PS288 Owner’s Manual

Versatile Automated Programming System

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Data I/O

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Preface

Contacting Data I/O

Contact Data I/O for technical assistance by visiting the Data I/O Web site and completing a Web-form, by sending e-mail, or by calling.

To help us give you quick and accurate assistance, please provide the following information:

- PS288 serial number
- TaskLink and AH500 software version numbers
- Detailed description of the problem you are experiencing
- Error messages (if any)
- Device manufacturer and part number (if device related)

World Wide Web

The Data I/O Web site at **http://www.dataio.com** includes links to general information about Data I/O, information about new and existing products, a device support search feature, and technical user information such as application notes, device lists, and Knowledge Base articles.

To contact Data I/O via the World Wide Web, go to **http://www.dataio.com** and click **Contact Us**. Complete the appropriate Web-form.

E-mail

E-mail the information listed above with your name, phone number, and address to the appropriate Data I/O Customer Support e-mail listed in this Preface.

Telephone

Call the appropriate Data I/O Customer Support number listed in this Preface. When you call, please be at your PS288, have this manual nearby, and be ready to provide the information listed above.

Data I/O Customer Support

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Other Countries

For technical assistance, repair or warranty service, contact your local Data I/O representative. To find your local Data I/O representative, use the Representative Search feature at:

http://www.dataio.com/contact/repsearch.asp

Warranty Information

Data I/O Corporation warrants this product against defects in materials and workmanship at the time of delivery and thereafter for a period of one (1) year. The foregoing warranty and the manufacturers' warranties, if any, are in lieu of all other warranties, expressed, implied, or arising under law,

including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Data I/O maintains customer service offices throughout the world, each staffed with factory-trained technicians to provide prompt, quality service.

For warranty service, contact Data I/O Customer Support at the numbers listed in this Preface.

Repair Service

After the warranty period expires, repair services are available at Data I/O Service Centers on a time-and-materials basis, or through a fixed price basis. The fixed price basis is an annual agreement that covers all parts and labor needed to correct normal malfunctions and includes semiannual performance certification.

For more information or to order a Service Contract, call Data I/O Customer Support at the numbers listed in this Preface.

User or Address Change

If the user for this product or your address has changed, please notify Data I/O Customer Support at the numbers listed in this Preface. This ensures that you receive information about product enhancements. Be sure to include the product serial number, if available.

About This Manual

Warnings, Cautions, and Safety Symbols

Special paragraphs in this manual warn about potentially hazardous situations and recommend practices to help avoid injury to people (***WARNING***) or damage to equipment (***CAUTION***). They are included to help you use the PS288 safely and efficiently.

Safety symbols used in this manual:


Crush Hazard


Electric Shock Hazard


General Hazard Warning


Eye Protection Warning


Glove Protection Warning


Laser Hazard Warning


Electrostatic Discharge Warning

Chapter 1 Introduction

The PS288 is a versatile production programmer that handles traditional and fine-pitched packages. Its flexibility is due to modular design, allowing you to optimize for the level of production required by your facility.

PS288 features include:

- Automated programming, handling, and labeling for µBGA, PGA, QFP, TQFP, TSOP, SOIC, PLCC, DIP, and other packages
- Configured with four FlashCORE programmers
- Support for memory and microcontroller devices in many package types
- Optical vision system
- Flexible input and output options include static tray, automatic tray feeder, tube, and tape systems
- Label or laser marking
- Modular design allows configuration for a wide range of applications
- Small mechanical footprint

System Description

The PS288 moves devices from input media through a programming and marking process to output media for delivery to the next phase of the production process. It combines a device programming system and a high-speed pick and place head (PNP head) to provide rapid programming of standard pitch devices, as well as ultra-fine pitched devices.

TaskLink™ software and Automated Handler (AH500) software running on the system's Handler Computer direct the PS288 to perform a series of processes, including automatic handling, programming, marking, and placement of devices in the output media of choice. Operator interaction is reduced by allowing the selection of a Job from a list and starting the system.

Specifications

Facilities:

Air Pressure	620-827 kiloPascals (90-120 PSI)
Air Flow	85 liters/minute (3 SCFM)
AC Input Voltage (single phase)	208-240 VAC
AC Input Voltage Frequency	50/60 Hz
AC Input Power (max)	10 A

Dimensions:

Length (including hinges)	900 mm (35 inches)
Width (including hinges)	800 mm (31 inches)
Height	626 mm (64 inches)
Weight	364 kg (800 lbs)

Environment:

Operating Temperature	+13 to +30 C (+55 to +86 F)
Humidity (non-condensing)	90%

Terms Used to Indicate Direction

The PS288 motion system operates on three primary axes: ***X***, ***Y, Z***. These axes are used throughout this manual to describe the motion of the various parts of the system, and are described relative to the front of the PS288.

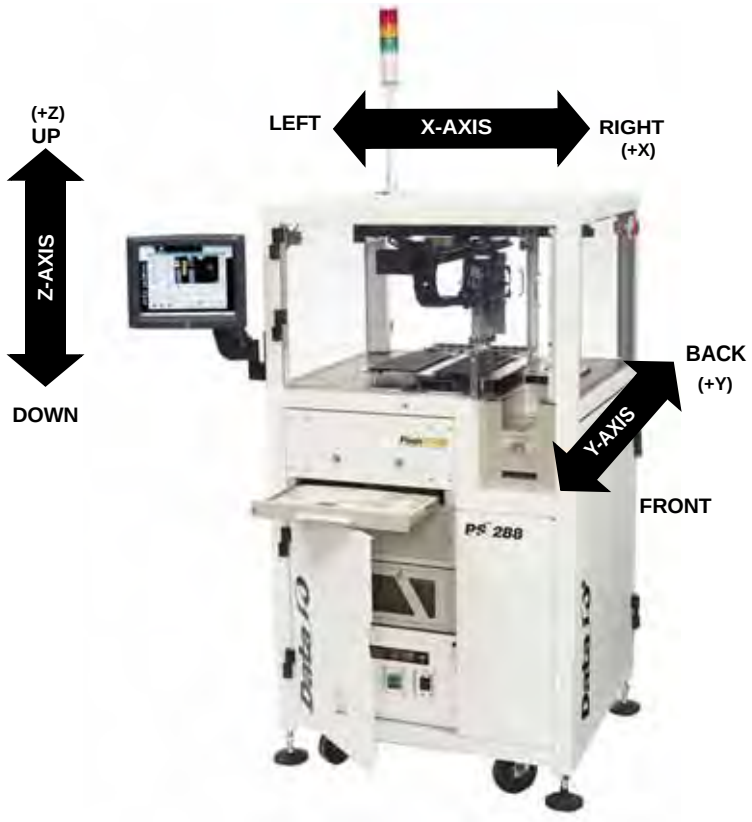


Figure 1-1—PS288 motion axes

An additional axis, called the R-axis (*theta*), is used to adjust the angular (rotational) position of devices by the PNP head.

Four Basic Operations

The PS288 performs four basic operations when processing devices:

1. **Unload devices from the input media—**
   The pick and place head (PNP head) unloads devices from the input tube, tray, or tape module. These devices are placed in a programming socket for programming or on the shuttle pedestal for marking.

2. **Program devices—**
   Devices in the programming sockets go through a series of pre-programming tests to make certain they are blank and are correctly inserted in the sockets. If the tests are successful, the devices are programmed with the data contained in programmer RAM using an algorithm approved by the semiconductor manufacturer. Data in devices that pass the programming operation are verified against the RAM data to ensure that they have been programmed correctly. Testing, programming, and verifying options can be changed from the default settings using TaskLink software.

3. **(Optional) Mark devices—**
   When marking is selected, devices that pass the programming and verification operations are moved to a pedestal on the shuttle transfer assembly, then to the label marker or laser marker where they are marked for identification.

4. **Load devices onto the output media—**
   Devices are moved by the PNP head from the programming socket or the marking stage and placed in either trays, tubes, or tape. Devices that failed the programming operation or subsequent verification are transported to a dedicated reject tray or other reject module where they are held for failure analysis or other disposition.

Subassemblies

The PS288 has several subassemblies that work together to provide for proper operation. Refer to *Figure 1-2* for the physical location on the PS288 of the primary subassemblies. (Some of these assemblies are optional and are not shown in *Figure 1-2*).

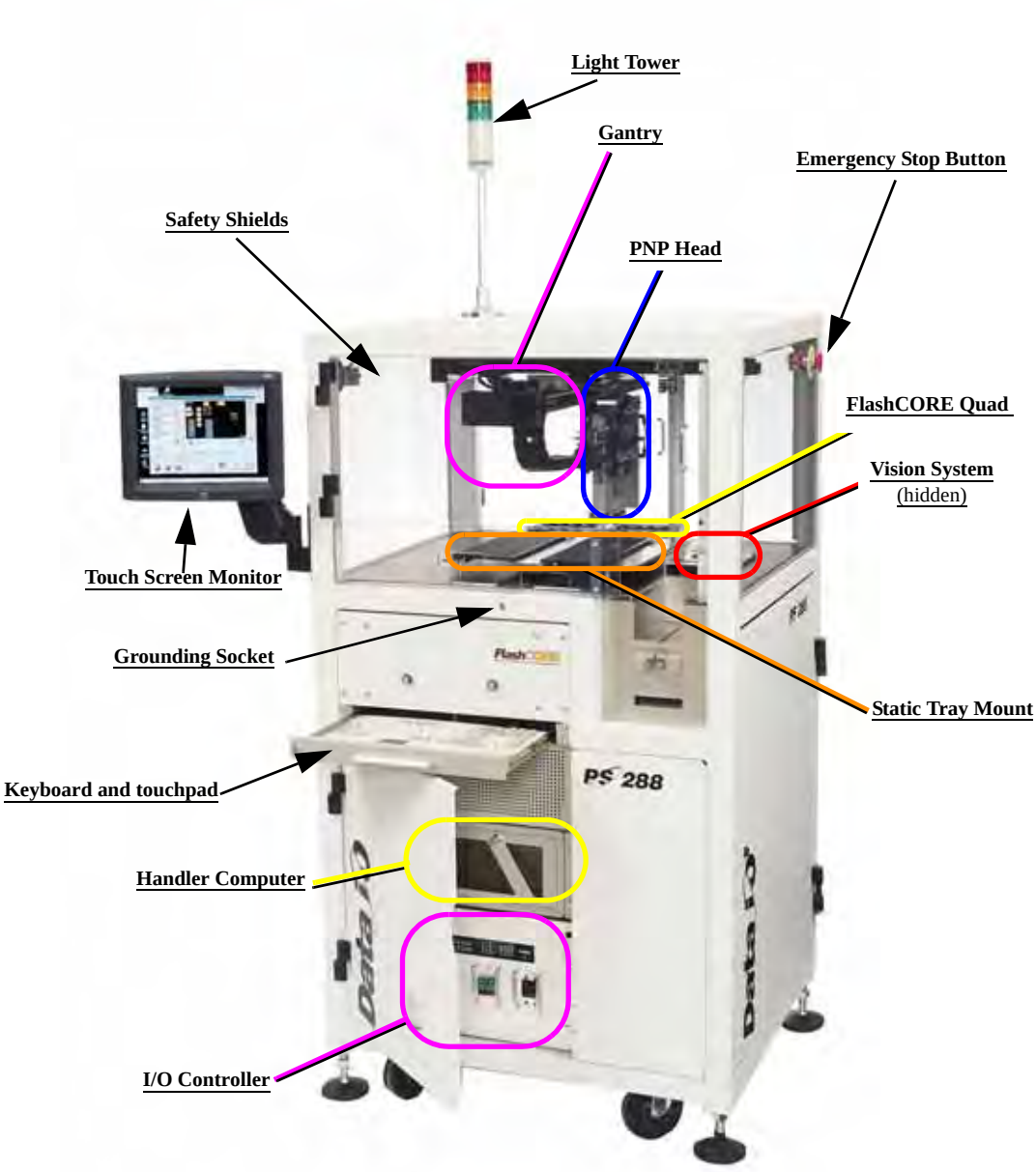


Figure 1-2—PS288 primary subassemblies

Light tower—

Allows monitoring the status of the PS288 from a distance while the system is processing devices. See “Monitor the Light Tower” on page 3-13 for a complete description of light colors and significance.

Gantry—

Travels along X- and Y-axes moving the PNP head to different locations within the work envelope.

Pick and place head (PNP head)—

The motion system responsible for moving devices to and from their respective stages within the handler. The PNP head moves devices in four axes, ***X***, ***Y, Z*** and ***R*** (also called theta), within the operating enve-

lope. A computerized vision system allows the PNP head to make adjustments for very accurate device placement.

The PNP head uses different sized probe tips to accommodate the great number of device types that are available. During operation, a vacuum is switched on as the probe tip is lowered toward the device. A vacuum sensor is used to detect when the probe tip touches the device. The PNP head then picks up the device and moves it to the camera where it compares the device position on the probe tip to a digital image of a known good position. It can then correct for probe misalignments on the ***X***, ***Y***, and ***R*** axes (up to 30°) before the device is placed in the programming socket.

Once corrections are made, the PNP head moves the device to the drop location, the probe tip is lowered, and the vacuum is turned off. The drop position of the probe tip is slightly higher than the pickup position, as a *blow-off*, a small amount of positive-pressure air, is applied to break the vacuum seal. The short drop from the probe tip to the programming socket or output media prevents fine pitched leads from being damaged by excessive pressure.

WARNING: The gantry system and associated components move with great speed and force, and have the potential to cause great bodily harm. Do not bypass the safety interlocks or operate the PS288 with the safety shields open or removed.

Emergency stop (E-Stop) buttons—

Two E-Stop buttons (on either side of the PS288 near the top) are used to stop motion of the gantry and PNP head in case of an emergency. When an E-Stop button is pressed, the gantry and PNP head stop moving immediately.

WARNING: Pressing an E-Stop button stops motion of the gantry and PNP head only. It does not remove power from the PS288 or the Option Bay (if installed).

Quad Programmer Assembly —

A Quad assembly containing four FlashCORE programmers that accept Socket Adapters with 1 to 4 sockets each, for a total of up to 16 programming sockets.

Vision system—

The camera and associated components of the vision system are used to verify proper alignment of devices removed from the input media before inserting them into the programming sockets. Misalignments are corrected before placing the device in the programming socket or marking pedestal.

Static tray mount—

Using positioning pins and “L” bracket magnets, holds several different tray sizes including JEDEC and non-JEDEC standard trays in position for the PNP to pick up devices and return them after processing.

I/O Controller—

Provides 115 VAC for the Handler Computer and associated components, as well as the PNP head. Also provides 24VDC for the various sensor systems throughout the PS288. The I/O Controller provides a transfer point for all sensor signals within the PS288 and optional assemblies, and sends the signals to the Handler Computer for processing.

Handler Computer—

The Handler Computer operates using the Microsoft® Windows XP operating system. It hosts TaskLink and AH500 operating software for the PS288, monitors all sensors, and hosts the vision system.

CAUTION: *The PS288 should never have software added unless instructed to do so by Data I/O Customer Support. Adding software to the PS288 can cause damage and/or cause the system to operate improperly. Adding software without specific instruction from Data I/O Customer Support will void the warranty and may incur service charges.*

Keyboard and touchpad—

Used to set up system operation. Can be used instead of the touch screen monitor if desired.

Grounding socket—

Used to prevent damage to devices from electrostatic discharge (ESD). Operators should wear an antistatic wrist strap inserted in the grounding socket.

Touch screen monitor—

Central display mechanism for the PS288, shows system status and information about programming jobs and vision system. The touch screen may be used instead of the keyboard and touchpad if desired.

NOTE: *Throughout this manual, the term “click” is used to mean “touch” when using the touch screen monitor.*

Safety shields—

Used to protect against personnel and equipment damage when the PNP head is in motion. Safety interlocks on the safety shields stop movement of the gantry and PNP head if the shields are opened or removed while the gantry is in operation.

Marking system (optional; not shown)—

A label marking or laser marking system used to mark devices so they may be identified at a later time. Installed in the Option Bay on the right rear of the PS288.

The marking system uses a shuttle transfer assembly to move devices to and from the marking stage. The shuttle transfer is a belt-driven shuttle system that has two pedestals for holding devices. Initially, a device is placed in the second pedestal and is transported to the marking area. After the device is marked, the shuttle moves it back to the second pedestal. The PNP head places an unmarked device in the first pedestal and then removes the marked device from the second pedestal and routes it to the tray or tube output module. The device in the first pedestal is then marked. This process continues, and alternates pedestals throughout the remainder of the Job.

If the tape output system is selected, then only one of the pedestals is used. Since both the marking system and the tape output system are placed in the Option Bay on the rear of the PS288, both pedestals cannot be used. Additionally, if the devices are marked with the label printing system, only one pedestal is utilized.

The laser marking system uses a CO_2 laser to mark parts. The laser applies a user-defined mark that can include letters, numbers, or drawings. The laser marking system operates as a Class 1 laser system (CDRH classification), and therefore uses integrated interlocks to prevent the laser from firing while any cover is open. The laser should never be operated without safety covers in place.

WARNING: Blindness hazard! Always wear eye protection when the laser safety shields are open, such as during service. Direct or diffuse laser radiation can damage eyes. Goggles must block 10.6 µm laser radiation. Goggles protect against scattered energy but not against direct viewing of the laser beam or reflections from metallic surfaces.

WARNING: Serious burn hazard! Direct or diffuse laser radiation can cause serious burns. Keep hands and other parts of the body out of the path of the laser bean when servicing.

WARNING: Toxic fume hazard! Laser marking generates vapors, fumes, and particles that may be noxious, toxic, or even fatal. Follow maintenance procedures on the fume extractor. Use proper ventilation.

For additional safety information, see “Laser Safety” on page 1-16.

Automatic tray feeder (optional; not shown)—

TF20 and TF30 automatic tray feeders are available as options. Designed to automatically supply devices in trays to the PS288, the TF20 accepts thin or thick JEDEC trays only and the TF30 accepts semi-vendor matrix trays including JEDEC.

Tube input (optional; not shown)—

Tube input uses tubes to provide blank devices to the system for programming. Vibration mechanisms keep devices sliding freely by gently vibrating the tubes to reduce the likelihood of device jams.

Tube output (optional; not shown)—

Tube output uses tubes to collect devices following programming. Vibration mechanisms keep devices sliding freely by gently vibrating the tubes to reduce the likelihood of device jams.

Vibration adjustment controls (optional; not shown)—

Located on the front of the PS288 when the optional tube input or output modules are installed, the vibration adjustment controls are used to control vibration the tubes receive to reduce the likelihood of device jams when unloading or loading the tubes.

Tape input (optional; not shown)—

Tape input uses a reel of sealed carrier tape containing unprogrammed devices to provide devices for programming. Each device is picked from a carrier tape pocket and placed into a programming socket after alignment by the vision system. A sprocket wheel advances the tape one carrier pocket to align the next device into the pick position. As the carrier tape advances, the cover tape is peeled off so that the PNP head can pick up the device.

Tape output (optional; not shown)—

Tape output uses a reel of empty carrier tape to hold devices after they are programmed. Each programmed device is placed into an empty pocket on the carrier tape. The carrier tape then advances through either a heat seal or pressure seal unit that applies cover tape to the filled carrier tape.

Fume extractor (optional; not shown)—

Used with the laser marking option, the fume extractor removes harmful smoke and hazardous materials from the marking area and safely stores them for proper disposal.

WARNING: Laser marking generates vapors, fumes, and particles that may be noxious, toxic, or even fatal. The fume extractor is required for use with the laser marking option and must not be disabled. Analysis of filter contents obtained following marking a representative variety of devices has revealed a sufficient level of hazardous materials, such as antimony and other heavy metals, to require that the filter be treated as hazardous waste. Filters must

be disposed of in accordance with government hazardous waste regulations.

Input panel (not shown)—
Fittings on this panel, located on the rear of the PS288, allow for the attachment of air (used to generate the necessary vacuum and positive-pressure air to manipulate devices and operate optional assemblies) and power. See *Figure 2-2*.

Circuit breakers (not shown)—
Circuit breakers located on the input panel provide circuit protection and a source of power for the various assemblies in the PS288.

Main power switch (not shown)—
Located on the input panel, the main power switch is used to switch primary power for the PS288.

Input/Output Options and Combinations

PS288 input and output options include static tray (manual), automatic tray feeder, tube, and tape.

Standard configuration for the PS288 is static tray input/static tray output. However, **any** combination of input and output options may be used. For example, the PS288 can be configured with automatic tray feeder input combined with tube output, or tape input combined with static tray output, or tube input combined with tape output, *etc*.

Safety Systems

The PS288 has several safety systems to prevent personal injury and machine damage. These systems include:

1. **Emergency stop (E-Stop) buttons—**
   Two large, red Emergency Stop buttons are located near the top of the PS288, one on either side of the machine. The buttons are easily reached in an emergency. When an E-Stop button is pressed, the gantry and PNP head stop moving immediately.

Figure 1-3—Emergency stop button

WARNING: Pressing an E-Stop button stops motion of the gantry and PNP head only. It does not remove power from the PS288 or the Option Bay (if installed).

To restart the system, turn the E-Stop button clockwise (follow the direction of the arrows on the button) until it springs back to its full height. Follow onscreen messages to resume operation.

2. **Safety shields and interlocks—**
During operation, when the high-speed PNP head is processing devices, the clear plastic shields around the system are closed to protect personnel from injury.

WARNING: The high speed and force behind a moving gantry will expose anyone working inside the operating envelope to serious bodily injury. When working within the machine, moving the PNP head must be the responsibility of only one qualified individual. All other personnel near the system must stay clear of the operating envelope and any machine controls to prevent injury to the person working within the PS288. Never operate the PS288 with any interlock bypassed.

CAUTION: *Do not use solvents such as acetone, lacquer thinner, mineral spirits, isopropyl alcohol, or any type of abrasive compound on the safety shield surfaces. Use of these products will damage the safety shield surfaces and reduce visibility within the operating area.*

Software and User Interface Components

During programming operations, the PS288 is controlled using the keyboard, touchpad, or touch screen, and two software interfaces (TaskLink and AH500). The software components reside in the Handler Computer on the PS288.

The PS288 is a complete system with various subsystems within it, such as the robotics system, power supplies, programmers, and Handler Computer. In order to operate properly, the PS288 must remain intact.

The Handler Computer, with an additional Network Interface Card (NIC), can communicate with a corporate network. The primary logon for the Handler Computer will be MS Client.

Customer-supplied antivirus software can be installed on the Handler Computer. However, the antivirus software should not be scheduled to execute during a Job run. Instead, execute the antivirus software after the PS288 is first started and before a Job is run.

In addition, customer-supplied Statistical Process Control software can be installed on the Handler Computer. See “Statistical Process Control Software (SPC)” on page 3-50 for more information.
The PS288 should never have other software added unless instructed to do so by Data I/O Customer Support.

CAUTION: *Adding software to the PS288 can cause damage and/or cause it to operate improperly. Adding software without specific instruction from Data I/O Customer Support will void the warranty and may incur service charges.*

CAUTION: *Windows system parameters and network parameters should not be changed unless instructed to do so by Data I/O Customer Support. Changing Windows or network system parameters can cause failure and/or damage to these systems or cause improper programming.*

TaskLink Interface

Data I/O’s user interface is TaskLink™ for Windows®. TaskLink uses a Microsoft® Windows®-based system for Task creation and analysis and operates from the Handler Computer. TaskLink is used to create jobs to run on the PS288. *Figure 1-4* shows the TaskLink main screen.

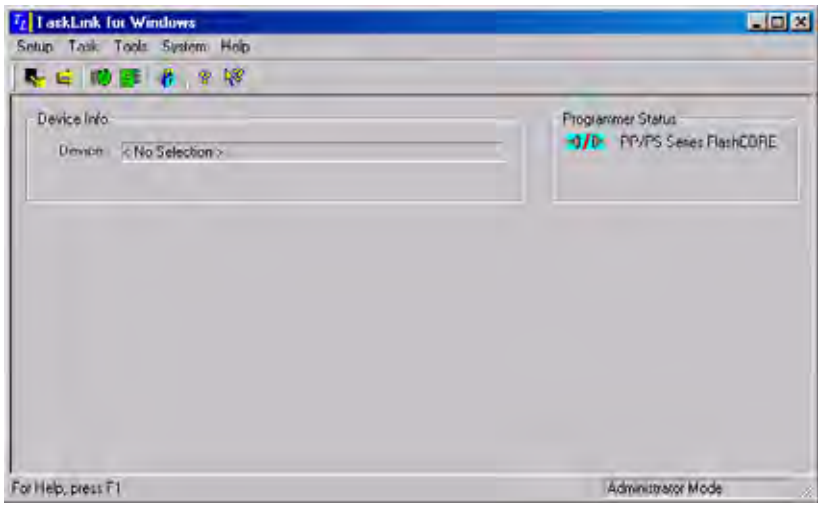


Figure 1-4—TaskLink main screen

Extensive online Help is available for TaskLink by selecting the Help menu on the main screen and clicking **Help Topics**.

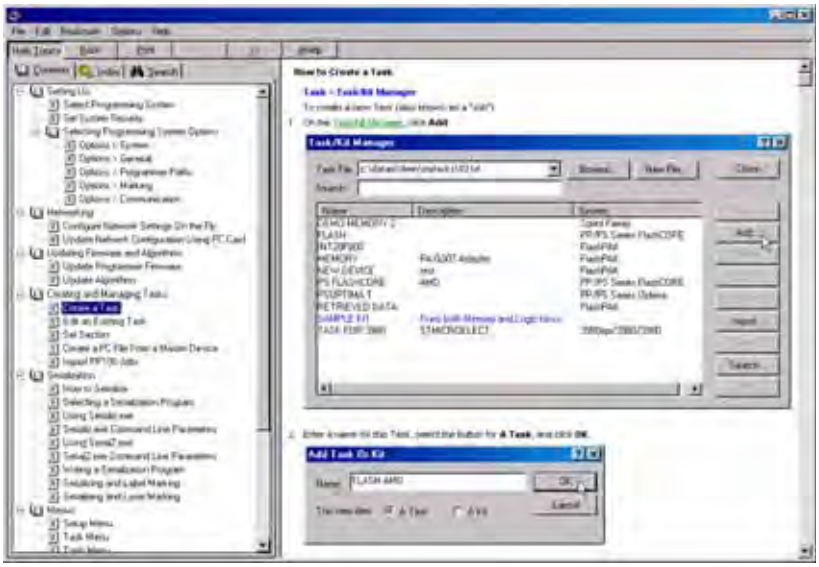


Figure 1-5—TaskLink online Help

AH500 Interface

Data I/O's Automated Handler (AH500) software is a Microsoft® Windows®-based system used to set up various PS288 system parameters such as input/output configurations, labeling options, vision system, and PNP head calibration. These parameters are contained in the WinAH400.ini file. AH500 operates from the Handler Computer. *Figure 1-6* shows a sample AH500 user interface window.

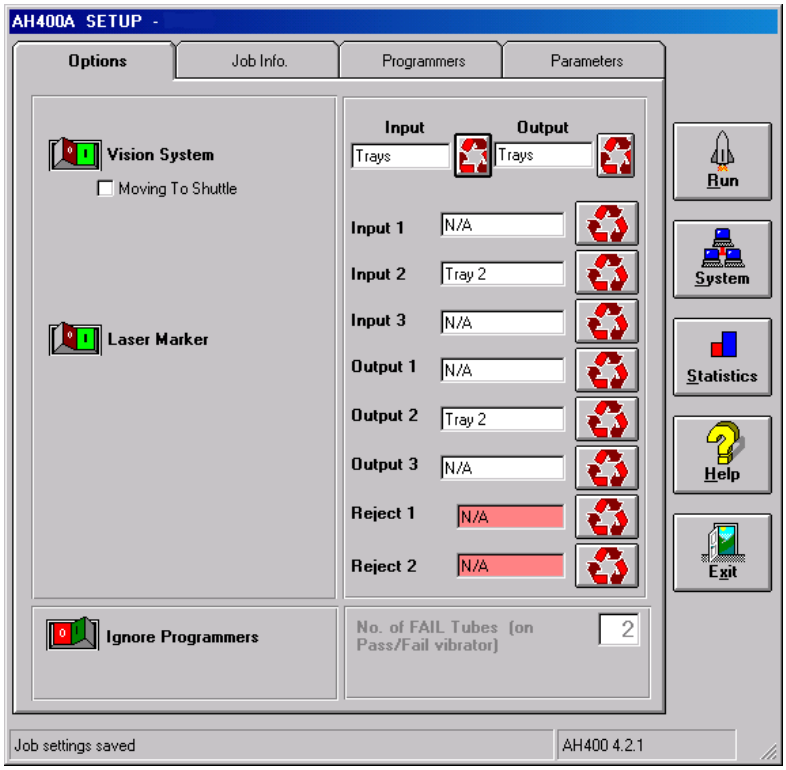


Figure 1-6—AH500 user interface example

Understanding the AH500 Gantry Window

The AH500 Gantry window displays important information about the work envelope of the PS288.

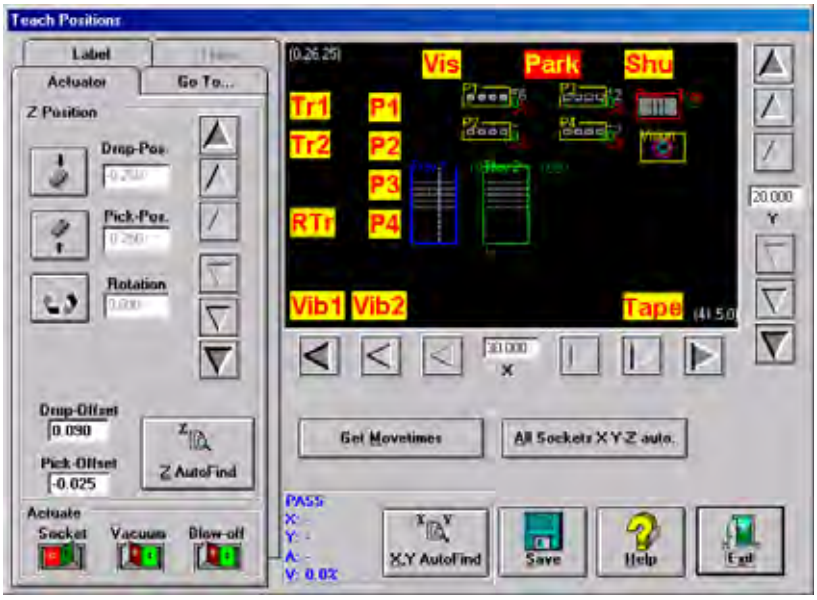


Figure 1-7—Gantry window

The yellow position labels on the Gantry window represent locations in the work envelope. Clicking a yellow position label (for example, **Tr1**) moves

the PNP head to that location in the work envelope. When selected, the yellow position label turns red. In *Figure 1-7*, the **Park** label (red) is selected and the PNP head is at the Park position.

Figure 1-8 lists position labels and their locations in the work envelope.

Label	Location in work envelope
Tr1	Tray 1
Tr2	Tray 2
RTr	Reject Tray
P1	Programmer 1
P2	Programmer 2
P3	Programmer 3
P4	Programmer 4
Vib1	Tube Vibrator 1
Vib 2	Tube Vibrator 2
Vis	Vision System
Park	Park
Shu	Shuttle Transfer
Tape	Tape Input

Figure 1-8—Label and locations

Also on the AH500 Gantry window are adjustment arrows for the X-axis and Y-axis. Clicking an arrow moves the PNP head the given distance in the direction chosen. From the inside working outward, the arrows adjust the position ±0.001, 0.010, and 0.100 inches respectively. See *Figure 1-9*.

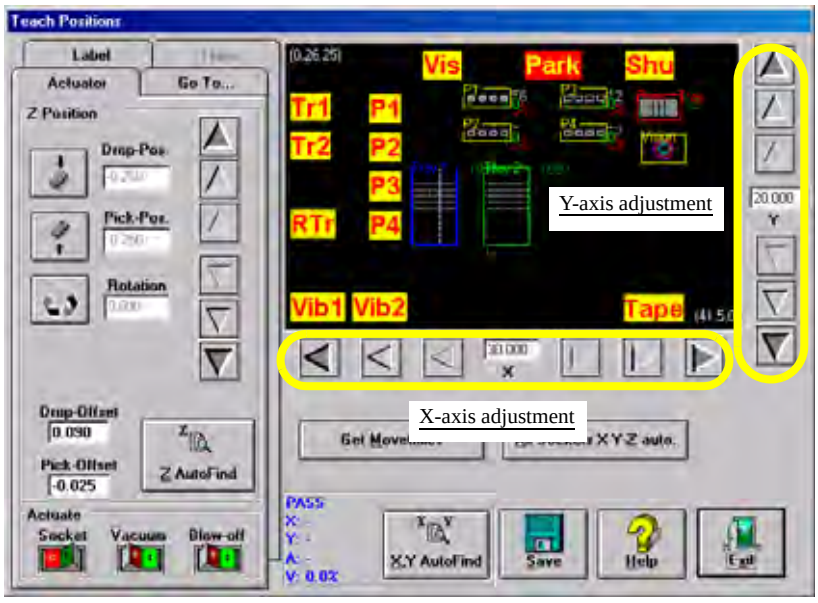


Figure 1-9—Adjustment arrows for X- and Y-axes

Laser Interface

The Laser interface is used to create parameters required for laser jobs and start laser marking. The software resides on the Laser Computer in the laser marking system located in the Option Bay. The Laser Computer operates using the Microsoft® Windows XP operating system.

The Laser Computer is accessed through the keyboard by pressing CTRL-CTRL, typing "B" and pressing ENTER. The Laser interface is displayed on the monitor and controlled through the keyboard and touchpad. The touch screen does not work while in Laser Computer mode. To return to the Handler Computer, press CTRL-CTRL, type "A" and press ENTER.

When the laser marking system is set up and initialized, it receives commands from the AH500 software initiating the marking sequence. See *Figure 1-10* for an example of the laser interface configuration window. More information about the laser interface follows in *Chapter 2—Set Up* and *Chapter 3—Operation*.

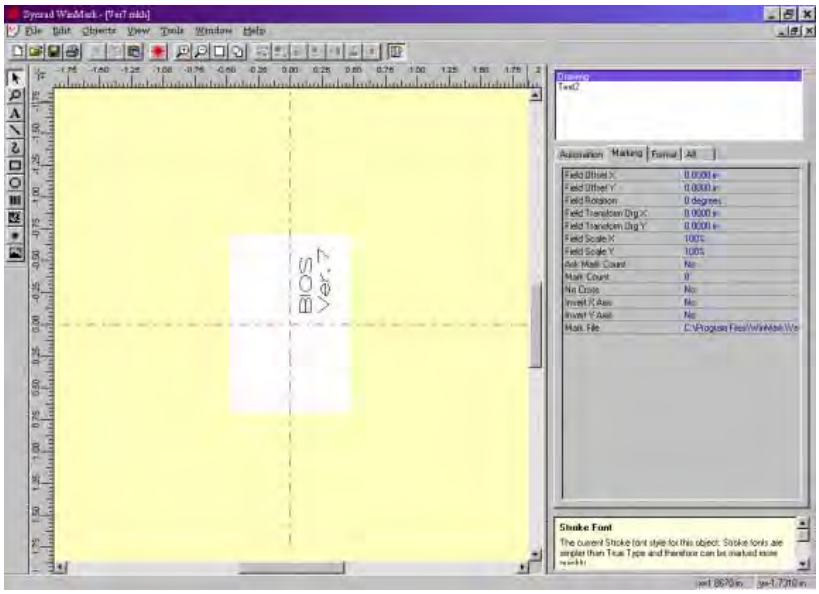


Figure 1-10—Laser computer interface example

Required Facilities for Operation

The PS288 is a self-contained unit that creates most of its own power supply voltages and signals required for proper operation. Power requirements are 208–240 VAC, 50/60 Hz, single phase electrical power. Air requirements are clean, dry, oil-free air, input rated between 620 and 827 kiloPascals (90 to 120 PSI) from an industrial grade compressor with a tank of sufficient size to maintain constant air pressure at 85 liters per minute (3 Standard Cubic Feet per Minute).

Precautions for Safe Operation

The PS288 has many safety features designed to make the system safe and efficient to operate. **The system can be dangerous if the safety precautions and features in the manual are ignored.**

To avoid possible personal injury or damage to the equipment, please observe the following practices:

- Do not use the PS288 for any purpose other than its intended use.
- Do not operate the system if the safety shields are not in their normal operating positions.
- Do not operate the system when any of the outer sheet metal panels are removed.
- Only qualified personnel trained by Data I/O to service and maintain the PS288 (including laser safety training) should install, maintain, repair, or troubleshoot the system.
- Do not operate a system while servicing, replacing, or adjusting any component unless directed to do so in this manual. Make sure that the system is properly shut down before performing any of these operations.
- Do not operate the PS288 unless you have been thoroughly trained and have read and understand the instructions in this manual, particularly those that describe the system's safety features.
- Disconnect the external air line before servicing pneumatic parts.
- Do not place any part of your body near or in the direct path of moving parts.
- Do not disable or attempt to defeat any of the safety features of this system. Serious personal injury and/or equipment damage can occur if any safety systems on the PS288 are disabled. If you suspect that a safety feature of the system is damaged or malfunctioning, stop using the PS288 immediately and contact your local Data I/O Support office.
- Read and follow the laser vacuum filter disposal requirements described later in this section. Always dispose of any other hazardous or residual by-products of the production process in accordance with governing laws and regulations.
- Use extra caution when using the tape input/output modules or device labeling option. The PS288 safety shields do not cover or fully enclose these modules. It is possible that hands, body parts, or loose clothing can get caught or pinched in these mechanisms.

Laser Safety

The laser marking system, located in the Option Bay attached to the PS288, has been designed in accordance with the following safety guidelines:

- Operates as a Class 1 laser (CDRH classification).
- Fume extractor traps marking fumes and other by-products of the laser marking operation.
- System designed to comply with OSHA guarding standards.
- Integrated safety interlocks prevent the laser from firing while any interlock is activated.
- Refer to and follow laser and safety precautions in ANSI X136.1-1993, *American National Standard for the Safe Use of Lasers*. Procedures listed under the Standard include: appointment of a Laser Safety Officer, operation of the product in an area of limited access by trained personnel, servicing of the equipment only by trained and authorized personnel, and posting of signs warning of potential hazards.

WARNING: Blindness hazard! Always wear eye protection when the laser safety shields are open, such as during service. Direct or diffuse laser radiation can damage eyes. Goggles must block 10.6 µm laser radiation. Goggles protect against scattered energy but not against direct viewing of the laser beam or reflections from metallic surfaces.

WARNING: Serious burn hazard! Direct or diffuse laser radiation can cause serious burns. Keep hands and other parts of the body out of the path of the laser bean when servicing.

WARNING: Toxic fume hazard! Laser marking generates vapors, fumes, and particles that may be noxious, toxic, or even fatal. Follow maintenance procedures on the fume extractor. Use proper ventilation.

Laser Specifications

Specifications for laser Model 48-1(S) installed in the Option Bay are shown in *Figure 1-11*.

Output Power	10W	
Mode Quality	TEM_{00}, 95% Purity M^2<1.2	
Ellipticity	<1.2	
Rise Time	<150µsec	
Beam Diameter	3.5mm	
Beam Divergence (full angle)	4mR	
Wavelength	10.57-10.63µm	
Power Stability, from cold start (guaranteed)	±10	
Polarization	Linear (Vertical)	
Cooling	Air	Water
Heat Load (max)	300W	
Flow Rate, Air	250 CFM x 2	N/A
Flow Rate, Water (18-22°C)	N/A	0.5 GPM
Input Voltage / Current	30 VDC / 7A	
Dimensions (in) (mm)	16.9 x 2.8 x 4.2 429 x 71 x 107	
Weight	9 lbs / 4.1 kg	

Figure 1-11—Model 48-1(S) laser specifications

Laser Safety Interlocks

The Option Bay has five laser safety interlocks that prevent the laser from firing when any safety shield on the Option Bay is removed. To physically enable the laser, all laser safety interlocks must form a complete electrical circuit to the laser's safety inhibit input. When activated, (*i.e.*, when any safety shield is removed) the safety interlock disables the laser's safety inhibit circuit. Activation of the safety interlock prevents (via hardware in the laser itself) the laser from firing. A laser safety interlock is shown in *Figure* .

Figure 1-12—Laser safety interlock

The five laser safety interlocks are located:

1. Behind the removable safety shield on the **front** (toward the PS288) of the Option Bay
2. Behind the removable safety shield on the **upper left** side of the Option Bay
3. Behind the removable safety shield on the **top** of the Option Bay
4. Behind the removable safety shield on the **upper right** side of the Option Bay
5. Behind the removable safety shield on the **lower left** side of the Option Bay

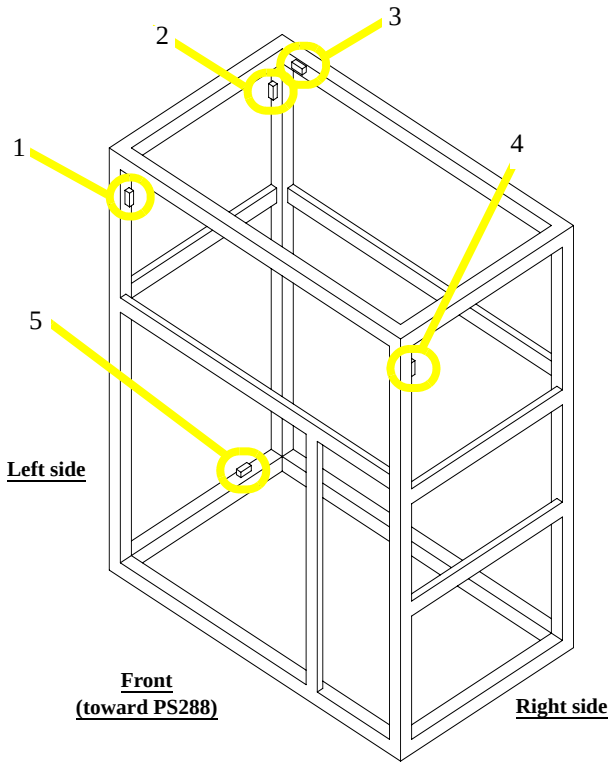


Figure 1-13—Location of five safety interlocks

The laser safety interlocks can be overridden for service. To override a laser safety interlock, pull out on the switch. The laser can now fire with the safety shield removed.

WARNING: The laser safety interlocks should be overridden only by qualified and trained service personnel.

WARNING: Never leave system unattended with safety shield removed and safety interlocks overridden. Serious burn hazard! Direct or diffuse laser radiation can cause serious burns. Blindness hazard! Direct or diffuse laser radiation can damage eyes.

Laser Safety Labels

The laser safety label shown in *Figure 1-14* warns of laser danger.

Figure 1-14—Laser safety label

Laser safety labels are located on the **left** and **right** sides of the Option Bay:

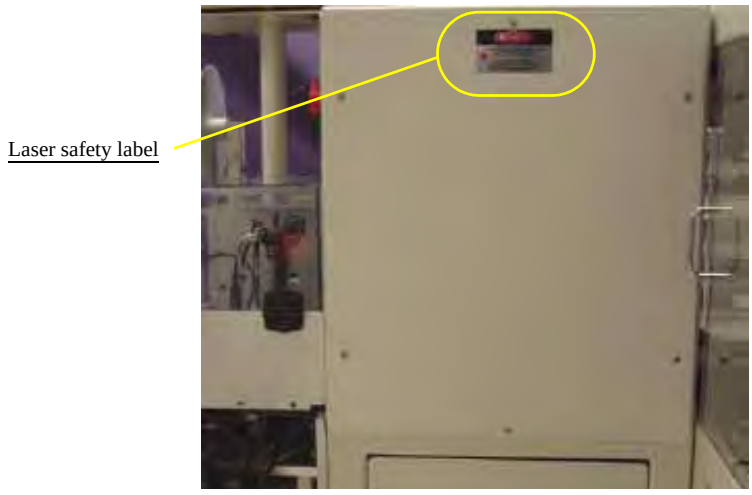


*Figure 1-15—Label location on **left** side of Option Bay*

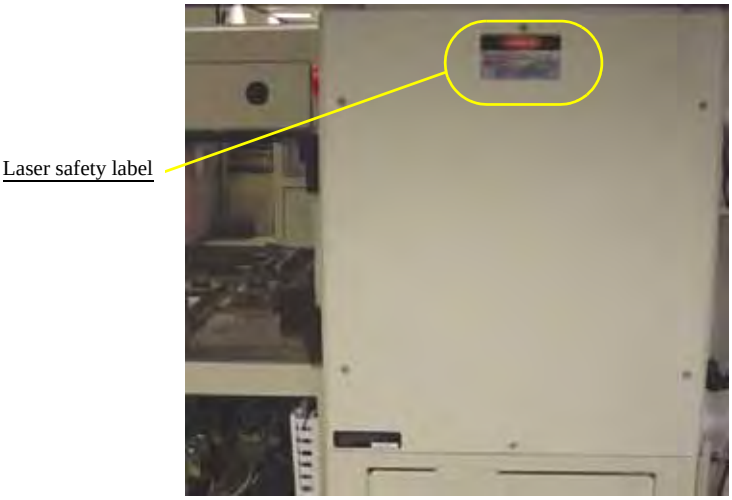


Figure 1-16—Label location on right side of Option Bay

Disposal of Laser Vacuum Filters

The laser system uses a vacuum to remove the smoke and other by-products of the laser marking process. The smoke fumes pass through a series of filters designed to remove airborne particles from the operating environment. Material Safety Data Sheets (MSDS) for materials being processed should be thoroughly evaluated and the adequacy of provisions for fume extraction, filtering, and venting should be carefully considered.

The exact composition of the materials trapped by the filters depends upon the materials used by the semiconductor manufacturer to create the device package. Analysis of filter contents obtained after marking a representative variety of devices has revealed a sufficient level of potentially hazardous material, such as antimony and other heavy metals, to require that you handle and dispose of the filters with other hazardous waste within the facility. Dispose of the filters in accordance with the facility's hazardous waste policy and in a manner that meets all applicable government (local, state, and federal—or equivalent) regulations.

Review the following references for further information regarding exposure criteria:

- ANSI Z136.1-1993, *Standards for the Safe Use of Lasers*, section 7.3.
- U.S. Government's Code of Federal Registers: 29 CFR 1910, subpart Z.
- *Threshold Limit Values* (TLVs) published by the American Conference of Environmental Industrial Hygienists (ACEIH).

Laser Vacuum Filter Replacement Intervals

Replace the filters in the fume extractor according to information in the "Interval Table" on page 5-2. If the filters are not replaced as required, the laser vacuum system will not be able to prevent fumes and marking by-products from escaping into the work environment.

WARNING: Do not clean the laser vacuum filters by blowing with compressed air, shaking, or using any method that allows the particulate trapped by the filters to be released into the work environment. Dispose of the filters as directed in your fume extractor manual.

WARNING: Failure to replace the laser vacuum filters at the required intervals could create a hazardous operating environment.

Determining Filter Contents

The company contracted to dispose of the facility's hazardous waste may be required to perform a profile of the filter contents to determine the specific composition of the particulate matter. The manufacturer of the semiconductor devices being marked may be able to provide a profile sheet describing the composition of their packaging material.

Standard plastic device packages typically contain *antimony hydroxide* as a fire retardant, the source of the antimony in the vacuum filters. Other hazardous materials may also be present depending upon the type of device packages that are laser marked.

After the initial profile is performed and on record with the company that disposes of the facility's hazardous waste, additional testing of contaminated filters should not be needed unless the contents of the device packages or type of device packages being marked changes significantly.

The licensed hazardous waste disposal company can provide the necessary information to label the bags containing the filters and will complete the paperwork required for transportation and disposal in a manner that meets applicable government (local, state, and federal—or equivalent) hazardous waste regulations.

Filter Handling and Storage

The procedure for replacing the laser vacuum filters is described in the fume extractor manual. Following the precautions listed below will help ensure a safe work area for all personnel using the PS288.

Ensure that protective gloves (disposable latex or vinyl) are worn during the removal of the contaminated filters. Handle the contaminated filters in a manner that minimizes the release of the particulate on the filters.

Dispose of the contaminated filters in a tightly sealed plastic bag (such as a bag with a reusable locking seal). When all filters have been carefully placed in the bag, pull off the disposable gloves (inside out), place them in the bag, and seal the bag.

If it is determined that the by-products of laser marking contain potentially hazardous materials, a hazardous waste label that meets government requirements (local, state, and federal—or equivalent) needs to be affixed to this bag or other hazardous waste container.

WARNING: Numerous government regulations apply to the storage of hazardous waste. Ensure that contaminated filters are properly labeled and stored in your hazardous waste storage area. Also, make sure that they are not stored on your site longer than government regulations allow (the typical limit is 90 days). Check your government (local, state, and federal—or equivalent) regulations for hazardous waste storage requirements.

Room Ventilation

The PS288, its optional systems, and its label or laser marking system contain mechanical components and associated electrical systems that generate heat and extremely low levels of particulate matter.

The PS288 should be located in a room with adequate space to allow easy access to all enclosures. A minimum of one meter (36 inches) of clearance on all sides is required for removal of system components.

The room should be provided with suitable levels of general room heating, ventilation, and air conditioning. For an occupied office area, the American Society of Heating, Refrigeration, and Air Conditioning Engineers, Inc. (ASHRAE) Standard 62-1992 specifies a minimum of 15 cubic feet per minute (CFM) of air per occupant. This level of ventilation is intended to provide the occupants of the room with sufficient air movement to provide a comfortable environment. The air movement is intended to dissipate heat, odors, and other exhalation products from respiration (such as carbon dioxide and water vapor).

Because the PS288 generates heat, an additional 85 CFM is recommended, bringing the total room air exchange rate to 100 CFM. In a room with dimensions of 10 feet by 10 feet, with an 8 foot ceiling (800 cubic feet of total interior area), 100 CFM would provide approximately six room air changes per hour.

Based on industrial hygiene monitoring performed during the worst case operating scenario of a PS288 laser marking system, this rate of air movement is sufficient to provide a safe and healthy airborne work environment.

WARNING: *Operating the PS288 in an area that does not meet the minimum ventilation requirements could result in a hazardous operating environment.*

Electrostatic Discharge (ESD) Precautions

The circuit boards inside the PS288 are susceptible to electrostatic discharge (ESD), which can damage the circuitry of the programming electronics. Also, devices processed through the PS288 are very sensitive to static and can be damaged by accidental and unintended electrostatic discharge while being handled. The easiest way to prevent damage from ESD is to make sure a common electric potential (ground) exists between a static-sensitive device or component, its environment, and the operator.

Operators should wear an antistatic wrist strap connected to the grounding socket on the front of the PS288. The wrist strap should contain a 1M-ohm (minimum value) to 10M-ohm (maximum value) current limiting resistor.

Handling Devices Safely

To prevent damage to device leads, use a vacuum tool to move or pick up devices. The vacuum tool is designed to handle devices without damaging them.

CAUTION: *Do not touch devices with your hands or any implement other than the vacuum tool. Damage to fine-pitched leads may result.*

To pick up a device using the vacuum tool, squeeze the bladder, place its rubber tip on the device body, release pressure on the bladder, and lift up. Depending upon the physical size of the device, a different sized rubber tip may need to be used to adequately handle the device. See *Figure 1-17*.

Figure 1-17—Semiconductor device vacuum tool (PN 565-8000-001)

Chapter 2

Set Up

PS288 installation is performed by Data I/O service personnel or an authorized distributor. The PS288 requires an operating location and two external facilities (power and air).

The system arrives in a wooden crate. After ensuring that there is no damage to the exterior of the crate, the installer removes the crate and inspects for damage that may have occurred during shipping. If there appears to be no damage, the PS288 is unbolted from the shipping pallet and moved to the floor.

The operating location for the PS288 must:

- allow at least one meter (36 inches) of area around its perimeter for opening and removing panels as well as repairing and replacing internal subassemblies
- provide a solid foundation (for example, a concrete floor)

Once the PS288 is properly located, the feet are adjusted to level the system.

WARNING: Use only the adjustable feet provided on the PS288 for leveling the machine. Do not use shims of any kind to assist in leveling. The PS288 contains a fast-moving gantry with sizable mass. Instability may occur if all four of the installed feet do not make suitable contact with the floor, or if the leg lock nuts are not tightened against the underside of the frame. The operating area for the PS288 must be stable, solid, and mostly level prior to installation. If this is not achievable, consider moving the system to another location.

Making the Necessary Connections

The PS288 requires two external facilities: pressurized air and electrical power. Both facilities connect to the PS288 through the input panel found on the rear of the PS288. With these two facilities, all unique electrical voltages and signals, as well as pneumatic requirements, are generated within the PS288.

Pneumatic Input and Controls

The PS288 requires clean, dry, oil-free air from an industrial grade compressor. The compressor's tank should be of sufficient size to maintain constant air pressure at 85 liters per minute (3 Standard Cubic Feet per Minute).

> ***NOTE:*** *If the compressor cannot maintain the correct air pressure, system performance will be affected.*

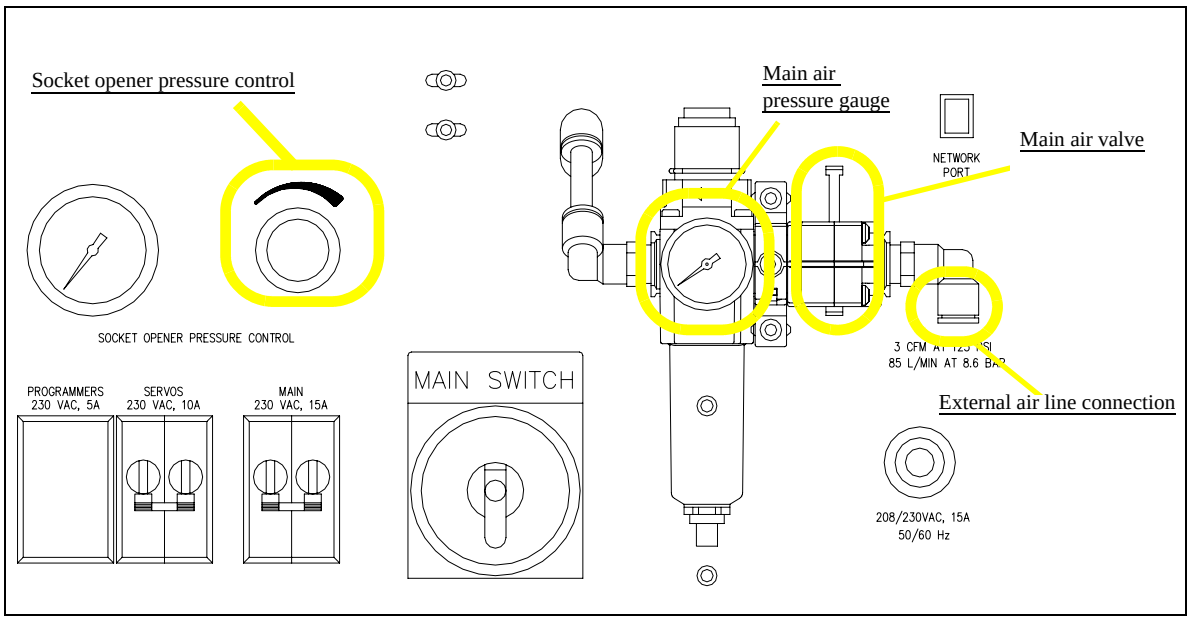


Figure 2-1—Pneumatic input and controls on the input panel

External Air Line Connection—
The low pressure air source is supplied to the system through the external air line connected to the air filter. The PS288 air filter is a secondary filter only. The main filter should be a 10 micron filter/regulator installed between the factory compressor and the PS288. The external air line should be at least 3 meters (10 feet) long to allow the supplied air to cool sufficiently so that water vapor contained in the air condenses and can be extracted. See *Figure 2-1* for the location of the external air line connection.

