



MANUAL POST ETCH PUNCH

Revision "B" as of 24 March 1999

Multiline Technology, Inc.
400 Broadhollow Road
Farmingdale, L.I., NY 11735
U.S.A
Phone: (516) 249-8300
FAX: (516) 752 - 7948

PEM-3-24-99

MANUAL POST ETCH PUNCH

TABLE OF CONTENTS

INTRODUCTION	1
GENERAL SYSTEM DESCRIPTION	2
OPERATION	4
INSTALLATION	6
TROUBLE SHOOTING	8
PREVENTIVE MAINTENANCE SCHEDULE	10
MANUFACTURER'S WARRANTY	11
LIST OF DRAWINGS	13

INTRODUCTION

The Manual Post Etch Punch is an innerlayer punch for accurate alignment of tooling holes to the etched circuit pattern on the panel. The innerlayer is positioned manually and a 'vision assist' system enables the operator to align two etched targets on the panel to reference targets tooled into the unit, and split any difference caused by plotting errors or material instability. Pinless automated exposure can now be an option. The innerlayer with punched tooling features is then typically pinned to lamination plates for the subsequent lamination cycle, ensuring the layer to layer registration requirements for multilayer fabrication.

The Manual Post Etch (PEM) is an air actuated, single phase electrical, self contained unit that requires very little effort to set up and operate. Two monitors display the image seen by the two TV cameras mounted above the panel. The operator manipulates the innerlayer position by rotating three micrometer thimbles pressing against a spring-loaded material platform to align the etched target on the panel to an electronically generated box and cross hair displayed on the monitor. When proper alignment and "split the difference" is achieved, as determined by the operator, the innerlayer is punched.

Standard Multiline Technology Manual Post Etch Registration Systems are supplied in the four slot centerline configuration and four slot centerline with edge positions. The Operating Instructions are the same for all systems, generally, and this manual is intended for all Manual Post Etch Punch Registration Systems. If this unit differs from the Multiline Technology Standard system significantly, an addendum will be included with this Manual.

GENERAL SYSTEM DESCRIPTION

Refer to the system Footprint Drawing supplied with the unit.

Post Etch Punch Section

The punch is a four post die set designed to repeatably punch the tooling configuration used in the multilayer lamination process. This punch is pneumatically powered to punch laminate up to .031" thick.

Access to the die set work area is provided on all four sides. The right and left sides and the rear are protected by removable access windows. These windows have safety interlocks that do not allow the punch to cycle when not in place.

Between the top and bottom die shoe is a material platform on which the innerlayer is placed. This platform is adjusted by the operator to locate the panel prior to punching. An air operated platen lowers on command to secure the panel to the platform and hold it flat during the positioning and punching operation.

Punch and die blocks move in slide castings to the appropriate panel size. These blocks are secured in the selected location by means of a precision locator pin in the block to a jig ground hole in the casting.

Mounted to the camera/punch block is an air manifold, referred to as an Air Target Clip. The Air Target Clip directs a jet of air on the panel to hold the panel edge flat adjacent to the reference target in the die block. This operator activated feature is particularly important when processing very thin core which are not flat. Lighting for the vision system is provided by means of a fiber optic light tube that is attached to the reference target/die block. Bottom lighting only is provided with the Manual Post Etch Punch (PEM).

There are three micrometer thimbles located at the front of the work area that are used to position the material platform. One thimble controls the position of the X axis, left to right, and the other two thimbles control the left side and right side Y axis, front to back. Below the micrometer thimbles are double hand controls for the material hold down platen and the punch command. Located between these is the Air Target Clip selector switch.

Monitor and Control Stand

Located above the punch section, mounted on the hood is a monitor and control unit stand on which are mounted two monitors. The left monitor displays the reference/film target on the left side and the right displays the reference/film target on the right side. The magnification of the image is approximately 40X. The contrast and brightness controls for the monitors have no effect on the operation of the PEM and can be adjusted for operator comfort.

Beneath the monitors is a control unit that houses the controls for the electronically generated box and cross hair. These controls adjust the position, HORIZ, VERT, and SIZE of the box for both the left and right cameras. The SHADING of the CROSS HAIR and BOX can also be adjusted.

A rocker power switch turns the unit on and off.

Also mounted to the hood is a single light source for illuminating the reference/panel target from the bottom. A knob on the front of this unit controls light intensity. There is also an on/off switch on the front of the light source and it can normally be left on.

OPERATION

* Turn on the unit by pressing the rocker switch on the Control Unit, located below the monitors.

Note: Allow the system to warm up for about one half hour prior to running product if it has been turned off for one half hour or more.

* Position the punch and die blocks to the desired panel size.

