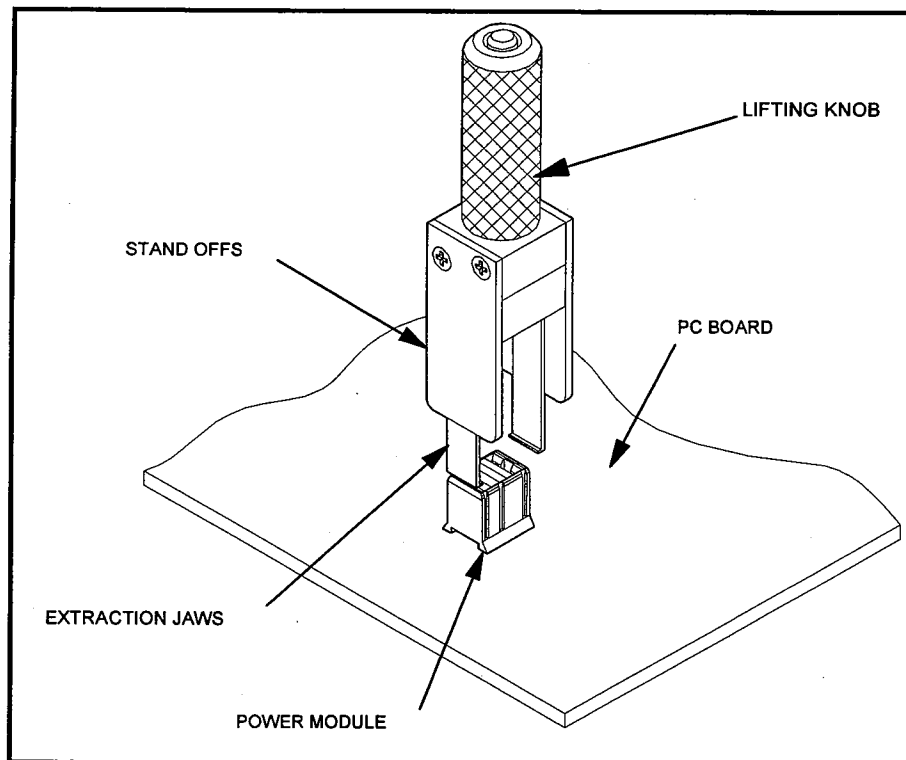
Order No. 62100-1100

The HDM Backplane Power Module Removal Tool is a manually operated hand tool used to remove the backplane power module insulator (73656 series). (Tool no. 62100-1200 is used to remove the contacts.) This tool measures 17mm (0.67 in.) Square by 82mm (3.25 in.) Long and weights about .06kg (2 oz).

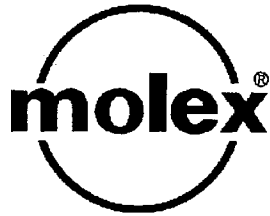
CAUTION: 1) Be sure that all parts of the tool will clear any components on the printed circuit board during use. The force this tool can generate will damage any components placed under it.
2) Tape may be placed over circuit traces or on the bottom of the tool standoffs for added protection of the printed circuit board.

OPERATION:

- 1) Turn the lifting knob counter-clockwise until half the extraction jaws are exposed below the standoffs.
- 2) Slide the extraction jaws down over the power module until the jaws lock into the slots at the base of the module. The jaws must snap into these slots for the tool to work.
- 3) Turn the lifting knob clockwise until the tool standoffs touch the printed circuit board.
- 4) Continue turning the lifting knob clockwise until the insulator is removed from the contacts.
- 5) Move the tool away from the board, then remove the insulator from the tool by turning the tool on its side and slide the insulator out.



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INSTRUCTION SHEET

HDM BACKPLANE POWER CONTACT REMOVAL TOOL

Order No. 62100-1200

The HDM Backplane Power Contact Removal Tool is a manually operated hand tool used to remove the backplane power contact from a printed circuit board once the insulator is removed. (Tool no. 62100-1100 is used to remove the insulator.)

This tool measures 19mm (0.75 in.) Wide by 87mm (3.43 in.) Deep by 158mm (6.22 in.) Long and weights about .22kg (7.7 oz).

CAUTION: 1) Be sure that all parts of the tool will clear any components on the printed circuit board during use. The force this tool can generate will damage any components placed under it.

OPERATION:

- 1) Slide the contact gripper over the power contact to be removed. Be sure the tool is centered on contact, see Fig. 2.
- 2) Pull the contact from the printed circuit board by squeezing the removal tool handle.
- 3) Move the tool away from the board, then release the handle.
- 4) Remove the contact from the tool and discard the contact.

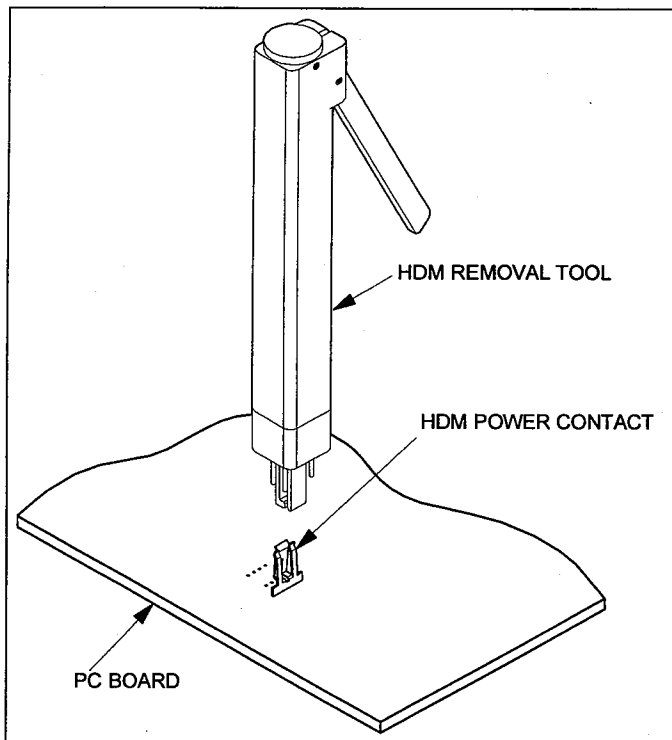


Fig. 1

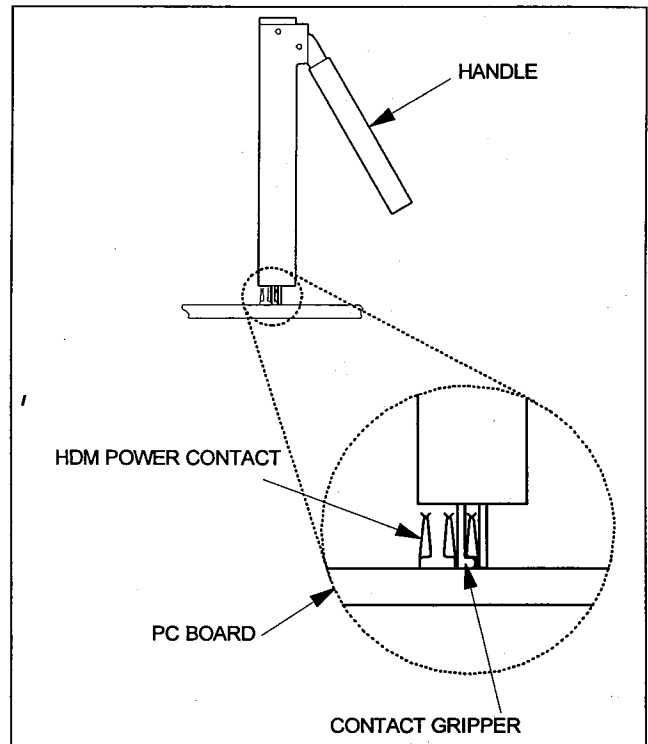


Fig. 2

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Naperville, IL 60563
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INSTRUCTION SHEET

HDM DAUGHTER CARD MODULE REMOVAL TOOL

Order No. 62100-1300

The HDM Daughter Card Removal Tool is a manually operated hand tool used to remove the stiffener from a daughter card module. This tool measures 19mm (0.75 in.) Wide X 85mm (3.35 in.) Deep X 161mm (6.34 in.) Long and weighs about .22kg (7.7 oz).

OPERATION:

- 1) Remove the screw from the back of the printed circuit board that holds the guide module in place.
- 2) Place the printed circuit board in an appropriate fixture or on stiff foam to protect any components from damage.
- 3) On the HDM Daughter Card Removal Tool the opposite side of the mounting head from the rectangular pins has two round pins sticking out, place these pins in two holes on the top of the stiffener and position the push bar against the lip on the guide module. See Fig. 3.
- 4) Squeeze the handle to push the guide module out.
- 5) Once the guide module is out, reposition the HDM Daughter Card Removal Tool so that the rectangular pins go into two rectangular slots near one end of the stiffener. The push bar must rest on the plastic ledge and the tool be tipped away from the stiffener about 10 to 15 degrees. See Fig. 4.
- 6) Squeeze the handle slowly to begin to lift the stiffener away from the module.
- 7) Repeat steps 5 & 6, relocating the tool along the length of the stiffener until the entire length is removed from each module.

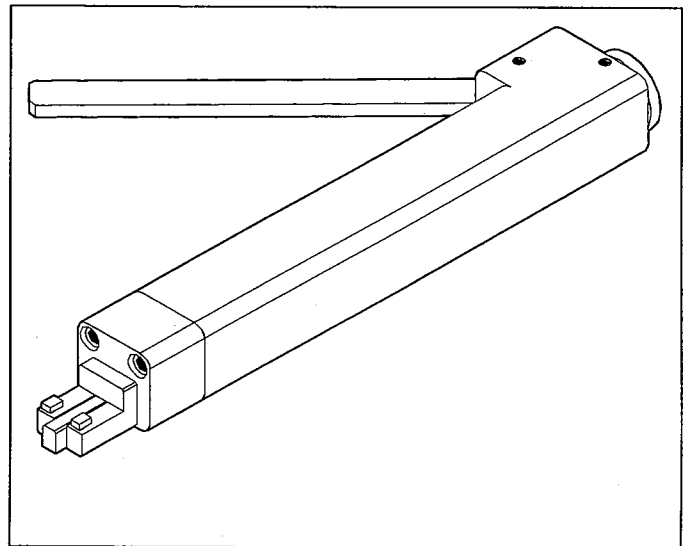


Fig. 1

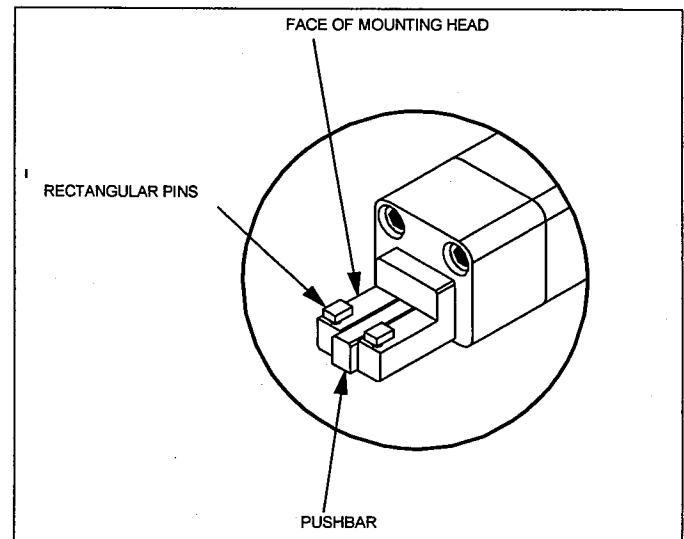


Fig. 2

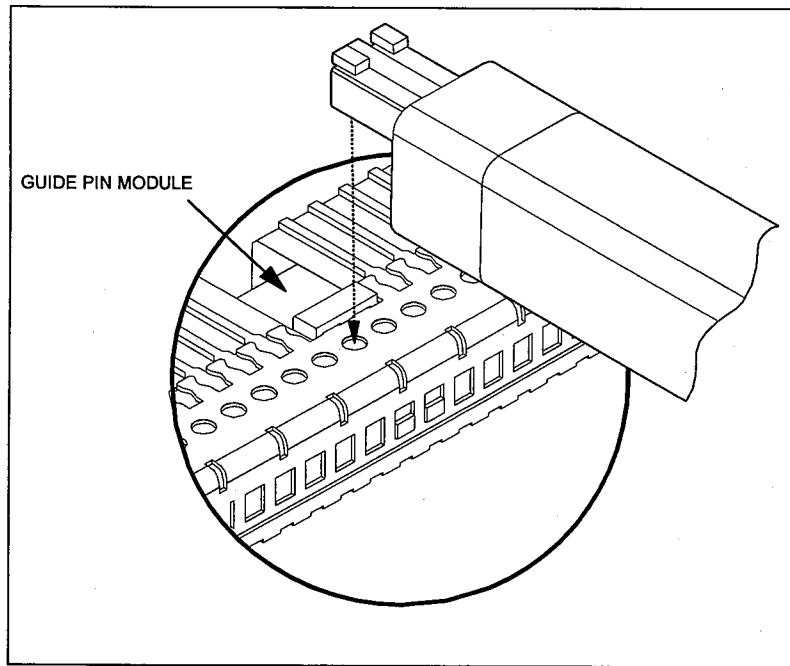


Fig. 3

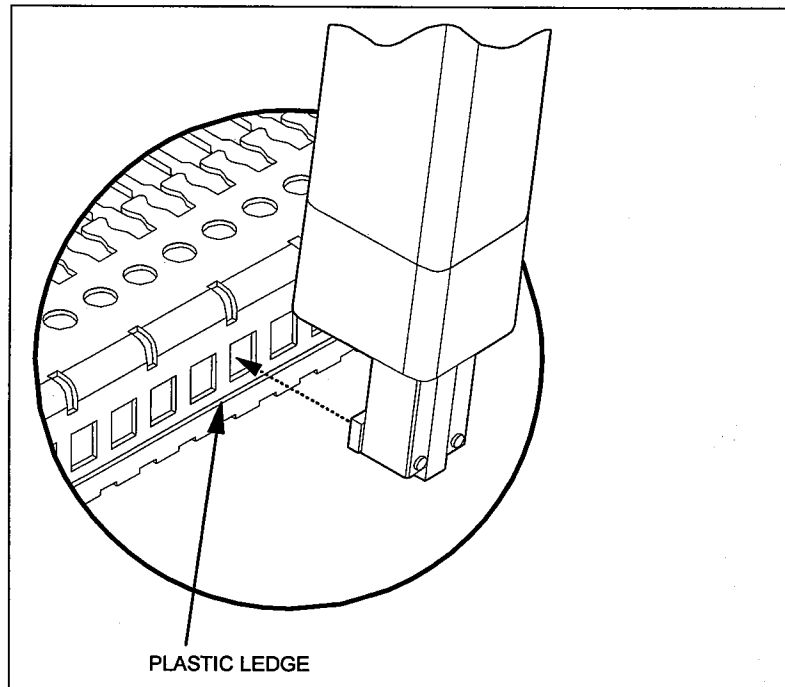


Fig. 4

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Naperville, IL 60563
(630) 9694550; FAX: (630) 505-0049



INSTRUCTION SHEET

HDM SINGLE CONTACT INSERTION TOOL

Order No. 62100-1400

The HDM Single Contact Insertion Tool is a manual hand tool used to insert a single HDM backplane signal contact (73645 series) into a backplane module mounted to a printed circuit board (to replace a damaged contact that was previously removed). This tool measures 14mm (0.55 in.) Diameter by 128mm (5.5 in.) Long and weighs about .22kg (7.7 oz).

ADJUSTMENTS:

To adjust the insertion strike force, grasp the insertion tool at the wide knurled section of the tool and turn the knob on the top CW to increase the force, or CCW to decrease the force.

OPERATION:

- 1) Place the backplane into an appropriate fixture to provide adequate support to protect components from damage. (Stiff Foam may be substituted for the fixture.)
- 2) Place the mating post of a single contact into the insertion tool (See Fig. 2).
- 3) Align the flag on the contact with the slot in the backplane insulator (See Fig. 3).
- 4) Press the tool *STRAIGHT* down towards the insulator until the tool "snaps", seating the contact.
- 5) Lift the tool straight up off the mating post.
- 6) Check the seated contact height per Fig. 4.