> ***CAUTION:*** *Oil, excessive moisture, or poorly filtered air will obstruct the system's internal air network, affect performance, and void the warranty related to air system failure. If oil or excessive moisture is detected, call Data I/O Customer Support immediately.*

Main Air Pressure Gauge—
The main air pressure gauge displays the air pressure the PS288 uses internally to generate vacuum and air operations. The main pressure regulator is pre-set to 586 kiloPascals (85 PSI) as read on the gauge on the input panel. This setting is not adjustable. See *Figure 2-1* for the location of the main air pressure gauge.

Socket Opener Pressure Control—

> ***NOTE:*** *The Socket Actuator must be switched on from the AH500 software before the regulator gauge will display a reading.*

The socket opener pressure control, also on the input panel, controls the air pressure used to lower the Socket Actuator that opens the socket(s). This pressure should remain in the range of 138-276 kiloPascals (20–40 PSI) but may be adjusted within that range depending on the socket in use. See *Figure 2-1* for the location of the socket opener pressure control.

> ***NOTE:*** *See "Adjusting the Socket Actuator Air Pressure" on page 5-37 for more information.*

Electrical Input

Required power is provided through a customer-supplied 3 wire power cable with one end terminated in an electrical plug as required by the customer's facility. Data I/O trained personnel route the other end of the 3 wire power cable through the input panel and screw it into a terminal block inside the PS288. See *Figure 2-2* for the power cable routing through the input panel.

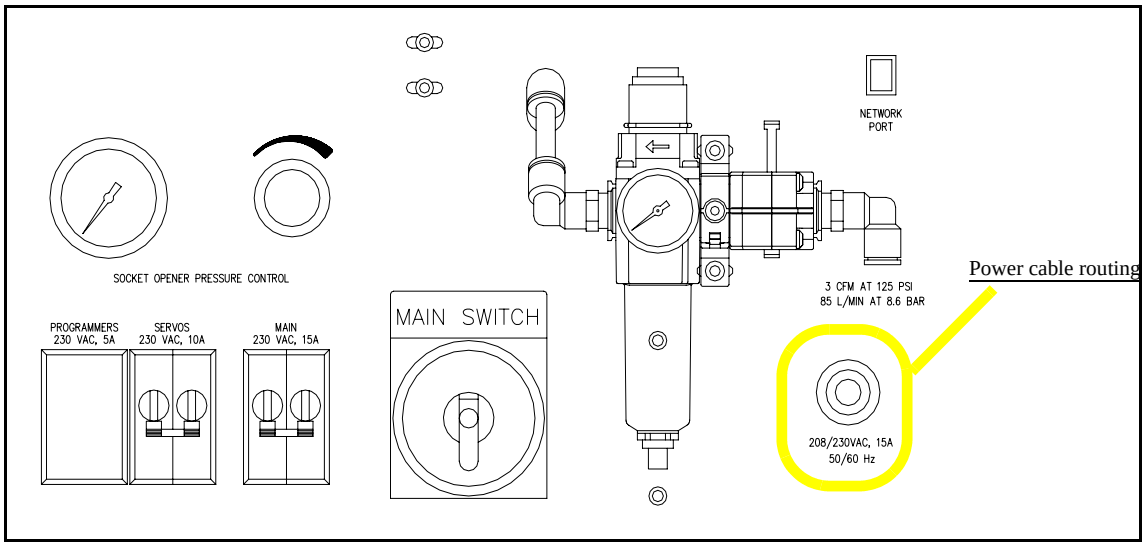


Figure 2-2—Power cable routing through input panel

See *Figure 2-3* for the terminal block where the 3 wire cable is attached.

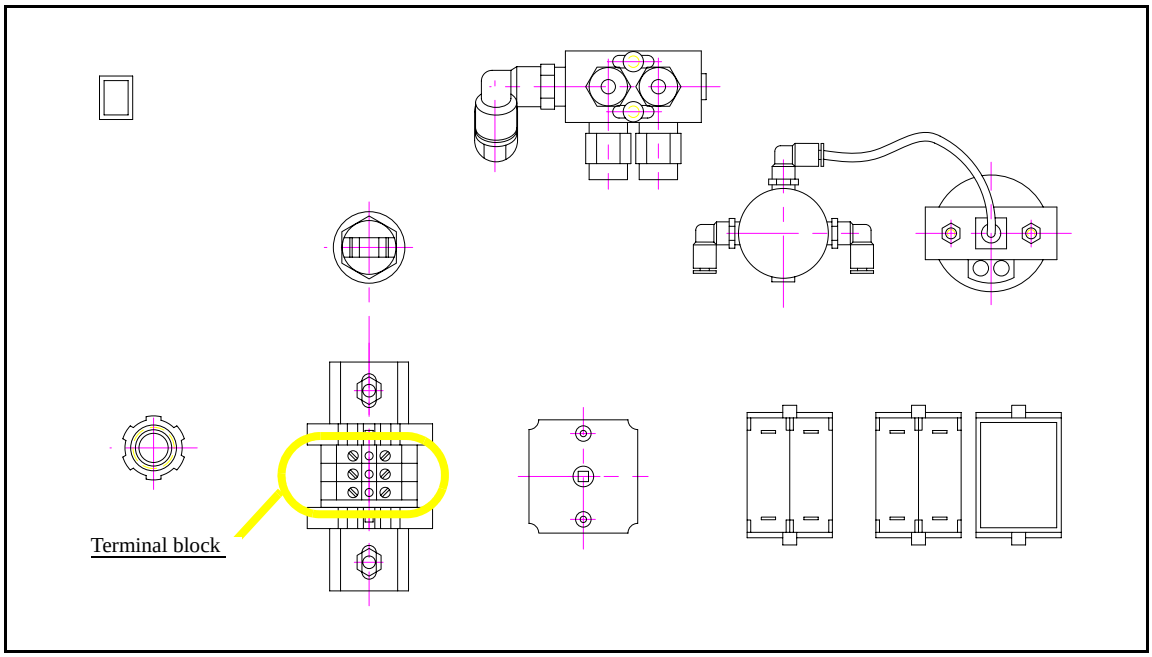


Figure 2-3—Terminal block

Applying Power for the First Time

Before the PS288 is switched on the first time, ensure the following:

- The external air line is connected, and the main air valve is open.
- All E-Stop buttons are in the released (operating) positions (refer to *Figure 1-2* for location of the E-Stop buttons).
- All safety shields are closed (refer to *Figure 1-2* for location of the safety shields).
- The circuit breakers on the input panel on the back of the PS288 are in the **ON** (i.e., UP) position.
- The circuit breaker on the I/O Controller is set to the **ON** position.
- The power switch on the Handler Computer is set to the **ON** position.
- The Socket Adapters required for the job have been installed on all necessary programmer sites. See “(Optional) Change a Socket Adapter” on page 3-17 for more information.

Once the above conditions have been checked, turn the main power switch on the input panel (on the rear of the PS288) in a clockwise direction to the **ON** position. Then press the I/O Controller **START** button.

WARNING: Electric shock hazard. Power is applied to the programmer assemblies when the main power switch is switched on, even when the I/O Controller is turned off.

After power is applied, verify that all mechanical assemblies appear to be at rest, and no obvious failures or electrical anomalies occur. Verify that the Handler Computer boots properly and is waiting at a network login window.

If electrical or mechanical problems are noted, turn off the PS288 and notify Data I/O Customer Support immediately.

Setting Up Static Tray Input/Output

Static tray input and output is the standard configuration on the PS288.

> ***NOTE:*** *When using static tray input and output, ensure that blank devices are loaded with the correct pin 1 orientation. Pin 1 orientation is set when the PNP head locations are taught. For more information, see "Teach Tray Locations" on page 3-38.*

To set up the static tray input and output:

1. Prepare system—

1a) If a job is running, press **Pause** on the Run window.
1b) Press **Exit** to return to the Setup window.
1c) Click the **Options** tab.
1d) Open the front safety shield.

2. Install Static Trays—

2a) Orient the static trays so that the beveled edge is in the lower right corner. See *Figure 2-4*.

Figure 2-4—Static tray orientation

2b) Slip trays into Static Tray 1 and Static Tray 2 locations.
2c) Place the "L" shaped magnet in the upper right corner of each tray so that the each tray seats against the 4 positioning pins. When properly seated, each tray blocks an optic sensor. See *Figure 2-5*.

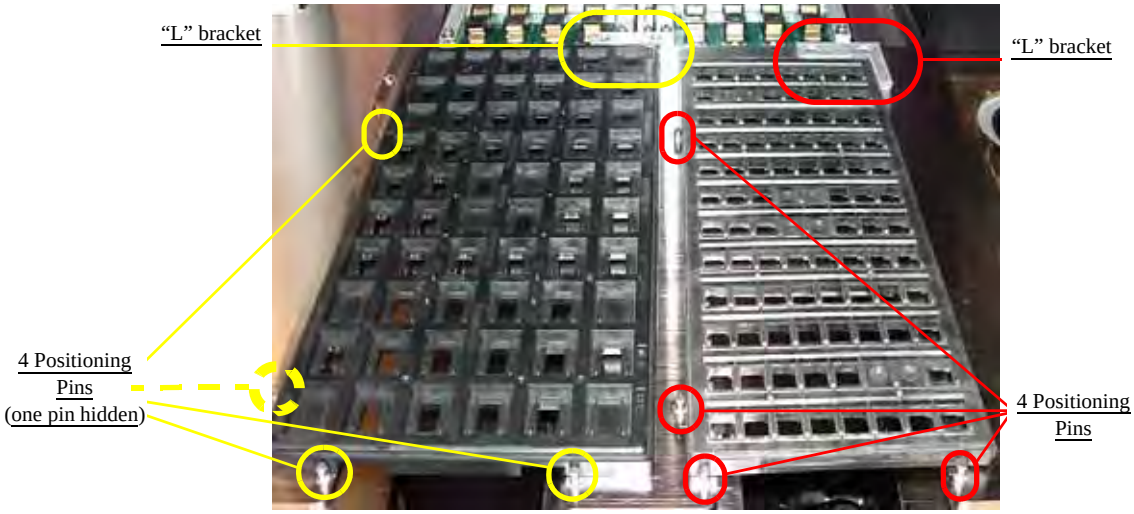


Figure 2-5—Two Static Trays seated with optic sensors (hidden) blocked

CAUTION: *If a Job is Paused and a static tray is removed from the Static Tray 1 or Static Tray 2 location and then returned to the Static Tray 1 or Static Tray 2 location, the software detects that the optic sensor was uncovered. As a result, all devices in a static tray are reset to new, and the PS288 proceeds as if all devices are blank (unprogrammed). Therefore, use caution when removing partially programmed static trays.*

3. Install optional reject bin/box—

Place a small bin or box to the front of the Vision position (and behind the optional Tape input position) on the work surface, as shown in *Figure 2-6*.

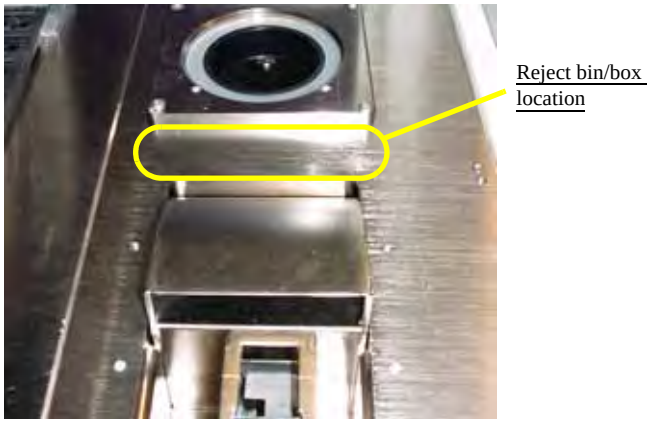


Figure 2-6—Reject bin/box location

NOTE: *On the Gantry window, the reject bin/box is represented with the* ***RTr*** *yellow position label.*

This completes the procedure for setting up of the static tray input and output module.

Before running a job for the first time, it is necessary to:

- Select tray input/output settings in the AH500 software. For information, see “Configure Input/Output Settings” on page 3-4.
- Teach locations to the PNP head. For information, see “Teach the Package File” on page 3-33.

(Optional) Setting Up the Automatic Tray Feeder

The PS288 can be configured with either the TF20 or TF30 automatic tray feeder.

For automatic tray feeder setup, see the installation instructions supplied with the TF20 or TF30.

For information on operating the TF20, see “(Optional) Operate the TF20 Automatic Tray Feeder” on page 3-18.

For information on operating the TF30, see “(Optional) Operate the TF30 Automatic Tray Feeder” on page 3-19.

(Optional) Setting Up the Tube Input and Tube Output Modules

As an option, the PS288 can be configured with tube input and tube output modules.

To set up the tube input and output modules:

1. Collect materials—

1a) Determine the size of the devices to be programmed and select tubes that match device size.

1b) Identify the input tube loader platform. See *Figure 2-7*.

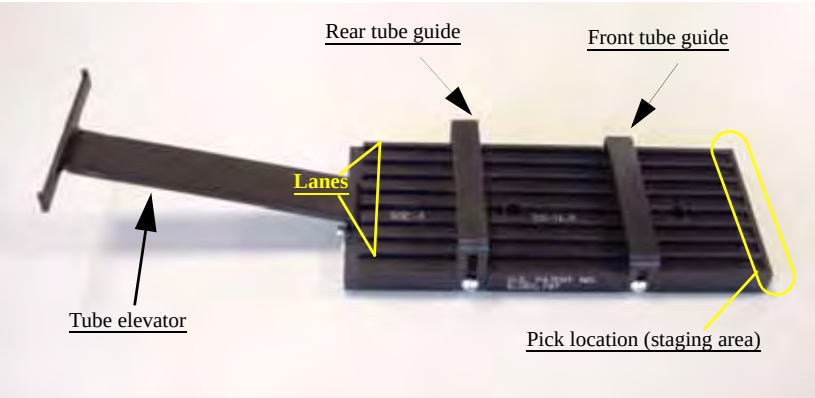


Figure 2-7—Input tube loader platform

2. Install input tube loader platform—

2a) Open the front safety shield.

2b) Install the input tube loader platform onto the input Vibrator Motor 1 (V1) on the left side of the work surface. Vibrator Motor 1 is shown in *Figure 2-8*.

2c) Tighten the two screws using a 9/64 inch Allen wrench.

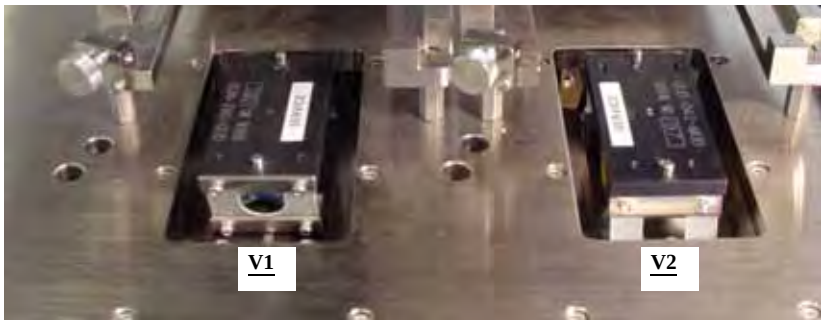


Figure 2-8—V1 and V2

3. Install output tube unloader platform—

3a) Install the output tube unloader platform onto the output Vibrator Motor 2 (V2) on the right side of the work surface. Vibrator Motor 2 is shown in *Figure 2-8* above.

3b) Tighten the two screws using a 9/64 inch Allen wrench.

4. Insert tubes in input tube platform—

4a) Insert empty tubes in the first and last lanes of the input tube loader platform. See *Figure 2-9*.

4b) Adjust the rear tube guide and the front tube guide so the tubes are held on the input tube platform snugly but are not compressed out of shape. See *Figure 2-9*.

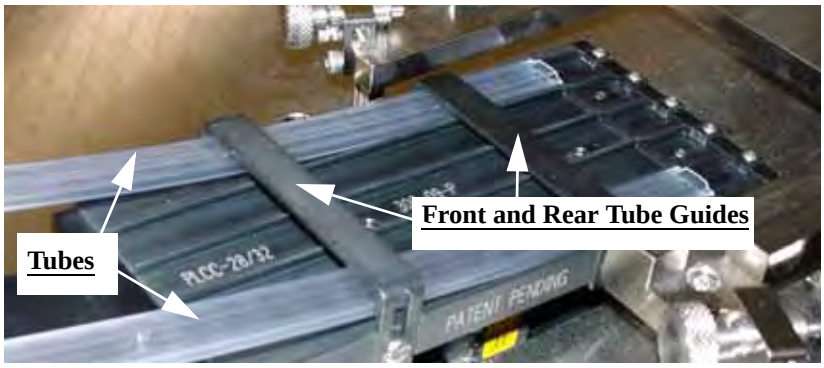


Figure 2-9—Adjust front and rear tube guides

4c) Remove the empty tubes from the first and last lanes of the input tube loader platform.

5. Adjust output tube unloader platform—

5a) Identify the output tube unloader platform. See *Figure 2-10*.

Figure 2-10—Output tube unloader platform

5b) Adjust the output tube unloader platform front and rear tube guides as described in Step 4 above.

6. Insert tubes—

6a) Insert **full** tubes into the input tube loader platform.
6b) Insert **empty** tubes into the output tube unloader platform.
6c) Close the safety shield.

***NOTE**: The pin 1 orientation for devices is set in the package file. Devices should be loaded in tubes as defined in the package file.*

***NOTE:** If this is the first time you are installing tube feeders on your PS288, you may need to edit the WinAH400.ini file to reflect this additional option. Proceed with Step 7.*

If you have previously installed tube feeders on your PS288, skip to Step 8.

7. Configuring AH500 after first tube feeder installation—

7a) Make a backup copy of WinAH400.ini: e.g., WinAH400backup.ini.
7b) Using Windows Explorer, open C:\AH400_32\WinAH400.ini.with NOTEPAD editor.
7c) Locate the section
`;------- tube media settings -----`
7d) Ensure that the value for **`Tube Feeder 1`** (input tube feeder) is **`STDIN`**. Change if it is not.
7e) Ensure that the value for **`Tube Feeder 2`** (output tube feeder) is **`STDOUT`**. Change if it is not.
7f) Save the WinAH400.ini file and exit Windows Explorer.

8. Configuring AH500 after repeat tube feeder installation—

8a) On the Options window, select "Tubes" for the input and output media.
8b) If the vision system will be used to check every device, set Vision System to **ON**.
8c) If the vision system will be used to check only the first and last devices in a tube, set Vision System to **OFF** and check "**1st +last 2 /tube**."

9. Adjust vibration controls—

If devices do not travel freely in the input tubes or the output tubes, increase the vibration by turning the vibration controls clockwise. The magnitude of vibration is set by adjusting V1 for the input tubes and V2 for the output tubes.

***NOTE:** Within AH500's Gantry window, Vibrator 1 is represented by the yellow position label **Vib1**. Vibrator 2 is represented by the yellow position label **Vib2**.*

This completes the procedure for setting up a tube input and tube output modules.

Before running a job for the first time, it is necessary to:

- Teach locations to the PNP head. For information, see “Teach the Package File” on page 3-33.

(Optional) Setting Up the Tape Input Feeder

The PS288 can be configured with an optional tape input feeder. The tape input feeder is installed on the front of the PS288.

Tape input feeders are available in 8, 12, 16, 24, 32, 44, and 56 mm sizes to match device tape of those widths. The last two digits of the tape input feeder part number indicate the tape width. For example, a 32 mm tape input feeder has a part number ending in 32. See *Figure 2-11*.

Figure 2-11—Part number for 32 mm feeder

To install the tape input feeder:

1. For first-time installation—
If the tape input feeder is being installed for the first time on your PS288, the WinAH400.ini file may need to be edited to reflect this additional option.

1a) Using Windows Explorer, open C:\AH400_32\WinAH400.ini with NOTEPAD editor.

1b) Locate the section
```
;------- tape input/output -----
```

1c) Ensure value for Tape Advance Installed is **TRUE**, as shown.
```
TapeAdvanceInstalled=TRUE
```

1d) Save the WinAH400.ini file and exit Windows Explorer.

2. Prepare the system—

2a) From the Handler Computer interface, stop any Job that is running and exit to the main window as shown in *Figure 2-12*.

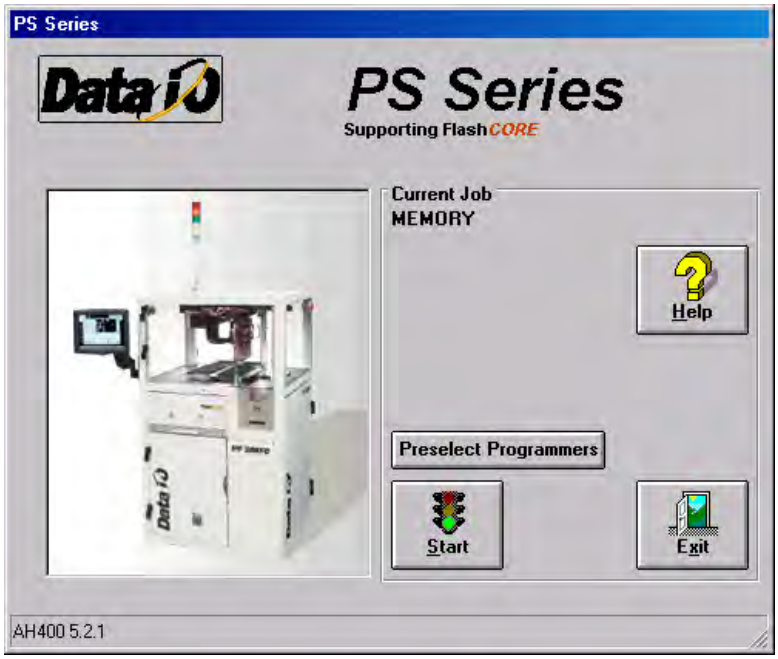


Figure 2-12—Main window

2b) Remove the two screws holding the small safety shield that covers the tape input feeder slot.

Figure 2-13—Remove two screws holding small safety shield

2c) Remove the small safety shield and set it aside. It is not used when the tape input feeder unit is installed.

3. Mount the feeder unit—

3a) Align the rail on the bottom of the feeder unit with the channel in the base plate.

3b) Slide the feeder unit down the channel until the feeder unit reaches the front wedge. See *Figure 2-14.*

Figure 2-14— Slide feeder unit down channel

3c) Push the feeder down.

4. Connect interface cable—

Insert interface cable into the plug and push until cable snaps in. See *Figure 2-15*.

Figure 2-15—Connect interface cable

5. Mount device reel—

5a) Orient the reel so that devices are on the top of the carrier tape as the tape comes off the reel.
5b) Slide the reel onto the reel pin shaft and lock on the locating ridge.
5c) Rotate the reel pin cap to secure the reel to the shaft.

6. Thread device carrier tape—

NOTE: *For more information about threading device carrier tape, see the manual that came with your tape feeder system.*

6a) Insert device carrier tape under the input roller.
6b) Thread device carrier tape down the input guide so that it sits under the guide and on top of the step.

6c) Thread device carrier tape under cover tape roller.
6d) Lift the spring-loaded tape window latch and lift the tape window.
6e) Pull device carrier tape until it is visible at the end of the feeder unit.
6f) Separate cover tape from the device carrier tape.
6g) Pull device carrier tape forward to feed into carrier waste tape channel.

NOTE: *The empty device carrier tape will eventually come out of the channel. Place a reject box on the floor to contain empty device carrier tape.*

6h) Align the guide holes in the device carrier tape with the teeth on the Drive Sprocket.

7. Thread cover tape—

7a) Thread the cover tape through the tape window, under the window roller, and over the cover tape roller.
7b) Thread the cover tape under the cover tape wheel.
7c) Attach the end of the cover tape to the cover tape wheel using a small piece of adhesive tape.

8. Adjust pitch—

8a) Count the number of guide holes in the carrier tape between the center of one pocket and the center of the next pocket.
8b) On the feeder unit control panel, set the pitch index to the number of guide holes. For example, if there are 4 guide holes from center to center, enter 4 in the pitch index. Use the **-** and **+** buttons to lower or raise the pitch index. See *Figure 2-16*.

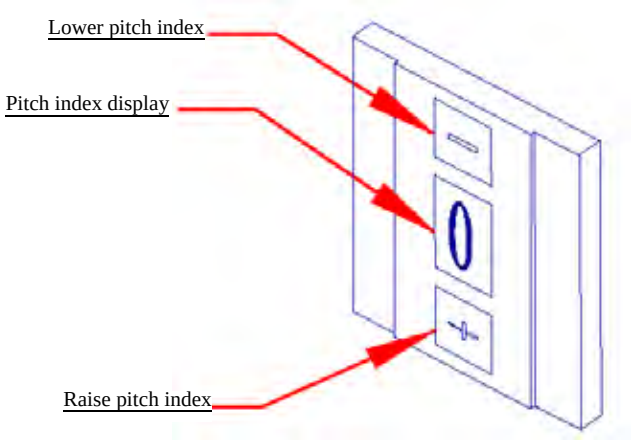


Figure 2-16—Setting pitch index

9. Switch on the feeder unit—

9a) Close all safety shields and release E-Stop buttons.
9b) On the Gantry window, press **Park**.

NOTE: *The circuit breaker K1 is now engaged and power is on for the feeder unit.*

10. Align pick point—

10a) On the feeder unit control panel, press and hold the center button.

10b) While holding the center button, press the forward button. The carrier tape advances one guide hole. Advance the carrier tape in this manner until the pick point mark on the tape window aligns with the center of the pocket.

10c) Release the center button. Press the forward button once to index the device tape forward one pocket.

11. Replace full cover tape reel—

11a) Remove full cover tape reel from spindle.

11b) Pull off cover tape.

11c) Replace cover tape reel.

This completes the procedure for setting up the tape input feeder.

Before running a job with the tape input feeder in place, it is necessary to:

- Teach locations to the PNP head. For information, see “Teach the Package File” on page 3-33.
- Select tape input setting in the AH500 software. For information, see “Configure Input/Output Settings” on page 3-4.

(Optional) Setting Up the Tape Output System

The PS288 can be configured with an optional tape output system attached to the Option Bay. Tape output systems come with either heat seal or pressure seal units. See *Figure 2-17* and *Figure 2-18* below:

Figure 2-17—Heat seal unit

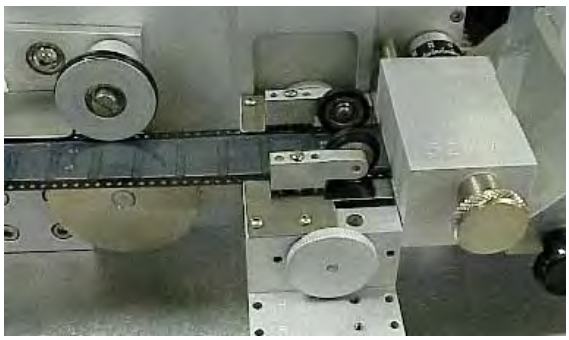


Figure 2-18—Pressure seal unit

NOTE: *Installation of the tape output system is the same for both pressure seal and heat seal units, unless noted otherwise. Refer to the manual that came with your heat seal unit (**Taping Machine Operator's Manual**) or pressure seal unit (**Universal PSA Sealer Operator's Manual**) for additional information.*

To set up the tape output system:

1. For first-time installation—
If the tape output system is being installed for the first time, the WinAH400.ini file may need to be edited to reflect this additional option.

1a) Using Windows Explorer, open C:\AH400_32\WinAH400.ini.with NOTEPAD editor.

1b) Locate the section
`;------- tape input/output -----`

1c) Ensure value for Tape Output Installed is **TRUE**, as shown.
`TapeOutputInstalled=TRUE`

1d) Save the WinAH400.ini file and exit Windows Explorer.

2. Determine the width of the carrier tape—
Standard sizes are 8, 12, 16, 24, 32, 44, and 56mm.

3. Install carrier tape supply reel—
Place the reel on the spindle so that the carrier tape comes off the top of the reel with the empty carrier pockets facing up.

4. Insert tape into feeder—

4a) Thread the end of the carrier tape under the Front Tape Guide.

4b) Thread the tape into the Adjustable Loading Track so that it sits under the guide and on top of the channel, as shown in *Figure 2-19*.

Figure 2-19—Carrier tape threaded into track

5. Adjust width of Adjustable Loading Track—
The Adjustable Loading Track has detents at 8, 12, 16, 24, 32, 44, and 56 mm widths. Adjust the width of the Adjustable Loading Track by gently pushing in or pulling out the near side to match the width of the carrier tape, as shown in *Figure 2-20*.

Figure 2-20—Adjustable Loading Track

6. Advance carrier tape—

Slide the carrier tape to the left until it passes the Out of Pocket sensor, as shown in *Figure 2-21*.

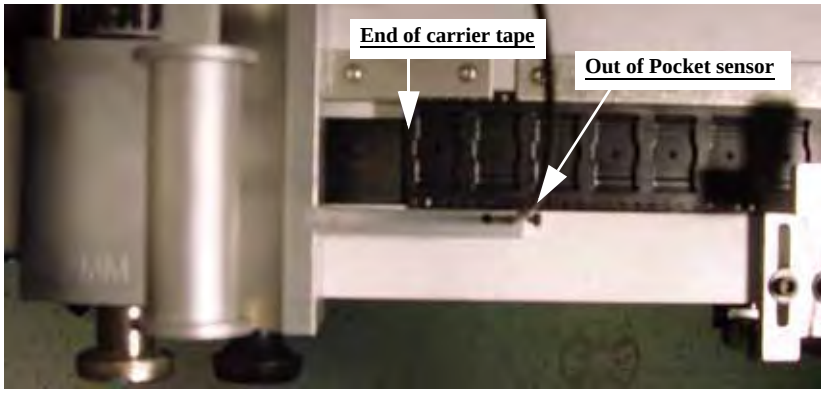


Figure 2-21—Out of Pocket sensor and tape location on the tape output

7. Install seal unit—

HEAT SEAL UNIT:

- Install the heat seal unit that matches the width of the carrier tape. Heat seal units come in 8, 12, 16, 24, 32, 44, and 56 mm sizes.
- Use the long screw to attach the heat seal unit at the top and the short screw to attach it at the bottom. See *Figure 2-22*.

Figure 2-22—Installing heat seal unit

PRESSURE SEAL UNIT:

- Remove the Allen head screw on top of pressure seal unit.
- Adjust the width of pressure seal unit to match the width of tape.
- Tighten the Allen head screw. See *Figure 2-23*.

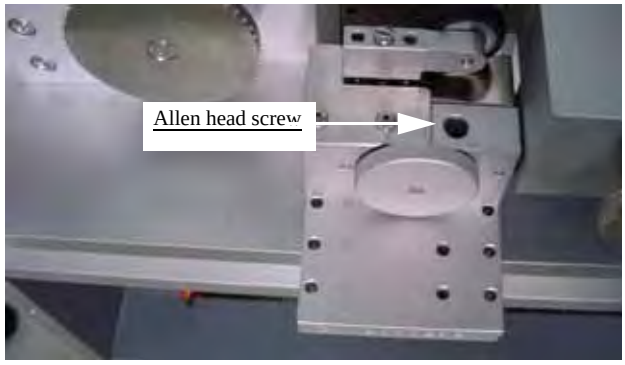


Figure 2-23—Adjusting width of pressure seal unit

- Use the short screw to attach the pressure seal unit at the top and the long screw to attach it at the bottom. See *Figure 2-24*.

Figure 2-24—Installing pressure seal unit

8. Plug seal unit into control box—

Insert the power cord from the seal unit into the tape output controller as shown in *Figure 2-25*.

Figure 2-25—Power cord in tape output controller

9. Switch on and adjust seal pressure—

9a) Turn the Air Pressure ON/OFF Switch to **ON**.

9b) Set the Seal Pressure Adjust Controls so that Inner and Outer air pressure are 40-50 PSI, as shown in *Figure 2-26*.

Figure 2-26—Seal pressure control settings

10. Install cover tape—

10a) Select cover tape of the same width as the carrier tape.

10b) Install the cover tape reel on the spindle so that the smooth side of the cover tape faces the seal unit.

10c) Thread the cover tape around Cover Tape Guide #1 and Cover Tape Guide #2 as shown in *Figure 2-27*.

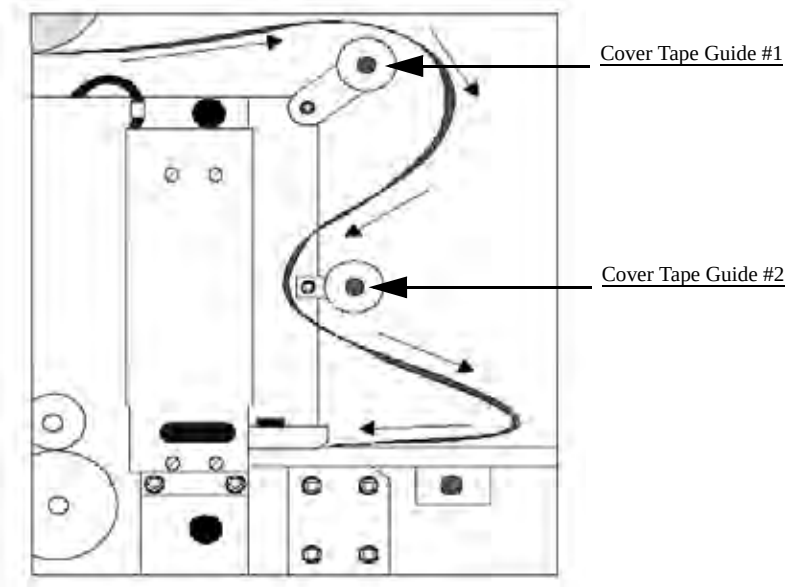


Figure 2-27—Path of cover tape

11. Turn power on to tape output controller—

11a) Set Seal Switch to ON position.

11b) Set Inside and Outside temperature to 150-160° C.

11c) Wait for temperature to reach target range. See *Figure 2-28*.

Figure 2-28—Power and heat settings

12. Remove Sensor Clamp Block—

Remove and set aside the Sensor Clamp Block to facilitate advancing the carrier tape through the seal unit. See *Figure 2-29*.

Figure 2-29—Remove sensor clamp block

13. Attach cover tape to carrier tape—

Use a small piece of adhesive tape to attach the end of the cover tape to the carrier tape. See *Figure 2-30*.

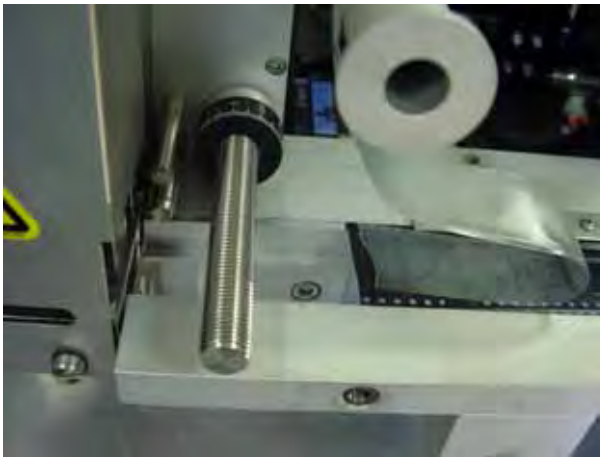


Figure 2-30—Combine cover and carrier tape

14. Advance combined tape—
Advance the combined cover/carrier tape through the seal unit.

15. Install Cover Tape Guide #3—
15a) Cover Tape Guide #3 comes in 8, 12, 16, 24, 32, 44, and 56 mm sizes. Pick the size that matches the carrier tape width.
15b) Slide Cover Tape Guide #3 onto shaft (as shown in *Figure 2-31*) and tighten the knurled knob.

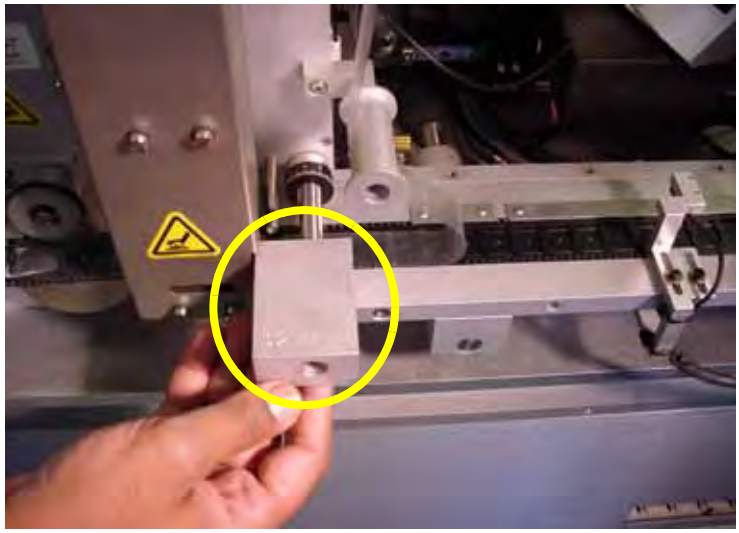


Figure 2-31—Cover Tape Guide #3

15c) Reinstall the Sensor Clamp Block.

16. Advance combined cover/carrier tape through seal unit—
Slide the combined cover/carrier tape through the seal unit until it is visible on the left of the seal unit.

17. Drive sprocket—
17a) Lift the Idler Arm and insert the combined cover/carrier tape.
17b) Align the holes on the combined cover/carrier tape with the teeth on the Drive Sprocket. See *Figure 2-32*.

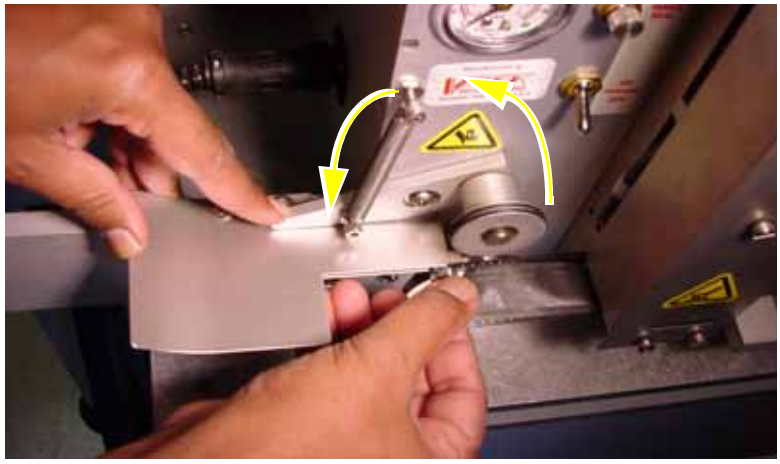


Figure 2-32—Idler Arm and Drive Sprocket

18. Set tape output controller values—

18a) On the tape output controller, press ESC to display the main menu.

Figure 2-33—Tape output controller main menu

> ***NOTE:*** *Values used in this example are for illustration purposes only. For more specific information, refer to "Approximate Starting Points for Seal Controls" on page 16 of 36 in the* ***TM-330 Taping Machine Operator's Manual*** *that came with your system.*

18b) Select **2** for Pitch. Count the number of guide holes in the carrier tape between the center of one pocket and the center of the next pocket. Enter that number for the Pitch value.

18c) Select **4** for Speed. Enter 100 and press ENT.

18d) Select **7** for Mode. On the Mode window, select choice 2. An asterisk (*****) appears to the right of "Heat Seal w/32mm." Press ESC.

18e) Select **5** for Dwell. Verify the value is 350-400. Press ENT.

18f) Select **3** for Advance. On the Advance window, Select 1. Press ENT.

18g) Select **8** for Run. Verify values.

19. Advance the combined cover/carrier tape—

Step on the foot pedal to advance the combined cover/carrier tape 100-125 millimeters (4-5 inches) to the left of the seal unit.

20. Inspect position of cover tape over carrier tape—

The cover tape should align over the carrier tape so that the cover tape touches the side rails of the carrier tape and but does not cover the guide holes on the carrier tape. See *Figure 2-34*.

Figure 2-34—Alignment of cover tape over carrier tape

If the cover tape does not align properly, adjust Cover Tape Guide #3 as follows (refer to *Figure 2-35*).

- If cover tape needs to move toward the **outside** of the carrier tape, loosen the knurled knob on Cover Tape Guide #3 and turn the adjustment dial **counterclockwise**. Tighten the knurled knob on Cover Tape Guide #3 and advance the tape 10-13 cm to the left of the seal unit. Recheck the alignment of cover tape over carrier tape. Repeat until cover tape centers on carrier tape.
- If cover tape needs to move toward the **inside** of the carrier tape, loosen the knurled knob on Cover Tape Guide #3 and turn the adjustment dial **clockwise**. Tighten the knurled knob on Cover Tape Guide #3 and advance the tape 10-13 cm to the left of the seal unit. Recheck the alignment of cover tape over carrier tape. Repeat until cover tape centers on carrier tape.

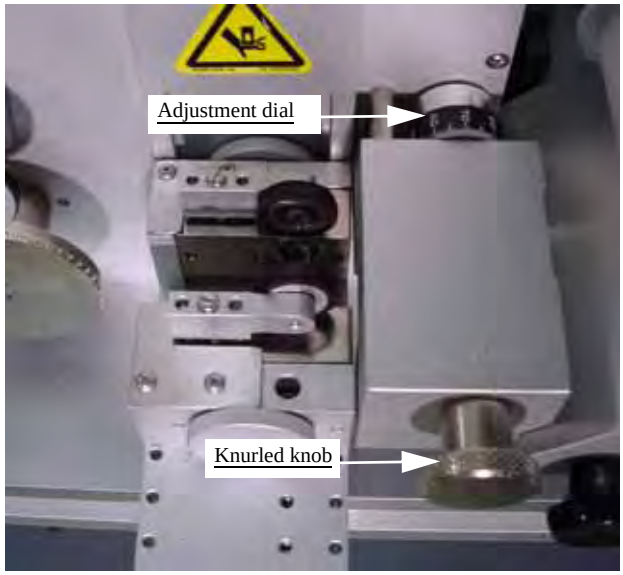


Figure 2-35—Adjusting Cover Tape Guide #3

21. Set tape output controller values—

21a) On the tape output controller, press ESC to exit run mode.
21b) Select **1** for Count. Select 1 to reset Count to 0 (zero).
21c) Verify the Stop number or enter a new Stop number.
21d) Select **8** to Run.

22. Install take up reel—

22a) Advance the combined carrier/cover tape to supply a few empty pockets. This number varies depending on your application requirements.
22b) Select a take up reel of the same size as the carrier tape. Reels come in 8, 12, 16, 24, 32, 44, and 56 mm sizes.
22c) Insert the end of combined carrier/cover tape into slot on the inner reel and turn the take up reel to wind tape.

23. Adjust location of PNP head—

It is necessary to accurately position the Tape Output PNP head over the carrier tape so that devices are placed properly.

23a) On the PLC controller:

- Toggle DOWN the switch labeled “Transfer.”
- Toggle DOWN the switch labeled “Long Stroke.”
- Toggle DOWN the switch labeled “Short Stroke.”

Figure 2-36—Toggle switches in DOWN position

23b) On the tape output controller:

- Select **6** for Jog. This advances the carrier tape in 0.04 mm increments.
- Continue to press **6** for Jog until the center of the empty pocket is directly beneath the PNP head.

23c) On the PLC controller, press the black reset button located on the left side of the PLC controller.

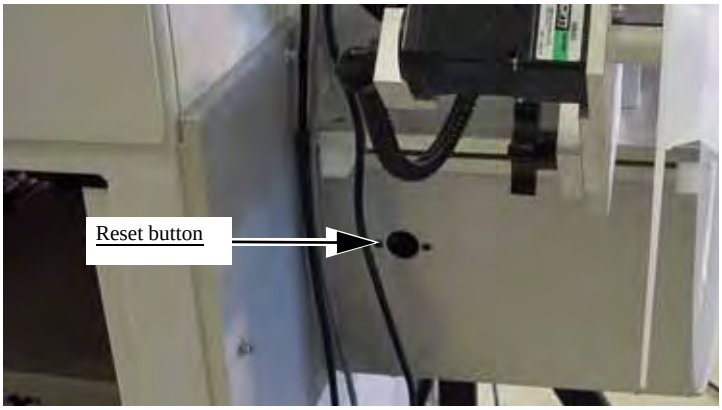


Figure 2-37—Reset button

23d) On the front of the controller, toggle UP all switches. This is the “normal” position. See *Figure 2-38*.

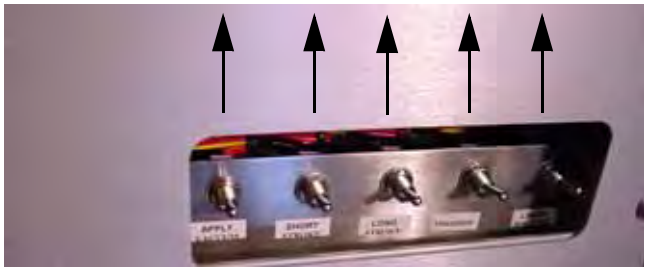


Figure 2-38—Toggle switches should be in UP (“normal”) position

23e) On the tape output controller, press ESC to enter run mode.

The tape output system is now ready for programmed devices.

24. Replace full take up reel—
When the take up reel is full:
24a) Leave job-specified number of empty pockets on the carrier tape.
24b) Cut the carrier tape.
24c) Roll carrier tape onto take up reel and remove reel.
24d) Install empty take up reel.
24e) Continue job.

(Optional) Setting Up the Label Printing System

The PS288 can be configured with the optional label printing system. To set up the label printing system, load the media (labels and transfer ribbon) and install the tamp applicator.

> ***NOTE:*** *For detailed information about the label printing system, see the* ***Apollo 1 Operator's Guide*** *and the* ***Apollo 1 Service Manual*** *that came with your label printing system.*

If the label printing system is being installed for the first time on your PS288, the WinAH400.ini file may need to be edited.

1. For first-time installation—
1a) Using Windows Explorer, open C:\AH400_32\WinAH400.ini.with NOTEPAD editor.
1b) Locate the section
```
;------- marking system settings -----
```
1c) Ensure the value for Marking System corresponds to the label printing system installed on your PS288. For example, if your label printing system is Apollo, the value should look like this:
```
;MarkerSystem=M&R
;MarkerSystem=M&R+TAPE
MarkerSystem=BRADY_APOLLO
```
1d) Save the WinAH400.ini file and exit Windows Explorer.

2. Loading labels and transfer ribbon—
To load labels and transfer ribbon in the label printing system, follow the loading diagram located on the labeler. See *Figure 2-39* for the location of the loading diagram:

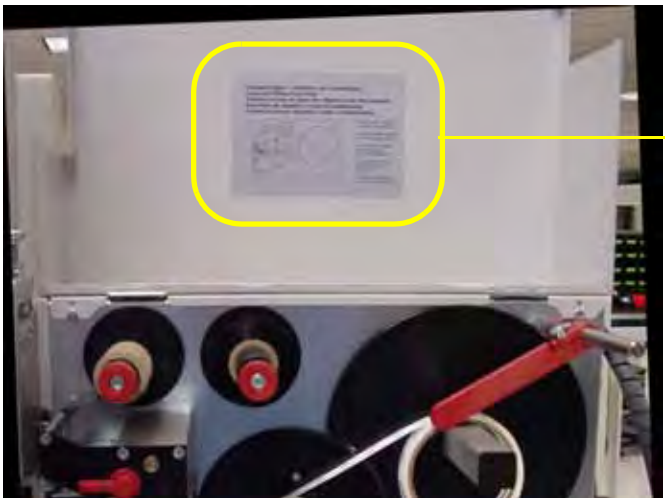


Figure 2-39—Loading diagram

3. Installing the tamp applicator—
To install the tamp applicator in the label printing system, follow the steps below. Refer to *Figure 2-40*.

NOTE: *For additional information about the tamp applicator, see the* ***Tamp Applicator with Lift Cylinder Operating Instructions/Service Manual*** *that came with your label printing system.*

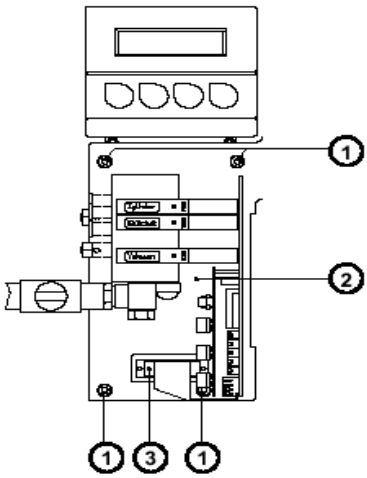


Figure 2-40—Installing the tamp applicator: 1=screw locations; 2=cover; 3= connector

3a) Remove the applicator's cover (**2**) by loosening the screws, two on the left and one on the right.
3b) Fasten the applicator to the front of the label printer using the four supplied screws (**1**) including the washers.
3c) Plug the connector (**3**) of the applicator's electronic system into the peripheral port of the label printer.
3d) Reinstall the applicator cover.

> ***NOTE:*** *To create a label printer file, see "(Optional) Create a Label Printer File" on page 3-63.*

(Optional) Setting Up the Laser Marking System

PS288 that is ordered with the optional laser marking system requires no additional set up at a customer's site. All mechanical connections are complete, and the laser marking system is ready to use.

To use the laser marking system, a laser marking file must first be created and added to a job file. For more information, see "(Optional) Create a Laser Marking File" on page 3-55.

If the laser marking system is being installed for the first time on your PS288, the WinAH400.ini file may need to be edited.

1. For first-time installation—

1a) Using Windows Explorer, open C:\AH400_32\WinAH400.ini.with NOTEPAD editor.

1b) Locate the section

```
;------- marking system settings -----
```

1c) Ensure the value for Marking System corresponds to the laser system installed on your PS288. For example, if your laser system is Synrad Digital, the value should look like this:

```
;MarkerSystem=NONE
;MarkerSystem=LASERMARK
;MarkerSystem=SYNRAD
MarkerSystem=SYNRAD_DIGITAL
;MarkerSystem=ROFIN_SINAR
```

1d) Save the WinAH400.ini file and exit Windows Explorer.

Chapter 3

Operation

The PS288 provides a configurable set of instructions for the rapid programming of semiconductor devices. Two primary levels of operation are:

- Operator functions
- Administrator functions

This chapter is divided into sections regarding each of these levels of operation.

Operators follow this sequence to process devices on the PS288:

Figure 3-1—Operator Functions

Administrators follow this sequence to create Tasks for the PS288:

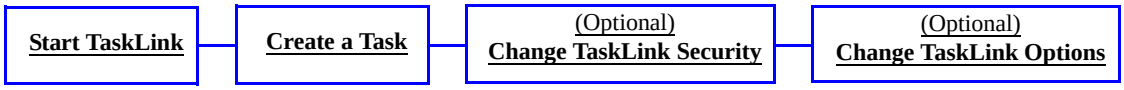


Figure 3-2—Administrator Functions

Operator Functions

Operator functions include turning on the PS288, starting TaskLink, loading a Job, and running a Job. Before these functions are performed, the operator should be familiar with the information in *Chapter 1—Introduction*. It is assumed that the hardware modules are already installed and adjusted, and that the PS288 is ready to process devices.

> ***NOTE:*** *This section includes procedures for options that your PS288 may not have. The illustrations in this manual may appear different than your system, depending on the options installed.*

These operator functions are described:

Check System Readiness

Before you switch on power, check that:

- ☞ The external air line is connected, and the air pressure switch is in the **ON** position.
- ☞ All E-Stop buttons are in the released (operating) position.
- ☞ All safety shields are closed.
- ☞ The main circuit breaker switch on the front of the PS288 is in the **ON** position.
- ☞ The power switch on the Handler Computer is in the **ON** position.
- ☞ The Socket Adapters for the job you want to run are installed on all programmer sites. If necessary, change the Socket Adapters as described in "(Optional) Change a Socket Adapter" on page 3-17.

Switch On System Power

After checking system readiness as described above:

1. Turn the main power switch clockwise to the **ON** position.
2. Press the I/O Controller **START** button.

Start TaskLink and Load Job

1. Double-click the TaskLink icon on the Handler Computer desktop.

Figure 3-3—TaskLink icon

2. From the TaskLink Run Task/Kit window, select the Task from the list and click **Run**

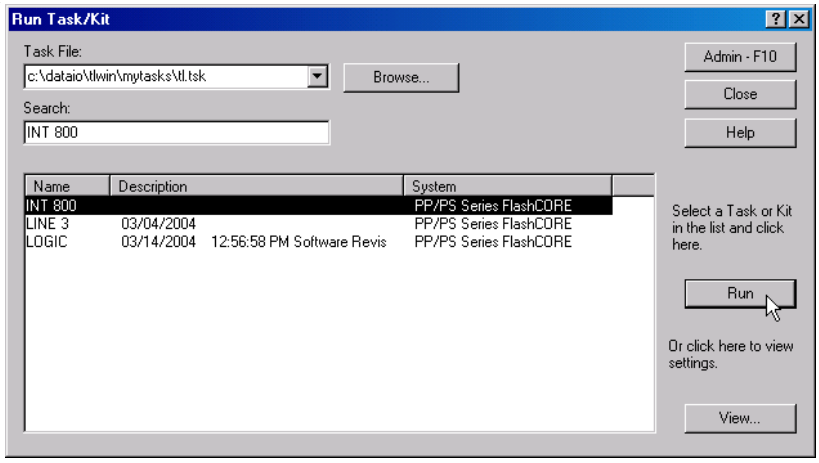


*Figure 3-4—Select Task and click **Run***

3. Enter the number of devices to be processed in the Pass Limit field (or leave at 0 for an unlimited number of devices). Click **OK**.

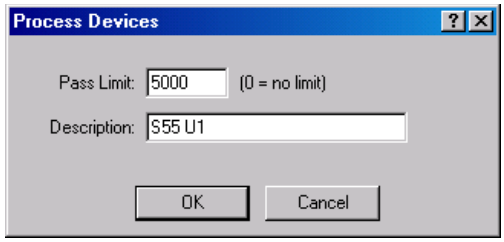


Figure 3-5—Set Pass Limit

4. TaskLink displays Job progress which includes transferring files to the programmers. This may take several minutes.

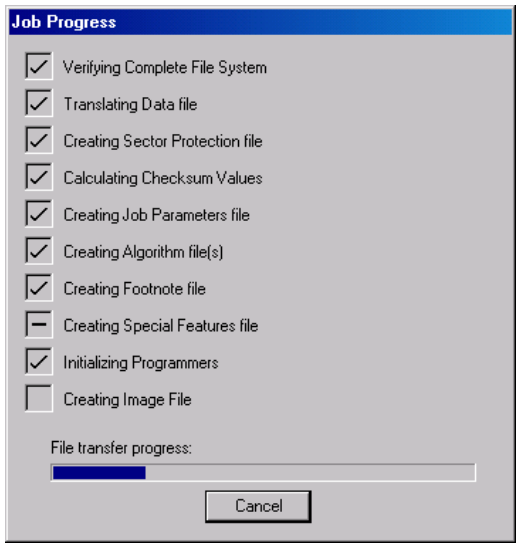


Figure 3-6—File transfer progress

5. When Job loading is complete, TaskLink displays the calculated checksum value and prompts to launch the AH500 software. Click **Yes** to launch AH500. TaskLink then minimizes itself.

