



**OPTILINE PE
SERIES 3000 CONSOLE**

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INTRODUCTION

The Optiline PE is a post etch multilayer registration punch. Aligning to two imaged targets, the Optiline PE automatically punches features in the innerlayer that are registered to the circuit pattern. The innerlayers with punched tooling features are then placed on pins in lamination plates, ensuring layer to layer registration in the lamination process. Several of the manufacturing tolerances associated with artwork distortion, pinning, and laminate stability are significantly reduced. Pinless automated printing is now an option. The result is superior quality and improved yields for high density multilayer printed circuit boards.

The Optiline PE is hydraulically actuated, three 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 brings the innerlayer targets into the field of view of the cameras and starts the process. The system automatically aligns the panel targets to reference targets tooled into the system, splits any error caused by dimensional change, and punches the panel.

The SERIES 3000 operating system for the Optiline PE is the latest development in technology aimed at improving an already versatile user friendly, menu driven system. The SERIES 3000 Console gives additional flexibility to the manufacturer as well as greater accuracy in the process because of improved and automated features such as Automatic Zero Acquisition and Automatic Sensitivity setting. These two features eliminate possible mistakes an operator could make in processing innerlayers. New on-line SPC graphics plotting allows the manager as well as the operator to see at a glance how the manufacturing process is progressing.

The Optiline PE, Post Etch Punch, is supplied in the four slot centerline configuration and the four slot centerline and four hole configuration as standard units. Custom configurations are also available. The Operating Instructions are the same for all systems, generally, and this manual is intended for all Optiline PE SERIES 3000 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 hydraulically powered to punch laminate up to .125" 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. The front is protected by a light curtain that prohibits the punch from cycling if the curtain is broken.

Between the top and bottom die shoe is a material platform on which the innerlayer is placed. This platform is directed by the vision system to move in X, Y, and Theta to locate the panel prior to punching. An air operated platen lowers automatically 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. The system CCD cameras are mounted to the left and right punch blocks, and the reference targets are mounted to the left and right die blocks.

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 automatically activated feature is particularly important when processing very thin cores that 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. There is another fiber optic light tube attached to the punch block that can be used for top lighting the product. The light sources are mounted on top of the machine hood. There are two light sources, one for bottom lighting and one for top lighting. There is an on/off switch on the front of the light source and it can normally be left on. A knob on the front of this unit controls light intensity.

Electrical Enclosure

Mounted on the right side of the frame is an enclosure that contains the motor starter for the hydraulic power, power supplies, relays, terminal strips, pneumatic relays for the platen control, etc. Also in this enclosure is a non-resetable cycle counter. Main power for the system enters through this enclosure.

Below the Die Set Area

Access to the area below the die set is protected on all four sides by safety interlocks.

The front sheet metal skin contains a Start switch to start the positioning sequence once the innerlayer has been loaded. Also mounted on this panel is an Emergency Stop switch. There is another EMO located on the panel on the left side of the machine. Below, located between the machine legs, is a scrap drawer that can be removed for cleaning when required.

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The left side sheet metal skin contains a pneumatic control panel for adjusting the air pressure for the panel crowding function. It can be preset for typical thick or thin panels.

The rear sheet metal panel holds the Adjustment Handle for positioning the punch and die blocks in the slide castings. It is also electrically interlocked so that the machine will not operate when the Handle is not in its storage place. Mounted on this panel is the Filter/Regulator/Lubricator for incoming shop air.

Behind the skins and below the die set is housed the hydraulic power supply and fluid reservoir, a scrap chute to direct the scrap generated by the punching operation to the drawer below, pneumatic controls for the various cylinders, the main power transformer, terminal strips, relays, etc. The motor controller is located on the bottom plate, and suspended from the lower die shoe is the positioning X-Y-Theta deck. The control unit for the light curtain is mounted to the back of the Electrical Enclosure box.

Console

The left monitor displays the reference/panel target on the left side and the right displays the reference/panel 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 OPE and can be adjusted for operator comfort.

Located to the right of the monitors is a resettable cycle counter.

On the front panel are main switches for CONTROL, HYDRAULIC pump and a series of system status lamps; JAM, EMO, and INTERLOCK. The MAIN POWER lamp indicated that electrical power has been supplied to the unit.

On the right of the Console is the START switch, for starting the positioning sequence, and a RESET button to interrupt the cycle.

The OPERATION switch selects the intended operation of the system. OPE position activates the vision and automatic positioning system. ACC position disables the vision and positioning system and the unit will operate as a pre-image punch when the START button is pressed. The SEMI, AUTO and MANUAL selection switch under ACC MODE are non-functional in the Series 3000 system.

A SHORT STROKE selection switch is provided with those systems that have the short stroke feature.

The CAMERA LIGHTING switches select the target illumination from either the TOP or the BOTTOM from the Console.

The PANEL switch provides the selection of high pressure air, THICK, or low pressure air, THIN, to the crowder cylinders. In the OFF position, air is provided to the crowder cylinders as though panels are thick, .032" or greater.

TARGET, STOPS, CROWDER, and PLATEN switches activate these normally automatic functions, but only in the MANUAL MODE.

