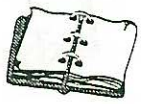
DEK

248

Part No. 248230

DEK Align 4



DEK ALIGN 4 MANUAL

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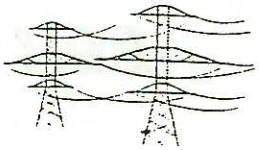
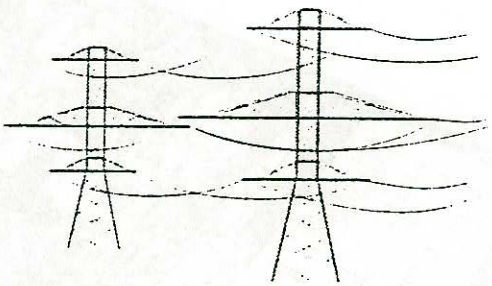


CHAPTER 1

POWER SUPPLY



POWER SUPPLY

INTRODUCTION

The 248 DA4 system power supply distribution is provided by the following:

- Service Tray
- UPS (Uninterruptible Power Supply)

At machine switch on , ac power is supplied via the mains filter to the following:

- dc power supply unit to provide ± 24V to the control board.
- ac power to the UPS (Uninterruptible Power Supply) via the service tray auxiliary power socket.

SERVICE TRAY

The Service Tray (Y1) comprises the following main components:

- Power Supply Unit
- Control Board

NOTE
The service tray also contains the services for the machine air supply.

The following units are also detailed in this chapter:

- Mains Input Filter
- Remote Start
- Common Earth Busbar

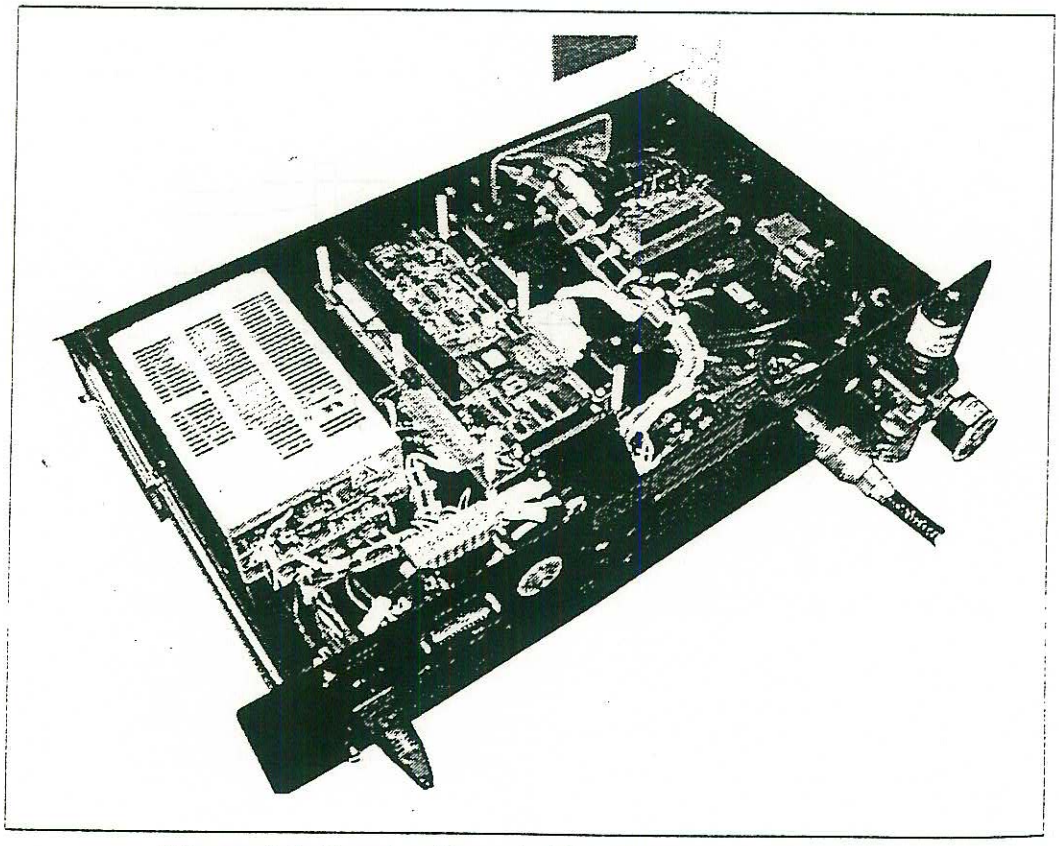


Figure 1-1 Service Tray (with safety cover removed)

ELECTRICAL SCHEMATIC

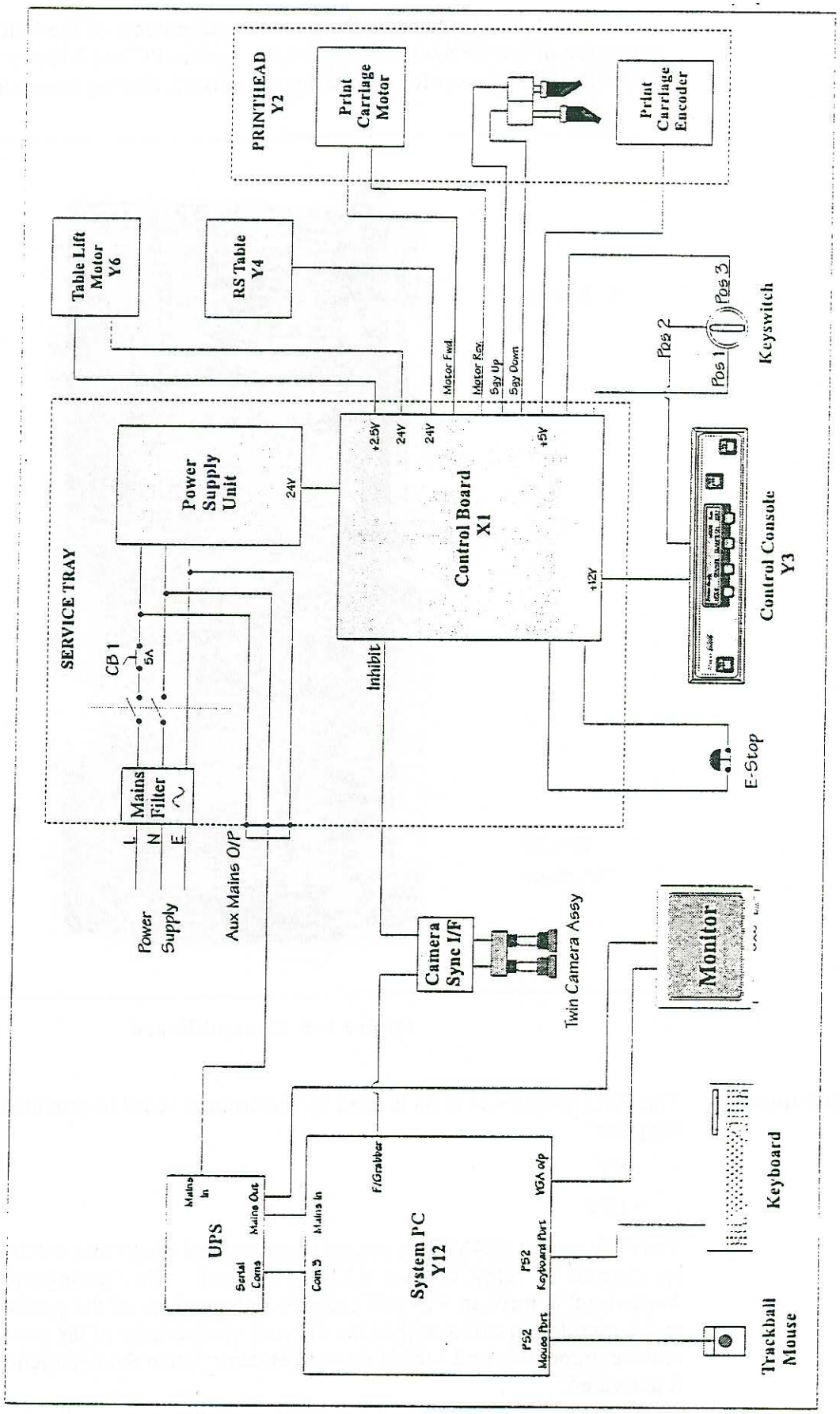


Figure 1-3 Machine Electrical Schematic

CONTROL BOARD

The Control Board manages the power requirements of the Machine (with the exception of the UPS which supplies the system PC and Monitor), and contains the EPROM processor for monitoring all sensors, driving motors and solenoids.

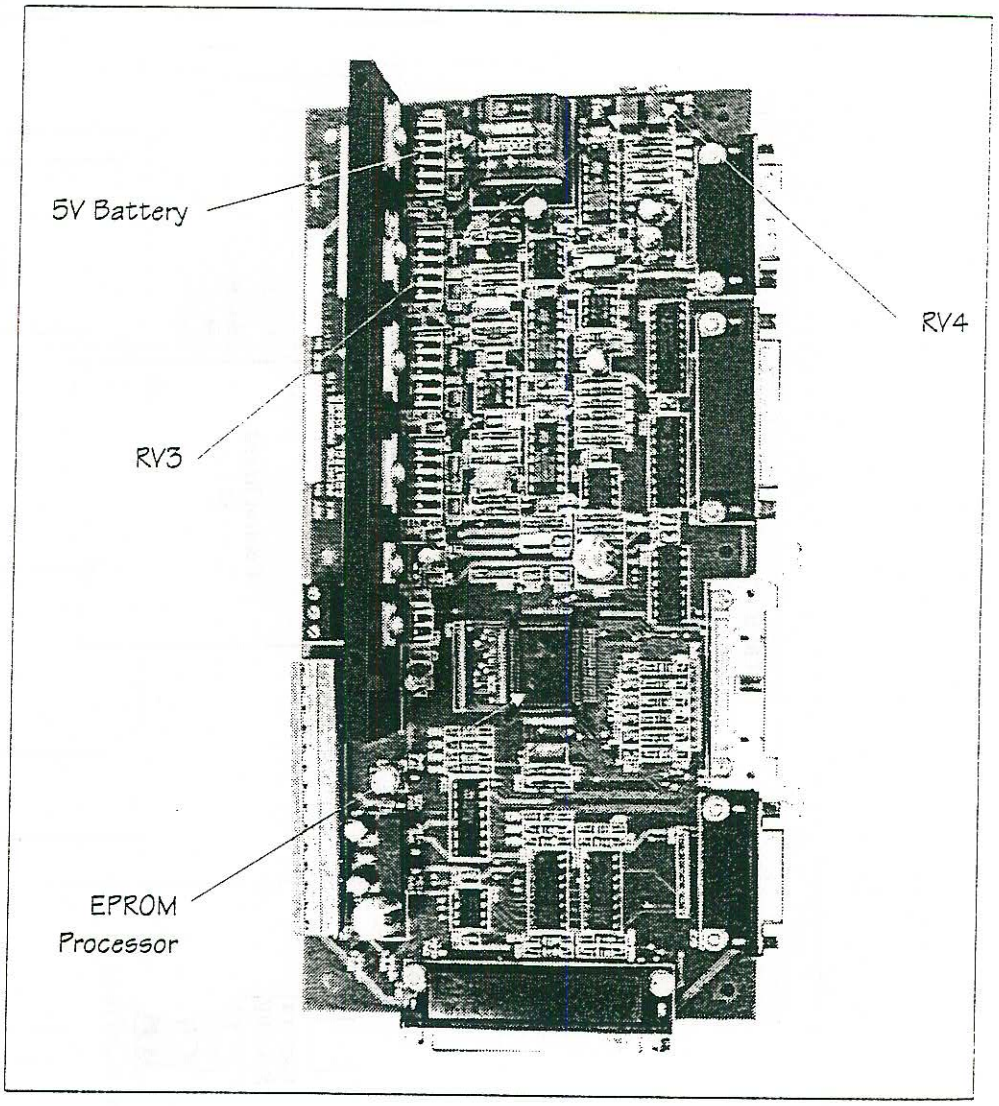


Figure 1-5 Control Board

Voltage Supply

The PSU output +24V(A) is used by the control board to provide the following supplies:

- +5V
- +12V

The PSU output +24V(B) is routed to the control board and is subject to control by closure of relay contact RL1-1 (E Stop). This arrangement ensures a 'hardwired' control to +24V(B) supply independent of the processor software and is therefore used to control the moving mechanisms of the printer that would require immediate and certain power cessation when the emergency stop switch is activated.

The +5V output is a mains fail signal for the EPROM battery back-up.

The following tables detail the circuit breaker and the test point configurations and RV adjustments found on the control board:

Circuit Breaker

Name	Description
CB1	Mini circuit breaker

Test Points

Name	Description
TP 1	+24V(B) output
TP 2	+24V(A) Supply
TP 3	0V
TP 4	+12V reference supply / battery trickle charge
TP 5	+15V
TP 6	-15V
TP 7	+5Vto dc/dc converter / external panel supply

RV Adjustments

Name	Description
RV 3	Table Height display adjustment (254 -255)
RV 4	Print Carriage display adjustment (224-225)

Mains Input Filter

Protection for the analog and digital equipments housed within the service tray against mains-borne interference, is provided by the mains filter unit.

The mains filter (Type FN329) has an operating voltage of up to 250Vac max. and a current rating of 6A.

WARNING

LETHAL VOLTAGE. DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT. ENSURE ALL ELECTRONICS COVERS AND MAIN MACHINE COVERS ARE FITTED BEFORE OPERATING THIS EQUIPMENT.

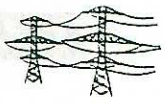
E STOP CIRCUIT. THE E STOP CIRCUIT FITTED TO THE MACHINE ONLY ISOLATES THE 24 VOLT SUPPLY TO THE MAIN CONTACTORS. LETHAL VOLTAGES ARE STILL PRESENT ON THE MACHINE AFTER THE E STOP HAS BEEN ACTIVATED.

Common Earth Busbar

The printer, machine stand and all major elements are electrically earthed to a Common Earth Busbar, located in the service tray.

Remote Start

Provided by foot switch control (optional). The lead connection of the remote box plugs into the service tray panel.



Purpose

The UPS is powered from the auxiliary power connector at the rear of the service tray and provides power to:

- The System PC
- Vision Monitor

The unit is also connected to the system PC via an RS232 serial port (COM 3) to provide control signals to and from each unit.

AC power is normally clean and stable, however during transmission it may be subject to load variations or accidents causing power problems or complete power failure. The UPS provides protection from these disturbances by smoothing out voltage variations.

Normally the UPS filters and connects ac mains input to the system PC. When the UPS senses a power failure or mains voltage overload, ac power is supplied to the equipment through a lead acid battery, (the battery LED on the front of the UPS illuminates along with an audible warning).

Battery

The UPS battery is a valve regulated lead acid type with the following specification:

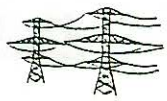
Description	Specification
Voltage	12 volts
Rating	7 ampere hours
Back up Time	5 - 6 minutes at full load
Time from Low Battery Alarm to Shutdown	Approx. 2 mins (dependent upon load)
Recharge Time	8 - 10 hours to 90% capacity
Battery Life	3 - 5 years typical

The battery test button on the rear of the unit performs two functions:

- Tests the condition of the battery.
- Silences unit alarms.

If the charge is sufficient the UPS Battery LED (Amber) illuminates, (the system runs on battery power for 15 seconds then returns to mains power). If the battery fails the test, the Check LED illuminates and the UPS immediately returns to mains power. The Check LED (red) remains illuminated whilst on mains power.

NOTE
In this condition the battery requires either recharging or replacing, (refer to UPS user manual).