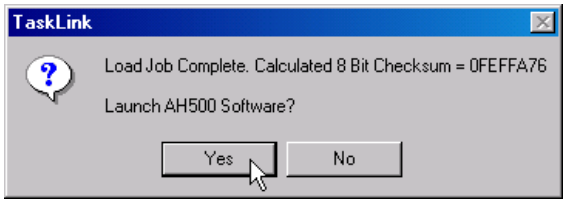


Figure 3-7—Launch AH500 software

6. The AH500 main window opens. Under Current Job, the name of the Job just loaded is displayed.

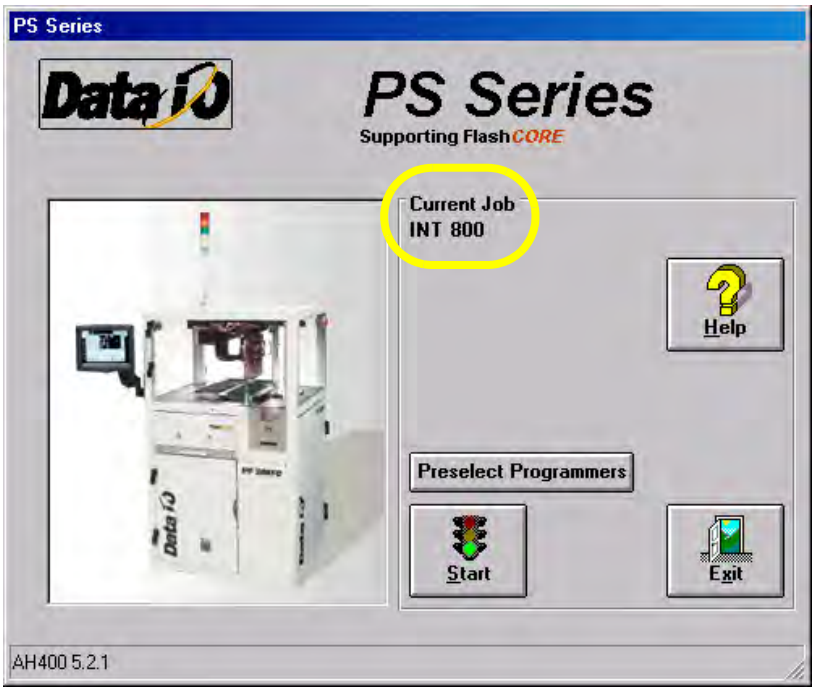


Figure 3-8—AH500 main screen with Job loaded

> ***NOTE:*** *At this time, you can select which programmers are used. See "(Optional) Preselect the Programmers" on page 3-15.*

Configure Input/Output Settings

> ***NOTE:*** *If you preselected programmers [see "(Optional) Preselect the Programmers" on page 3-15.], skip forward to Step 1b.*

1. Prepare the system—

1a) On the AH500 main window, click **Start.**

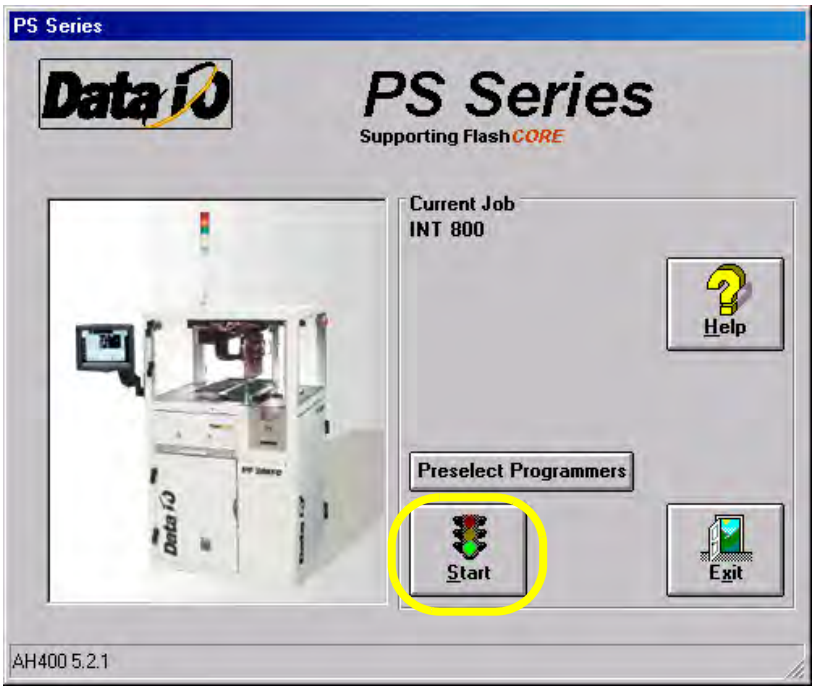


Figure 3-9—Click Start

1b) From the Setup window, select the **Options** tab.

1c) With the cycle buttons, select the main **Input** and **Output** media. The selections are **Tube**, **Tape**, and **Tray**.

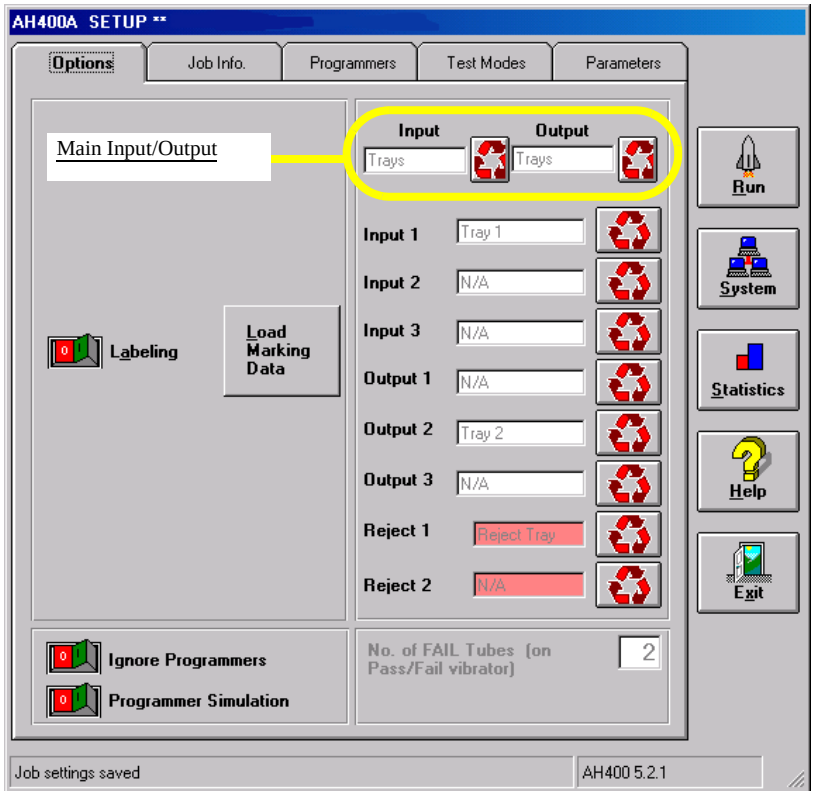


*Figure 3-10—Main Input/Output selections on **Options** tab*

2. **Input 1, 2, 3 and Output 1, 2, 3 media—**
   Select media for Input 1, 2, 3 and Output 1, 2, 3 with the cycle buttons to the right of each field. Options vary depending on the selections made for the main **Input** and **Output** media.

3. **Reject media—**
   Select media for Reject 1 and Reject 2. These fields are highlighted in red.

NOTE: *When settings are changed for Input and Output media, reject media are set to N/A. When Reject Media 1 is changed, Reject Media 2 is set to N/A. Always set reject media last.*

NOTE: *Only applicable media are shown depending upon the mode selected.*

Verify Job Information

1. **Select Job Info tab—**

1a) On the Setup window, click the **Job Info** tab.

1b) Verify that all the information displayed matches the information for this job. See *Figure 3-11*.

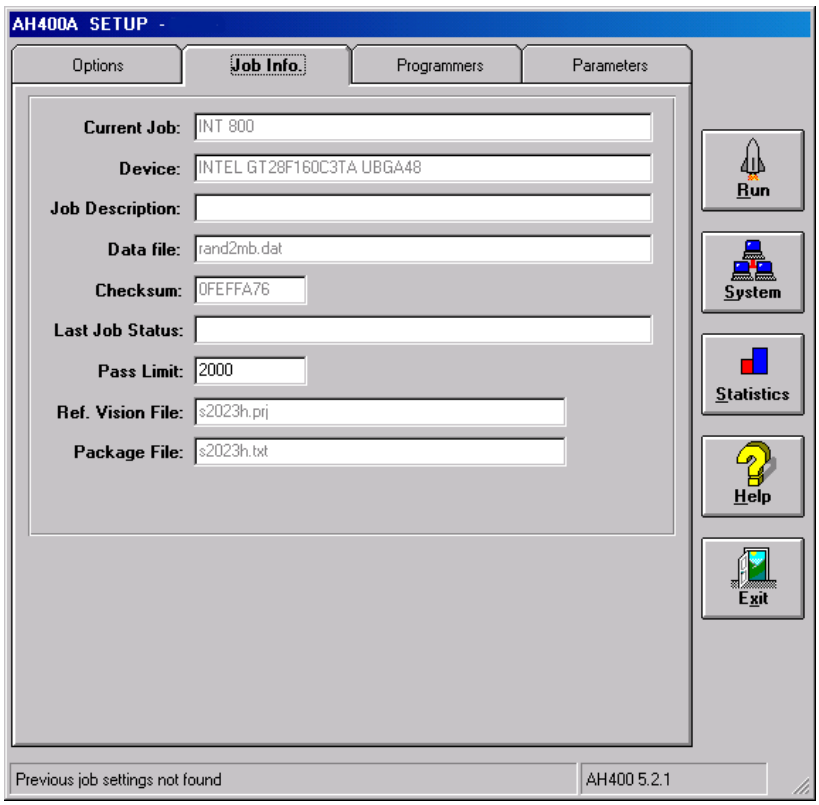


Figure 3-11—Job info

***NOTE:** Only the Pass Limit information displayed on the **Job Info** tab is editable. To change the Pass Limit, complete Step 2 below.*

2. Change Pass Limit (optional)—

2a) On the **Job Info** tab, click on the Pass Limit field. This opens the Keyboard window which displays the current Pass Limit (in this example, 2000).

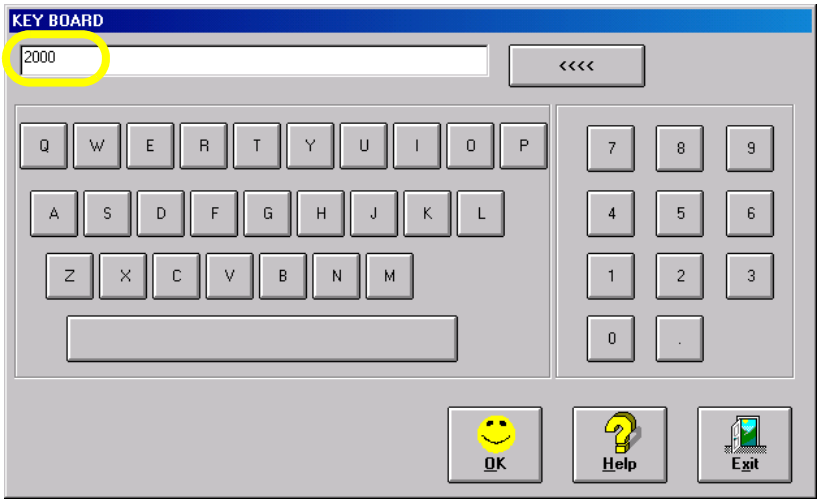


Figure 3-12—Keyboard window

2b) Enter the new Pass Limit value (for example, 5000) and click **OK**. The new Pass Limit is then displayed on the **Job Info** tab. See *Figure 3-13*.

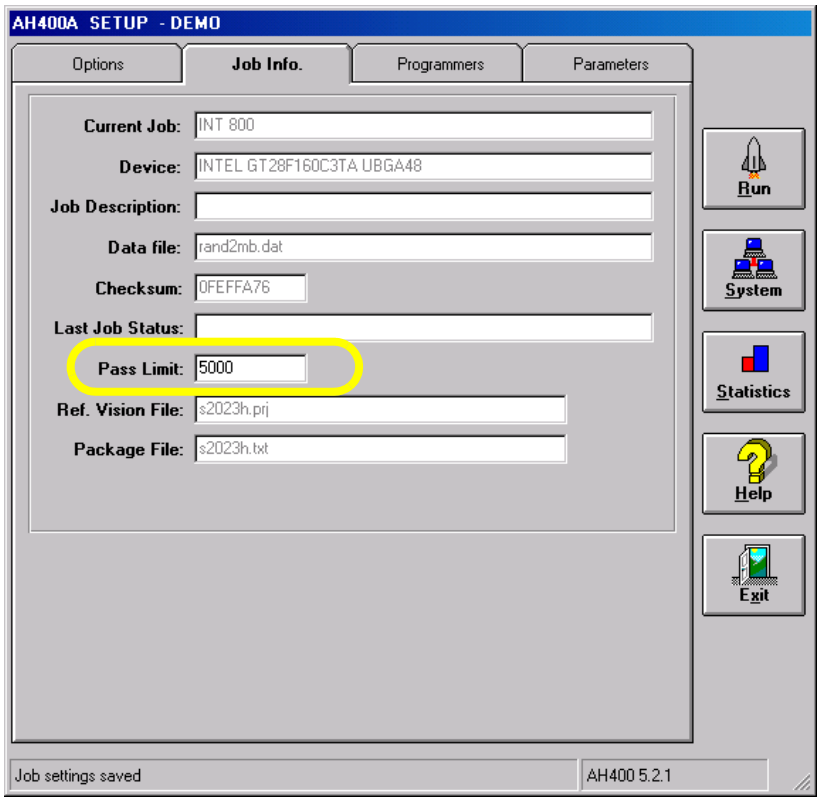


Figure 3-13—New Pass Limit

Prepare Input/Output Modules

CAUTION: *Devices programmed on the PS288 may be highly sensitive to internal damage from electrostatic discharge (ESD). To prevent damage from ESD, always wear an antistatic wrist strap. The wrist strap should be connected to the grounding socket and should contain a 1M-ohm (minimum value) to 10M-ohm (maximum value) current limiting resistor.*

Regardless of input module used, all devices should be installed right-side-up ("live bug" orientation), with the device leads pointing toward the floor so that identifying marks are visible on the top of the device.

The system must be reconfigured if a different device type is programmed or if the input module (tube, tape, or tray) changes.

When a device is in the pick position waiting for the PNP head, pin 1 on the device must match the *pin 1 orientation* predefined in the job. If it does not, when the PNP head picks the device and rotates it based on the information in the job, the device might be inserted incorrectly in the socket, possibly damaging device leads and socket contacts.

NOTE: *Ask your system administrator for pin 1 orientation for trays and tape input as defined by your facility.*

CAUTION: *Devices and the sockets can be damaged if the devices at the pick position do not match the pin 1 orientation defined in the job. Make certain that they are the same. If they are not, do not start the job until you reinstall the devices in the input module or modify the job.*

If the devices require a different size probe tip, make sure that you install the appropriate probe tip onto the PNP head as shown below:

If processing this device type:	Use this size probe tip:
FBGA **µBGA**	Small (2 mm)
300 mil DIP **20 PLCC** **32 TSOP**	Medium (4 mm)
28 PLCC or greater **40 TSOP or greater** **QFP** **600 mil DIP**	Large (6 mm)

Figure 3-14—Selecting probe tip size

For instructions on how to set up the static tray input/output module, see "Setting Up Static Tray Input/Output" on page 2-5.

For instructions on how to set up the automatic tray feeder, see “(Optional) Setting Up the Automatic Tray Feeder” on page 2-7.

For instructions on how to set up the tube input/output modules, see “(Optional) Setting Up the Tube Input and Tube Output Modules” on page 2-7.

For detailed instructions on how to set up the tape input and tape output systems, see “(Optional) Setting Up the Tape Input Feeder” on page 2-10 and “(Optional) Setting Up the Tape Output System” on page 2-14.

Run a Job

WARNING: Do not continue until making sure that all safety shields are closed, or personal injury may result.

1. From the Setup window, click **Run**.

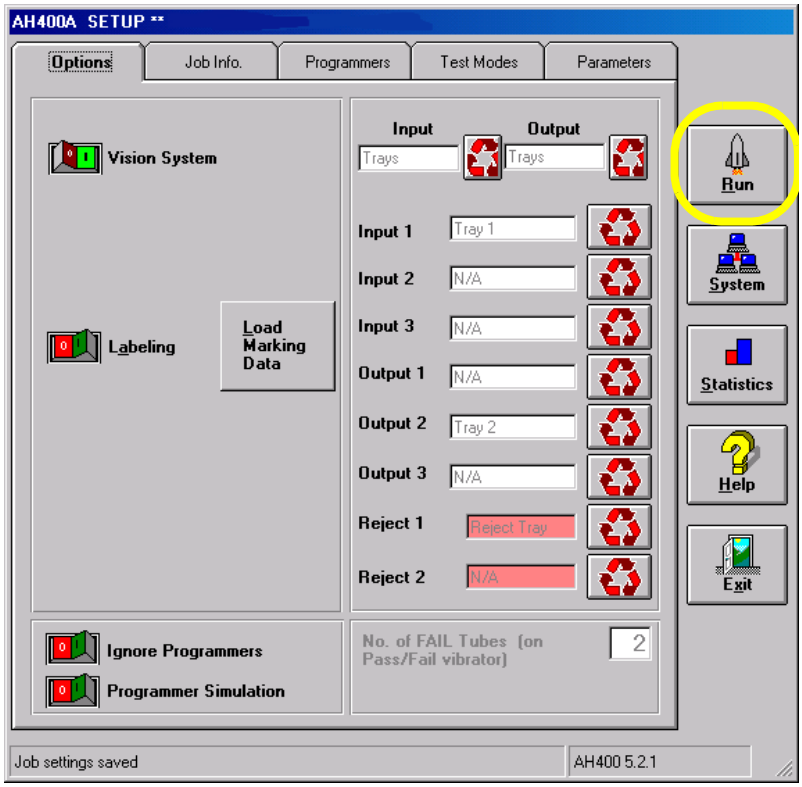


*Figure 3-15—Click **Run** on the Setup window*

2. On the Run window, click **Run**.

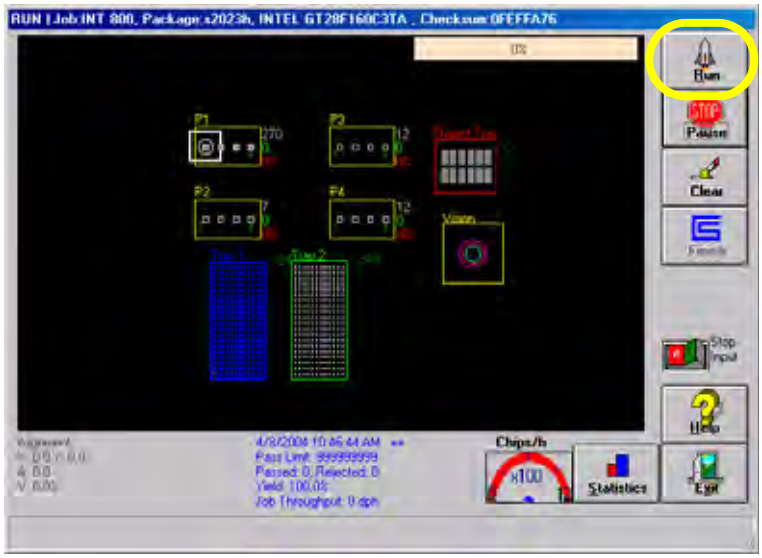


*Figure 3-16— Click **Run** on the Run window*

The PNP head moves to the Park position and then starts the Job. Status indicators appear inside the programmer outlines, and PNP head location is tracked on the Run window.

***NOTE:** If the input/output media are tubes, you may need to adjust tube vibration if devices do not move easily. Use the vibration controls on the front of the PS288 to adjust tube vibration.*

***NOTE:** To end a Job after the "pass" media is full, click **Stop Input** to the **ON** position.The **Stop Input** switch can be selected while a Job is running. If there are more devices in sockets than empty spaces in the "pass" media, the system will load an additional tray or tube before stopping. You can continue a Job stopped in this way by clicking **Run** again.*

Stop the System

There are three methods for stopping the PS288:

- **Emergency Stop and Restart** — Stop the movement of the PNP head in an emergency.
- **Pause a Programming Session —** Pause a programming session to perform routine tasks and then resume the programming session.
- **End a Job —** Complete the current programming cycle, remove devices from the sockets, and place them into the output media (pass or reject).

Emergency Stop and Restart

To prevent bodily injury or damage to equipment in an emergency, press either of the red **Emergency Stop** (E-Stop) buttons located on the upper

sides of the system. Pressing an E-Stop button immediately stops motion of the PNP head and the gantry.

WARNING: Do not use the Pause button in an emergency. Pressing Pause allows the PNP head to continue moving at full speed until the current operation is complete. In an emergency, press the E-Stop button.

Figure 3-17—Emergency stop (E-Stop) button

To restart the system, turn the E-Stop button clockwise (in the direction of the arrows) until it springs back to its full height. On the touch screen monitor is the message “Check doors/E-stop!” Click **OK**. The system starts up and resumes the interrupted operation.

***NOTE:** The PNP head shuts down if the input air pressure drops below a factory-set threshold level. If the system stops for no apparent reason, check the input air pressure and air line connections.*

Pause a Programming Session

To pause a moving PNP head at the end of the current programming cycle, click **Pause** on the Run window. This is the preferred method of pausing the system in a non-emergency situation. To recover, click **Run**. See *Figure 3-18*.

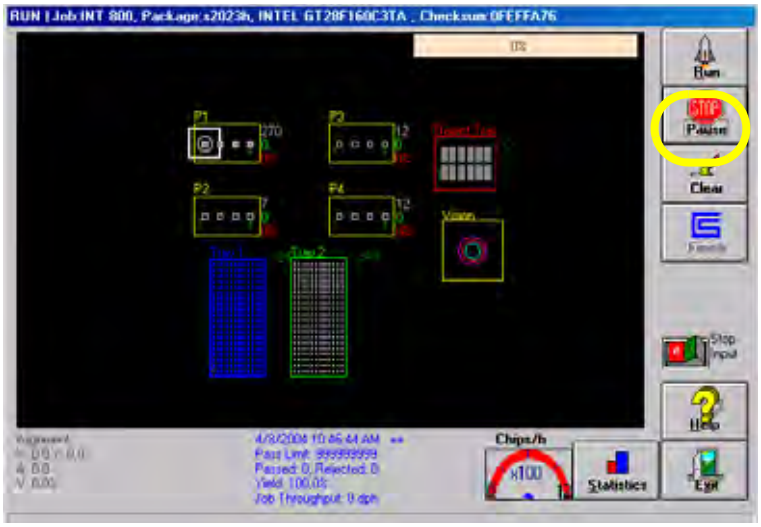


*Figure 3-18—Click **Pause***

> ***NOTE:*** *If you are using tape output, you also must press the red reset button on the taping machine to continue running a job after pausing.*

To remove all devices that are currently in programmers, click **Clear** on the Run window. All devices will be removed from the programming sockets and placed in the reject module.

End a Job

To end a job, click **Finish** on the Run window. This completes the current programming cycle. No more blank devices are picked from the input media, and all devices in the sockets are removed and placed in the appropriate output or reject modules.

Another method to end a job is to click the **Stop Input** switch to the **ON** position. The job then ends after a "pass" tray or tube is full.

Shut Down the System

To remove power to all PS288 components, for instance when the system will not be run overnight or before performing major service procedures, follow these steps:

1. Complete or exit any Job that is running.
2. Remove all devices from the system.
3. Exit the laser software (if this option is installed), and shut down the Laser Computer from the Windows **Start** menu.
4. Exit AH500 and TaskLink, and shut down the Handler Computer from the Windows **Start** menu.
5. Turn the main power switch to the **OFF** (vertical) position.
6. (Optional) Padlock the main power switch so that it cannot be turned back on until the padlock is removed.

Monitor the Light Tower

During operation of the PS288, you can monitor the light tower to reduce system down time. The light tower displays the following conditions:

Light	Condition	Action Required	Possible Causes	PS288 Status
Red	Major error	Operator intervention is mandatory. Likely that tools and troubleshooting skills required.	Motion control system error; actuator error; vacuum sensor malfunction; insufficient air pressure; possible collision; socket opener sensor error; input shutter error; laser not ready; software exceptions.	Stopped
Yellow/ Red (alternating)	Error	Operator intervention is mandatory. Correction through AH500 or minor hardware adjustment.	Unprogrammed devices on Input/Pass tray; labeler error; setup-related errors; serialization errors; chip lost; tape input error; laser error, no programmer can be used; file read/write error.	Stopped
Yellow	Normal stop	Operator intervention is mandatory.	Output media full or input media empty.	Stopped
Yellow/ Green (alternating)	Normal	Operator intervention is suggested.	End of job; vacuum errors present on programmers; sockets disabled due to errors.	Processing or Stopped (end of job)
Green	Normal	No operator action needed.	Processing devices; clearing sockets to reject output.	Processing

Figure 3-19—Light tower indictors

Troubleshoot Programmer Problems

During operation, you may need to troubleshoot programmer problems.

Clearing Programmer Disabled Status

If the status indicator disappears from any of the programmer outlines, or the PNP head skips a programmer, you might be able to correct the problem by simply clearing the programmer disabled status using the following procedure.

1. On the Run window, click **Pause.**

2. Place the cursor over the disabled programmer.

2a) To re-enable all sockets on a programmer, right-click the touchpad and select
All => EMPTY

Programmer outlines turn grey and all sockets are re-enabled. See *Figure 3-20*.

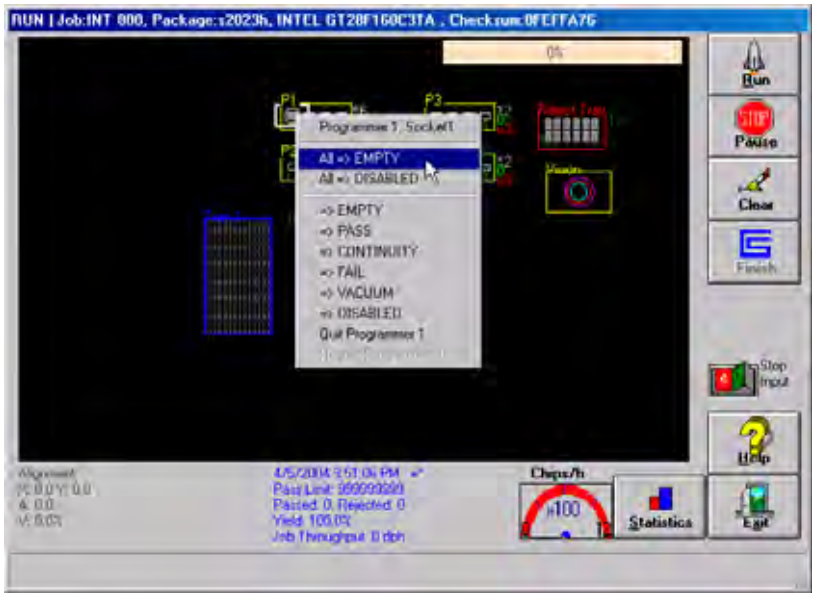


Figure 3-20—Re-enabling all sockets

2b) To re-enable a single socket, right-click the socket and select **=> EMPTY**
The programmer outline turns grey and the socket is re-enabled. See *Figure 3-21*.

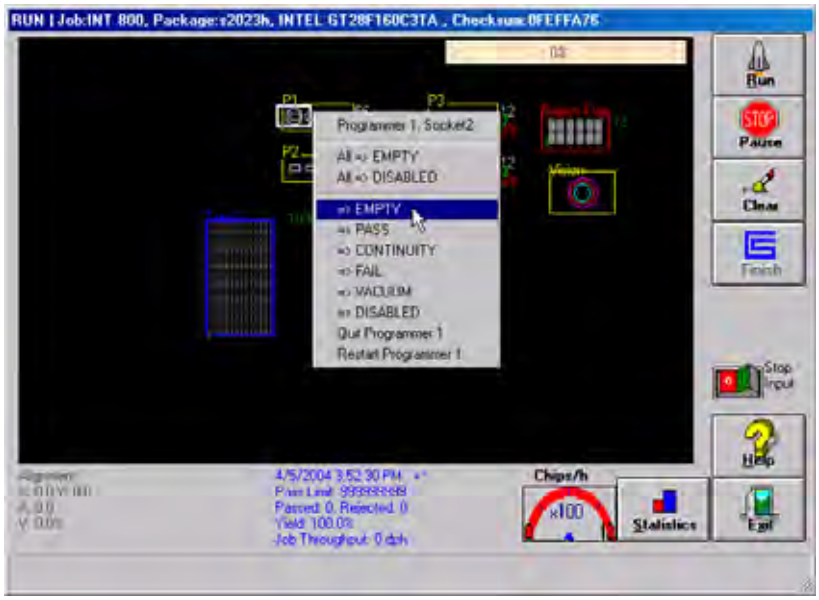


Figure 3-21—Re-enabling a single socket

3. Resume job—

3a) Remove any devices in the programmer's sockets.

3b) Click **Run**, and then click **Run** again to resume the job.

Disabling Programmers

If programmers are not performing and the error cannot be cleared, disable those programmers and continue to use the other sites to process devices.

Perform the following to disable a programmer:

1. Setup window—

1a) From the Setup window, click the **Programmers** tab.

1b) Click the button for the failed programmers.

1c) Click the black **DISABLED** button. The programmer buttons change to black. For example, in *Figure 3-22*, programmers 1 and 4 are disabled.

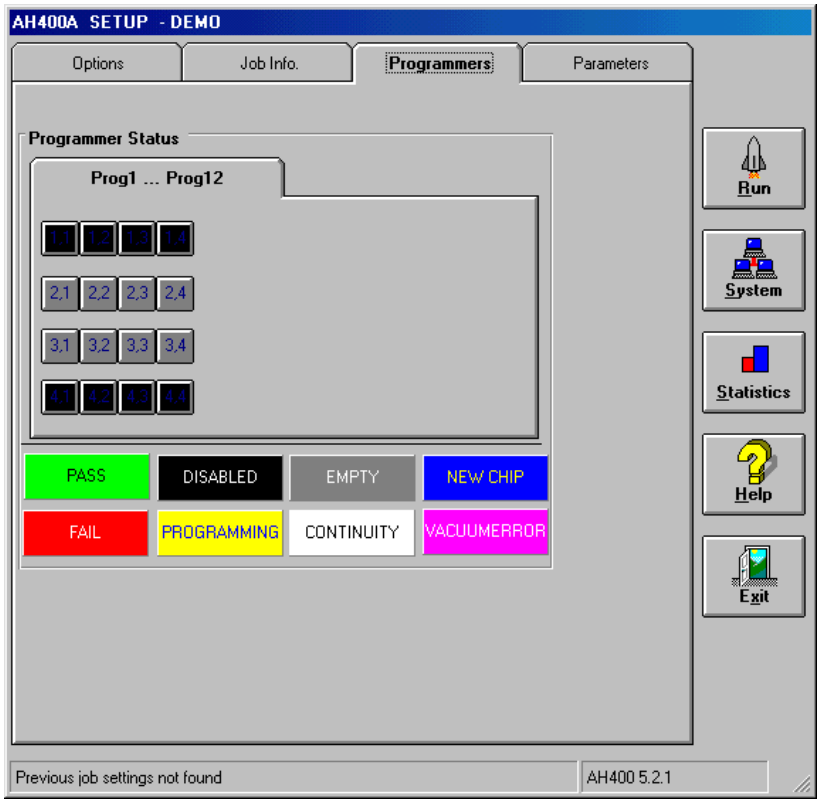


Figure 3-22—Programmers 1 and 4 disabled

2. Resume job—

Click **Run** to resume the job.

(Optional) Preselect the Programmers

The PS288 has a FlashCORE Quad assembly that contains four FlashCORE programmers. To improve efficiency, you may wish to shut off programmer(s) that are not used.

1. Preselect programmers —

1a) On the AH500 main window, click **Preselect Programmers.**

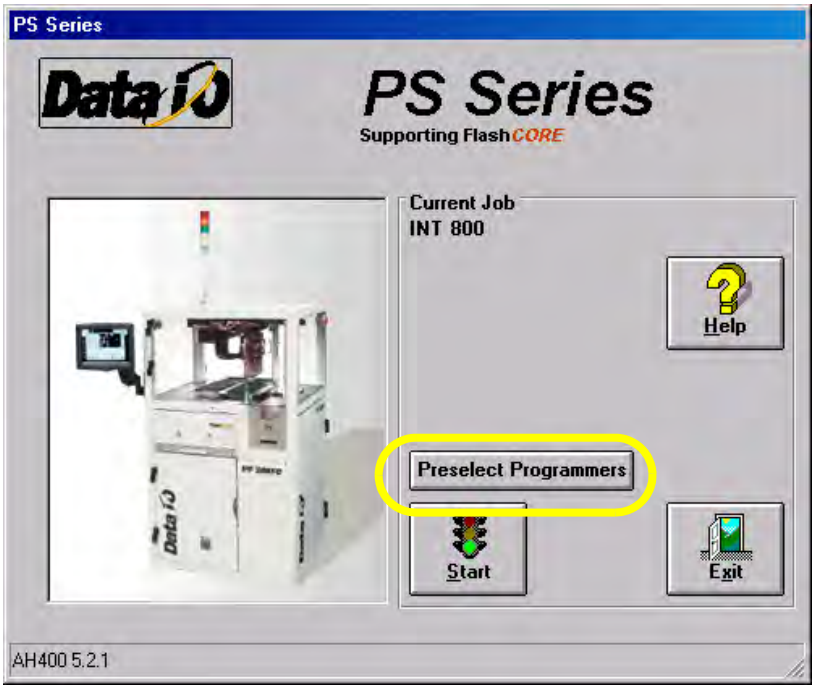


Figure 3-23—Preselect programmers

1b) Unlock the configuration by clicking the **I** (green) side to toggle to the **Unlock Cnf** position.

1c) Click the **I** (green) side of the toggle switch to enable a programmer. Click the **O** (red) side of the toggle switch to disable a programmer. In *Figure 3-24*, programmers 1, 2, and 3 are enabled, and programmer 4 is disabled.

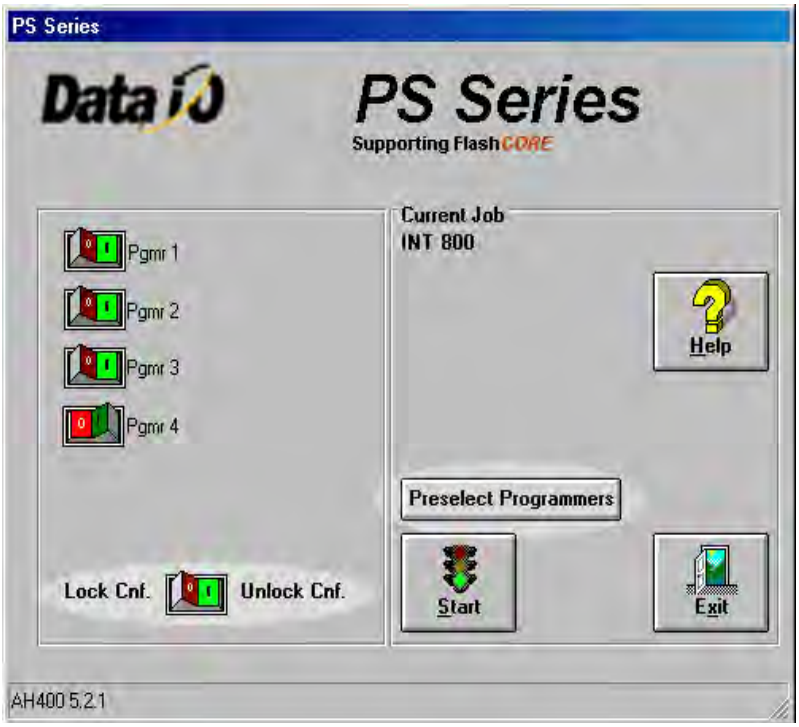


Figure 3-24—Programmers selected

2. Lock configuration and start—

2a) To lock configuration (so that next time the system is switched on the same programmers are selected), click the **O** (red) side of the **Lock Cnf.** toggle switch.

2b) On the AH500 main window, click **Start**. This opens the Setup window.

(Optional) Change a Socket Adapter

To change a Socket Adapter:

1. If a job is running, click **Finish** on the Run screen and wait for the PNP head to empty the sockets and return to Park.
2. Exit the AH500 software.
3. Open the safety shield that offers the easiest access to the programmer(s).

CAUTION: *Electrostatic discharge may damage Socket Adapters and devices. Wear an ESD strap or discharge static against a common ground.*

4. Unscrew the two captive, 4 mm socket head screws and open the Adapter Bracket.
5. Open the Adapter Bracket and lift up the Socket Adapter. (Programmer not shown.) See *Figure 3-25*.

Figure 3-25— Lift the Socket Adapter

6. Without touching the gold contact surfaces on the bottom of the Socket Adapter, lift it up off the dowel pins and remove.
7. Insert the correct Socket Adapter, making sure that it seats on the dowel pins.
8. Screw in the two screws.

To restart a stopped Job, in TaskLink select the Job and click **Run** on the Task/Kit Manager window.

NOTE: *If you are using tape output, you also must press the red reset button on the taping machine to continue.*

(Optional) Operate the TF20 Automatic Tray Feeder

As an option, the PS288 can be configured with an automatic tray feeder (either the TF20 or the TF30). Basic operation of the TF20 automatic tray feeder is described here. For more detailed information, see the TF20 Tray Feeder Instruction Manual that came with your system.

1. Starting—

Plug the TF20 power cable into the PS288. The TF20 automatically initializes. If the TF20 detects a tray on the conveyor, it moves the tray to the pick/place position inside the PS288 work envelope and clamps it in place. Otherwise there is no conveyor motion.

2. Check operator indicators—

- Check the Thick/Thin switch. This switch prepares the TF20 to operate with JEDEC trays of the correct thickness. Verify that the switch correctly matches the type of JEDEC trays used.

> ***NOTE:*** *If the Thick/Thin switch is set incorrectly, the feeding mechanism will jam and cause an error condition (orange LED on and flashing).*

- If the blue LED (indicating Full/Empty) is on and not flashing, the lower input elevator is out of trays. Open the tray access door and place one or more trays in the lower input stack. Close the door. The elevator automatically begins to move up to a normal run position.
- If the blue LED is on and flashing, the TF20 is full of trays. Remove the trays from the upper output stack.
- If the yellow LED is on and not flashing (indicating an inhibit condition), close the elevator access door.

3. Loading trays—

The TF20 can be reloaded with trays at any time. When the last tray is moved to the pick/place position, the lower input stack is empty and the blue LED turns on without flashing. The TF20 is in an empty condition. The elevator then drives down to its lower limit. It is best to reload the TF20 at this time or sooner.

If you do not reload the TF20 and the PS288 continues to operate, the last tray is returned to the upper output stack. The TF20 automatically goes to an inhibit condition.

3a) If the TF20 is not empty, press the Elevator Down button. The TF20 automatically goes to an inhibit mode, and the elevator begins driving down toward its lower limit.
3b) Open the elevator access door and insert one or more trays.
3c) Close the elevator door and the elevator begins moving up to a normal run position.Once the elevator has reached the normal run position, the TF20 automatically leaves the inhibit mode.

4. Unloading trays—

The TF20 can be unloaded at any time with little or no interruption to the operation of the PS288. When the upper output stack reaches its maximum

capacity, the TF20 automatically goes to an inhibit condition and signals that it is full (blue LED on and flashing). It is best if you unload the TF20 at this time or sooner.

If the you do not unload the TF20 and the PS288 continues to operate, the TF20 does not accept any further manual or automatic tray exchange requests and goes to idle mode.

4a) If the blue LED is not flashing, the upper output stack has room to accept more trays. Before you remove the trays, press the Inhibit button. Remove the trays.

***NOTE**: Before removing trays, press the Inhibit button and wait to see the yellow LED. The inhibit mode prevents the TF20 from cycling a tray while you are removing trays.*

4b) If the blue LED is flashing, remove the trays. Once the trays have been removed, press the Inhibit button to resume normal operation.

For more detailed information, see the TF20 Tray Feeder Instruction Manual that came with your system.

(Optional) Operate the TF30 Automatic Tray Feeder

To operate the TF30 automatic tray feeder:

1. AH500—
Apply power to the TF30 automatic tray feeder by invoking AH500 and clicking **Run** on the Setup window.

2. Elevator—
2a) On the TF30 control panel, press the ENABLE and START buttons simultaneously. The elevator comes to the top.
2b) Press the ENABLE and START buttons simultaneously again. The elevator comes to the loading position.

3. Load magazine—
3a) Open the TF30 door and place the loaded magazine inside. Make sure the arrows on the magazine point toward the PS288.
3b) Close the door and press the ENABLE and START buttons.
3c) Press the ENABLE and START buttons again until the magazine is all the way down to the first position.

***NOTE:** If you want to bring the magazine back up again, you must press the STOP button first. Then press ENABLE and START again.*

Change the magazine when the empty light illuminates. To run the TF30 in continuous mode, make sure the top tray slot in the magazine is empty. If you use the STOP button, make sure the tray is back in the magazine.

For more detailed information, see the TF30 Tray Feeder Instruction Manual that came with your system.

Administrator Functions

Administrators are responsible for several functions not performed by operators. In addition to general service and preventive maintenance, administrators would likely perform these functions:

- “Create a Task Using TaskLink” on page 3-20
- “Teach the Reference Vision File” on page 3-21
- “Teach the Package File” on page 3-33
- “Monitor Statistics” on page 3-48
- “Maximize Programming Yields” on page 3-51
- “Monitor Daily Operation Logs” on page 3-53
- “(Optional) Create a Data File from a Master Device” on page 3-54
- “(Optional) Create a Laser Marking File” on page 3-55
- “(Optional) Create a Label Printer File” on page 3-63

Each of these functions will be discussed in this section.

Create a Task Using TaskLink

"Task" is the TaskLink term for a set of instructions to complete a programming Job. Tasks, which are stored in a Task database file (*.TSK), contain all the information necessary for programming and testing one or more devices with a particular data pattern. Information contained in a Task includes:

- Device settings - Specific device or a list for operator selection
- Data settings - PC file name
- System settings - Package file name and reference vision file name
- Process settings - Continuity check, electronic ID check, blank check, erase, verify, program and mark device

> ***NOTE:*** *Once a* ***Task*** *is selected and a Pass Limit is set, the Task is referred to as a* ***Job*** *to run on PS288.*

In addition to containing all device-specific settings, a Task references three files:

- ***reference vision file (vision.prj)*** The reference vision file contains camera data required to compensate for minor inaccuracies. A reference vision file template (Vision Template.prj) is included with the AH500 software. For instructions on how to fill the values for the reference vision file, see “Teach the Reference Vision File” on page 3-21.
- ***package file (package.txt)*** The package file is a text file containing calibration information that the PNP head uses to properly pick and place devices. A package file template (PackageTemplate.txt) is included with the AH500 software. For instructions on how to fill the values for the package file, see “Teach the Package File” on page 3-33.
- ***data file (*.hex or *.bin, for example)*** The data file contains all the data that will be programmed into the devices.

Options to add, remove, and edit Tasks are found in TaskLink’s Task/Kit Manager window. Tasks are displayed in the Run Task/Kit window. For complete instructions on how to create a Task, see TaskLink online Help.

- For more information on laser marking, see “(Optional) Create a Laser Marking File” on page 3-55.
- For more information on label printing, see “(Optional) Create a Label Printer File” on page 3-63.

Teach the Reference Vision File

The reference vision file contains all the vision system data required by the PNP head to compensate for minor inaccuracies caused by mechanical variations in devices, minor errors in the placement of devices on the PNP head, and other small inaccuracies.

During Task creation, you copied the Vision Template.prj file and renamed it to the adapter used in the Job. This renamed reference vision file contains the Vision Template values. Now it is necessary to teach the reference vision file for the particular device being programmed.

To teach the reference vision file:

1. Prepare the system—

1a) Using TaskLink, load the Job containing the reference vision file you want to teach.
1b) On the AH500 main window, click **Start**.
1c) On the Setup window, click **System**.

> ***NOTE:*** *You may be prompted to enter your Password.*

1d) On the System window, click **Gantry**.
1e) Click the **P1** yellow position label representative of Programmer 1. The gantry will move the PNP head to the location specified.
1f) Adjust the location of the probe tip so that it is centered on the socket. Use the up/down arrows for Y-axis adjustments and the left/right arrows for X-axis adjustments. From the inside working outward, the arrow buttons adjust the position ±0.001, 0.010, and 0.100 inches respectively.
1g) Click **Save**.
1h) Click **Park** to move the PNP head to the Park location.

2. Teach Z drop and Z pick—

2a) Place a device in the socket in Programmer 1.
2b) Click **P1** to move the PNP head back to the socket.

> ***NOTE:*** *Adjust the Socket Actuator ribs if required. See Step 4 on page 3-35.*

2c) Click **Z AutoFind.** See *Figure 3-26*. Ensure that the device is picked up in the center.

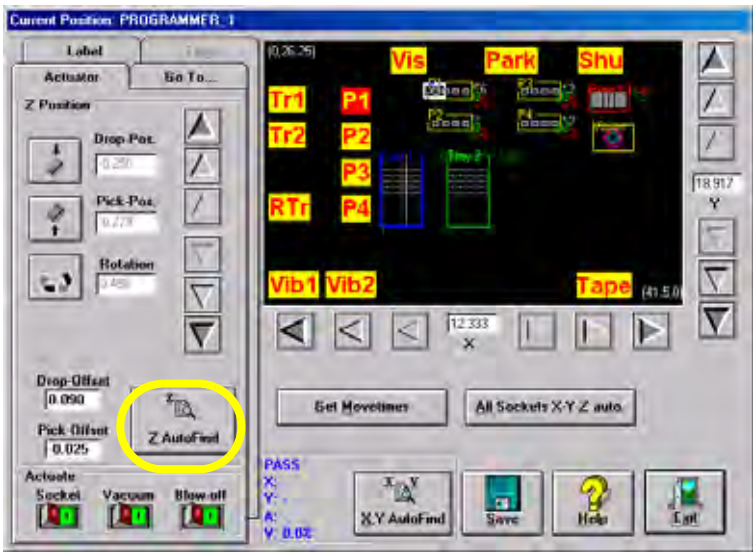


Figure 3-26—Click Z AutoFind

3. Set R-axis rotation values

NOTE: *When a device is inserted into a socket, pin 1 of the device must match pin 1 of the socket. For example, if pin 1 of the device (in the input media) is the upper left corner, and pin 1 of the socket is the upper left corner, no rotation is required. However, if pin 1 of the device in the input media is* ***not*** *the same as pin 1 of the socket, the PNP head must rotate the device. The R-axis value determines how the PNP head rotates the device as it moves the device from the input media to the socket or the Vision camera.*

3a) Set R-axis of **input media** to 0.000:

- Click **Tr1** to move the PNP head to the Tray 1 location.
- Click the Rotation icon.
- Enter the rotation value **0.000**. See *Figure 3-27*.

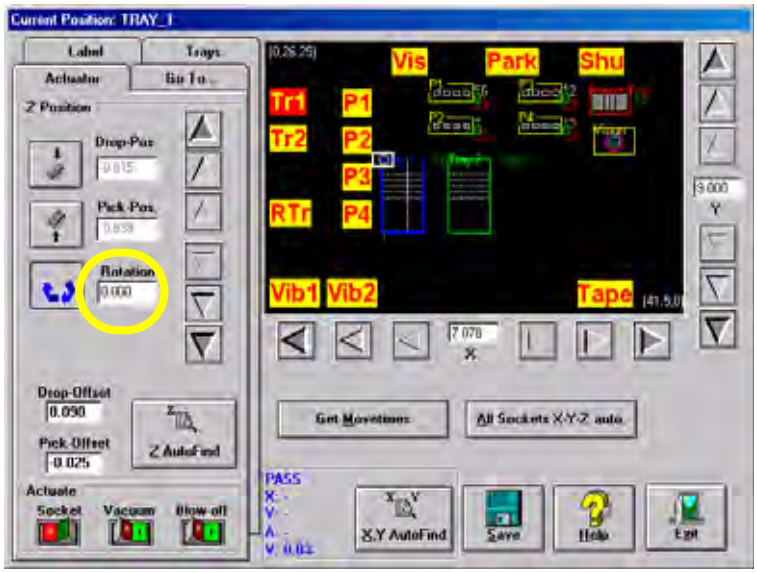


Figure 3-27—Rotation set at 0.000 at Tr1

- Press <Enter>.
- Click **Save**.
- Click **Yes** to overwrite previous values.
- Repeat for **ALL** input media (tray, tape and tube).

NOTE: *The R-axis rotation value at **ALL** input media must be 0.000.*

3b) Set R-axis rotation at **Vision** and **socket**:

- Click **Vis** to move the PNP head to the vision location.
- Click the Rotation icon.
- Enter the R-axis rotation value required to rotate the device so that pin 1 on the device matches pin 1 on the socket. See *Figure 3-28*:

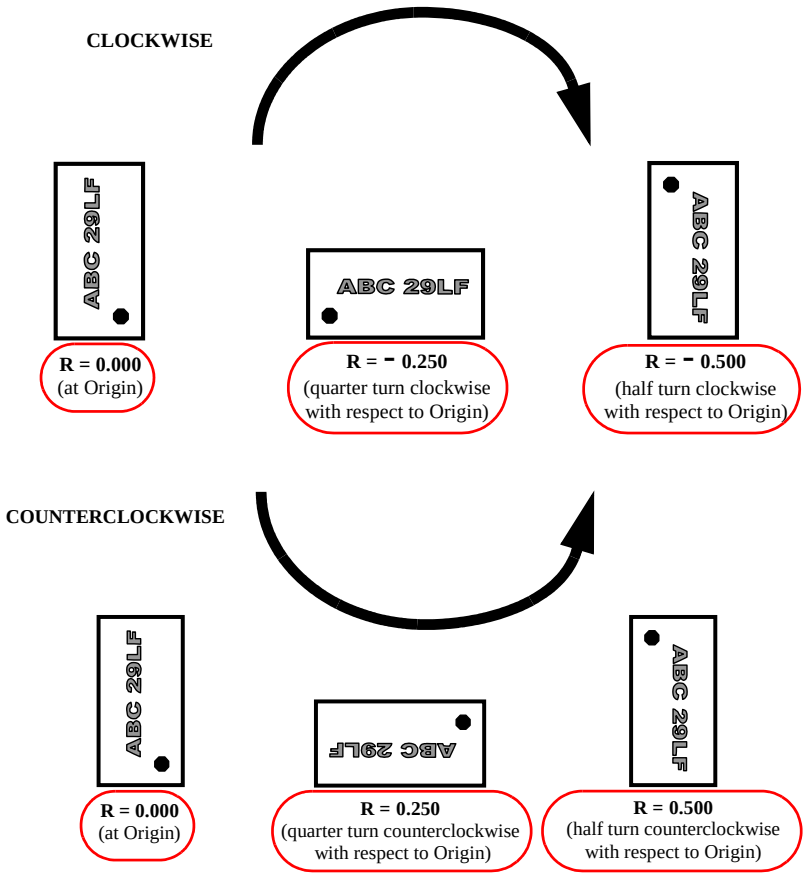


Figure 3-28—R-axis values for rotation

NOTE: *For example, if a device must be rotated a quarter turn in the clockwise direction as it goes from the input media to the socket, set the R-axis at the socket to -0.250. In this example, 0.250 is entered. See Figure 3-29.*

- Press <Enter>.
- Click **Save**.

- Click **Yes** to overwrite previous values.

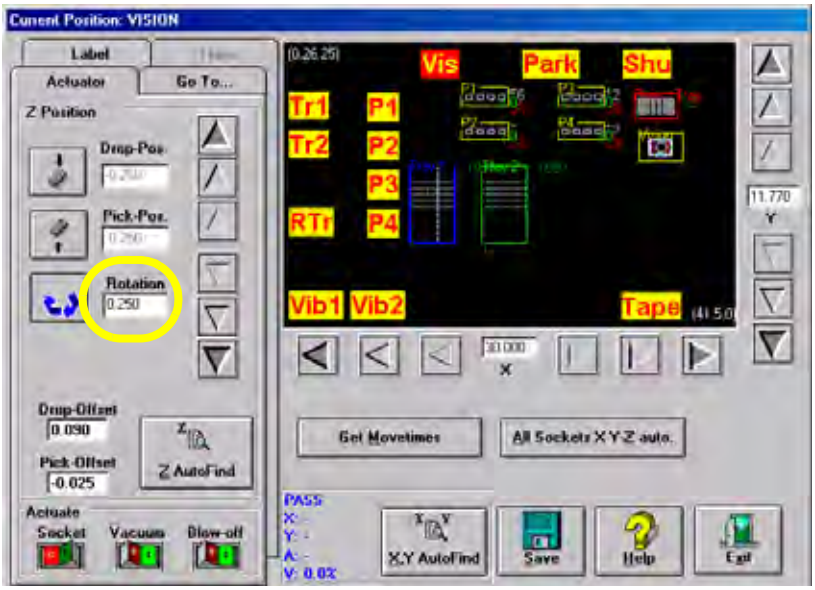


Figure 3-29— Rotation value at Vision

- Click **P1**. The gantry moves the PNP head to Programmer 1 location.
- Click the Rotation icon.
- Enter the same R-axis rotation value entered at the Vision location.
- Press <Enter>.
- Click **Save**.
- Click **Yes** to overwrite previous values.

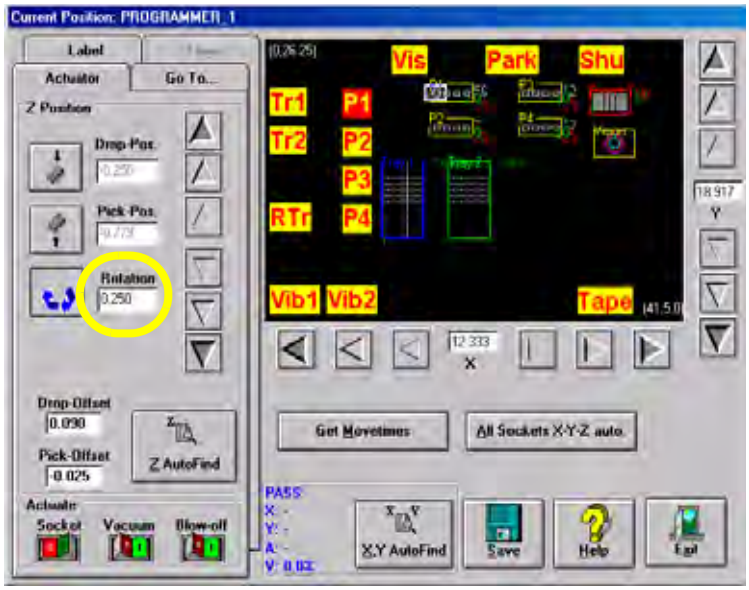


Figure 3-30—Rotation value at P1

***NOTE:** The R-axis value at **ALL** programmer locations and the Vision location must be the same.*

- Repeat for **ALL** programmer locations.

4. Move device to the Vision system—

4a) Pick up the device by bringing the cursor over the programmer label and right-clicking the touchpad.

4b) On the Gantry window, select the **Go To...** tab.

4c) Click **Go To Vision**. The device moves to the Vision system.