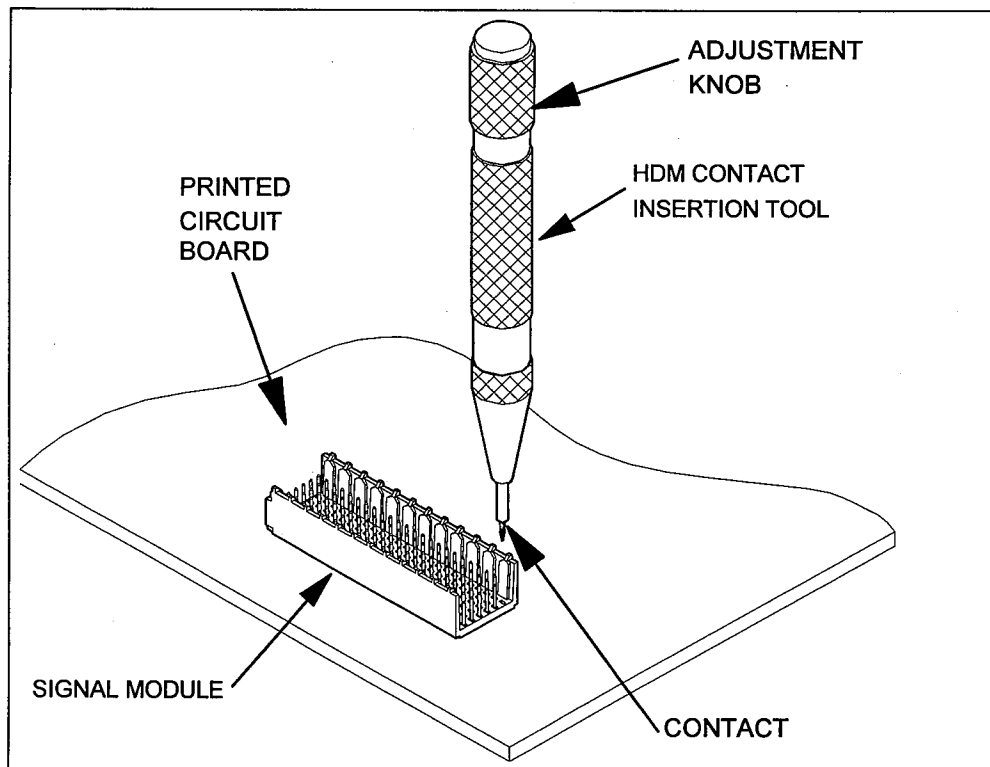


Fig. 1

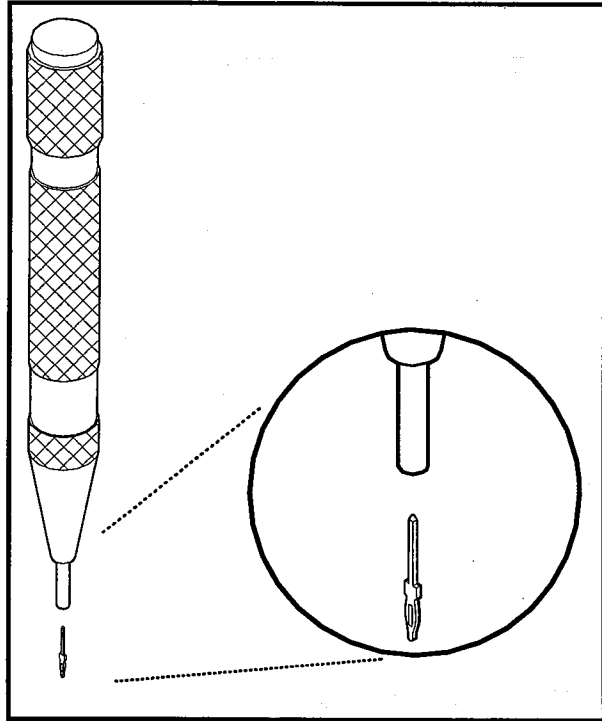


Fig. 2

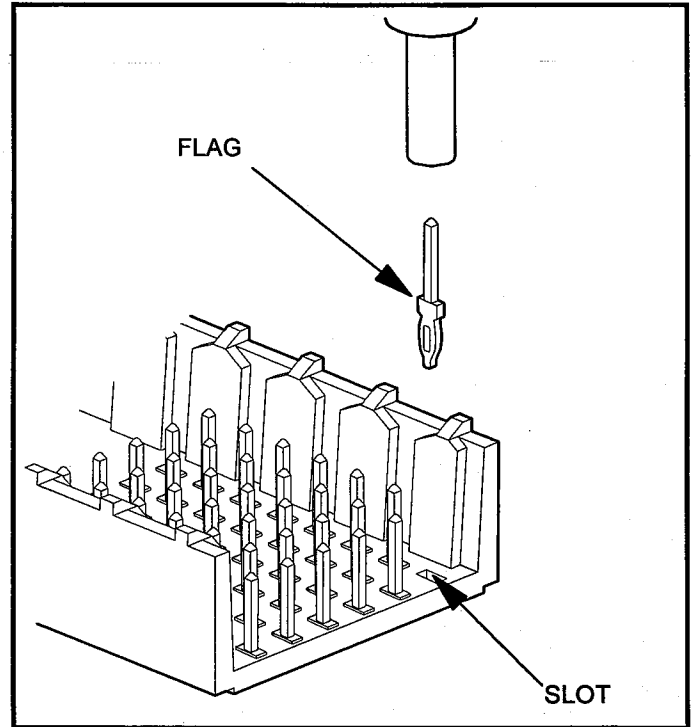


Fig. 3

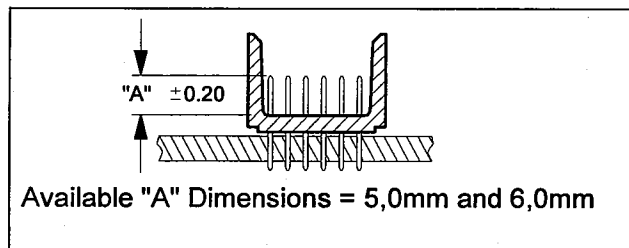
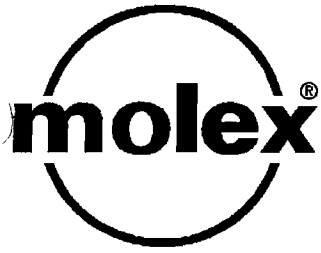


Fig. 4

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 1150 E. Diehl Road
 Naperville, IL 60563
 (630) 969-4550; Fax (630) 505-0049



INSTRUCTION SHEET

HDM 48 POSITION SHROUD REMOVAL TOOL

Order No. 62100-3300

The HDM 48 Position Shroud Removal Tool is a hand operated repair tool designed to remove 48 position shrouds (P.N. 73087-0 series) from damaged HDM connectors so that repairs can be made to the connector. It measures 15 mm (0.59 in.) by 6.4 mm (0.25 in.) by 120 mm (4.72 in.) high with a threaded knob that is 25.4 mm (1.0 in.) diameter. It weights about 0.24 kg (.5 lbs).

OPERATION

1. Extend the gripping pawls about 17.8 mm (.7 in.) beyond the side posts as shown in Fig. 2. Do this by pushing down on the threaded knob. It may be necessary to back the knob off by turning it counterclockwise in order for the pawls to extend sufficiently.
2. Slid the gripping pawls down over the shroud to be removed until the lips on the ends of the pawls snap under the shroud as shown in Fig. 3.
3. Press down on the tool until the side posts contact the printed circuit board. See Fig. 4.
4. Now turn the threaded knob clockwise until it touches the side posts and upper cross member as shown in Fig. 5.
5. Continue slowly turning the threaded knob clockwise until the shroud is lifted clear of the pc board as shown in Fig. 6.
6. Turn the threaded knob counterclockwise until the shroud can be removed from the tool.

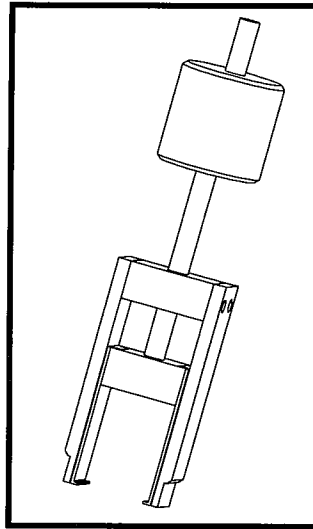


Fig. 1
62100-3300

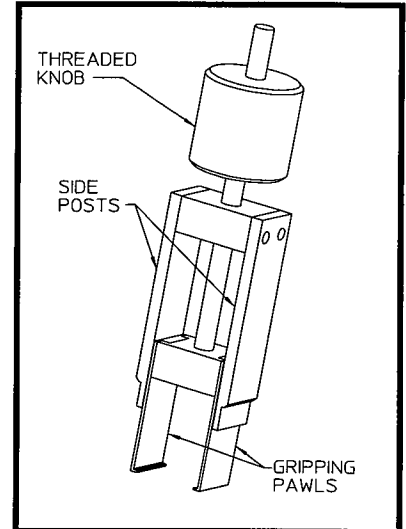


Fig. 2
OPERATION STEP 1

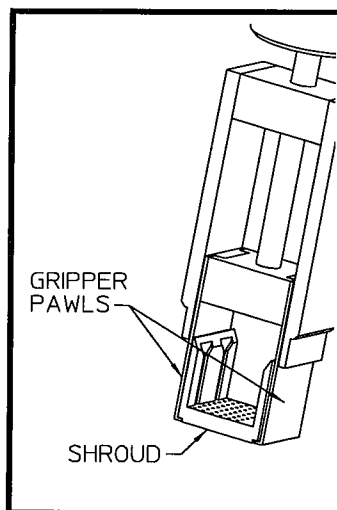


Fig. 3
OPERATION STEP 2

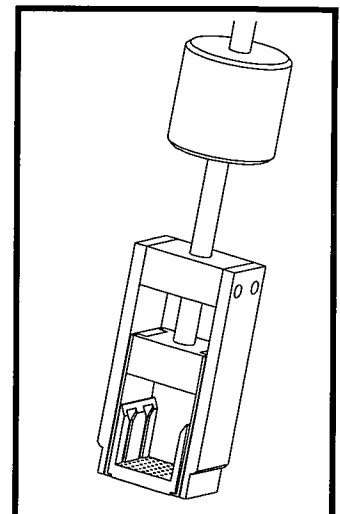


Fig. 4
OPERATION STEP 3

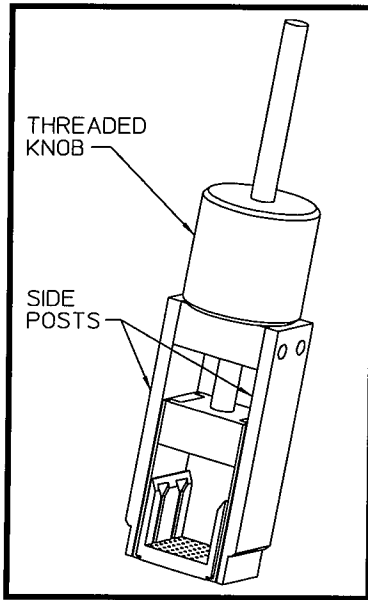


Fig. 5
OPERATION STEP 4

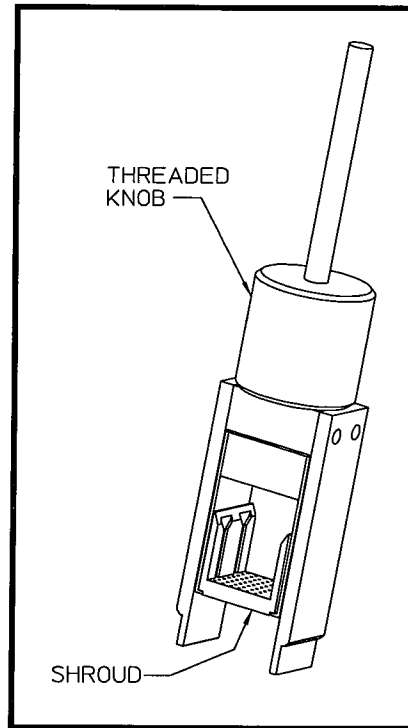


Fig. 6
OPERATION STEP 5
SHROUD REMOVED FROM
PC BOARD

MOLEX CONNECTOR CORP.
APPLICATION TOOLING GROUP
1150 E. Diehl Road
Naperville, IL 60563

(630) 969-4550
FAX: (630) 505-0049



INSTRUCTION SHEET

HDM 72 POSITION SHROUD REMOVAL TOOL

Order No. 62100-3400

The HDM 72 Position Shroud Removal Tool is a hand operated repair tool designed to remove 72 position shrouds (P.N. 73087-0 series) from damaged HDM connectors so that repairs can be made to the connector. It measures 15 mm (0.59 in.) by 6.4 mm (0.25 in.) by 120 mm (4.72 in.) high with a threaded knob that is 25.4 mm (1.0 in.) diameter. It weights about 0.24 kg (.5 lbs).

OPERATION

1. Extend the gripping pawls about 17.8 mm (.7 in.) beyond the side posts as shown in Fig. 2. Do this by pushing down on the threaded knob. It may be necessary to back the knob off by turning it counterclockwise in order for the pawls to extend sufficiently.
2. Slid the gripping pawls down over the shroud to be removed until the lips on the ends of the pawls snap under the shroud as shown in Fig. 3.
3. Press down on the tool until the side posts contact the printed circuit board. See Fig. 4.
4. Now turn the threaded knob clockwise until it touches the side posts and upper cross member as shown in Fig. 5.
5. Continue slowly turning the threaded knob clockwise until the shroud is lifted clear of the pc board as shown in Fig. 6.
6. Turn the threaded knob counterclockwise until the shroud can be removed from the tool.

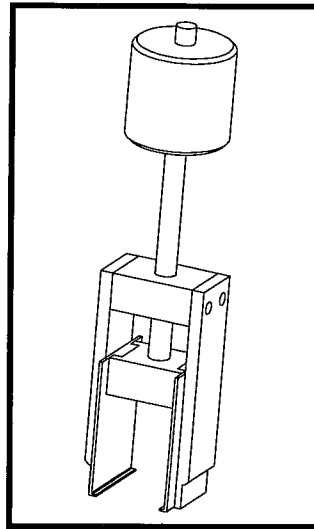


Fig. 1
62100-3300

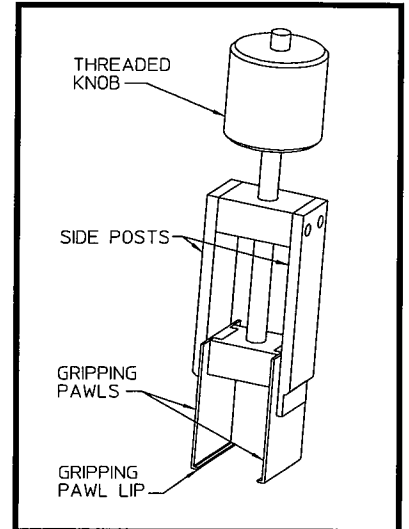


Fig. 2
OPERATION STEP 1

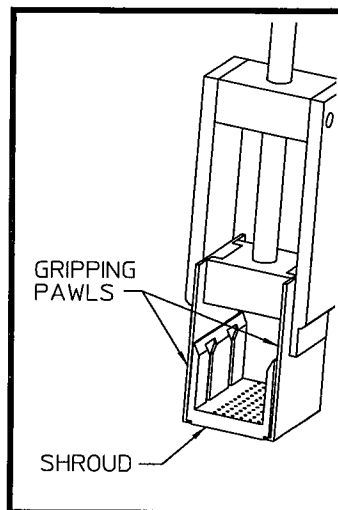


Fig. 3
OPERATION STEP 2

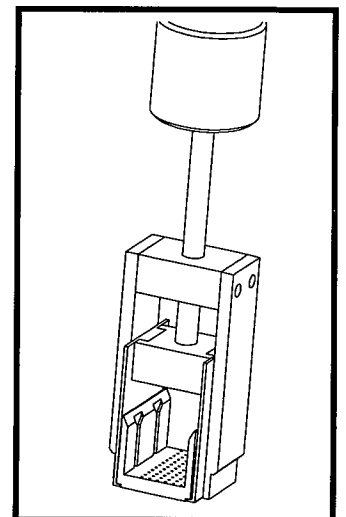
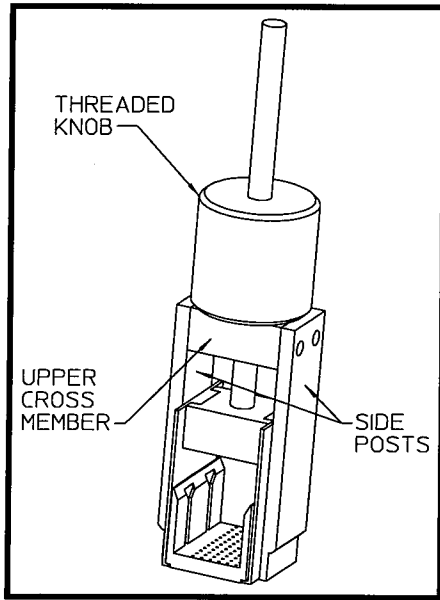
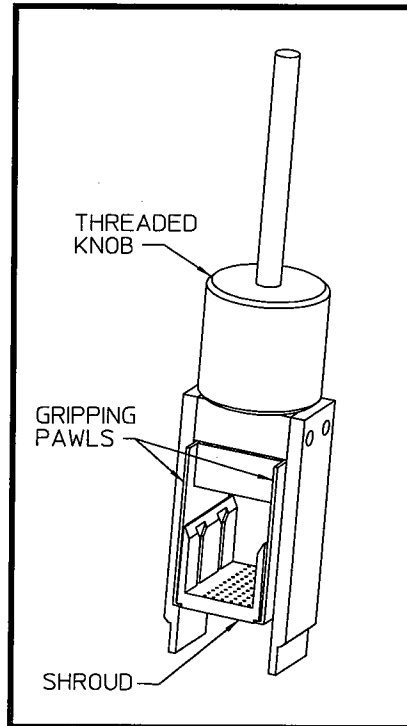


Fig. 4
OPERATION STEP 3



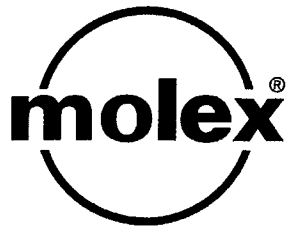
**Fig. 5
OPERATION STEP 4**



**Fig. 6
OPERATION STEP 5
SHROUD REMOVED FROM
PC BOARD**

**MOLEX CONNECTOR CORP.
APPLICATION TOOLING GROUP
1150 E. Diehl Road
Naperville, IL 60563**

**(630) 969-4550
FAX: (630) 505-0049**



INSTRUCTION SHEET

HDM & VHDM JOINER / GROUND INSERTER TOOL

Order No. 62100-3800

The HDM & VHDM Joiner/Ground Insertion Tool is a simple pliers type tool for loading Hdm joiner/ground modules (73773 Series) or VHDM joiner/ground modules (74039 Series) into stiffener rails. It measures approximately 203 mm (8 in.) long by 76 mm (3 in.) wide (closed) by 25 mm (1 in.) thick and weights .48 kg (1 lb).

OPERATION (SHORT & MEDIUM LENGTH HDM & VHDM)

1. Locate the desired joiner or ground module into the proper location on the HDM or VHDM stiffener.
2. Pre load into position by squeezing lightly with fingers. See Figure 2.
3. Position the 62100-3800 insertion tool over the module and stiffener assembly with the long jaw of the tool over the module and the short jaw over the stiffener. See Fig. 3.
4. Squeeze the grips until the module is completely seated.

OPERATION (LONGER VHDM)

1. Locate the desired joiner or ground module into the proper location on the HDM or VHDM stiffener.
2. Pre load into position by squeezing lightly with fingers. See Figure 2.
3. Position the 62100-3800 insertion tool over the module and stiffener assembly with the long jaw of the tool against the back of the stiffener and the short jaw against the top portion of the module where it attaches to the stiffener. See Fig. 4.
4. Keeping the tool parallel to the assembly, squeeze the grips to seat the module. See Figure 4.