Configuring the UPS

Configuring the UPS enables the unit to inform the system PC when the following occurs:

- Power supply failure
- Battery power low

In either event the system PC initiates an orderly shutdown of the Windows NT operating system thus preventing potential software corruption.

To install and configure the UPS software carry out the following procedure:

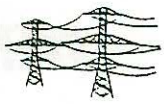
1. Place the UPS installation diskette into the system PC floppy drive.
2. In Windows NT, click on the start button and select **RUN**.
3. In the Run box type: **A:\install.exe**. Click **OK**.
4. Select **Drive C**. Click **OK**.
5. Select '**\Sitenet 1**' directory. Click **OK**.
6. Click **OK** on the 'Successfully Started' message window.
7. In the Configure UPS box carry out the following settings:

- UPS Port Device - **COM 3**
- Polling Interval - Default (2 seconds)
- Shutdown Time - **10 seconds**
- Low Battery Shutdown - **10 seconds**
- Disruption Time - **5 seconds**
- **De-select** the 'Enable Network Broadcasts' box
- UPS shut-off should be **ENABLED**
- **High Signal** should be selected

8. Select **OK** in the Configure UPS window.

Configuration Description:

UPS Port Device	The UPS Port Device selects the serial port on the system PC.
Polling Interval	The Polling Interval is the amount of time between UPS status checks.
Shutdown Time	The Shutdown Time is the amount of time from the detection of a power failure until application shutdown begins.
Low Battery Shutdown Time	The low Battery Shutdown Time is the amount of time from the detection of a low battery condition until application shutdown begins.
Disruption Time	The Disruption Time is the amount of time from the detection of a utility power failure until the UPS Status window is maximized. The disruption timer prevents short power outages interrupting the operator with warning messages.



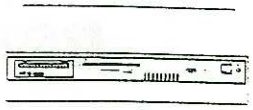
ASSOCIATED DRAWINGS

Electrical

Description	Drawing Number
Service Tray	144712
Control Board Circuit	131424

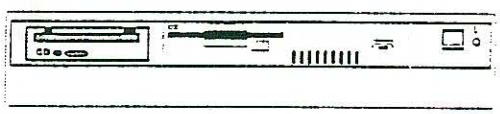
Mechanical

Description	Drawing Number
Service Crate G.A.	248062



CHAPTER 2

SYSTEM PC



SYSTEM PC

INTRODUCTION The System PC is sited on the bottom shelf of the 248 machine providing the following software functions:

- DA4 Vision System

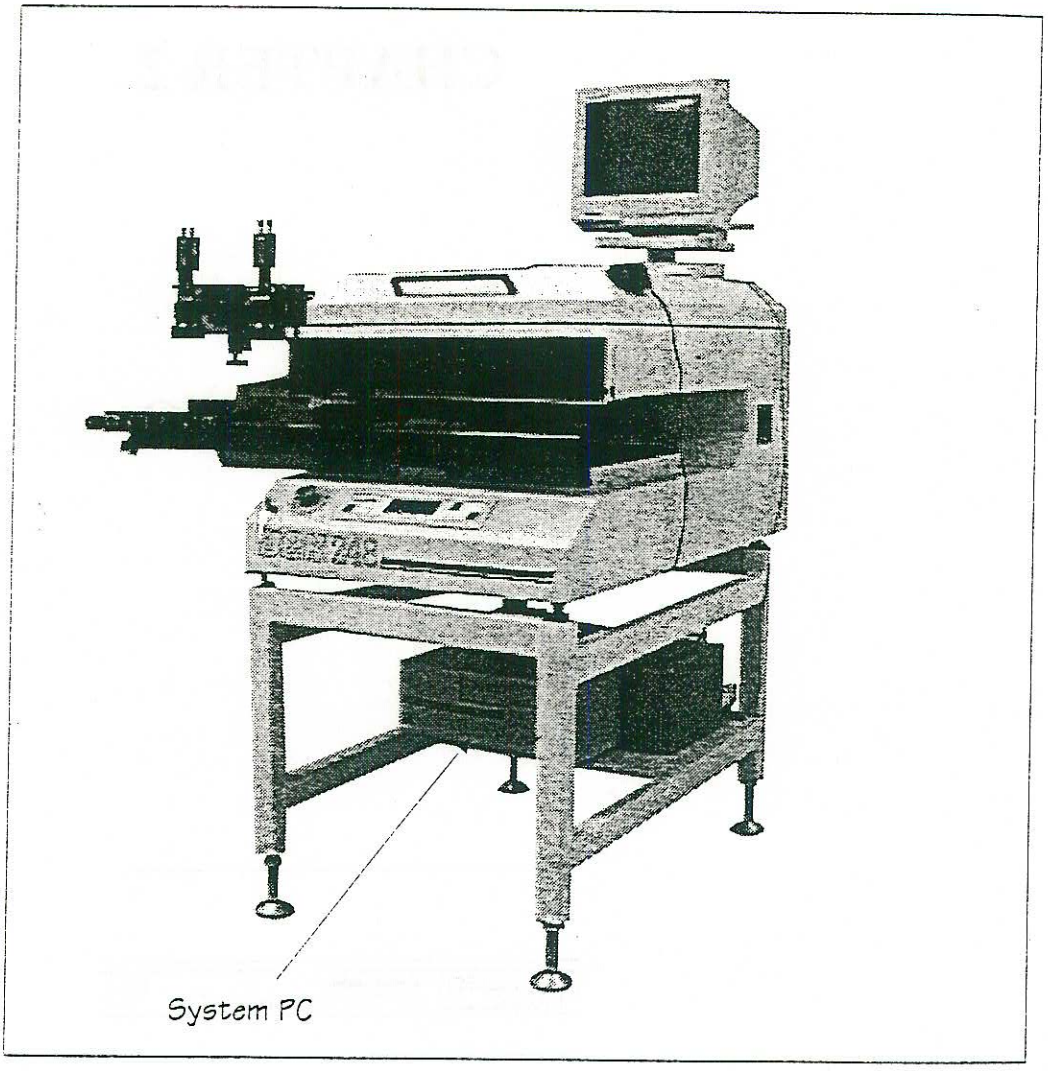
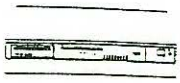


Figure 2-8 System PC Overview



MECHANICAL DETAIL

The 248 Machine is fitted with a standard 'off the shelf' desk top PC, compatible with the minimum specification as detailed in the table below:

Description	Item	Requirement
Desk Top Case	Mechanical Dimensions (maximum)	Width 550mm Depth 600mm Height 200mm
	Hard Disk Drive (HDD)	1 Gb minimum Windows NT Compliant
	Floppy Disk Drive (FDD)	Standard 3.5"
	CD ROM	Standard 5.25" ATAPI 16 speed minimum
	Framegrabber Card	Imagenation PCX200F DEK Part No. 144683
	Video Card	AGP Video Card with 4Mb minimum, using the i740 chipset
	Serial I/O Card	COM 3 no IRQ 10 @ address 03E8 COM 4 IRQ5 @ address 02E8
Power Supply	Universal Mains Input	96V- 250V @ 50Hz / 60Hz
Motherboard	CPU	Celeron - 333 Mhz minimum L1 & L2 Cache
	RAM	64 Mbyte minimum
	L2 Cache RAM	128 KByte minimum
	Advanced Graphics Port (AGP)	Video card
	PCI connection slots (3 minimum)	Framegrabber
	EIDE Controller	HDD CD ROM
	Floppy Controller	FDD
	PS2	Keyboard and mouse
	Windows NT and Year 2000 compliant	Motherboard and BIOS
Operating System		Windows NT 4.0 OEM Workstation (Service Pack 3)

System Shutdown

The system PC uses the Windows NT operating system which, when running produces a large number of temporary files. It is therefore very important that the following Windows NT shutdown procedure is observed:

1. From the main setup page select the **EXIT TO WINDOWS** icon, this terminates the application and returns system to the Windows NT desktop.
2. Select the **START** icon.
3. From the menu select **SHUT DOWN.**
4. From the shut down window box select **Shutdown the Computer** and click the **YES** button. (Windows NT activates shutdown procedure.)
5. The monitor indicates when it is safe to turn off the system PC.
6. When the shutdown completes and the message box 'It is now safe to turn off your computer' is displayed, push and hold in the system PC **power switch** until the front panel power indicator is extinguished.
7. Switch **OFF** the UPS at the front of the unit.
8. Shutdown the 248 Machine at the rear of the machine by switching the mains switch to **OFF.**

Shutdown Sequence Label

The Shutdown Sequence Label is affixed at the rear of the machine above the service tray and is used as an aid to the operator for correct machine shutdown

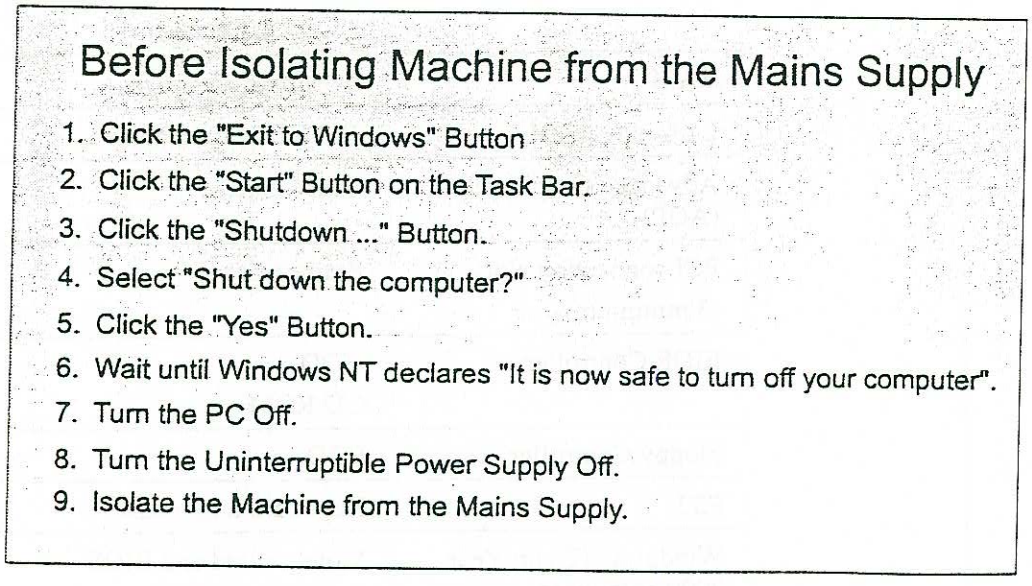


Figure 2-10 Machine Shutdown Sequence Label

REPLACEMENT PROCEDURES

WARNING

LETHAL VOLTAGE. DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT.

Carry out the following procedure when replacing the system PC:

1. Power down the 248 Machine as described in the System Shutdown section of this chapter.
2. All LED's are extinguished on the front panels of both the UPS and system PC.
3. Access the rear connectors of the System PC.
4. Remove all the connectors from the rear of the system PC.

   NOTE
   All D-type connectors are secured into position by screwed fixings.
5. Remove the unit from the printer.
6. Replacement of system PC is carried out in reverse order to above.

   NOTE:
   Check the input voltage selector switch (if present) on the rear of the system PC before installing into the 248 machine. Ensure that the selected voltage is correct for the ac voltage being supplied to the printer.

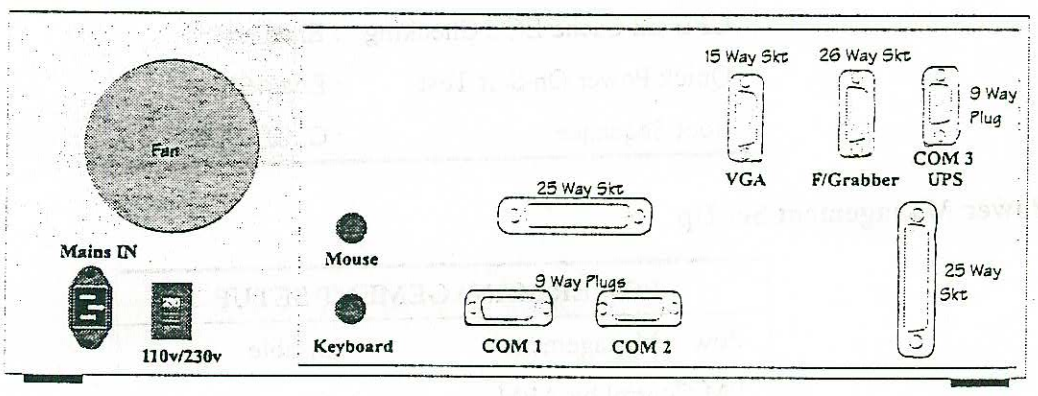


Figure 2-11 Typical PC Connector Configuration

PC BIOS SETTINGS

The BIOS (Basic Input/Output System) is the section of the operating system that interfaces with the actual hardware of the microprocessor. Certain system components such as disk drives, peripheral support, boot sequences etc, are stored in the CMOS battery backed RAM and can be configured using the set up routine, which resides in the BIOS ROM. This set up is available each time the PC is powered up.

After installation of a replacement system PC or if the BIOS battery supply fails the configuration should be checked and configured as necessary with reference to the settings table detailed below.

NOTE
The settings can be accessed during the initial phase of the system PC boot-up sequence by pressing ***DELETE****.*

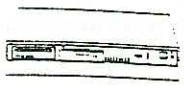
Great care must be taken to ensure that any changes/corrections made to the BIOS settings are carried out correctly, any incorrect settings may either cause the system to become inoperable or to give unexpected results.

BIOS Feature Set Up

BIOS FEATURES SETUP	
CPU Level 1 Cache	: Enabled
CPU Level 2 Cache	: Enabled
CPU L2 Cache ECC Checking	: Enabled
Quick Power On Self Test	: Enabled
Boot Sequence	: C, CDROM,A

Power Management Set Up

POWER MANAGEMENT SETUP	
Power Management	: Disable
PM Control by APM	: Yes
Doze Mode	: Disable
Standby Mode	: Disable
Suspend Mode	: Disable
IDE HDD Power Down	: Disable
Power Button	: Instant Off
Power On by Ring	: Enabled



FAULT FINDING

Symptom	Possible Solution
No display on monitor	Check main machine isolator on the rear of the printer is set to **ON**
	Check UPS status indicators
	Check PC front panel for illuminated power indicator
	Check for power availability at monitor
	Check VGA connection between monitor and system PC
Display is corrupted or unusable	Check VGA connection between monitor and system PC
	On boot up use the Windows NT VGA mode and check display properties
Machine fails to start-up Windows NT™	Check system PC BIOS configuration
Machine fails to start-up the application software	Check Windows NT configuration
An unexpected Windows NT™ error is reported	Shutdown and restart the machine
	Re-install Windows NT Service pack 3
The picture in picture display from the camera is blank	Is the camera LED lighting **ON**?
	Has the camera aperture setting been adjusted?
	Check the system wiring is connected between the system PC, the camera sync interface box and the camera units themselves

ERROR MESSAGES

There are no application error messages.