The punch and die blocks are moved in the slide castings with the Adjustment Handle located in a holder on the rear skin of the punch. Place the Adjustment Tool against the punch and die blocks and toggle the lever handle. The locating pins will withdraw into the blocks. Carefully move the blocks to the panel size required with the handle. A prism located on the blocks will indicate on engraved scales the proper position for each panel size. Toggle the lever handle of the Adjustment Handle and gently rock the Adjustment Handle up and down to make sure the locator pin fall into place. **DO NOT FORCE THE ADJUSTMENT HANDLE LEVER**; this will damage the locator pins or the Adjustment Handle.

Note: The Adjustment Handle cannot be removed unless the locating pins are properly engaged. This prevents damage to the blocks due to improper alignment of the top to bottom blocks.

Return the Adjustment Handle to its storage position at the rear of the punch.

* Turn on the air supply. The top die shoe will rise.

Connect camera cables and fiber optic light guides to the appropriate blocks. Do not over tighten set screws as this could cause damage to the fiber optic cables.

* On the Control Unit, position the box and cross hair to the center of the reference targets.

Use the horizontal, vertical and size knobs on the Control Unit to position the box on both monitors. Adjust SHADING of the box and cross hair for a minimum contrast between the box and the reference target for comfortable viewing, dictated by operator's preference.

Note: Once the box and cross hair have been set, care must be taken to ensure that they are not moved during a run.

* Load a panel on the material platform bringing the panel targets into the field of view of the cameras.

* Press the two hand buttons below the die set area to lower the platen and secure the panel to the material platform.

* Turn on the Air Target Clip selector switch. Air jets will force the innerlayer edge down against the target block and ensure a crisp target image on the monitors.

* Using the three micrometer thimbles move the material platform to position the panel targets to align with the preset box and cross hair on the monitors. It may be easier to rotate the two Y thimbles first until the targets appear aligned to the boxes horizontally, and then move the X thimble to split any error between the film targets and the boxes on the monitors.

* Press the dual PUNCH buttons on the front skin when satisfied with the alignment.

The die set will activate and produce the required features in the panel. The operator should hold the punch buttons in until the punch cycle is complete. Releasing the dual palm buttons early will send the upper die shoe to its top position without punching the material.

The system will **not** punch if the platen has not been activated to secure the panel to the material platform.

* Remove the panel from the material platform by first turning off the air target clips and releasing the platen by pressing the dual palm buttons for the platen.

* Insert the next panel in the job lot, locate the panel targets in the field of view of the cameras, turn on the platen, air target clips, and position the panel as above.

INSTALLATION

The Manual Post Etch Punch (PEM) was designed for customer installation. Following these few simple notes will make the installation go smoothly.

1. Remove packing material from the exterior and unbolt the unit from the shipping skids. When using a fork lift, be sure to lift on the tubular frame, front and rear. Do not lift from the sides. Take care to avoid the scrap drawer mounted to the lower frame.
2. The drive plate is secured to the lower die shoe in two or four corners with plastic tubular restraints. Remove screws, washers and tubes and save in the event that the system has to be moved again.
3. Mount the control unit and monitors on the top of the punch hood and connect cables as indicated by the wire markers.
4. Adjust the leveling feet to level the material platform to ensure that the load is evenly distributed at all four positions. A precision level with an accuracy of .0005" per foot, per division is recommended and leveling should be done in both axis.
5. All mechanical parts related to the tooling have been coated with a protective lubricant prior to shipment to ensure that the corrosive environments sometimes encountered during shipment do not damage these parts. All sliding components should be wiped down with a mild solvent and lubricated with WD-40 or equivalent.
6. Follow any other instructions for unpacking that may be indicated on the equipment.
7. Provide 110 volt electrical service to the duplex located on the rear of the hood, on the right side.
8. Connect 100 psi, +/- 10 psi, 10 cfm, compressed air line to the 1/4" N.p.t. quick disconnect fitting at the rear frame. Set the drip rate for the lubricator to 1/8 to 1/4 turn from the fully closed position.
9. Once shop air has been supplied, turn on the system and remove the two,

one inch aluminum blocks from the black safety stop columns inside the die set area. These blocks rest between the safety stops and the upper die shoe and are only used during shipping.

10. When moving punch and die blocks to the different panel sizes, the system must be turned off and the upper die shoe resting on the safety stop columns. Always use the Adjustment Handle when moving punch and die blocks and always return it to its storage place at the rear of the punch.

TROUBLE SHOOTING

Some simple areas to check if the PEM develops problems.