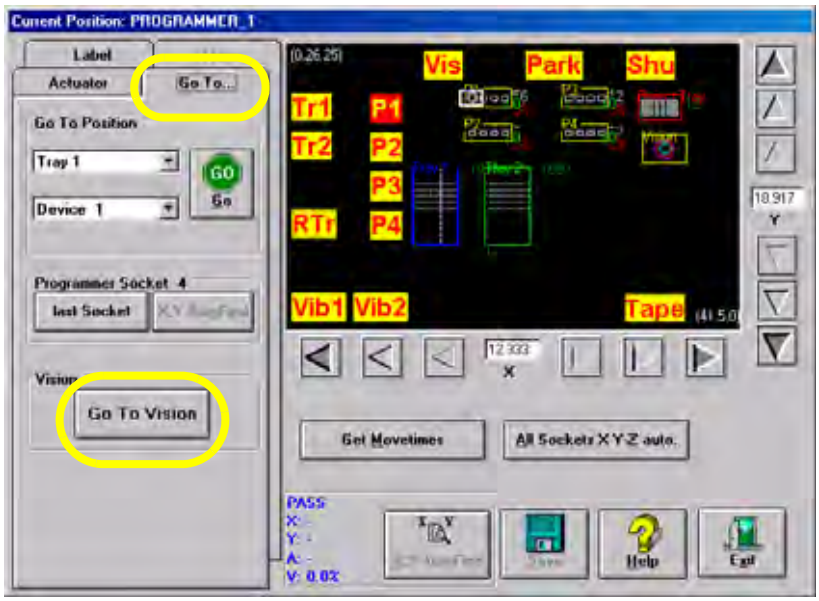


*Figure 3-31—On **Go To** tab, click **Go to Vision***

5. Verify correct file—

On the Vision System window, note that the name of the reference vision file for this Job is displayed.

Figure 3-32—Reference vision file name

6. Display acuWin32 tool bar—

Bring the cursor anywhere inside the black and white vision image area shown below and double-click. This opens the acuWin32 tool bar. See *Figure 3-33*.

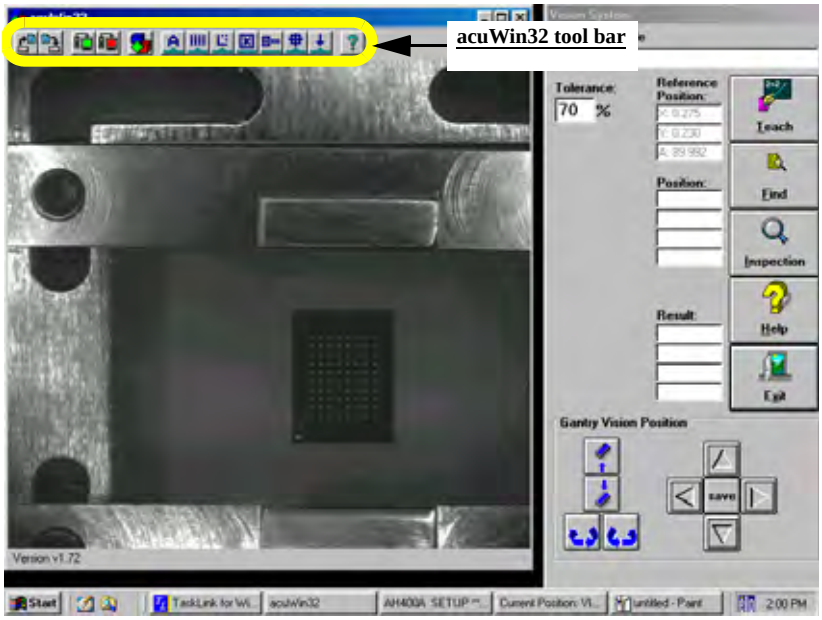


Figure 3-33—Click inside black and white vision image area to open the AcuWin32 tool bar

***NOTE:** It may be necessary to adjust the device search area for this device. If so, proceed with Step 7. If not, skip forward to Step 8.*

7. Adjust device search area (if necessary) —

7a) On the acuWin32 tool bar, click the icon to open the Search Search dialog.

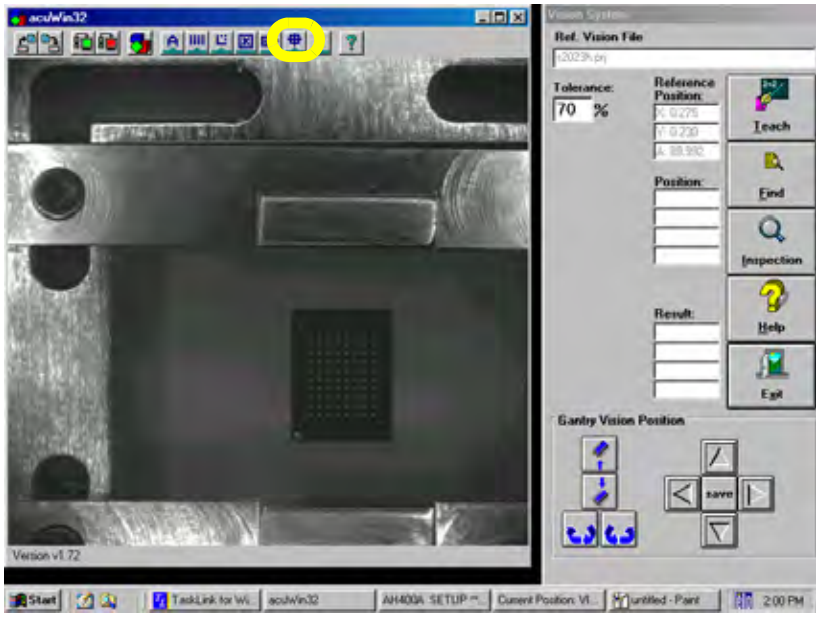


Figure 3-34—Click to open Search Search dialog

7b) On the Search Search dialog tool bar, click the icon to open the Area Search dialog.

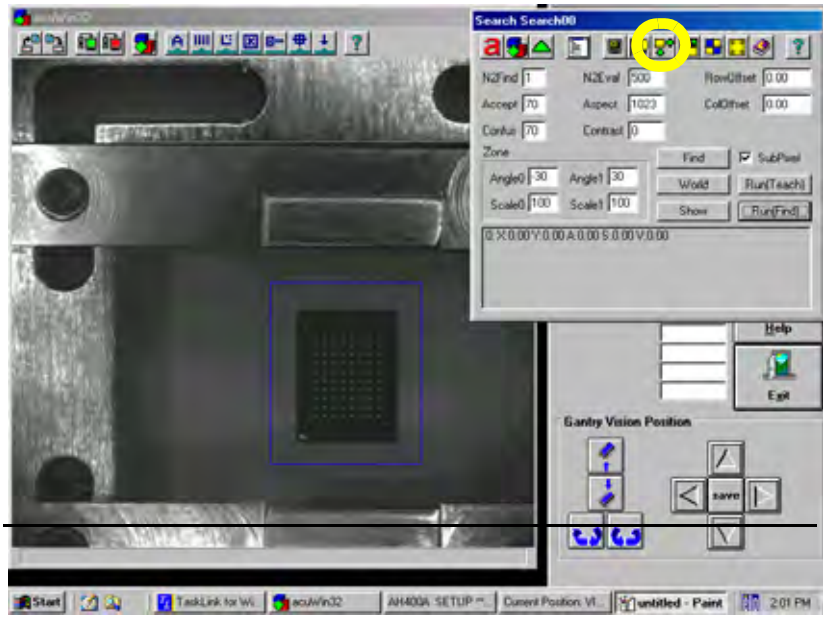


Figure 3-35—Click to open Area Search dialog

7c) Set the device search area (red rectangle in *Figure 3-36*) around the device so that it is 30-50% larger than the device. To adjust the device search area, place the arrow on any red line, hold down the left touch-pad button, and use the touchpad to drag the line.

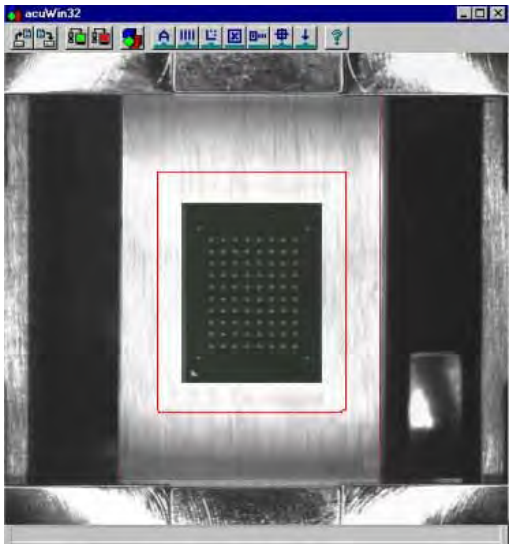


Figure 3-36—Set device search area (red rectangle) around device

7d) When the device search area is adjusted, click the green triangle to exit the Area Search dialog. See *Figure 3-37*.

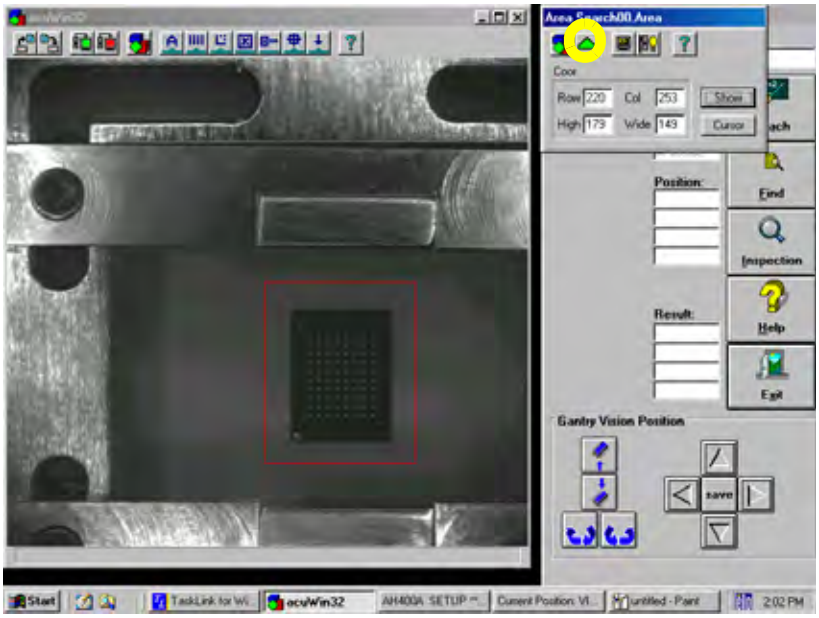


Figure 3-37—Click green triangle to exit Area Search dialog

7e) On the Search Search dialog tool bar, click **a** to hide the Search Search dialog. See *Figure 3-38*.

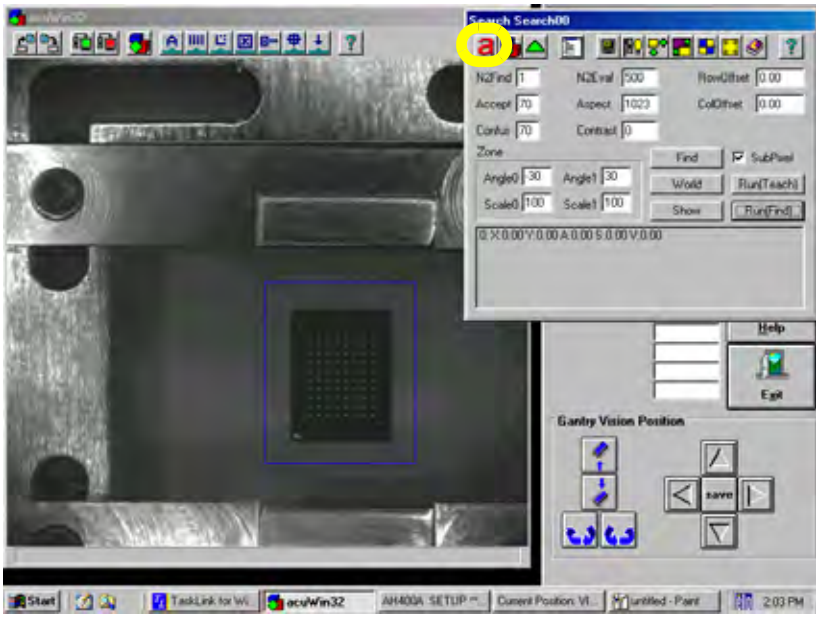


*Figure 3-38—Click **a** to hide Search Search dialog*

8. Teach—

8a) On the Vision System window, click **Teach**.

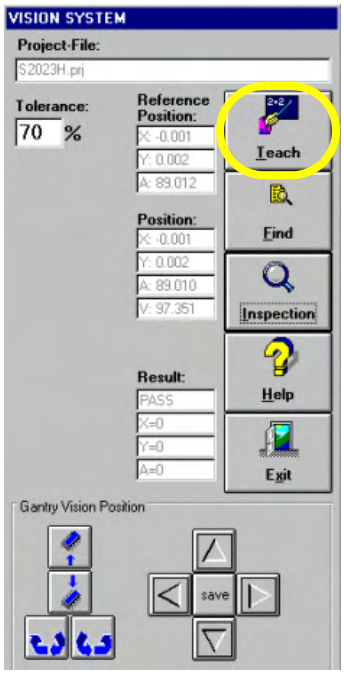


*Figure 3-39—Click **Teach***

8b) In the acuWin32 window, size the device image area (red rectangle) so that it matches the edges of the device. In *Figure 3-40*, the device image area is offset slightly from the device for clarity. In actuality, the device image area needs to match the device exactly.

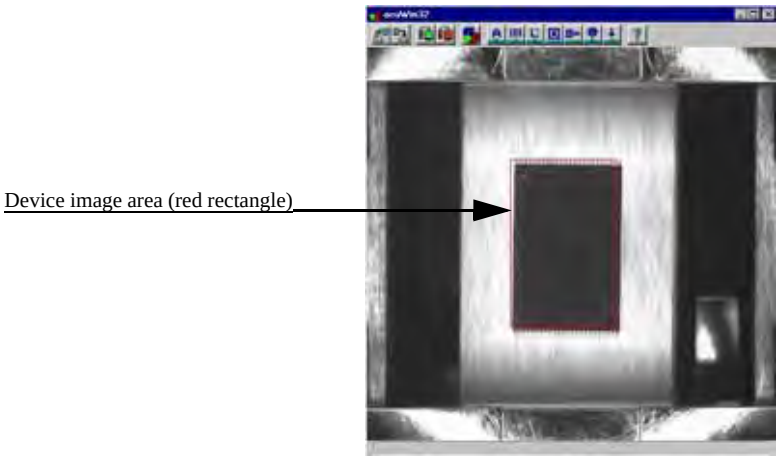


Figure 3-40—Device image area (red rectangle) matches the device

8c) When the device image area exactly matches the device, click **OK**.

8d) If the Attention message box appears, click **Yes** to save the changed value. See *Figure 3-41*.

Figure 3-41—Save changed value

9. Check new values—

9a) On the Vision System window, note the new **Reference Position** values for X and Y. Values are in inches. Ideally, these values are 0 (zero). Values of ±0.005 inches are within tolerance. In the example shown here, X = - 0.001 and Y = 0.002.

9b) Note the **Verification** value. This value should be greater than 95. In the example shown here, the value is 97.351.

***NOTE:** If values are **not** within tolerance, proceed with Step 10. If the values **are** within tolerance, skip forward to Step 11.*

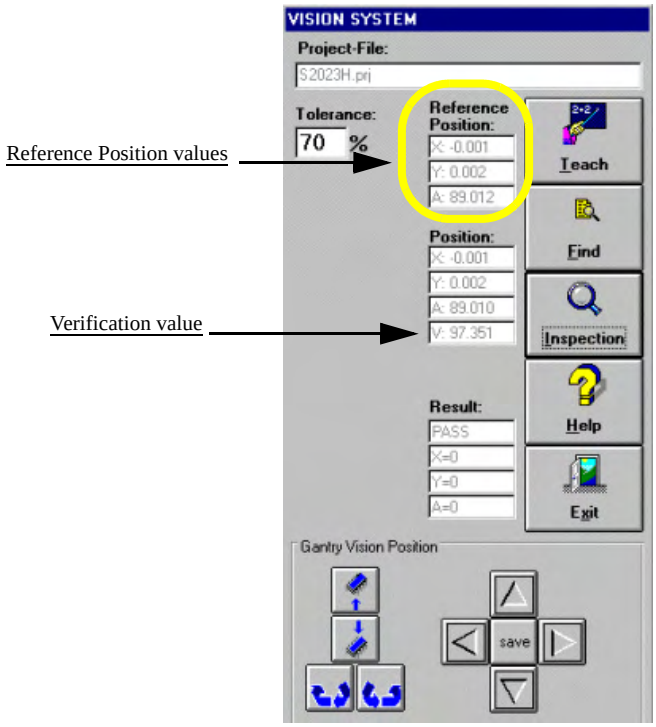


Figure 3-42—New values

10. Adjust device image area again (if necessary)—

10a) Adjust the device image area and move it in the X-axis and/or Y-axis direction as required.

10b) On the Vision System window, click **Teach** again.

10c) On the Attention message box, click **Yes** to accept changed values.

10d) Check new **Reference Position** and **Verification** values.

11. Inspect—

11a) Click **Inspection** on the Vision System window.

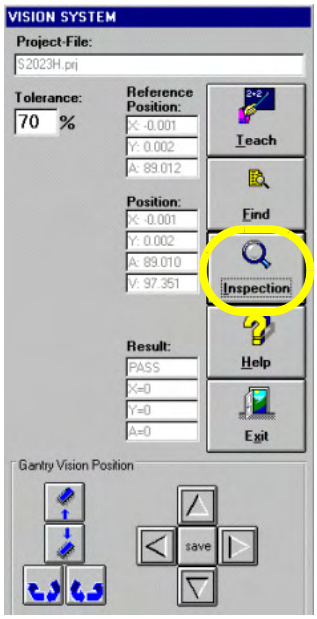


*Figure 3-43— Click **Inspection***

11b) Verify that the **Result** now reads as shown in *Figure 3-44*.

PASS
X = 0
Y = 0
A = 0

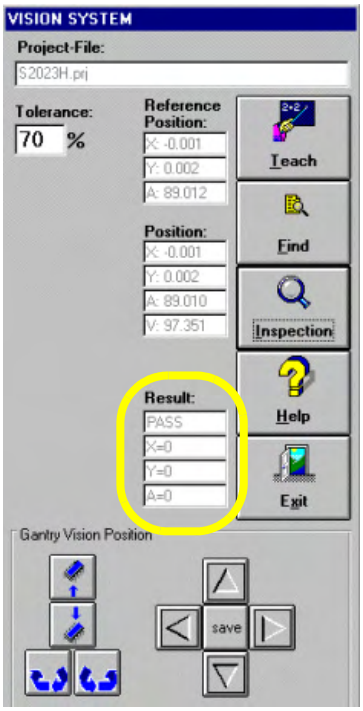


Figure 3-44—Result: PASS

12. Verify reference vision file (optional)—

12a) Move the X-axis and Y-axis two steps (20 mils) by clicking twice on the forward arrow corresponding to each axis. See *Figure 3-45*.

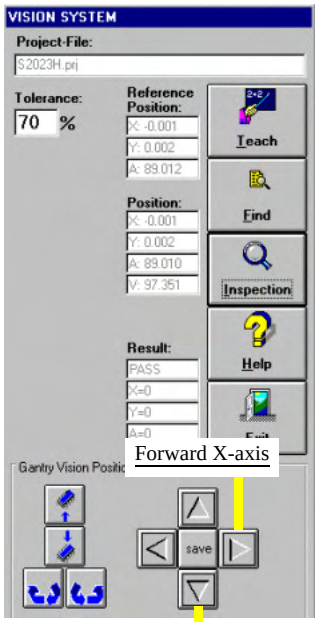


Figure 3-45—Forward arrows for X-axis and Y-axis

12b) Click **Inspection**.

12c) Verify that X = 20, Y = 20 and A = 0.

12d) Move the X-axis and Y-axis two steps back by clicking twice on the back arrow corresponding to each axis.

12e) Click **Inspection**.

12f) Verify that X = 0, Y = 0 and A = 0.

12g) Click the Theta rotation button twice. See *Figure 3-46*.

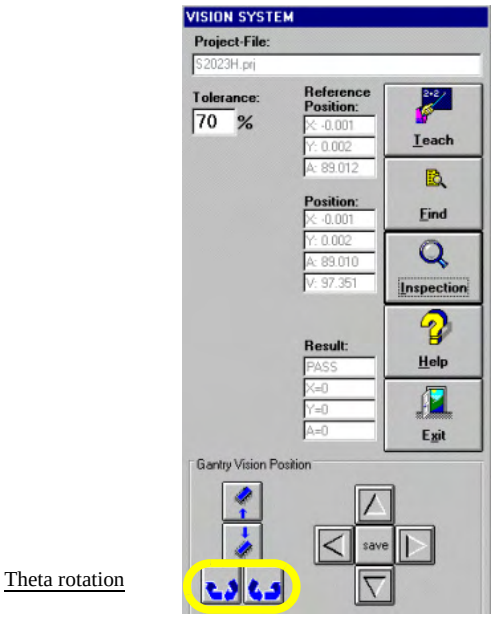


Figure 3-46—Theta rotation

12h) Click **Inspection**.
12i) Verify that X = 0, Y = 0 and A = 20.

> ***NOTE:*** *If X or Y is more than ±5, then the vacuum cup nozzle is not correctly positioned. Repeat Step 1 and Step 2 on page 3-21 to reposition the vacuum cup nozzle.*

12j) On the Vision System window, click **Exit**.

This completes the process of teaching a reference vision file.

Teach the Package File

The package file contains information about the location of all programmers, all available input media, and the shuttle transfer (if installed). During Task creation, you copied the PackageTemplate.txt file and renamed it to the adapter used in the Job (see TaskLink online Help). This renamed package file contains the Package Template values. Now it is necessary to teach the package file for the particular device being programmed.

> ***NOTE:*** *If an error button appears on the Gantry window while teaching the package file, see "Errors" on page 3-45.*

To teach the package file:

Teach Programmer Locations

1. Prepare the system—
1a) From TaskLink, select and load the newly created Job.
1b) From the AH500 Setup window, select the **Options** tab.
1c) For main Input and Output media, select **Trays**.
1d) For Reject 1, select **Reject Tray**.
1e) By hand, open the socket on Programmer 1 and insert a device.

> ***NOTE:*** *If Programmer 1 contains more than one socket, insert devices in the first and last sockets.*

1f) On the AH500 Setup window, click **System**.
1g) On the System window, click **Gantry** to display a graphic representation of the work surface, including yellow position labels for all locations in the work envelope. The Gantry window also includes Y-axis and X-axis adjustment arrows. See *Figure 3-47*.

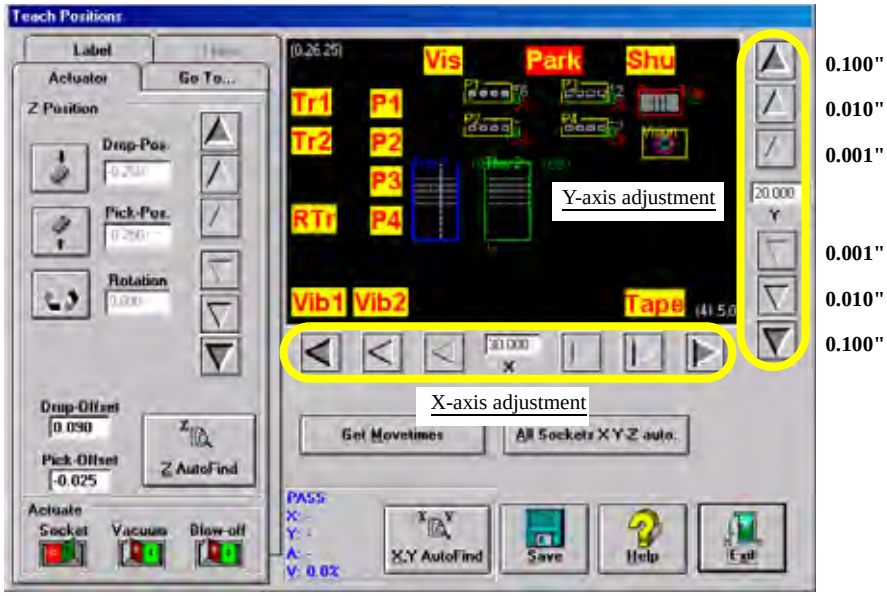


Figure 3-47—Graphic representation of work envelope

WARNING: Stay clear of the operating envelope while teaching PNP head locations. The PNP head can move without notice when operating in this mode.

1h) Click **P1**. The gantry moves the PNP head to the location specified, and a white box appears on the graphic relative to the PNP head's physical location. The position label flashes RED then YELLOW indicating the position of the PNP head.

2. Adjust location of the probe tip—

2a) Adjust the location of the probe tip so that it is centered on the device. Use the up/down arrows for Y-axis adjustments and the left/right arrows for X-axis adjustments. From the inside working outward, the arrow buttons adjust the position ±0.001, 0.010, and 0.100 inches respectively. See *Figure 3-47*.

2b) Click **Save**.

***NOTE:** When saved, these settings are kept in the appropriate package file (.txt) in the directory* `C:\AH400_32\Package` *on the Handler Computer.*

3. Z AutoFind—

3a) Click **Z AutoFind.** The PNP head lowers and the probe tip touches the device.

3b) Click **Yes** to save the new values.
The Z-axis reference position is now set. From the Z-axis reference, the drop and pick offsets are added.
For example, if Z-axis reference = -1.000, then:
Zdrop = -0.910 and Zpick = -1.025
See *Figure 3-48*.

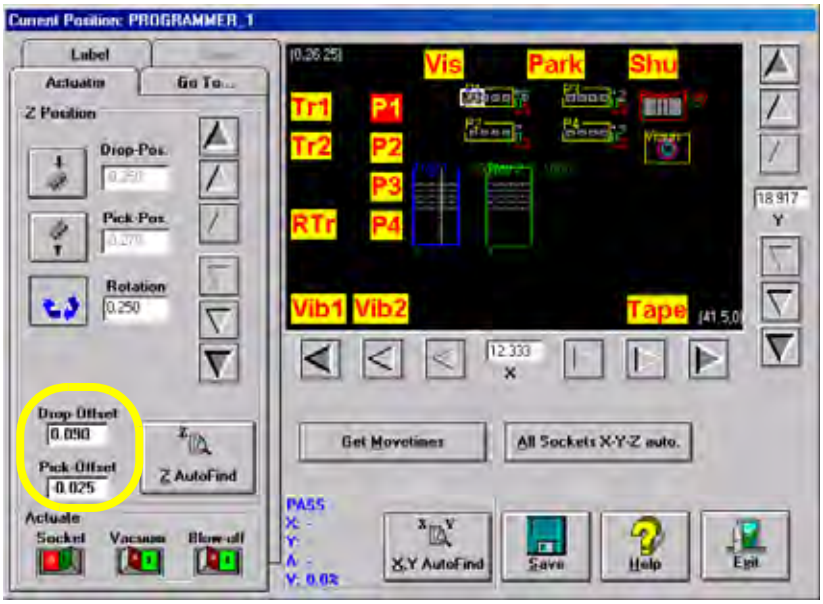


Figure 3-48—Drop and Pick offsets

4. Adjust Socket Actuator (if required)—

> ***NOTE:*** *Adjust the Socket Actuator only if the socket fails to open or if devices are dropped. It is necessary to adjust the Socket Actuator only once while teaching a package file.*

4a) Click **Socket** ON. This lowers the Socket Actuator and opens the socket.

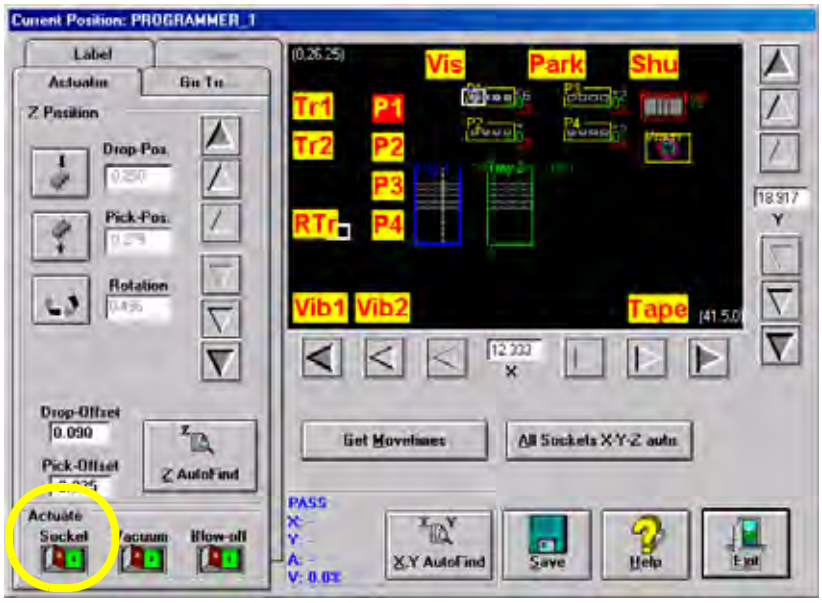


*Figure 3-49—Socket **ON***

4b) On the input panel, push the main air valve down to the **OFF** position.

4c) By hand, adjust the Socket Actuator so that the ribs open the socket as the probe tip descends and so the actuator does not interfere with the device as it is picked up by the probe tip.
4d) On the input panel, push the main air valve up to the **ON** position.
4e) Click **Socket** OFF to raise the Socket Actuator.

5. Set R-axis value—
Follow the instructions in "Set R-axis rotation values" on page 3-22.

6. Pick the device—
6a) Click **P1** to return the PNP head to Programmer 1.
6b) Press **X,Y AutoFind**. The PNP head picks the device, takes it to the vision location and compares the orientation of the device to the orientation in the reference vision file.
6c) When the Attention message box pops up, check the **Results** information.

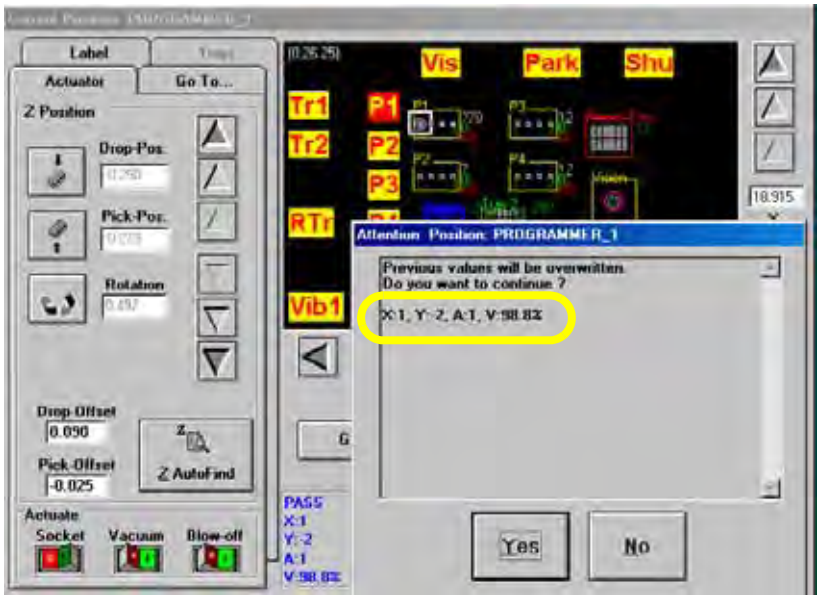


*Figure 3-50—**Results** information*

6d) If the new values for X and Y are >±5, press **Yes** and repeat Step 6b. If the new values for X and Y are <±5, press **No**.

***NOTE:** If the programmer has multiple sockets, complete Step 7.*

7. Multiple socket programmers—
7a) On the **Go To** tab, click **last Socket**. See *Figure 3-51*.

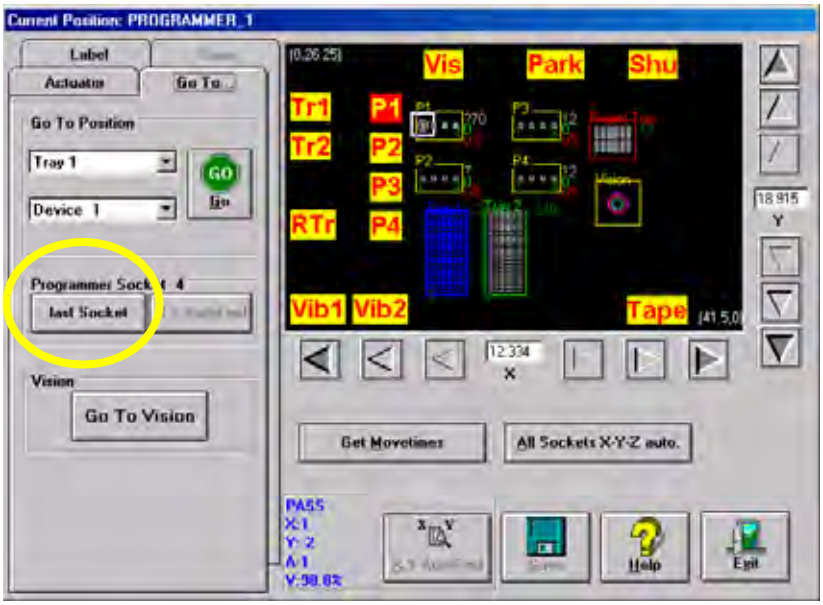


Figure 3-51— last Socket

7b) Click **X,Y AutoFind**.

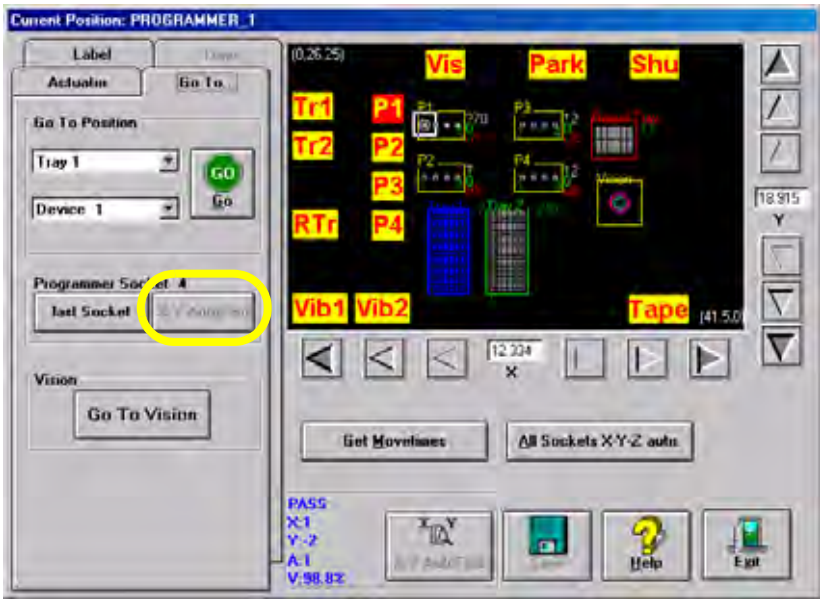


Figure 3-52—X,Y AutoFind

7c) When the Attention message box pops up, check the **Results** field.
7d) If the new values for X and Y are >±5, press **Yes** and repeat Step 7b.
If the new values for X and Y are <±5, press **No**.

This completes the process of teaching Programmer 1 locations. Repeat for **ALL** programmers.

Teach Tray Locations

The PS288 can have static tray or automatic tray feeder (TF20 or TF30) input and output modules. Teaching tray locations is the same.

> ***NOTE:*** *If the automatic tray feeder option is installed, trays are displayed in the Gantry window as shown in Figure 3-53.*

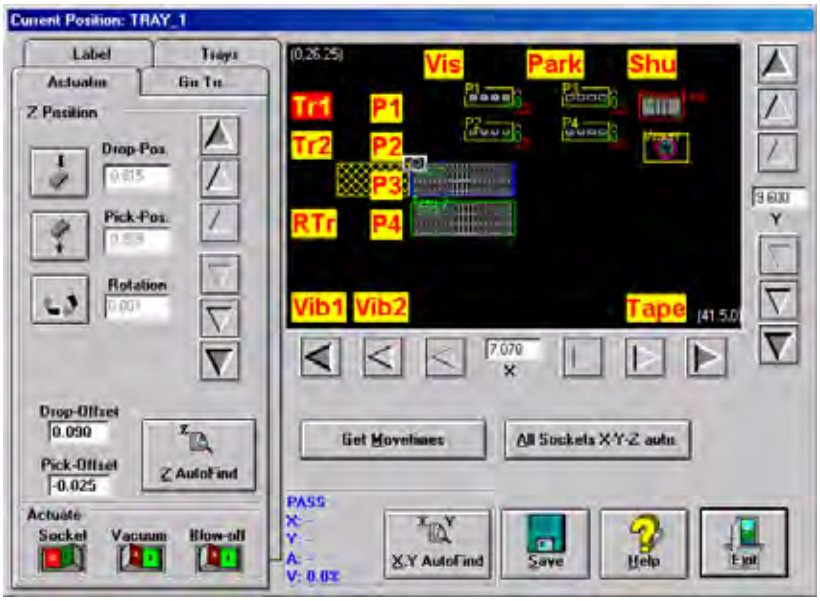


Figure 3-53—Gantry window display with automatic tray feeder installed

1. Prepare the system—

1a) In Tray 1, insert devices in the upper left corner and lower right corner.

1b) In Tray 2, insert a device in the upper left corner only.

2. Teach upper left corner of Tray 1—

2a) Click **Tr1**.

2b) Adjust the location of the probe tip so that it is centered on the device in the upper left corner of Tray 1. Use the up/down arrows for Y-axis adjustments and the left/right arrows for X-axis adjustments. From the inside working outward, the arrow buttons adjust the position ±0.001, 0.010, and 0.100 inches respectively.

2c) Click **Save**.

> ***NOTE:*** *When saved, these settings are kept in the appropriate package file (.txt) in the directory* `C:\AH400_32\Package` *on the Handler Computer.*

2d) Click **Z AutoFind.** The PNP head lowers and the probe tip touches the device. Click **Yes** to save the new values. The Z-axis reference position is now set.

2e) Press **X,Y AutoFind**. The PNP head picks the device, takes it to Vision and compares the orientation of the device to the orientation in the reference vision file.

2f) If the new values for X and Y are >±5, press **Yes** and repeat Step 2e. If the new values for X and Y are <±5, press **No**.

3. Teach lower right corner of Tray 1—

3a) Select the **Trays** tab.

3b) Enter the number of columns and rows for this tray. See *Figure 3-54*.

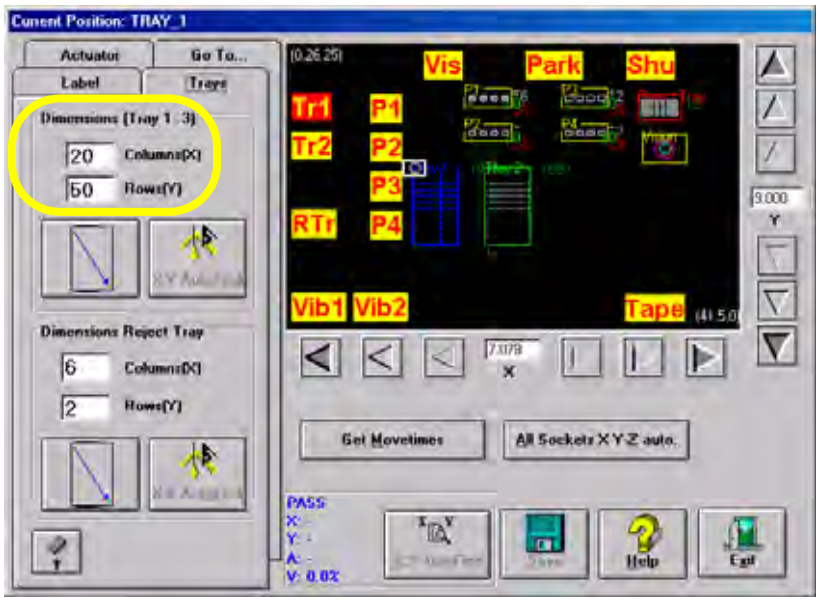


Figure 3-54—Specify dimensions of Tray 1

3c) Click the diagonal arrow. See *Figure 3-55*. The PNP head moves to the lower right corner of Tray 1.

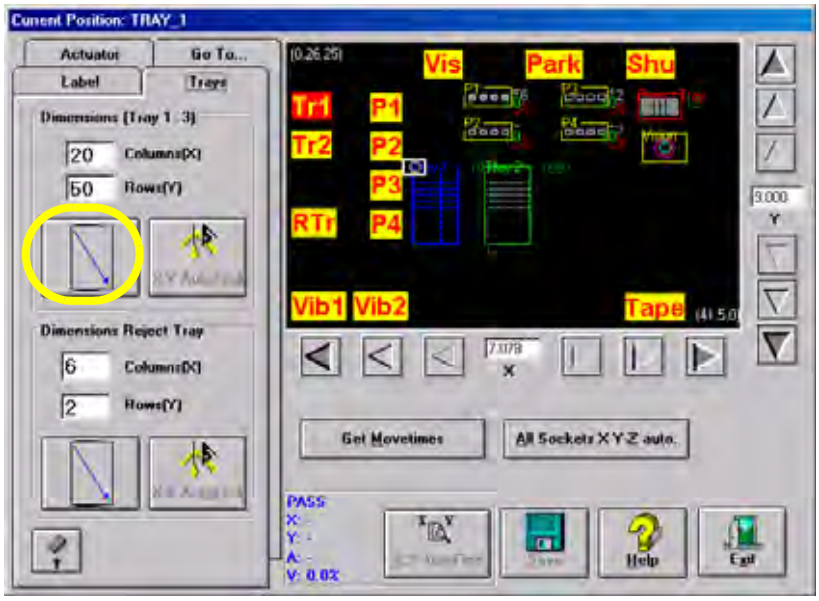


Figure 3-55—Click diagonal arrow

3d) Adjust the location of the probe tip so that it is centered on the device in the lower right corner of Tray 1. Use the up/down arrows for Y-axis adjustments and the left/right arrows for X-axis adjustments.

3e) Click **X,Y AutoFind**.

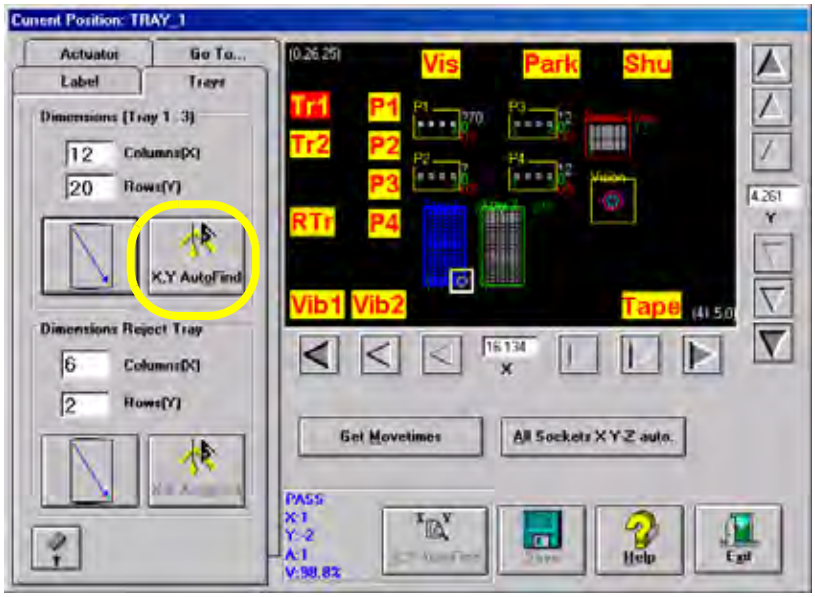


*Figure 3-56—Click **X,Y AutoFind***

3f) If the new values for X and Y are >±5, press **Yes** and repeat Step 3e. If the new values for X and Y are <±5, press **No**.

4. Teach Tray 2 location—

4a) Click **Tr2**.

4b) Adjust the location of the probe tip so that it is centered on the device in the upper left corner of Tray 2. Use the up/down arrows for Y-axis adjustments and the left/right arrows for X-axis adjustments.

4c) Click **Save**.

4d) Click **Z AutoFind.** The PNP head lowers and the probe tip touches the device. Click **Yes** to save the new values. The Z-axis reference position is now set.

4e) Click **X,Y AutoFind.** The PNP head picks the device, takes it to Vision system and compares the orientation of the device to the orientation in the reference vision file.

4f) If the new values for X and Y are >±5, press **Yes** and repeat Step 4e. If the new values for X and Y are <±5, press **No**.

5. Teach Reject location—

***NOTE:** See Figure 2-6 for possible physical location of reject box/bin.*

5a) Click **RTr**.

5b) Adjust the location of the probe tip so that it is centered at the upper left corner of the reject box/bin. Use the up/down arrows for Y-axis adjustments and the left/right arrows for X-axis adjustments.

5c) Click **Save**.

5d) Select the **Trays** tab.

5e) In the Dimensions Reject Tray field, enter a value for Columns (X) and Rows (Y) for the reject box/bin. These values set the number of reject devices sent to the reject box/bin before the **Reject is Full** message is displayed. In the example shown in *Figure 3-57*, the **Reject is Full** message is displayed after 12 (6 x 2 = 12) devices are placed in the reject tray.

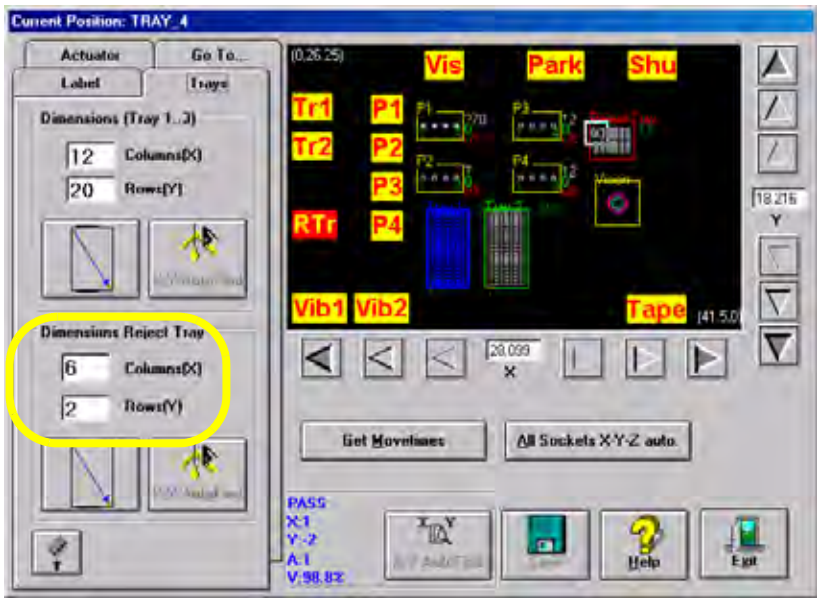


Figure 3-57— Setting number of devices sent to reject tray

5f) Click the diagonal arrow. The PNP head moves to the lower right corner of the reject tray.

5g) Adjust the location of the probe tip so that it is centered at the lower right corner of the reject tray. Use the up/down arrows for Y-axis adjustments and the left/right arrows for X-axis adjustments.

5h) Click **Save**.

5i) When prompted, click **Yes** to overwrite values.

Teach Tube Locations

1. Prepare the system—

1a) From the AH500 Setup window, select the **Options** tab.

1b) For main Input and Output media, select **Tubes**.

1c) For Reject 1, select **Vibrator 2**.

1d) In the **Count of Fail Tubes** field, enter the number of tubes in Vibrator 2 (output feeder) that will receive failed (reject) devices.

1e) Insert tubes in Vibrator 1 (input feeder) and Vibrator 2 (output feeder).

2. Teach Vibrator 1 locations—

2a) On the Gantry window, click **Vib1**.

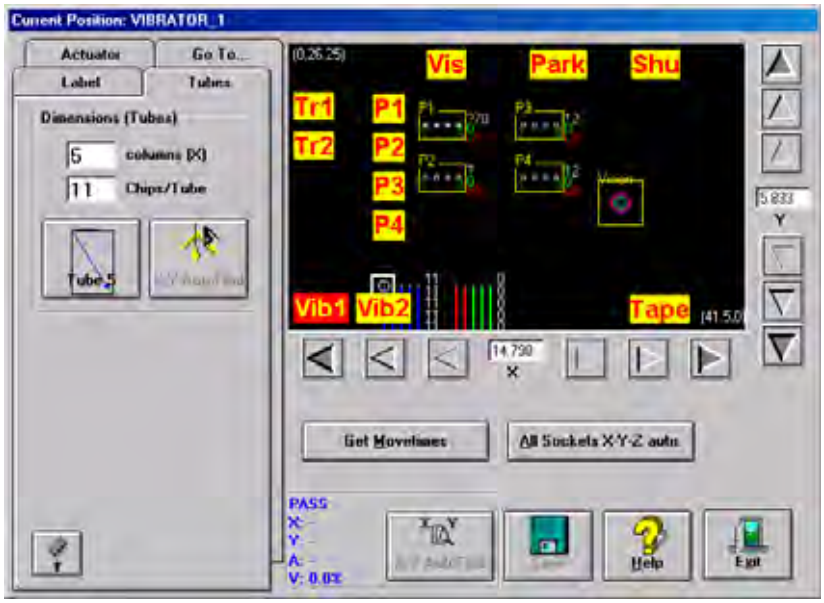


Figure 3-58—Vib1 location

2b) Adjust the location of the probe tip so that it is centered on the device in the staging area of the left-most tube of Vibrator 1. Use the up/down arrows for Y-axis adjustments and the left/right arrows for X-axis adjustments.
2c) Click **Save**.
2d) Click the **Tubes** tab.
2e) In the **Columns (X)** field, enter the number of tubes in Vibrator 1.
2f) In the **Chips/Tube** field, enter the number of devices per tube.
2g) Click the diagonal arrow. The PNP head moves to the right-most tube in Vibrator 1.
2h) Adjust the location of the probe tip so that it is centered on the device in the staging area of the right-most tube. Use the up/down arrows for Y-axis adjustments and the left/right arrows for X-axis adjustments.
2i) Click **X,Y AutoFind**.
2j) If the new values for X and Y are >±5, press **Yes** and repeat Step 2h to Step 2i.
If the new values for X and Y are <±5, press **No**.

3. Teach Vibrator 2 locations—
3a) On the Gantry window, click **Vib2**.
3b) Adjust the location of the probe tip so that it is centered on the device in the staging area of the left-most tube of Vibrator 2. Use the up/down arrows for Y-axis adjustments and the left/right arrows for X-axis adjustments.
3c) Click **Save**.
3d) Click the **Tubes** tab.
3e) In the **Columns (X)** field, enter the number of tubes in Vibrator 2.
3f) In the **Chips/Tube** field, enter the number of devices per tube.
3g) Click the diagonal arrow. The PNP head moves to the right-most tube in Vibrator 2.
3h) Adjust the location of the probe tip so that it is centered on the device in the staging area of the right-most tube of Vibrator 2. Use the

up/down arrows for Y-axis adjustments and the left/right arrows for X-axis adjustments.

3i) Click **X,Y AutoFind**.

3j) If the new values for X and Y are >±5, press **Yes** and repeat Step 3h to Step 3i.
If the new values for X and Y are <±5, press **No**.

Teach Shuttle Transfer Locations

1. Teach locations—

1a) On the Gantry window, click **Shu**. The PNP head moves to the marking shuttle.

1b) Adjust the location so the probe tip is centered on Shuttle Ped 2 in the marking pedestal. Use the up/down arrows for Y-axis adjustments and the left/right arrows for X-axis adjustments.

1c) Click **Save**.

1d) Click **Park**. The PNP head moves to the Park location.

1e) Select the **Label** or **Laser** tab (depending on which type of marking system is installed). Click the Vacuum switch to **ON**. See *Figure 3-59*.

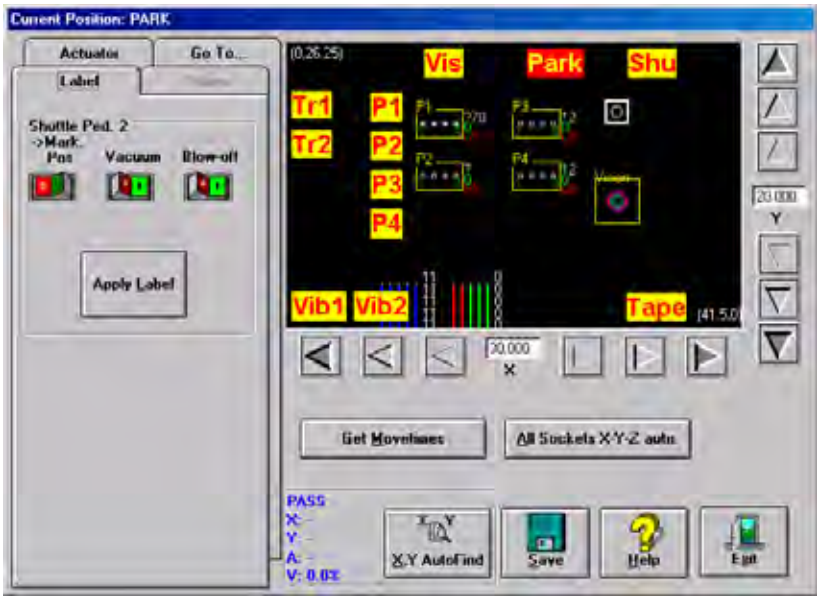


*Figure 3-59— Vacuum switch **ON***

1f) Insert a device in Programmer 1.

1g) Click **P1**. The PNP head moves to Programmer 1.

1h) Right-click the touchpad to pick up the device.

1i) Click **Shu**. The PNP head moves to the marking shuttle.

1j) Right click to place the device on Shuttle Ped 2.

1k) On the Actuator tab, click **Z AutoFind.** The PNP head lowers and the probe tip touches the device.

1l) Click **Yes** to save the new values. The Z-axis reference position is now set.

1m) Click **X,Y AutoFind.** The PNP head picks the device, takes it to Vision system and compares the orientation of the device to the orientation in the reference vision file.

1n) If the new values for X and Y are >±5, press **Yes** and repeat Step 1m.
If the new values for X and Y are <±5, press **No**.

Teach Tape-Input Location

1. Prepare the system—

On the feeder unit control panel, press and hold the center button. While holding the center button, press the forward button. The carrier tape advances one guide hole. Advance the carrier tape in this manner until the pick point mark on the tape window aligns with the center of the device. A device is now in the pick location.

2. Teach locations—

2a) On the Gantry window, click **Tape**. The PNP head moves to the tape input pick location.

2b) Adjust the location of the probe tip so that it is centered on the device in the pick location of the feeder unit. Use the up/down arrows for Y-axis adjustments and the left/right arrows for X-axis adjustments.

2c) Click **Save**.

2d) Click **Z AutoFind.** The PNP head lowers and the probe tip touches the device.

2e) Click **Yes** to save the new values. The Z-axis reference position is now set.

2f) Click **X,Y AutoFind.** The PNP head picks the device, takes it to Vision system and compares the orientation of the device to the orientation in the reference vision file.

2g) If the new values for X and Y are >±5, press **Yes** and repeat Step 2f. If the new values for X and Y are <±5, press **No**.

Get Movetimes

When the package file is taught, you can optimize the movement of the PNP head in the work envelope by getting movetimes.

To get movetimes:

1. Gantry—

1a) On the Gantry window, click **Get Movetimes**.