ASSOCIATED DRAWINGS

Electrical

Description	Drawing Number
260 DA4 Vision Circuit	144713
DA4 Interface Box Circuit	144665

Mechanical

Description	Drawing Number
Main Machine G.A.	248236

CHAPTER 3

MAN MACHINE INTERFACE

MMI

MAN MACHINE INTERFACE

INTRODUCTION The Man Machine Interface (MMI) provides a complete machine control interface for the operator. The MMI consists of the following units:

- Control Panel
- SVGA Monitor
- Keyboard
- Trackball Mouse
- Footswitch (optional)

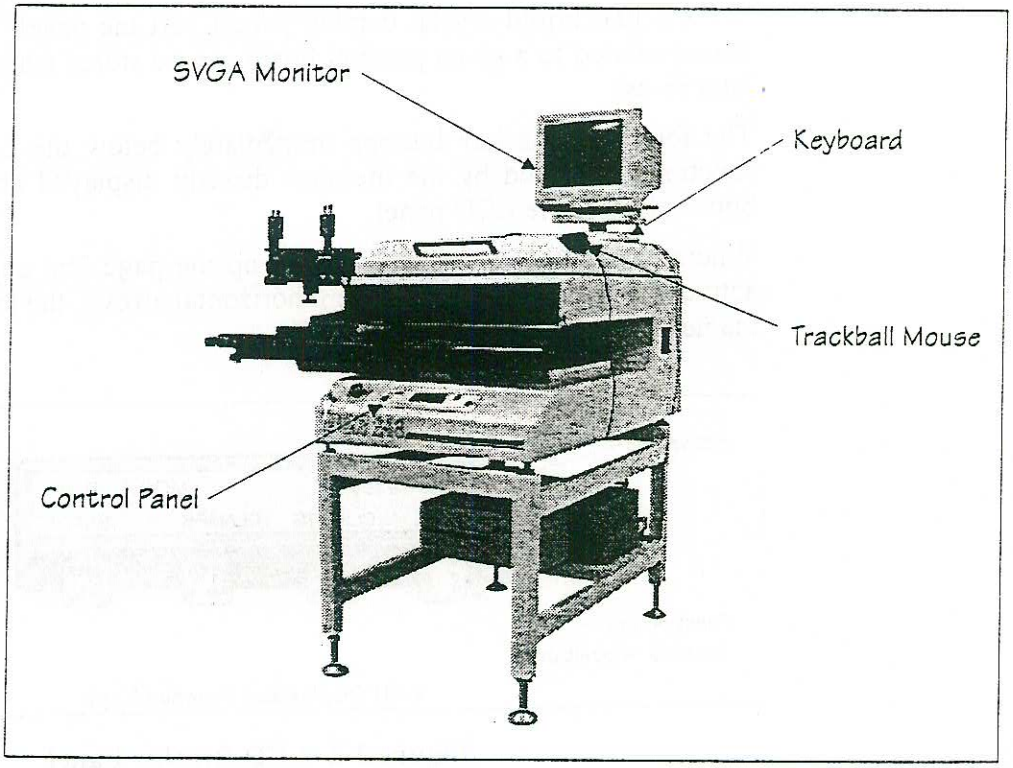


Figure 3-1 MMI Overview

CONTROL PANEL

The Control Panel firmware provides the operator with a control interface for machine operations and a printing process information status. The control panel has the following available functions:

- LCD Display Panel
- UP function
- DOWN function
- CLEAR function
- ENTER function
- GO function
- System function

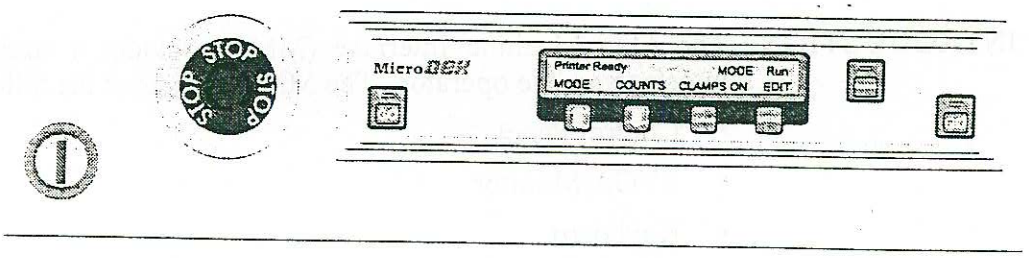


Figure 3-3 Control Panel

LCD Display Panel

System information in the form of a message is presented at the two-line display, (24 x 2 line liquid crystal display panel). At the panel, the set of parameter values related to a given product board can be stored (saved) and retrieved for later re-use.

The four function key buttons immediately below the LCD panel have soft functions indicated by the message directly displayed above the key on the bottom line of the LCD panel.

Where parameter values are scrolled up the page, the upper (top) line is the active line (denoted by an adjacent horizontal arrow), the lower (bottom) line is the next parameter.

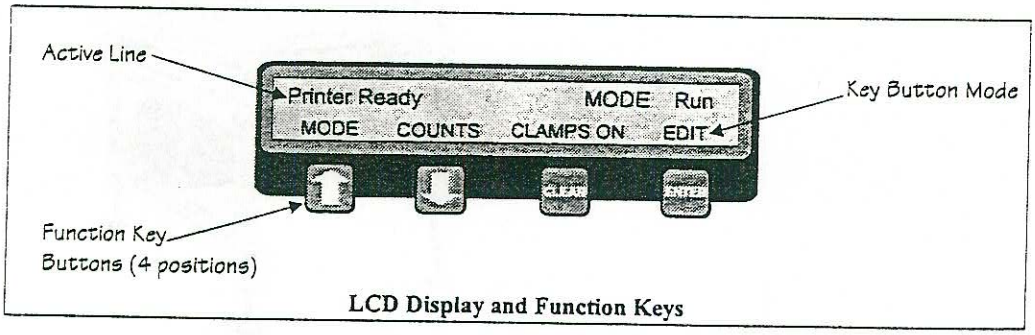


Figure 3-2 LCD Display Panel

UP Function Button

Pressing the UP Function Button scrolls line 1 to line 2, or increases any selected numerical parameter values.

DOWN Function Button

Pressing the DOWN Function Button scrolls line 2 to line 1, or decreases any selected numerical parameter values.

CLEAR Function Button

Dependent upon the current page selected, ie in the Edit Parameters page, pressing the CLEAR Function Button affirms the current settings and provides the return to printer ready page.

ENTER Function Button

Dependent upon the current page selected, when pressing the ENTER Function Button the page selected is exited and the next related page is accessed.

GO Function Buttons

Pressing the GO Function Buttons informs the Machine to perform the next complete operation. An LED lamp indicates that the button is active.

NOTE
The Machine operates a two button control safety feature which requires both GO function buttons to be pressed simultaneously (within 0.5 seconds of each other) in order to become active. The positioning of these (GO) buttons are needed to maintain maximum safety for the operator during certain operations.

This function may be overridden to a one GO button function (left button) by turning the Machine key switch to position 2 (Key Switch paragraph refers).

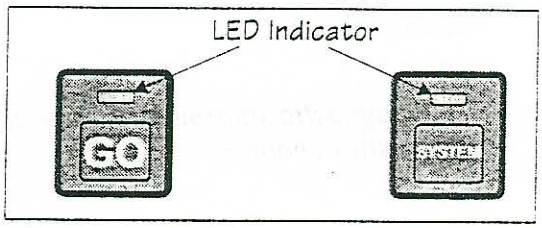


Figure 3-4 GO and System Function Buttons

System Function Button

Pressing the System Function Button activates the Machine initialization following switch on and is used by the control system to recover from error conditions. The system button is active when the LED indicator lamp is illuminated.

Emergency Stop Button

The Emergency Stop Button situated next to the Machine control panel (see 248 Control Panel figure), is a latching push button which when pressed activates the following conditions:

- Cuts power to the print carriage motor.
- Cuts power to the table lift actuator.
- Vents air from the table drive cylinder.

To recover the system:

- Turn the button anti-clockwise to unlatch and release it.
- Press **SYSTEM** button on the control panel.
- Squeegee is lifted.
- Print carriage drives to the rear.
- Table lowers.
- Air is restored to the table cylinder, followed by table out.

Keyswitch

The Keyswitch situated next to the machine control panel (see 248 Control Panel figure), is used to select machine operation between the following:

Position 1

Normal operating position for two GO key button operation. When selected both GO key button LED indicators illuminate. Both GO function buttons need to be pressed simultaneously (within 0.5 seconds of each other) in order to become active.

Position 2

Normal operating position for one GO key button operation. When selected the left hand GO key button LED indicator illuminates.

Position 3

This position selects the Diagnostic mode. To leave Diagnostic mode the key should be turned to position 1 or 2 and then press the **CLEAR** button **twice** at the control panel.

NOTE
For Diagnostic information refer to the 248 Technical Reference Manual - Diagnostics chapter.

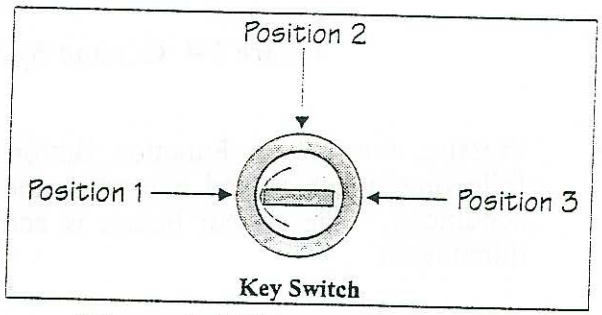


Figure 3-5 Keyswitch Positions

MMI SCHEMATIC

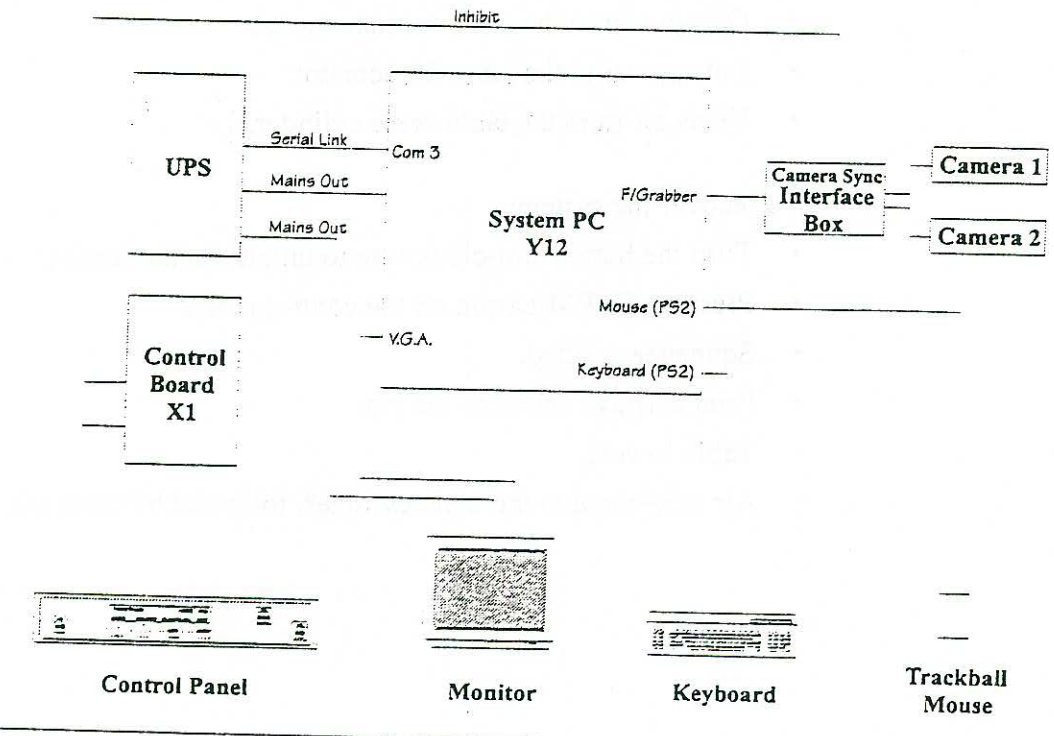


Figure 3-6 MMI Schematic

SVGA MONITOR

The SVGA Monitor is housed on a plinth on top of the machine and is the operators visual interface with the machine vision system.

The monitor specification is:

- Colour SVGA resolution - 800 pixels x 600 pixels.
- Operating voltage -110V / 230Vac (to suit local supplies) supplied from the machine's uninterruptible power supply (UPS).

NOTE
Figure represents an example of the monitor type used on the Machine, (monitor control panels may vary slightly).

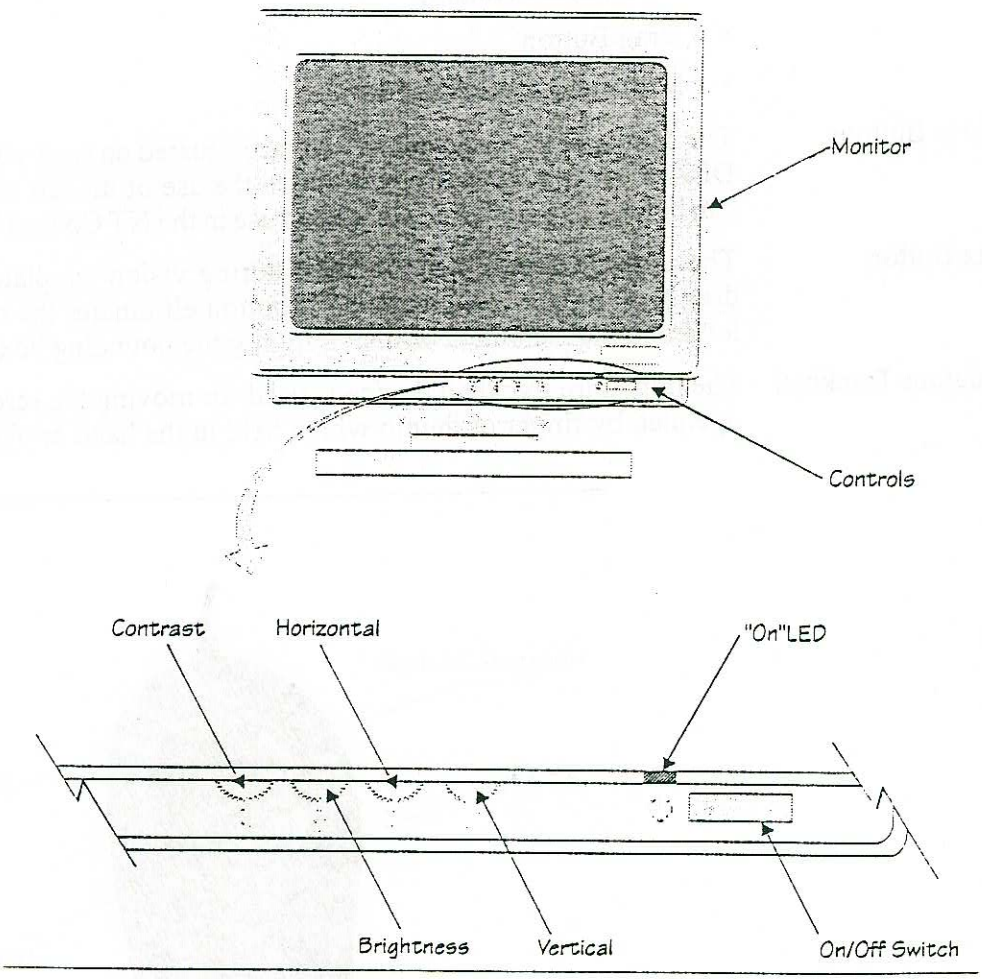


Figure 3-7 Monitor Controls

WARNING

LETHAL VOLTAGE. DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT. ENSURE ALL ELECTRONICS COVERS AND MAIN MACHINE COVERS ARE FITTED BEFORE OPERATING THIS EQUIPMENT.

KEYBOARD

The Keyboard, which can be stowed on the lower shelf of the 248 machine when not in use, is a qwerty, low-height, lightweight model. It is for the use of the service engineer for the following functions:

- Setting up the machine.
- Carrying out off-line diagnostics.

TRACKBALL MOUSE

The Trackball Mouse unit is an environmentally sealed handheld trackball mouse utilizing an opto-mechanical encoder system.

During operation the device can be hand held or surface mounted onto a magnetically suitable surface.

The following controls are available on the unit:

- Two Mouse Buttons
- Drag Button
- Miniature Trackball Mouse

Mouse Buttons The Mouse Buttons (left and right) are situated on each side of the trackball. The DEK Align 4 software only requires the use of the left hand mouse button, this can be set up for left or right handed use in the NT Control Panel (mouse setup).