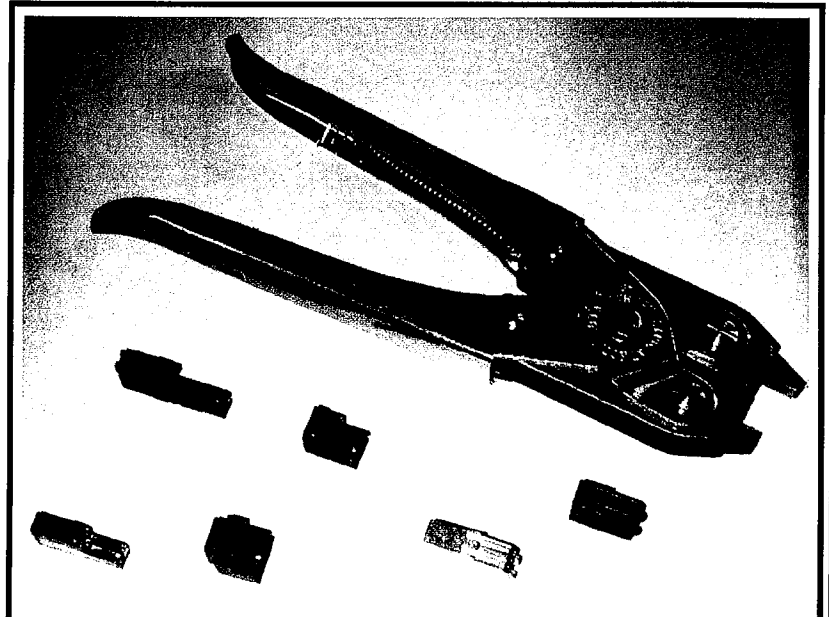


Fig. 1
62100-3800 TOOL AND TYPICAL CONNECTORS

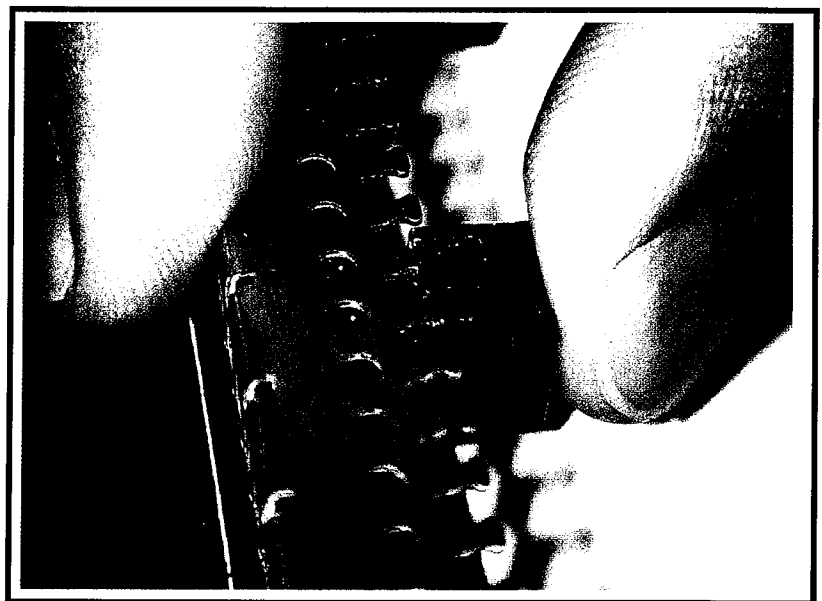


Fig. 2
STARTING JOIINER/GROUND INTO RAIL

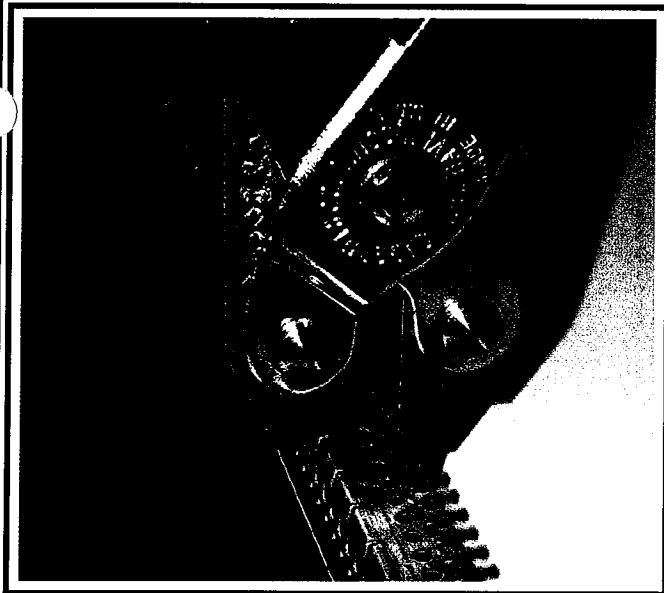


Fig. 3
INSERTING A SHORT OR MEDIUM LENGTH HDM
OR VHDM MODULE INTO A RAIL

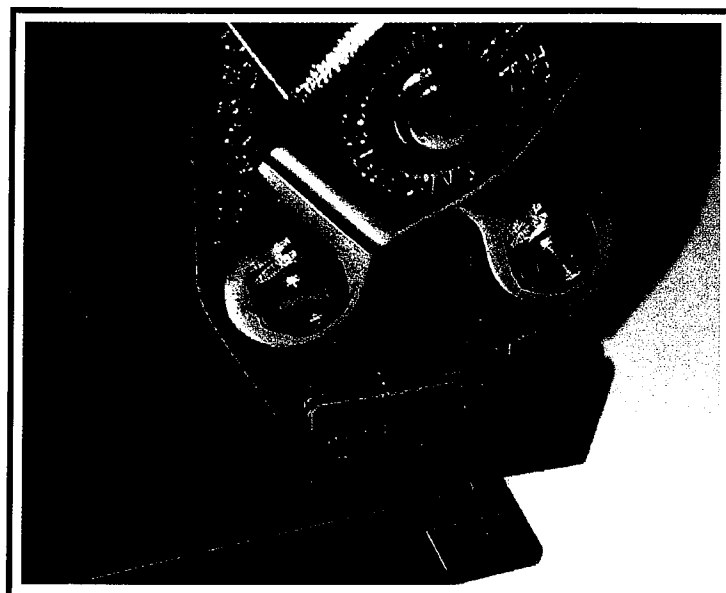
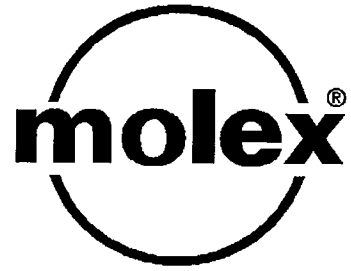


Fig. 4
INSERTING A LONGER VHDM MODULE INTO A RAIL

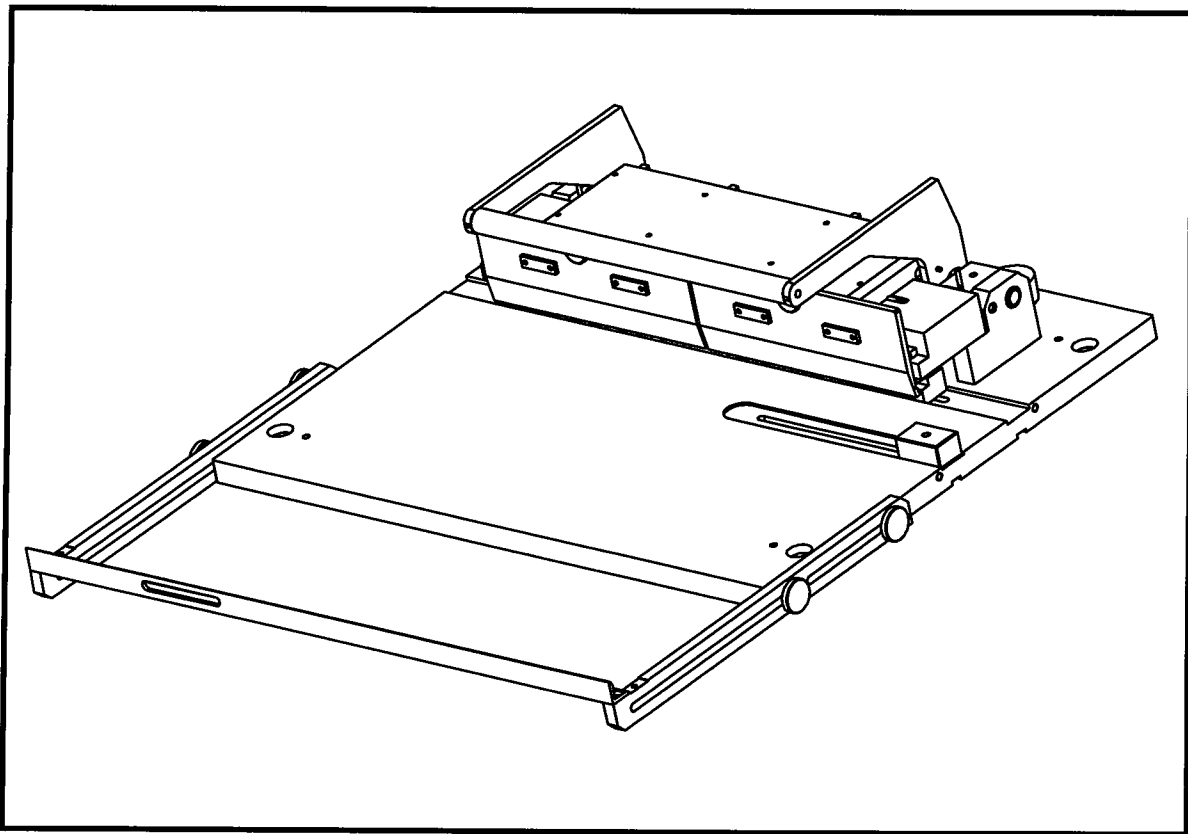
MOLEX CONNECTOR CORP.
APPLICATION TOOLING GROUP
1150 E. Diehl Road
Naperville, IL 60563

(630) 969-4550
FAX: (630) 505-0049



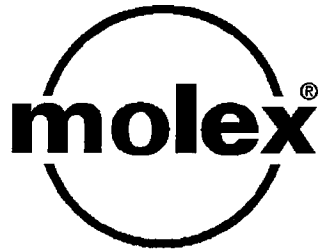
62201-5600 HDM STIFFENER REMOVAL/INSTALLATION TOOL

This picture is for reference only. See the separate manual (P.N. 62201-5699) for details on this tool.



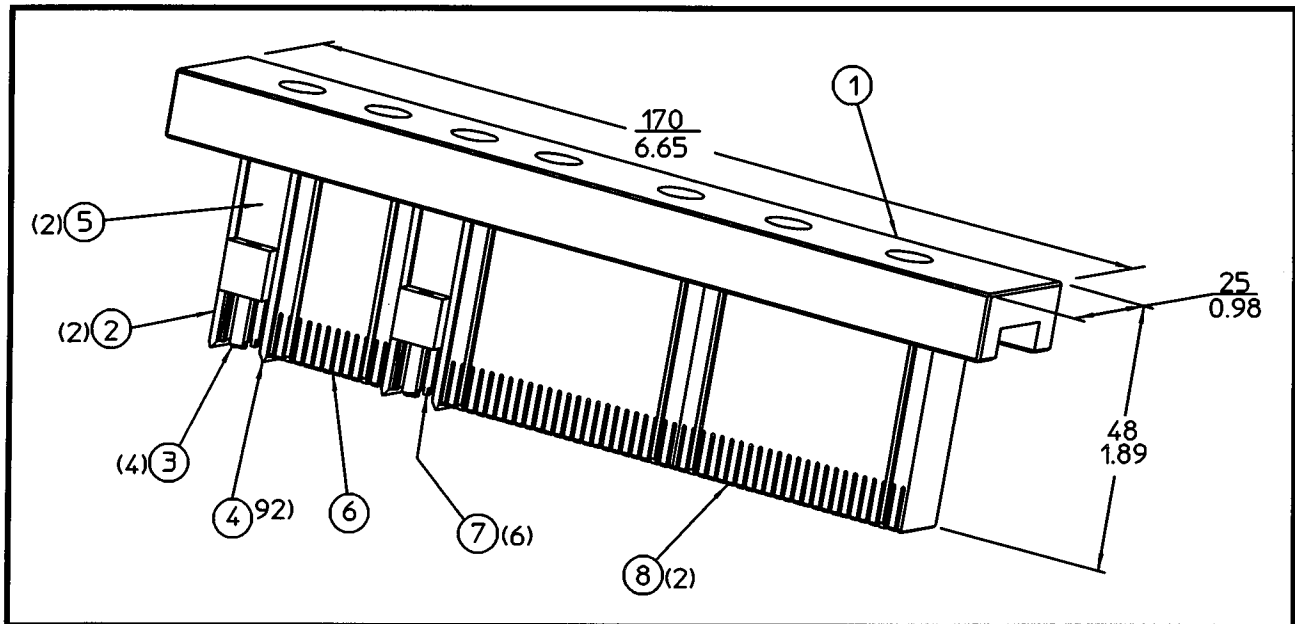
APPENDIX C

Custom Tooling



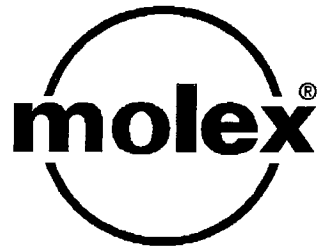
**62200-8500 HDM "GRAND" CONNECTOR TOOL
(LEFT HALF) (CUSTOM FOR INTEL)**

This tool is designed to insert (2) HDM Power Modules , (1) 72 position backplane connector and (2) 144 position backplane connectors. See Section 2 of this manual for operation. This tool is the mirror image of 62200-8600 and is used to insert the left half of the Intel "Grand" connector.



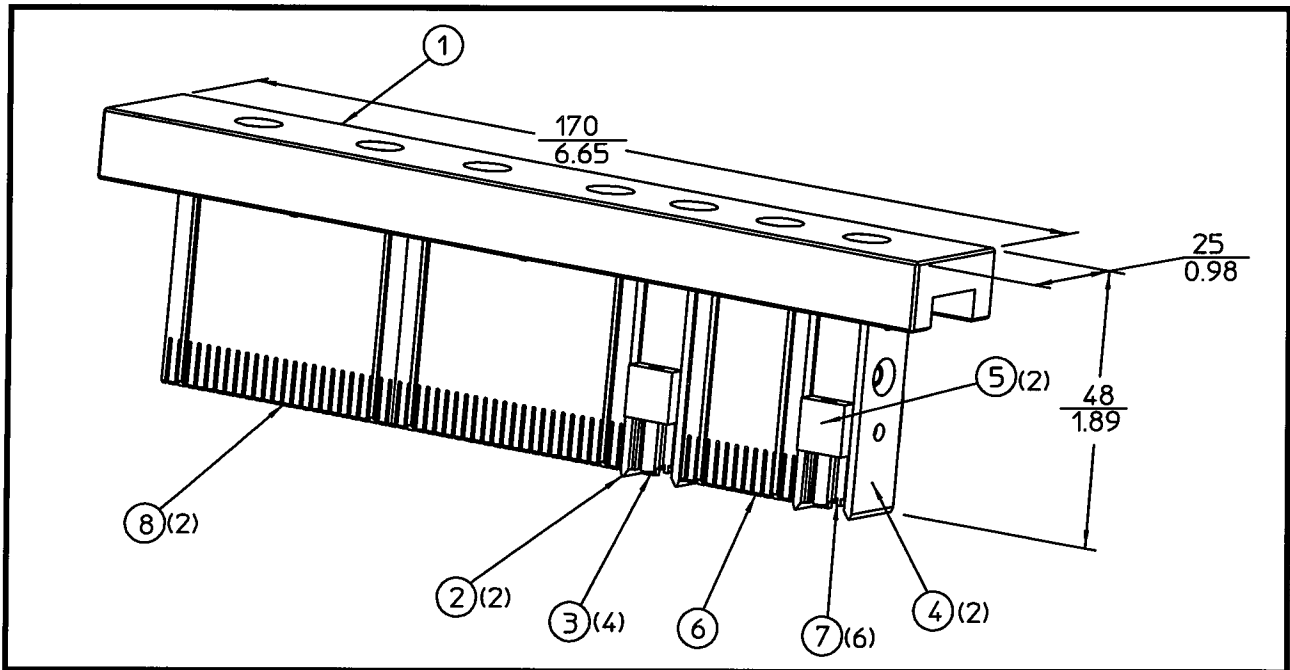
BILL OF MATERIALS FOR 62200-8500

Item	Order No.	Description	Req'd.
1	62200-8509	Block, Mounting	1
2	62200-8507	Plate, Left Side	2
3	62200-8506	Pin, Alignment	4
4	62200-8504	Plate, Right Side	2
5	62200-8503	Body, Power Module Main	2
6	62200-8502	Tool, 72 Pos. HDM Insertion	1
7	62200-5709	Blade, Termination	6
8	62200-5703	Tool, 144 pos. HDM Insertion	2



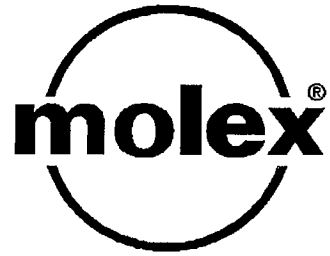
**62200-8600 HDM "GRAND" CONNECTOR PRESS IN TOOL
(RIGHT HALF) (CUSTOM FOR INTEL)**

This tool is designed to insert (2) HDM Power Modules , (1) 72 position backplane connector and (2) 144 position backplane connectors. See Section 2 of this manual for operation. This tool is the mirror image of 62200-8500 and is used to insert the right half of the Intel "Grand" connector.