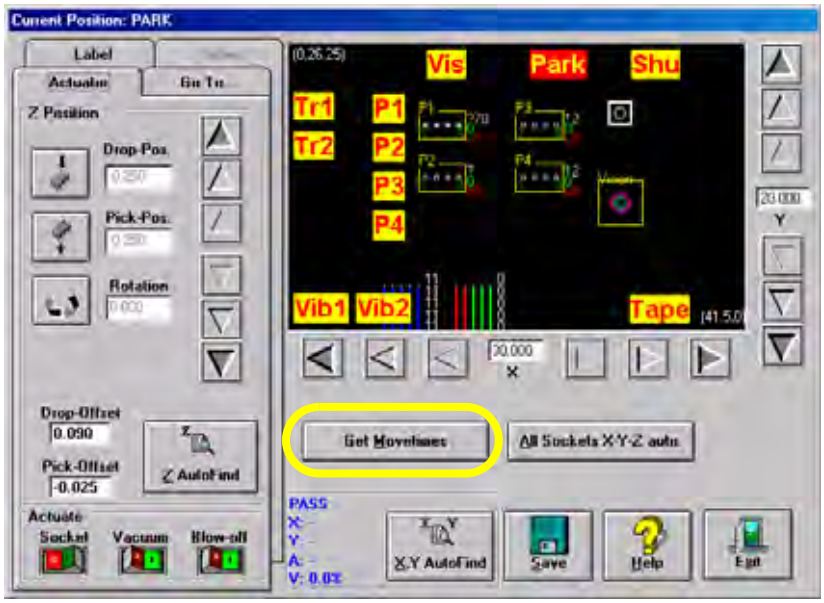


*Figure 3-60—Click **Get Movetimes***

1b) Click **Yes** when prompted to save positions.

Figure 3-61—Save positions

1c) Wait for the calculation to finish.

This completes the process of teaching the package file.

Errors

During the process of teaching the package file, you will be directing the PNP head to move to various locations inside the work envelope. If the PNP head is directed to move beyond its X-axis or Y-axis limits, you will see a red error button.

To resolve axis limit errors:

1. Identify error—

1a) Click the Error button to see the error message.

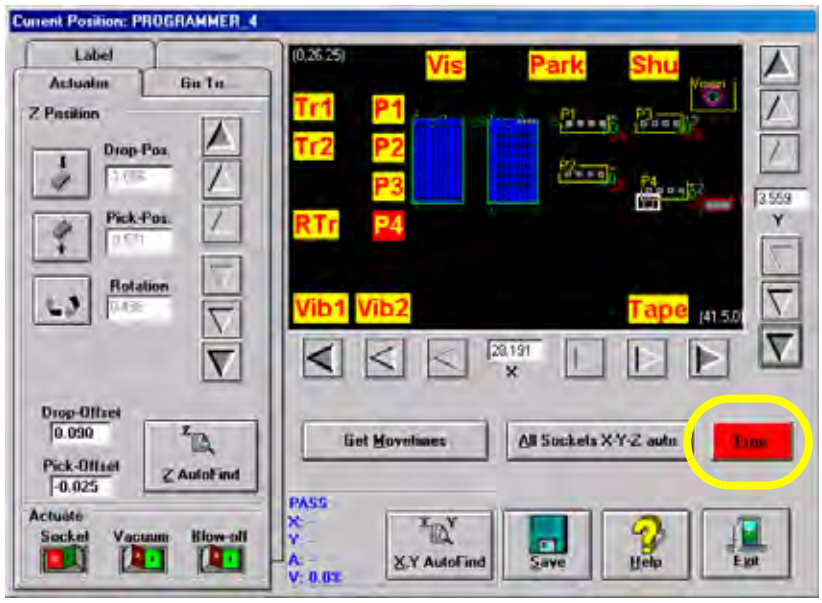


Figure 3-62—Click red Error button

1b) A message similar to *Figure 3-63* is displayed.

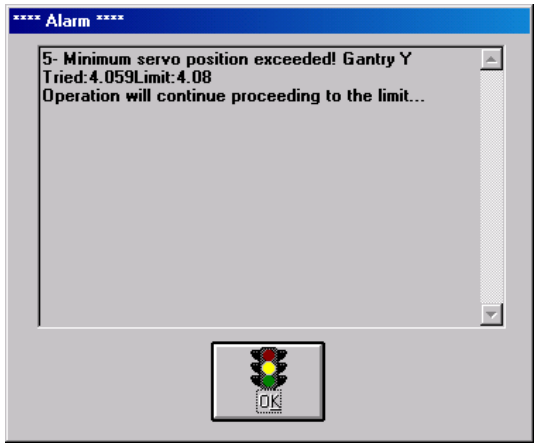


Figure 3-63—Alarm message

1c) Write down the axis (in this case, Y-axis), whether the minimum or maximum position has been exceeded (in this case, the minimum position), and the "Tried" and "Limit" values (in this case, Tried = 4.059 and Limit = 4.08).
1d) Click **OK**.

2. Enter Service Mode—

CAUTION: *Service Mode allows changes that could make the PS288 inoperable. Do not make changes you are not sure about; contact Data I/O Customer Support.*

2a) Exit AH500 and return to the TaskLink Task/Kit Manager window.
2b) In the Task/Kit Manager window, re-select the Task and click **Run**.
2c) When the AH500 main screen opens, double-click the "PS Series" area (see *Figure 3-64*). This places the AH500 software in Service Mode.

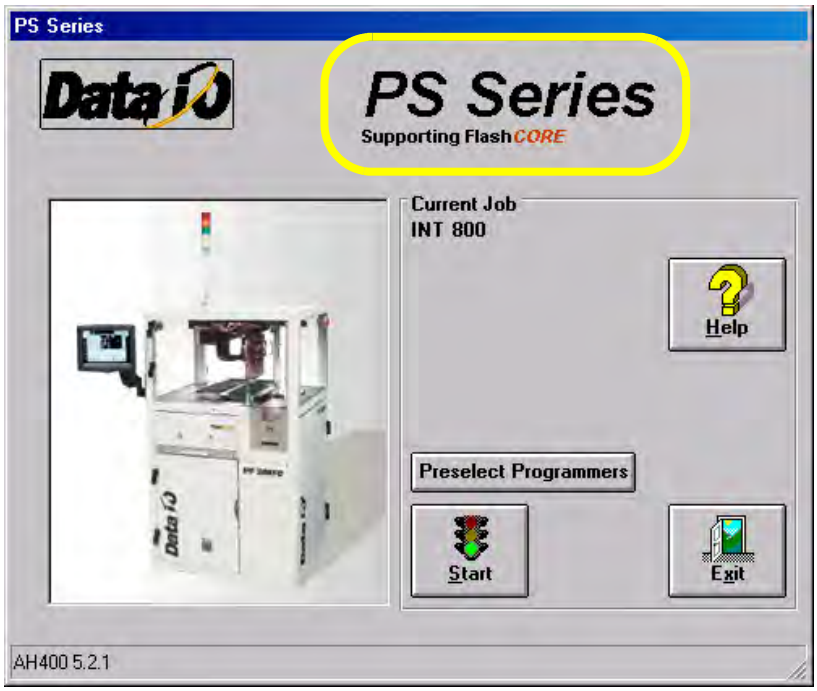


Figure 3-64—Double-click to enter Service Mode

2d) On the main screen, click **Start.**
2e) On the Setup window, click **System**.
2f) On the System window, click **Package File**.

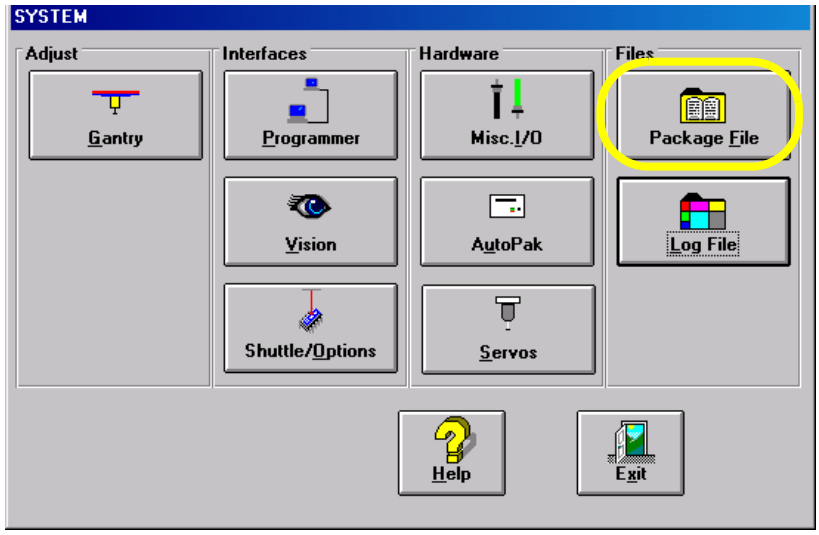


*Figure 3-65—Click **Package File***

3. Edit the package file—

3a) In the Package File window, locate the appropriate line.
In the example shown in *Figure 3-63*, the error is the Y-axis minimum.
Record No.16 displays the Y-axis minimum value:
"GANTRY Y MOTOR, MINIMUM"
The limit is 4080.

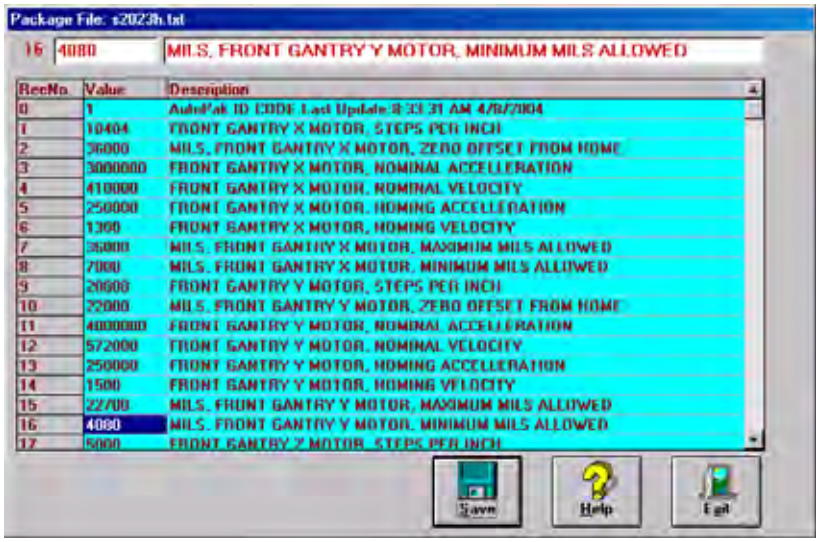


Figure 3-66—Edit package file

3b) Edit the appropriate Record No. line in the Package File window.
In this example, the Tried value was 4.059.
Change Record No. 16 value to 10% lower than the Tried value, for example, 4040.

3c) Click **Save**.

3d) Click **Exit**.

Monitor Statistics

Occasionally, the system administrator may require statistics for a group of devices for a given job. This is easily accomplished using any of three statistics tools:

- TaskLink's Session Data Logging Feature
- AH500's Package Statistics Feature
- (Optional) Statistical Process Control Software (user-supplied)

TaskLink Session Data Logging

For complete instructions on enabling and using TaskLink's Session Data Logging option, see TaskLink online Help.

AH500 Package Statistics

To view programming statistics using the AH500 software:

1. Prepare the system—
From the Setup window, select the **Job Info** tab. Click **Statistics**.

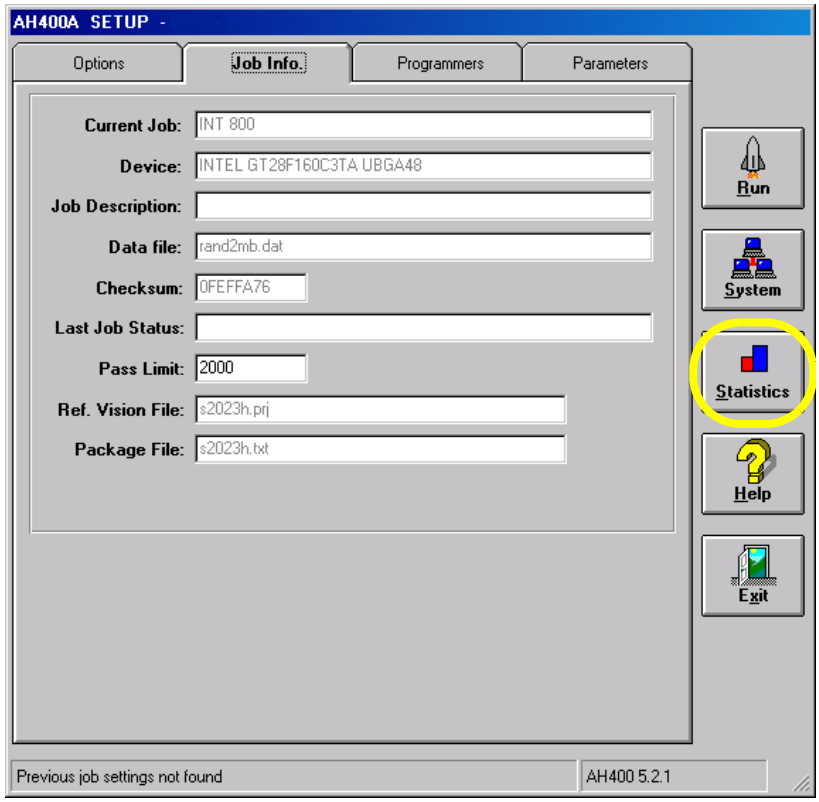


*Figure 3-67—**Job Info** tab*

2. Review statistics information—
The statistics include such items as successful programs, continuity failures, verify failures, etc.

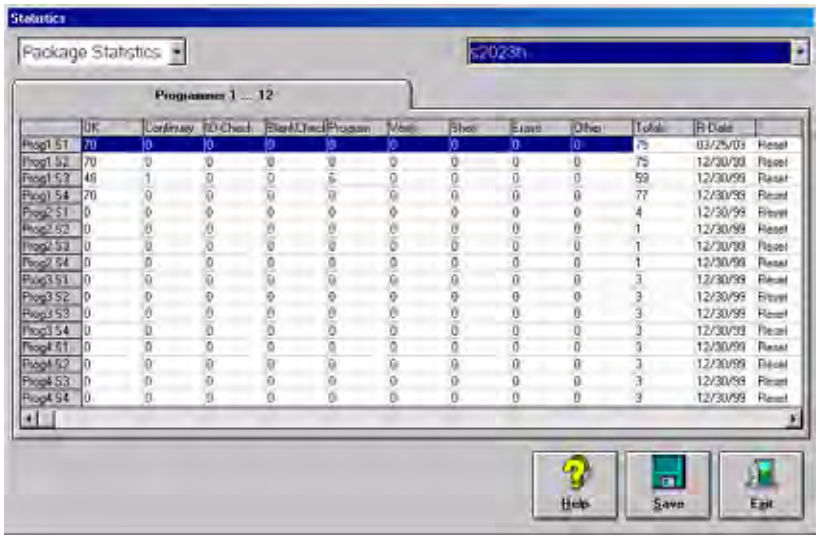


Figure 3-68—Package statistics

Pass/fail criteria are logged for each individual programmer. This is useful when attempting to identify a potential hardware problem with a programmer.

3. Reset statistics—

The statistics displayed correspond to the package file and therefore to the Socket Adapter used. When a Socket Adapter (or an individual socket in a Socket Adapter) is replaced on a particular programmer, statistics for that Socket Adapter or individual socket must be reset.

To reset statistics, click **Reset** in the right-most column corresponding to the programmer on which the Socket Adapter (or individual socket) was replaced.

- If a Socket Adapter was replaced, reset all rows for that programmer.
- If an individual socket was replaced, reset only the row corresponding to the replaced socket.

The R-date (reset date) is set to the current date and statistics are reset to all zeroes.

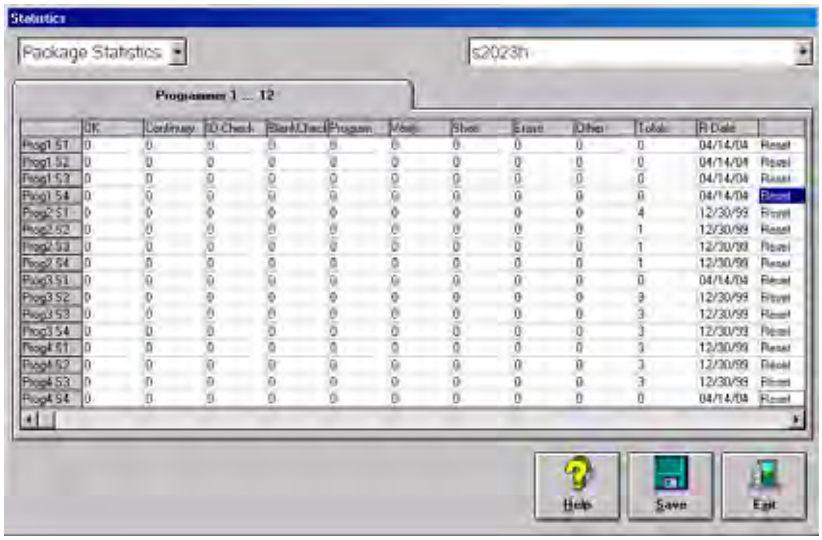


Figure 3-69—Resetting statistics for Prog1

Statistical Process Control Software (SPC)

This user-supplied software program can import the comma-delimited file generated by the AH500 software.

1. Enable SPC—

1a) On the Handler Computer, navigate to C:\AH400_32 and open WinAH400.ini with Notepad editor.

1b) Locate the section for SPC Logging. It will look like this:

```
[SPC Logging]
LoggingEnabled=FALSE
MaxFileSize=10485760
TempLogFile=C:\AH400_32\spcout.txt
```

1c) Set the second line value to TRUE:

```
LoggingEnabled=TRUE
```

1d) Save and close WinAH400.ini.

NOTE: *In the above example the SPC logging file is saved to C:\AH400_32\ directory. It can, however, be saved anywhere on the*

Handler Computer hard drive, or on a networked drive if the PS288 is connected to a network.

The SPCOut.txt file contains 19 comma-delimited fields, as follows:

	Description
01	DevicesInputSystem - number of devices picked from Input media
02	DevicesInspected - number of devices inspected by Vision system
03	InspectionQuality - as percentage, compared with reference vision
04	InspectionYield
05	DevicesInsertedSocket - number of devices inserted into socket
06	SocketYield
07	ProgrammerYield
08	ProgSysYield (Yield of all programmers together)
09	DevicesProcessedMarker
10	MarkingYield
11	SystemThroughputExcWait - Starts with first device placed, excludes wait times.
12	SystemTotalThroughputIncWait - Starts when Run starts, includes wait times
13	SystemYield
14	AreaID - Programmer #1 = "17", Programmer #2 = "18", …, Programmer #24 = "40")
15	PosID - that is Socket #
16	TimeStamp - Date/Time of SPC log entry
17	OrderNumber - Job Name and or number
18	Package - Package File used for the job
19	VisionPRJ - Reference Vision File used for the job

Figure 3-70—Comma-delimited fields

Maximize Programming Yields

Occasional declines in system yields may occur during day to day operation of the PS288. While overall yield levels can vary depending on device manufacture, any short term change in yields of more than 0.5% is sufficient reason for investigation of a local or immediate cause of variation. These changes in yield can be attributed to a number of causes, including the manufacture of devices, socket issues, system maintenance, and process errors.

Manufacture of Devices

Variations in the manufacture of devices may affect yields in an automated system, such as:

- Variation in dimensions from different manufacturing lots or facilities can cause devices to fit improperly in the sockets or require re-calibration of the system to be placed successfully.
- Presence of residual plastic on the edges of the devices (“flashing”) can cause devices to rest improperly in the sockets.
- Die changes (shrinks, process improvement for improved wafer yield, etc.) require new algorithms. Data I/O tracks these changes with vendors and recommends all customers subscribe to the algorithm update program.
- Die processes contain variability. Programming yields can sometimes vary on a normal die. Device families recently introduced to the market tend to have more fluctuations in yields as the semi-vendor's manufacturing process stabilizes.
- Multiple fabrication sites often produce the same devices. Performance characteristics, including programming yield, can vary from location to location.
- Lead oxide accumulating on device leads is an issue for some devices. This can vary with age and the conditions with which the devices are stored.
- Programming yields decrease with the number of programming cycles. Devices that are processed more than once are more likely to experience problems.

Socket Issues

The programming sockets are perhaps the most important and vulnerable element of the PS288. They are subject to residue buildup, damage from mis-inserted devices (perhaps due to poor calibration of the placement system), and general wear and tear. Socket life is generally rated by their manufacturer as insertions per socket, depending on the type, after which yields may drop significantly.

Socket conditions that cause varying yields include the following:

- Debris of any type can prevent sockets from closing completely. Sometimes the debris may not be visible. Simple actuation may clear debris, or it may be necessary to clean sockets with low pressure air.

> ***NOTE:*** *Clean or blow out sockets with low pressure air (90 PSI or less) every day. Press down on the opener to blow out debris from beneath the contacts. More frequent cleaning is recommended in a dirty environment.*

- Small molded tabs between each of the contact fingers may become damaged, preventing one or more fingers from closing completely and causing intermittent socket failures.
- Clamping fingers are one piece, from the connector pin to the contact finger. If the connector pin is not seated in the molded base it will affect the contact point of the finger.
- Bent or distorted contact fingers can cause intermittent socket failures.

System Maintenance

System maintenance is critical to maintaining high yields. Periodic cleaning, adjustment and replacement of worn elements will ensure the best possible performance. These periodic procedures are outlined in *Chapter 5—Maintenance* and should be followed closely.

Careful system calibration is also critical to maintaining high yields. While not normally required during steady operation, calibration of the PS288 should be checked anytime yields fall to unacceptable levels. See “Adjustments, Calibrations, and Functional Tests” on page 5-29.

Process Errors

Finally, a number of process errors can result in reduced yield. While an automated approach eliminates most human error during production, errors in system setup or maintenance programs can result in reduced yield:

- Using old algorithms may affect programming yields. PS288 algorithms are updated weekly at http://www.dataio.com/algorithms/ and are available depending on your maintenance plan.
- Selecting the wrong part number in a job, thus using the wrong algorithm.
- Changing programming parameters (sector protection, security options, verify options, continuity testing, blank checking).
- Measuring yields too infrequently, so that a drop in yield rates is not detected until a large number of devices have failed.
- Using the wrong data file.
- Socket abuse, such as digging failed devices out with sharp instruments.
- Changing to second or third vendor source. Lower quality devices tend to produce lower yields.

Monitor Daily Operation Logs

Daily operation logs are saved for each operation that the PS288 performs. As the operation is performed, its completion status is noted in the log for statistical purposes, or for troubleshooting if necessary.

To view the daily operation logs:

1. Prepare the system—

1a) On the Setup window, select **System**.

1b) From the System window, select **Log File**. See *Figure 3-71*.

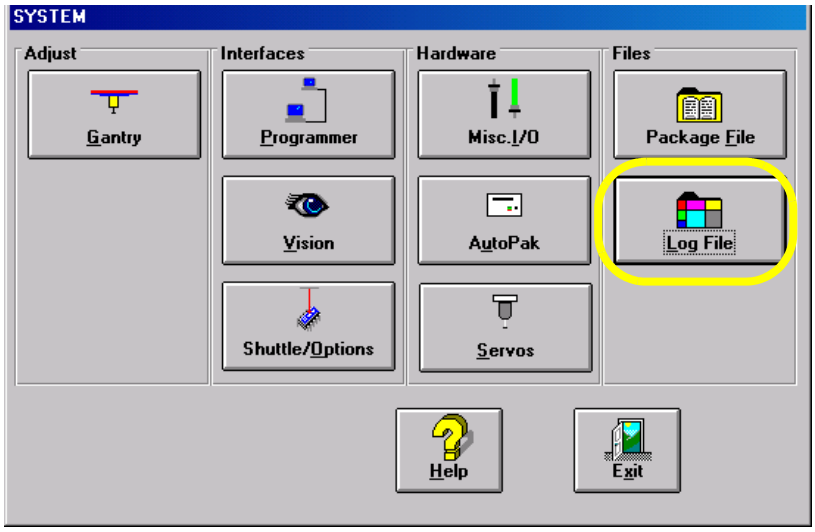


*Figure 3-71—Select **Log File***

2. The *LogFile* window—

2a) Information is displayed about the successful or unsuccessful completion of any operation of the PS288.

2b) (Optional) View, print, or store daily operation logs to another location.

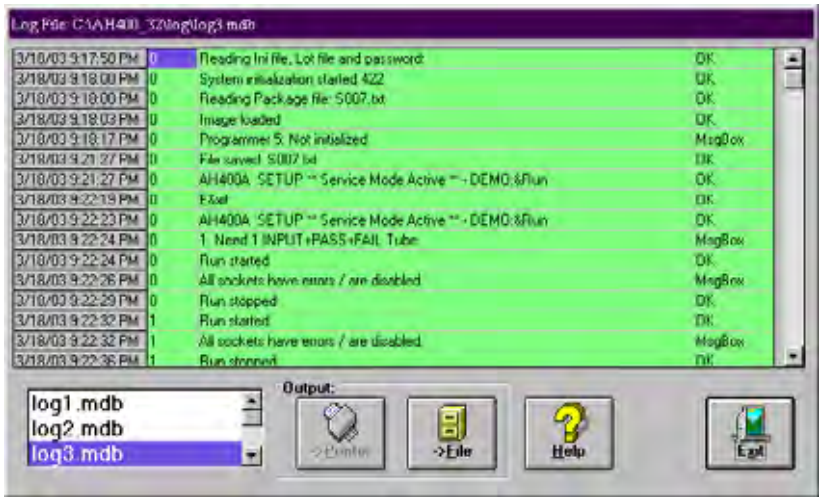


Figure 3-72—LogFile window

> ***NOTE:** The Log Files are named **log1.mdb**, **log2.mdb**, **log3.mdb**, and so on up to **log7.mdb**. They correspond to the days of the week, where **log1.mdb** is the Log File for Sunday, **log2.mdb** is the Log File for Monday, and so on up to **log7.mdb** for Saturday.*

(Optional) Create a Data File from a Master Device

The PS288 can read data from a master device and create a data file (PC file) that can then be used in programming jobs.

For complete instructions on creating a data file from a master device, see TaskLink online Help.

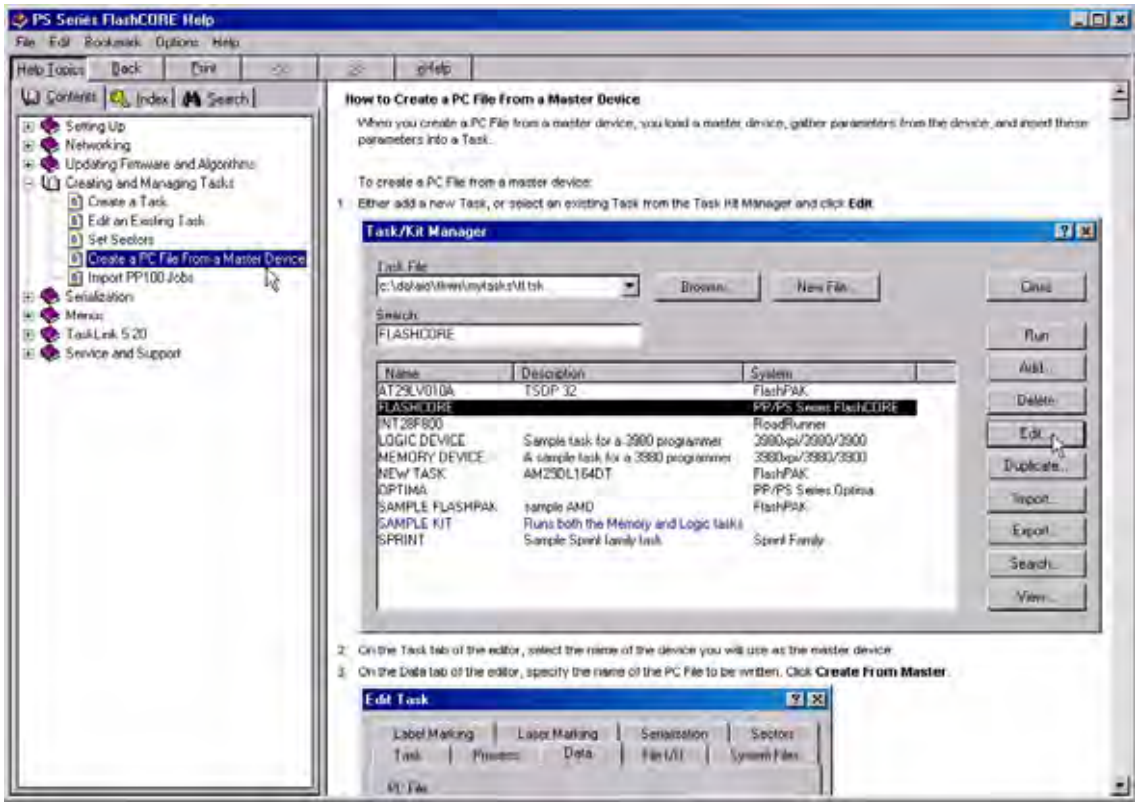


Figure 3-73—Procedure for creating PC file from master device

(Optional) Create a Laser Marking File

Laser graphics used to mark devices are generated using the WinMark Pro software on the Laser Computer. Any style of marking (whether text-based, graphic-based, or both) can be generated and used for marking devices. The only limitation is the size of the device to be marked.

Creating an Image File for the Laser System

To create an image file for the laser system to use in laser marking devices:

1. Prepare the system—

1a) Select the Laser Computer. Copy and paste *Template.mkh* to create *Copy of Template.mkh*.

1b) Rename *Copy of Template.mkh* to the name you gave the laser marking (drawing) file in the job creation process, e.g. Ver7.mkh.

1c) Start WinMark Pro by double-clicking the WinMark icon on the desktop.

2. Load the file—

2a) From the menu at the top of the window, select **File > Load**.

2b) Select your laser marking file from the list that appears, or navigate to the location and select the file.

2c) Click **Open** to load the file.

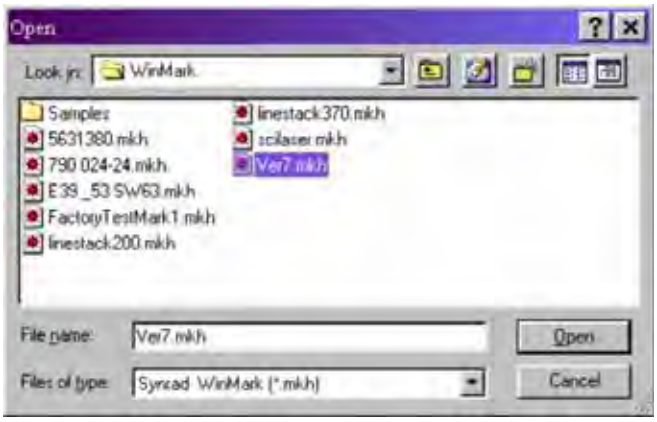


Figure 3-74—Selecting the laser marking file

3. Format—

3a) Click **Drawing** in the right-hand side of the Properties window.

3b) Click the **Format** tab.

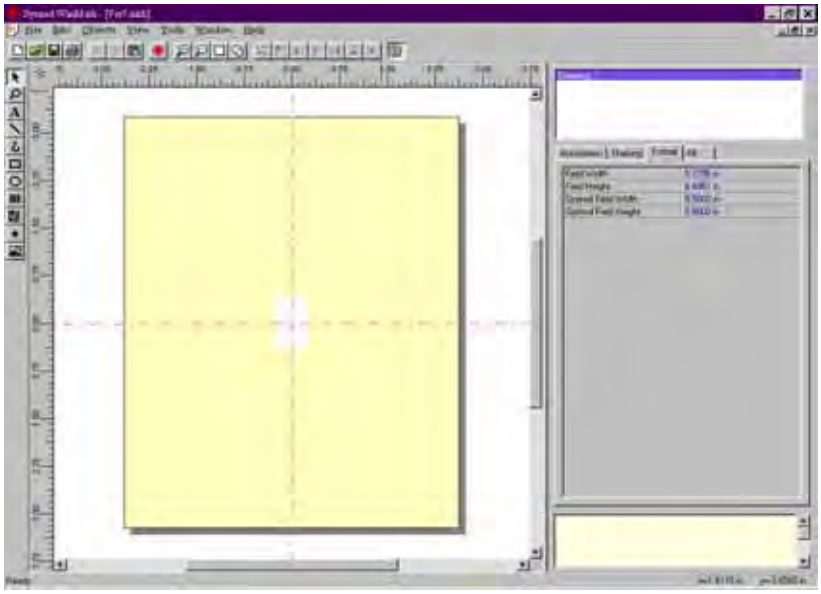


Figure 3-75— Format tab

3c) On the Format tab, set the Optimal Field Width and Optimal Field Height to the approximate height and width of the device to be marked.

CAUTION: *Do NOT change values in the* Automation *tab. These values are set in Template.mkh.*

4. Create text—

4a) On the vertical tool bar on the left side of the window, select the Text tool (the button with the letter **A** on it).

4b) Click the mouse anywhere in the drawing area.

4c) Type the desired text.

NOTE: *The center of the drawing area is the center of the device to be marked and is indicated by the red cross hairs. Ensure that the graphics and text fit onto the surface of the device to be marked. Use the rulers above and to the left of the drawing area as guides to marking placement.*

4d) Save the file by selecting **File > Save** from the menu at the top of the page.
4e) Exit WinMark Pro by selecting **File > Exit**.

Default Settings in Template.mkh
When creating or editing text, use Stroke fonts. These fonts are drawn and marked on the devices very quickly using point-to-point vectors. If you choose True Type fonts instead of Stroke fonts, marking time increases.

Setting	Default Value	Range
Velocity	30 ips (in./sec)	Range 0.01 to 240 ips (0.25 to 6,096 mm/sec)
Power	60%	Range 0 to 100%
Resolution	600 dpi	200 to 1000 dpi
Pline Start Delay	100 secs	0 to 80,000 secs
Pline End Delay	450 secs	0 to 80,000 secs
Interseg Delay	350 secs	0 to 80,000 secs
Off Vector Delay	300 secs	0 to 80,000 secs
Off Vector Velocity	75 ips (1,905 mm/sec)	0 to 600 ips
Off Vector Resolution	300 dpi	0 to 600 dpi

Figure 3-76—Template.mkh settings

The three most important settings are Velocity, Power and Resolution. These three settings, plus object delays on the Marking tab, are the primary factors that determine the speed and quality of the laser mark on devices.

NOTE: *For more information, refer to the manual that came with your marking system.*

Edit Text in an Image File

If an image file already exists and you wish to edit the text:

1. Prepare the system—
1a) Double-click the WinMark icon on the desktop.
1b) From the menu at the top of the window, select **File > Load**.
1c) Select your laser marking file from the list that appears, or navigate to the location and select the file.

1d) Click **Open** to load the file.

2. Edit text—

2a) On the Format tab, click the ellipses to the right of the Text Caption field. See *Figure 3-77*.

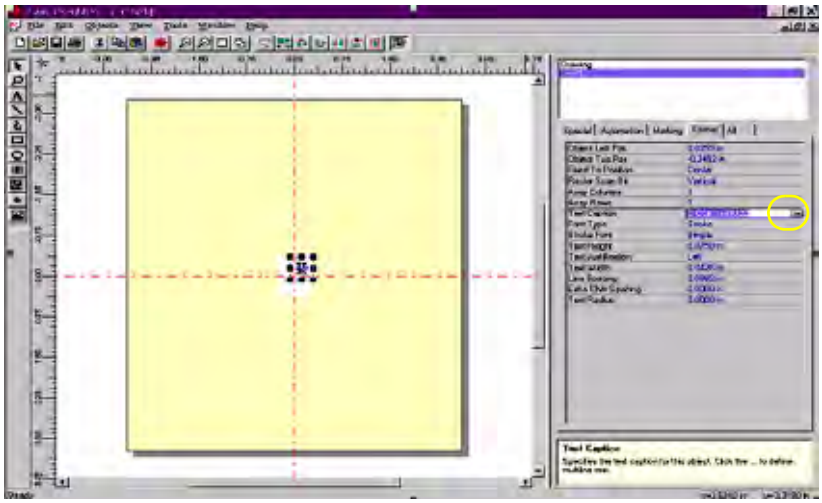


Figure 3-77—Click ellipses

2b) On the Text Caption Editor window, edit the text as desired. Press **OK** when finished. See *Figure 3-78*.

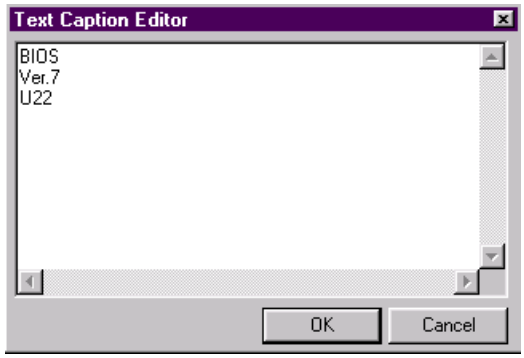


Figure 3-78—Edit text

Loading the Image File

To load the image file and use it to mark devices:

1. Prepare the system—

1a) Select the Laser Computer.

1b) Start Serial Marking Interface (SMI) by double-clicking the icon on the desktop.

> ***NOTE:*** *This completes the process of loading the image file if your system has SMI.If your system does not have SMI, continue with Step 2.*

2. Open WinMark Pro—
Start WinMark Pro by double-clicking the WinMark icon on the desktop.

3. Load the file—
3a) From the menu at the top of the window, select **File > Load**.
3b) Select your laser marking file from the list that appears, or navigate to the location and select the file.
3c) Click **Open** to load the file.

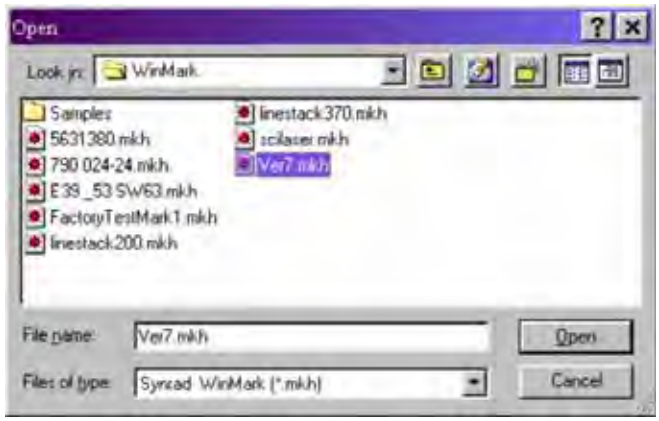


Figure 3-79—Selecting the laser marking file

4. The Mark icon—
4a) From the tool bar at the top of the WinMark window, click the **Mark** icon.

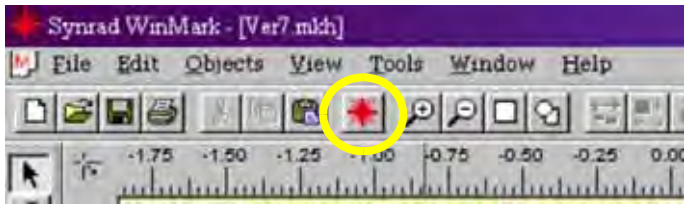


*Figure 3-80—The **Mark** icon on the tool bar*

4b) The Synrad WinMark control window opens and displays the marking graphic that was created.

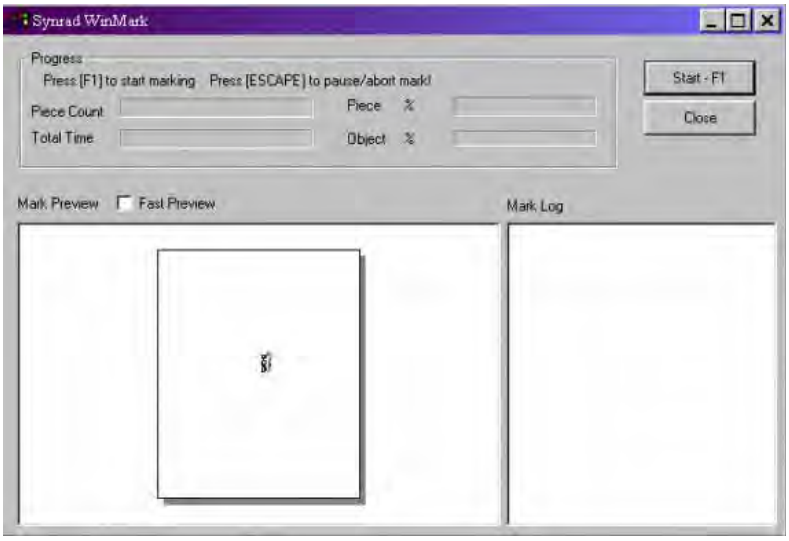


Figure 3-81—Synrad WinMark control window

4c) Click **Start–F1**.

The WinMark software is now waiting for commands from the Handler Computer to begin marking devices.

Verifying Proper Laser Operation

WARNING: Blindness hazard! Always wear eye protection when the laser safety shields are open, such as during service. Direct or diffuse laser radiation can damage eyes. Goggles must block 10.6 μm laser radiation. Goggles protect against scattered energy but not against direct viewing of the laser beam or reflections from metallic surfaces.

WARNING: Serious burn hazard! Direct or diffuse laser radiation can cause serious burns. Keep hands and other parts of the body out of the path of the laser bean when servicing.

WARNING: Toxic fume hazard! Laser marking generates vapors, fumes, and particles that may be noxious, toxic, or even fatal. Follow maintenance procedures on the fume extractor. Use proper ventilation.

WARNING: The following procedures must NEVER be performed with the laser safety shield removed from the laser marking assembly. The laser system is aligned at the factory for optimal performance. If there are gross inaccuracies with the laser marking system, a factory service person should be called to service the machine.

These tests will verify the proper operation of the laser marking system:

1. Prepare the system—

1a) Start the AH500 software.

1b) From the AH500 Setup window, click **System**.

1c) From the System window, select **Shuttle/Options**.

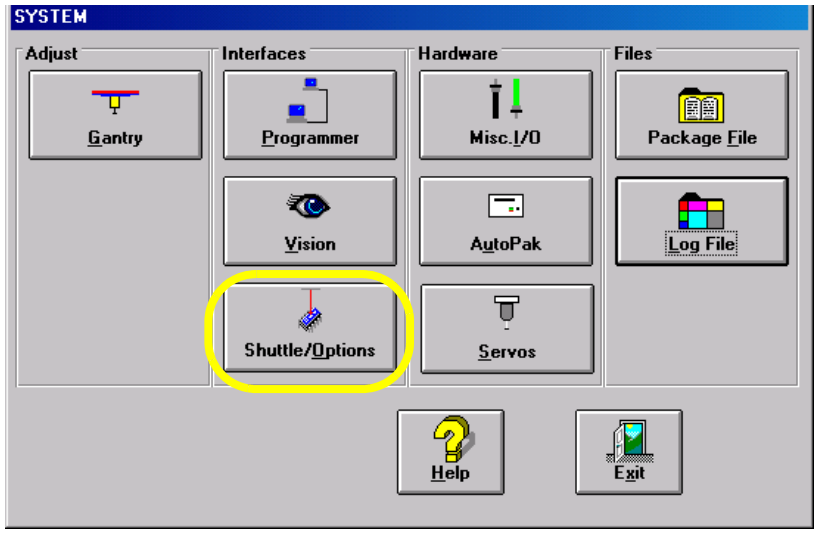


*Figure 3-82—Select **Shuttle/Options***

2. Shuttle/Options window—

2a) On the Shuttle/Options window, click **Home**.

2b) Click **Go** next to **Ped.2 Load Pos**. to move the laser marking shuttle to the front of the marking assembly.

2c) Click the **Ped. 2 Vacuum** switch to the **ON** position.

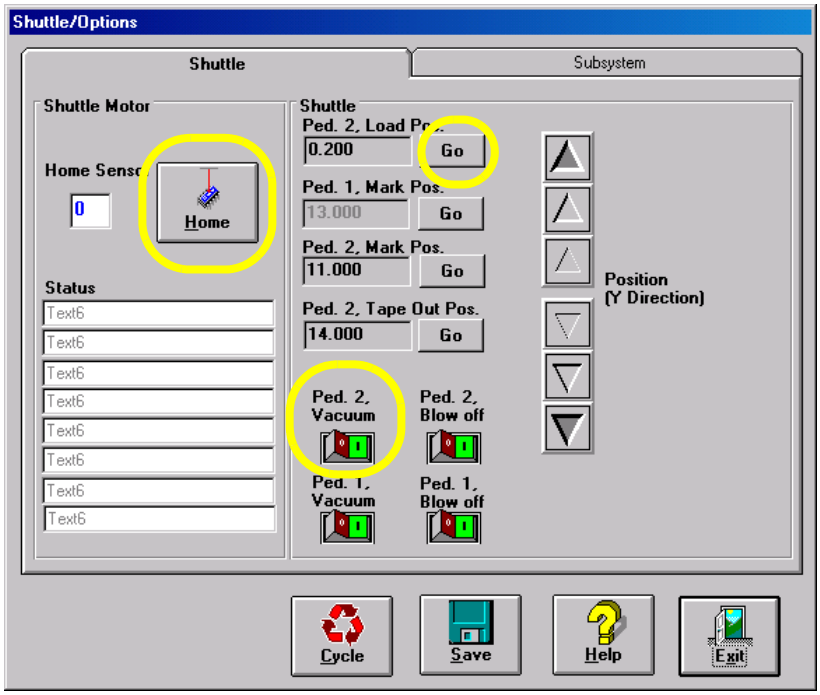


Figure 3-83—Shuttle tab

WARNING: Do not perform any of the following steps if the laser safety shields have been removed. Extreme burns can occur to anyone in the area of the laser if proper safety equipment is not in place. If these procedures fail, contact Data I/O Customer Support to place a service call.

2d) Place a device to be marked on marking Pedestal 2, ensuring that it is centered.
2e) Click **Go** next to **Ped**. **2 Mark Pos**. to move the laser marking shuttle to the marking position.

CAUTION: *Never fire the laser without a device on the transport pedestal. Damage to the pedestal O-rings can result.*

2f) Select the Subsystem tab.
2g) Click **Laser Marker** to fire the laser.
2h) When the **Done Marking** message appears, click the Shuttle tab.
2i) On the Shuttle tab, click **Go** next to **Ped**. **2 Load Pos**. to move the laser shuttle to the front of the marking assembly.

3. Verify marking graphic—
3a) Verify that the marking graphic is centered on the device.
3b) If the graphic is not centered, adjust the value in the **Ped**. **2 Mark Pos**. field until properly centered.

NOTE: *Manually placing the device on the transport pedestal will not be as accurate as allowing the PNP head to place the device. Manual placement should only be used as a rough alignment when necessary. Check the laser marking on the devices after the PNP head has had the opportunity to place them. Make fine adjustments to the marking position measurements at this time.*

4. Troubleshooting—
If the device is not marked, perform the following:
4a) Lay a sheet of paper in the laser bay over the pedestals and fire the laser.
4b) If the image appears, move the pedestal to center the marking on the device.
4c) If no image appears, verify power is applied to the laser marking assembly and that it is turned on.
4d) If all appears correct, contact Data I/O Customer Support for further assistance.

(Optional) Create a Label Printer File

If devices are to be labeled using the optional label printing system, a label printer file must be created. Follow these steps to create a label printer file.

1. **Prepare the system—**
   Open the label printing software by clicking the shortcut on the Handler Computer desktop or by navigating to and double-clicking **MRPRT.exe**. The Printer Setup displays label printing parameters. See *Figure 3-84.*

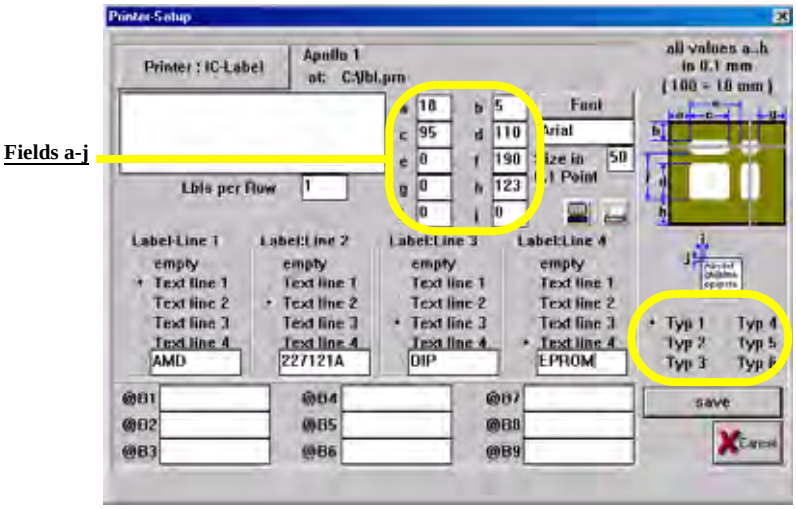


Figure 3-84—Label printing parameters window

2. **Select label type—**
   Select the label type to use when this job is run.The MRPRT software allows up to six sizes of labels called “types.”

> ***NOTE:*** *Each label type has different values in* ***a*** *to* ***j****. All values are in millimeters.*

3. **Set a to j values—**
   Enter the values for fields **a** to **j**. See *Figure 3-85* for an explanation of what each value represents.

	Meaning/Description
a	The offset in X (left to right) of the print from the edge of the label
b	The offset in Y (top to bottom) of the print from the edge of the label
c	The label size in the X
d	The label size in the Y (must be less than value for **f**)
e	This is not used on the PS288 and should be set to 0
f	The distance from the front of the label to front edge of the next label
g	Rotation (not yet implemented)

h	Label advance. This is the distance to advance the label toward the tamp applicator after printing. This only makes some small changes. The Tamp head should be in the correct position first.
i	Text centering in X direction. 0= Auto and 1= All the way to the left of the label. Normally set to 0.
j	Text centering in Y direction. 0= Auto and 1= All the way to the top of the label. Normally set to 0.

Figure 3-85—Values for a to j

4. Set text lines—

4a) Select the correct box for each line of text for up to four lines.

4b) In the box, type the text to be printed on label.

5. Set labels per roll—

Set “Labels per Roll” to 1.

6. Save printer file—

Click **Save** to save and exit the MRPRT software.

NOTE: *For information on selecting label printing during Task creation, see TaskLink online Help.*

Chapter 4

System Theory

The PS288 consists of various electrical and mechanical systems which provide facilities for—or perform a portion of—the overall operation of the machine. Their operation and relationship with the other components of the system are described in this chapter.

Main Power System

The main power system provides primary and generated voltages for use within the PS288. Input power is received from the input panel on the rear of the machine. It is a 208–240 VAC, 50/60 Hz, 30A circuit.

Circuit Breakers

208–240 VAC is provided to the programmer power supplies, gantry servo motor amplifiers, and the I/O Controller. The two circuit breakers on the input panel provide circuit protection for the main power input and the gantry servo amplifiers.

I/O Controller

The I/O Controller provides 115 VAC, 60 Hz, for all other systems in the PS288 including, but not limited to, the Handler Computer, video monitor, and programmer power supplies. Additionally, the I/O Controller provides a power-on control signal to the servo motor power contactor, allowing the 208–240 VAC to be applied to the gantry's X and Y servo motor amplifiers and two low voltage systems used for sensor power and PNP head motor drivers. See *Figure 4-1*.

Figure 4-1—I/O Controller

The I/O Controller also provides an interface for all sensor systems, several visual indicators, and power and control of other systems throughout the PS288. Sensor conditions are reported back to the Handler Computer through a series of connections on the rear of the I/O Controller. Connections supported by the I/O Controller include:

- Air pressure sensors
- Light tower
- Tube vibration assemblies
- Component position optics
- Vacuum and pressure control solenoids and sensors
- Safety shield interlocks
- Tape output control and associated sensors
- Power contactor for the laser marking stage
- Label and laser marking system controls and associated sensors
- Additional connectivity for future options

For a listing of status indicator lights on the I/O Controller, see Appendix A, “I/O Controller LED Status.”

FlashCORE Programmer

FlashCORE programmer structure is shown in *Figure 4-2*:

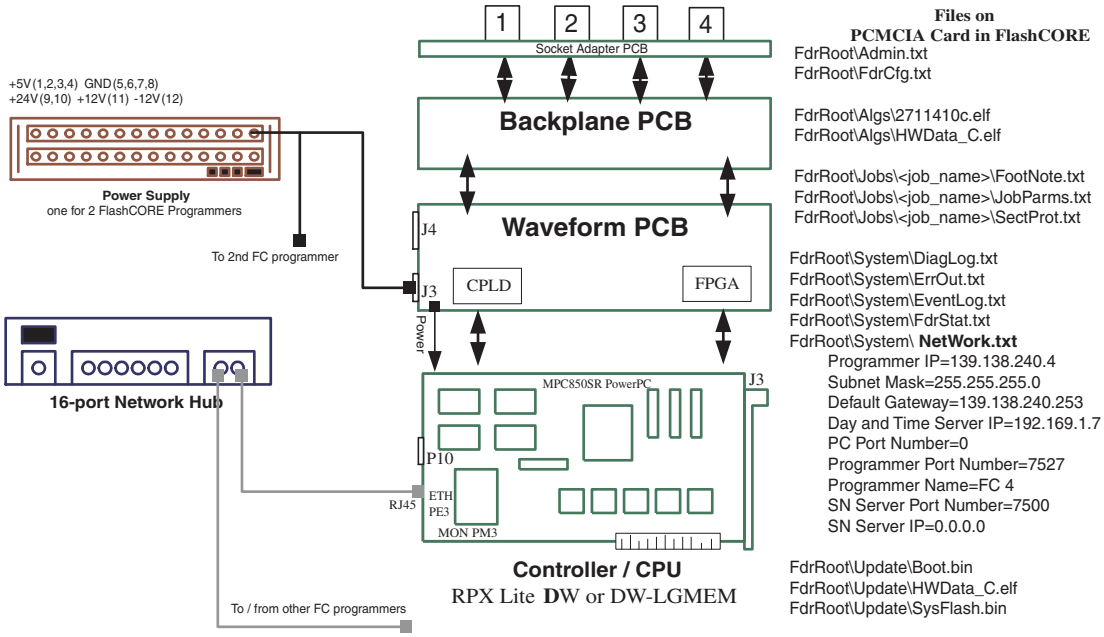


Figure 4-2—Internal structure of FlashCORE programmer

FlashCORE programmers on the PS288 are made up of the following components:

CPU - PowerPC Controller Board (RPX-Lite)

The PowerPC Controller Board is based on MCP850 PowerPC CPU and includes many hardware elements, like 10 Base-t Ethernet port and a PCMCIA interface.

It has a memory controller that allows the device programming algorithm to control the bus cycle timing for the memory range used for programming. The onboard I2C bus is used to address a serial EEPROM on the adapter board of the programmer to collect statistics on a given socket. The I2C bus is also used on the RPX Lite Board to address the temperature and thermal monitor (STTM) and another onboard serial EEPROM used for RPX configuration storage.

Waveform Board

The core of the FlashCORE programmer design, the Waveform Board interfaces to the PowerPC Controller Board with two programmable logic devices: a CPLD (non-volatile) and a FPGA (volatile). These two logic devices make up the basic programmer control circuitry. The CPLD contains logic to control the communications interfaces as well as the analog controls of the programmer and configuration of the volatile FPGA. The FPGA is used to route address, data and control signals from the PowerPC to the devices in socket, and provide Device Insertion, V_{PP} waveform generation, and Self-test circuit control logic.

Backplane Board

The Backplane Board is a connection scheme to connect the Waveform Board to the Socket Adapter board. In addition to supplying connections between the two boards, it also supplies the circuitry for address line buffering to isolate each device so that a failing part cannot affect non-failing devices and power and ground switching relays.

