TB-2026

PROCESS FOR INSTALLATION OF PRESS FIT VHDM® BACKPLANE CONNECTORS

Revision "G"

Specification Revision Status

Revision	SCR No.	Description	Initial	Date
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"A"	26393	Revised in its Entirety	C. Murphy	12-18-98
"B"	39902	Added Trademark,New Template	P. Yeh	9-13-02
"C"	41108	Revised in its Entirety	M. Wilensky	2-4-03
"D"	S0073	Added "Reference Documents" section, Revised Appendix A, Reformatted Document	K.LeBlanc	1-26-06
"E"	S0594	Added eHSD 8 press tool P/N to appendix B.	M. Hanrahan	6-25-07
"F"	S0802	Updated copyright information	C Palmer	02-25-08
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1.0 SCOPE

1.1. This document describes the method and tools for the seating of VHDM press fit **BACKPLANE** (B/P) connectors into printed circuit boards. See Appendix A for a list of VHDM backplane installation tooling and for seating press recommendations and process recommendations.

2.0 REFERENCE DOCUMENTS

2.1. The following documents form a part of this specification to the extent specified herein.

2.1.1. TB-2025 – Process for Installation of Right Angle Press Fit VHDM Daughtercard Connectors

2.1.2. TB-2033 – General Product Specification – VHDM Connectors

2.1.3. TB-2040 - VHDM Signal Trace Routing Guidelines – Backpanel and Daughtercard

2.1.4. TB-2043 – VHDM VHDM 6 Row, 8 Row, VHDM-HSD 5, 6, and Right Angle Mal

2.1.5. TB-2047 – VHDM 6 and 8 Row Single Pin Replacement Procedure

2.1.6. TB-2048 – VHDM Backplane Signal Pin and shield Replacement Procedure

2.1.7. TB-2049 – VHDM Backplane Shield Extraction Procedure

2.1.8. TB-2075 – VHDM Backplane Module Handling Specification

2.1.9. TB-2076 – Workmanship Criteria for VHDM Backplane Module

2.1.10. TB-2100 – VHDM Backplane Pin Position Gauging Process

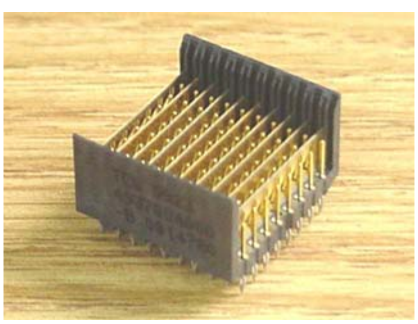
3.0 TOOLS

3.1. Determine the appropriate tool to use to press the desired VHDM B/P connector.

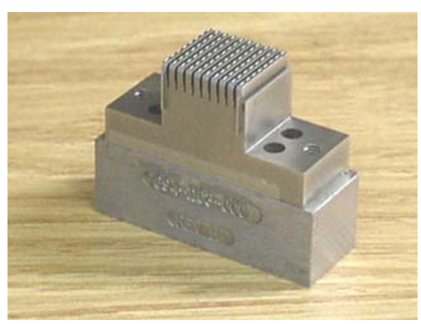
3.1.1. For additional information see **Appendix B: VHDM + VHDM HSD, eHSD B/P Connector-Tool Matrix**

3.2. See pictures below for a typical VHDM B/P connector and pressing tool.

3.2.1. Note: specific connectors and tools may vary slightly in style/design depending on their respective revision and configuration.



Typical VHDM 8x10 B/P connector



Typical VHDM 8x10 B/P pressing tool

3.3. Any questions on the proper tool to use should be directed to you Amphenol TCS representative.

4.0 <u>PROCEDURE</u>

4.1. Incoming Product Inspection

4.1.1. Each PCB should be inspected for blocked holes.

4.1.1.1. This can be accomplished quickly and easily by simply holding the board up to a light and visually looking at the connector plated thru hole pattern for any holes that are not clear. This ensures that the connector will insert and seat properly in a PCB.

4.1.2. Each PCB should be inspected for finished plated thru hole size.

4.1.2.1. Compliance to the finished plated thru hole size is extremely important in maintaining a consistent pressing process. This can be easily accomplished by using the appropriate gauge pins. An appropriate sampling of holes should be inspected across the connector hole pattern.

4.1.2.2. It is also extremely important that the correct drilled hole size be used. In some cases, even if the finished hole size is correct, pressing can be adversely affected by over or underplating to compensate for an incorrectly drilled hole. This can only be determined by cross sectional analysis. This analysis can be performed after all other potential pressing errors are eliminated. See TB-2033 and TB-2040 for specific details around plated through hole requirements.

4.1.3. Each connector should be inspected for damage (both mating side and compliant pin side)

4.1.3.1. This can occur during connector handling as well as during connector manufacturing

4.1.3.1.1. Bent pins

4.1.3.1.2. Improper Pin height in the corresponding location

4.1.3.1.3. Scratches/damage to Au plating

4.1.3.1.4. Bowed shields

4.1.3.1.5. Damaged chevron

4.1.3.1.6. Damaged plastic

4.2. Locate and obtain the correct pressing tool and support fixture (pallet).

4.2.1. All tooling + fixtures should be inspected for wear and/or damage prior to use

4.2.1.1. <u>**Any damaged tooling should be immediately repaired (if applicable) or replaced**</u>.

4.2.1.2. Even a slight bump or scrape mark may alter the flatness on fixtures or tools, adversely affecting the pressing process, which can contribute to creating a defect.

4.2.1.3. The surface finish of the fixtures and tooling should also be smooth (16 RMS surface finish, minimum, for all surfaces coming in direct contact with product) so that the tooling appears as one continuous surface to the connector.