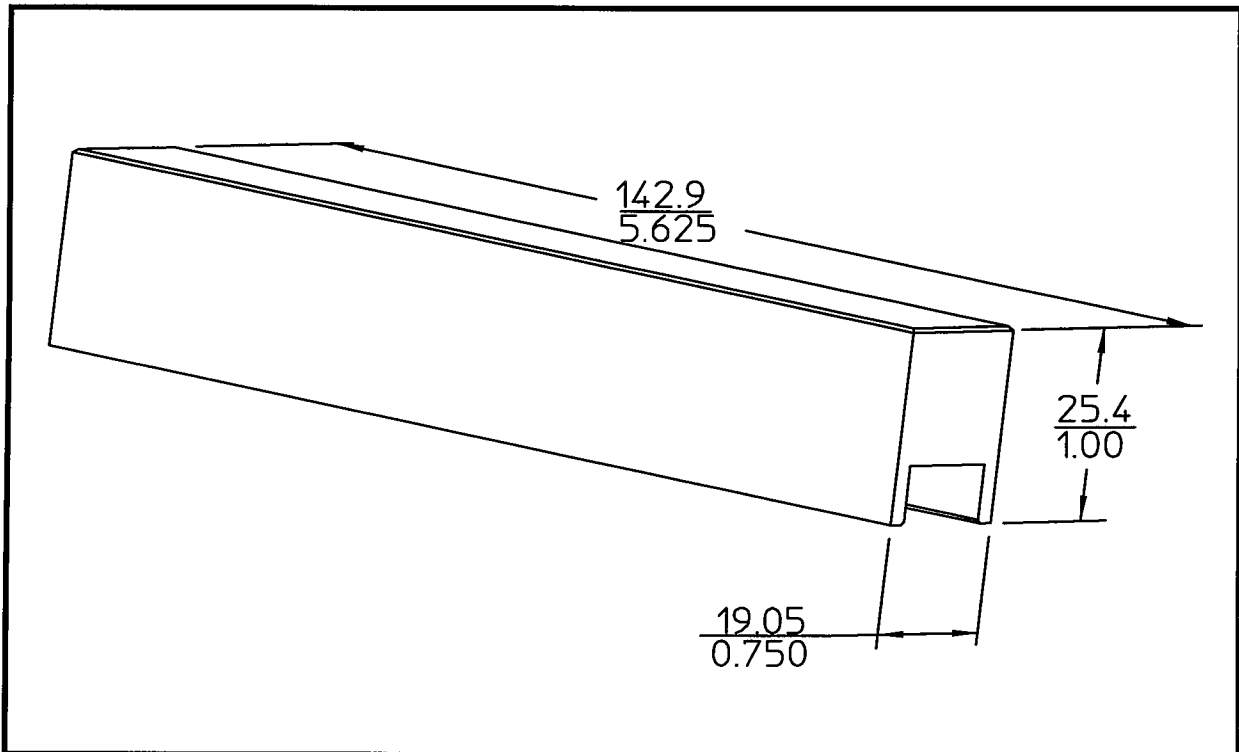
BILL OF MATERIALS FOR 62200-8600

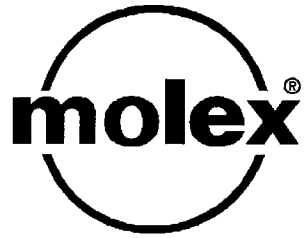
Item	Order No.	Description	Req'd.
1	62200-8509	Block, Mounting	1
2	62200-8507	Plate, Left Side	2
3	62200-8506	Pin, Alignment	4
4	62200-8504	Plate, Right Side	2
5	62200-8503	Body, Power Module Main	2
6	62200-8502	Tool, 72 Pos. HDM Insertion	1
7	62200-5709	Blade, Termination	6
8	62200-5703	Tool, 144 pos. HDM Insertion	2



**62200-8700 HDM DAUGHTER CARD PRESS IN TOOL
(CUSTOM FOR INTEL)**

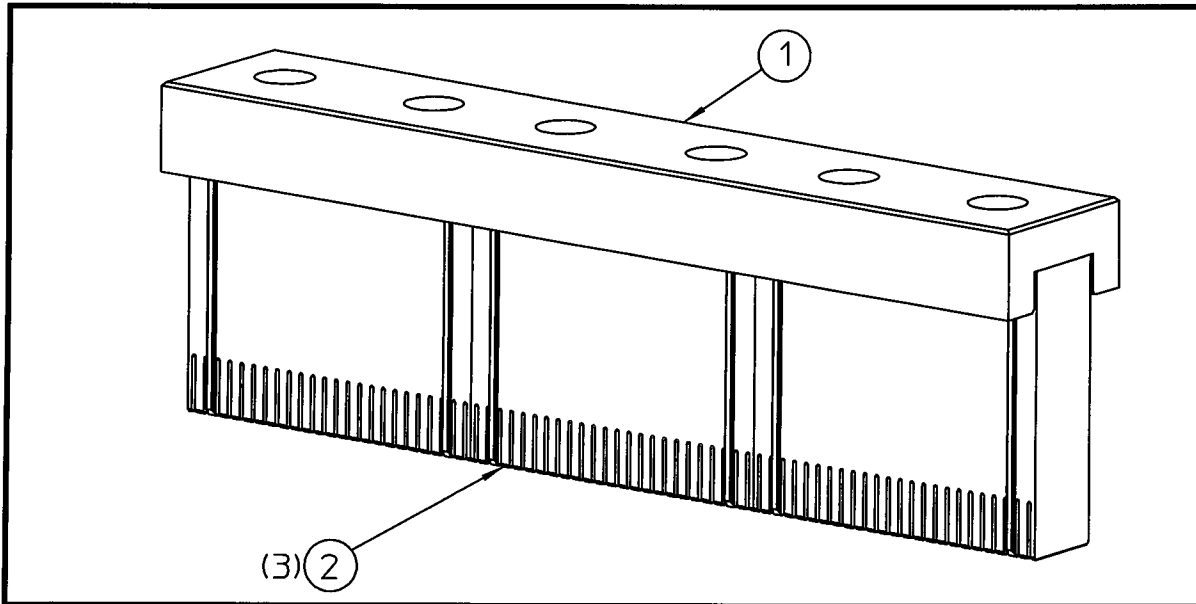
This tool is designed to press in an Intel custom daughter card connector arrangement. See Section 2 of this manual for operating instructions.





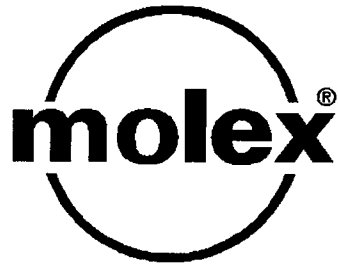
**62200-8800 HDM MATING HALF PRESS IN TOOL
(CUSTOM FOR INTEL)**

This tool is designed to press in an Intel custom HDM connector arrangement consisting of three (3) 144 position HDM modules. See Section 2 of this manual for operating instructions.



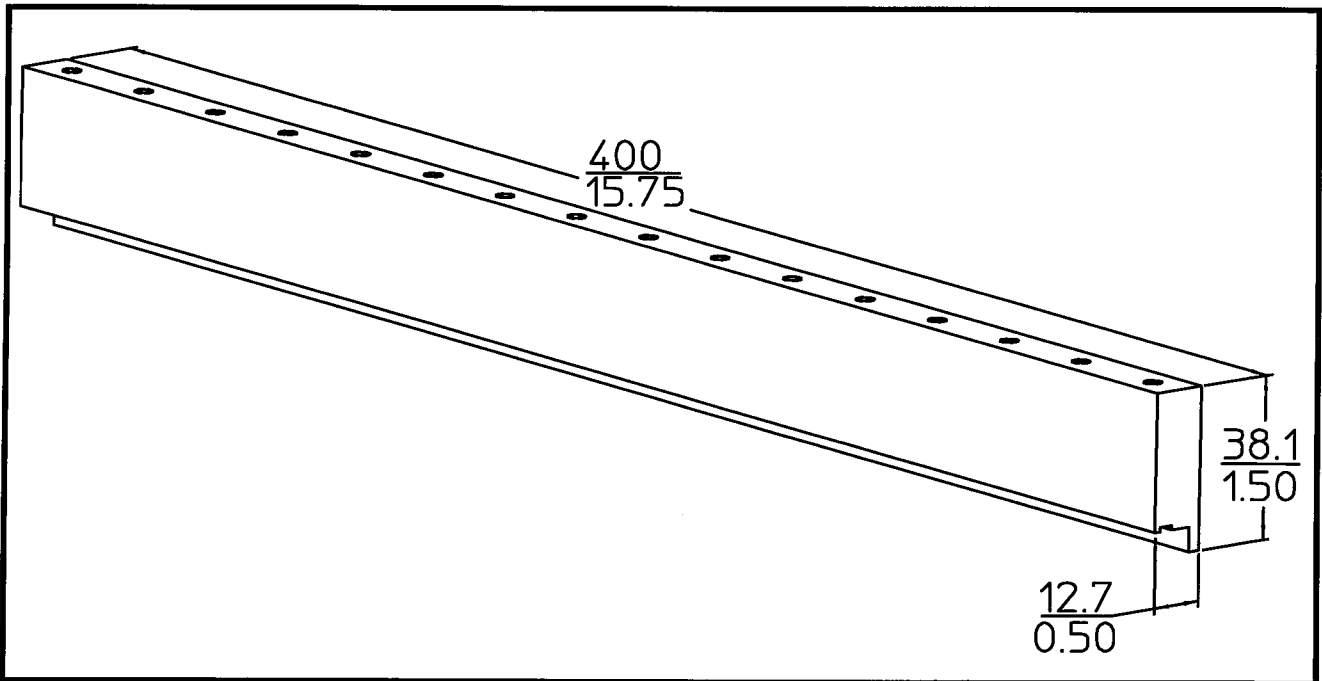
BILL OF MATERIALS FOR 62200-8800

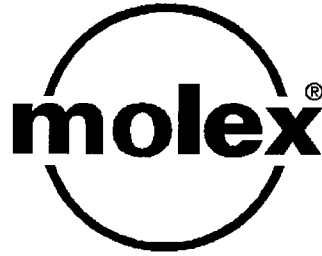
Item	Order No.	Description	Req'd.
1	62200-8801	Block, Mounting	1
2	62200-5703	Module, 144 Position HDM Insertion	3



**62200-9100 HDM DAUGHTER CARD RIGHT ANGLE PRESS IN TOOL
(CUSTOM FOR INTEL)**

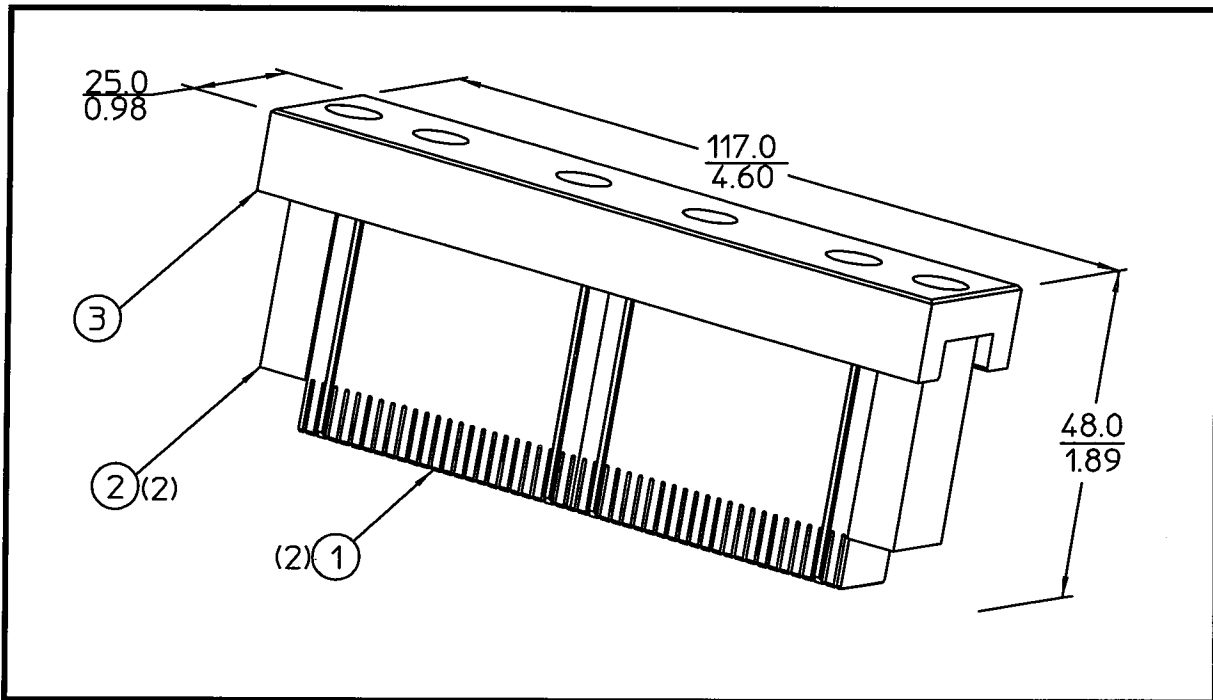
This press in tool is designed to press in a custom arrangement of right angle daughter card connectors for Intel. There are a series of M4 tapped holes in the tool should it be desired to mount the tool to the press platen. See Section 2 for operating details.





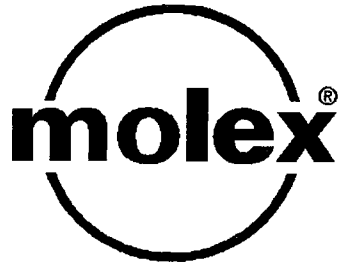
**62200-9600 HDM 288 SHROUD PRESS TOOL
(CUSTOM FOR INTEL)**

This tool is designed to press two (2) 144 position HDM shrouds with special alignment pins onto the backside of a pc board. It is used the same as header press in tools as described in Section 2 of this manual except that the alignment blocks insure that the tool is oriented correctly.



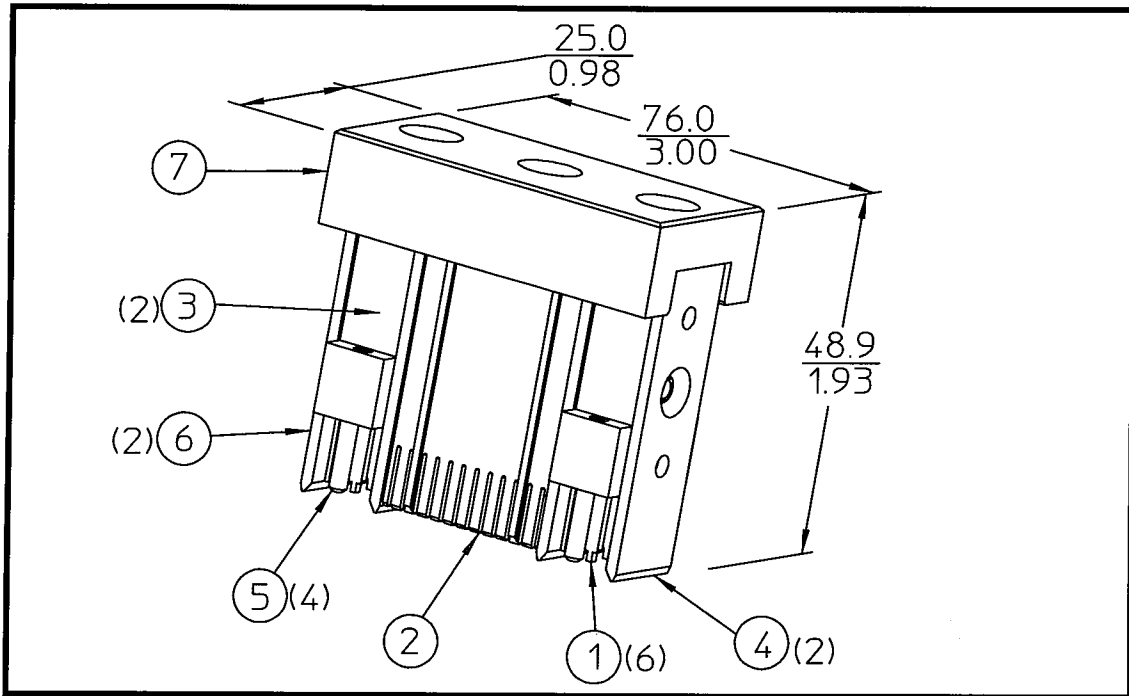
BILL OF MATERIALS FOR 62200-9600

Item	Order No.	Description	Req'd.
1	62200-5703	Tool, 144 Position Insertion	2
2	62200-8508	Block, Alignment	2
3	62200-9601	Block, Mounting	1



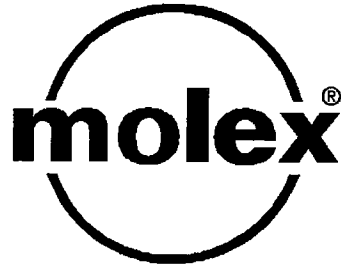
**62200-9700 HDM 72/POWER PRESS TOOL
(CUSTOM FOR INTEL)**

This press in tool is designed to press in two (2) power modules and one 72 position backplane header in a custom Intel arrangement. See Section 2 of this manual for operating instructions.



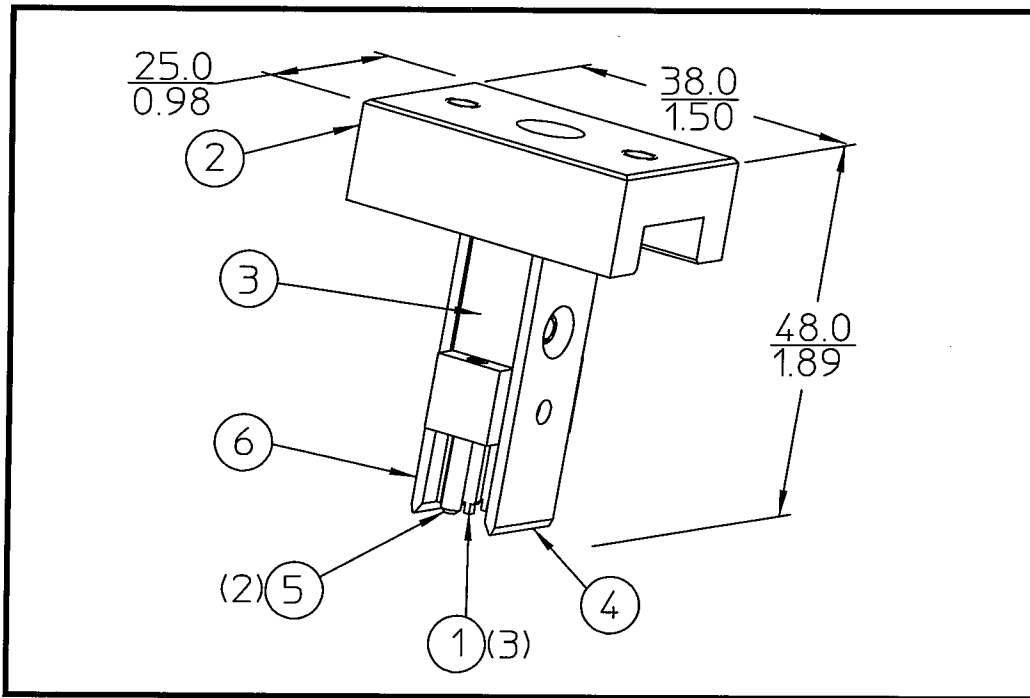
BILL OF MATERIALS FOR 62200-9700

Item	Order No.	Description	Req'd.
1	62200-5709	Blade, Termination	6
2	62200-8502	Tool, 72 Position Insertion	1
3	62200-8503	Body, Power Module Main	2
4	62200-8504	Plate, Right Side	2
5	62200-8506	Pin, Alignment	4
6	62200-8507	Plate, Left Side	2
7	62200-9701	Block, Mounting	1



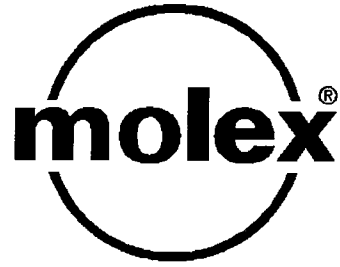
**62201-0100 HDM POWER MODULE PRESS IN TOOL
(CUSTOM FOR INTEL)**

This tool is designed to press in an Intel special power module. See Section 2 for operating instructions.