Socket Adapter Board

The Socket Adapter Board connects to the Backplane Board to supply the electrical connections for programming to the individual sockets. It also contains a 10 bit ID bus used to identify the adapter installed. A small EEPROM exists on this board for maintaining socket cycle counts for this physical adapter. By putting this EEPROM on the adapter itself, the socket cycle counts for a specific Socket Adapter Board can be tracked independent of the FlashCORE programmer it has been installed on.

In each FlashCORE programmer, there is a PCMCIA card that acts as the local drive for the FlashCORE programmer. There are various sub-directories and files on this, as shown in *Figure 4-2*.

Power to FlashCORE programmers is provided by a universal power supply, which powers two FlashCORE programmers.

Each programmer is connected to the 16-port network hub via a UTP cable with RJ45 connectors at both ends. The network hub is also connected to the Handler Computer, which communicates to all FlashCORE programmers during the device programming process and when running diagnostics tests on a FlashCORE programmer.

Computer System

The computer system of the PS288 consists of the Handler Computer and various networking components that allow the Handler Computer to communicate with the FlashCORE programmers.

Handler Computer

The Handler Computer operates using the Microsoft® Windows XP operating system and the client network communications. It hosts TaskLink and the AH500 operating software, as well as several subsystems within the machine including:

- Vision system and software
- PNP head motion control system
- Label marking system
- I/O Controller interface

The Handler Computer communicates with the network by a 10BaseT Ethernet connection, and contains mappings of all the major disk volumes used by the network. Any data transfer required from a major network volume can be accomplished on the Handler Computer using Windows® Explorer.

The PS288 user interface (AH500 software) is run from the Handler Computer. It contains all graphic components that the system operator uses during normal operation, including option configuration, programmer setup, and system adjustments.

The vision interface card is installed in the Handler Computer, as well as its operating software. This system is run in conjunction with the AH500 operating software to ensure proper alignment of programmable devices before being placed into the programming sockets.

The motion control system interface allows the AH500 software to communicate with the PNP head gantry system. Movement commands and positional feedback are provided to the AH500 software with this system.

The Handler Computer and AH500 software communicate with the label marking system via serial port on the rear of the Handler Computer. Label data transfer and labelling system responses are sent to and from the label marking stage through this connection.

The I/O Controller interface determines the condition of the various sensors and systems located throughout the PS288 as reported to the I/O Controller. These conditions are then read by the AH500 software to determine the state of the machine before issuing system commands. See Appendix A, “I/O Controller LED Status.”

User Interface System

Operator interaction with the PS288 is achieved with the following equipment:

- Touch screen monitor
- Keyboard and touchpad
- Light tower

Through the use of these assemblies, the operator may communicate with and control the PS288, as well as view system feedback and status indications.

Touch Screen Monitor

The touch screen monitor is a 30 cm (12 inch) LCD flat panel with integrated touch screen. There are three cabled connections: DC electrical power, a DB-15HD SVGA monitor connection, and a DB9 / RJ-45 connection for touch screen communications.

The 115 VAC supply is provided by the I/O Controller.

The RS-232 connection for the touch screen is plugged into the COM1 port on the Handler Computer. The touch screen can be used in place of the touchpad for operations or any other tasks that take place on the Handler Computer. The touch screen does not work with the Laser Computer.

Keyboard and Touchpad

The PS288 uses an integrated keyboard and touchpad for space saving purposes. The keyboard and touchpad are used as the central control mechanisms for all systems on the PS288.

Light Tower

The light tower located on the top of the PS288 is used as a visual indicator of the operating condition of the machine. It receives system status signals from the I/O Controller:

Safety Systems

The PS288 employs safety systems to assist in the prevention of personal injury, as well as potential damage to the equipment. Because of the speed and force by which the PNP head moves, it is imperative that these safety systems are operational and are never bypassed.

Emergency Stop and Safety Shield Interlocks

WARNING: Pressing an E-Stop button stops motion of the gantry and PNP head only. It does not remove power from the PS288 or the Option Bay (if installed).

Each of the safety shields found around the operating envelope of the PS288 has a safety interlock switch associated with it. When any safety shield is opened during normal operation, gantry and SPNP head motion stops, and a

"Check doors/E-stop!" message appears on the screen. When the door is closed and the message is cleared, motion resumes.

Safety shield condition is monitored by a human safety relay controller. The safety shield interlock switches are connected in series and wired to the human safety relay controller. Any open door breaks the circuit and provides a signal representative of an open door to the human safety relay controller. The human safety relay controller, in turn, relays the signal to the AH500 software and displays the "Check doors/E-stop!" message.

WARNING: Opening a safety shield stops the motion of the gantry and removes power from the gantry only. When the safety shield is closed and the "Check doors/E-stop!" message cleared, the gantry resumes its motion from the point where it stopped moving.

Pick And Place System

The PNP head consists of two motion subsystems: X- and Y-axes gantry system, and Z- and R-axes motor system. A vacuum subsystem on the Socket Actuator is used to pick devices from and place devices into their programming sockets and input/output media. Together, these systems facilitate the movement and proper placement of devices throughout the PS288.

Gantry System

The gantry system moves the PNP head on the **X-axis** and **Y-axis**. The system is controlled by the AH500 software and moved with two servo motor amplifiers. Each of the servo motor amplifiers is fed with 208–240 VAC via the servo motor amplifier contactor controlled by the I/O Controller. Digital encoders attached to the motors determine the PNP head's position along the lead screws and are accurate to within 0.0001 inches.

The servo motor amplifiers receive movement commands from the motion controller interface card in the Handler Computer. Positional information from the motor encoders is also interpreted on this card.

Home sensors for both axes provide reference locations for the gantry to base movement distances upon, and are also monitored by the motion controller interface card. Each of the optical sensors is powered by the 24 VDC power supply described earlier in this chapter.

The motion controller interface card, in addition to the functions described above, also provides commands and receives responses from the laser transfer assembly (if installed) and the PNP head controls.

Pick And Place Head

The pick and place head facilitates movement on the **Z-axis** and **R-axis** using an independent 24 VDC power supply to move the pick and place head up and down, as well as apply rotational corrections. Its motion is controlled by the motion controller interface card in the Handler Computer, and encoders built into the pick and place head provide positional information to the

motion controller interface card. When combined with the X–Y gantry system, devices may be picked up and placed into any physical location within the operating envelope.

The PNP head has an integrated probe tip through which a vacuum or positive pressure may be applied to attach or remove devices from the probe tip. The probe tip is interchangeable to accommodate various sizes and package types.

Socket Actuator

The Socket Actuator is a pneumatic driven solenoid used to actuate the sockets before the PNP head places devices into or removes devices from them. Sensors attached to the solenoid indicate the position of the Socket Actuator and verify that it is safe to move devices to and from the socket.

The two sensors, one for the up position and one for the down position, are adjustable for optimum sensing of the Socket Actuator's position. When the "up" sensor is active, the gantry system may retract the PNP head and move to another area of the machine. When the "down" sensor is active, the PNP head may extend to pick up a device from or place a device into a programming socket. The Socket Actuator is not used when picking devices from or placing devices into their input/output media.

Each sensor has an LED which turns red when the Socket Actuator is in the up or down position.

Vision System

The vision system is used in conjunction with the PNP head to ensure accurate alignment of the devices to be inserted into the sockets for programming. Using data in a reference vision file for the device type to be programmed, the PNP head can compensate for the misalignment of a device in the **X**, **Y**, and **R** (up to 30 degrees) axes. Misalignments can be corrected within 0.001 inches. The vision system cannot compensate for **Z-axis** errors.

The vision system consists of a camera, light ring, interface card, and software. The light ring and camera are mounted onto a specialized bracket below the work surface in a location dependent upon the configuration of the machine. The interface card is installed in the Handler Computer, as is its software interface.

The light ring is used to illuminate the device being analyzed by the camera so that an accurate picture may be taken. The LED light source is powered by 24VDC.

The camera is mounted to a bracket below the work surface and is optimally focused onto a device attached to the PNP head when in the down position. Focus and alignment data are set using the calibration routine described in "Calibrating the Vision System" on page 5-41, and by the vision system software.

Input and Output Modules

Devices may be presented to and re-packaged from the system in various combinations. The input and output modules include:

- Tube input
- Tube output
- Tape input
- Tape output
- Tray input
- Tray output

These input and output modules may be used in any combination.

Tube Input and Output

The tube input and tube output modules are attached to the work surface toward the front of the machine. Each module accommodates a number of different sized tubes and each is adjustable. Tubes are inserted into the modules through holes in the safety shield designed for them. The input tube module is slanted to cause the devices to slide toward the staging area, while the output tube module is slanted to cause devices to slide away from the staging area. There are no sensors to alert the user when a tube is full or empty.

The tubes are gently vibrated to keep devices moving freely and reduce the likelihood of device jams. The level of vibration may be varied using the adjustment controls found on the right front panel of the machine. Each tube vibrator is powered by 115 VAC from the I/O Controller.

Tape Input and Output

Manipulation of devices in a tape and reel form is supported in both input and output modules, depending upon the configuration of the PS288. A tape input feeder may be placed in a bracket on the right front of the PS288 to provide the machine with devices to be programmed. Additionally, a tape output system, attached to the Option Bay, can be equipped with either pressure sealed cover tape or heat sealed cover tape capabilities.

The tape input feeder provides the system with devices to be programmed via tape and reel. The tape is fed by a toothed sprocket along an adjustable rail system. As the tape is fed, the cover tape is removed by a motorized take-up reel, exposing the device to be picked from the tape. The tape is advanced into the operating envelope one tape pocket at a time. Optical sensors in the input tape module determine whether the tape pocket has a device in place or is empty, as well as the position of the pocket in the tape. When the PNP head removes the device from the tape pocket, the sensors detect the pocket is empty and the tape is moved one position forward. Empty input tape exits from the bottom of the tape feeder. It is not taken up on a reel, but falls freely.

The tape output system allows programmed and marked (if a marking stage is installed) devices to be placed in an output tape for use with another pick and place machine on the production line or another facility. A reel of empty pocket tape is placed on a spindle, and the tape is fed into an adjustable-width track. The tape is pulled through the track with a toothed sprocket at a rate determined by the ***pitch*** (pocket size and distance) of the tape. Sen-

sors determine the position of the tape and whether the tape pocket contains a device or is empty. Other sensors determine whether the device is seated properly in the tape before being covered.

When a device has been programmed, the PNP head moves the device to the rear of the machine where a shuttle mechanism transports the device to the marking stage (if installed), then to an empty tape pocket. Sensors determine that the tape pocket contains a device, and the tape is advanced one position as set by the pitch control on the tape output controller.

A roll of cover tape is installed on its dedicated spindle on the machine. It is threaded through the tape output system so that it is applied to the pocket tape before it is placed on an output spool. The cover tape may be pressure sealed with a cold adhesive and pressure rollers or heat sealed with a hot iron. The tape output system must be specifically configured for the type of cover tape to be used. Sensors determine when the cover tape roll is empty and needs to be changed.

When the tape is sealed, it is then collected on a takeup spool at the other side of the tape output system. Sensors determine when the takeup spool is full and needs to be removed.

Tray Input and Output

Devices may be presented from and returned to trays within the operating envelope. Regardless of whether the PS288 uses static trays, the TF20 automatic tray feeder, or the TF30 automatic tray feeder, there are two tray positions. Typically, blank devices are taken from the right-most tray, programmed, and then placed back on the tray from which they came. The left-most tray is typically used as a reject tray for devices that fail an operation during the programming routine.

The static tray input and tray output modules accept JEDEC and non-JEDEC standard trays. The TF20 automatic tray feeder accepts JEDEC standard trays, and the TF30 accepts all types of trays, including JEDEC standard. Each type of tray must be “learned” by the PS288 so that the number of rows and columns, as well as the pitch, is properly interpreted when picking devices from, and placing devices in, the tray. Tray positions are fixed and require no adjustment or calibration.

Label Marking System

An option for marking devices is the label marking system which uses adhesive labels.

In the label marking system the device is moved into the marking position. A newly printed label is removed from its backing tape assisted by an “air knife” mechanism. An air operated solenoid contains a specialized label placement head consisting of a replaceable application surface designed for the specific device package in use and a vacuum system. The labelling head is moved over to and slightly above the waiting label, and a vacuum is applied, removing the label from the backing. The head is then moved over the device and lowered until the label adheres to the surface of the device with direct pressure. Once the label is placed, the vacuum is removed, and the head is moved back to the ready position above a newly printed label.

The marked device is then moved to its output media through whatever steps are required.

The label marking system consists of the label feed mechanics (including labelling tape supply reels, labelling head, and take-up mechanics), an air powered transport shuttle mechanism, a print head computer (for printing label data and control of label delivery mechanics), and a motion computer used exclusively for the label placement head. The print head computer receives label printing data from the Handler Computer AH500 software. This data is used throughout the programming job. Each time a job is executed, the labeler is reset and new label data is sent to the print head computer.

The motion computer is a self contained, dedicated computer designed to properly control the placement of the label on the device once it leaves the backing tape. It has a series of sensors used to determine the position of the label placement head and the presence or absence of devices on the labelling pedestal of the shuttle transport. All mechanical adjustments are accomplished through software and are accessible through front panel controls of the motion computer.

Laser Marking System

The optional laser marking system, used to mark devices for easy identification, is enclosed in the Option Bay attached to the rear of the PS288. It contains a Laser Computer accessed from the keyboard and touchpad, a CO_2 laser tube along with its laser marking head and lens controlled by the Laser Computer, and a shutter system for blocking laser radiation while marking. The laser marking system is set up with a specialized marking program operating on the Laser Computer. Marking jobs are normally executed when the programming job runs. For information on laser marking stage configuration, see “Creating an Image File for the Laser System” on page 3-55.

After setting up the laser marking file to be used, the marking system stands ready, waiting for a marking command from the AH500 software. When a device has been programmed and is ready for marking, the PNP head places the device on one of two pedestals on the shuttle transport, a shuttle mechanism that moves the device from the operating envelope to the marking area. Two pedestals on the shuttle are used to carry devices to be marked, and they are used alternately when using a tray as the output media. Initially, a device is placed in the second marking position and is transported to the marking area.

When the device is ready in the marking area, the AH500 software sends the Laser Computer a marking command. After the device has been marked, the shuttle moves it back to the drop/pickup location. The system places an unmarked device in the first marking position, then removes the marked device from the second position and routes it to the output tray. The device in the first position is then marked. This process continues, alternating marking pedestals throughout the remainder of the job.

Laser Marking System and Tape Output System

If the PS288 is equipped with both a laser marking system and a tape output system:

- Only one of the marking positions is used. Because the tape output system is attached to the Option Bay that houses the laser marking system, both marking positions cannot be effectively used.
- A shutter system covers the device before the laser is activated. This blocks any direct or stray laser radiation from harming personnel or equipment. Safety interlocks on the laser shutter prevent the laser from being activated while the shutter is still in the open position.

WARNING: Blindness hazard! Always wear eye protection when the laser safety shields are open, such as during service. Direct or diffuse laser radiation can damage eyes. Goggles must block 10.6 μm laser radiation. Goggles protect against scattered energy but not against direct viewing of the laser beam or reflections from metallic surfaces.

WARNING: Serious burn hazard! Direct or diffuse laser radiation can cause serious burns. Keep hands and other parts of the body out of the path of the laser bean when servicing.

A fume extractor removes toxic fumes and particulate matter from the marking area. It is automatically switched on when using the laser marking stage and should never be bypassed.

WARNING: Laser marking generates vapors, fumes, and particles that may be noxious, toxic, or even fatal. The fume extractor is required for use with the laser marking option and must not be disabled. Analysis of filter contents obtained following marking a representative variety of devices has revealed a sufficient level of hazardous materials, such as antimony and other heavy metals, to require that the filter be treated as hazardous waste. Filters must be disposed of in accordance with government hazardous waste regulations.

Chapter 5

Maintenance

Perform the maintenance procedures described in this chapter to optimize uninterrupted operation of your PS288 and to minimize operational malfunctions. Refer to the manuals that came with your system options for additional maintenance procedures.

> ***NOTE:*** *Only individuals trained on these procedures by Data I/O or its representatives are qualified to perform maintenance on the PS288.*

Preventive Maintenance

This section describes the preventive maintenance schedule for the PS288.

WARNING: Blindness hazard! Always wear eye protection when the laser safety shields are open, such as during service. Direct or diffuse laser radiation can damage eyes. Goggles must block 10.6 μm, laser radiation. Goggles are designed to protect against scattered energy, but not against direct viewing of the laser beam or reflections from other surfaces.

WARNING: Serious burn hazard! Enclose the laser beam path during service. Direct or diffuse laser radiation can seriously burn.

WARNING: Electrocution hazard! Turn off the main power switch before removing any panels. Servicing the PS288 involves a significant risk of electric shock.

WARNING: The high speed and force behind a moving gantry can cause serious bodily injury to anyone working inside the work envelope. Moving the PNP head must be the responsibility of only one qualified individual. All other personnel near the system must stay clear of the work envelope while the gantry is moving.

The information in this section is organized as follows:

Interval Table

The recommended intervals in the table below are based on the system processing 100,000 devices per month. Information about these procedures and intervals can be found on the pages referenced in the **Page** column.

Interval	Component	Action	Page
Every Day	Sockets	Clean with dry compressed air. Check for wear; replace if necessary.	**5-4**
	Input air pressure	Verify input air pressure is 620-827 kiloPascals (90-120 PSI).	**1-2**
Every Week	General system	Clean tops of modules, especially the clamp area, and all areas in work envelope with a clean brush or dry compressed air.	**5-4**
	Vision camera lens	Clean with dry compressed air, lens cleaning tissue, and isopropyl alcohol.	**5-4**
	Device probe tip on PNP head, on tape output PNP head (if installed), and on shuttle pedestals (if installed)	Clean and inspect tips to make certain they can create a good vacuum seal on the device. Replace if probe tip is worn, cut, or damaged.	**5-4**
	Automatic tray feeder (if installed)	Check feeder and conveyor belts. Clean; replace if necessary.	**5-5**
Every Month	Input air filter	Check; clean and replace if necessary. Drain excess fluid.	**5-5**
	Shuttle assembly	Clean shuttle assembly.	**5-5**
	Shuttle assembly	Adjust tension on shuttle belt.	**5-6**
	Laser housing	Clean housing to remove laser marking dust.	**5-7**
	Laser marker fume extractor	Replace the pre-filter if marking regularly.	**5-8**
	Laser marker shuttle assembly	Clean.	**5-9**
	PNP head vacuum filter and silencer	Check; replace if necessary.	**5-11**
	Automatic tray feeder (if installed)	Clean system. Check pinch roller; replace if necessary.	**5-12**

Interval	Component	Action	Page
Every 3 months	Shuttle belt	Replace if worn; adjust if loose.	**5-12**
	PNP head motor amps	Check connections; tighten if necessary.	**5-12**
	Gantry servo motor amps	Check connections; tighten if necessary.	**5-13**
	Gantry mounting bolts	Check; tighten if necessary.	**5-14**
	Tray-present sensors	Check; tighten and reset if necessary.	**5-15**
Every 6 months	PNP head and PNP gantry wiring harnesses	Check; tighten if necessary.	**5-15**
	Flexible cables	Clean and check; tighten if necessary.	**5-16**
	Vision camera	Check mounting bolts; tighten if necessary.	**5-18**
	Laser marker fume extractor	Replace the pre-filter and pleated filter if marking regularly.	**5-18**
	Laser Computer	Replace Laser Computer air filter.	**5-22**
Once a Year	Gantry lead screws	Once a year, or whenever the gantries become noisier, clean and lubricate.	**5-23**
	Laser marker fume extractor	Replace all filters.	**5-24**
	FlashCORE programmers	Calibrate voltages within the FlashCORE programmers.	**5-27**

Materials

To perform preventive maintenance procedures on the PS288, you need the following materials:

- Grease gun (THK MG70 with AFB grease or equivalent)
- Lens cleaning paper
- Isopropyl alcohol
- Antistatic cleaner
- Silicone lubrication spray
- Tri-Flow lubricant (Data I/O part number 560-3300-901)
- Dry compressed air
- Safety goggles
- Disposable protective gloves
- SAE and metric hex head wrenches and Allen wrenches
- Shop vacuum cleaner
- Diagnostic adapter board

WARNING: Always wear protective eye goggles when you clean with pressurized air. Pressurized air blown directly on the eye or debris blown into the eyes could cause permanent eye damage.

Procedures Performed Every Day

Clean and Check the Sockets on the Socket Module

1. Use clean, dry compressed air to remove dirt from the sockets.
2. Check the sockets for wear and replace if necessary.

> ***NOTE:*** *The socket replacement cycle depends upon the type of socket used and the socket manufacturer. For the most current replacement guidelines, refer to the documentation shipped with your sockets.*

Procedures Performed Every Week

Clean the General System

General cleaning should be performed on a weekly basis. General cleaning includes but is not limited to the following:

1. Remove all dropped devices, debris, and other manufacturing materials from all working areas.
2. Remove all devices and manufacturing materials that may have fallen inside the system.
3. Use dry compressed air to remove all dust and debris from the table surface, under the machine, and from all other visible areas.
4. Dust the safety shields, inside and outside, with an antistatic cleaner.
5. Wipe the top and side skins to remove grease, fingerprints, and dust.
6. Dust the top surfaces of the input/output modules.

Clean the Vision Camera Lens

1. **Dry compressed air—**
   Use dry compressed air to remove all dust and other foreign material from the camera lens.

2. **Lens cleaning tissue—**
   Clean the lens using a lens cleaning tissue dampened with isopropyl alcohol if required.

Check the Device Probe Tips

A worn or damaged probe tip on the PNP head or the tape output PNP head (if installed) will cause dropped devices and placement problems.

1. **Check device probe tip—**

1a) Check the device probe tip for cracks or tears in the rubber.
1b) If necessary, replace with a probe tip of the same size.

2. **Verify vacuum on new probe tip—**

2a) From the Setup window, click **System**.
2b) Click **Gantry** to open the Gantry window.
2c) Click the Vacuum switch to **ON**.
2d) Place a device on the probe tip.
2e) If the vacuum does not firmly hold the device, replace the probe tip with a probe tip of the same size.

Check Automatic Tray Feeder

1. Feeder—

1a) Check the automatic tray feeder for damaged or broken parts.

1b) Contact Data I/O Customer Support if you find damaged or broken parts.

2. Conveyor belts—

2a) Check the orange conveyor belts for dirt, nicks, or other signs of damage.

2b) If the conveyor belts are dirty, clean with dry compressed air or wipe with a dry, lint-free cloth.

Procedures Performed Every Month

Clean the Input Air Filter and Assembly

1. Disconnect the input factory air line from the input air filter assembly.

2. Remove the air contamination collection bowl.

3. Check the collection bowl and input air filter for dirt, oil, or water. Clean as necessary.

4. Reconnect the collection bowl and air filter.

5. Reconnect the air line.

6. Restore air pressure to the PS288.

Clean the Shuttle Assembly

1. Prepare the system—

1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.

1b) Remove the upper left Option Bay panel. *Figure 5-1* shows the panel removed and the shuttle transfer assembly is visible.

Figure 5-1—Upper left Option Bay panel removed

2. Clean—

Clean the shuttle track using isopropyl alcohol.

3. Lubricate—

Use Tri-Flow lubricant to lubricate the bearing block and shuttle track.

CAUTION: *Use a small amount of lubricant, just enough to allow the bearing block to move freely on the track. Too much lubricant will aid in the build up of contamination and cause stalling.*

4. Reinstall—
Reinstall all guards and panels.

Adjust Tension on the Shuttle Belt

WARNING: Electric shock hazard. Shut down the PS288 (see "Shut Down the System" on page 3-12) and turn off the main power switch before removing any panels.

1. Prepare the system—
1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.
1b) Remove the upper left Option Bay panel.

2. Check the shuttle belt—
Check the belt for wear and replace if necessary.

3. Adjust shuttle belt tension—
3a) Pull slightly on the center of the shuttle belt to the right of the motor. See *Figure 5-2*.

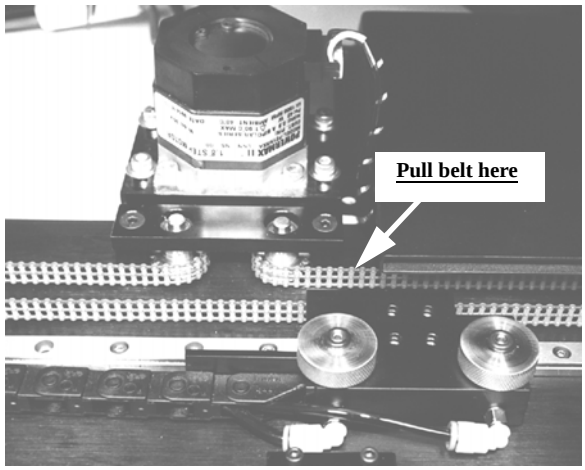


Figure 5-2—Shuttle belt and motor

3b) If the belt moves more than 12 mm (0.5 inch) off its path, loosen the four motor mounting screws (see *Figure 5-3*), and then push the motor away from the belt until the belt tension is correct.

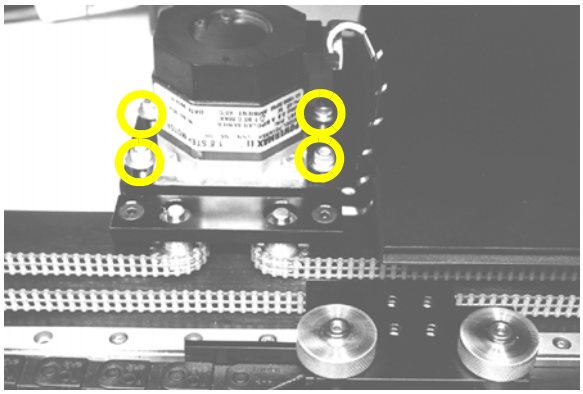


Figure 5-3—Location of four motor mounting screws

3c) If the belt still moves more than 12 mm (0.5 inch), remove it and cut off as many links as needed to achieve the proper tension.
3d) Replace the belt and tighten the four motor mounting screws.

4. Check the belt sprocket set screws—
4a) Check the belt sprocket set screws and tighten if necessary.
4b) If a sprocket has loosened and is rubbing against the frame, reposition the sprocket up off the frame and tighten the set screw.
4c) Reinstall all guards and panels.

Clean the Laser Housing

WARNING: Hazardous materials. Wear safety goggles and disposable protective gloves.

WARNING: Electric shock hazard. Shut down the PS288 (see "Shut Down the System" on page 3-12) and turn off the main power switch before removing any panels.

1. Prepare the system—
1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.
1b) Remove all the laser marker housing panels.

2. Clean—
2a) Use a damp paper towel and antistatic cleaner to wipe laser marking dust and other foreign material from the housing into a sealable plastic bag.
2b) Place the paper towel in the plastic bag. Pull off the disposable protective gloves, place them in the sealable plastic bag, and then close and tightly seal the bag.

WARNING: Numerous government regulations apply to the storage of hazardous waste. Ensure that contaminated filters are properly labeled and stored in your hazardous waste storage area.

Also, make sure that they are not stored on your site longer than government regulations allow (the typical limit is 90 days). Check your government (local, state, and federal) regulations for hazardous waste storage requirements.

3. Reconnect—

3a) Clean all the clear plastic safety shields with an anti-static cleaner.

3b) Reconnect all guards and panels.

Check Pre-Filter in Fume Extractor

Once a month, check the pre-filter in the laser marker fume extractor to determine if it is clogged. The pre-filter is shown in *Figure 5-4*.

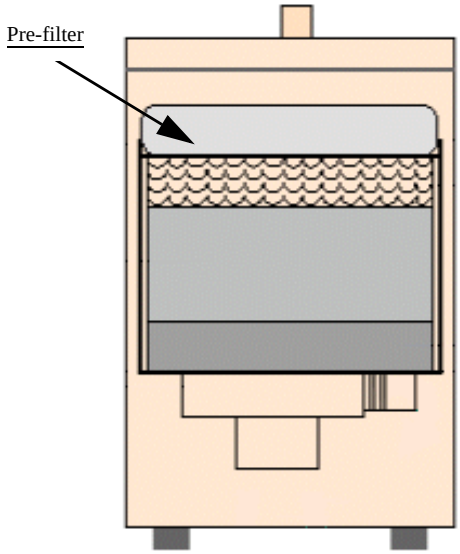


Figure 5-4—Location of pre-filter

WARNING: Failure to replace the laser vacuum filters at the appropriate intervals could create a hazardous operating environment.

WARNING: Hazardous materials. Wear safety goggles and disposable protective gloves.

WARNING: Electric shock hazard. Shut down the PS288 (see "Shut Down the System" on page 3-12) and turn off the main power switch.

WARNING: Do not clean the laser vacuum filters by blowing with compressed air, shaking, or using any other method that allows the particulate trapped by the filters to be released into the work environment.

1. Prepare the system—

1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.

1b) Remove the lower back laser housing panel.

1c) Loosen the vacuum hose clamp and detach the vacuum hose from the extractor top.

1d) Undo the four spring clamps on the extractor top and remove the extractor top.

2. Inspect the pre-filter—

If clogged or dirty, remove the filter and discard it in a sealable plastic bag.

> ***NOTE:*** *For detailed instructions, see "Replace Pre-filter and Pleated Filter in Fume Extractor" on page 5-18.*

Clean the Laser Marker Shuttle Assembly

During extended or heavy periods of use, the shuttle assembly may become dirty and gummed up by laser dust or other foreign material. This situation may cause the shuttle assembly to stall during movement to and from the laser mark position.

WARNING: Hazardous materials. Wear safety goggles and disposable protective gloves.

WARNING: Electric shock hazard. Shut down the PS288 (see "Shut Down the System" on page 3-12) and turn off the main power switch. Do not use compressed air to remove laser dust.

To clean the laser marker shuttle assembly:

1. Prepare the system—

1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.

1b) Remove the upper left laser housing panel. *Figure 5-5* shows the panel removed.

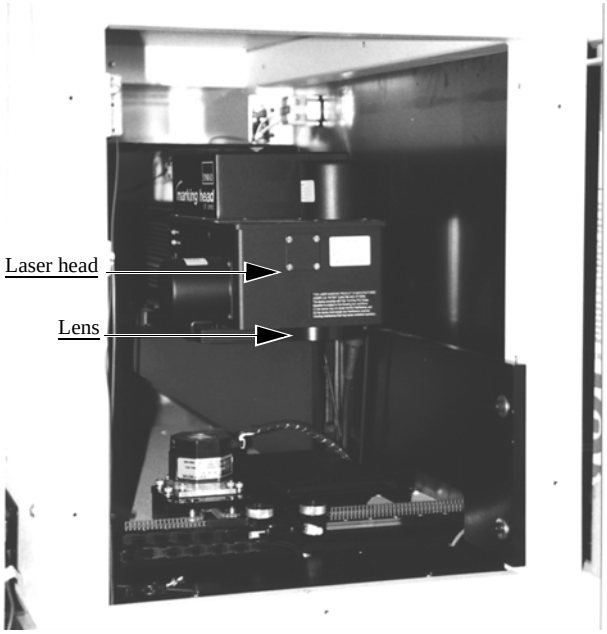


Figure 5-5—Upper left laser housing with panel removed

2. Clean—

2a) Use a damp paper towel and antistatic cleaner to wipe laser marking dust and other foreign material from the housing into a sealable plastic bag.

2b) Place the paper towel in a sealable plastic bag. Pull off the disposable protective gloves, place them in the sealable plastic bag, and close and tightly seal the bag.

WARNING: Numerous government regulations apply to the storage of hazardous waste. Ensure that contaminated filters are properly labeled and stored in your hazardous waste storage area. Also, make sure that they are not stored on your site longer than government regulations allow (the typical limit is 90 days). Check your government (local, state, and federal) regulations for hazardous waste storage requirements.

2c) Clean the laser shuttle track using isopropyl alcohol.

3. Lubricate—

Use Tri-Flow lubricant to lubricate the bearing block and shuttle track.

***NOTE:** Use a small amount of lubricant, just enough to allow the bearing block to move freely on the track. Too much lubricant will aid in the build up of contamination and cause stalling.*

4. Reinstall—

Reinstall all guards and panels.

Check the PNP Head Vacuum Filter and Silencer

A clogged or dirty vacuum filter or silencer will cause vacuum problems, dropped devices, and placement problems.

WARNING: Electric shock hazard. Shut down the PS288 (see "Shut Down the System" on page 3-12) and turn off the main power switch before removing the PNP head vacuum filter.

1. Prepare the system—

1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.

1b) Remove the two bolts that hold the vacuum generator to the PNP head.

2. Check silencer and filter—

2a) Push the silencer out of the vacuum generator. If dirty or clogged, replace with new silencer (Data I/O part number 288 5500 902).

2b) Loosen knob and remove vacuum filter. If dirty or clogged, replace with new filter (Data I/O part number 288 5500 901). See *Figure 5-6*.

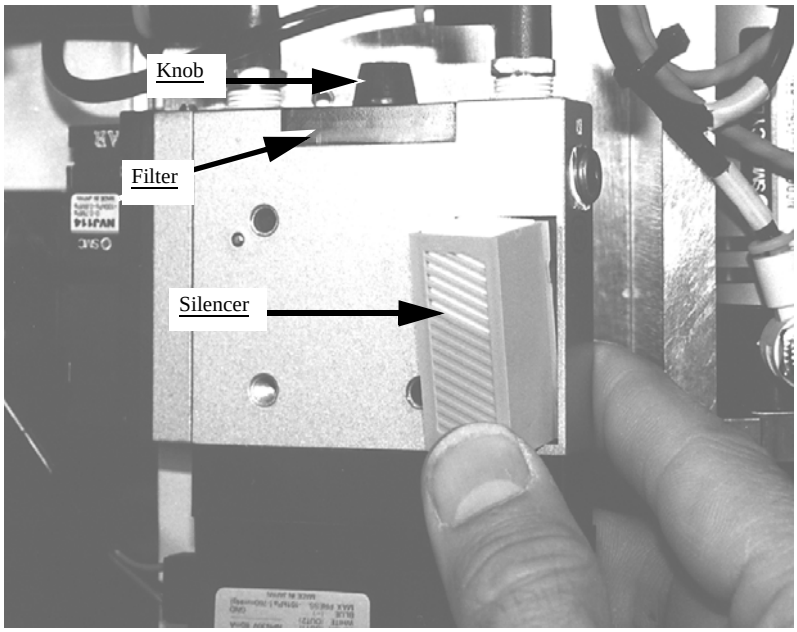


Figure 5-6—Removing the PNP head vacuum filter and silencer

3. Reinstall generator—

Reinstall the generator.

***NOTE:** For systems with an Option Bay, there are two additional vacuum generators: for Ped 1 and for Ped 2. Follow the procedure described above to check and replace if necessary.*

NOTE: *For systems with a tape output system, there is an additional vacuum generator on the tape output PNP head. Follow the procedure described above to check and replace if necessary.*

Clean Automatic Tray Feeder

1. Conveyor belts and tray platform—
Clean conveyor belts with dry compressed air or dry, lint-free cloth. Clean the tray platform with lint-free cloth and isopropyl alcohol.

2. Pinch roller—
Check the urethane pinch roller attached to the tray clamping mechanism for signs of wear or damage. Replace if necessary.

Procedures Performed Every Three Months

Replacing a Worn Shuttle Belt

WARNING: Electric shock hazard. Shut down the PS288 (see "Shut Down the System" on page 3-12) and turn off the main power switch before removing any panels.

1. Prepare the system—
1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.
1b) Remove the upper left Option Bay panel.

2. Motor mount—
2a) Loosen the four motor mounting screws.
2b) Pull the motor all the way forward.

3. Remove belt—
3a) Remove the two Allen bolts from the top of the pedestals.
3b) Remove the belt.

4. Replace belt—
Replace the belt by reversing the above steps.

PNP Head (Z and R) Motor Amps

WARNING: Electric shock hazard. Shut down the PS288 (see "Shut Down the System" on page 3-12) and turn off the main power switch before removing any panels.

1. Prepare the system—
1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.
1b) Open the right side cabinet door and locate the R-axis and Z-axis servo motor amps. See *Figure 5-7*.

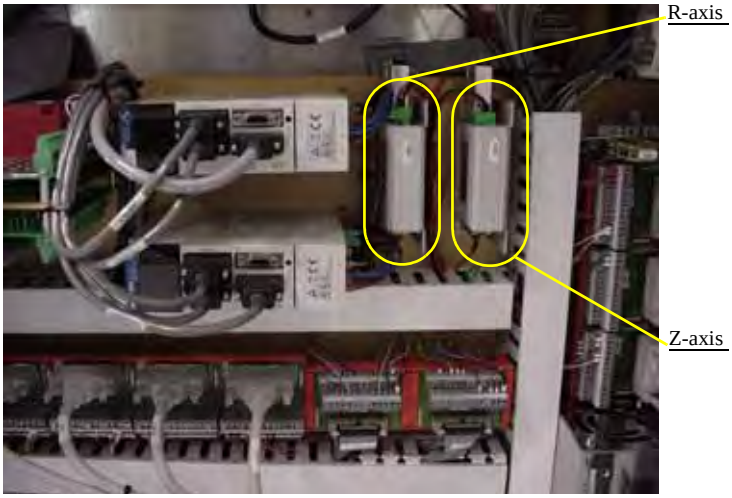


Figure 5-7—Z-axis and R-axis servo motor amps

2. Check all wiring harness connections—

2a) Check connections for the Z-axis and R-axis servo motor amps.

2b) Tighten if necessary.

***NOTE:** The Z-axis and R-axis servo motor amps are located directly behind the panel to the left of the gantry servo motor amps. Some systems may be slightly different.*

2c) Reinstall all guards. Close and lock door.

Check the Gantry (X-axis and Y-axis) Servo Motor Amps

WARNING: Electric shock hazard. Shut down the PS288 (see "Shut Down the System" on page 3-12) and turn off the main power switch before removing any panels.

1. Prepare the system—

1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.

1b) Open right side cabinet door and locate the Y-axis and X-axis servo motor amps. See *Figure 5-8*.

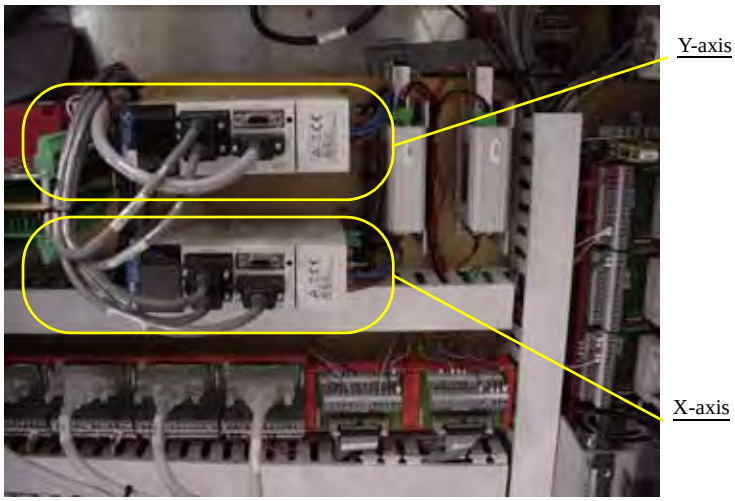


Figure 5-8—Y-axis and X-axis servo motor amps

2. Check wiring harness connections—

2a) Check the wiring harness connections for the X-axis and Y-axis servo motor amps.

2b) Tighten if necessary.

NOTE: *The X-axis and Y-axis servo motor amps are located just behind the panel and are marked 1Y1 and 1X1.*

2c) Reinstall all guards and panels.

Check the Gantry (X and Y) Mounting Bolts

WARNING: Electric shock hazard. Shut down the PS288 (see "Shut Down the System" on page 3-12) and turn off the main power switch before removing the lead screw shields.

1. Prepare the system—

1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.

1b) Remove the four bolts that hold the two lead screw shields to the gantry rails.

1c) Remove the shields.

2. Check X-axis lead screw rail—

From the bottom side of the X-axis lead screw rail, check and tighten the mounting bolts located on each end of the rail.

3. Check Y-axis lead screw rail—

From the bottom side of the Y-axis lead screw rail in the center of the rail, check and tighten the four mounting bolts.

4. Reinstall—

Reinstall the two lead screw shields.

Check the Tray-Present Sensors

1. Check fiber optics—
Check that the fiber optics are illuminated at each tray position.

2. Check sensor mounting set screws—
Check and if necessary tighten each sensor mounting set screw.

3. Reset sensor if position has changed—

3a) If the sensor position has changed, loosen the set screws.
3b) Insert a tray into the tray holder.
3c) Adjust the sensor so that I/O Controller LED Port 1, Bit 3 is on when Tray 1 is inserted. See *Figure 5-9*.
3d) Adjust the sensor so that I/O Controller LED Port 1, Bit 4 is on when Tray 2 is inserted.

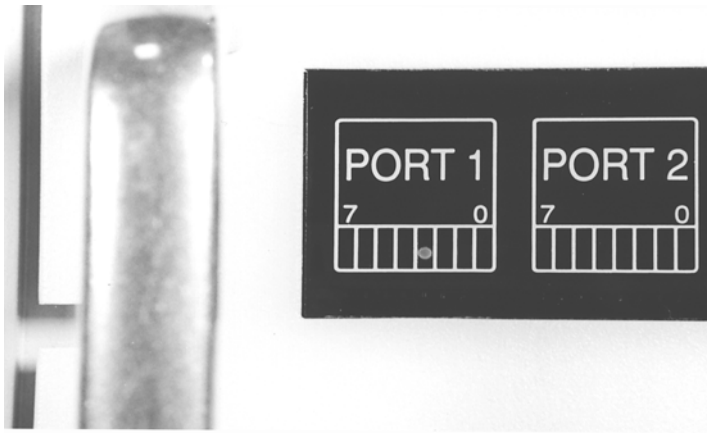


Figure 5-9—I/O Controller *LED showing Port 1, Bit 3 is on*

3e) Tighten the set screws.
3f) Remove the tray and check that the LED is off.

Procedures Performed Every Six Months

Check the PNP Head and PNP Gantry Wiring Harnesses

1. Check—

1a) Check and if necessary tighten the mounting screws of the PNP head wiring harness. See *Figure 5-10*.

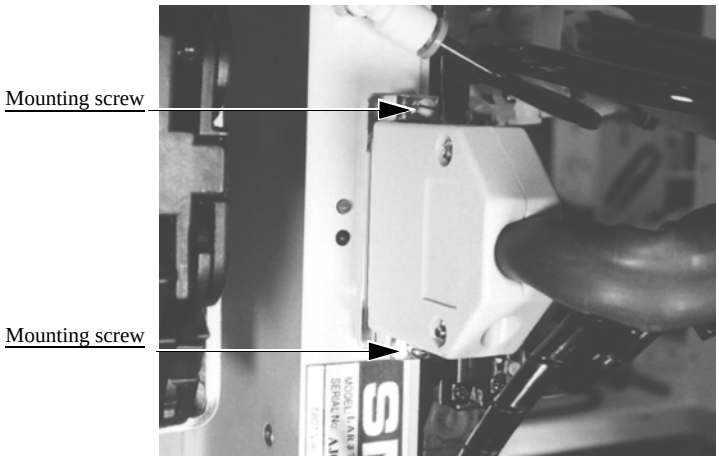


Figure 5-10—PNP head mounting screws

1b) Check PNP gantry wiring harness plug connections and make sure that they are secure. See *Figure 5-11*.

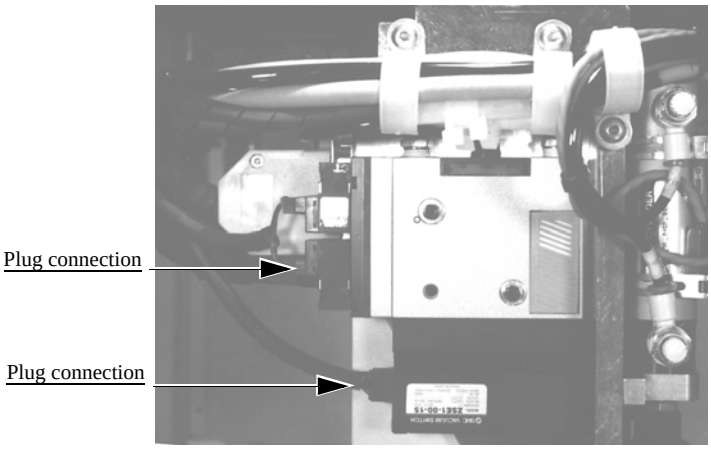


Figure 5-11—PNP gantry wiring harness plug connections

Clean and Check the Cable Carriers

1. Clean—

Use dry compressed air to remove all foreign material from the cable carriers.

2. Check—

2a) Check that the cables are not too loose or too tight. The cables should be in good condition.

2b) Check the two screws on the ***upper carrier*** and tighten if necessary. See *Figure 5-12*.

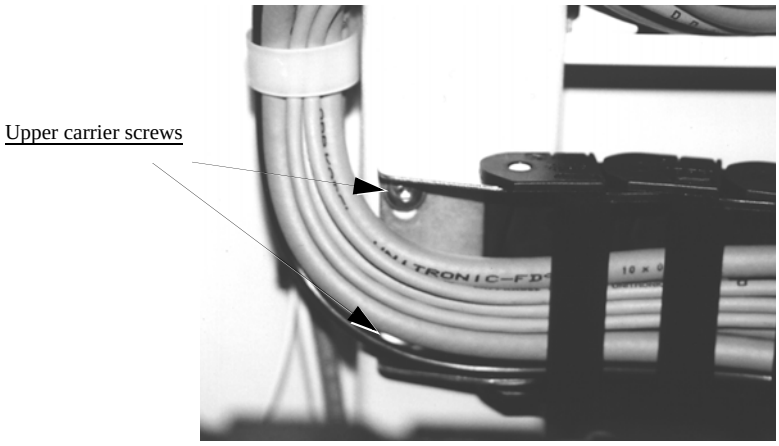


Figure 5-12—Upper carrier screw locations (one is hidden in this view)

2c) Check the two screws on the ***lower carrier*** and tighten if necessary. See *Figure 5-13*.

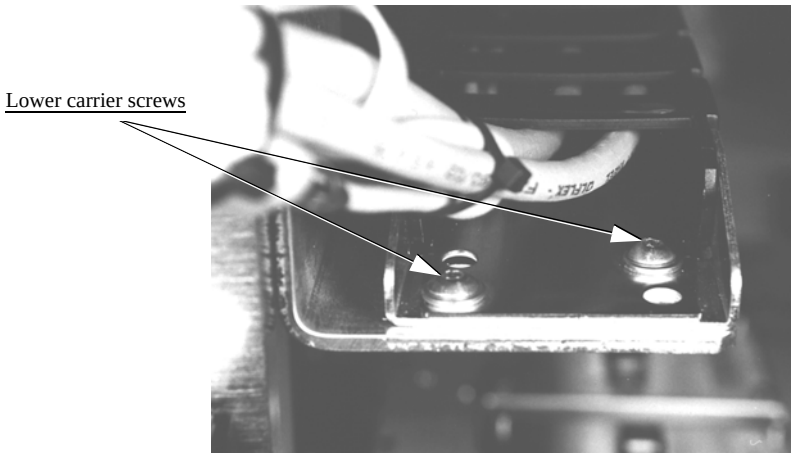


Figure 5-13—Lower carrier screw locations

2d) Check the four screws on the ***center carrier*** and tighten if necessary. See *Figure 5-14*.

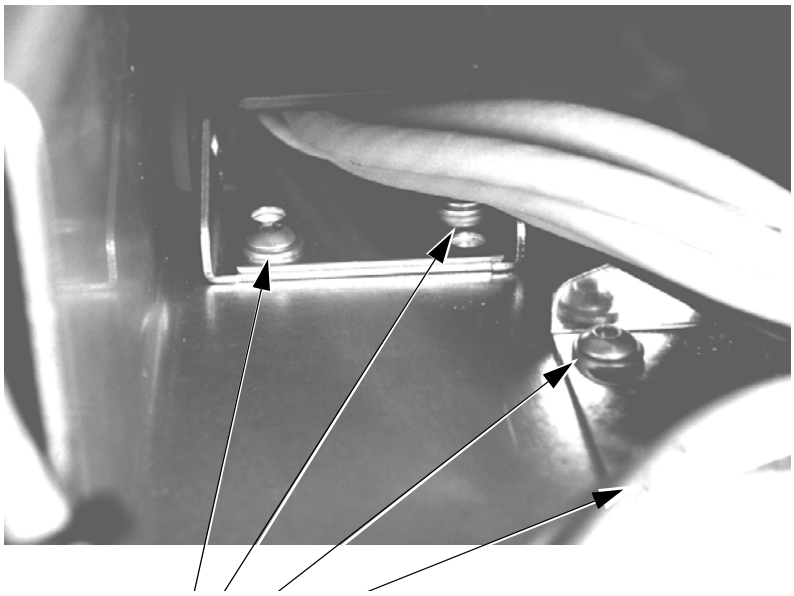


Figure 5-14—Center carrier screw locations (one is hidden in this view)

Check the Vision Camera

WARNING: Electric shock hazard. Shut down the PS288 (see "Shut Down the System" on page 3-12) and turn off the main power switch before removing any panels.

1. Prepare the system—

1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.

1b) Remove the right or rear cabinet panel, depending on where the camera is mounted.

2. Check mounting bolts—

2a) Check the mounting bolts above the camera.

2b) Tighten if necessary.

3. Check knob—

3a) Check the knob behind the camera.

3b) Tighten if necessary.

4. Check thumb screws—

4a) Check the cable, aperture and focus thumb screws.

4b) Tighten if necessary.

4c) Reinstall all guards and panels.

Replace Pre-filter and Pleated Filter in Fume Extractor

The laser vacuum filters require changing on a regular basis. The maintenance interval depends on the number of devices marked and the amount of text marked. In general, the pre-filter and pleated filter should be changed every six months, or more frequently if low air flow is detected. The carbon

filter and HEPA (High Efficiency Particulate Air) filter should be changed every twelve months. See *Figure 5-15* for the location of the four replaceable laser vacuum filters.

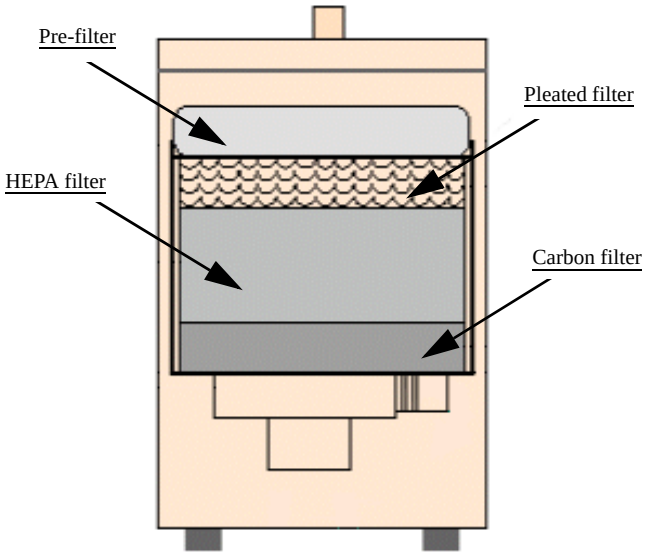


Figure 5-15—Laser vacuum filter locations

The Handler Computer software monitors the air flow sensor on the laser filter system. If the sensor detects low air flow, the error message "Laser filter full" is displayed. When this error message displays, the laser system will mark 10 more devices as defined in the WinAH400.ini file.

WARNING: Failure to replace the laser vacuum filters at the appropriate intervals could create a hazardous operating environment.

WARNING: This procedure should be performed only by qualified service personnel who have successfully completed Data I/O's laser training class. This procedure involves exposure to hazardous by-products from the laser marking process.

WARNING: Electric shock hazard. Shut down the PS288 (see "Shut Down the System" on page 3-12) and turn off the main power switch.

WARNING: Hazardous materials. Wear safety goggles and disposable protective gloves. Do not clean the laser vacuum filters by blowing with compressed air, shaking, or using any method that allows the particulate trapped by the filters to be released into the work environment.

To replace the pre-filter and the pleated filter:

1. Prepare the system—

1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.

1b) Remove lower back laser housing panel from the laser enclosure by removing the eight screws highlighted in yellow in *Figure 5-16*.

Figure 5-16—Lower back laser housing panel screw locations

1c) Remove side laser housing panel by removing the four screws highlighted in yellow in *Figure 5-17*.

Figure 5-17—Side laser housing panel screw locations

1d) Put on the disposable protective gloves and open the sealable plastic bag.

2. Detach vacuum hose—

2a) Loosen the clamp holding the vacuum hose to the extractor top and detach the vacuum hose from the extractor top. See *Figure 5-18*.

2b) Carefully set the vacuum hose aside.

Figure 5-18—Vacuum hose clamp

WARNING: Hazardous materials. Do not allow particulate matter in the vacuum hose to be released into the work environment.

3. Release spring clips—

3a) Release the four spring clips (one on each side) securing the extractor top to the filter system. See *Figure 5-19* for location of one spring clip.

3b) Remove the extractor top and set aside.

Figure 5-19—Filter system spring clip

4. Remove pre-filter and pleated filter—

4a) Remove pre-filter and pleated filter and carefully place in sealable bag.

4b) Pull off the disposable protective gloves and place in sealable bag.

4c) Seal the bag and dispose of as hazardous waste.

WARNING: Numerous government regulations apply to the storage and disposal of hazardous waste. Ensure that contaminated filters are properly labeled and stored in your hazardous waste storage area. Also, make sure that they are not stored on your site longer than government regulations allow (the typical limit is 90 days). Check your government (local, state, and federal) regulations for hazardous waste storage requirements.

5. Replace pre-filter and pleated filter—

5a) Replace the pre-filter with Data I/O Model Name Pre-Filter, Polyester.

5b) Replace the pleated filter with Data I/O Model Name Filter, Panel, Pleated.

6. Re-install extractor top—

6a) Carefully place the extractor top back on the filter system.

6b) Attach the four spring clips that secure the extractor top in place.

7. Re-install vacuum hose—

7a) Carefully attach the vacuum hose to the extractor top.

7b) Tighten the clamp that secures the vacuum hose in place.

8. Re-install panels—

Re-install lower back laser housing panel and side laser housing panel.

Change the Laser Computer Air Filter

The Laser Computer is located in the Option Bay and can be accessed from the back of the Option Bay. See *Figure 5-20*.

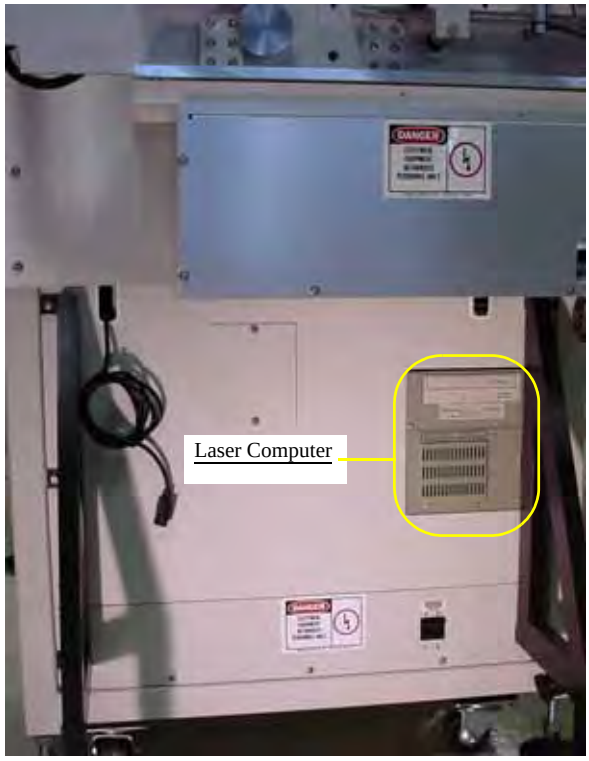


Figure 5-20—Location of Laser Computer

To change the Laser Computer air filter:

1. **Remove cover—**
   Use a screwdriver to remove the two screws holding the filter cover to the Laser Computer. See *Figure 5-21*.