Drag Button The Drag Button may be utilized during vision template setup operations, eg dragging the bounding box. This button eliminates the need to hold down the left hand mouse button whilst dragging the bounding box.

Miniature Trackball The miniature trackball device is used for moving the screen cursor, this can be operated by finger or thumb whilst held in the hand or placed on a surface.

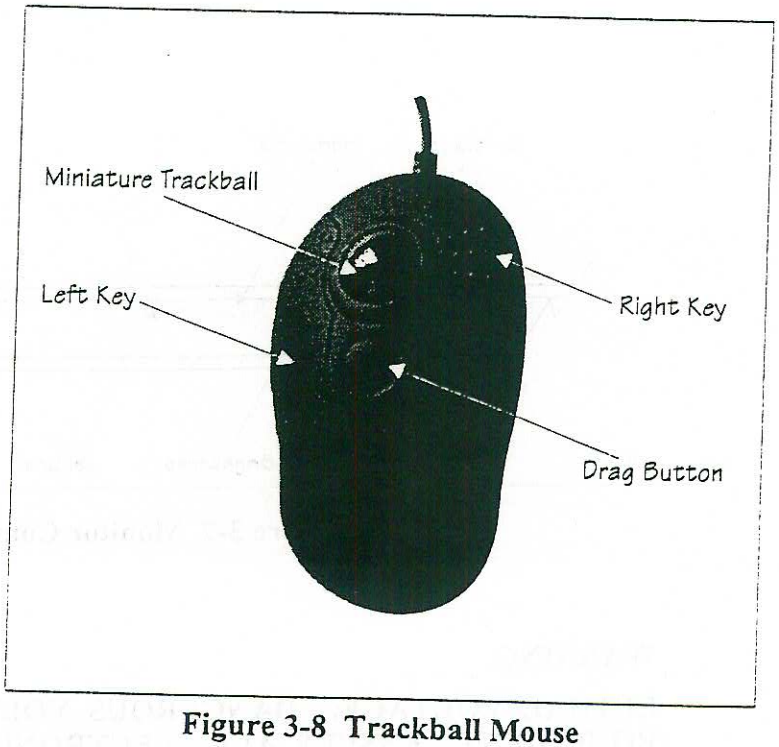


Figure 3-8 Trackball Mouse

SYSTEM POWER UP

To power up the system carry out the following procedures:

1. Switch the main system switch on the rear of the machine to **1** (ON). This provides power to the machine control hardware.
2. Switch UPS unit (lower shelf of machine) to **ON**.
3. If the system PC does not auto start then carry out the following:

   a. Activate the front panel power switch of the system PC (lower shelf of machine). The system PC boots up and the sequence may be observed via the machine's monitor.

   NOTE
   The system is pre-configured to auto log the user into the Windows NT operating system and then to start the application software. Therefore after pressing the system PC power switch no further operator intervention is required until the final application is loaded.

Display information data for the monitor is provided from the:

- DA4 Vision software

Vision Software Interface

The Vision data is displayed as picture-in-picture windows (one for each camera) in the upper half of the display. Vision command icons are also displayed in the lower half of the display area (Vision Display Example figure refers).

NOTE
For information on the vision module refer to the Camera and Vision chapter of this manual.

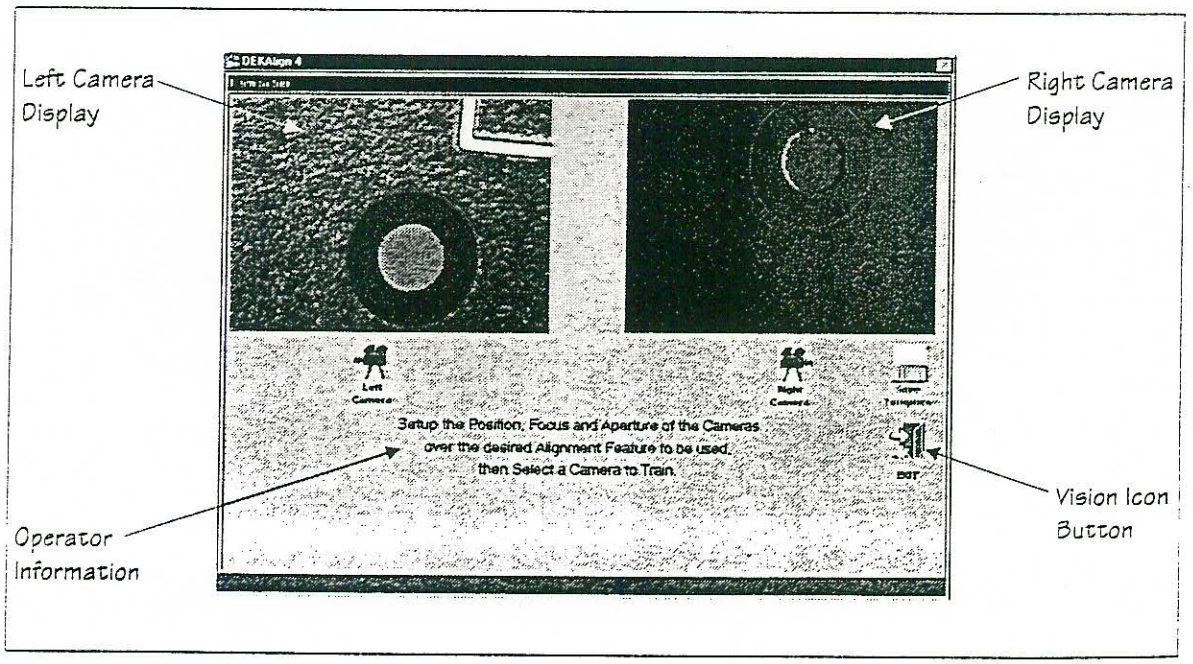
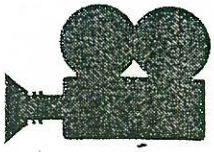


Figure 3-9 Vision Display Example

ASSOCIATED DRAWINGS

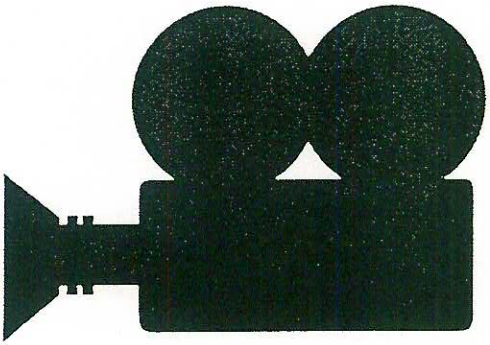
Electrical

Description	Drawing Number
Y3 Control Console	111353
Fascia Circuit	131217
Footswitch Circuit (optional)	131372
DA4 Interface Box Circuit	144665
DA4 Vision Circuit	144713



CHAPTER 4

CAMERA & VISION SYSTEM



CAMERA & VISION SYSTEM

MODULE OVERVIEW

Purpose

The Vision Module option is used to create a vision template (reference image) from the first board to be printed, ideally by utilizing a printed image of the Screen. This reference image is then used when aligning the remainder of the batch of boards to be printed.

Elements

The main elements of the DEK Align 4 (DA4) camera and vision system are:

- Cameras (2 units)
- X and Y Camera Arm Assembly
- DA4 Vision Software
- System PC (refer to System PC Chapter of this manual)
- Vision Monitor
- Camera Sync Interface Box
- UPS (Uninterruptible Power Supply)

Operation

The function of the camera and vision system is to use the reference image at the board loading position. This is achieved by printing the stencil onto a white 'Mylar Flap' fitted on top of the board. The operator then uses the vision system to acquire an image of selected solder features (from the white Mylar flap). The Mylar flap is then removed and the board aligned to the previously acquired images. With the board now aligned to the stencil image the final reference image is created. This may be carried out on the same pads, or the cameras may be moved to utilize alternative features, eg fiducials.

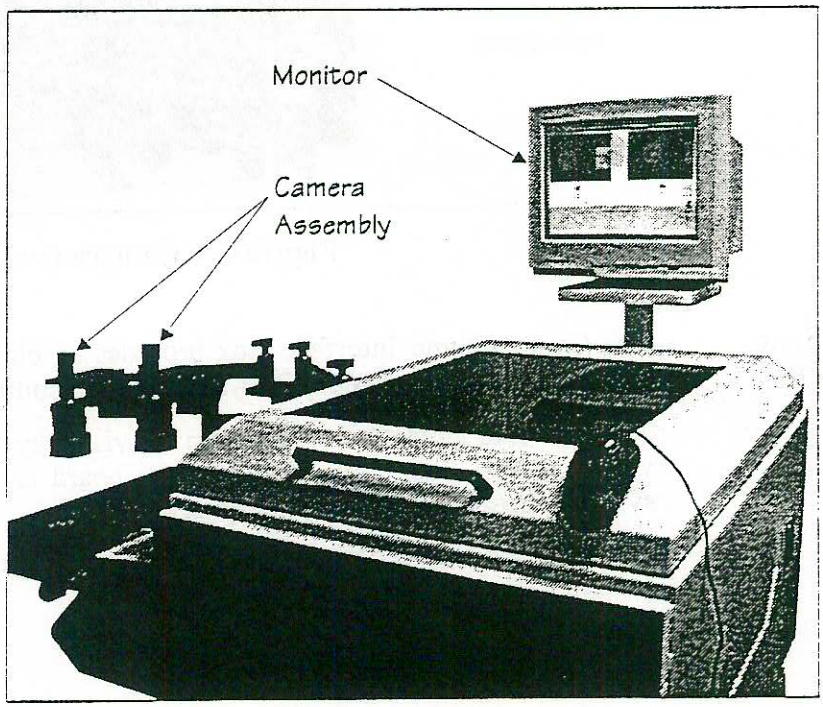


Figure 4-1 Vision Overview

MECHANICAL DETAIL

Cameras

The left and right monochrome camera units consist of the following:

- Charged coupled device (CCD) units - allowing live board featuress to be displayed.
- LED lighting control system.
- Optical lens unit with manual image focus and manual aperture settings.

Camera movement is manually adjusted in the X and Y axis by moving the camera support arms to the required positions. The arms are then locked in position by turning the control knobs on the top of the camera arms.

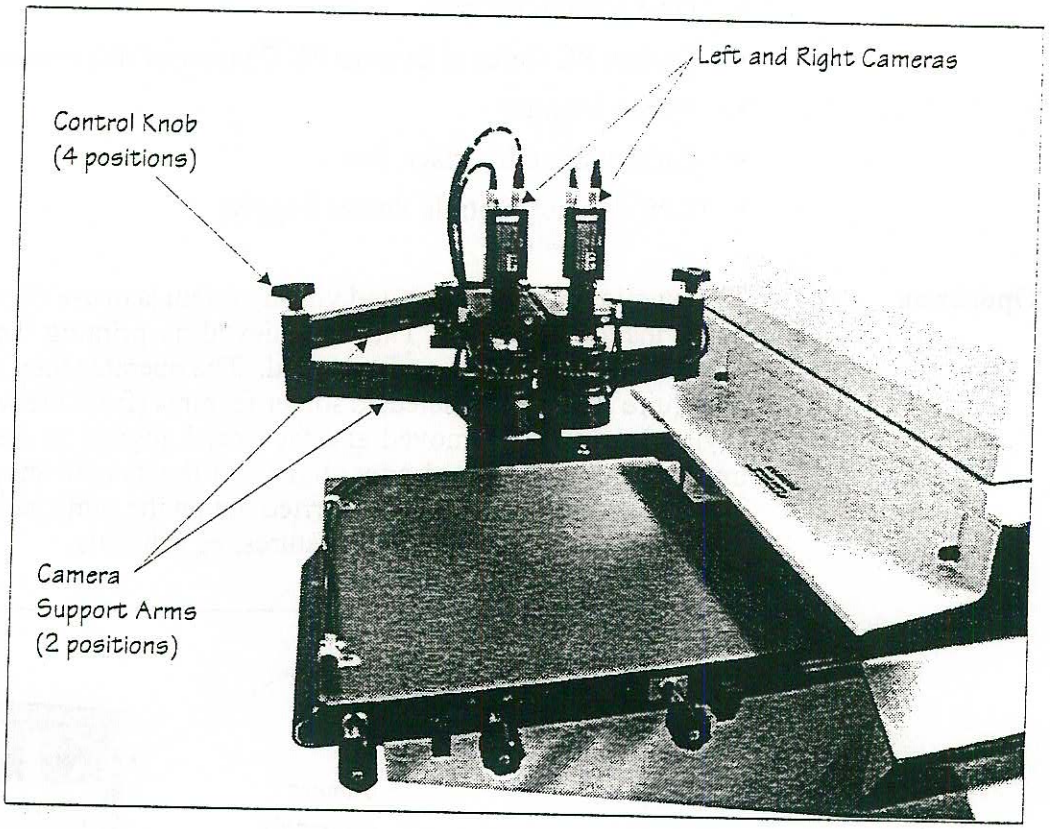


Figure 4-2 Camera Overview

Camera Sync Interface Box

The Camera Sync Interface Box provides an electrical interface between the camera system, the system PC (Y12) and the control board (X1).

This provides an inhibit signal from the vision system to the machine when the vision system does not accept that the board is aligned, and also boosts the synchronization signals to the cameras.

The interface box is positioned on the left hand side of the machine, below the camera arms.

ADJUSTMENTS AND SETTINGS

The following display pages are presented to the operator during DA4 vision setup procedures:

- Vision Access Page
- Main Setup Page
- Camera Selection Page
- Region of Interest Setup Page
- Template Setup Page
- Advanced Template Setup Page
- Overlay Setup Page
- Configuration Page

Vision Access Page The Vision Access Page is the first presentation page when switching the system on.