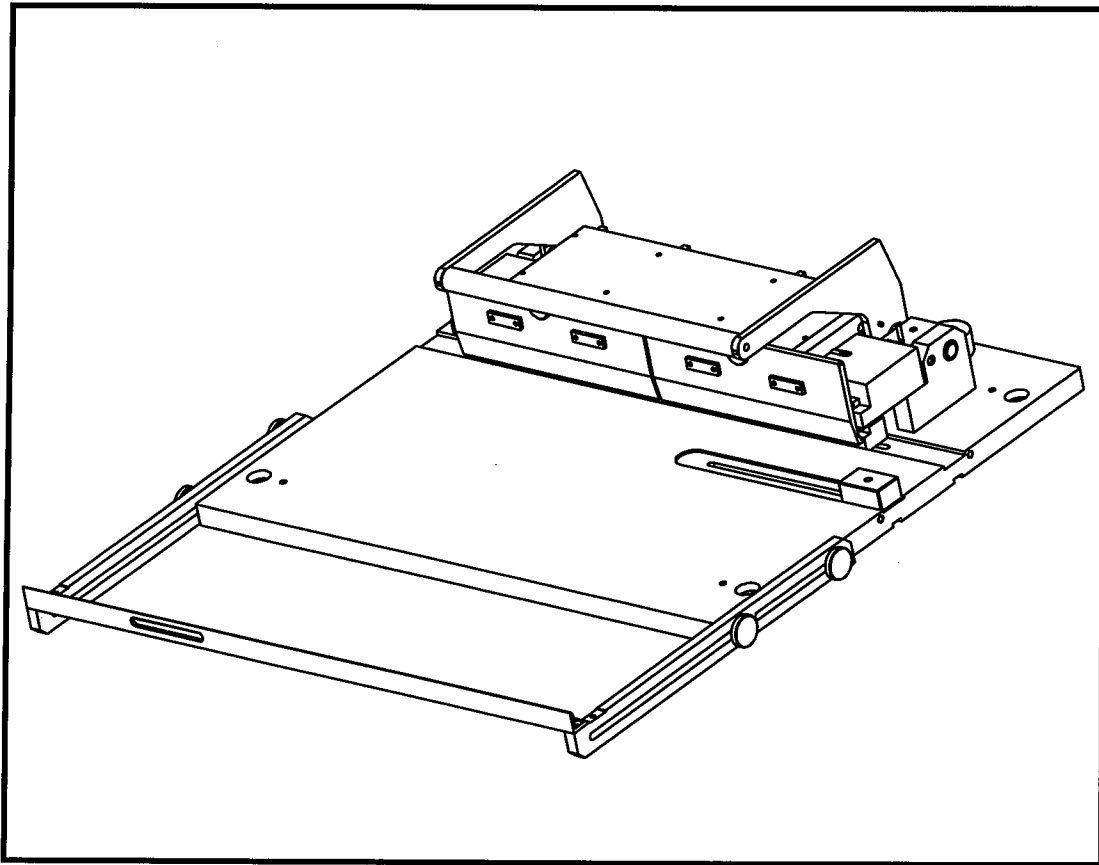
BILL OF MATERIALS FOR 62201-0100

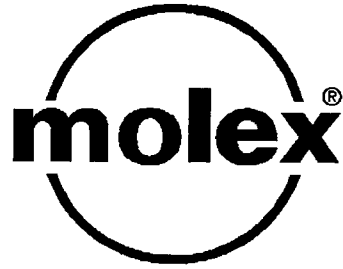
Item	Order No.	Description	Req'd.
1	62200-5709	Blade, Termination	3
2	62200-5712	Plate, Mounting	1
3	62200-8503	Body, Power Module	1
4	62200-8504	Plate, Right Side	1
5	62200-8506	Pin, Alignment	2
6	62200-8507	Plate, Left Side	1



**62201-0500 HDM STIFFENER REMOVAL/INSTALLATION FIXTURE
(CUSTOM FOR INTEL)**

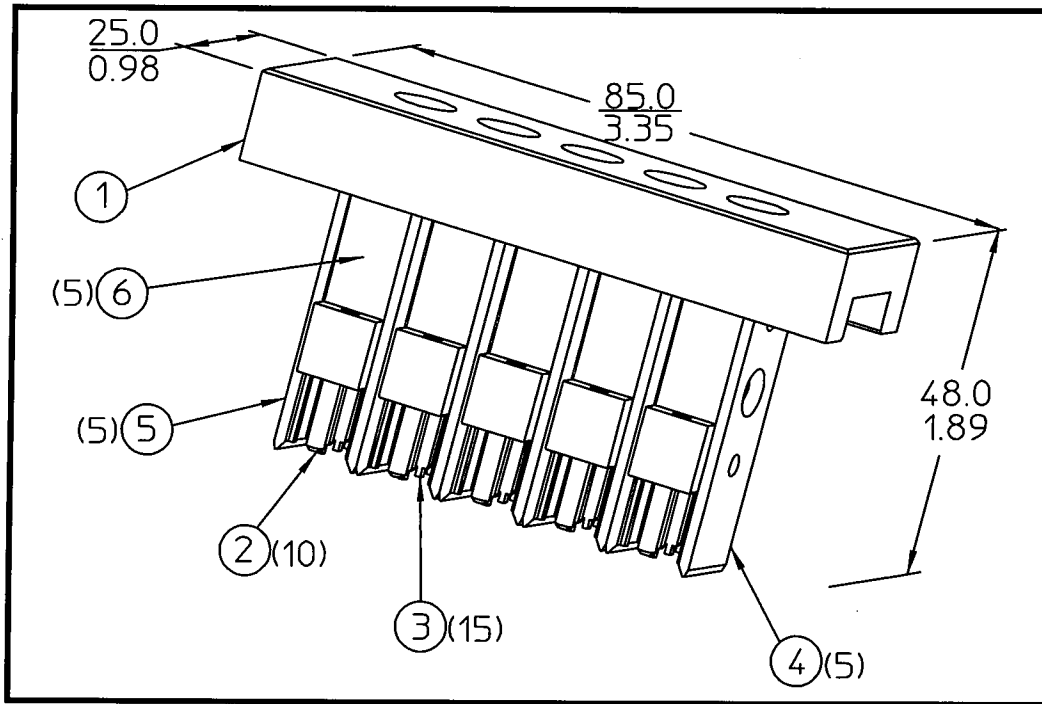
This picture is for reference only, see the separate instruction manual (P.N. 62201-0599) for details.





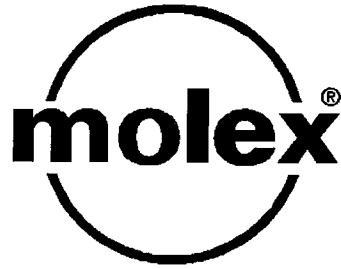
**62201-0700 5 POSITION POWER MODULE LOADING HEAD
(CUSTOM FOR SCI)**

This loading head is designed specifically for SCI to press in 5 HDM backplane power modules (73656 series) into a printed circuit board. This tool is intended to be used in a flat rock press. See Section 2 for details. A customer supplied support fixture is required.



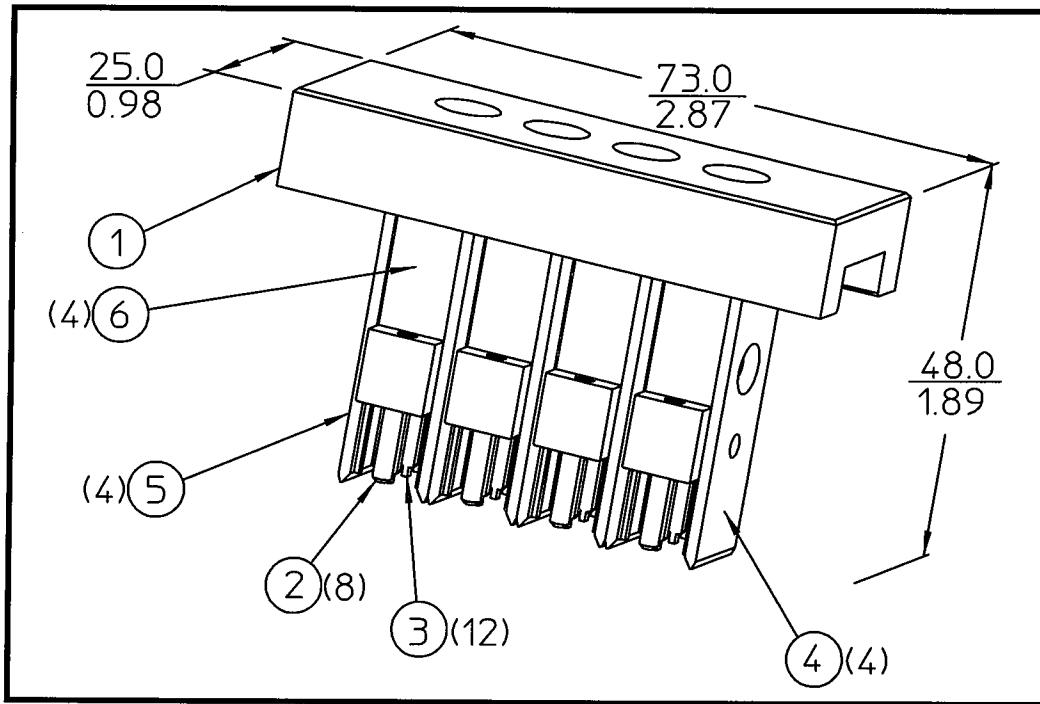
BILL OF MATERIALS FOR 62201-0700

Item	Order No.	Description	Req'd.
1	62201-0701	Rail, Mounting	1
2	62200-8506	Pin, Alignment	10
3	62200-5709	Blade, Termination	15
4	62200-5708	Plate, Right Side	5
5	62200-5707	Plate, Left Side	5
6	62200-5706	Body, Power Module Main	5



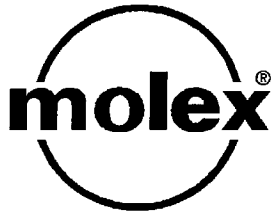
**62201-0800 4 POSITION POWER MODULE LOADING HEAD
(CUSTOM FOR SCI)**

This loading head is designed specifically for SCI to press in 4 HDM backplane power modules (73656 series) into a printed circuit board. This tool is intended to be used in a flat rock press. See Section 2 for details. A customer supplied support fixture is required.



BILL OF MATERIALS FOR 62201-0800

Item	Order No.	Description	Req'd.
1	62201-0701	Rail, Mounting	1
2	62200-8506	Pin, Alignment	8
3	62200-5709	Blade, Termination	12
4	62200-5708	Plate, Right Side	4
5	62200-5707	Plate, Left Side	4
6	62200-5706	Body, Power Module Main	4



INSTRUCTION SHEET

CUSTOM DAUGHTER CARD PRESS-IN FIXTURE (Custom for Q-Tera)

Order No. 62201-8400

This is a custom fixture used to press a combination of Molex OmniGrid and HDM connectors into a printed circuit board. It is designed to be used in a flat platen press with a minimum available force of five (5) tons. The upper plate should be at least 16 inches wide and the base at least 24 inches wide. Molex has an 8 ton pneumatic press (P.N. 62201-3800) and a 15 ton electrical press (P.N. 62200-6400) suitable for this application.

OPERATION

1. Remove the upper tooling from the lower tooling.
2. Locate the printed circuit board on the fixture (See Fig. 2). Make sure the board is positioned on the pilot pins
3. Load the connectors onto the pc board in their proper locations.

CAUTION: Care must be taken to prevent bending the pins when loading the connectors.

4. Position the upper tooling over the connectors and slide the tooling locating pins into the locating bushings. The coding block locators must also slide into the coding blocks.

NOTE: The coding blocks are loose so some maneuvering of these blocks may be necessary to get the locators to slide freely into them.

5. The upper tooling should now be resting on the spring loaded pads.
6. Cycle the press.

NOTE: Due to varying thickness' of printed circuit boards, it may be necessary to add or remove shims under the stops to prevent the press from damaging the connectors by coming down too far or not seating them adequately. A complete set of shims has been supplied with the fixture.

NOTE: The press blocks and nest backups can be installed or removed as required to accommodate the printed circuit board configuration.

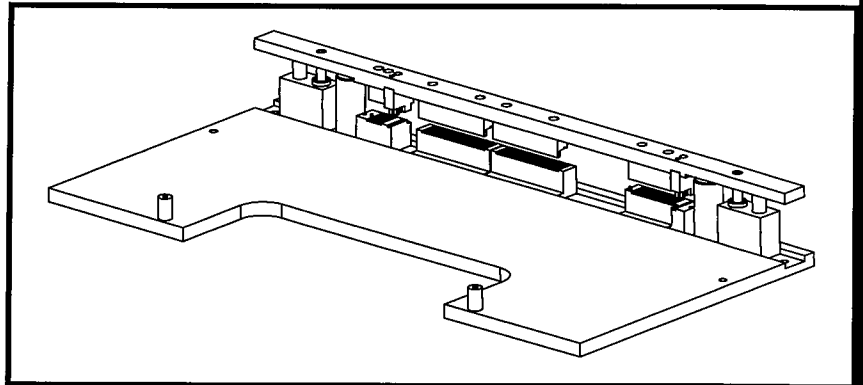


Fig. 1
CUSTOM DAUGHTER CARD PRESS-IN FIXTURE
ORDER NO. 62201-8400

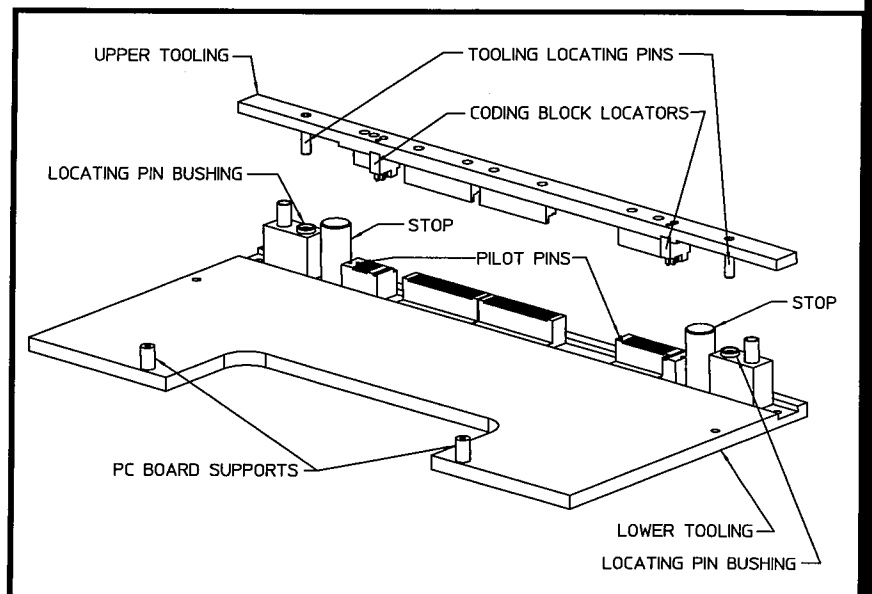
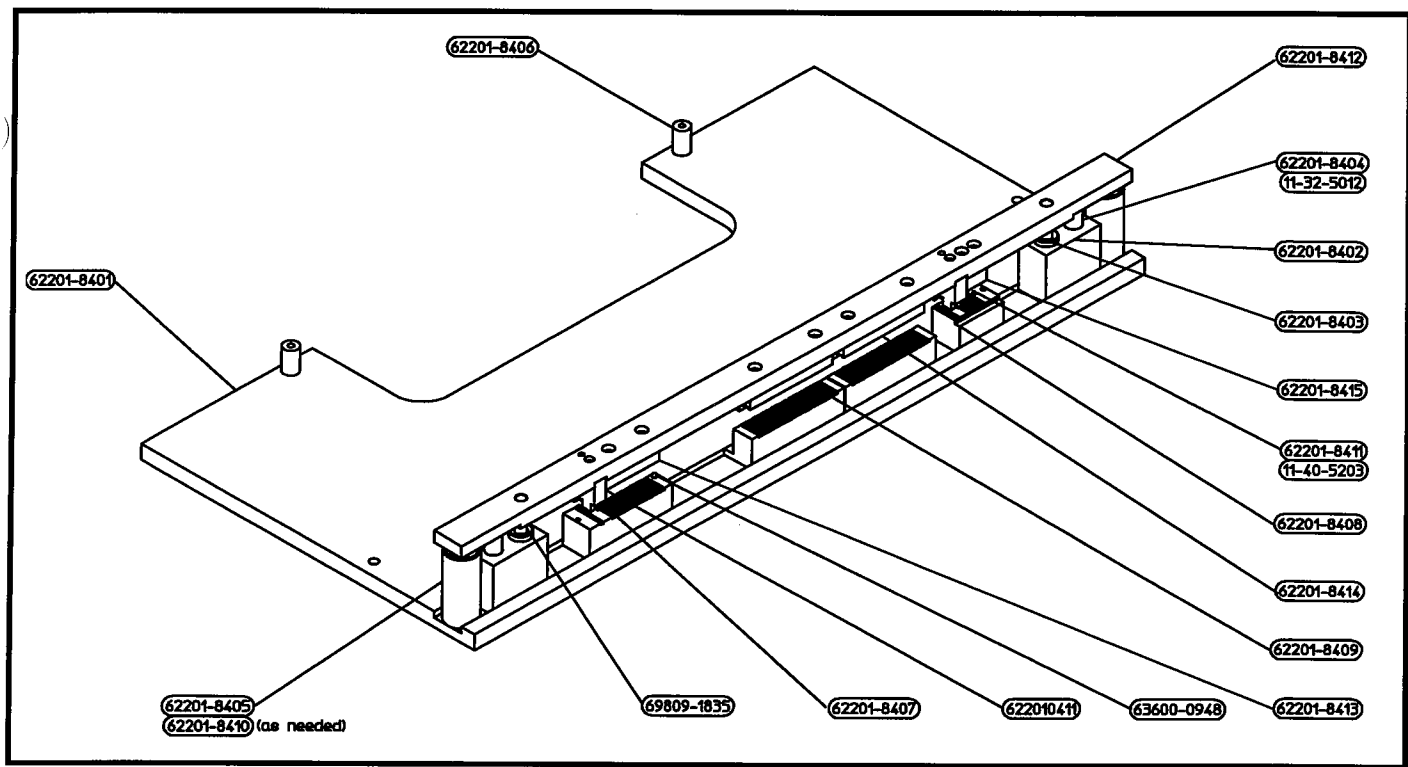


Fig. 2
DETAILS OF FIXTURE



**62201-8400
ASSEMBLY, CUSTOM DAUGHTER CARD PRESS-IN FIXTURE**

PARTS LIST FOR 62201-8400 CUSTOM DAUGHTER CARD PRESS-IN FIXTURE

Order No.	Description	Req'd.	Order No.	Description	Req'd.
11-32-5012	Spring	2	62201-8408	Nest, Backup	1
11-32-5203	Spring, Compression	1	62201-8409	Nest, Backup	2
62201-0411	Insert, Coding Block	2	62201-8410	Spacer	6
62201-8401	Plate, Base	1	62201-8411	Pilot, Spring Loaded	1
62201-8402	Block, Locator	2	62201-8412	Holder, Tool	1
62201-8403	Bushing	2	62201-8413	Block, Press	1
62201-8404	Pad, Spring	2	62201-8414	Block, Press	2
62201-8405	Stop, Press	2	62201-8415	Block, Press	1
62201-8406	Rest, Board	2	63600-0948	Pin	1
62201-8407	Nest, Backup	1	69809-1835	Dowel, 8mm X 35 Lg.	2

MOLEX CONNECTOR CORP.
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 Naperville, IL 60563

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APPENDIX D

Product Specification



AS-73642-9998 APPLICATION SPECIFICATION FOR HIGH DENSITY METRIC (HDM) COMPLIANT BACKPLANE CONNECTORS

1.0 SCOPE

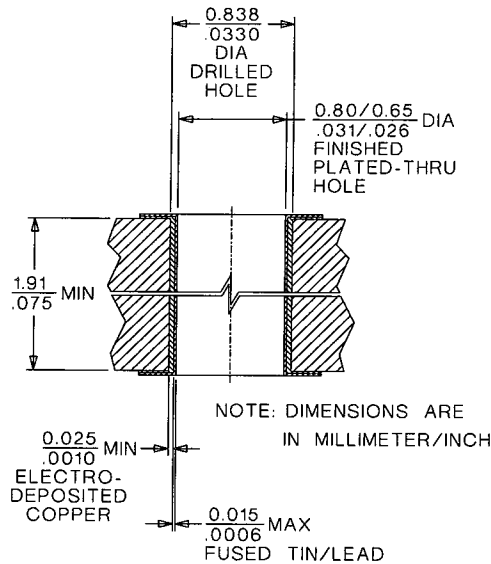
This specification covers the insertion and removal requirements for the the 73642, 73643, 73644, 73650, 73769, 73770, 73771, 73797, 73798, 73799, 73800, 73801, & 73802 HDM compliant (press-fit) backplane connectors.