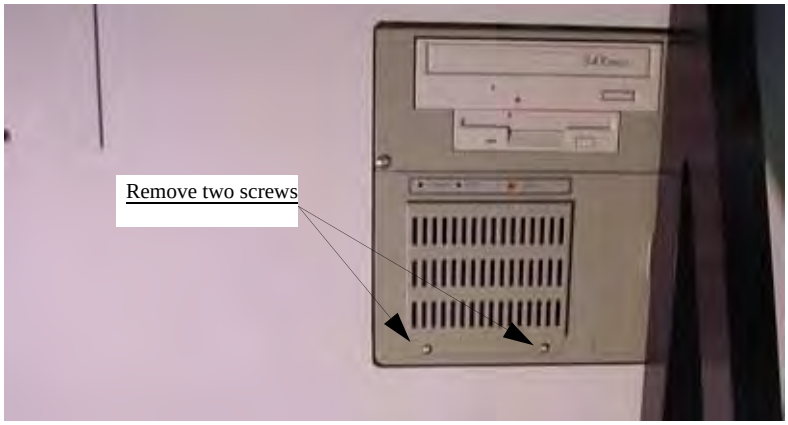


Figure 5-21—Remove screws from Laser Computer filter cover

2. **Replace air filter—**
   Remove the old air filter and replace with a new air filter. See *Figure 5-22*.

Figure 5-22—Replace air filter

3. **Reinstall cover—**
   Use a screwdriver to tighten the two screws holding the filter cover to the Laser Computer.

Procedures Performed Once a Year

Lubricate the Gantry (X and Y) Lead Screws

WARNING: Electric shock hazard. Shut down the PS288 (see "Shut Down the System" on page 3-12) and turn off the main power switch before removing the lead screw shields.

1. **Prepare the system—**

1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.

1b) Remove the four bolts that hold the two lead screw shields to the gantry rails.

1c) Remove the shields.

2. **Remove old grease—**
   Using shop towels and isopropyl alcohol, remove the old grease and dirt build up from the lead screws.

3. **Apply new grease—**

3a) Using a THK MG70 (or equivalent) grease gun, apply THK AFB Multipurpose lithium (or equivalent) grease to the lead screw grease fittings. See *Figure 5-23*.

3b) Apply grease to the entire length of each lead screw.

CAUTION: *Do not over-apply the grease. Over-applying will cause grease to splatter inside the work envelope.*

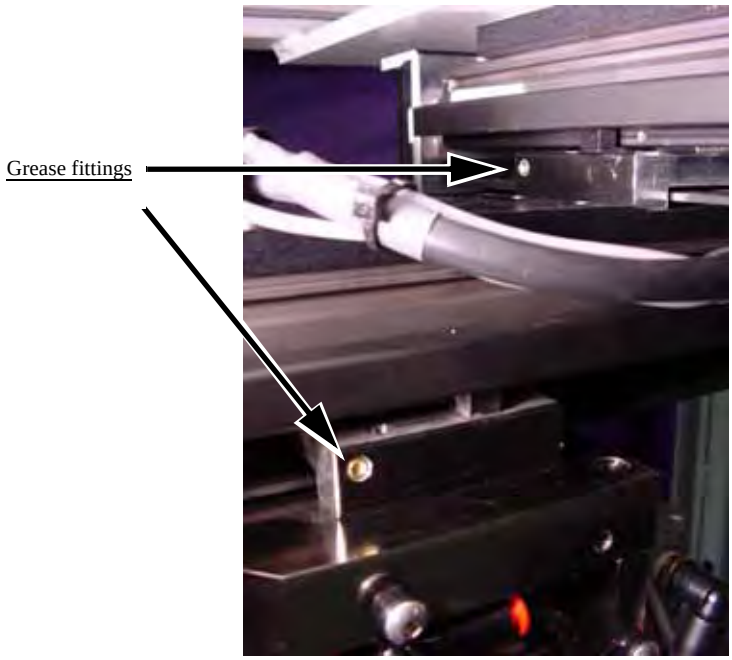


Figure 5-23—Grease fittings

3c) Reinstall the two lead screw shields.

Replace all Filters in the Fume Extractor

Once a year, replace all filters in the laser marker fume extractor. See *Figure 5-24* for the location of the four replaceable laser vacuum filters.

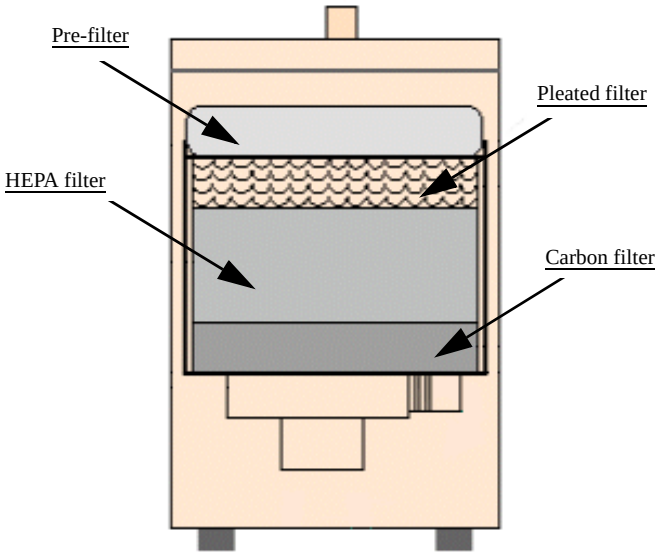


Figure 5-24—Laser vacuum filter locations

WARNING: Failure to replace the laser vacuum filters at the appropriate intervals could create a hazardous operating environment.

WARNING: This procedure should be performed only by qualified service personnel who have successfully completed Data I/O's laser training class. This procedure involves exposure to hazardous by-products from the laser marking process.

WARNING: Electric shock hazard. Shut down the PS288 (see "Shut Down the System" on page 3-12) and turn off the main power switch.

WARNING: Hazardous materials. Wear safety goggles and disposable protective gloves. Do not clean the laser vacuum filters by blowing with compressed air, shaking, or using any method that allows the particulate trapped by the filters to be released into the work environment.

To replace all filters:

1. Prepare the system—

1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.

1b) Remove lower back laser housing panel by removing the eight screws highlighted in yellow in *Figure 5-25*.

Figure 5-25—Lower back laser housing panel screw locations

1c) Remove side laser housing panel by removing the four screws highlighted in yellow in *Figure 5-26*.

Figure 5-26—Side laser housing panel screw locations

2. Take safety precautions—
Put on the disposable protective gloves and open the sealable plastic bag.

3. Detach vacuum hose—
3a) Loosen the clamp holding the vacuum hose to the extractor top and detach the vacuum hose from the extractor top. See *Figure 5-27*.
3b) Carefully set the vacuum hose aside.

Figure 5-27—Vacuum hose clamp

WARNING: Hazardous materials. Do not allow particulate matter in the vacuum hose to be released into the work environment.

4. Release spring clips—
4a) Release the four spring clips (one on each side) that secure the extractor top to the filter system. See *Figure 5-28* for location of one spring clip.
4b) Remove the extractor top and set aside.

Figure 5-28—Filter system spring clip

5. Remove filters—

5a) Remove all four filters and carefully place in the sealable bag.

5b) Pull off the disposable protective gloves and place in the sealable bag.

5c) Seal the bag and dispose of as hazardous waste.

WARNING: Numerous government regulations apply to the storage and disposal of hazardous waste. Ensure that contaminated filters are properly labeled and stored in your hazardous waste storage area. Also, make sure that they are not stored on your site longer than government regulations allow (the typical limit is 90 days). Check your government (local, state, and federal) regulations for hazardous waste storage requirements.

6. Replace filters—

6a) Replace the pre-filter with Data I/O Model Name **Pre-Filter, Polyester**.

6b) Replace the pleated filter with Data /O Model Name **Filter, Panel, Pleated**.

6c) Replace the HEPA filter with Data I/O Model Name **Filter, HEPA, Particle, BD Frame**.

6d) Replace the carbon filter with Data I/O Model Name **Activated Carbon Cell, 3lb NET**.

7. Re-install extractor top—

7a) Carefully place the extractor top on the filter system.

7b) Attach the four spring clips that secure the extractor top in place.

8. Re-install vacuum hose—

8a) Carefully attach the vacuum hose to the extractor top.

8b) Tighten the clamp that secures it in place.

9. Re-install panels—

Re-install lower back laser housing panel and side laser housing panel.

Testing and Calibrating FlashCORE Programmers

To optimize programming yields, voltages within the FlashCORE programmer need to be calibrated ***once each year***.

You will need:

- Diagnostic Adapter Board (DAB), Data I/O part number 910-2200-003 (or later).

This Diagnostic Adapter Board (DAB) detects and isolates problems related to FlashCORE programmers containing either RPX-Lite DW or DW-LGMEM. The DAB tests the Waveform Circuit Board and Backplane Circuit Board. The DAB can also be used to locate problems that have not yet shown symptoms.

Data I/O suggests performing the programmer diagnostic test annually. This DAB requires a minimum firmware version 03.00.00.C.

The DAB performs these nine tests:

1. Bus Test
2. Adapter ID Test
3. LED Driver Test
4. G Node Test
5. Vcc Overcurrent Test
6. Vpp Overcurrent Test
7. I2C Bus Test
8. DAC Calibration Test
9. Gslew Test

To run diagnostic tests on FlashCORE programmer(s):

1. Prepare the system—

1a) Turn the programmer circuit breaker on the rear panel to OFF (down position).

WARNING: To prevent ESD shock, before you touch the Socket Adapter, discharge static electricity from yourself by touching a common ground or an unpainted metal surface. Always wear a wrist strap containing a 1M-ohm (minimum value) to 10M-ohm (maximum value) current limiting resistor. Connect the antistatic wrist strap to the grounding socket on the front of the PS288.

1b) Remove the Socket Adapter and insert the Diagnostic Adapter Board in the desired programmer, ensuring that it seats correctly on the adapter pins.

1c) Turn the programmer circuit breaker on the rear panel to ON (up position)

2. TaskLink—

2a) Start TaskLink and click the Tools menu.

2b) Under Tools, select "Run Programmer Diagnostics."

2c) On the Diagnostics window, select the programmer with the DAB installed.

2d) Select **Test All**.

The pass/fail test results are displayed in TaskLink and are also written to **/fdrroot/system/diaglog.txt** and **/fdrroot/system/eventlog.txt** files on the PC card of the selected FlashCORE programmer. These files can be viewed and saved from TaskLink and saved on the Handler Computer.
If any of the tests show Fail in the TaskLink display, contact your nearest Data I/O Service Center for repair options. To help our service personal diagnose your problem, please e-mail both the **eventlog.txt** and **diaglog.txt** files.

A sample **dialog.txt** file is shown here:

Diagnostic Pass #1
Run Vpp Overcurrent test.
DUT 1 G1 Vpp overcurrent is sensed at 57 mA.
DUT 1 G2 Vpp overcurrent is sensed at 57 mA.
DUT 1 G3 Vpp overcurrent is sensed at 57 mA.
DUT 1 G4 Vpp overcurrent is sensed at 57 mA.

DUT 2 G1 Vpp overcurrent is sensed at 57 mA.
DUT 2 G2 Vpp overcurrent is sensed at 57 mA.
DUT 2 G3 Vpp overcurrent is sensed at 57 mA.
DUT 2 G4 Vpp overcurrent is sensed at 57 mA.
Error: DUT 3 G1 Vpp overcurrent is not sensed from 50 mA to 70 mA.
Error: DUT 3 G2 Vpp overcurrent is not sensed from 50 mA to 70 mA.
Error: DUT 3 G3 Vpp overcurrent is not sensed from 50 mA to 70 mA.
Error: DUT 3 G4 Vpp overcurrent is not sensed from 50 mA to 70 mA.
DUT 4 G1 Vpp overcurrent is sensed at 57 mA.
DUT 4 G2 Vpp overcurrent is sensed at 57 mA.
DUT 4 G3 Vpp overcurrent is sensed at 57 mA.
DUT 4 G4 Vpp overcurrent is sensed at 57 mA.
Diagnostics failed

Laser Computer

The Laser Computer is used to laser mark devices. Located in the Option Bay, the Laser Computer requires no maintenance other than cleaning and changing the filter. The filter on the Laser Computer should be cleaned every month and changed every six months. See “Change the Laser Computer Air Filter” on page 22.

Handler Computer

Installing AH500 Updates

Periodically you will receive AH500 updates as changes and improvements are made to the software.

> ***NOTE:*** *AH500 Updates are numbered AH500_XXYY, where XX = the version number and YY = the minor release number.*

To install new AH500 updates on your Handler Computer, insert the update CD and follow instructions on the Readme.txt file.

Adjustments, Calibrations, and Functional Tests

The PS288 requires periodic adjustments, calibrations, and functional tests to maintain optimum performance of the sensors, the PNP head system, and FlashCORE programmers.

WARNING: Blindness hazard! Always wear eye protection when the laser safety shields are open, such as during service. Direct or diffuse laser radiation can damage eyes. Goggles must block 10.6 μm, laser radiation. Goggles are designed to protect against scattered energy, but not against direct viewing of the laser beam or reflections from other surfaces.

WARNING: Serious burn hazard! Enclose the laser beam path during service. Direct or diffuse laser radiation can seriously burn.

WARNING: Electrocution hazard! Turn off the main power switch before removing any panels. Servicing the PS288 involves a significant risk of electric shock.

WARNING: The high speed and force behind a moving gantry can cause serious bodily injury to anyone working inside the work envelope. Moving the PNP head must be the responsibility of only one qualified individual. All other personnel near the system must stay clear of the work envelope while the gantry is moving.

Adjusting the Vacuum Sensors

NOTE: *If you notice consecutive picking errors while programming, before adjusting vacuum sensors complete the Z-Axis adjustment. For instructions on Z-Axis adjustment, see "Teach the Package File" on page 3-33. If completing the Z-Axis adjustment does not reduce or eliminate subsequent picking errors, complete the vacuum sensor adjustments described here.*

Vacuum sensors on the PS288 are adjustable. The **I/O Interface** window displays a list of the sensors in the PS288 and the status of each sensor.

NOTE: *The number of sensors on the PS288 depends on the options installed.*

To view the status of sensors in the system, on the AH500 main window click **System**, and then click **Misc. I/O** to open the **I/O Interface** window.

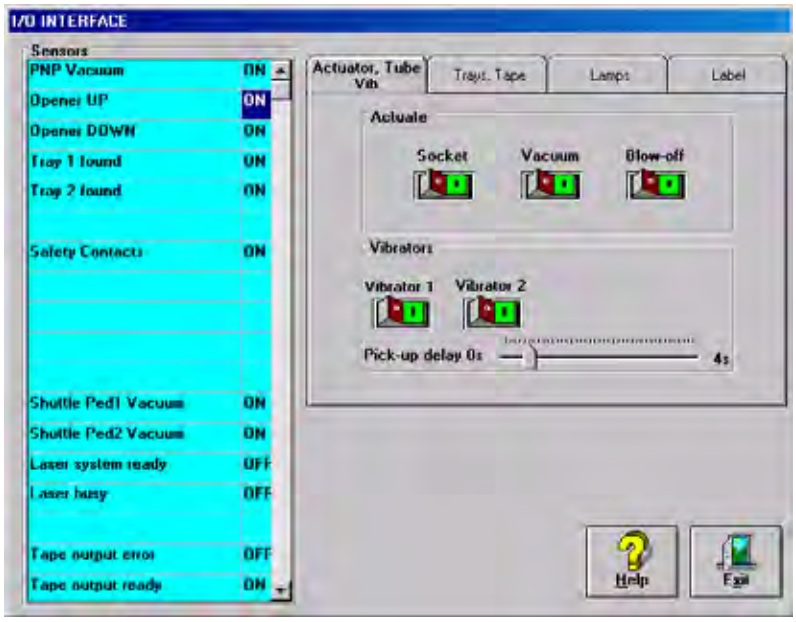


Figure 5-29—I/O Interface window

- The PS288 has an adjustable vacuum generator sensor on the PNP head. See “PNP Head Vacuum Generator Sensor” on page 31
- If the PS288 has the optional label or laser marking system, or the optional tape output system, there are adjustable vacuum generator sensors for the shuttle transfer system. See “Shuttle Ped 1 and 2 Vacuum Generator Sensors” on page 32
- If the PS288 has the optional tape output system, there is an adjustable vacuum generator sensor on the tape output PNP head. See “Tape Output PNP Head Vacuum Generator Sensor” on page 34.

PNP Head Vacuum Generator Sensor

1. Gantry window—

1a) On the Gantry window, move the PNP head to either the Tape or Vision location.

> ***NOTE:*** *To move the PNP head, on the touch screen place the arrow over either the Tape or Vision location and right-click the touchpad.*

1b) Click the Gantry Vacuum switch to **ON**.

2. Vacuum sensor—

On the vacuum generator sensor, locate the adjustment screws labeled HYS and SET. Locate the red sensor light. See *Figure 5-30*.

Figure 5-30—Vacuum sensor light. SET and HYS adjustment screws

3. Adjust the HYS and SET screws—

3a) Using a small flat screwdriver, turn the HYS screw all the way counter-clockwise.

3b) Then turn the SET screw counterclockwise until the red sensor light comes on.

3c) Then turn the SET screw clockwise until the red light goes off.

3d) Finally turn the SET screw another 1/8th turn clockwise.

4. Check adjustments—

4a) Block the hole on the PNP probe tip with a device. The red sensor light should come on immediately.

4b) Unblock the hole. The red sensor light should go off immediately.

5. Repeat—

5a) Repeat Step 4 three times to ensure the red sensor light goes on and off as described.

5b) If the red sensor light does not go off and on properly, turn the SET screw slightly clockwise and retry.

Shuttle Ped 1 and 2 Vacuum Generator Sensors

1. Prepare the system—

1a) On the back of the PS288, turn the “SERVOS” circuit breaker OFF.

1b) Remove the right lower access cover of the Option Bay.

1c) Set the cover aside.

2. AH500 software—

2a) On the System window, click **Shuttle/Options**.

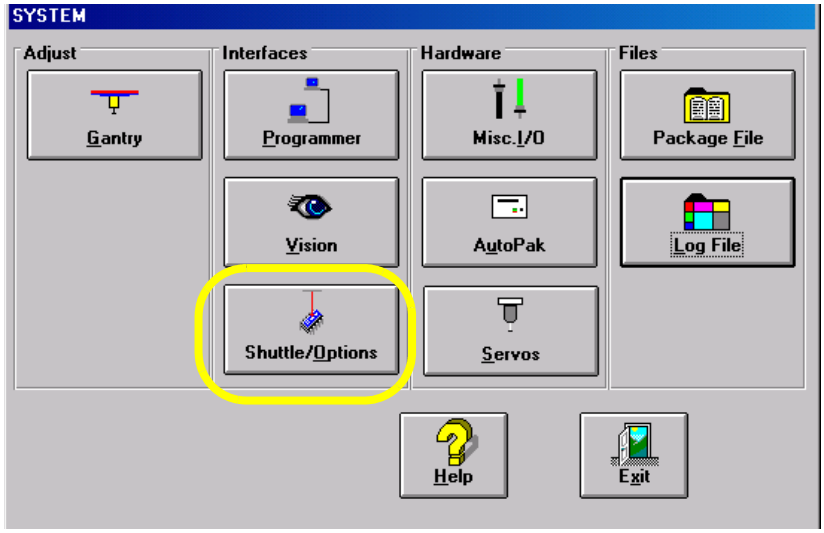


*Figure 5-31—Click **Shuttle/Options***

2b) On the **Shuttle** tab, click **GO** next to **Ped 2 Load Pos**. Then click the Ped 2 Vacuum to **ON**. See *Figure 5-32*.

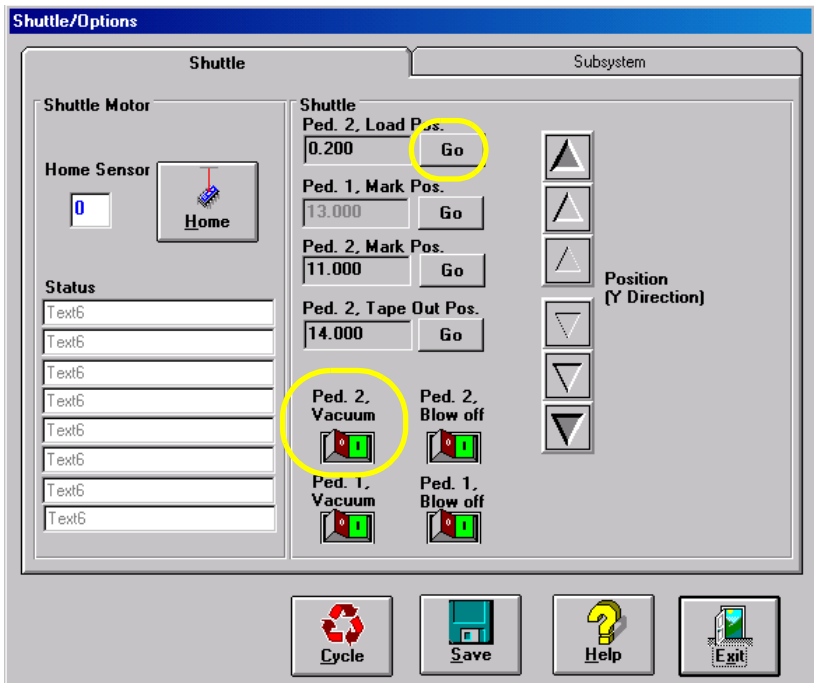


*Figure 5-32—Click **Go** and then turn Ped 2 Vacuum **ON***

***NOTE:** Refer to Figure 5-33 for Step 3 through Step 5.*

3. Adjust Cup 2 HYS and SET screws—

3a) Using a small flat screwdriver, turn the HYS screw all the way counterclockwise.

3b) Then turn the SET screw counterclockwise until the red vacuum sensor light comes on.

3c) Then turn the SET screw clockwise until the light goes off.

3d) Finally turn the SET screw another 1/8th turn clockwise.

4. Check adjustment—

4a) Block the hole on the shuttle pedestal. The red vacuum sensor light should come on immediately.

4b) Unblock the hole. The red vacuum sensor light should go off immediately.

4c) Repeat check to ensure the red vacuum sensor light goes on and off as described.

4d) If the red vacuum sensor light does not go off and on properly, turn the SET screw slightly clockwise and retry.

5. Adjust Cup 1 HYS and SET screw—

Repeat Step 3and Step 4 for Cup 1.

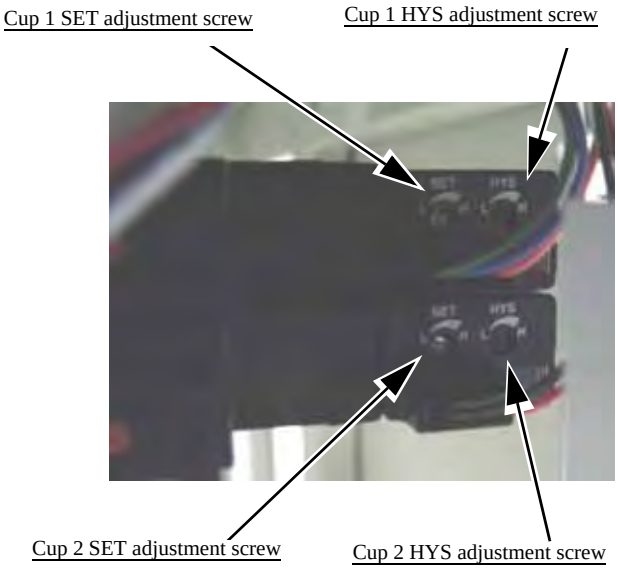


Figure 5-33—Cup 1 and Cup 2 vacuum generator adjustments

6. Shuttle tab—

6a) Click Ped 1 Vacuum to **OFF**.

6b) Click Ped 2 Vacuum to **ON**.

7. Reinstall cover—

Reinstall access cover on the Option Bay.

Tape Output PNP Head Vacuum Generator Sensor

If your system includes the optional tape output system, you will also need to adjust the vacuum generator sensor on the tape output PNP head.

1. Prepare the system—

1a) On the PLC Controller, turn the **Apply Vacuum** switch to the **ON** (up) position. See *Figure 5-34*.

*Figure 5-34—**Apply Vacuum** switch UP*

1b) Lift the clear plastic cover.

2. Vacuum sensor—

On the vacuum sensor, locate the adjustment screws labeled HYS and SET. See *Figure 5-35*.

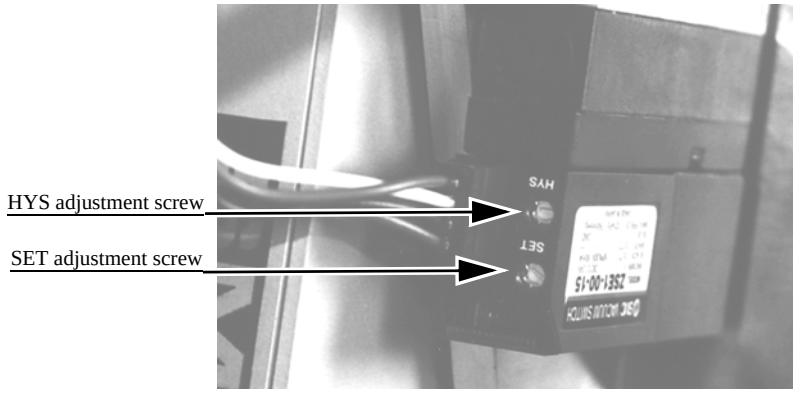


Figure 5-35—HYS and Set screw locations

3. Adjust the HYS and SET screws—

3a) Using a small flat screwdriver, turn the HYS screw counterclockwise.

3b) Then turn the SET screw counterclockwise until the red vacuum sensor light comes on.

3c) Then turn the SET screw clockwise until the light goes off.

3d) Finally turn the SET screw another 1/8th turn clockwise.

4. Check adjustments—

4a) Block the hole on the tape output PNP head. The red vacuum sensor light should come on immediately.

4b) Unblock the hole. The red vacuum sensor light should go off immediately.

5. Repeat—

5a) Repeat Step 4 three times to ensure the red vacuum sensor light goes on and off as described.

5b) If the red vacuum sensor light does not go off and on properly, turn the SET screw slightly clockwise and retry.

6. Complete—

Close the clear plastic cover.

NOTE: *If the hysteresis adjustment is set too high, the PS288 may return a vacuum error due to its inability to sense a vacuum within the time limits set in the AH500 software. The delay should be set as short as possible to prevent this occurrence. However, if the delay is set too short, vacuum line pulsations from usage throughout the rest of the system could inadvertently turn the sensor on when it should be off. Adjustments should be made to accommodate both conditions.*

Adjusting the Blow-Off Pressure

> ***NOTE:*** *The flow controls are set at the factory and should not require adjustment. If adjustments need to be made, they should be done in small steps until the desired results are reached.*

"Blow-off" is a small puff of positive pressure air applied for a short time during the drop period to assist in removing a device from the suction cup. Blow-off is produced by vacuum generators on the PNP head (or the tape output PNP head, if installed). If set too high, blow-off may cause a mis-alignment during device placement.

To adjust blow-off pressure on any vacuum generator:

1. Prepare the system—

1a) From the I/O Interface window, select the desired vacuum generator.

1b) Click **Vacuum** to the **OFF** position.

1c) Click **Blow off** to the **ON** position.

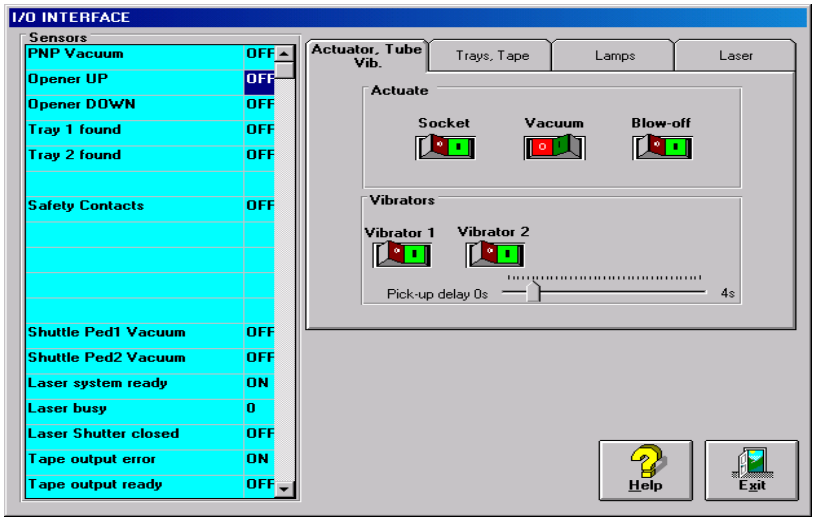


Figure 5-36—I/O Interface

2. Vacuum generator—

On the top of the vacuum generator, locate the blow-off adjustment screw above the valve coils (where the wires plug in). See *Figure 5-37*.

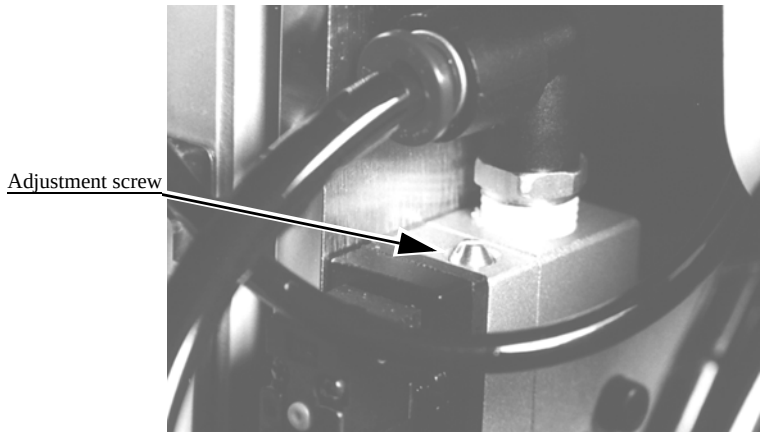


Figure 5-37—Blow-off adjustment screw on vacuum generator

3. Adjust—

3a) Turn the adjustment screw fully clockwise. This blocks all air and there is no “blow-off” puff of air at the probe tip.

3b) Turn the adjustment screw about 1/2 turn counterclockwise.

Adjusting the Socket Actuator Air Pressure

If the PNP head does not properly place or pick a device in a socket because the socket is not opening completely, the Socket Actuator air pressure may be set too low.

To adjust the Socket Actuator air pressure:

1. Prepare the system—

1a) Pause any Job that is running.

1b) On the Gantry window, select the **Actuator** tab.

1c) Verify the **Socket** switch is **ON**.

2. Input panel—

2a) Verify that the Socket Actuator pressure regulator is set in the 138-276 kiloPascals (20–40 PSI) range.

2b) Increase the Socket Actuator air pressure slightly (within the range).

3. Restart Job—

3a) Restart the job and check the action of the Socket Actuator.

3b) Increase Socket Actuator air pressure if needed.

CAUTION: *Setting the Socket Actuator air pressure too high can cause premature wear of the sockets.*

Adjusting the Socket Actuator Sensors

The Socket Actuator sensor tells the AH500 software the position of the Socket Actuator (up or down), and when a device can be put into a socket. To adjust the Socket Actuator sensor:

1. Prepare the system—

1a) From the Setup window, click **System**.

1b) On the System window, click **Gantry** to open the Gantry window.

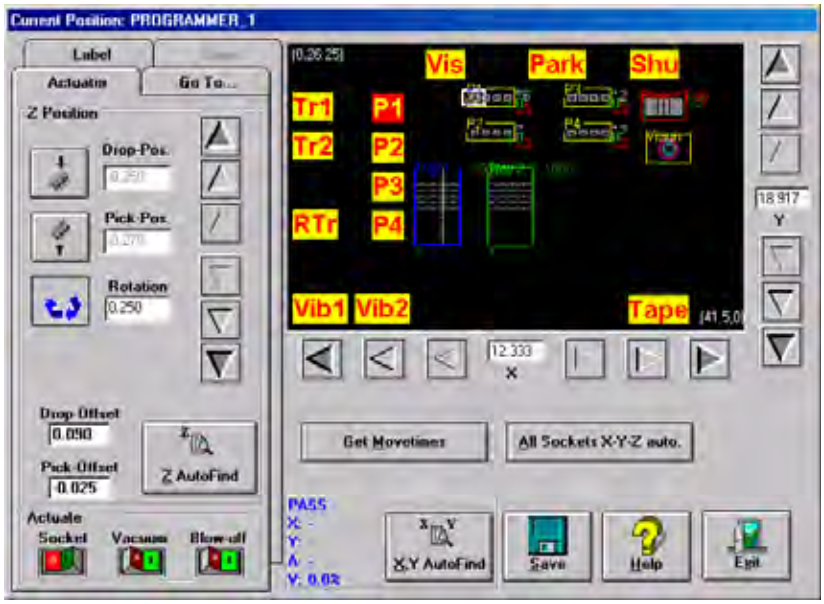


Figure 5-38—Gantry window

1c) Click on any programmer label (**P1** through **P4**) to move the PNP head to that programmer.

1d) On the PNP head, locate the up sensor and up sensor bracket screw. Locate the down sensor and down sensor bracket screw. See *Figure 5-39*.

NOTE: *On some PS288s, the up sensor and down sensor contain LEDs that indicate the position of the Socket Actuator.*

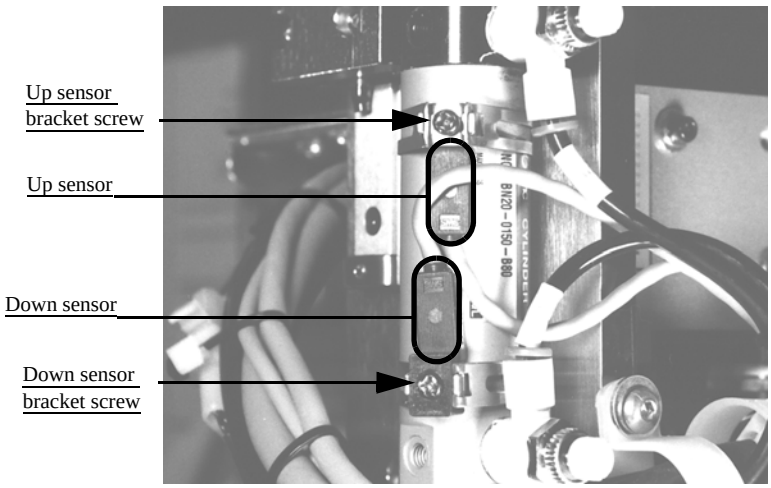


Figure 5-39—Sensors and brackets as viewed from back of PNP head

2. Adjust up sensor—

2a) Loosen the Phillips-head screw on the up sensor bracket.

2b) Move the up sensor upwards until the green I/O Controller LED for Port 1, Bit 1 illuminates. See *Figure 5-40*.

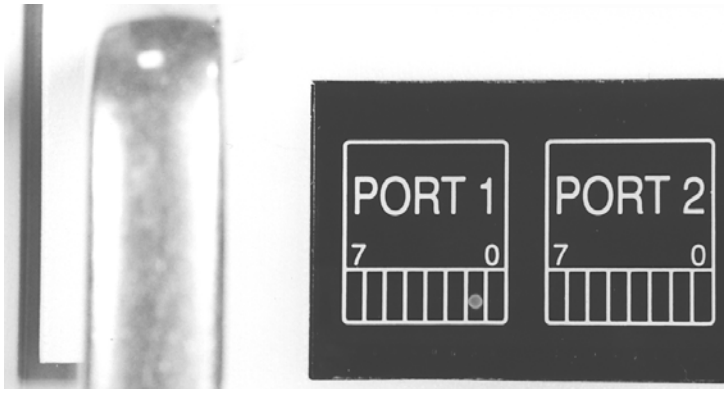


Figure 5-40—Port 1, Bit 1 LED illuminated

2c) Tighten the up sensor bracket screw.
2d) On the **Actuator** tab, click **Socket** to the **ON** position.

3. Adjust down sensor—

3a) On the Gantry window, ensure the Socket Actuator to toggled to the **ON** position. (see *Figure 5-41*). The Socket Actuator moves down.

Figure 5-41—Socket actuator ON

3b) On the input panel (on the rear of PS288), push the yellow bar down to shut off the input air (see *Figure 5-42*).

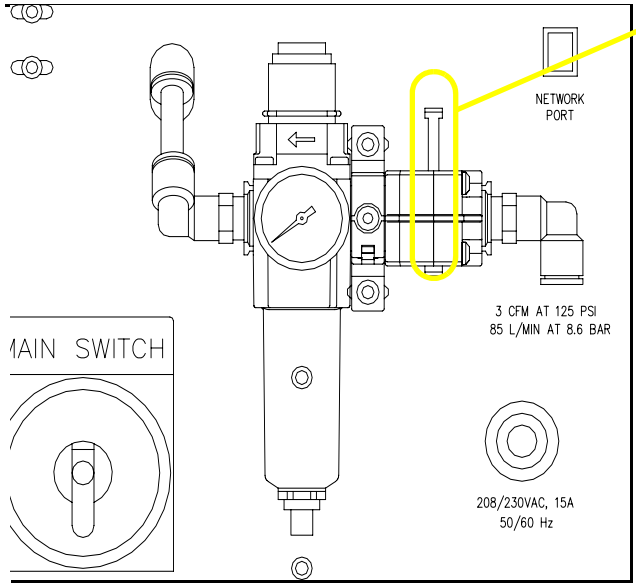


Figure 5-42—Push bar down on main air valve to turn off air

3c) By hand, move the Socket Actuator down until the Socket Actuator ribs make contact with the socket top. See *Figure 5-43*.

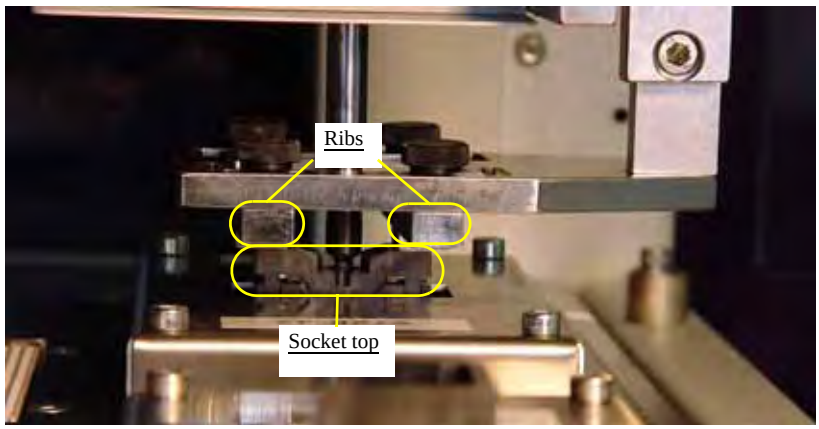


Figure 5-43—Socket actuator ribs contact socket top

3d) Loosen the Phillips-head screw on the down sensor bracket.
3e) Move the down sensor downward until the red LED on the sensor turns on. At this time, the green I/O Controller LED for Port 1, Bit 2 also illuminates.
3f) Tighten the down sensor bracket screw.
3g) By hand, push the Socket Actuator down farther and ensure that I/O Controller LED Port 1, Bit 2 remains illuminated.
3h) On the input panel (on rear of PS288), turn the Socket Actuator air pressure to **ON**.
3i) Click the socket switch OFF and ON several times to verify that the LED turns off and then on.

Calibrating FlashCORE Programmers

PS288 power is provided by a switching power supply. Secondary voltages are subsequently generated within the FlashCORE programmers to provide the signals required for processing the many devices supported. To optimize programming yields, voltages within the FlashCORE programmer must be calibrated ***once each year***.

For instructions, see “Testing and Calibrating FlashCORE Programmers” on page 5-27

Calibrating the Vision System

The vision system provides for angular correction up to 30 degrees for devices on the probe tip before they are placed in the programming socket. This angular correction is performed to reduce the likelihood of device damage from improper insertion.

If any of the following are true, the vision system may require calibration:

- The camera has been replaced, moved, refocused, or contrast changed (by aperture setting or device position).
- Many devices are being misaligned or rejected, and you suspect the motion settings or vision system may be at fault.
- There are continuity failures.

You will need:
Data I/O part number 695-0020-001 Vision Calibration Plate

1. Prepare the system—

1a) Start TaskLink and load a Job.

1b) In the AH500 Setup window, click **System**. If asked for a password, provide the password and click **System** again.

1c) Click **Gantry** to open the Gantry window.

1d) Click **Park** and then **Vis**. Verify that the following values display at both positions:
DropPos = -0.250
PickPos = -0.250
Rotation= 0.000

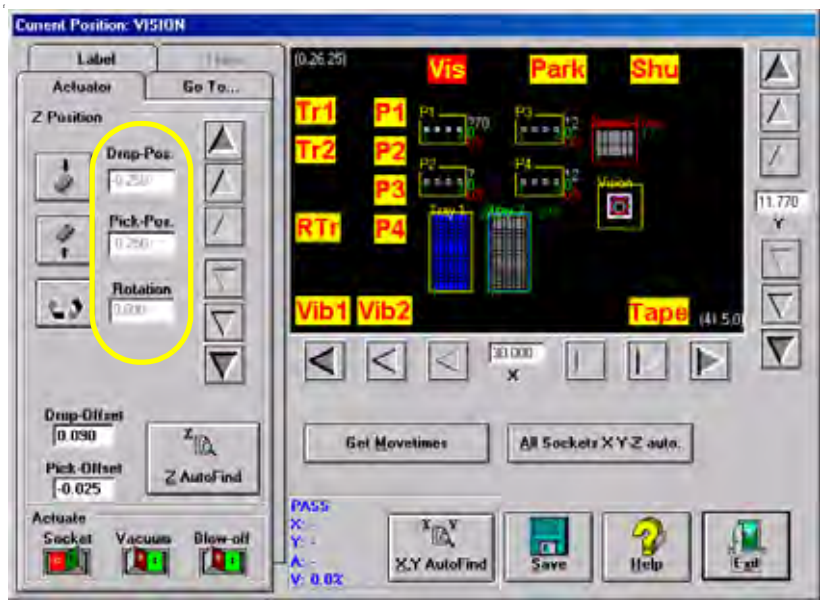


Figure 5-44—Verify values

1e) Open the package file for this job (for example: **`S273.txt`**) and ensure the following value:
Record #22 = 0

1f) Remove the clear plastic vision cover disk on the camera hole at the Vision position.

1g) Mark the center of the cover disk with a washable felt pen or dry erase marker.

1h) Replace the cover disk over the camera hole.

2. Set up AcuWin32—

2a) Within the Gantry window, click **Vis** to bring the PNP head to Vision.

2b) Double-click inside the small acuWin32 window in the upper left corner of the desktop.

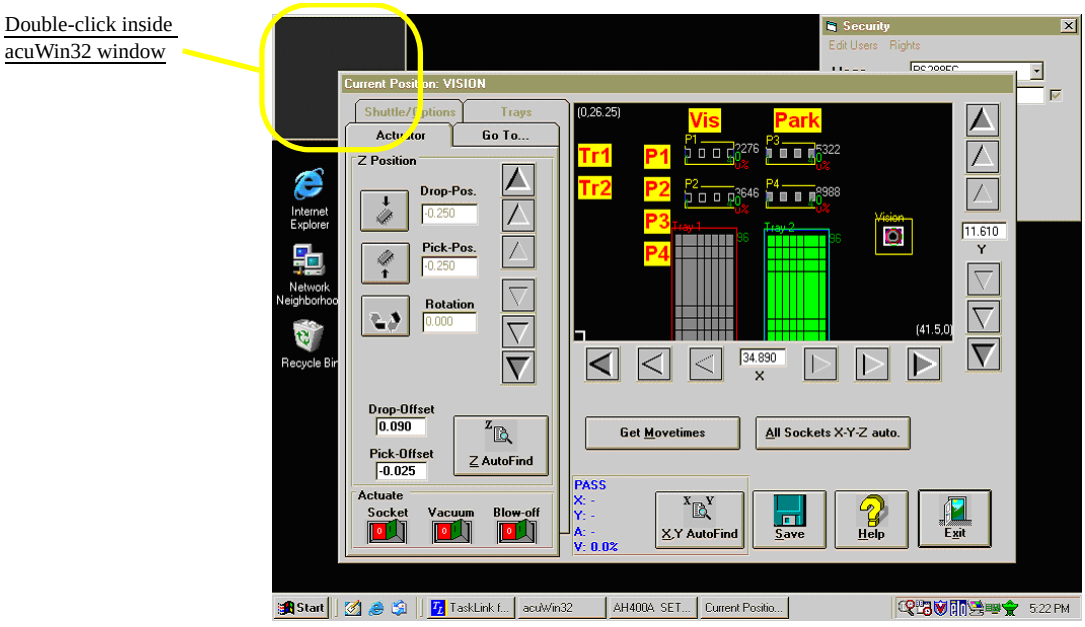


Figure 5-45—Double-click inside acuWin32 window

2c) Bring the cursor anywhere inside the black and white vision image area shown below and double-click. This opens the acuWin32 tool bar. *Figure 5-46* shows the tool bar open

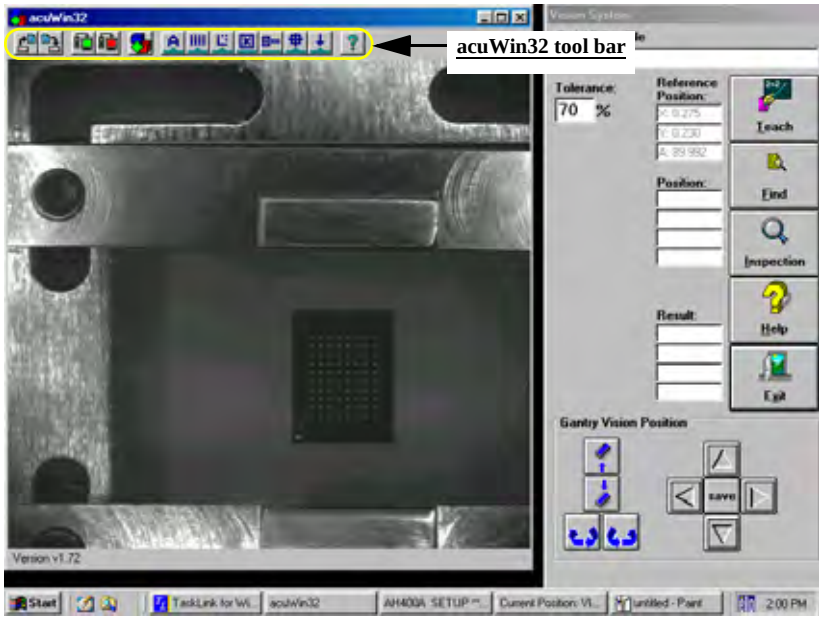


Figure 5-46—Click inside black and white vision image area to open the AcuWin32 tool bar

2d) On the acuWin32 tool bar, click the icon to open the Search Search dialog.

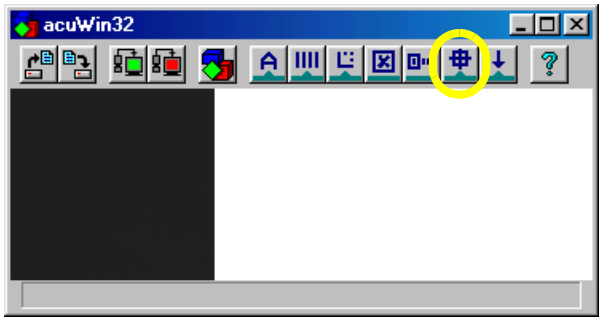


Figure 5-47— Click to switch to Search Search dialog

2e) On the Search Search dialog, click the icon to open the Display Obj-Man. Display dialog.

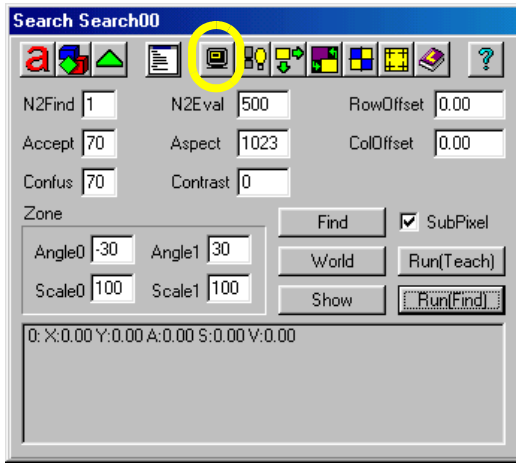


Figure 5-48—Click to open Display ObjMan. Display dialog

2f) On the Display ObjMan.Display dialog, set the DigRate to 0 “High” and the Format to 0 “Large.” Then press the green triangle to return to the Search Search dialog. See *Figure 5-49*.

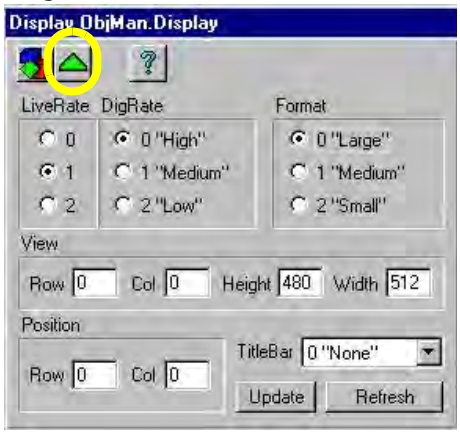


Figure 5-49—Display ObjMan.Display dialog settings

2g) On the Search Search dialog, set values in the Zone fields so that Angle0 is -30 and Angle1 is 30. See *Figure 5-50*.

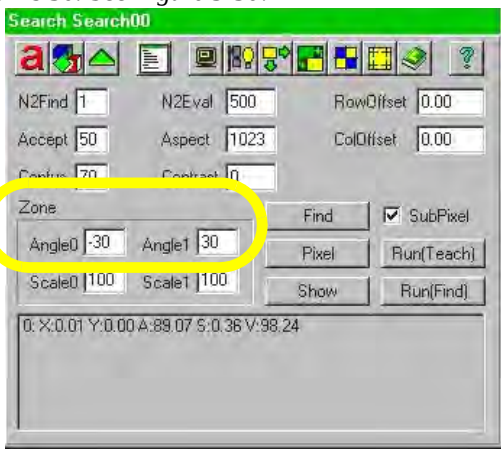


Figure 5-50—Set values in Zone fields

2h) Click the "Switch to Calib Object" dialog icon.

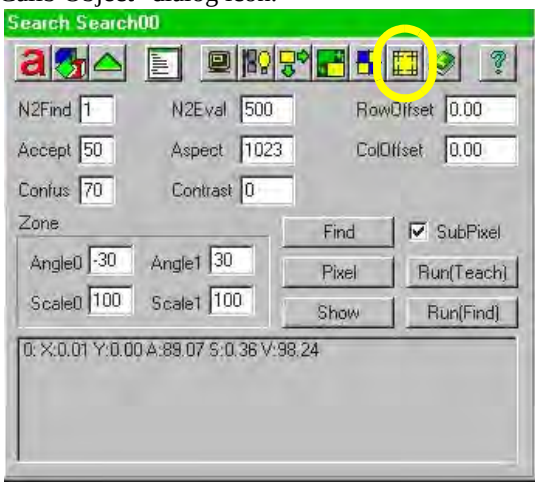


Figure 5-51—Click the "Switch to Calib Object" icon

2i) On the acuWin32 tool bar, click the icon to Acquire Image.

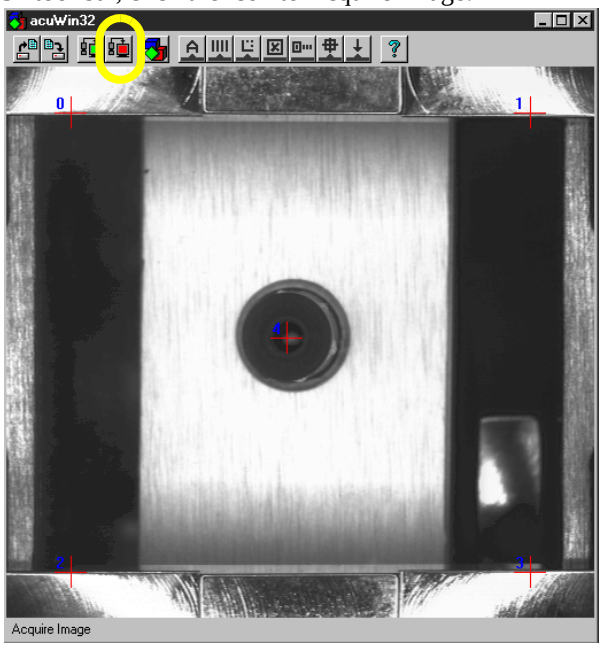


Figure 5-52—Acquire Image icon

3. Align cross hairs—

3a) The black dot marked on the vision cover will be visible as a dot or white “blemish.”

3b) Return to the Gantry window. Using the adjustment buttons for the X-axis and Y-axis, position the “blemish” so that it is in the center of the vacuum pickup cup. Press the Red icon to Acquire Image after adjusting the X-axis and the Y-axis. Repeat until the blemish is centered.

3c) Using the adjustment buttons for the X-axis and Y-axis, center cross hair 4 on the vacuum pickup cup as well. When correctly adjusted, the vacuum cup, “blemish” and Red Cross hair 4 are all lined up, as shown in *Figure 5-52*.

3d) In the Gantry window, turn the Vacuum rocker switch to **ON**, as shown in *Figure 5-53*.

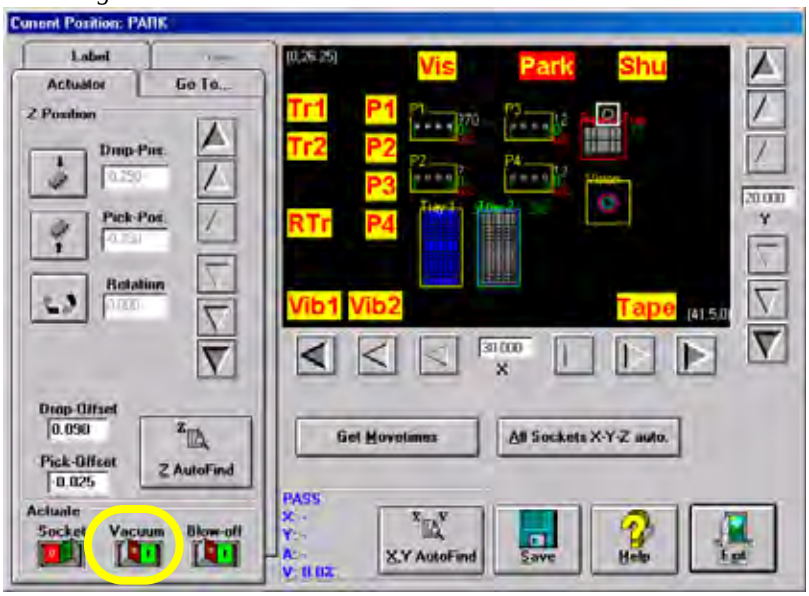


Figure 5-53—Vacuum switch is ON

3e) Place the Vision Calibration Plate on the Vacuum Cup nozzle. Adjust the Plate location manually until the center White Cross hair fully covers Red Cross hair 4. Press the Red Acquire Image icon.