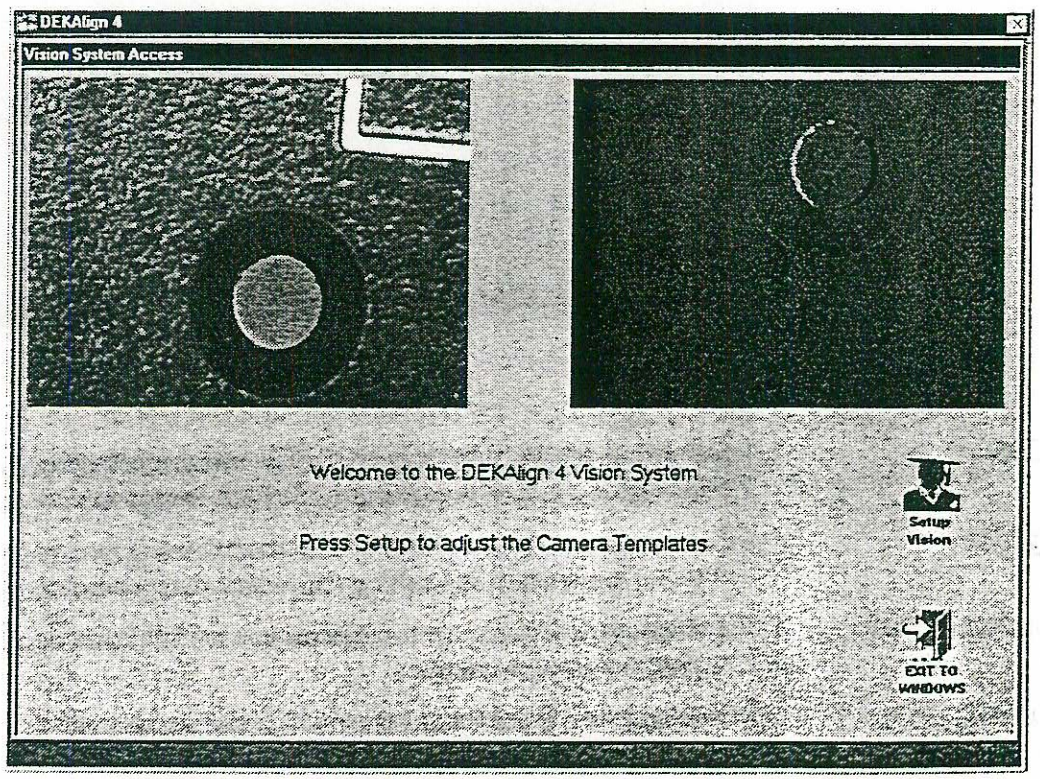


Figure 4-3 Vision Access Page

Main Setup Page

The Main Setup Page is used to access the following setting up pages:

- PCB Setup
- Mylar Setup
- Configuration

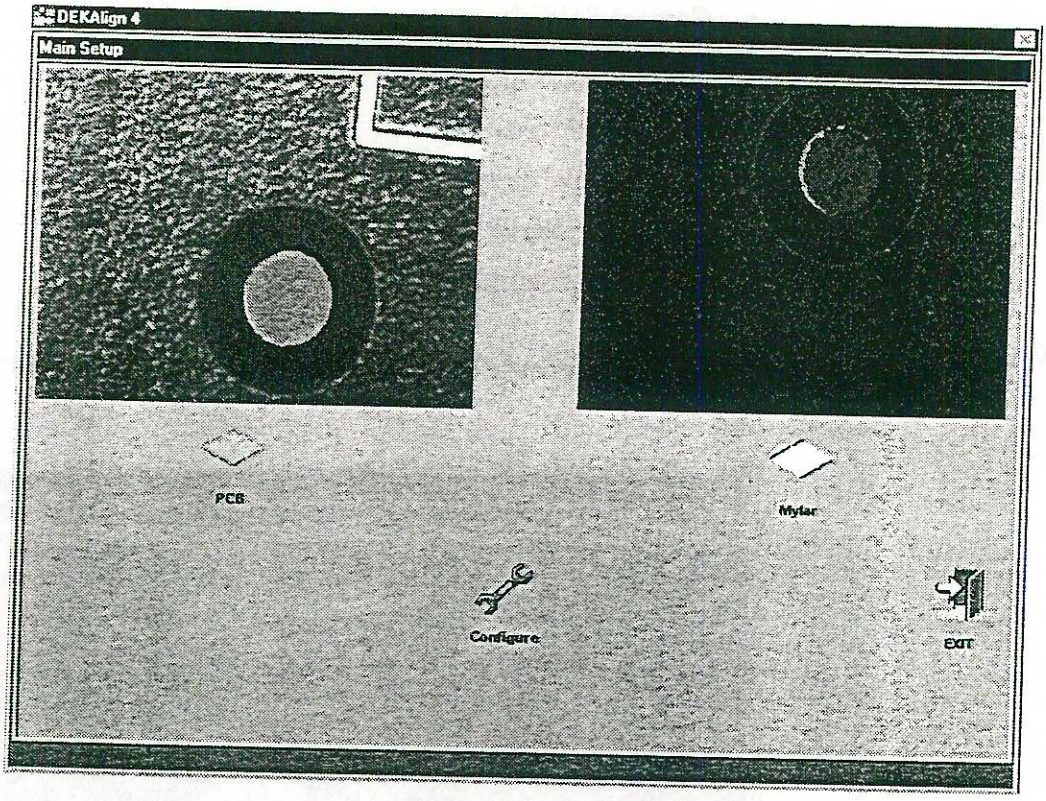


Figure 4-4 Main Setup Page

PCB	Selecting the PCB button opens the camera selection page for PCB templates. The vision system is looking for a light foreground on a dark background.
Mylar	Selecting the Mylar button opens the camera selection page for Mylar templates. The vision system is looking for a dark foreground on a light background.
Configuration	Pressing the Configuration button opens the vision configuration page enabling vision parameter changes.
Exit	Pressing the Exit button returns the user to the vision system access page.

Camera Selection Page

The Camera Selection Page is used to select the left or right camera in order to setup that particular vision template, and save when both are set up.

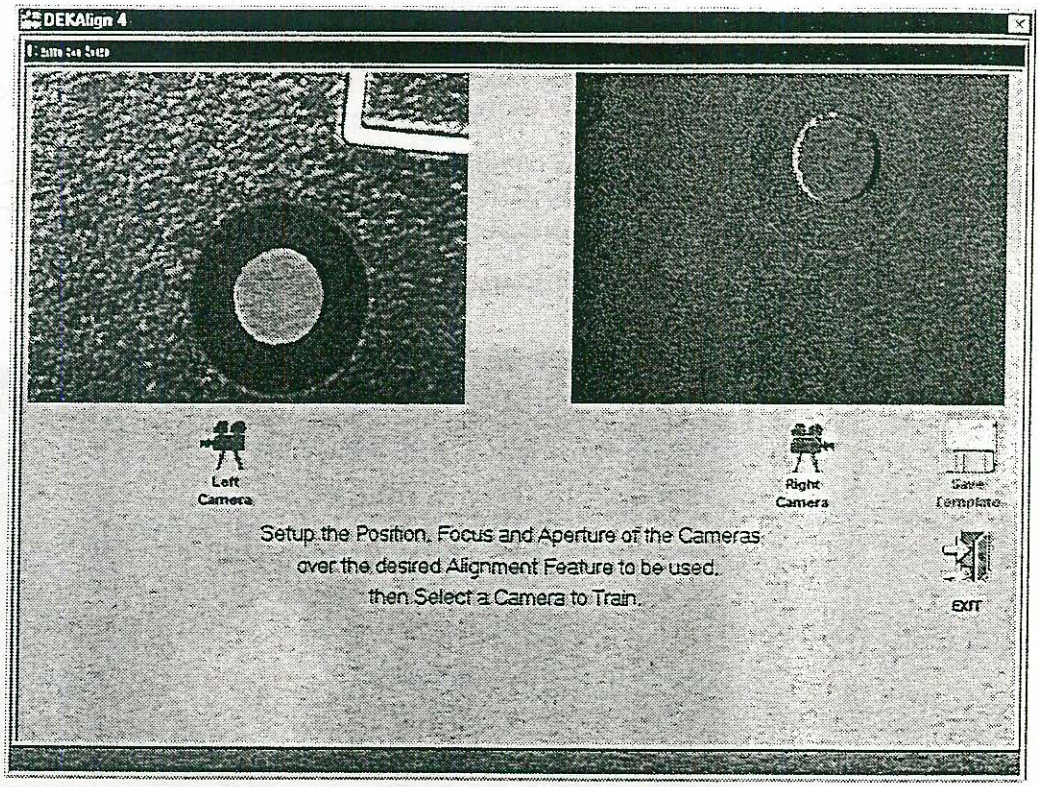


Figure 4-5 Camera Selection Page

Left Camera	Selecting the Left Camera button opens the region of interest page for the left camera template.
Right Camera	Selecting the Right Camera button opens the region of interest page for the right camera template.
Save Template	The Save Template button only becomes active when both templates have been aligned. Selection then saves these templates to hard disk.
Exit	The Exit button, when selected, returns the user to the main setup page.

Region of Interest Setup Page

This page is opened without a region of interest. The bounding box (red dotted line) is created by carrying out the following:

1. Using the trackball mouse, position the cursor to the top left corner of where the bounding box is to be created.
2. The bounding box is opened up by holding down the left mouse button, at the same time moving the mouse to required box size.
3. The box is complete when the user releases the mouse button (the red dotted line changes to red unbroken line). This process can be repeated until the user is satisfied with the region of interest created.

The selected camera is indicated in the top right hand corner of the screen.

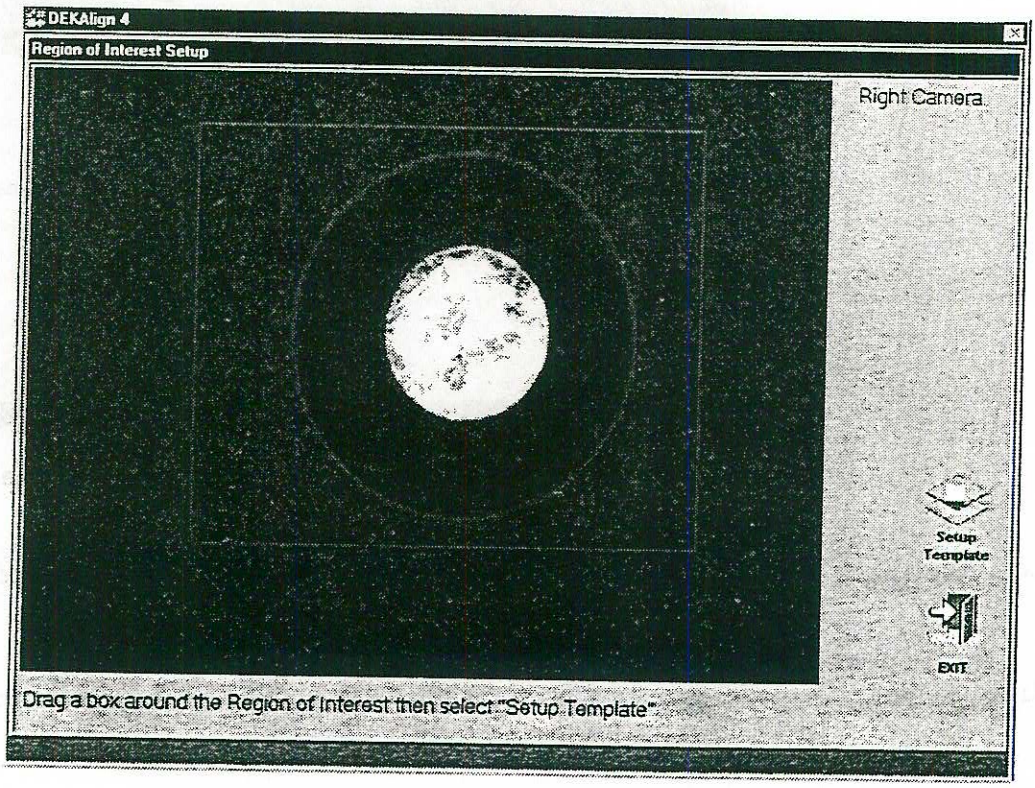


Figure 4-6 Region of Interest Setup Page (with bounding box)

Setup Template — Pressing the Setup Template button accepts the region of interest created and opens the template setup page.

Exit — The exit button returns the user to the camera selection page.

Template Setup Page

When the Template Setup page is opened an optimum threshold value is automatically determined and this, with the current value of the minimum feature parameter, are used to create a 'cleaned up' image (the alignment feature is binarised black and white).

NOTE
If setting up a Mylar template the image is black on a white background. If setting up a PCB template the image is white on a black background.

The selected camera is indicated on the top right hand corner of the screen.

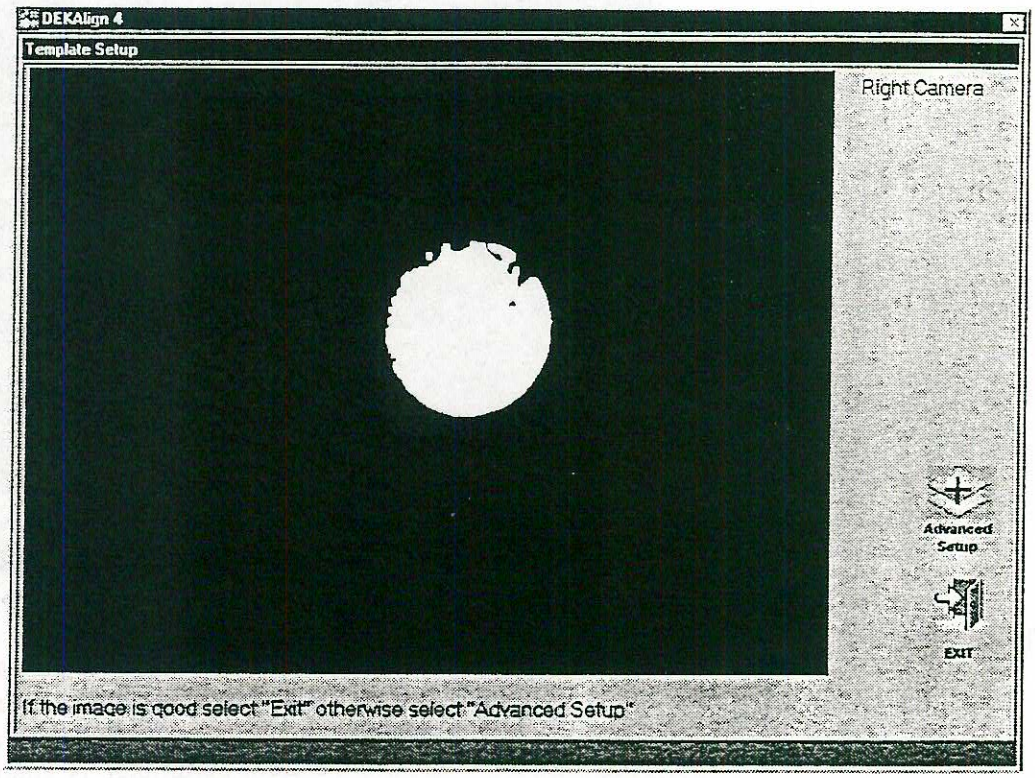


Figure 4-7 Template Setup Page (PCB image)

Advanced Setup — Selecting the Advanced Setup button opens the advanced setup page to enable modification of appropriate parameters.

Exit — Pressing the Exit button accepts the image and returns the user to the region of interest setup page.

Advanced Template Setup Page

The Advanced Template Setup page offers full control over the two parameters which affect the quality of the template.

NOTE
If setting up a Mylar template the image is black on a white background.
If setting up a PCB template the image is white on a black background.

The selected camera is indicated on the bottom left hand corner of the screen.

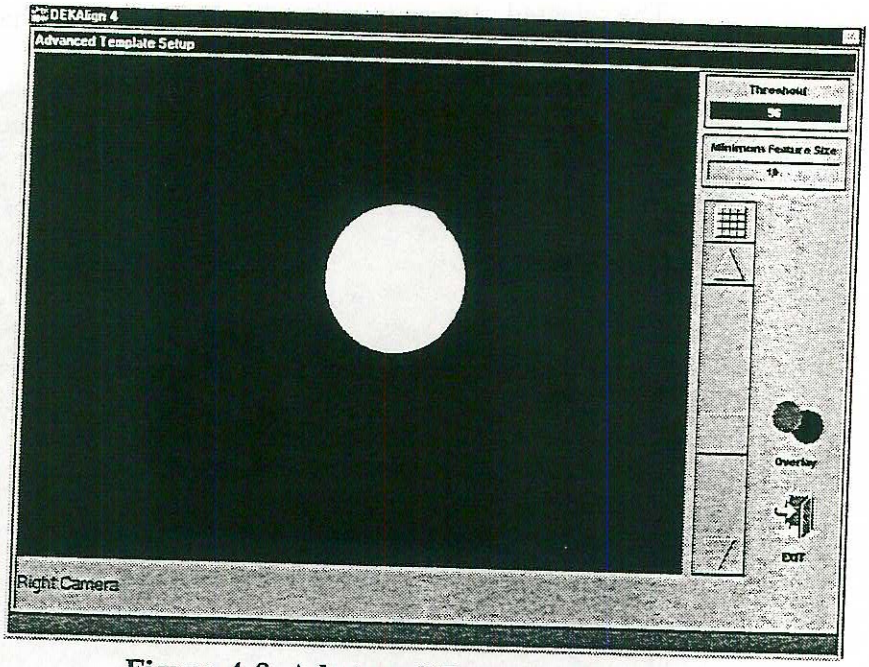


Figure 4-8 Advanced Template Setup Page

Threshold

Pressing the Threshold button connects the threshold parameter to the slidebar control allowing adjustment. The threshold parameter determines the value of the grey scale, below which the image is converted to black and above it is converted to white. Each time a new parameter is entered the template is re-calculated and displayed.