MATERIAL HANDLING MODES are only used with machines with these optional features.

OPERATION

Turn on the main breaker on the side of the electrical enclosure. The MAIN POWER lamp will come on.

Press the I/O switch for CONTROL. The control system will initialize automatically.

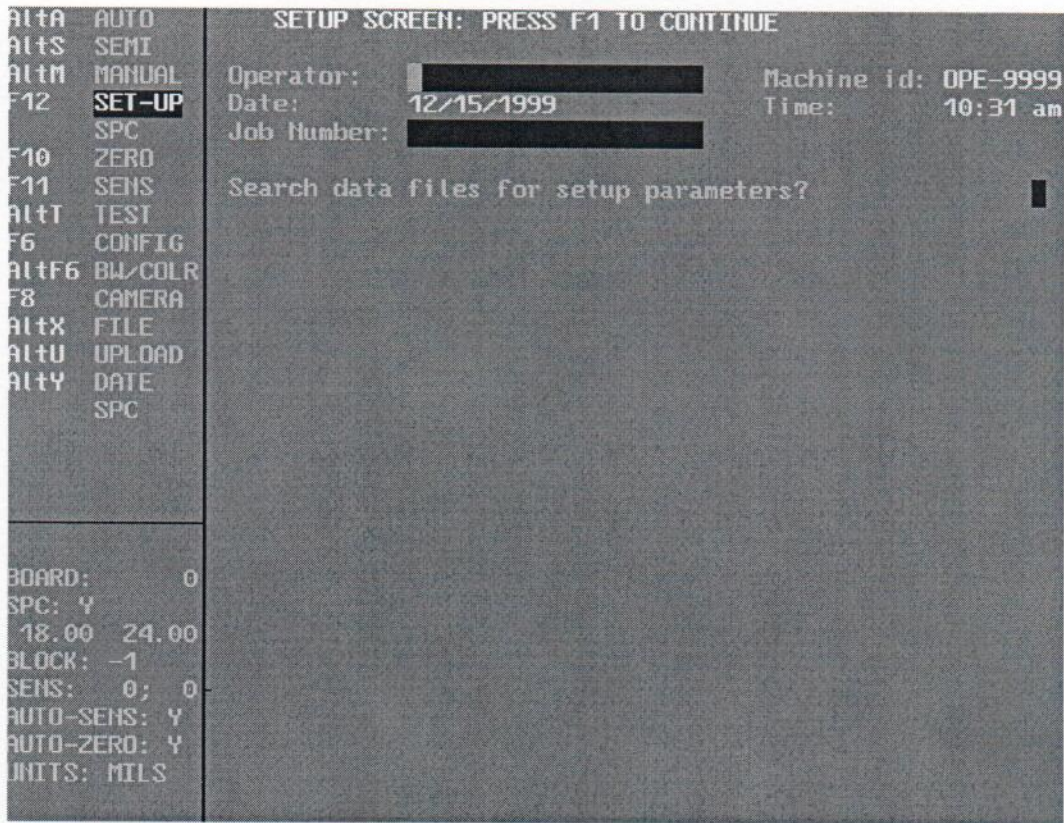
Note: Allow the system to warm up for about one half hour prior to running product if it has been turned off for one half hour or more.

A blue screen will be displayed on the system monitor. The installed software version is indicated at the top of the screen. The Program Index appears in the upper left edge of this screen and below this is a status Box. The Menu/Graphics is in the center of the screen and below this is the Data Window. A message will be displayed on the system monitor to "Press enter to begin".

<Enter>

At this point the X-Y-Theta deck will move to all of its limits and then to a home position. This serves as a self-check of the limit switch function, and finds the true center of the X-Y-Theta deck. A BUSY message will appear in the Status Box during this sequence. After finding the home position the system will automatically switch to the first setup screen and SET-UP will be highlighted in the Program Index.

FIRST SETUP SCREEN



The Operator and Job Number fields must be filled in; these are critical fields. Search data files for setup parameters?, has to be answered, Y/N (yes/no).

If Y (yes) is selected for search data files for setup parameters, the following appears on the monitor:

Part Number: Layer:
 Customer:
 Press F2 to pick from list of all available data files

The operator has the opportunity to define a set of parameters on which to search. These parameters consist of up to three fields; Part Number (primary search field), Layer, and Customer. The operator can fill in as many fields as necessary to define the search and the remainder can remain blank. Pressing F1 will display all of the previously run jobs matching the search description.

Pressing F2 will display a list of all of the previously run jobs.

The monitor will display:

SETUP FILE SCREEN: PRESS ENTER TO C ONTINUE

Below this will be a list of files that match the search request by; Part Number, Layer, Customer, # Runs, Last Run (date). Use the arrow up and arrow down keys to highlight and pick the file desired. Press Enter and the fields for Part Number, Layer, and Customer will be filled in on the Setup screen. If there is no file matching the requested search, the message, "No setup files currently available", will appear.

If N (no), and F1 is pressed on the keyboard, the system will change to the next setup screen and a new file will be created and named with all of the new setup information.