4.2.2. It is important that all tooling and fixtures be flat and parallel (and remain flat and parallel over time) to ensure proper seating of the connector

4.3. Setup Procedures.

4.3.1. Place pallet onto press

4.3.1.1. Pallet must be pinned to press.

4.3.1.2. Pallet must be correctly positioned below seating head

4.3.2. Place PCB onto pallet

4.3.2.1. Board must be pinned to pallet

4.3.3. Place connector onto PCB

4.3.3.1. Ensure connector is in correct orientation per documentation.

4.3.3.2. Check for any bent pins protruding from under connector assembly

4.3.3.3. Make sure all pin tips have started to engage into the holes

4.4. Pressing Procedures. **Refer to Appendix A for details on Amphenol TCS recommended press and recommended pressing procedures.**

4.4.1. Align pressing tool to connector

4.4.1.1. This can be by hand or machine.

4.4.1.2. **<u>It is critical that the pressing tool be accurately aligned to the connector before any significant pressure is applied.</u>**

4.4.1.3. Example pictures of a typical VHDM tool engaging a connector (without a PCB) are shown in **Appendix B: Typical VHDM B/P Connector and Tool Engagement**

4.4.2. Set the press for proper seating pressure.

4.4.2.1. Apply an appropriate pre-load force such that the entire press setup will stabilize just prior to inserting the connector. Pre-load is only intended to ensure perpendicular pressing action at the beginning of each press cycle

4.4.3. Engage the pressing cycle (see recommendations on pressing cycle in Section 0)

4.4.4. Care should be taken that no other components on the PCB are damaged by the tooling or support fixture used during the pressing process

4.5. Inspection Procedures.

4.5.1. After pressing, the completed assembly should be fully inspected.

4.5.2. First, inspect the mating side of the connector.

4.5.2.1. The plastic shroud should be seated evenly against the PCB across the length of the connector.

4.5.2.2. Connectors may be repressed if the seating is not correct (i.e. under-seated).

4.5.2.3. Verify the shroud should is not cracked, damaged or deflected in any way. This is a common result of over-pressing.

4.5.2.4. Verify that all the pins + shields are not damaged (bent, skived, nicks, burrs, etc.)

4.5.2.5. Verify that all keying (if applicable) is correct.

4.5.2.6. More specific seating requirements can be obtained from the respective customer use connector drawings.

4.5.3. Second, inspect the PCB opposite the connector to verify that every pin made it into every hole.

4.5.3.1. If a pin is missing, you should see it as a break in the geometric pattern of pins in holes.

4.5.3.2. The most common cause of a pin not finding a hole is improper loading of the connector, which causes a bent pin prior to pressing.

4.5.3.3. In many cases the PCB is too thick to be able to perform this type of manual inspection. In these cases an electrical test inspection is the best alternative.

4.5.4. All relevant inspection dimensions should be obtained from Amphenol TCS customer use documents associated with the product being pressed. Any questions on the proper inspection criteria or procedures should be directed to the respective Amphenol TCS application engineer.

Appendix A – VHDM Backplane Press Recommendations and Pressing Procedures

General Backplane Connector Pressing Recommendations

1) The press, tooling and support fixtures must be suitably rigid and stiff to maintain a stable platform to support the pressing of any size connectors, at any insertion force, throughout the entire pressing process. The press, tooling and fixtures cannot bow or deflect significantly while under force. This holds true for total connector insertion forces in up to several thousand pounds per connector slot.

2) It is recommended to use Amphenol TCS pressing tools for all VHDM B/P connector assembly processes. The press must be capable of applying a significant pre-load force and dwell for approximately 1 – 2 seconds such that the entire press setup will stabilize just prior to inserting the connector. A proper pre-load force will eliminate any bow that might exist in the PCB and/or the support fixture and firmly seats the connector in the PCB just prior to beginning the insertion. Too high or too low a pre-load force may increase the opportunity for improperly pressed connectors (i.e. bent pins).

3) The press must be capable of precisely controlling the insertion rate. It is important that the insertion of the connector, and more specifically the compliant pin into the plated thru hole, be controlled and repeatable. This allows for consistent presses every time, in spite of PCB thickness and connector height tolerances. This is to ensure the compliant pin conforms correctly and creates the gas tight fit that yields the highly reliable interconnect.

4) It is not recommended to press to a specific height. Experience has shown that the PCB and connector tolerances will not yield consistent connector seating. Further, it is not recommended to over press the connector to compensate for the tolerance build up, as this may cause damage to the connector, PCB, or both. An “over press” is defined as any changing/deformation in the shape of the plastic shroud after the connector insertion process (relative to the state of the connector before pressing)

Automation Services Group, or ASG, of West Palm Beach Florida, manufactures a press that meets all these requirements. The press is model number MEP-12T. Amphenol-TCS recommends using the ASG MEP-12T for all VHDM connector pressing.

VHDM BP Recommended Press Procedures

The following are recommended process steps to follow when pressing VHDM BP connectors.

Fixtures and tools should be designed to be strong and rigid enough to transmit the required pressing forces without bowing or deflecting. It is recommended that the tools and fixtures be made from steel rather than aluminum. Even a slight bump or scrape mark may alter the flatness on aluminum fixtures or tools, adversely affecting the pressing process. It is important that all tooling and fixtures be flat and parallel to ensure consistent seating of the connector and that these surfaces remain flat and parallel over time. The surface finish of the fixtures and tooling should also be smooth (check 63 finish minimum) so that the tooling appears as one continuous surface to the connector.

1) Each PWB should be inspected for blocked holes. This can be accomplished quickly and easily by simply holding the board up to a light and visually looking at the connector plated thru hole pattern for any holes that are not clear. This ensures that the connector will insert and seat properly in a PWB.

2) Each PWB should be inspected for finished plated thru hole size. Compliance to the finished plated thru hole size is extremely important in maintaining a consistent pressing process. This can be easily accomplished by using two gauge pins. A 0.0198” diameter gauge pin should pass freely in the holes. A 0.0242” gauge pin should not pass though the holes. **Note! The 0.198” and 0.0242” pins are for verifying a 0.020” to 0.024” plated through hole. Consult TB-2033 and TB-2040 for specific hole ranges based on VHDM product and PWB finish type.** Approximately 6-12 holes should be inspected across the connector hole pattern. It is also extremely important that the correct drill hole size be used. In most cases, even if the finished hole size is correct, pressing can be adversely affected by over or under plating to compensate for an incorrectly drilled hole. This can only be determined by cross sectional analysis. When trouble shooting a problem, this analysis can be performed after all other potential pressing errors are eliminated. See TB-2033 and TB-2040 for specific details around plated through hole requirements.