Maximum	255 (black)
Minimum	0 (white)
Default	125
Increment	1

Minimum Feature Size

Selecting the Minimum Feature Size button connects this parameter to the slide bar control allowing adjustment. This determines the minimum number of adjacent pixels that are to be treated as a feature and NOT cleaned up (removed).

Maximum	200 pixels
Minimum	4 pixels
Default	10 pixels
Increment	1pixel

Overlay

Pressing the Overlay button opens the overlay setup page.

Exit

The Exit button when selected, returns the user to the template setup page.

Overlay Setup Page The Overlay Setup Page enables adjustment for all template overlay parameters.

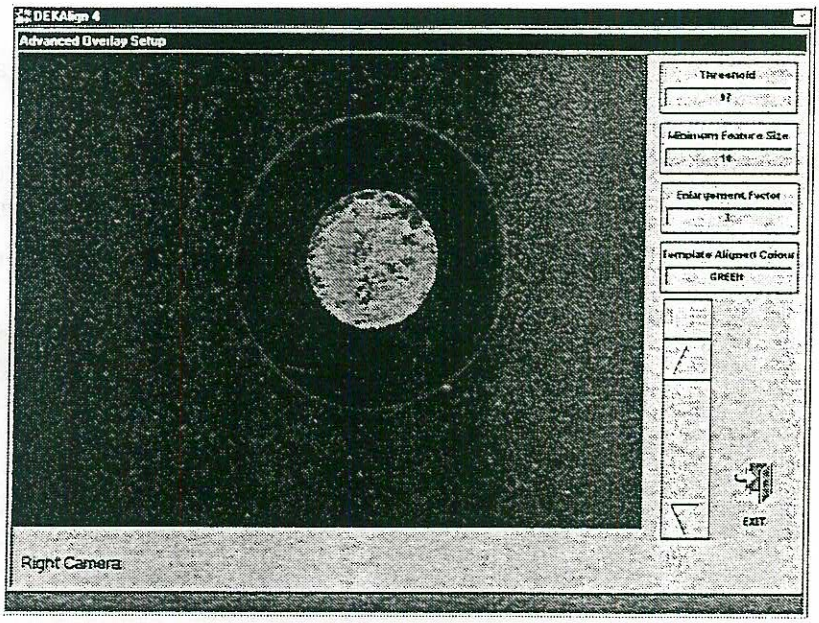


Figure 4-9 Overlay Setup Page

Threshold

Pressing the Threshold button connects the threshold parameter to the slidebar control allowing adjustment. The threshold parameter determines the value of the grey scale, below which the image is converted to black and above it is converted to white. Each time a new parameter is entered the template is re-calculated and displayed.

Maximum	255 (black)
Minimum	0 (white)
Default	125
Increment	1

Minimum Feature Size

Selecting the Minimum Feature Size button connects this parameter to the slide bar control allowing adjustment. This determines the minimum number of adjacent pixels that are to be treated as a feature and NOT cleaned up (removed).

Maximum	200 pixels
Minimum	4 pixels
Default	10 pixels
Increment	1pixel

Enlargement Factor

Selecting the Enlargement Factor button connects this parameter to the slide bar control allowing adjustment. This controls the misalignment tolerance. Acceptable alignment is when the live image is located within the enlarged area.

Maximum	20 pixels
Minimum	0 pixels
Default	3 pixels
Increment	1 pixel

Template Aligned Colour

Pressing the Template Aligned Colour button opens the aligned colour selection list enabling the colour of the aligned template to be set to either green or blue.

Exit

Selecting the Exit button returns the user to the advanced template setup page.

Configuration Page

The vision configuration page offers access to, and control over all saved parameters. To access the configuration page carry out the following:

In the vision setup page select the **Configuration** button.

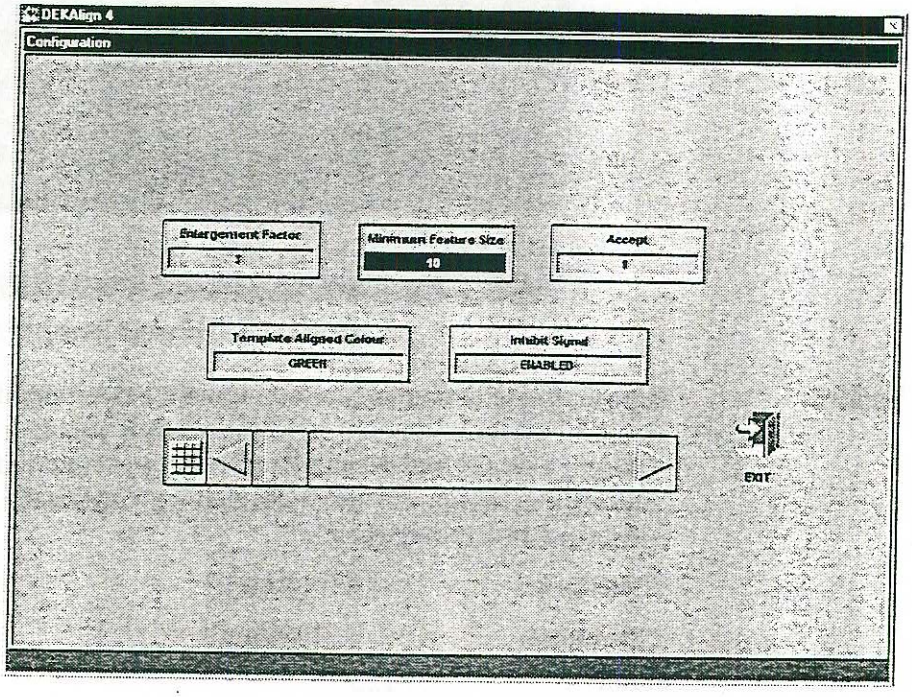


Figure 4-10 Configuration Page

Enlargement Factor

Selecting the Enlargement Factor button connects this parameter to the slide bar control allowing adjustment. This controls the misalignment tolerance. Acceptable alignment is when the live image is located within the enlarged area.

Maximum	20 pixels
Minimum	0 pixels
Default	3 pixels
Increment	1 pixel

Minimum Feature Size

Selecting the Minimum Feature Size button connects this parameter to the slide bar control allowing adjustment. This determines the minimum number of adjacent pixels that are to be treated as a feature and NOT cleaned up (removed).

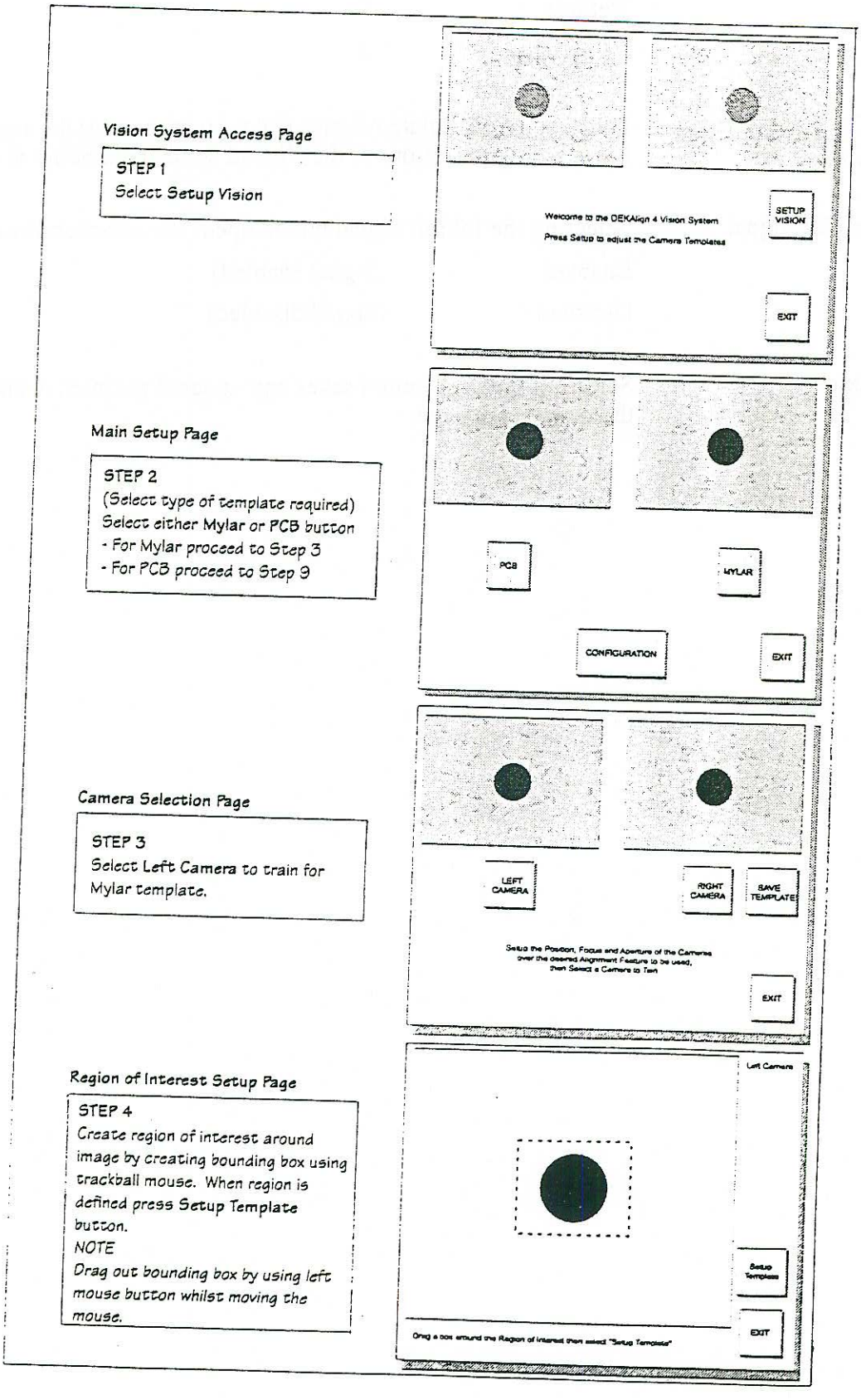
Maximum	200 pixels
Minimum	4 pixels
Default	10 pixels
Increment	1pixel

Accept	Pressing the Accept button connects to the slide bar control allowing adjustment of the 'noise' parameter that is acceptable within the alignment feature template.
	Maximum 10
	Minimum 1
	Default 9
	Increment 1
Template Aligned Colour	Pressing the Template Aligned Colour button opens the aligned colour selection list enabling the colour of the aligned template to be set to either green or blue.
Inhibit Signal	Selecting the Inhibit Signal button opens the selection list control.
	Enabled (Signal enabled)
	Disabled (Signal disabled)
Exit	Selecting the Exit button saves any updated parameters and returns the user to the main setup page.

Vision Setup

Before print operations can be carried out the vision system requires setting up so that a reference image of the stencil is obtained. This is achieved by using a white Mylar flap.

Setting up the reference image is achieved using the following procedures:

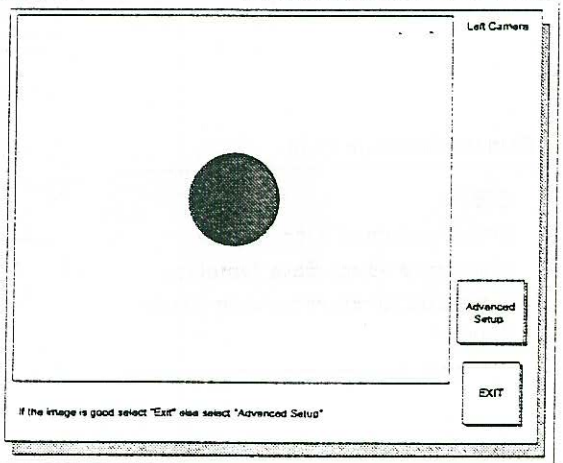


Template Setup Page

STEP 5

The optimum threshold value and cleaned up image is displayed.
If template is acceptable select **Exit** button **twice** and proceed to Step 7.
Otherwise select **Advanced Setup** button to proceed to Step 6.

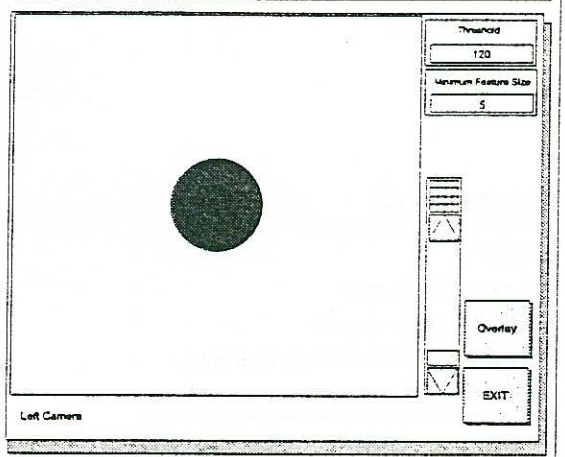
NOTE
Mylar - black image on white background
PCB - white image on black background



Advanced Template Setup Page

STEP 6

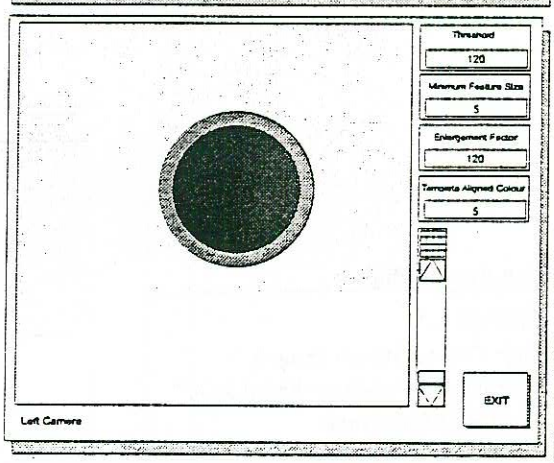
Advanced Setup facility enables modification of selected parameters.
Pressing **Overlay** opens the overlay setup page.
Selecting **Exit** moves page back to Template Setup page.



Overlay Setup Page

STEP 6a

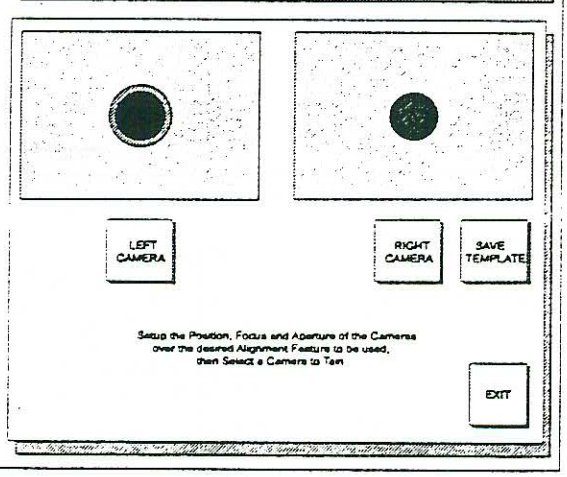
The image represents a PCB Template Overlay.
Outer area - live image of the board
Outer circle - overlay
Inner circle - live video image of alignment feature seen through the overlay.
Select **Exit** button 4 times until the **Camera Selection Page** is highlighted.