2.0 INSERTION REQUIREMENTS

2.1 MINIMUM PRINTED CIRCUIT BOARD THICKNESS

1.91mm/.075in

2.2 PLATED-THRU HOLE SIZE



REV.	A	A	A	A	A	A																
SHEET	1	2	3	4	5	6																
REVISE ON PC ONLY							TITLE APPLICATION SPECIFICATION FOR 73642 HDM COMPLIANT (PRESS-FIT) BACKPLANE CONNECTOR															
A	RELEASED FOR PROD. UDT1999-0074 BINGHAM 98/07/30						THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION															
REV.	DESCRIPTION						WRITTEN BY:	CHECKED BY:	APPROVED BY:	DATE:	YR/MO/DAY											
	DESIGN CONTROL			STATUS			BINGHAM	REED	BIXLER	98/07/30												
DOCUMENT NUMBER							DIMENSION CLASS:				FILENAME	SHEET										
AS-73642-9998							∇ CRITICAL = 0	\blacktriangledown MAJOR = 0	AS736421		1 OF 6											



2.3 MAXIMUM INSERTION FORCE PER TERMINAL

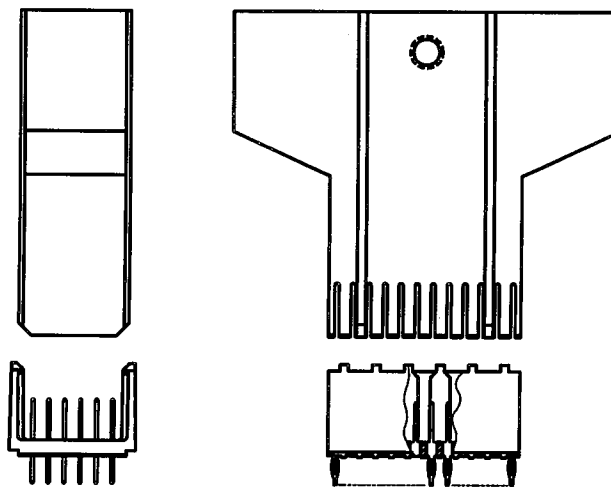
135N/30lb (force)

2.4 MINIMUM RETENTION FORCE PER TERMINAL

22.5N/5lb (force)

2.5 SEATING HEAD DETAIL

Seating heads are available in 72- position, 144 position, and 288 position configurations. Seating heads and instructions are available from Molex Tooling Group.



SEATING HEADS:

62200-5704 72-POSITION (SHOWN)

62200-5703 144-POSITION

62200-5705 288-POSITION

REVISE ON PC ONLY		TITLE APPLICATION SPECIFICATION FOR 73642 HDM COMPLIANT (PRESS-FIT) BACKPLANE CONNECTOR	THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION
A	RELEASED FOR PROD. UDT1999-0074 BINGHAM 98/07/30		
REV.	DESCRIPTION		
DOCUMENT NUMBER AS-73642-9998		DIMENSION CLASS: ▽ CRITICAL = 0 ▼ MAJOR = 0	FILENAME AS736421
			SHEET 2
ES-4000-3996 REV. A SHEET 12 95/MAR/10 EC U5-0926 DCBORD11.MWP			



2.5.1 ORIENTATION

The seating heads are not polarized. They may be used in either direction.

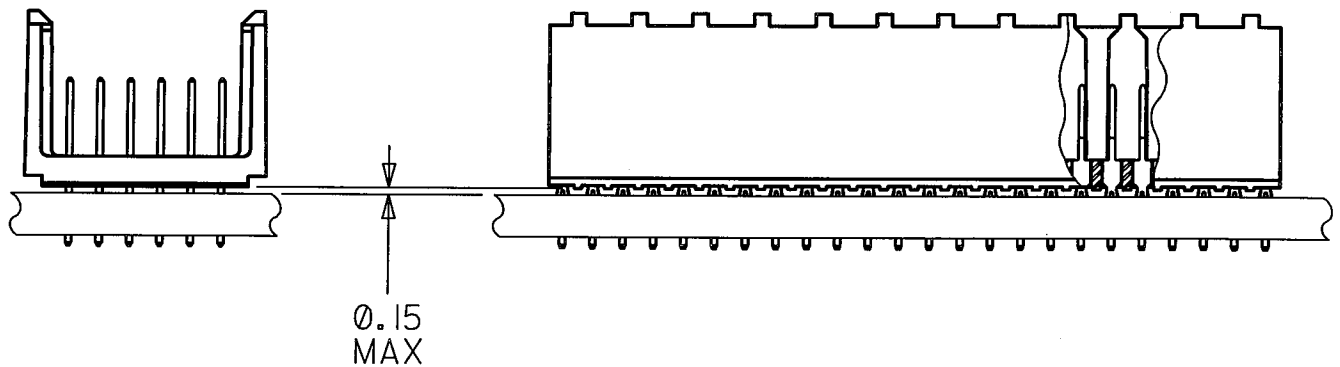
2.5.2 PRINTED CIRCUIT BOARD CLEARANCE

The seating heads fit inside the walls of the backplane housing. No keep out areas are needed around the perimeter of the connector.

2.6 INSERTION SPECIFICATIONS

2.6.1 MAXIMUM ALLOWABLE SEATING DEPTH GAP

0.15mm/.006in



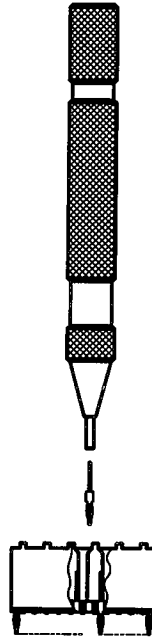
2.7 SINGLE CONTACT INSERTION TOOL

Single contacts may be inserted using Single Contact Insertion Tool part number 62100-1400. The tool and instructions are available from the Molex Tooling Group.

REVISE ON PC ONLY		TITLE APPLICATION SPECIFICATION FOR 73642 HDM COMPLIANT (PRESS-FIT) BACKPLANE CONNECTOR	SHEET 3
A	RELEASED FOR PROD. UDT1999-0074 BINGHAM 98/07/30		
REV.	DESCRIPTION	THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION	
DOCUMENT NUMBER AS-73642-9998		DIMENSION CLASS: ∇ CRITICAL = 0 \blacktriangledown MAJOR = 0	FILENAME AS736421
ES-4000-3996 REV. A SHEET 12 95/MAR/10 EC U5-0926 DCBORD11.MWP			



SINGLE CONTACT
INSERTION TOOL
62100-1400



3.0 REMOVAL REQUIREMENTS

3.1 REMOVAL TOOL NO. 62100-1000

Single contacts may be removed using the HDM Backplane Single Contact Knockout Tool. The tool is designe for use in four different contact conditions:

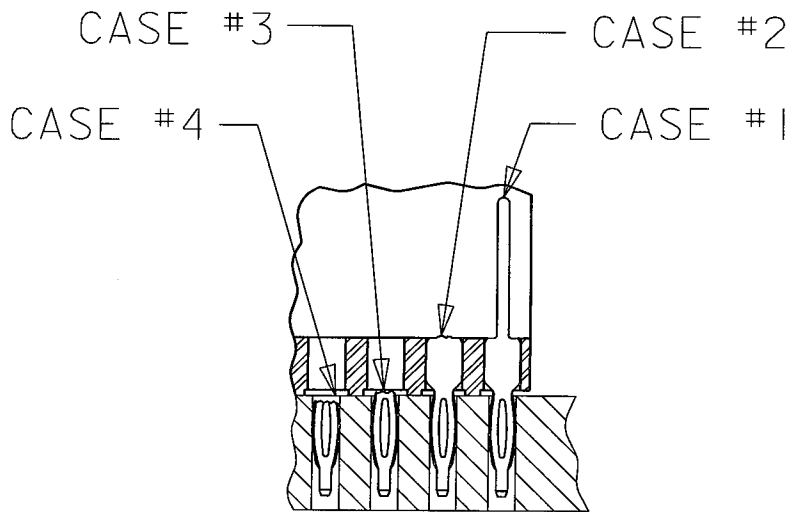
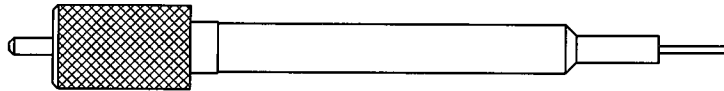
- 1) Contact intact
- 2) Contact mating post is broken off
- 3) Contact flag is broken off but part of the contact is above board surface
- 4) Contact flag is broken off but remainder of contact is below board surface

The tool and instructions are available from the Molex Tooling Group

REVISE ON PC ONLY		TITLE APPLICATION SPECIFICATION FOR 73642 HDM COMPLIANT (PRESS-FIT) BACKPLANE CONNECTOR	THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION
A	RELEASED FOR PROD. UDT1999-0074 BINGHAM 98/07/30		
REV.	DESCRIPTION		
DOCUMENT NUMBER AS-73642-9998		DIMENSION CLASS: ▽ CRITICAL = 0 ▼ MAJOR = 0	FILENAME AS736421
			SHEET 4
ES-4000-3996 REV. A SHEET 12 95/MAR/10 EC U5-0926 DCBORD11.MWP			



SINGLE CONTACT
KNOCKOUT TOOL
62100-1000

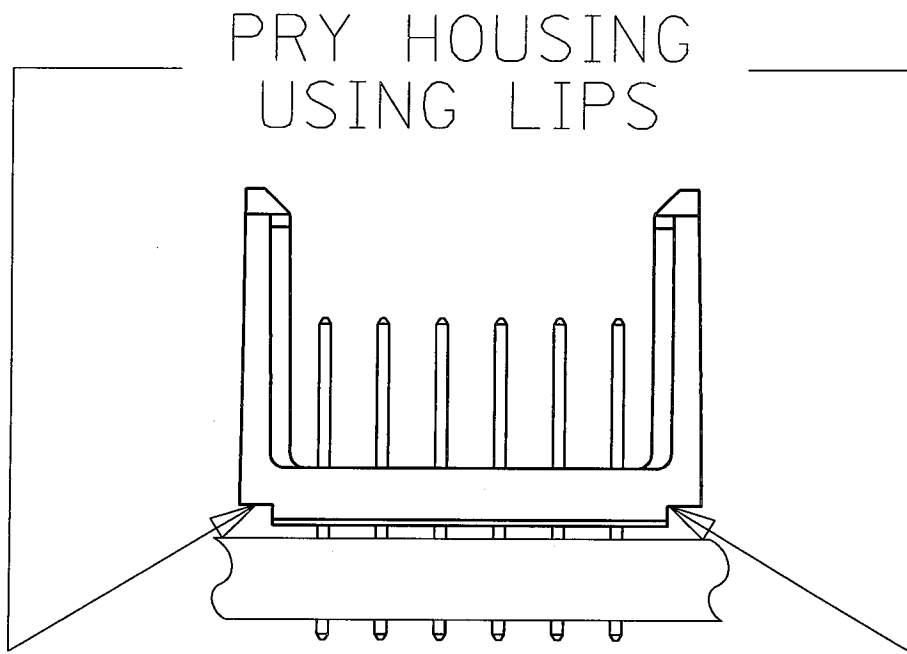


REVISE ON PC ONLY		TITLE APPLICATION SPECIFICATION FOR 73642 HDM COMPLIANT (PRESS-FIT) BACKPLANE CONNECTOR		
A	RELEASED FOR PROD. UDT1999-0074 BINGHAM 98/07/30			
REV.	DESCRIPTION	THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION		
DOCUMENT NUMBER AS-73642-9998		DIMENSION CLASS: ▽ CRITICAL = 0 ▼ MAJOR = 0	FILENAME AS736421	SHEET 5
ES-4000-3996 REV. A SHEET 12 95/MAR/10 EC U5-0926 DCBORD11.MWP				



3.2 MODULE REMOVAL

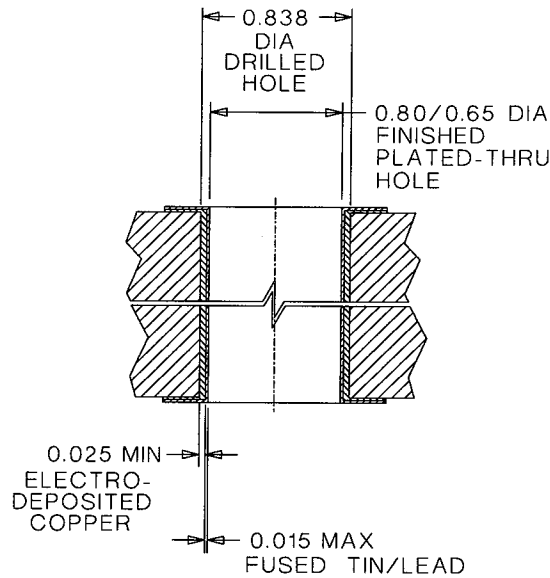
To remove an entire module the housing must be removed first. Remove the housing by carefully prying it loose from the contacts using the lips under the bottom edges. Work the housing off the contacts by first prying one side of the housing and then the other side to prevent damage from bending the contacts. Use a flat tool such as a screwdriver to pry the housing off. Be careful not to damage the circuit board during prying. Once the housing is off, remove the individual contacts using Single Contact Knockout Tool 62100-1000.



REVISE ON PC ONLY		TITLE APPLICATION SPECIFICATION FOR 73642 HDM COMPLIANT (PRESS-FIT) BACKPLANE CONNECTOR	THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION
A	RELEASED FOR PROD. UDT1999-0074 BINGHAM 98/07/30		
REV.	DESCRIPTION		
DOCUMENT NUMBER AS-73642-9998		DIMENSION CLASS: ▽ CRITICAL = 0 ▼ MAJOR = 0	FILENAME AS736421
			SHEET 6
ES-4000-3996 REV. A SHEET 12 95/MAR/10 EC U5-0926 DCBORD11.MWP			

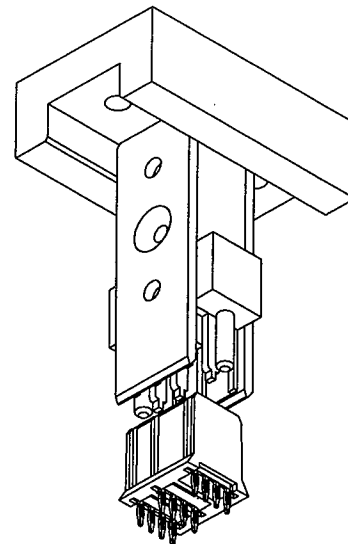


2.3 Plated Thru-hole Size



2.4 Insertion Head Tooling

Molex Tooling Group has available insertion tooling for the 73656 press fit family. This tooling is designed to apply insertion forces directly to the terminal, thus preventing damage to the housing. Part number for the insertion head for the -000* and -100* series power assemblies is 62200-5711. For the -500* series, part number is 62201-0100. The insertion heads are polarized so that the assemblies can only be seated one way. When mating with daughtercard powers that are next to each other on a stiffener, the backplane power center-to-center spacing is 12 mm.

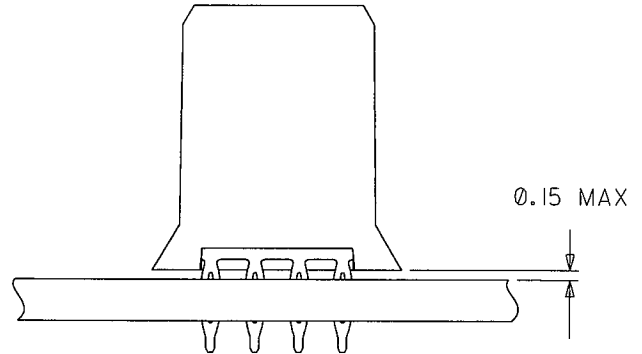


REVISE ON PC ONLY		TITLE	APPLICATION SPECIFICATION HDM BACKPLANE PRESS FIT POWER ASSEMBLIES	
A	SEE SHEET 1			
REV.	DESCRIPTION			
		THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION		
DOCUMENT NUMBER AS-73656-1998		DIMENSION CLASS: CRITICAL = 0 MAJOR = 0	FILENAME pwrappl.lwp	SHEET 2
ES-4000-3996 REV. A SHEET 12 95/MAR/10 EC U5-0926 DCBORD11.MWP				



2.5 Insertion Specification

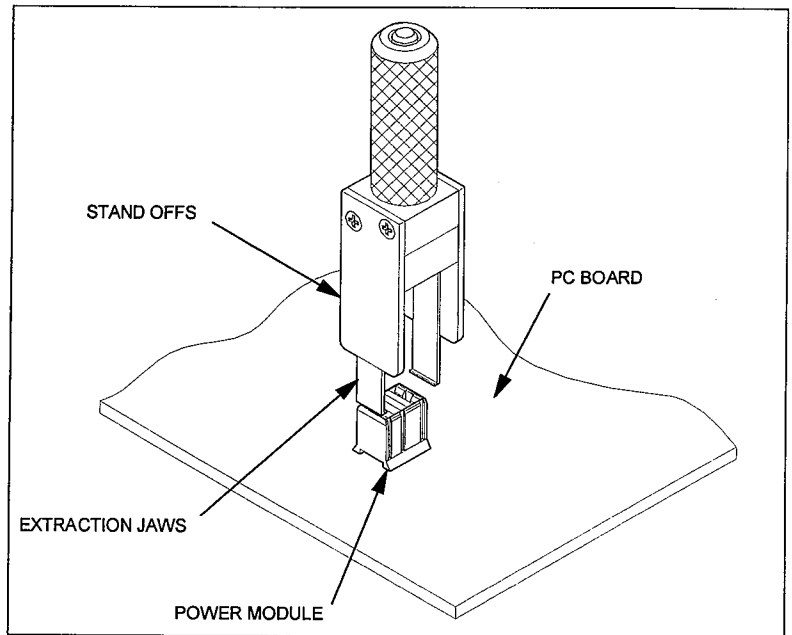
Bottom of power housing to be seated flush to the PC board with up to 0.15 mm maximum space.