3) After pressing, the completed assembly should be inspected. First, inspect the PWB opposite the connector to verify that every pin made it into every hole. If a pin is missing, you should see it as a break in the geometric pattern of pins in holes. The assembly can be repaired by removing the defective module and inserting a new one. The most common cause of a pin not finding a hole is improper loading of the connector, which causes a bent pin prior to pressing. Second, inspect the plastic seating surface to the PWB of the connector. The plastic standoffs should be seated evenly against the PWB across the length of the connector. The standoffs can be as much as 0.25 mm (0.010”) above the board, but should still be even all the way across. Connectors may be repressed if the seating is not correct. Also, the plastic standoff should not be cracked or deflected, as may result from over pressing.

Amphenol-TCS has already designed press tooling for use with the ASG MEP-12T Press and can assist customers with using this tooling and in designing product specific tools and fixtures.

VHDM DC Recommended Press Settings for Tyco (ASG) MEP-12T Presses

The following settings are recommended for applying VHDM connectors using MEP-12T presses. If the press is not an MEP-12T, please contact your Ampehenol-TCS representative for assistance in establishing correct settings for the specific type of press used.

Figure A-1. MEP-12T Manual-Electric Press.

Amphenol-TCS has developed a press profile that can be used on MEP presses to install VHDM connectors onto PWBs. The profile utilizes force feedback features on the MEP-12T press that ensure proper pressing of connectors. The VHDM press profile developed by Amphenol-TCS is named:

- *VHDM_STD_FG_DWELL.prf*

If this profile is not installed on your press, please contact your Amphenol-TCS representative for assistance. Other profiles tailored to specific connector and application needs may also be used. Consult your Amphenol-TCS representative for more information and assistance.

The following steps describe proper creation, setup, and application of VHDM Backplane connectors:
The MEP press main menu has 4 major screens that are required to setup a connector, tool, and PWB for pressing (See Figure A-2):

- 1 - Tool Editor
  This screen is where the tool name, ID and dimensions are entered.

- 2 - Connector Editor
  This screen is where connector name, dimensions, pin count, error limits, and termination method are entered.

- 3 - Profile Editor
  This screen is where the list of action steps for the press to execute is entered (the *VHDM_STD_FG_DWELL.prf* profile)

- 4 - Press Data Editor
  This screen is where a PWB is assigned connectors to be pressed, board thickness, and fixture thickness.

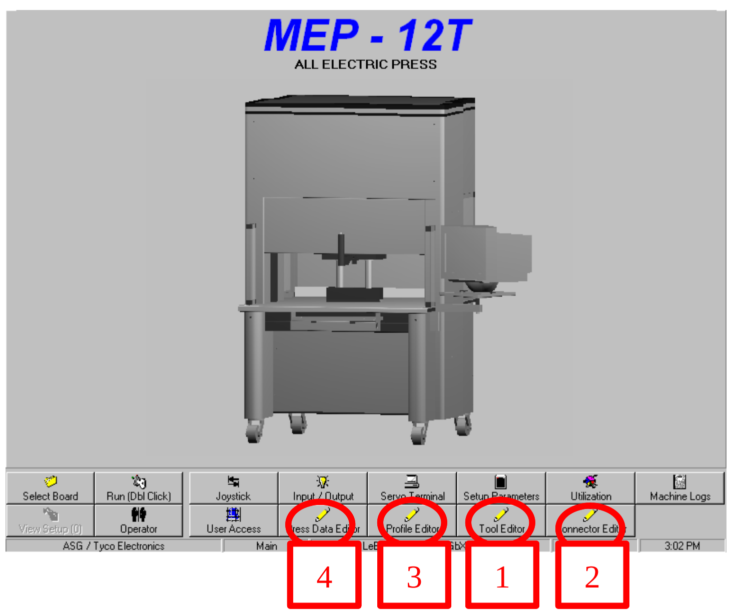


Figure A-2. Main Menu of MEP-12T Press.

1 - Tool Editor:
The Tool Editor screen allows for the creation of a new tool (See Figure A-3). This screen is the setup for top tooling only. Bottom tooling setup is in the press data editor screen and is categorized as “Fixture” (See Press Data Editor Screen).

- Tool Type – Unique identifier (User specified).
- Tool ID – Tool part number (User specified).
- Tool Clearance – Typically 0.100 inches unless additional height is needed for taller components on PWB.
- Tool Height – Overall height of tool from top of tool to tool contact point of connector.
- Tool Width – Width of tool.
- Tool Length – Length of tool.

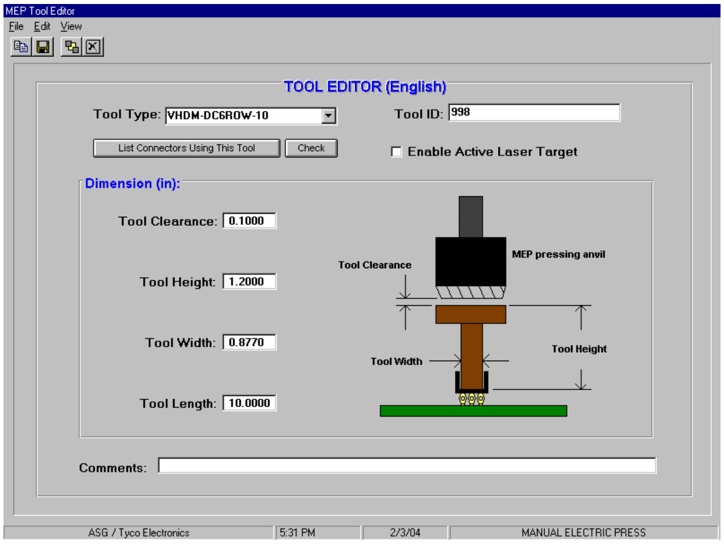


Figure A-3. Tool Editor Screen of MEP-12T Press.