Camera Selection Page

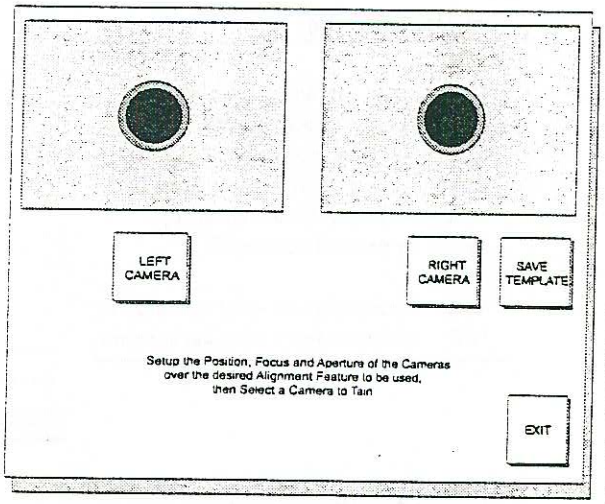
STEP 7

Repeat Steps 3 - 6a for right hand camera setup.



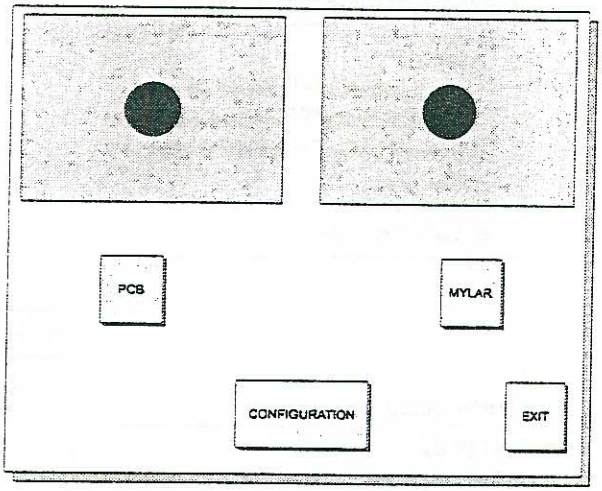
Camera Selection Page

STEP 8
On completion of both camera alignments select Save Template. Press Exit to return to Main Setup Page.



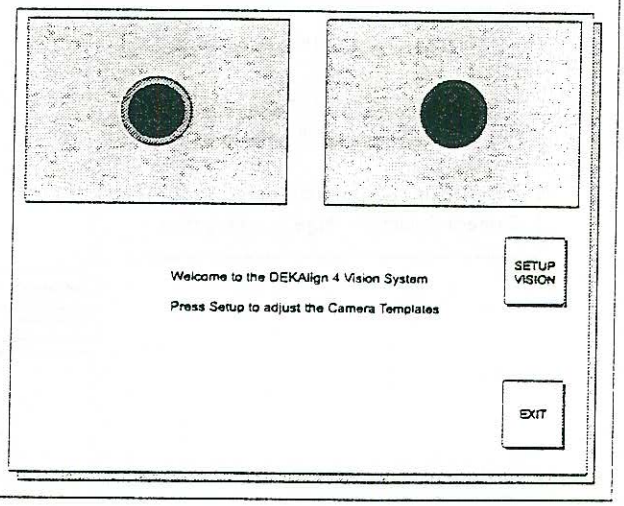
Main Setup Page

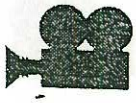
STEP 9
Select PCB button
Repeat Steps 3 to 8.
Select Exit to return to System Access Page.



Vision Access Page

STEP 10
Align PCB to stored images.
(If required re-position board by X,Y and Theta Adjusters.





FAULT FINDING

Symptom	Possible Solution
Output from Camera Unstable	Check lighting is available
	Check camera aperture
	Check camera sync interface box connections

ERROR MESSAGES

There are no system error messages.

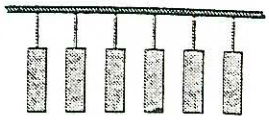
ASSOCIATED DRAWINGS

Electrical

Description	Drawing Number
248 DA4 Vision Circuit	144713
DA4 Interface Box Circuit	144665

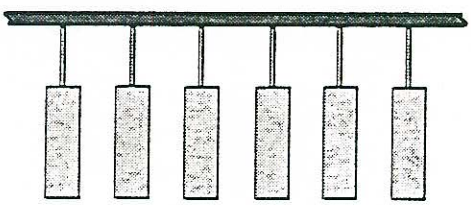
Mechanical

Description	Drawing Number
Mylar Flap G.A.	111178
Mylar Flap (Vision) G.A.	111224
Swinging Arm Camera G.A.	248158 (2 of 2)



CHAPTER 5

BOARD SUPPORT TOOLING



BOARD SUPPORT TOOLING

INTRODUCTION The following board support tooling options are available for the 248 printer:

- Vacuum Tooling (fitted as standard to all machines)
- AutoEdge Clamping (optional)

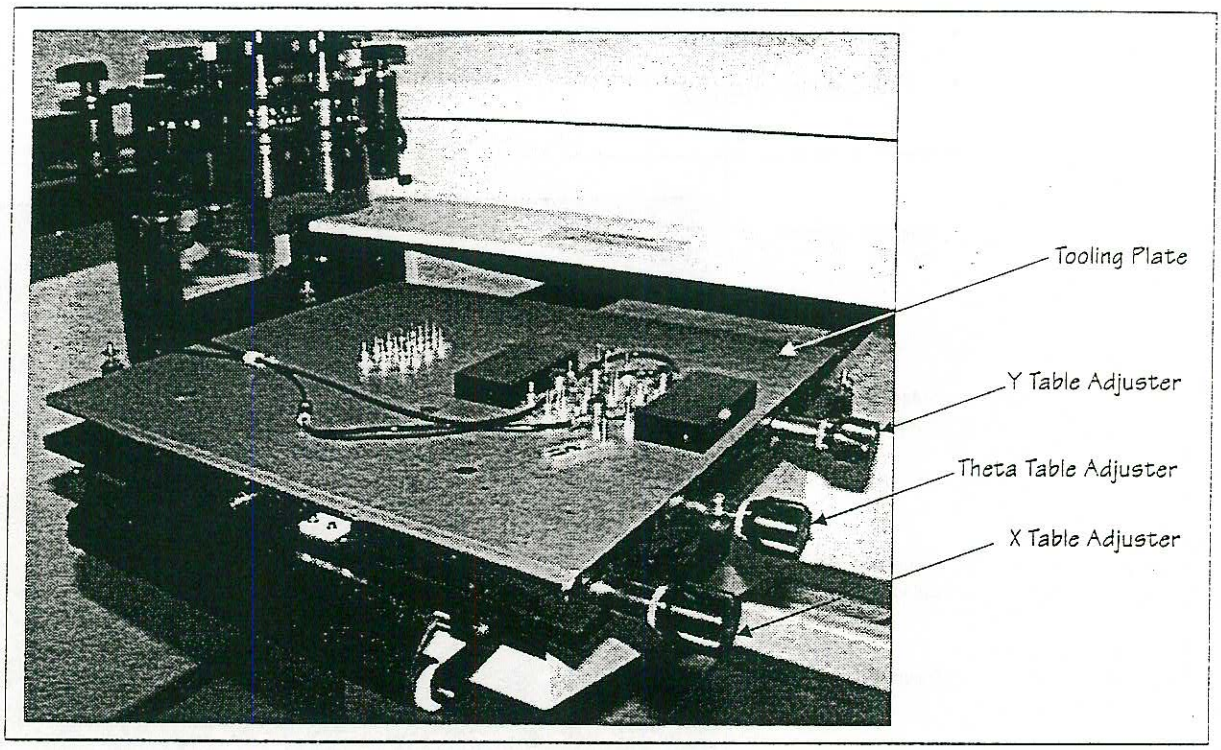


Figure 5-1 Manual Tooling Plate

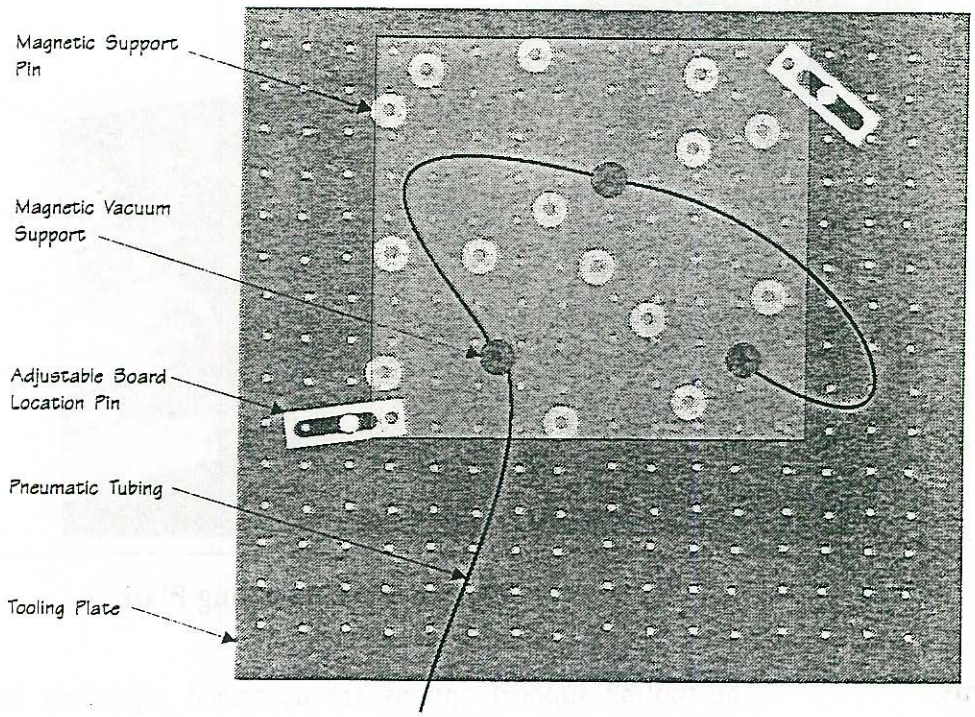
Systems Descriptions The tooling support options are described separately in this chapter. The specifications for these options are tabulated below.

Tooling	Position Reference	PCB Support	Pin Dimensions	Remarks
Vacuum Tooling	Location Pins	Magnetic Pins	Height 19.5mm Diameter 3mm	Supplied with machine
AutoEdge Clamping	PCB Edge	Magnetic Pins	Height 19.5mm Diameter 3mm	Pneumatic clamping in the X and Y plane

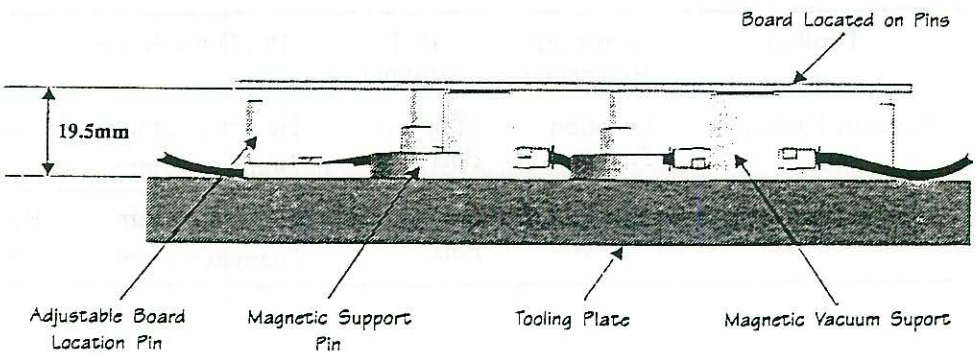
VACUUM TOOLING MODULE

The Vacuum Tooling Module is supplied as part of the 248 Machine. The main elements of the vacuum tooling module are:

- Magnetic Support Pillars (board supports)
- Vacuum Supports (board support and holding)
- Board Location Pin (board positioning location)
- Squeegee Support Blocks
- Pneumatic Supply



Plan View on the Toolplate



End View on the Toolplate

Figure 5-2 Standard Tooling Module

Support Pins

The magnetic Support Pins are positioned on the manual tooling plate by the operator. These pins can be positioned anywhere under the board to provide board support.

Vacuum Supports

The magnetic Vacuum Supports form part of the vacuum tooling module and are used in conjunction with the magnetic support pillars.

The vacuum support pillars are fitted with pneumatically operated rubber suction cups to hold boards in position during print operations.

Board Location Pin

The Board Location Pin is used to locate and secure the board to a fixed position. The location pin assembly is secured to the tooling plate by a pin base and shouldered screw thus allowing adjustment of location pin to board location hole.

The following size board location pins are supplied with the machine as standard:

- 3mm diameter pin (2 in number)
- 4mm diameter pin (2 in number)
- ⅛" diameter pin (2 in number)

Pneumatic Supply

A Pneumatic Supply is provided for both the standard vacuum tooling and AutoEdge clamping option.

This service is provided from the manifold assembly, Solenoid No.1 to a 2 port multiconnector outlet fixed to the manual tooling table (Tooling Pneumatic Schematic figure refers).

Squeegee Support Blocks

Magnetic Squeegee Support Blocks are supplied with the standard tooling and when positioned to the PCB provides support for the squeegees during printing at the beginning and end of each stroke.