3.0 REMOVAL REQUIREMENTS

3.1 Removal Tooling for Housing

Should repair be necessary to the assembly module, a removal tool can be applied. Pictured at right, the HDM backplane power module removal tool (62100-1100) can safely remove the housing without further damage to housing or backplane terminals.

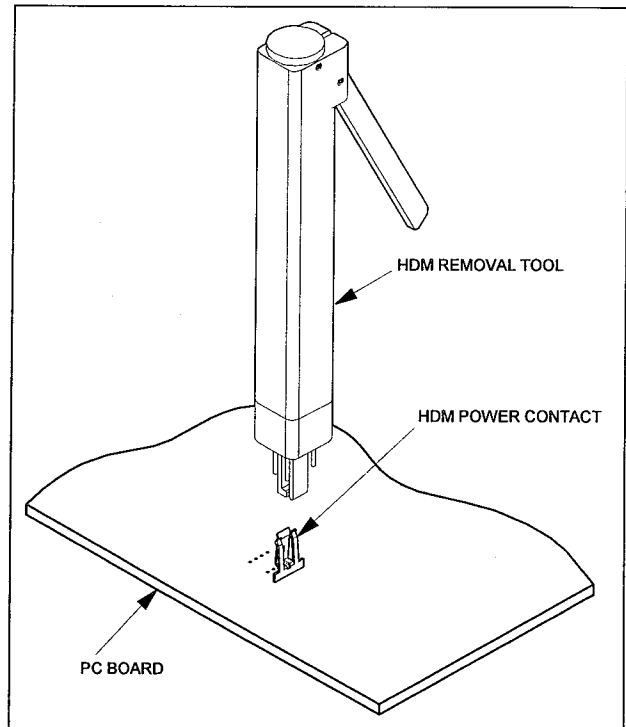


REVISE ON PC ONLY		TITLE		
A	SEE SHEET 1	APPLICATION SPECIFICATION HDM BACKPLANE PRESS FIT POWER ASSEMBLIES		
REV.	DESCRIPTION			
		THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION		
DOCUMENT NUMBER AS-73656-1998		DIMENSION CLASS:  CRITICAL = 0  MAJOR = 0	FILENAME pwrappl.lwp	SHEET 3
ES-4000-3996 REV. A SHEET 12 95/MAR/10 EC U5-0926 DCBORD11.MWP				



3.2 Removal Tooling for Terminal

After housing removal has been completed, the individual terminals can be safely removed. Using the backplane power removal tool 62100-1200, each terminal can be removed for board repair or rework without causing damage to PC board.



REVISE ON PC ONLY		TITLE	APPLICATION SPECIFICATION HDM BACKPLANE PRESS FIT POWER ASSEMBLIES	
A	SEE SHEET 1			
REV.	DESCRIPTION	THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION		
DOCUMENT NUMBER AS-73656-1998		DIMENSION CLASS: CRITICAL = 0 MAJOR = 0	FILENAME pwrappl.lwp	SHEET 4
ES-4000-3996 REV. A SHEET 12 95/MAR/10 EC U5-0926 DCBORD11.MWP				



PRODUCT SPECIFICATION



LANGUAGE

ENGLISH

4.0 RATINGS

4.1 Voltage

500 Volts AC (RMS) or 500 Volts DC.

4.2 Current

15 Amps at 30 °C rise for standard configuration on power assembly (per blade).

11 Amps at 30 °C rise for midplane configuration on 73656 power assembly.

4.3 Temperature

Operating: -55 °C to +105 °C.

5.0 PERFORMANCE

Performance tests to be announced. Ratings (Section 4.0) verified by UL / CSA.

Mating Force: 8 N max insertion force.



6.0 PACKAGING

Parts shall be packaged to protect against damage during handling, transit, and storage. See packaging drawings listed in this section.

- PK-70873-0819 Packaging Specification for HDM Backplane Power Assemblies
- PK-70873-0820 Packaging Spec. for HDM Daughtercard Assemblies with Mounting Ears
- PK-70873-0821 Packaging Spec. for HDM Daughtercard Assemblies w/o Mounting Ears
- PK-70873-1100 Packaging Specification for HDM Vertical (Stacker) Power Assemblies

7.0 GAGES AND FIXTURES

Gages and fixtures applied as needed for assurance of accurate data acquisition during performance verification (Section 5.0). See Application Specification for insertion requirements and tooling.

REVISE ON PC ONLY		TITLE	PRODUCT SPECIFICATION HDM POWER ASSEMBLIES
A	SEE SHEET 1		
REV.	DESCRIPTION	THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION	
DOCUMENT NUMBER PS-73651-1998		DIMENSION CLASS:  CRITICAL = 0  MAJOR = 0	FILENAME pwrspec.lwp
			SHEET 2
ES-4000-3996 REV. A SHEET 3 95/MAR/10 EC U5-0926 DCBORD.MWP			



PRODUCT SPECIFICATION



LANGUAGE

ENGLISH

- * 73797-0*00, -1*00 72-/144-Circuit HDM Backplane Single End Midplane Module, Open End, Press-fit
- * 73798-0*00, -1*00 72-/144-Circuit HDM Backplane Single End Midplane Module, Closed End, Press-fit
- * 73799- 0*00, -1*00 72-/144-Circuit HDM Backplane Single End Midplane Module, Polar/ Guide, Press-fit
- * 73800-0*00, -1*00 72-/144-Circuit HDM Backplane Double End Midplane Module, Open End, Press-fit
- * 73801-0*00, -1*00 72-/144-Circuit HDM Backplane Double End Midplane Module, Closed End, Press-fit
- * 73802-0*00, -1*00 72-/144-Circuit HDM Backplane Double End Midplane Module, Polar/ Guide, Press-fit
- * 74349-**** 144 Circuit HDM Backplane Double Closed End
- * 74428-**** 144 Circuit HDM Backplane Stacking Module Double Closed End.

2.2 DIMENSIONS, MATERIALS, PLATINGS, AND MARKINGS

Refer to the appropriate Sales drawings for information on dimensions, materials, platings, and markings.

2.3 SAFETY AGENCY APPROVALS

UL File Number. E29179
CSA File Number. LR19980

3.0 APPLICABLE DOCUMENTS AND SPECIFICATIONS

Refer to the appropriate Sales drawings and other sections of this Specification for the necessary referenced documents and specifications.

4.0 RATINGS

4.1 VOLTAGE

250VAC at 60Hz

4.2 CURRENT

1 Amp at 70 degC for each signal terminal

REVISE ON PC ONLY		TITLE	PRODUCT SPECIFICATION FOR HIGH DENSITY METRIC (HDM) SIGNAL STACKING CONNECTOR		
B	SEE SHEET 1				
REV.	DESCRIPTION	THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION			
DOCUMENT NUMBER		DIMENSION CLASS:		FILENAME	SHEET
PS-73780-999		CRITICAL = 0 MAJOR = 0		PS73780.LWP	2



PRODUCT SPECIFICATION



LANGUAGE

ENGLISH

4.3 TEMPERATURE
-55 degC to +105 degC

5.0 PERFORMANCE

5.1 ELECTRICAL PERFORMANCE

5.1.1 Contact Resistance (Low Level)

Test Condition	Requirement
Mated, 20mA, 20mV per EIA 364, Test No. TP-23	30 milliohms maximum initial; 10 milliohms maximum change

5.1.2 Insulation Resistance

Test Condition	Requirement
Unmated, 500VDC, per EIA 364, Test No.	5000 Megohms initial 1000 Megohms final

5.1.3 Dielectric Withstanding Voltage

Test Condition	Requirement
Unmated, 1500 VAC signal terminals per EIA 364, Test No. TP-20	No breakdown or flashover

5.1.4 Contact Disturbance

Test Condition	Requirement
Mated per EIA 364, Test No. TP-46	No interrupts greater than 10 nanoseconds

5.1.5 Compliant Pin Interface Resistance

Test Condition	Requirement
Contact inserted into printed circuit board per EIA 364, Test No. TP-23	Less than 1 milliohm

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B	SEE SHEET 1			
REV.	DESCRIPTION			
DOCUMENT NUMBER PS-73780-999		DIMENSION CLASS: CRITICAL = 0 MAJOR = 0	FILENAME PS73780.LWP	SHEET 3



5.2 MECHANICAL PERFORMANCE

5.2.1 Terminal Insertion and Separation Forces

Test Condition	Requirement
Insert and separate Backplane pin from Daughtercard terminal at rate of 25mm +/-6mm per minute per EIA 364, Test No. TP-37	0.55 N maximum insertion 0.15 N minimum withdrawal

5.2.2 Connector Mate and Unmate Forces

Test Condition	Requirement
Mate and unmate connector at rate of 25 +/-6mm per minute per EIA 364, Test No. TP-13	For 72-circuit, 40N maximum mate, 10N minimum unmate For 144-circuit, 80N maximum mate, 20N minimum unmate



5.2.3 Terminal Retention Force in Housing

Test Condition	Requirement
Axial pullout force on contact in housing at rate of 25 +/-6mm per minute	4N minimum for signal and shielded contacts

5.2.4 Durability

Test Condition	Requirement
Mated and unmated 200 times per EIA 364 Test No. TP-09	No change in LLCR greater than 10 milliohms

5.2.5 Vibration

REVISE ON PC ONLY		TITLE PRODUCT SPECIFICATION FOR HIGH DENSITY METRIC (HDM) SIGNAL STACKING CONNECTOR	THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION	
B	SEE SHEET 1			
REV.	DESCRIPTION			
DOCUMENT NUMBER PS-73780-999		DIMENSION CLASS:  CRITICAL = 0  MAJOR = 0	FILENAME PS73780.LWP	SHEET 4
ES-4000-3996 REV. A SHEET 3 95/MAR/10 EC U5-0926 DCBORD.MWP				



PRODUCT SPECIFICATION



LANGUAGE

ENGLISH

Test Condition	Requirement
Mated, 5-100 Hz, 1g peak, 24 hours, 3 axis per EIA 364 Test No. TP-28	No interrupts greater than 10 nanoseconds Dust applied during vibration sequence, no increase in LLCR greater than 10 milliohms

5.2.6 Mechanical Shock

Test Condition	Requirement
Mated, 15g half-sine excitation, 11ms, 3 axis, 3 in each direction per EIA 364 Test No. TP-27	No interrupts greater than 10 nanoseconds No increase in LLCR greater than 10 milliohms

5.2.7 Normal Force and Spring Rate

Test Condition	Requirement
Apply perpendicular force to contact beam at rate of 25 +/-6mm per minute	0.60N (61 g) minimum 12.5 g/mil deflection nominal

5.2.8 Compliant Pin Insertion Force

Test Condition	Requirement
Insert compliant backplane pin/daughtercard terminal into printed circuit board at rate of 25 +/-6mm per minute	For backplane pin, 135N maximum For daughtercard terminal, 45N maximum

5.2.9 Compliant Pin Retention

Test Condition	Requirement
Apply axial pullout force to backplane pin/daughtercard terminal at rate of 25 +/-6mm per minute	For backplane pin, 22.5N minimum For daughtercard terminal, 10N minimum

5.3 ENVIRONMENTAL PERFORMANCE

5.3.1 Thermal Shock

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B	SEE SHEET 1			
REV.	DESCRIPTION			
DOCUMENT NUMBER PS-73780-999		DIMENSION CLASS: CRITICAL = 0 MAJOR = 0	FILENAME PS73780.LWP	SHEET 5



PRODUCT SPECIFICATION



LANGUAGE

ENGLISH

Test Condition	Requirement
Mated, from -55 degC to +85 degC, 100 cycles per EIA 364 Test No. TP-32	No change in LLCR greater than 10 milliohms

5.3.2 Temperature Life

Test Condition	Requirement
Mated, +105 degC for 1000 hours per EIA 364 Test No. TP-17, Test Condition 4	No change in LLCR greater than 10 milliohms

5.3.3 Humidity

Test Condition	Requirement
Mated, from +25 degC to +65 degC per EIA 364 Test No. TP-31	No change in LLCR greater than 10 milliohms

5.3.4 Temperature Rise at Rated Current

Test Condition	Requirement
Mated at rated current after 96 hours	+105 degC maximum temperature at 1 Amp at 70 degC continuous

5.3.5 Mixed Flowing Gas

Test Condition	Requirement
10 days mated, 10 days unmated, 4 gas, controlled environment per ASTM Report B 827-92, 200 cycles durability total (100 prior to and 100 after exposure)	No change in LLCR greater than 10 milliohms

6.0 PACKAGING

Parts shall be packaged to protect against damage during handling, transit, and storage.

REVISE ON PC ONLY		TITLE PRODUCT SPECIFICATION FOR HIGH DENSITY METRIC (HDM) SIGNAL STACKING CONNECTOR	THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION
B	SEE SHEET 1		
REV.	DESCRIPTION		
DOCUMENT NUMBER PS-73780-999		DIMENSION CLASS: CRITICAL = 0 MAJOR = 0	FILENAME PS73780.LWP
			SHEET 6



PRODUCT SPECIFICATION



LANGUAGE

ENGLISH

Refer to the following packaging specifications:

- * PK-70873-0818 Backplane Signal Single End Midplane Modules
- * PK-70873-0868 Backplane Signal Double End Midplane Modules
- * PK-70873-0870 Backplane Signal Stacking Modules - 15mm Height
- * PK-70873-0871 Backplane Signal Stacking Modules - 10mm Height
- * PK-70872-0872 Daughtercard Signal Stacking Modules

7.0 TEST SEQUENCE

REVISE ON PC ONLY		TITLE PRODUCT SPECIFICATION FOR HIGH DENSITY METRIC (HDM) SIGNAL STACKING CONNECTOR	THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION
B	SEE SHEET 1		
REV.	DESCRIPTION		
DOCUMENT NUMBER PS-73780-999		DIMENSION CLASS: CRITICAL = 0 MAJOR = 0	FILENAME PS73780.LWP
			SHEET 7
ES-4000-3996 REV. A SHEET 3 95/MAR/10 EC U5-0926 DCBORD.MWP			



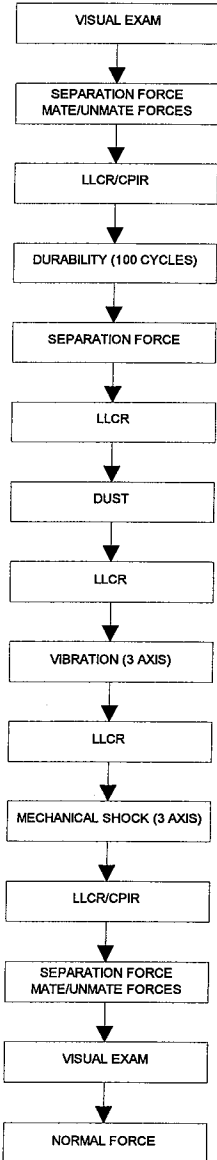
PRODUCT SPECIFICATION



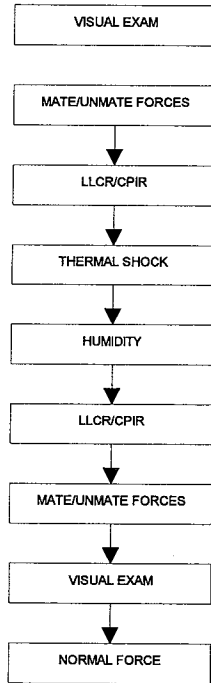
LANGUAGE

ENGLISH

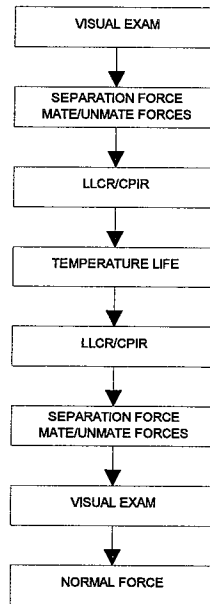
Group I



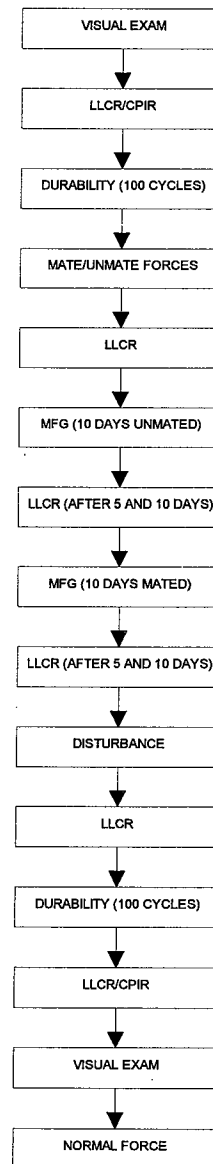
Group II



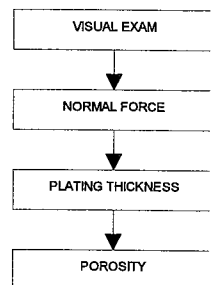
Group III



Group IV



Group V



CPIR = COMPLIANT PIN INTERFACE RESISTANCE
 LLCR = LOW LEVEL CONTACT RESISTANCE

REVISE ON PC ONLY		TITLE	PRODUCT SPECIFICATION FOR HIGH DENSITY METRIC (HDM) SIGNAL STACKING CONNECTOR	
B	SEE SHEET 1			
THIS DOCUMENT CONTAINS INFORMATION THAT IS PROPRIETARY TO MOLEX INC. AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION				
REV.	DESCRIPTION	DIMENSION CLASS:		FILENAME
		▲ CRITICAL = 0 ▼ MAJOR = 0		SHEET
DOCUMENT NUMBER		FILENAME		SHEET
PS-73780-999		PS73780.LWP		
ES-4000-3996 REV. A SHEET 3 95/MAR/10 EC U5-0926 DCBORD.MWP				

APPENDIX E

TERMS AND CONDITIONS

LEASE NEW.	E-3
BUY NEW	E-5
LEASE REFURBISHED	E-6
BUY REFURBISHED	E-8

Molex distributes their Harness Assembly Tools and Machines through several different plans:

1. Lease New ----- The customer may lease a new machine or tool for a prearranged period of time:
2. Buy New ----- The customer may purchase a new machine or tool outright;
3. Lease Refurbished----- If available, a customer may lease a completely refurbished machine or tool for a prearranged period of time.
4. Buy Refurbished ----- Again if available, a customer may purchase a completely refurbished machine or tool outright.

The terms and conditions, including warranties, vary with each plan. The following pages list the generic parts of these four (4) plans.

NOTE: Not all tooling is available through all four (4) plans. i.e.: Some tooling is purchase only and some is lease only. Contact your local Molex Sales Engineer for additional information.

MOLEX EQUIPMENT LEASE TERMS AND CONDITIONS

ARTICLE I OWNERSHIP OF EQUIPMENT

- 1.01 ALL EQUIPMENT is owned by LESSOR. No right, title or interest in the EQUIPMENT shall pass to LESSEE other than, conditioned upon LESSEE'S performance hereunder, the right to maintain possession and use of the EQUIPMENT.