2 – Connector Editor:
The Connector Editor screen allows for the creation of a new connector (See Figure A-4).

- Connector – Part number for connector being created (User specified).
- Tool – "Tool Type" and "Tool ID" from Tool Editor screen.
- Profile – Pressing profile used by the MEP-12T to install the VHDM connector (Amphenol-TCS recommendation is *VHDM_STD_FG_DWELL.prf*)
- Number of Pins – Sum of all pins entering PTHs on the connector (signal, shield, and power).
- Graph Scale – 15.0 for VHDM Backplane
- Distance – 0.1500
- Min Force / Pin – 0.5
- Max Force / Pin – 15.0 for VHDM Backplane
- User Force / Pin – Not used for *VHDM_STD_FG_DWELL.prf* profile.
- Other Force – Not used for *VHDM_STD_FG_DWELL.prf* profile.
- PARS – Not used for *VHDM_STD_FG_DWELL.prf* profile.
- Force Gradient Degrees – 75.0.
- SPC – Values to be dictated by process owner. Not covered in this document.
- Dimension – Unique to connector being installed. See Figure A-5.

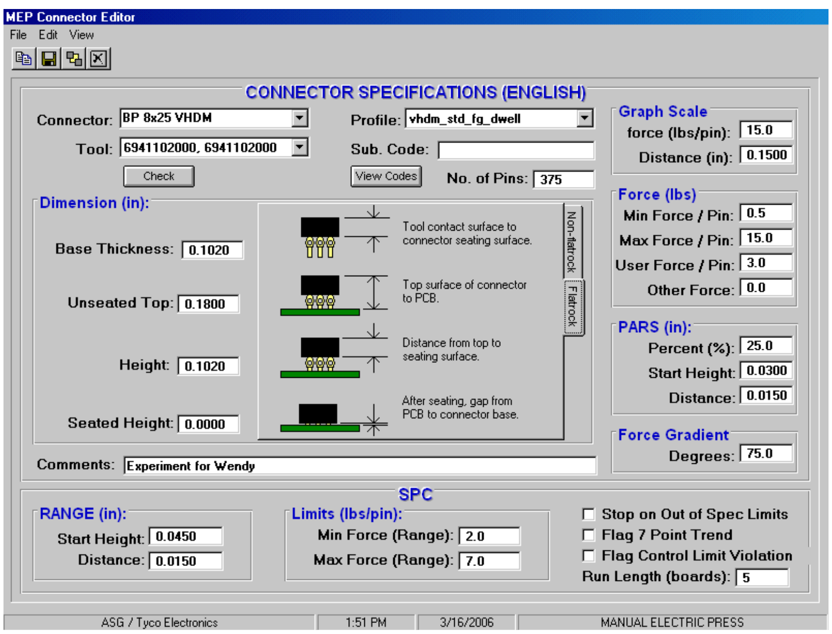


Figure A-4. Connector Editor Screen of MEP-12T press.

The dimensions of connectors that are critical to proper installation onto a PWB are:

- Base Thickness – The connector thickness between the contact point of the installation tool and the seating surface of the connector.
- Unseated Top – The unseated connector height from the contact point of the installation tool to the PWB surface.
- Height – Same as Base Thickness for VHDM Connectors.
- Seated Height – Gap between PWB and connector seating surface, ideally 0.00.

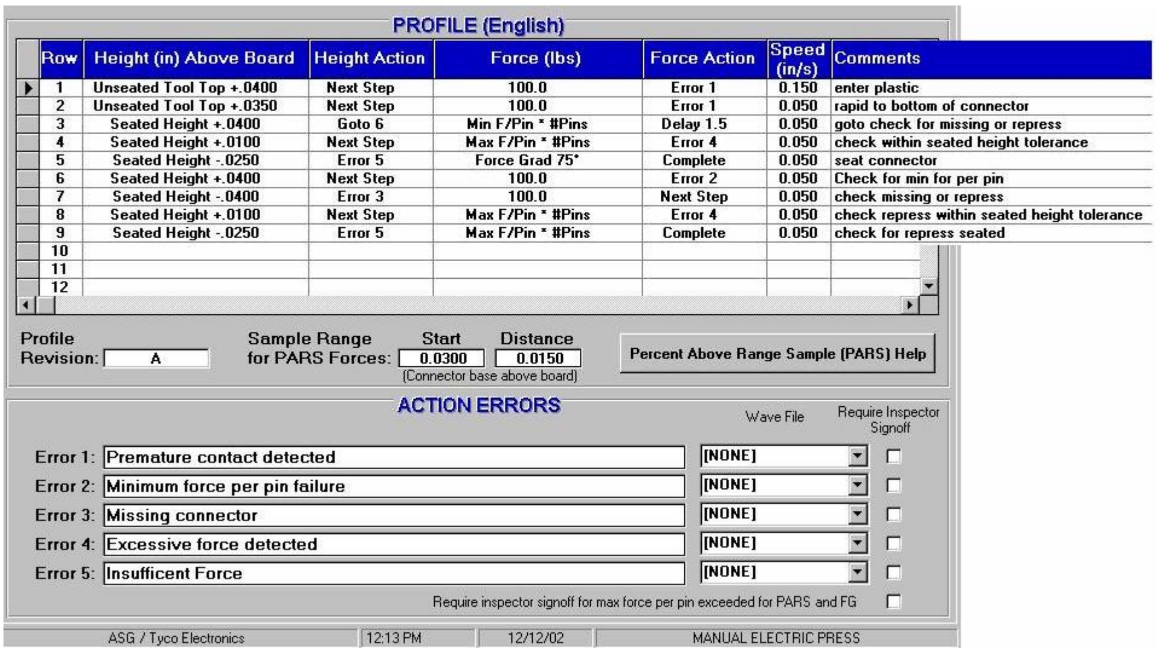
Figure A-5 below describes the dimension values for the Connector Setup screen of the MEP-12T press for VHDM Backplane connectors. If a particular VHDM connector is not listed, please consult your Amphenol-TCS representative for assistance.