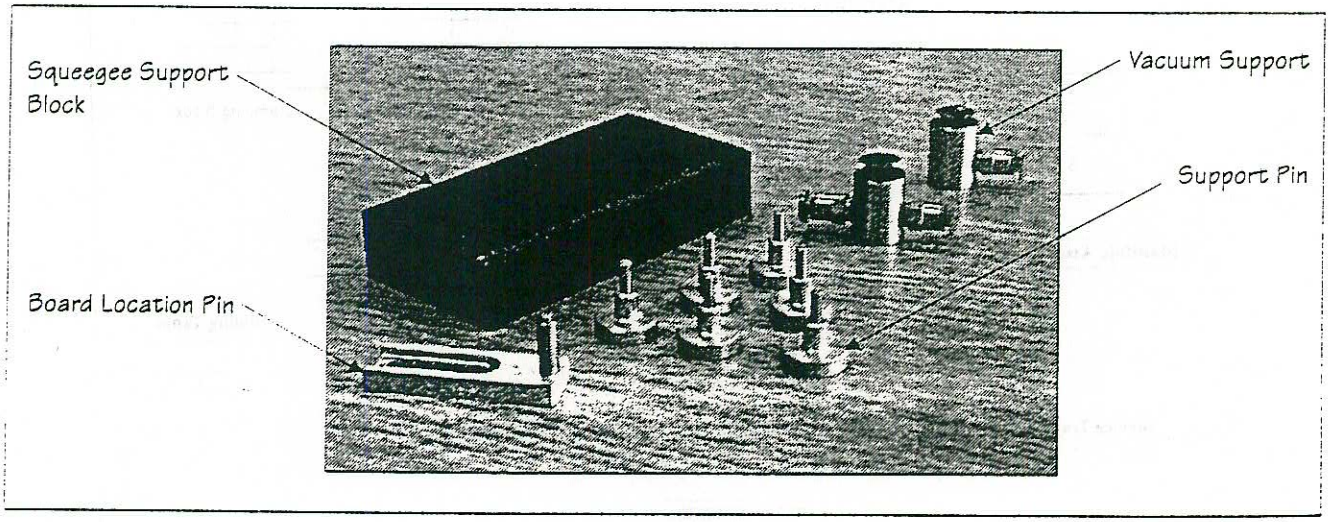


Figure 5-3 Standard Vacuum Tooling

PNEUMATIC CIRCUIT

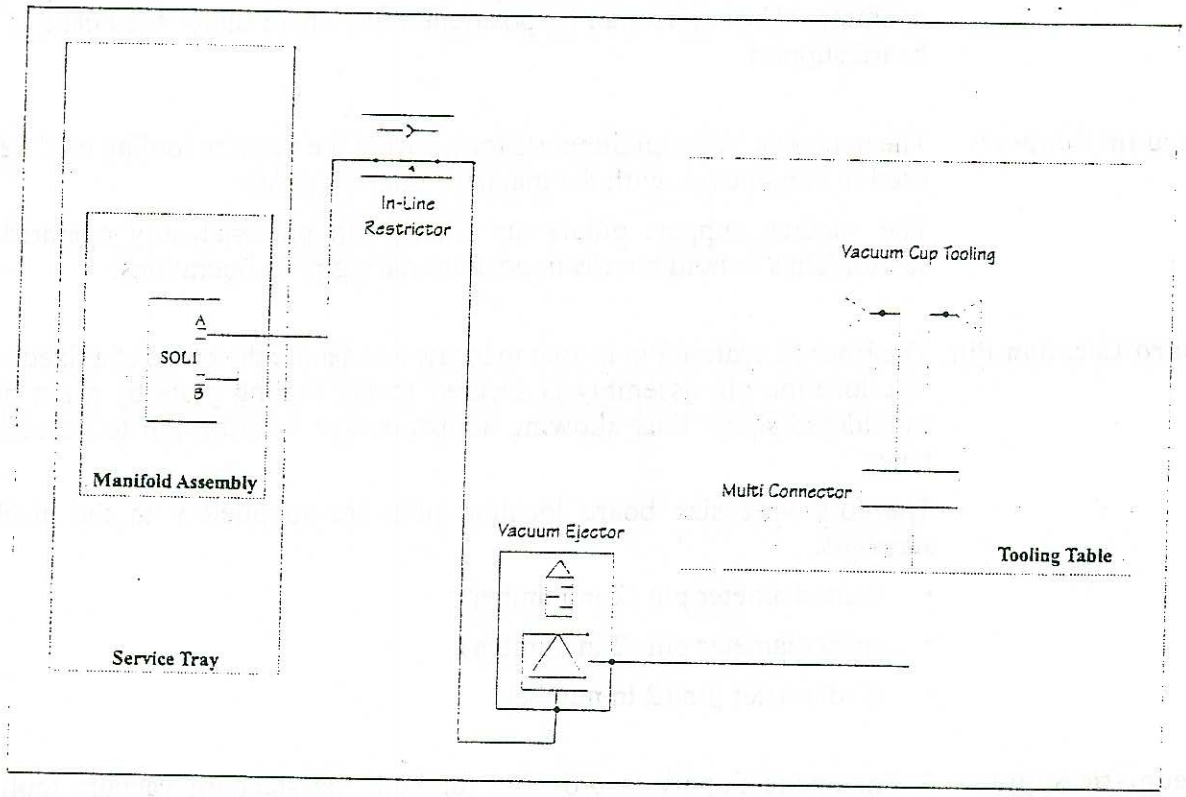


Figure 5-4 Standard Tooling Pneumatic Circuit

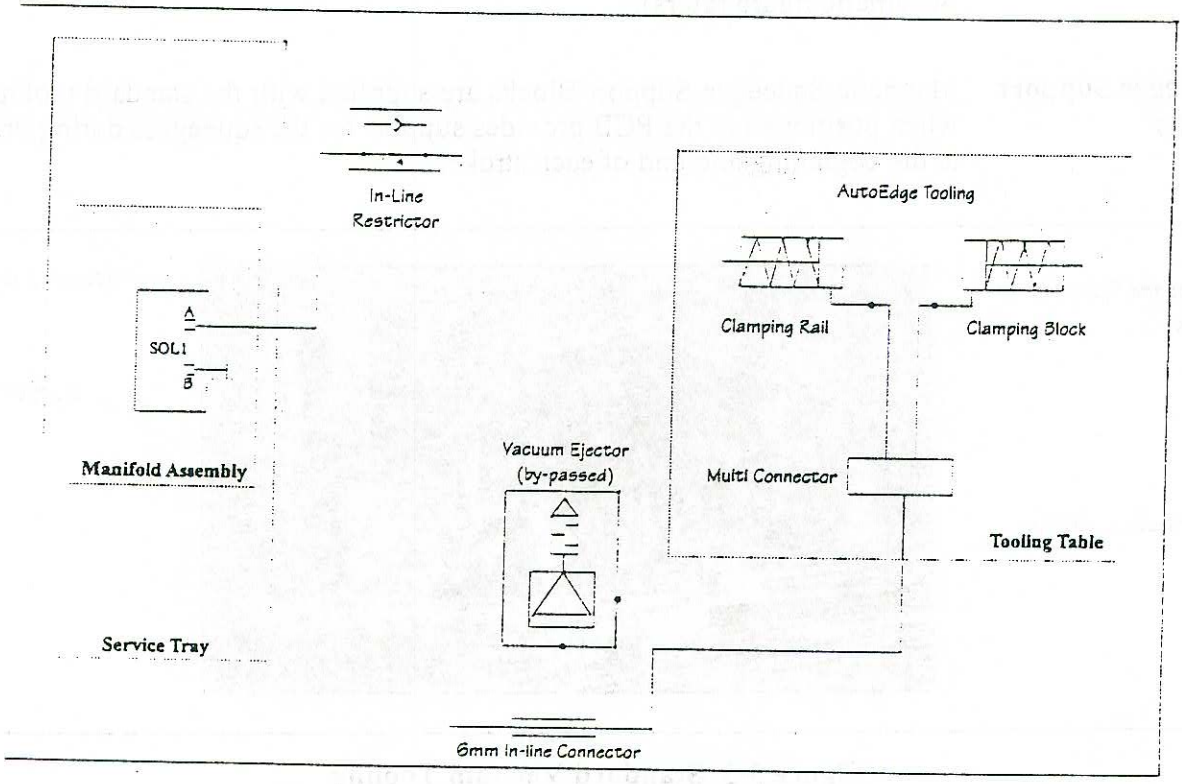


Figure 5-5 AutoEdge Tooling Pneumatic Circuit

AUTO EDGE CLAMPING

The AutoEdge Clamping option provides positive clamping to the printed circuit board edges by using two pneumatic cylinders clamping the board against fixed registers. These clamps are operated in the X and Y plane.

The AutoEdge clamping unit consists of:

- Clamping Rail (with pneumatic clamp)
- Fixed Rail
- Clamping Block (with pneumatic clamp)
- Fixed Block

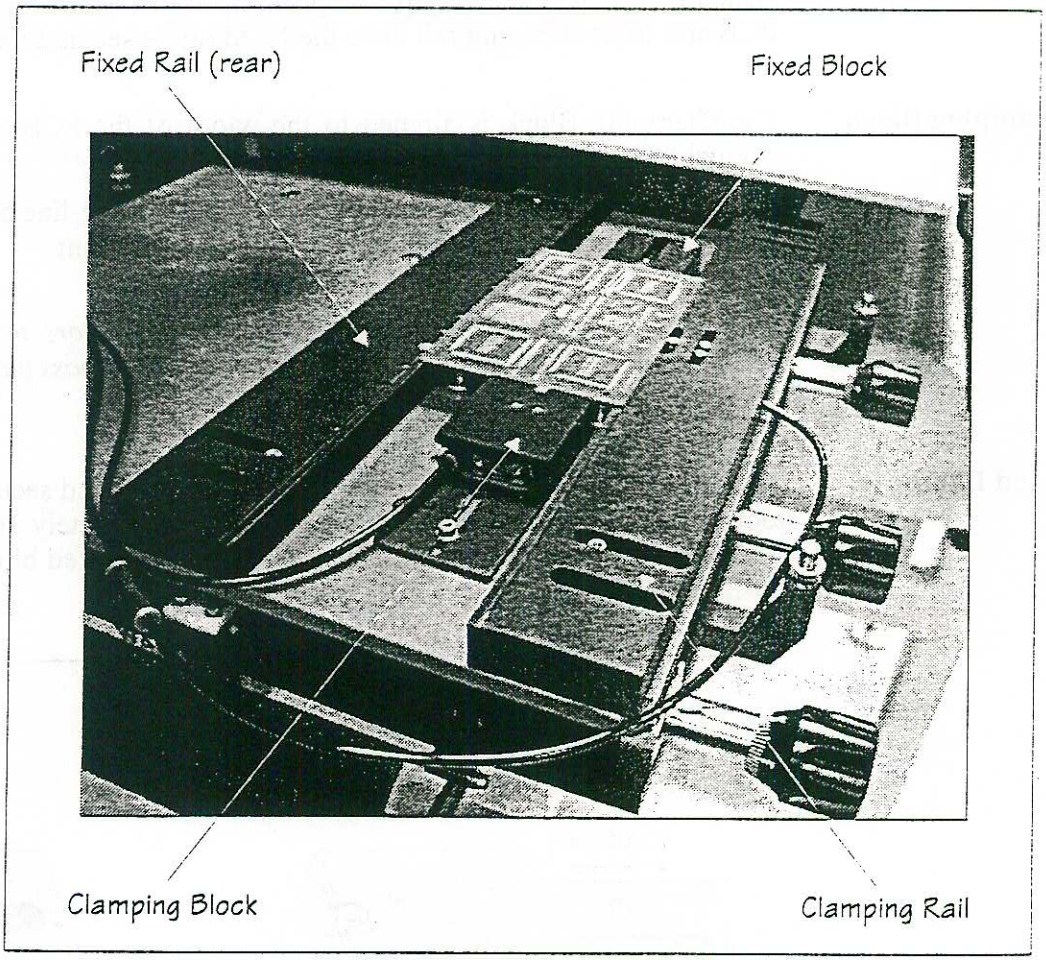


Figure 5-6 AutoEdge Clamp Overview

Clamping Rail

The fixed height AutoEdge Clamping Rail is secured to the standard tooling board by means of M4 securing bolts.

This rail is fitted with a pneumatic clamp which when activated holds the PCB firmly in position in the X plane. The clamp is in-line connected to one of the two outlets on the multiconnector (sited underneath the manual tooling table - rear).

NOTE
Before connecting the AutoEdge pneumatic connectors to the tooling table multiconnector block, refer to the Vacuum Ejector By-pass paragraph at the end of this Chapter.

Fixed Rail

The Fixed Rail is aligned and fitted to the rear position of the PCB on the standard tooling board. A gap of approximately 1mm should be left between the PCB and front clamping rail once the fixed rail is secured into position.

Clamping Block

The Clamping Block is aligned to the width of the PCB and secured to the manual tooling plate using two M4 bolts.

This block is fitted with a pneumatic clamp which is in-line connected to one of the two outlets on the tooling table multiconnector point.

NOTE
Before connecting the AutoEdge pneumatic connectors to the tooling table multiconnector block, refer to the Vacuum Ejector By-pass paragraph at the end of this Chapter.

Fixed Block

The Fixed Block is aligned to the width of the PCB and secured to the manual tooling table using one M4 Bolt. A gap of approximately 1mm should be left between the PCB and the clamping Block once the fixed block is secured into position.

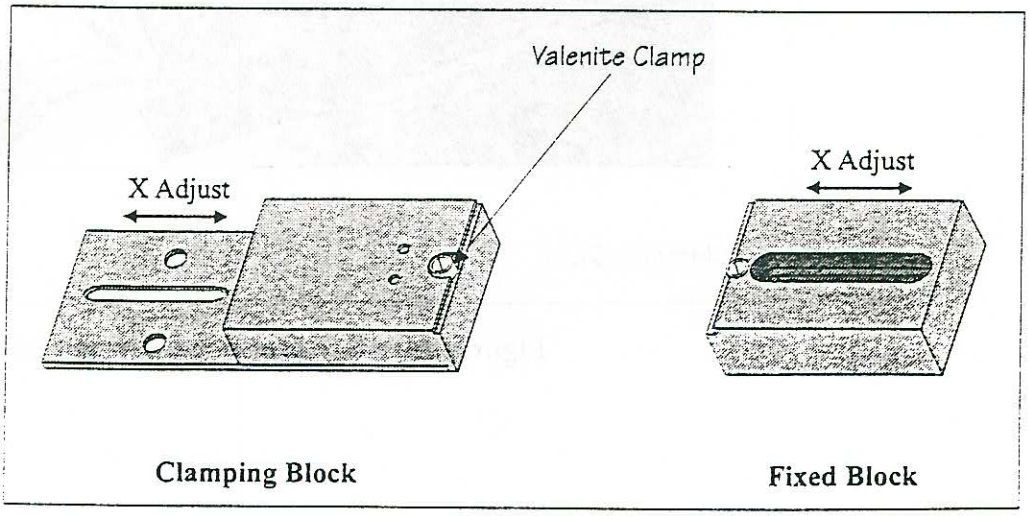


Figure 5-7 AutoEdge Clamping/Fixed Blocks

VACUUM EJECTOR BY-PASS

Before connecting the AutoEdge pneumatic connectors to the tooling table multiconnector, the vacuum ejector on the underside of the machine frame must be by-passed using a 6mm in-line pneumatic connector, (the underside machine panel must be removed for access).

The AutoEdge pneumatic circuit is detailed on the Pneumatic Circuit paragraph of this chapter (AutoEdge Tooling Pneumatic Circuit figure refers).

The figure below shows the vacuum ejector in the standard configuration (vacuum tooling).

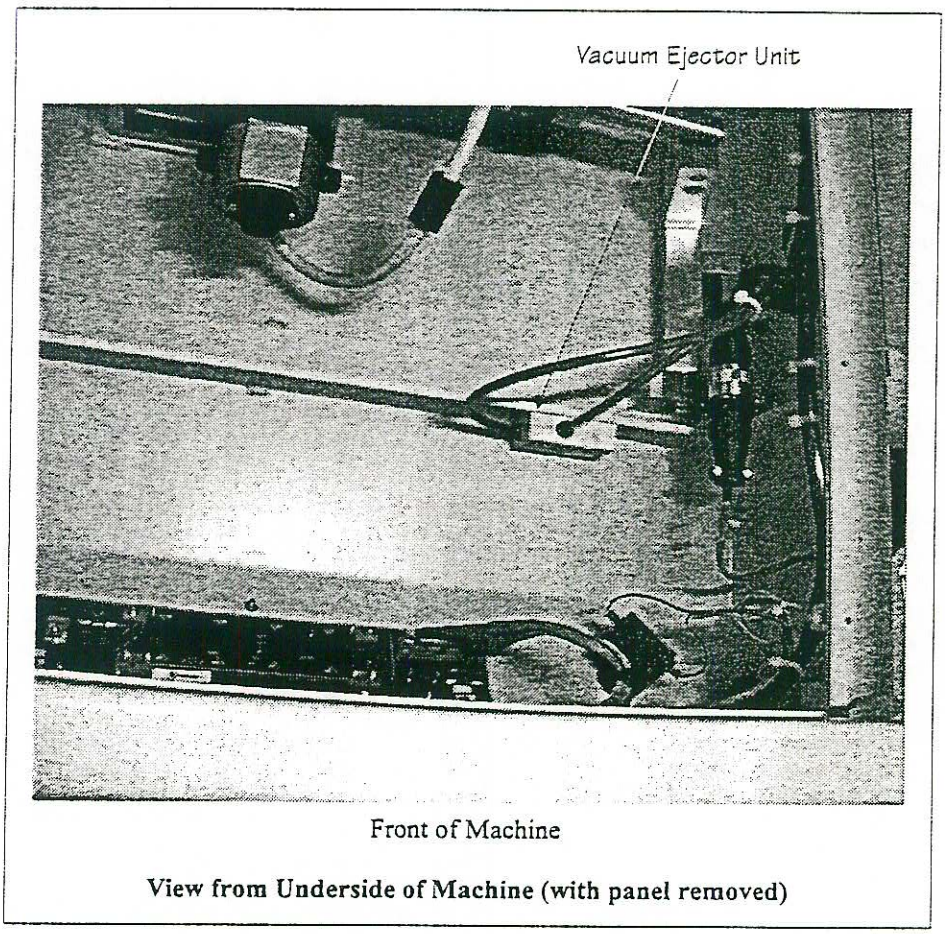


Figure 5-8 Pneumatic Vacuum Ejector

ASSOCIATED DRAWINGS

Mechanical

Description	Drawing Number
Board Edge Clamp Assembly	131589