1. Punch and Die Blocks do not move smoothly in castings.
 - A. Remove blocks and clean the castings with WD-40 or alcohol.
 - B. Remove blocks and inspect castings for burrs. Carefully and lightly stone the castings to remove any burrs.
2. Locating Pin in block is tight in the casting.
 - A. Remove block and clean the casting locator holes with alcohol and Q-tips. Clean the locator pin.
3. Material Platform not moving smoothly.
 - A. Check around the platform for any interference.
 - B. Check that the transfer balls under the material platform roll smoothly. Inspect for signs of rust or other corrosion. Replace if necessary.
 - C. Inspect the operation of the micrometer thimbles. Should be smooth.
 - D. Check the level of the platform. Adjust the transfer balls to level platform.
4. System does not punch on command.
 - A. Check incoming air pressure. Should be 100 psi, +/- 10 psi.
 - B. Check pneumatic line for kinks, leaks and open connections.
 - C. See if the punch solenoid valve is receiving the proper voltage.
 - D. Check the relay in the punch circuit.
 - E. The platen must be in the down position.
5. The Box and Cross Hair do not appear on the monitor.
 - A. Check to see if the camera cables are reversed at the rear of the control unit.
 - B. Inspect camera cables for damage. Wiggle the cables at the camera connector to see if the Box and Cross Hair can be restored. This will indicate a defective cable.
 - C. Inspect the camera plug for broken pins.
 - F. If possible, try another camera to isolate the problem.
 - G. Possible Video Board problem.

6. No lighting at the reference target.

- A. Check that main power is turned on and that the light source is plugged in.
- B. Check the light bulb in the light source.
- C. Check the relay for the lighting system. Plug the light source into an outside supply.

MANUFACTURER'S WARRANTY

The following MULTILINE TECHNOLOGY warranties apply:

1. All equipment which contains artificial intelligence, electronic vision systems, x-ray or microprocessor based automation is under warranty for a period of ninety days from the date of shipment for all parts, with the exception of punches and dies, strippers and caps, and light bulbs, providing that the buyer complies with shipping instructions.

All labor, travel and expenses will be covered for a period on ninety days from date of shipment. Beyond the ninety days labor warranty period, labor will be billed per MULTILINE TECHNOLOGY's published rate schedule; travel and expenses will be billed at actual rates incurred.

2. All computer equipment is installed as an integral part of the machine operation and is warranted by the manufacturer. Software is pre-installed. MULTILINE TECHNOLOGY retains ownership of the software.

This software is licensed to the purchaser strictly for operation of the equipment for which it is installed. Any attempt to alter, modify, or adapt the software, including, but not limited to translating, decompiling, disassembling, creating derivative works, and or utilizing this computer equipment for any other application unless specifically authorized by MULTILINE TECHNOLOGY will cancel this warranty and may cause damage to the equipment. This license and purchased right to use the software automatically terminate if the purchaser fails to comply with any provision of the license agreement.

MULTILINE TECHNOLOGY retains all rights not expressly granted. Nothing in this document or in the licensing agreement constitutes a waiver of MULTILINE TECHNOLOGY's rights under the U.S. Copyright laws or any other federal or state law.

Because software is inherently complex and may not be completely free of errors, any incident of non-performance in accordance with specification must be reported to MULTILINE TECHNOLOGY immediately and operation of the equipment should cease, pending assessment by MULTILINE TECHNOLOGY.

3. All other equipment is under warranty for parts for a period of 12 months and labor for ninety days from date of shipment.

MULTILINE TECHNOLOGY's warranties apply if the equipment or other goods sold under this contract are in the possession of the original buyer (or lessee). MULTILINE TECHNOLOGY will replace or repair, at their option, free of charge, any part or parts, manufactured by MULTILINE TECHNOLOGY in which, upon examination, they find defective workmanship or material, provided that, on their request, the part or parts of the machine are returned to MULTILINE TECHNOLOGY's plant, and provided further, that there is satisfactory documentation that the machine has been installed and maintained in accordance with instructions in their Service Manual. All standard purchased parts carry original equipment manufacturer's warranties.

Neither MULTILINE TECHNOLOGY nor our local representative shall be liable or responsible for any expense or liability for repairs, additions or modifications made upon the product with their written consent.

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES (WHETHER WRITTEN, ORAL OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE). IN NO EVENT, SHALL MULTILINE TECHNOLOGY OR OUR LOCAL REPRESENTATIVE BE LIABLE FOR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOST PROFITS OR OTHER DAMAGES FROM LOSS OF PRODUCTION) CAUSED BY DEFECTIVE MATERIAL, OR BY UNSATISFACTORY PERFORMANCE OF THE PRODUCT, OR BY ANY OTHER BREACH OF CONTRACT BY MULTILINE TECHNOLOGY OR OUR LOCAL REPRESENTATIVE.

OWNER'S RESPONSIBILITY

The owner of this equipment is responsible for providing a proper environment and maintaining the equipment in accordance with manufacturer's specifications. Failure to comply with installation parameters (see footprint drawings), improper maintenance or misuse could void warranty.

MAINTENANCE SERVICE

Service beyond the warranty period will be furnished by MULTILINE TECHNOLOGY, or an authorized representative, chargeable at published rates.

LIST OF DRAWINGS
MANUAL POST ETCH PUNCH
(PEM)

APG***	Panel Layout
ZFG0001	Footprint
SE064	Electrical Schematic
SE083	Remote Cable 12VDC
SX053	Pneumatic Schematic
AL***	Machine Composite

These drawings will be specific to the system.