VHDM Backplane Dimensional Values				
	Base Thickness (inches)	Unseated Top (Inches)	Height (inches)	Seated Height (inches)
5, 6, 8-Row HSD, 6, 8-Row VHDM, 5, 6, 8-Row L-Series	0.105	0.165	0.105	0.000
6, 8-Row H-Series 8-Row eHSD	0.105	0.155	0.105	0.000

Figure A-5. Connector Setup dimensions for VHDM Backplane connectors for MEP-12T press.

3 – Profile Editor:
The Profile Editor screen provides the detail of the Amphenol-TCS *VHDM_STD_FG_DWELL.prf* profile created for installing VHDM connectors onto PWBs (See Figure A-6). Rows 1 through 5 are the commands for a normal press sequence. Rows 6 through 9 are the commands for a “Re-Press” sequence. At each step in the profile sequence, the press executes on the event that occurs first. If the “Height Above Board” occurs first, then the press executes the “Height Action”. If the “Force” occurs first, the press executes “Force Action”.
The press speed during the press sequence is set to 0.050 inches / second. This speed is intended to ensure that the VHDM compliant pins remain stable during the pressing process. Speeds exceeding this are not recommended, and may result in connector pressing failures. Row 3 has a 1.5 second delay built into the press profile as a settling time for connectors to minimize the potential for pressing failures.

- Profile – Set of steps found in *VHDM_STD_FG_DWELL.prf* profile to perform normal press and re-press operations for VHDM connectors
- Sample Range for PARS Forces – Not used in *VHDM_STD_FG_DWELL.prf* profile.
- Action Errors – Messages that appear on MEP-12T monitor if error occurs.



Row	Height (in) Above Board	Height Action	Force (lbs)	Force Action	Speed (in/s)	Comments
1	Unseated Tool Top +.0400	Next Step	100.0	Error 1	0.150	enter plastic
2	Unseated Tool Top +.0350	Next Step	100.0	Error 1	0.050	rapid to bottom of connector
3	Seated Height +.0400	Goto 6	Min F/Pin * #Pins	Delay 1.5	0.050	goto check for missing or repress
4	Seated Height +.0100	Next Step	Max F/Pin * #Pins	Error 4	0.050	check within seated height tolerance
5	Seated Height -.0250	Error 5	Force Grad 75°	Complete	0.050	seat connector
6	Seated Height +.0400	Next Step	100.0	Error 2	0.050	Check for min for per pin
7	Seated Height -.0400	Error 3	100.0	Next Step	0.050	check missing or repress
8	Seated Height +.0100	Next Step	Max F/Pin * #Pins	Error 4	0.050	check repress within seated height tolerance
9	Seated Height -.0250	Error 5	Max F/Pin * #Pins	Complete	0.050	check for repress seated
10						
11						
12						

Figure A-6. Profile Editor of MEP-12T press displaying the Amphenol TCS *VHDM_STD_FG_DWELL.prf* profile, Revision A.

4 – Press Data Editor:
The Press Data Editor screen allows for the creation of a unique PWB assembly (See Figure A_7).

- Description – Unique identifier of assembly (User specified).
- Revision – To be determined by process owner (User specified).
- Board Thickness – Thickness of raw PWB in inches in the location of the VHDM connector. This value may be determined by a board thickness measurement taken automatically prior to press cycle (not covered in this document).
- Fixture Thickness – Thickness of bottom fixture or pallet to ensure that any VHDM connector over hang or compliant pin protrusion will not interfere with the MEP-12T press surface (See Figures A-8 and A-9). This thickness includes any tooling between “machine zero” and the bottom surface of the PWB. “Machine zero” is the original press table top, or may be reassigned as the top of a permanent bottom fixture or rolling table.
- Fixture ID – To be determined by the process owner (User specified).
- Press Sequence – Connector pressing order to be determined by process owner.
    - X, Y, and Angle – Locations of the connector being placed on PWB. To be determined by process owner.
    - Connector – Select VHDM connector from pull down menu in “Connector” cell.

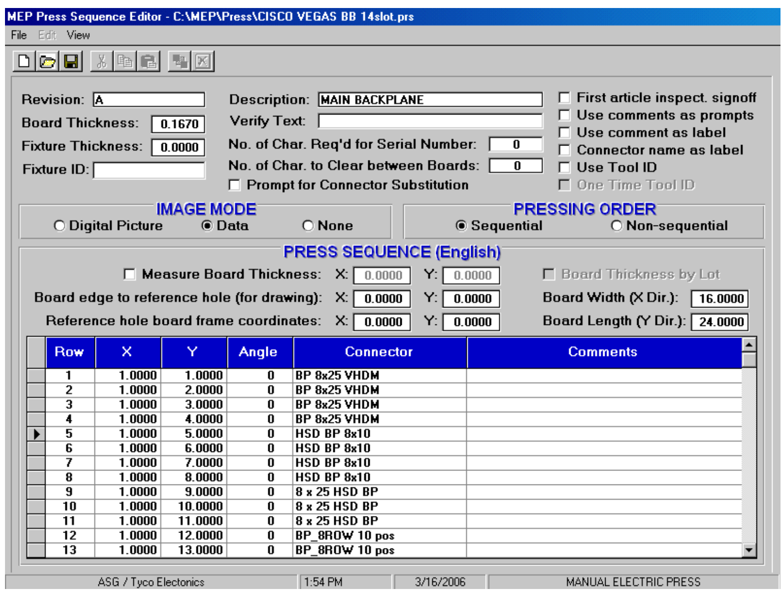


Figure A-7. Press Data Editor of MEP-12T press.