ARTICLE II SERVICE OF EQUIPMENT

- 2.01 LESSOR will provide LESSEE with instructions as to the set up, operation and maintenance of the equipment and, at LESSEE'S expense, an inventory of recommended perishable tooling.
- 2.02 LESSOR will service the EQUIPMENT (except for minor repairs and/or maintenance) to the extent provided for in the succeeding paragraphs.
- 2.03 If, during the first ninety (90) days after LESSEE received possession of the EQUIPMENT, the EQUIPMENT fails to perform in a satisfactory manner (except by reason of LESSEE'S misuse or negligence), LESSOR will repair the EQUIPMENT, at no cost for parts and labor, as soon as possible after notification.
- 2.04 After the first ninety (90) days of LESSEE'S possession, should the EQUIPMENT fail to operate satisfactorily (except by reason of LESSEE'S misuse or negligence), LESSOR will supply LESSEE with all the required perishable parts at the current standard selling price as soon as possible after notification. Spare parts will continue to be provided on a no-charge basis throughout the term of the lease. Should LESSEE be unable to repair the equipment, LESSOR will repair the inoperable equipment as soon as possible after notification.
- 2.05 By definition, perishable parts are those items that come in contact with the product media during the termination process. The media, normally, would be terminals, wire, connectors, cable, and the like. Examples of perishable parts are: punches, anvils, insertion blades, connector/terminal guides, etc. Where-in examples of spare parts are: motors, solenoids, valves, cylinders, et al.
- 2.06 If LESSOR cannot repair the EQUIPMENT as stated in paragraphs 2.03 and 2.04 hereof, LESSOR will replace the EQUIPMENT or any portion thereof, as soon as possible.
- 2.07 LESSOR cannot be responsible for the quality of connectors or terminals other than those of LESSOR. Accordingly, notwithstanding paragraphs 2.03 and 2.04 and/or 2.06 hereof, LESSOR reserves the right to charge LESSEE the cost of labor and/or parts for repairing EQUIPMENT which is applying connectors or terminals other than LESSOR'S.
- 2.08 LESSOR cannot be responsible for any modifications performed by LESSEE on the EQUIPMENT or the performance of the EQUIPMENT when used in association with machine components not supplied by LESSOR. Accordingly, notwithstanding paragraphs 2.03, 2.04 and/or 2.06 hereof, LESSOR reserves the right to charge LESSEE the cost of labor, and/or parts for the repairing the EQUIPMENT modified by LESSEE or used in association with machine components not supplied by LESSOR.

ARTICLE III WARRANTIES AND REMEDIES

- 3.0 In case of breach of warranty by LESSOR, LESSEE'S sole remedy shall be repair, or, at LESSOR'S option, replacement of the EQUIPMENT.
- 3.02 Under no circumstances shall LESSEE be entitled to any special or consequential damages for any action or non-action taken by LESSOR in connection with furnishing or servicing the EQUIPMENT.

ARTICLE IV LESSEE'S OBLIGATIONS

- 4.01 General - LESSEE shall use the EQUIPMENT in a careful manner, shall comply with all the laws relating to its possession, use, and maintenance and shall be responsible for keeping the EQUIPMENT in good repair, condition and working order and will not modify the EQUIPMENT without the prior written consent of LESSOR.

*ARTICLE IV
LESSEE'S OBLIGATIONS (Continued)*

- 4.02 Inspection - LESSEE shall permit LESSOR to inspect the EQUIPMENT and any pertinent records concerning the EQUIPMENT during LESSEE'S business hours.
- 4.03 Insurance - LESSEE shall provide, maintain, and pay for insurance against loss, theft, damage, and destruction of the EQUIPMENT. LESSEE shall also provide, maintain, and pay for public liability insurance, both personal injury and property damage, covering the EQUIPMENT in form and amount satisfactory to LESSOR.
- 4.04 Liens - LESSEE shall keep the EQUIPMENT free and clear of all levies, liens and encumbrances caused by LESSEE and shall not permit the EQUIPMENT to become a fixture on any premises.
- 4.05 Taxes - LESSEE shall pay all charges and taxes, which may now or hereafter be imposed upon the leasing, rental, possession or use of the EQUIPMENT. LESSOR shall have the right to invoice LESSEE any such taxes that it has paid.
- 4.06 Risk of loss - LESSEE assumes and shall bear the entire risk of loss, theft, destruction, and damage to the EQUIPMENT from any and every cause whatsoever from the date of delivery until return of the EQUIPMENT to LESSOR's plant excepting only that damage directly attributable to LESSOR's negligence. In the event of damage, LESSEE shall, as soon as possible, replace or repair the EQUIPMENT.
- 4.07 Indemnification - LESSEE shall indemnify, hold harmless, and (at LESSOR's option but at LESSEE'S expense) defend LESSOR against any and all claims, actions, liabilities, losses, damages, and expenses including attorney's fees, arising out of LESSEE'S breach of its obligations under this Agreement.

*ARTICLE V
TERMINATION*

- 5.01 Either party hereto may terminate this Agreement for nonperformance under any provision hereof within 10 days after the complaining party has made written demand therefore.
- 5.02 Lessor, at its sole discretion, may terminate this Agreement in the event of LESSEE'S bankruptcy, receivership, insolvency, assignment for the benefit of creditors or similar action or condition relating to LESSEE or LESSOR's property.
- 5.03 Upon termination of this Agreement for any reason except LESSOR's breach, LESSEE, at its expense, will return the EQUIPMENT in as good condition as received less normal wear, tear and depreciation to one of LESSOR's facilities situated in Illinois that shall be designated by LESSOR.

*ARTICLE VI
MISCELLANEOUS*

- 6.01 All notices hereunder shall be in writing and mailed to the respective parties, by registered or certified mail, at the address set forth in the preamble on the face of this Agreement.
- 6.02 This Agreement cannot be varied except by a writing signed by authorized agents of the parties. The definition of EQUIPMENT may be enlarged with the written consent of the parties. Any additional items which become EQUIPMENT shall be fully governed by this Lease Agreement.
- 6.03 This Agreement shall be governed by the Laws of the State of Illinois.
- 6.04 Any provision herein held unenforceable by a court of competent jurisdiction shall not affect any other provision herein and may be modified by such court so that it becomes reasonable and enforceable and, as modified, will be enforced as any other provision.

MOLEX EQUIPMENT SALES TERMS & CONDITIONS

ARTICLE I SERVICE OF EQUIPMENT

- 1.01 SELLER will provide BUYER instructions as to the setup, operation and maintenance of the EQUIPMENT and an inventory of suggested perishable tooling, if ordered, at BUYER'S expense.
- 1.02 SELLER will service the EQUIPMENT (except for minor repairs and/or maintenance) to the extent provided for in the succeeding paragraphs.
- 1.03 If, during the first thirty (30) days after BUYER received possession of the EQUIPMENT, the EQUIPMENT fails to perform in a satisfactory manner (except by reason of BUYER'S misuse or negligence), SELLER will repair the EQUIPMENT, at no cost for parts and labor, as soon as possible after notification.
- 1.04 If, during the first year after BUYER received possession of the EQUIPMENT, the EQUIPMENT fails to perform in a satisfactory manner (except by reason of the BUYER'S misuse or negligence), SELLER will repair the EQUIPMENT, at no cost for spare parts and labor, as soon as possible after notification. The replacement of perishable parts during the remaining eleven (11) months of the warranty is the responsibility of the BUYER.
- 1.05 By definition, perishable parts are those that come into contact with the product media during the termination process. The media, normally, would be terminals, wire, connectors, cable and the like. Examples of perishable parts are: punches, anvils, insertion blades, connector/terminal guides, etc. Wherein examples of spare parts are: motors, solenoids, valves, cylinders, et. al.
- 1.06 If SELLER cannot repair the EQUIPMENT as stated in Paragraphs 1.03 and 1.04 hereof, SELLER will replace the EQUIPMENT, or any portion thereof, still under warranty.
- 1.07 After the first year of BUYER'S possession, should EQUIPMENT fail to operate satisfactorily, SELLER will supply BUYER with all the required parts at the current standard selling price, as soon as possible after notification. Should BUYER be unable to repair the EQUIPMENT, SELLER will repair the inoperable EQUIPMENT, as soon as possible after notification. at then current service charges.
- 1.08 SELLER cannot be responsible for the quality of the connectors or terminals other than those of the SELLER. Accordingly, notwithstanding Paragraphs 1.03, 1.04, 1.06, and/ or 1.07 herein, SELLER reserves the right to charge BUYER the cost of labor and/or parts for repairing EQUIPMENT which is applying connectors or terminals other than SELLER'S.
- 1.09 SELLER cannot be responsible for any modifications performed by the BUYER on the EQUIPMENT or the performance of the EQUIPMENT when used in association with machine components not supplied by the SELLER, Accordingly, notwithstanding Paragraphs 1.03, 1.04, 1.06 and/or 1.07 hereof, SELLER reserves the right to charge BUYER the cost of labor and/or parts for repairing the EQUIPMENT modified by the BUYER or used in association with machine components not supplied by SELLER.

ARTICLE II WARRANTIES AND REMEDIES

- 2.01 In case of breach of warranty by SELLER, BUYER'S sole remedy shall be repair, or at SELLER'S option, replacement of the EQUIPMENT.
- 2.02 Under no circumstances shall BUYER be entitled to any special or consequential damages for any action or non-action taken by SELLER in connection with furnishing or servicing the EQUIPMENT.

MOLEX EQUIPMENT LEASE TERMS AND CONDITIONS FOR REFURBISHED EQUIPMENT

ARTICLE I OWNERSHIP OF EQUIPMENT

- 1.01 ALL EQUIPMENT is owned by LESSOR. No right, title or interest in the EQUIPMENT shall pass to LESSEE other than, conditioned upon LESSEE'S due to performance hereunder, the right to maintain possession and use of the EQUIPMENT.

ARTICLE II SERVICE OF EQUIPMENT

- 2.01 LESSOR will provide LESSEE with instructions as to the set up, operation and maintenance of the equipment and, at LESSEE'S expense, an inventory of recommended perishable tooling.
- 2.02 LESSOR will service the EQUIPMENT (except for minor repairs and/or maintenance) to the extent provided for in the succeeding paragraphs.
- 2.03 If, during the first thirty (30) days after LESSEE received possession of the EQUIPMENT, the EQUIPMENT fails to perform in a satisfactory manner (except by reason of LESSEE'S misuse or negligence), LESSOR will repair the EQUIPMENT, at no cost for parts and labor, as soon as possible after notification.
- 2.04 After the first thirty (30) days of LESSEE'S possession, should the EQUIPMENT fail to operate satisfactorily (except by reason of LESSEE'S misuse or negligence), LESSOR will supply LESSEE with all the required perishable parts at the current standard selling price as soon as possible after notification. Spare parts will continue to be provided on a no-charge basis throughout the term of the lease. Should LESSEE be unable to repair the equipment, LESSOR will repair the inoperable equipment as soon as possible after notification.
- 2.05 By definition, perishable parts are those items that come in contact with the product media during the termination process. The media, normally, would be terminals, wire, connectors, cable, and the like. Examples of perishable parts are: punches, anvils, insertion blades, connector/terminal guides, etc. Where-in examples of spare parts are: motors, solenoids, valves, cylinders, et al.
- 2.06 If LESSOR cannot repair the EQUIPMENT as stated in paragraphs 2.03 and 2.04 hereof, LESSOR will replace the EQUIPMENT or any portion thereof, as soon as possible.
- 2.07 LESSOR cannot be responsible for the quality of connectors or terminals other than those of LESSOR. Accordingly, notwithstanding paragraphs 2.03 and 2.04 and/or 2.06 hereof, LESSOR reserves the right to charge LESSEE the cost of labor and/or parts for repairing EQUIPMENT which is applying connectors or terminals other than LESSOR'S.
- 2.08 LESSOR cannot be responsible for any modifications performed by LESSEE on the EQUIPMENT or the performance of the EQUIPMENT when used in association with machine components not supplied by LESSOR. Accordingly, notwithstanding paragraphs 2.03, 2.04 and/or 2.06 hereof, LESSOR reserves the right to charge LESSEE the cost of labor, and/or parts for the repairing the EQUIPMENT modified by LESSEE or used in association with machine components not supplied by LESSOR.

ARTICLE III WARRANTIES AND REMEDIES

- 3.01 In case of breach of warranty by LESSOR, LESSEE'S sole remedy shall be repair, or, at LESSOR'S option, replacement of the EQUIPMENT.
- 3.02 Under no circumstances shall LESSEE be entitled to any special or consequential damages for any action or non-action taken by LESSOR in connection with furnishing or servicing the EQUIPMENT.

*ARTICLE IV
LESSEE'S OBLIGATIONS*

- 4.01 General - LESSEE shall use the EQUIPMENT in a careful manner, shall comply with all the laws relating to its possession, use or maintenance and shall be responsible for keeping the EQUIPMENT in good repair, condition and working order and will not modify the EQUIPMENT without the prior written consent of LESSOR.
- 4.02 Inspection - LESSEE shall permit LESSOR to inspect the EQUIPMENT and any pertinent records concerning the EQUIPMENT during LESSEE'S business hours.
- 4.03 Insurance - LESSEE shall provide, maintain, and pay for insurance against loss, theft, damage, or destruction of the EQUIPMENT. LESSEE shall also provide, maintain, and pay for public liability insurance, both personal injury and property damage, covering the EQUIPMENT in form and amount satisfactory to LESSOR.
- 4.04 Liens - LESSEE shall keep the EQUIPMENT free and clear of all levies, liens and encumbrances caused by LESSEE and shall not permit the EQUIPMENT to become a fixture on any premises.
- 4.05 Taxes - LESSEE shall pay all charges and taxes, which may now or hereafter be imposed upon the leasing, rental, possession or use of the EQUIPMENT. LESSOR shall have the right to invoice LESSEE any such taxes that it has paid.
- 4.06 Risk of loss - LESSEE assumes and shall bear the entire risk of loss, theft, destruction, or damages to the EQUIPMENT from any and every cause whatsoever from the date of delivery until return of the EQUIPMENT to LESSOR'S plant excepting only that damage directly attributable to LESSOR'S negligence. In the event of damage, LESSEE shall, as soon as possible, replace or repair the EQUIPMENT.
- 4.07 Indemnification - LESSEE shall indemnify, hold harmless, and (at LESSOR'S option but at LESSEE'S expense) defend LESSOR against any and all claims, actions, liabilities, losses, damages, and expenses including attorney's fees, arising out of LESSEE'S breach of its obligations under this Agreement.

*ARTICLE V
TERMINATION*

- 5.01 Either party hereto may terminate this Agreement for nonperformance under any provision hereof within 10 days after the complaining party has made written demand therefore.
- 5.02 Lessor, at its sole discretion, may terminate this Agreement in the event of LESSEE'S bankruptcy, receivership, insolvency, assignment for the benefit of creditors or similar action or condition relating to LESSEE or LESSOR'S property.
- 5.03 Upon termination of this Agreement for any reason except LESSOR'S breach, LESSEE, at its expense, will return the EQUIPMENT in as good condition as received less normal wear, tear and depreciation to one of LESSOR'S plants situated in Illinois that shall be designated by LESSOR.

*ARTICLE VI
MISCELLANEOUS*

- 6.01 All notices hereunder shall be in writing and mailed to the respective parties, by registered or certified mail, at the address set forth in the preamble on the face of this Agreement.
- 6.02 This Agreement cannot be varied except by a writing signed by authorized agents of the parties. The definition of EQUIPMENT may be enlarged with the written consent of the parties. Any additional items which become EQUIPMENT shall be fully governed by this Lease Agreement.
- 6.03 This Agreement shall be governed by the Laws of the State of Illinois.
- 6.04 Any provision herein held unenforceable by a court of competent jurisdiction shall not affect any other provision herein and may be modified by such court so that it becomes reasonable and enforceable and, as modified, will be enforced as any other provision.

MOLEX SALES TERMS & CONDITIONS FOR REFURBISHED EQUIPMENT

ARTICLE I SERVICE OF EQUIPMENT

- 1.01 SELLER will provide BUYER instructions as to the setup, operation and maintenance of the EQUIPMENT and an inventory of suggested perishable tooling, if ordered, at BUYER'S expense.
- 1.02 SELLER will service the EQUIPMENT (except for minor repairs and/or maintenance) to the extent provided for in the succeeding paragraphs.
- 1.03 If, during the first thirty (30) days after BUYER received possession of the EQUIPMENT, the EQUIPMENT fails to perform in a satisfactory manner (except by reason of BUYER'S misuse or negligence), SELLER will repair the EQUIPMENT, at no cost for parts and labor, as soon as possible after notification.
- 1.04 If, during the first six (6) months after BUYER received possession of the EQUIPMENT, the EQUIPMENT fails to perform in a satisfactory manner (except by reason of the BUYER'S misuse or negligence), SELLER will repair the EQUIPMENT, at no cost for spare parts and labor, as soon as possible after notification. The replacement of perishable parts during the remaining five (5) months of the warranty is the responsibility of the BUYER.
- 1.05 By definition, perishable parts are those that come into contact with the product media during the termination process. The media, normally, would be terminals, wire, connectors, cable and the like. Examples of perishable parts are: punches, anvils, insertion blades, connector/terminal guides, etc. Wherein examples of spare parts are: motors, solenoids, valves, cylinders, et. al.
- 1.06 If SELLER cannot repair the EQUIPMENT as stated in Paragraphs 1.03 and 1.04 hereof, SELLER will replace the EQUIPMENT, or any portion thereof, still under warranty.
- 1.07 After the first year of BUYER'S possession, should EQUIPMENT fail to operate satisfactorily, SELLER will supply BUYER with all the required parts at the current standard selling price, as soon as possible after notification. Should BUYER be unable to repair the EQUIPMENT, SELLER will repair the inoperable EQUIPMENT, as soon as possible after notification. at then current service charges.
- 1.08 SELLER cannot be responsible for the quality of the connectors or terminals other than those of the SELLER. Accordingly, notwithstanding Paragraphs 1.03, 1.04, 1.06, and/ or 1.07 herein, SELLER reserves the right to charge BUYER the cost of labor and/or parts for repairing EQUIPMENT which is applying connectors or terminals other than SELLER'S.
- 1.09 SELLER cannot be responsible for any modifications performed by the BUYER on the EQUIPMENT or the performance of the EQUIPMENT when used in association with machine components not supplied by the SELLER, Accordingly, notwithstanding Paragraphs 1.03, 1.04, 1.06 and/or 1.07 hereof, SELLER reserves the right to charge BUYER the cost of labor and/or parts for repairing the EQUIPMENT modified by the BUYER or used in association with machine components not supplied by SELLER.

ARTICLE II WARRANTIES AND REMEDIES

- 2.01 In case of breach of warranty by SELLER, BUYER'S sole remedy shall be repair, or at SELLER'S option, replacement of the EQUIPMENT.
- 2.02 Under no circumstances shall BUYER be entitled to any special or consequential damages for any action or non-action taken by SELLER in connection with furnishing or servicing the EQUIPMENT.