Depending on the PWB thickness and VHDM connector being installed, there is compliant pin tail protrusion and / or a connector overhang that must be accounted for using a fixture or pressing pallet. If there is pin protrusion through the under side of the PWB, then the fixture or assembly pallet will require clearance holes consistent with the VHDM pin pattern. Figure A-8 describes how to design a bottom fixture based on pin protrusion and connector overhang by providing these dimensions for each VHDM connector type. Figure A-9 shows this requirement pictorially.

VHDM Backplane PWB + Fixture Thickness Requirements and Compliant Pin Protrusion Lengths		
	PWB + Fixture Thickness Minimum (inches)	Compliant Pin Protrusion (inches)
5, 6, 8-Row HSD, 6, 8-Row VHDM, 5, 6, 8-Row L-Series	0.110	0.110
6, 8-Row H-Series 8-Row eHSD	0.085	0.085

Figure A-8. PWB + Fixture dimensions for Press Data Editor setup for MEP-12T press.

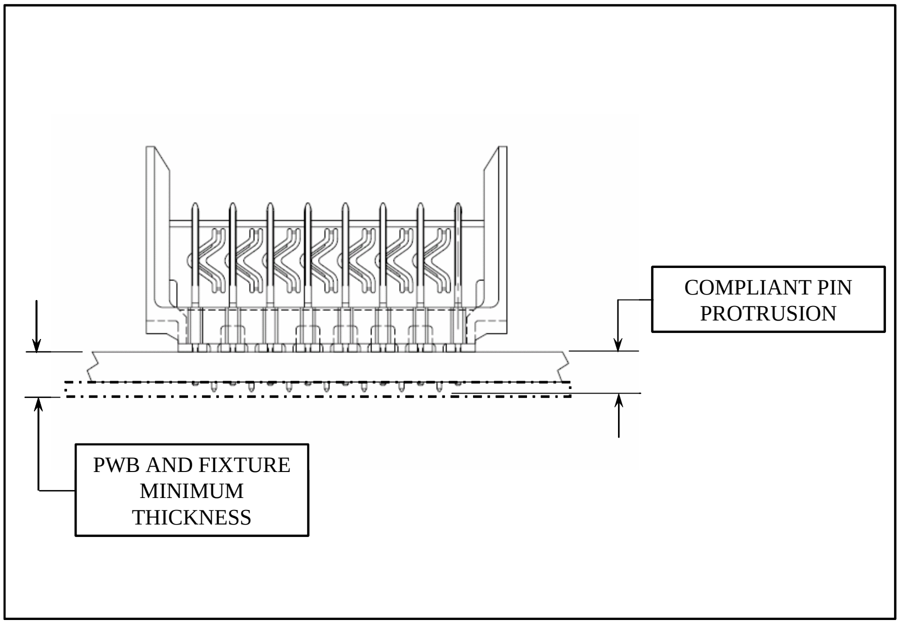


Figure A-9. Detail of PWB + Fixture thickness requirements and compliant pin protrusion of VHDM Backplane connectors.

The MEP-12T press produces a Force vs. Distance curve during a pressing sequence similar to the one shown in Figure A-10. The main areas of the curve are: the initial compression of the VHDM compliant pin and compliance of the PWB hole (1), the full collapse of the VHDM compliant pin (2), the sliding of the compliant pin in the PWB hole (3), and the termination force of the pressing sequence at the 75 Degree Force Gradient line (4). The following descriptions of these areas as for reference and are intended as an aid in understanding the pressing characteristics of the VHDM connector utilizing the *VHDM_STD_FG_DWELL.prf* profile.

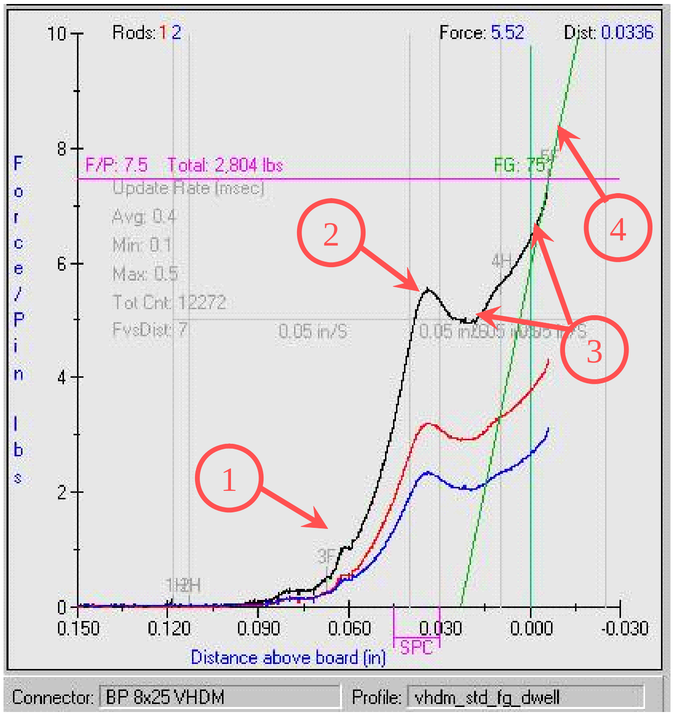


Figure A-10. Typical Force vs. Distance Curve of MEP-12T press for VHDM connectors.

1 – Initial Compression of VHDM compliant Pins:
Part of the initial pressing sequence with the *VHDM_STD_FG_DWELL.prf* profile (Refer to Figure A-6) is to permit settling and alignment of all the compliant pins of the connector prior to a full pressing sequence. In this zone, the VHDM compliant pins and the PWB plated through holes begin to conform to each other and the VHDM complaint pins begin to compress. At this zone the slope of the force gradient line begins to increase as the VHDM compliant pins continue to compress.

2 – Full collapse of the VHDM compliant pin:
At approximately 0.050 to 0.070 inches of insertion into the PWB plated through hole (approximately at the 0.035 inches mark on X axis of the Force Gradient Curve), the VHDM compliant pin is fully collapsed in the PWB plated through hole. This is represented by the peak in the force gradient curve, referred to the knee of the curve. Depending on multiple variables including PWB surface finish, PWB hole diameter, compliant pin feature size, number of power pins vs. signal pins, etc., the knee will be more or less pronounced, but is typically highlighted by an inflection point in the curve as Figure A-11 shows.

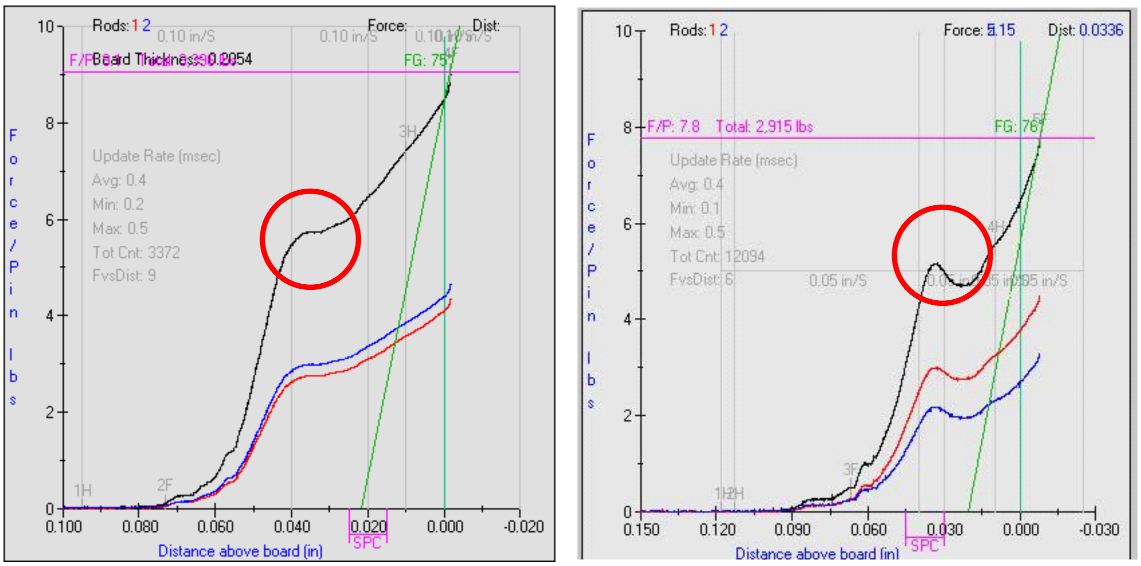


Figure A-11. VHDM pressing Force vs. Distance Graph showing two shapes of the knee area utilizing an MEP-12T press.

3 – Sliding Force of the VHDM compliant pin in the PWB hole:
After the compliant pin of the VHDM connector is fully compressed, the pin travels further into the PWB plated through hole. As this sliding occurs, the force required to continue the installation process of the VHDM connector past this point may decrease between 1 and 10 percent for a short distance before beginning to increase again as the compliant pin travels further into the PWB plated through hole. The specific amount of decrease depends on multiple variables including PWB surface finish, PWB hole diameter, compliant pin feature size, number of power pins vs. signal pins, etc. Figure A-11 shows a typical Force vs. Distance curve where the graph on the left does not show a decrease in force during the pressing process, where the graph on the right shows a slight decrease in the force. Both conditions produce a properly installed VHDM connector.

Figure A-12 shows that between 0.040 inches and 0.010 inches above the PWB surface (spanning zones 2 and 3, refer to Figure 20), the *VHDM_STD_FG_DWELL.prf* profile searches for the “Max Force Per Pin” value entered in the Connector Editor Tool (Refer to Figure 14). If this force is seen by the MEP-12T press in this region, the press will stop and display an error that the Max Force Per Pin has been reached. If the MEP-12T press does not see the “Max Force Per Pin”, the *VHDM_STD_FG_DWELL.prf* profile will move to the next phase of the pressing process; the “75 Degree Force Gradient Line”.

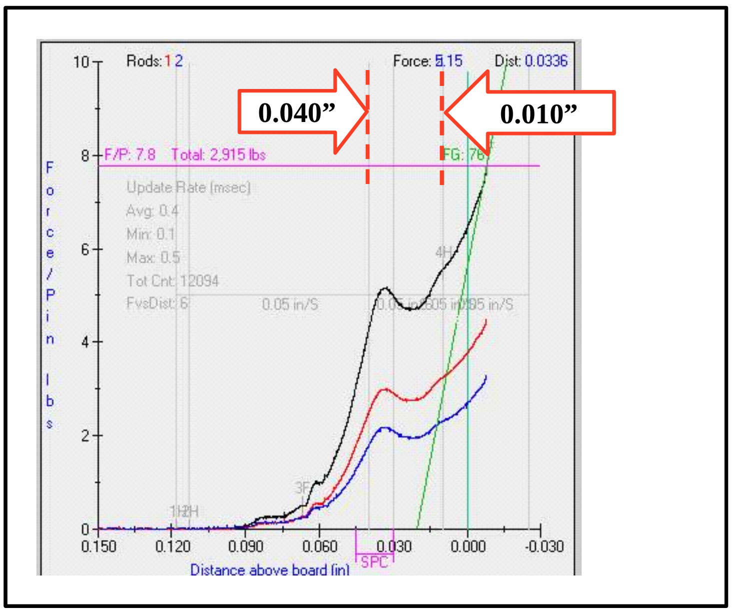


Figure A-12. Force vs. Distance Graph showing the “Max Force Per Pin” zone.

4 – Termination Force at the 75 Degree Force Gradient Line:
Once the VHDM connector standoff features begin to come in contact with the PWB surface, the force vs. distance curve will begin to further increase in slope. During this stage of the pressing sequence, the *VHDM_STD_FG_DWELL.prf* profile is designed to begin to search for the force vs. gradient curve to reach a 75 degree angle at a distance from 0.010 inches above to 0.025 inches below the PWB surface (See Profile Editor and Press Data Editor Sections). Once the connector standoff features come in contact with the PWB surface, the connector is fully seated (flush to 0.25 mm above PWB surface, refer to Figure A-9). Figure A-13 shows the termination phase of the pressing process area on the Force Gradient curve.

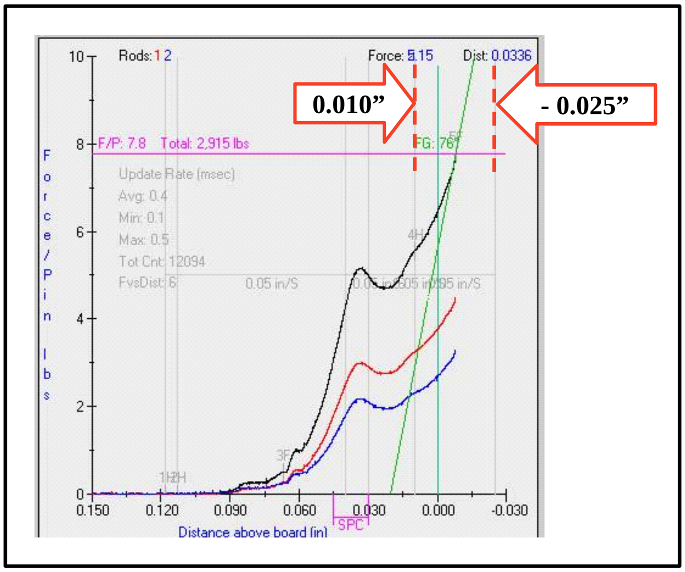


Figure A-13. Force vs. Distance Graph showing the 75 Degree Force Gradient Zone.

The termination force generated by the pressing sequence is a combination of the frictional sliding forces created by the VHDM complaint pins and the PWB plated through hole along with other reactionary forces such as complaint pin alignment during the pressing process, connector standoff interference with the PWB surface, PWB and fixture warping, etc. It is important to understand that the termination force of a connector is not equivalent to the force experienced strictly by the connector complaint pin or PWB plated through holes. As a result of the components and process variables associated with the installation of VHDM onto PWBs, termination forces of VHDM connectors can be expected to be as high or higher than the knee of the curve described within zone 2 (Refer to Figure A-11).

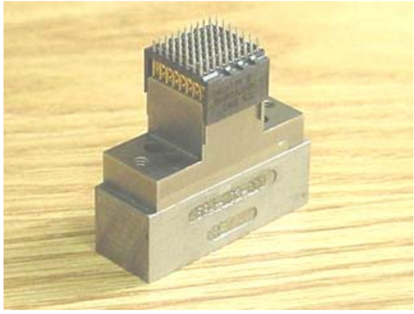
Appendix B: VHDM + VHDM HSD, eHSD B/P Connector-Tool Matrix

The following table is a list of Amphenol-TCS VHDM backplane installation tooling. If there is a specific tool that is not listed in this table, contact your Amphenol-TCS representative for assistance.

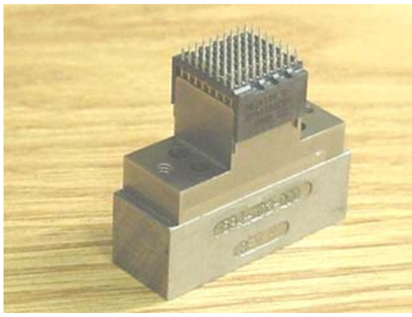
Connector Style	Row x Position	Shield Style	Tool P/N	Tool P/N *
VHDM	6x10	Standard	694-1101-000	
VHDM	6x25	Standard	694-1100-000	
VHDM	6x10	Advanced Mate	694-2634-000	
VHDM	6x25	Advanced Mate	694-2636-000	
VHDM	8x10	Standard	694-1103-000	
VHDM	8x25	Standard	694-1102-000	
VHDM	8x10	Advanced Mate	694-2639-000	694-4805-000
VHDM	8x25	Advanced Mate	694-2641-000	694-4806-000
VHDM HSD	5x10	Standard	694-2009-000	
VHDM HSD	5x25	Standard	694-2008-000	
VHDM HSD	5x10	Advanced Mate	694-2009-000	
VHDM HSD	5x25	Advanced Mate	694-2008-000	
VHDM HSD	6x5	Standard	694-2092-000	
VHDM HSD	6x9	Standard	694-2515-000	
VHDM HSD	6x10	Standard	694-2091-000	
VHDM HSD	6x25	Standard	694-2090-000	
VHDM HSD	6x10	Advanced Mate	694-2091-000	
VHDM HSD	6x25	Advanced Mate	694-2090-000	
VHDM HSD	8x10	Standard	694-2550-000	
VHDM HSD	8x25	Standard	694-2552-000	
VHDM HSD	8x10	Advanced Mate	694-2550-000	694-4803-000
VHDM HSD	8x25	Advanced Mate	694-2552-000	694-4804-000
VHDM eHSD	8X10	Standard	694-1103-000	694-4831-000
VHDM eHSD	8X25	Standard	694-1102-000	

*Alternate tooling to be used on an automated press when advanced mate signal contacts are used

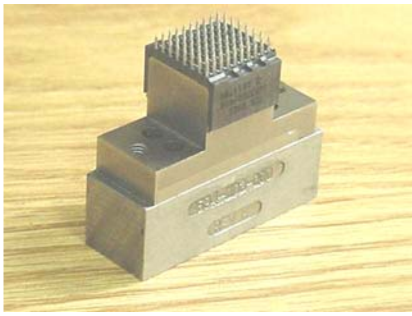
Appendix B: Typical VHDM B/P Connector and Tool Engagement



Typical VHDM 8x10 pressing tool with typical VHDM 8x10 connector **INITIALLY** engaged



Typical VHDM 8x10 pressing tool with typical VHDM 8x10 connector **PARTIALLY** engaged



Typical VHDM 8x10 pressing tool with typical VHDM 8x10 connector **FULLY** engaged