3f) Move the Red Cross Hairs-0, 1, 2 and 3 on top of the four White Cross hairs in the four corners, as shown in *Figure 5-54*. Between each Red Cross hair, there should be three White Cross hairs.

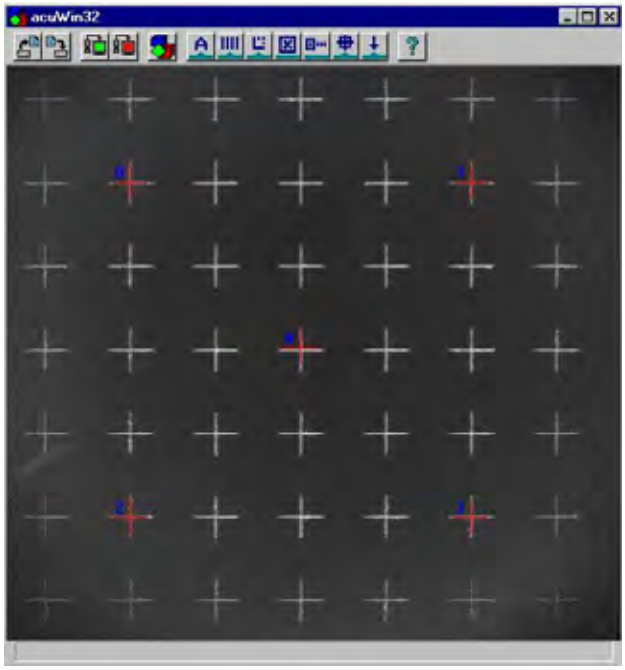


Figure 5-54—Cross hairs line up

3g) On the Calib SysCalib window, set the **World X** and **Y** values as shown in *Figure 5-55*. Press the **Solve** button. Then press the green triangle to return to the Gantry window.

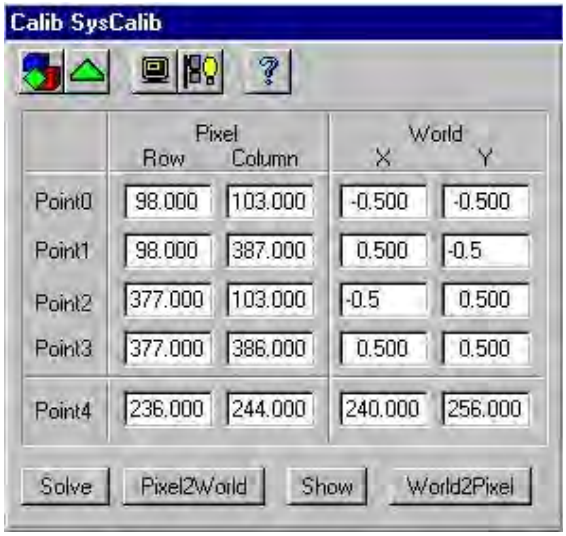


Figure 5-55—World values for X and Y

4. Adjust the Search Area—

4a) Manually remove the Vision Calibration Plate from the Vacuum Cup nozzle. On the Gantry window, turn the Gantry Vacuum switch to OFF.

> ***NOTE:*** *In this example, Programmer 4 is used for illustration purposes. Choose any programmer near the front of the PS288.*

4b) Click **P4**. The PNP head will move to Programmer 4. Center the vacuum cup nozzle on the socket in Programmer 4. Use the X-axis and Y-axis adjustment buttons on the Gantry window to center the PNP head on the socket.

4c) Click **Park** to move the PNP head to the Park position. Manually place a device in the socket of Programmer 4. Click **P4** to move the PNP head back to Programmer 4. Adjust the width of the Socket Actuator ribs so that the ribs make contact with the socket top and yet are far enough apart to be clear of the device when the device is picked.

4d) On the **Actuator** tab, click **Z AutoFind.** See *Figure 5-56*. Ensure that the device is picked from the center.

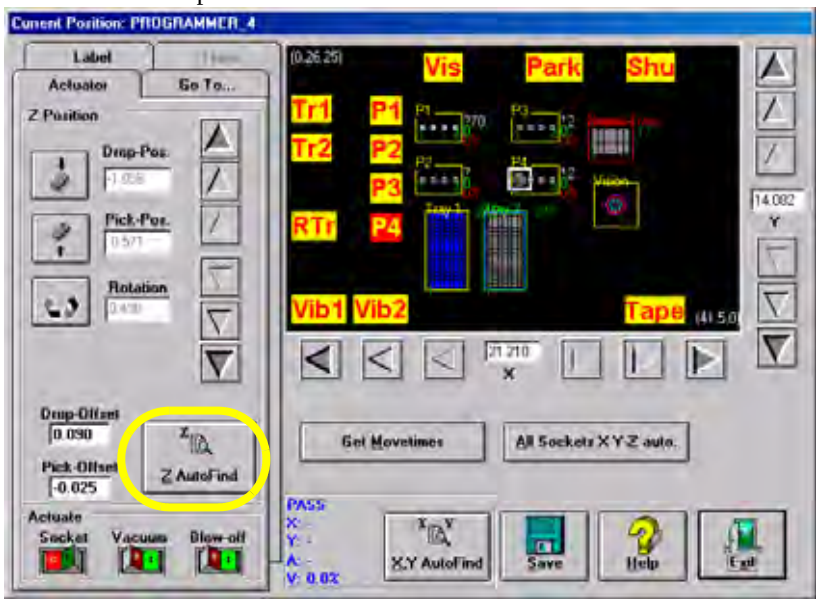


Figure 5-56—Z AutoFind.

4e) Pick up the device by right-clicking the touchpad over the device. Left-click over the **Vis** area on the window to move the device to the Vision system.

4f) On the Search Search dialog tool bar, click the icon to open the Area Object dialog.

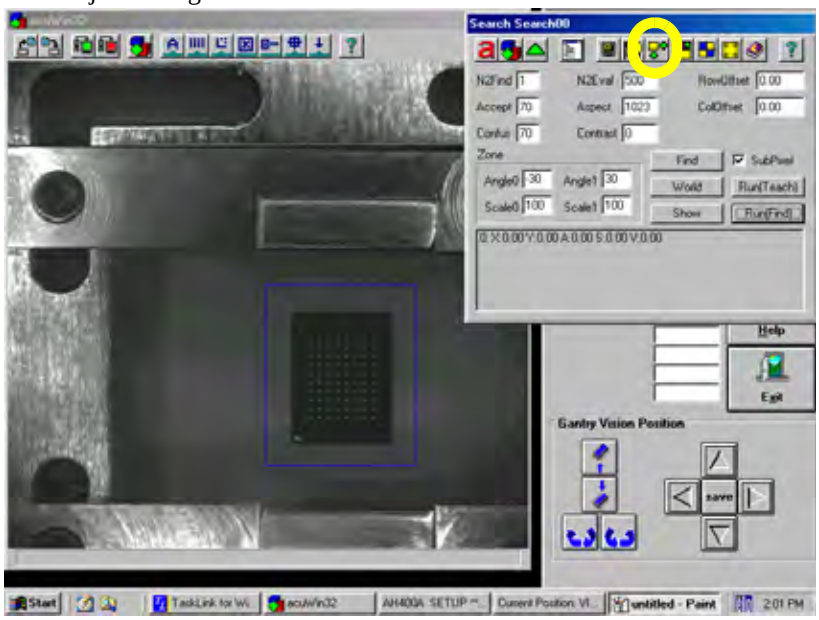


Figure 5-57—Click to open Area Object dialog

4g) Adjust the size of the device search area (red rectangle) around the device so that it is 30-50% larger than the device. To adjust the device

search area, place the arrow on any line, hold the left touchpad button down, and use the touchpad to drag the line.

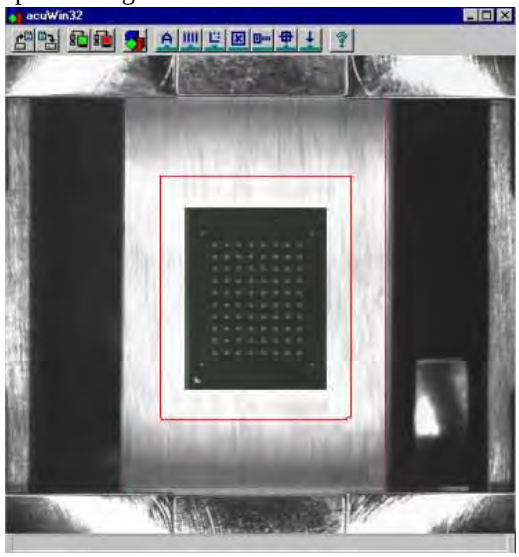


Figure 5-58—Adjust device search area around device

4h) When the device search area is adjusted, click the green triangle on the Area Search00.Area dialog to exit. See *Figure 5-59*.

Figure 5-59—Click green triangle

4i) On the Search Search dialog tool bar, click **a** to hide Object dialog. See *Figure 5-60*.

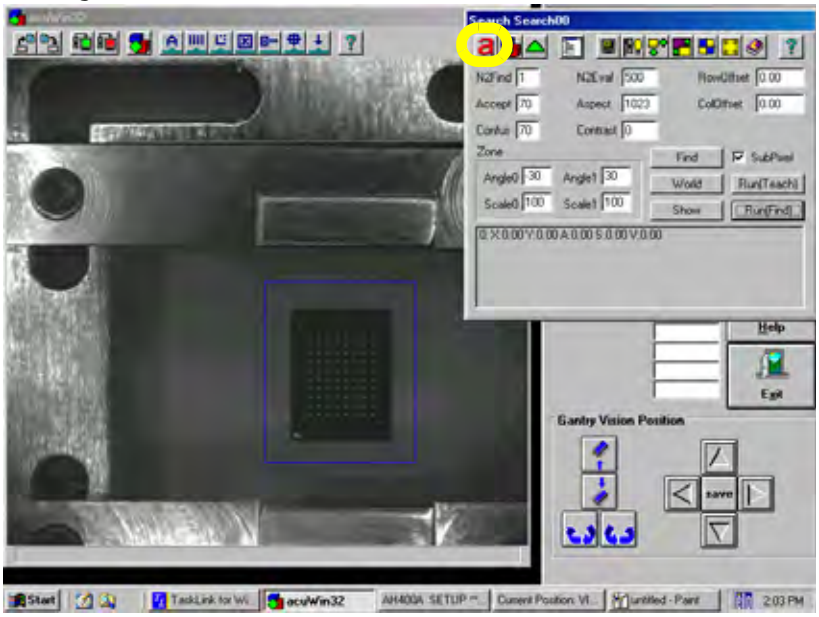


*Figure 5-60—Click **a** to hide Object dialog*

4j) On the Gantry window, click **P4** to return the PNP head to Programmer 4. Right-click to place the device in the socket.
4k) On the Handler Computer, use Windows Explorer to copy the reference vision file just modified (in this example, *S273.prj*).
4l) Paste a copy of *S273.prj* file to create *Copy of S273.prj*.
4m) Rename *Copy of S273.prj* to *VisionTemplate.prj*. This ensures that the new vision calibration values are saved to the template used to teach reference vision files.

This completes the process of calibrating the vision system.

> ***NOTE:*** *To teach a reference vision file, see "Teach the Reference Vision File" on page 3-21*

Replacing Major Assemblies

The PS288 is a modular system that easily facilitates the removal and replacement of most major assemblies. Basic instructions for their replacement can be found in this section.

> ***WARNING: Replacement of any mechanical assembly requires machine recalibration to ensure proper placement of devices and prevent damage to the PS288 or potential injury to personnel.***

Replacing the Pick And Place Head

To replace the PNP head:

1. Prepare the system—

1a) From the Gantry window, move the PNP head to the front of the work envelope so it can be easily reached. The Tape input location works well. See *Figure 5-61*.

1b) Verify that the PS288 is shut down (see “Shut Down the System” on page 3-12) and the main power switch is in the **OFF** position.

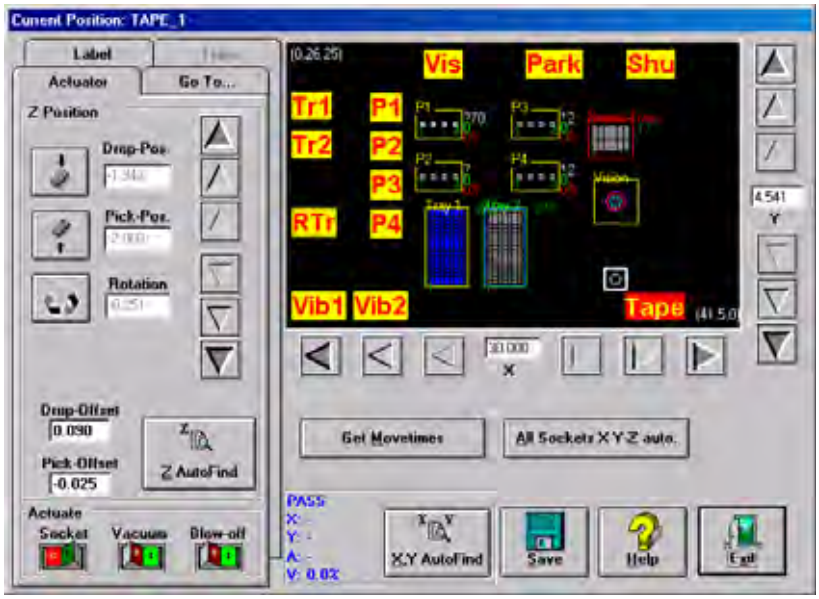


Figure 5-61— Move PNP head to Tape input location

2. Remove vacuum line and cable—

2a) Remove vacuum line by pulling the line gently while pushing the red collar.

2b) Remove cable by loosening two screws (indicated in *Figure 5-62*).

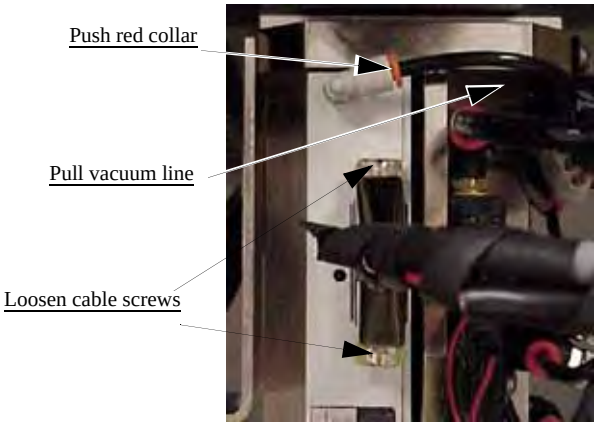


Figure 5-62—Location of vacuum line and cable screws

3. Swing Socket Actuator away from guide—

3a) Using a 2.5 mm Allen wrench, remove the four screws that hold the Socket Actuator to the guide.

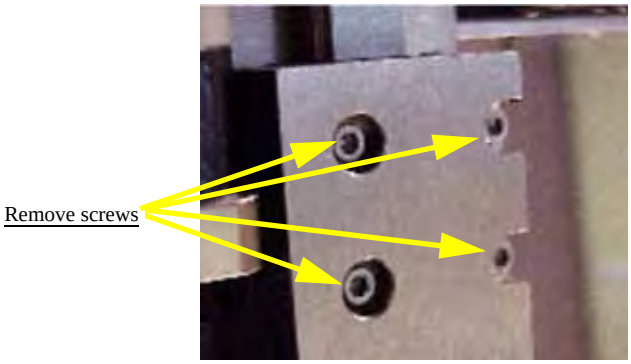


Figure 5-63—Removing four screws

3b) Swing the Socket Actuator away from the guide.

4. Remove old PNP head—

CAUTION: *Hold the PNP head while removing the screws to prevent the PNP head from falling.*

4a) Using a 2.5 mm Allen wrench, remove the two lower screws that hold the PNP head in place. See *Figure 5-64*.

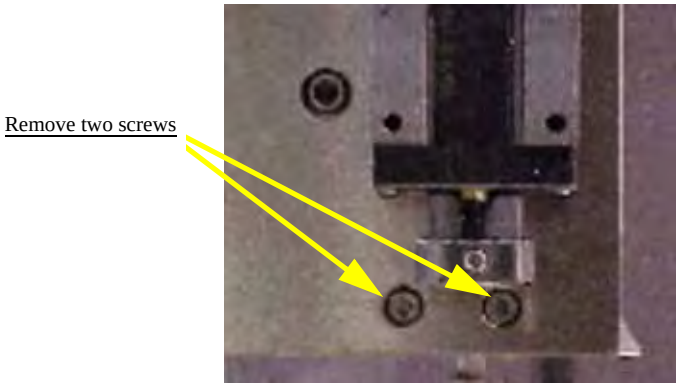


Figure 5-64—Removing lower screws

4b) Using a 2.5 mm Allen wrench, remove the two upper screws that hold the PNP head in place. See *Figure 5-65*.

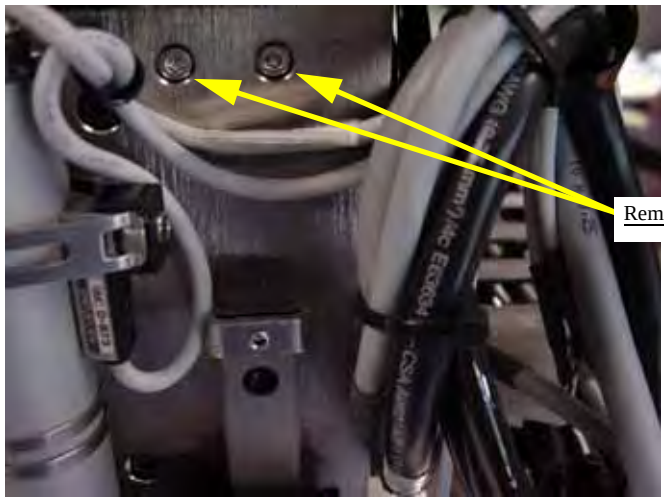


Figure 5-65—Removing upper screws

5. Install new PNP head—

5a) Install new PNP head by securing the two upper and two lower screws.

5b) Reassemble in reverse order.

5c) Verify that all screws are tight.

Replacing FlashCORE Quad or FlashCORE Assemblies

The PS288 contains a FlashCORE Quad assembly. The FlashCORE Quad assembly holds four individual FlashCORE programmer assemblies. Both the FlashCORE Quad assembly and individual FlashCORE programmer assemblies can be replaced.

WARNING: Electrocution hazard! Turn off the main power switch before removing any panels. Servicing the PS288 involves a significant risk of electric shock.

Figure 5-66—FlashCORE Quad assembly

To replace the FlashCORE Quad assembly:

1. Prepare the system—

1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.

1b) Open the outer access panel closest to the FlashCORE Quad assembly.

2. Disconnect cables—
Disconnect the power and communications cables from the FlashCORE Quad assembly.

> ***NOTE:*** *Each cable should be labelled (if not already) to facilitate proper reinstallation when the FlashCORE Quad assembly is replaced.*

3. Remove FlashCORE Quad assembly—

3a) Remove the six hex screws that fasten the FlashCORE Quad assembly to the work surface.

3b) Carefully lift the FlashCORE Quad assembly from the work surface, ensuring that none of the circuit boards, cables, or other mechanical assemblies catch during removal.

4. Replace—
Replace with new FlashCORE Quad assembly in reverse order.

5. Assign sites and update firmware—
Each of the four newly installed FlashCORE programmer assemblies in the FlashCORE Quad must be "located" and assigned sites from TaskLink. Once each site is assigned, firmware on the new FlashCORE programmer assemblies must be updated from TaskLink.

See TaskLink online Help for information about updating firmware.

To replace an individual FlashCORE programmer assembly:

1. Prepare the system—

1a) Verify that the PS288 is shut down and the main power switch is in the **OFF** position.

1b) Open the outer access panel closest to the defective FlashCORE programmer assembly.

2. Disconnect cables—
Disconnect the power and communications cables from the FlashCORE programmer assembly.

3. Remove FlashCORE programmer assembly—

3a) Remove the three mounting screws that hold the FlashCORE programmer assembly to the top plate.

3b) Carefully remove the defective FlashCORE programmer assembly.

4. Replace—

4a) If the defective board(s) in the removed FlashCORE programmer assembly is known, it may be replaced as required. Otherwise, replace the entire FlashCORE programmer assembly, including CPU, Waveform Board and Backplane Board.

4b) Replace FlashCORE programmer assembly in reverse order.

5. **Update firmware—**
   The newly installed FlashCORE programmer assembly must be "located" and assigned a site from TaskLink. Once the site is assigned, firmware on the new FlashCORE programmer assembly must be updated from TaskLink.

   See TaskLink online Help for information about updating firmware.

Fixing Failures

This section contains solutions to problems that may arise during operation of the PS288. While this list is not a comprehensive compilation of all possible failures, it provides helpful troubleshooting tips for systems most likely to cause problems.

Tube Input and Output Problems

Problem:

- The vibration controls are fully clockwise and neither of the tube platforms vibrates.

Check this:

☞ Make sure that tube input or tube output has been selected on the **Setup** window.

Problem:

- Only one tube platform vibrates.

Check this:

☞ Shut down the PS288 (see “Shut Down the System” on page 3-12) and check the 2A 250V fuse above the three-wire connector on the back of the I/O Controller. The input vibrating motor connector is labeled 9-1; the output vibrating motor connector is labeled 9-2.

☞ Make sure that the power cable on the back of the I/O Controller is fully connected.

☞ Check the 5A 250V fuse on the bottom of the vibration controller box (behind the control knobs).

☞ Remove the controller and make sure that the on/off switch was left on when it was last installed.

If the fuses are continually being blown, the vibration controller box may be defective and must be replaced. You can switch the wire from the working controller to the defective controller to determine if this is the case.

Problem:

- The PNP head will not center on the devices.

Check this:

☞ Adjust the **X-**, **Y-**, and **Z-axis** positions using the adjustment arrows on the Gantry window. See “Teach the Package File” on page 33 for more information.

Problem:

- The PS288 is putting the wrong number of devices into the tubes.

Check this:

☞ From the Setup window, on the **Options** tab, ensure that Input and/or Output options are set to tubes. Click the **System** icon, then click **Gantry** to open the Gantry window. Click the yellow **Vib1** label to move the PNP head to the first position of the input vibration controller.

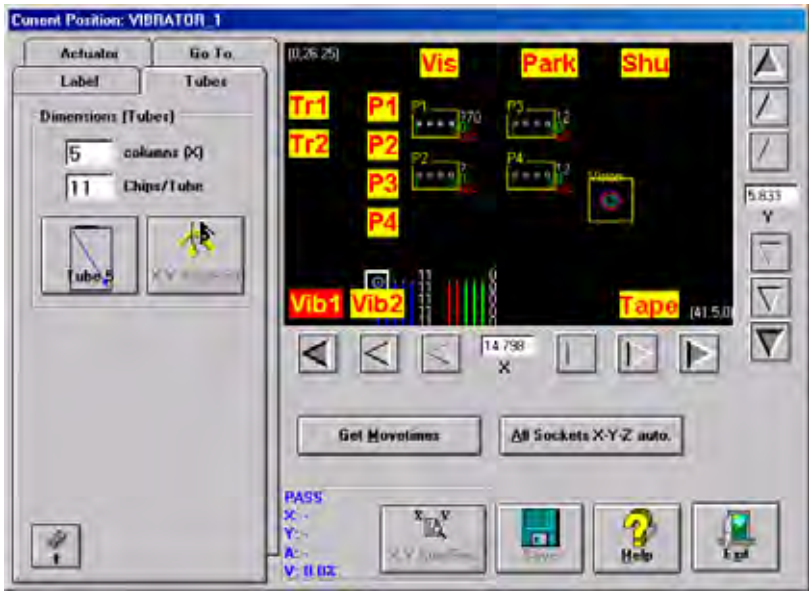


Figure 5-67—Enter correct number of devices

☞ Click the **Tubes** tab, and then enter the correct number of devices per tube in the Chips/Tube box.

☞ Click **Save** to store the new settings to the package file.

Programmer Errors

Programmer errors discussed:

- Clearing a Programmer Disabled Status
- Fixing Programmer Continuity Failures
- Fixing Programming Failures in All Programmers
- Disabling a Programmer that Fails Self-test

Clearing a Programmer Disabled Status

If the status indicator disappears from any of the programmer outlines, or the PNP head skips a programmer, first try to clear the programmer disabled status.

1. Prepare the system—

1a) On the Run window, click **Pause**, then click **Exit**.

1b) From the Setup window, select the **Programmers** tab.

1c) Note which programmers are disabled. In *Figure 5-68* below, Programmer 1 and Programmer 4 are disabled.

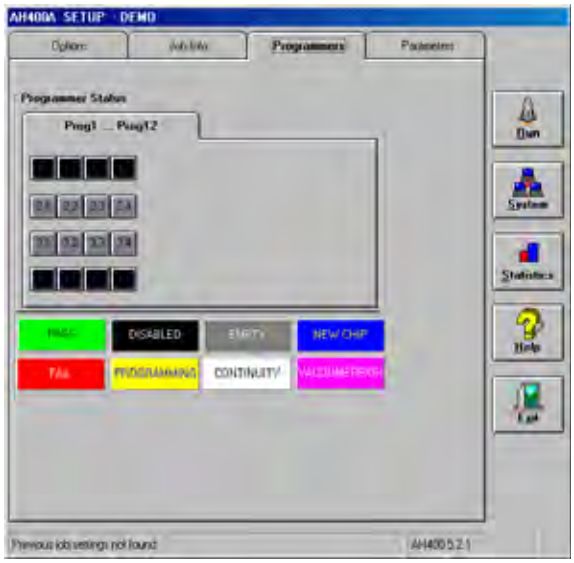


Figure 5-68—Programmers 1 and 4 are disabled

1d) Click the label for the disabled programmer, and then click the EMPTY (grey) button. The programmer label changes to grey.

2. Repeat Step 1 for other disabled programmers.

3. Restart job—

3a) Remove any devices in programmer sockets.

3b) Click **Run**, and then click **Run** again.

Fixing Programmer Continuity Failures

If only one programmer fails to program devices and continuity failures predominate in the **Statistics** window, try the following:

- ☞ Move the socket module to another programmer. If the failure moves with the socket module, check for bent, damaged or worn pins on the socket and socket module. If the failure persists in the same programmer, re-calibrate the device centers for this socket. For information regarding calibration of the PNP head, see “Teach the Package File” on page 3-33.

Data I/O does not encourage you to perform repairs on the programmer, especially if still under warranty. However, you can check for these possible failures:

Fixing Programming Failures in All Programmers

If all programmers fail to program devices, try the following:

- ☞ Check that the **Programmer Simulation** switch on the Setup window is **OFF**.
- ☞ Ensure the network hub has power.

Figure 5-69—Network hub with power on

Disabling a Programmer that Fails Self-test

If a programmer is not performing and you cannot correct the error, you can continue to use other programmers after disabling the non-functional programmer.

To disable a programmer:

1. From the Setup window, click the **Programmers** tab.
2. Click the label for the failed programmer.
3. Click the black DISABLED button. The programmer label changes to black and the programmer is disabled.

I/O Controller Problems

Problem:

- The I/O Controller green power LED doesn't light when the START button is pressed.

Check this:

- ☞ Check the power source.
- ☞ Make sure that the front circuit breaker is on.
- ☞ Check that the loop back plug is inserted into the connector labeled "Remote ON/OFF 24V" at the rear of the I/O Controller.
- ☞ Make sure that the top I/O Controller I/O module lid is screwed tight. There is a safety interlock switch inside the lid.
- ☞ Check the fuse at the rear of I/O Controller; if you can hear the contactor “clunk” internally, and the **START** switch lights, this indicates the 24 VAC low voltage loop circuit works, but the 5VDC supply is not working.

Problem:

- The I/O Controller shuts off by itself after a while.

Check this:

- ☞ Check for power surges causing the circuit breakers to open.

Problem:

- An output relay is not activating, and its corresponding green LED is off at the front panel.

Check this:

- ☞ Make sure that the four 30-connector ribbon cables labeled J1–J4 are connected to the I/O Controller I/O Module from the PC AT Module.
- ☞ Make sure that the direction selection at that port's jumper patch is not missing or set for an input type of port.

Problem:

- An output relay is not activating, but the green LED on the front panel indicates that it should be.

Check this:

- ☞ Check the voltage selection at that port's jumper patch.
- ☞ Check the fuse on the case of the solid state relay.

Air Pressure Problems

Problem:

- There is no main air pressure.

Check this:

- ☞ Make sure that the main air switch on the input panel is in the **ON** position.
- ☞ Check the fuse in the I/O Controller connector.
- ☞ Make sure that the sensor switch in the pneumatic control panel (+24V) is on.
- ☞ Check the pico fuse in the sensor/dump bank inside of the I/O Controller.

Problem:

- There is no or low vacuum on the PNP probe.

Check this:

- ☞ Make sure that there is voltage at the sensor mounted on the PNP head.
- ☞ Check the vacuum/blow-off solenoid.
- ☞ Check solenoid 4 (vacuum and blow-off) mounted on top of manifold.
- ☞ Check solenoid 1 (up/down) mounted of top of manifold.
- ☞ Check the PNP head probe to determine if it is clogged. Clean if necessary.

Servo Motor Problems

When you need to reload the software on the motion controller card of the PS288, complete this procedure:

You will need Software MC_DSP_XP (Windows version)

1. Prepare the system—

1a) Open the door on the right side of the PS288.

1b) Examine the Y-axis and X-axis servo motor amps.

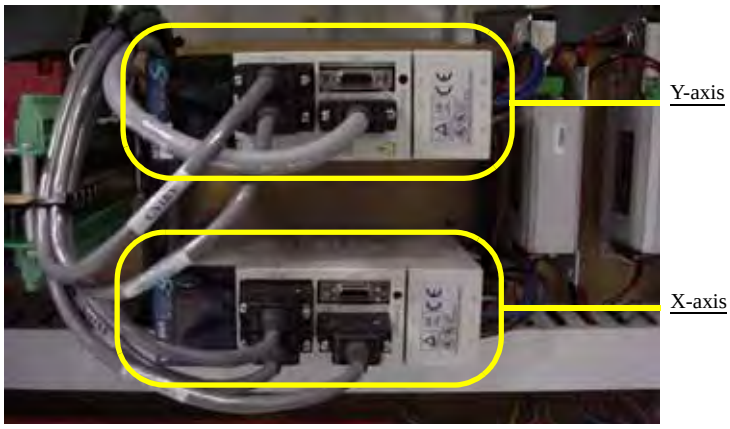


Figure 5-70—Y-axis and X-axis servo motor amps

2. Launch Windows Explorer—

2a) Go to C:\Install\Setup.

2b) Run MC_DSP_XP.

3. Add controller—

3a) If your window shows no controller in the Controller List field (see *Figure 5-71*), click **Add Controller**.

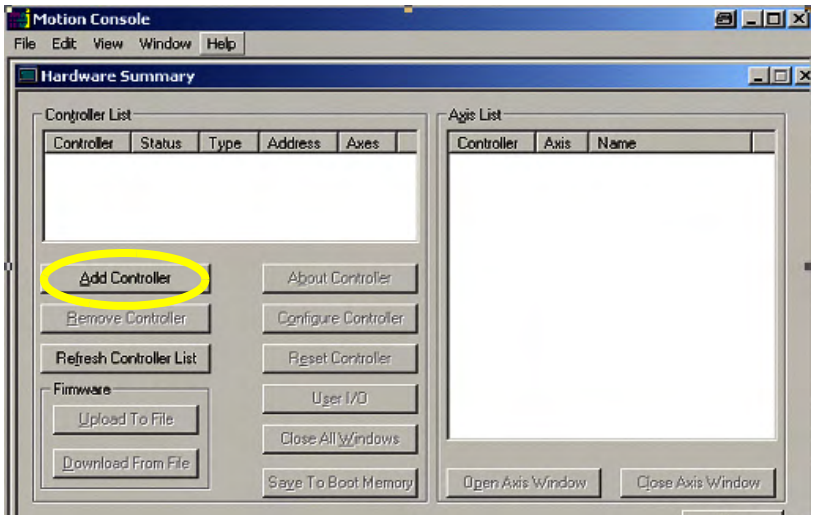


Figure 5-71—No controller in list box

3b) In the Add Controller window, type MEI. Click **OK**. See *Figure 5-72*.

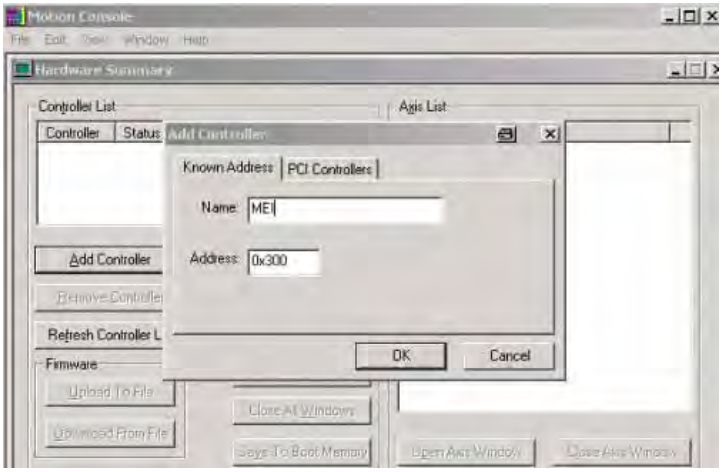


Figure 5-72—Add controller

4. Download file—

4a) On the Hardware Summary window, select **Download From File**. See *Figure 5-73*.

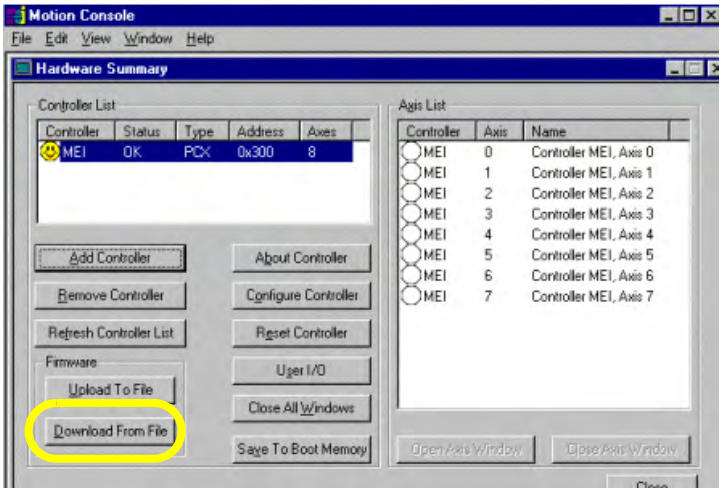


Figure 5-73—Download from file

4b) Select the correct software file for the type of servo motor installed. For Mitsubishi motors, select MEI1214M.ABS.

4c) Click **Open**.

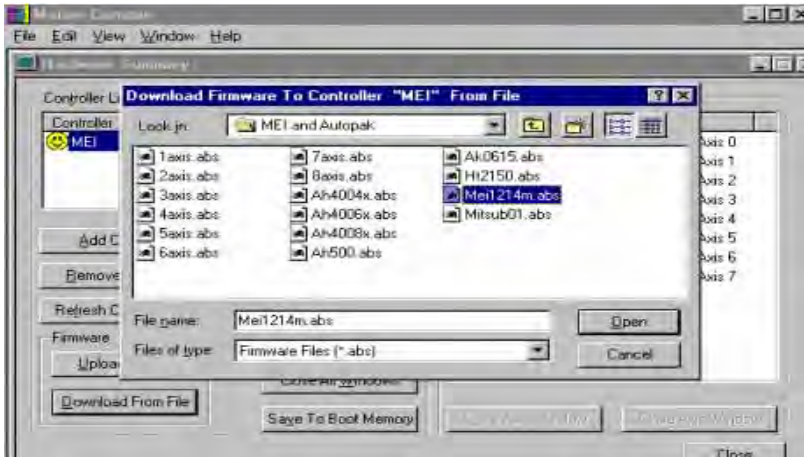


Figure 5-74—Select file

4d) Click **Yes** to replace the firmware on controller "MEI," as shown in *Figure 5-75*.

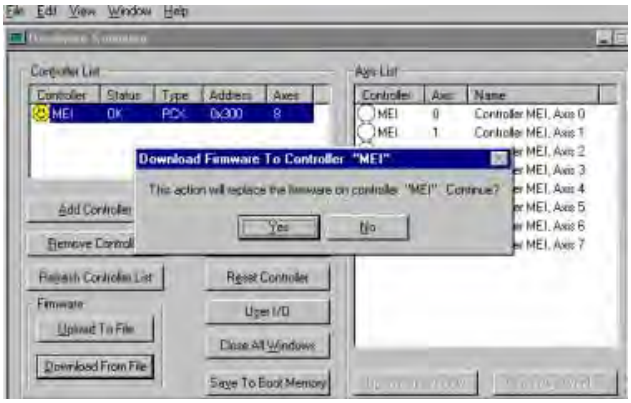


Figure 5-75—Replace firmware

5. Complete process—
Press Alt-X to exit.

The motion controller card now has the new software loaded and the process is complete.

(Optional) Tape Output System

Cleaning the Pressure Seal Tape Output System

Pressure seal tape output systems require cleaning to prevent problems with breaking the carrier tape or tearing the carrier tape sprocket holes. The cleaning process removes adhesive build up from the cover tape application rollers and the drive sprocket top pressure idler wheel.

To clean the pressure seal tape output system:

TOOLS REQUIRED: Shop towel and alcohol or commercial alcohol wipes.

1. Prepare the system—

1a) Switch on the PS288 and start the AH500 software on the Handler Computer.

1b) Load a job that requires the use of the tape output Controller.

1c) Start the job and let the AH500 complete its startup process.

1d) Switch on the tape output Controller.

2. Configure the tape output Controller—

2a) Configure the tape output Controller by setting the following:

- From the *Setup* menu, reset Count Stop to desired amount.
- From the *Setup* menu, reset Present Count to zero.
- From the *Setup* menu, select the desired carrier tape pitch from the pitch selection menu. The pitch selection choices are 4, 8, 12, 16, 20, 24, 28, 32, and other.
- From the *Advance* menu, set the number of pockets to advance to 1.
- From the *Speed* menu, set the advance speed from 40 to 100 depending on the carrier tape width and device size. Smaller devices and narrower tape widths run best with slower speeds, in the range 40 to 60. Higher speeds may cause the devices to be dislodged from the pockets or may cause the sprocket holes on the tape to rip out. A recommended speed is 60 to prevent carrier tape advance problems and breakage.
- From the *Jog* menu, jog the carrier tape forward to line up the pocket with the PNP head.
- From the *Mode* menu, press option 3 (PSA) for pressure seal cover tape.
- From the *Run* menu, place the unit in the run mode. The run window displays all the selected setup parameters.

2b) Verify all settings for accuracy.

3. Inspect the cover tape application rollers—

Visually inspect the cover tape application rollers (see *Figure 5-76*) for build up of adhesive from the cover tape.

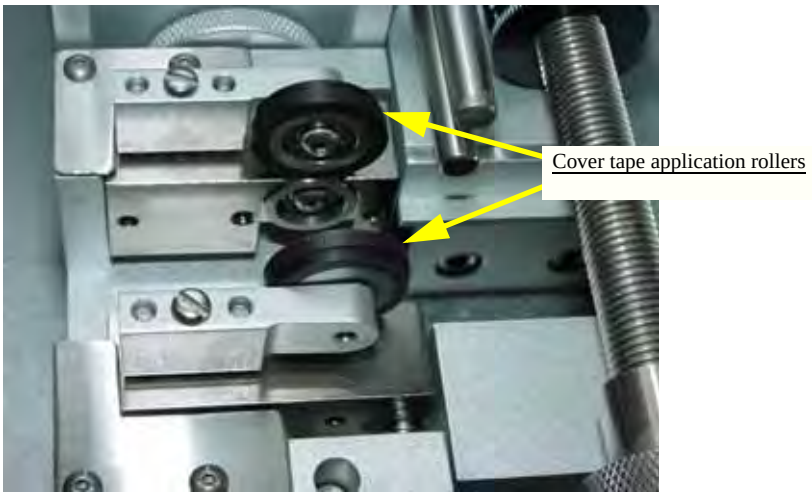


Figure 5-76—Cover tape application rollers

4. Inspect drive sprocket idler and rubber O-rings—

Visually inspect the drive sprocket top idler and rubber O-rings for any build up of adhesive from the cover tape. See *Figure 5-77*.

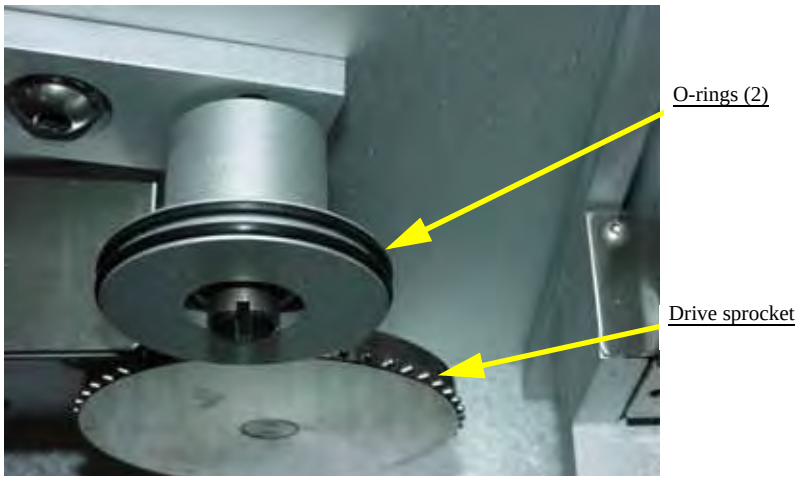


Figure 5-77—Idler pressure wheel and O-rings

5. Remove adhesive build up from drive sprocket idler and O-rings—

5a) Gently remove the O-rings from the drive sprocket idler. Avoid damage to the O-rings.

5b) Using a shop towel damp with alcohol or a commercial alcohol wipe, remove all adhesive from O-rings.

CAUTION: *Wipe gently to avoid breaking the O-rings.*

5c) With the O-rings removed from the idler, clean the top idler using the shop towel and alcohol or alcohol wipes.

5d) Once all adhesive has been removed from the O-rings and idler wheel and the alcohol has dried, reinstall the O-rings on the top idler wheel.

6. Remove adhesive build up from the cover tape application rollers—

6a) Using a shop towel and alcohol or alcohol wipes, clean the adhesive build up from the cover tape application rollers. Hold the alcohol towel or wipe on the roller and spin the roller until the entire roller has been cleaned.

6b) Repeat procedure for the other application roller.

7. Check pressure of cover tape application roller—

7a) Advance the carrier tape with the cover tape through the application rollers using the manual advance pedal. Advance enough pockets to correctly align the cover tape on the carrier tape.

7b) Perform a "peel back" test by peeling the cover tape from the carrier tape. Note how well the cover tape adhered to the carrier tape. Perform a "twist" test by giving the tape a slight twist. Note if the cover tape detaches from the carrier tape.

7c) If either test produces loose cover tape, increase the application roller pressure by screwing in on the roller mounting screw and spring assembly.

7d) If both tests look acceptable, visually inspect the sealed carrier tape for adhesive that may have been squeezed out during application. If adhesive is visible, the application roller pressure is too high. Decrease the

application roller pressure by screwing out on the roller mounting screw and spring pressure assembly.

The cleaning procedure for the pressure sealing tape output system is now complete.

Troubleshooting and Adjusting Sensors in the Tape Output System

The tape output system contains sensors that detect these fault conditions:

- A device is jammed in the carrier tape (Device Jam Sensor)
- No cover tape is on the reel (Cover Tape Sensor)
- Carrier tape is not properly inserted in the Carrie Tape Input Guide (Carrier Tape Sensor)
- A pocket in the carrier tape is empty (Pocket Empty Sensor)

When the AH500 software displays the error message “Tape Out Unit,” one of the tape output system sensors has been triggered. The most likely sensors to trigger are the Device Jam and Carrier Tape sensors. See *Figure 5-78*.

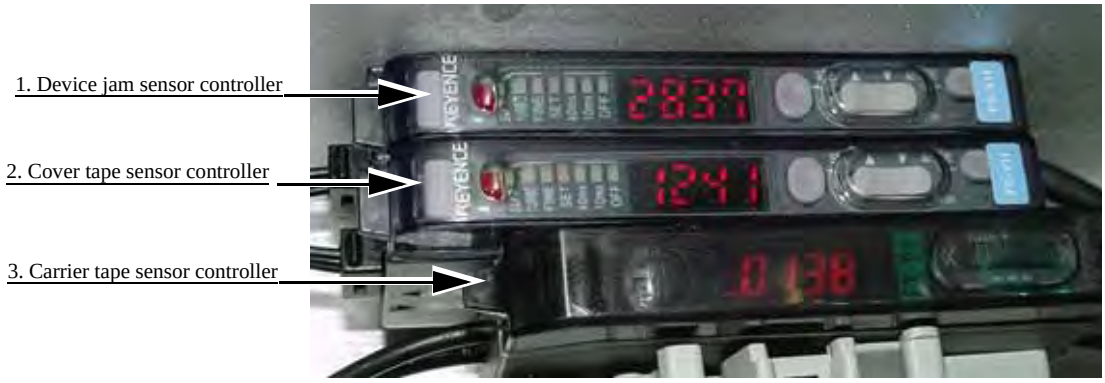


Figure 5-78—Sensor controllers

Device Jam Sensor and Controller

The Device Jam sensor detects when a device is not properly seated in the pocket. This sensor is located on the Adjustable Loading Track immediately before the carrier tape enters the Carrier Tape Guide.

When the Device Jam sensor is triggered, an orange LED is illuminated in the Device Jam Sensor Controller (**1** in *Figure 5-78*).

Problem:

- Error message "Tape Out Unit" displays and an orange LED is illuminated in the Device Jam Sensor Controller.

Check this:

- ☞ Use a vacuum tool to seat the device in the carrier tape pocket.
- ☞ Re-seat the carrier tape in the Adjustable Loading Track.
- ☞ Use air to blow any debris out of the Device Jam sensor path.
- ☞ Adjust the Device Jam Sensor Controller. See below.

Adjusting the Device Jam Sensor Controller

1. Fiber optic cables—
Set the fiber optic cables by unscrewing the hex screw and rotating the cable until the light shines through and the LED value reads as high as possible (typically around 200).

2. Output Mode 1—
2a) There are two output modes: Output Mode 1 and Output Mode 2. Set to Output Mode 1 by turning the jog switch to the (+) or (-) side. The blinking cursor bar alternates between Output 1 and Output 2.
2b) Press the jog switch to Output Mode 1. Change it from "Lnon" to "Dnon" by turning the jog switch to either (+) or (-) side.

NOTE: *Lnon = Light ON and Dnon = Dark ON*

2c) Turn the mode selection switch to "SET." The current threshold value is displayed. Re-set the current threshold value to 90 by turning the jog switch to either (+) or (-) side to obtain the desired threshold value.
2d) Repeat Step 2a through Step 2c for Output Mode 2.

3. RUN—
When both Output Mode 1 and Output Mode 2 are set, set MODE switch to "RUN." For normal operation, both fault LEDs should be off.

Cover Tape Sensor and Controller

The Cover Tape sensor detects when there is no cover tape on the reel. When the Cover Tape sensor is triggered, a red LED is illuminated in the Cover Tape Sensor Controller (**2** in *Figure 5-78*).

Problem:
- Error message "Tape Out Unit" displays and red LED is illuminated in the Cover Tape Sensor Controller.

Check this:
- ☞ Replace empty cover tape reel.
- ☞ Adjust the Cover Tape Sensor Controller if the reel still contains cover tape. See below.

Adjusting the Cover Tape Sensor Controller

1. Ensure that the Output Selector Switch is set to D.ON.
2. Install a roll of cover tape on the unit.
3. Press and release the "SET" button. The Calibration Indicator, [SET] LED bar, will light up.
4. Remove the cover tape.
5. Press and release the "SET" button.

NOTE: *If an error occurs or the sensor fails to detect the cover tape after switching from a different type of cover tape, then the Cover Tape sensor may need to be re-taught to sense that particular type of cover tape.*

Carrier Tape Sensor and Controller

The Carrier Tape sensor detects when carrier tape is not inserted in the Carrier Tape Input Guide. When the Carrier Tape sensor is triggered, a red LED is illuminated on the Carrier Tape Sensor Controller (**3** in *Figure 5-78*).

Problem:

- Error message "Tape Out Unit" displays and the red LED on the Carrier Tape Sensor Controller is illuminated.

Check this:

☞ Replace the carrier tape reel if it is empty.

☞ Adjust the Carrier Tape Sensor Controller if the reel still contains carrier tape. See below.

Adjusting the Carrier Tape Sensor Controller

1. Set switches—

Ensure that the switches are set as shown:
MODE = D.ON
ALM = OUT
TIMER = OFF

2. Fiber optic sensor—

2a) Adjust the open end of the fiber optic sensor cable so that the green LED illuminates when the carrier tape is present.

2b) Adjust the open end of the fiber optic sensor cable so that the red LED illuminates and a buzzer sounds when carrier tape is not present.

Pocket Empty Sensor

The Pocket Empty sensor verifies that a pocket is empty as the carrier tape approaches the Tape Output PNP head location. The sensor shines a fiber optic light through the small hole in the center of the pocket. If the fiber optic light is blocked, for example by a device in a pocket, the sensor is triggered. There is no controller that displays this condition.

Problem:

- Error message "Tape Out Unit" displays and no other sensor has triggered an LED.

Check this:

☞ Adjust the Pocket Empty Sensor. Using an Allen wrench, loosen the two cap screws that hold the sensor bracket. Move the bracket in the Y-axis direction until the fiber optic light shines through the hole in the center of the pocket. Tighten the screws.

(Optional) Label Printing System

For detailed information on completing regular maintenance, replacing assembly units, making mechanical alignments and adjustments, and troubleshooting the label printing system, see the ***Apollo 1 Service Manual*** that came with your label printing system.

(Optional) Automatic Tray Feeder

The TF20 automatic tray feeder is designed to keep a tray from stopping too abruptly when it reaches the end of the conveyor nearest the PS288 or the end of the conveyor nearest the TF20. (Abrupt stops can cause devices to move on the tray.) You may need to adjust the conveyor speed if trays are stopping too abruptly.

Conveyor Speed Adjustments

Two sensors control the speed of the conveyor.

- The "Return to Stack" sensor is located near the end of the conveyor closer to the TF20 stack. When the leading edge of the tray passes this sensor, the conveyor shifts to slow speed operation.
- The “Place in PS288” sensor is located near the end of the conveyor closer to the PS288. When the leading edge of a tray passes this sensor, the conveyor shifts to slow speed operation.

When either sensor is triggered, the conveyor shifts to slow speed operation. The speed of the conveyor is adjusted with the potentiometers shown in *Figure 5-79*.

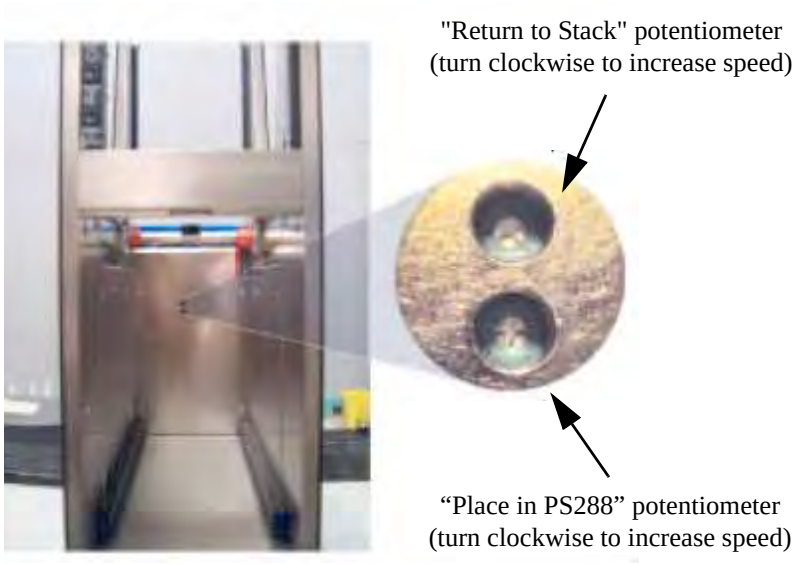


Figure 5-79—Conveyor speed potentiometers

To adjust conveyor speed:

1. Press the **Stop** button on the TF20.

2. Adjust “Return to Stack” or “Place in PS288” potentiometer:
   - To **increase** conveyor speed, turn potentiometer **clockwise**
   - To **decrease** conveyor speed, turn potentiometer **counterclockwise**

3. Press the **Reset** button on the TF20.

Appendix A

I/O Controller LED Status

I/O Controller LED Status - by Port Number

ON = LED turned On (i.e. lit green) - indicates logical bit value of 0 (zero).

Input Ports - Sensor signals coming into the I/O Controller (as sensed by I/O Controller)	
Port-1	
Bit-0	PNP Head Vacuum Sensor. ON = sensed device on pickup tip.
Bit-1	Socket Opener - UP. ON = Socket Opener is in the UP position
Bit-2	Socket Opener - down. ON = Socket Opener down, socket is pressed open.
Bit-3	Tray #1 Present. ON = Tray-1 Present - OR Tray Feeder #1 READY
Bit-4	Tray #2 Present. ON = Tray-2 Present - OR Tray Feeder #2 READY
Bit-5	Tray #3 Present. ON = Tray-3 Present
Bit-6	Safety Shield/Door Interlocks. ON = Doors Closed, OFF = Door Open. Machine will NOT run.
Bit-7	Not Used
Port-2	
Bit-0	ON = Auto Tray Feeder #1 ERROR-1
Bit-1	ON = Auto Tray Feeder #1 ERROR-2
Bit-2	ON = Auto Tray Feeder #2 ERROR-1
Bit-3	ON = Auto Tray Feeder #2 ERROR-2
Bit-4	Not Used
Bit-5	ON = Device present on Cup#2, Laser Vacuum Sensor -SV14, Cup#2 on Laser Transfer Shuttle.
Bit-6	Labeler Sensor
Bit-7	ON = Device present on Cup#1, Laser Vacuum Sensor -SV12, Cup#1 on Laser Transfer Shuttle.
Port-3	
Bit-0	ON = Input Shutter Piston, Open - Shutter should NOT be covering Laser Bay
Bit-1	ON = Input Shutter Piston, Closed - Shutter should be covering Laser Bay
Bit-2	Label Sensor - Limited Use, only on some units
Bit-3	Ink Marker Door Closed - Limited Use, only on some units
Bit-4	Labeler (Apollo) Finished Marking. 0 = On Not Ready, 1 = Off = Ready for Marking
Bit-5	ON = Output Shutter @ Tape Out Unit Closed
Bit-6	ON = Output Tape Ready. (V-Tek) Taping unit Ready
Bit-7	ON = Output Tape Error, could be due to one of the 5 sensors on the Tape-Out Unit
Port-4	
Bit-0	ON = Input Shutter Closed - Door Sensor. Door Closed and sensed by Opto Sensor on side.
Bit-1	Air Flow Sensor for FUMEX filter. ON indicates insufficient air flow -> Replace Filter(s)
Bit-2	Laser System Ready. ON indicates Device under Laser Head and ready to be marked
Bit-3	Not Used
Bit-4	Not Used
Bit-5	Not Used
Bit-6	Not Used
Bit-7	Laser Done Marking. O =On, Laser has finished marking the device. Device ready to proceed.

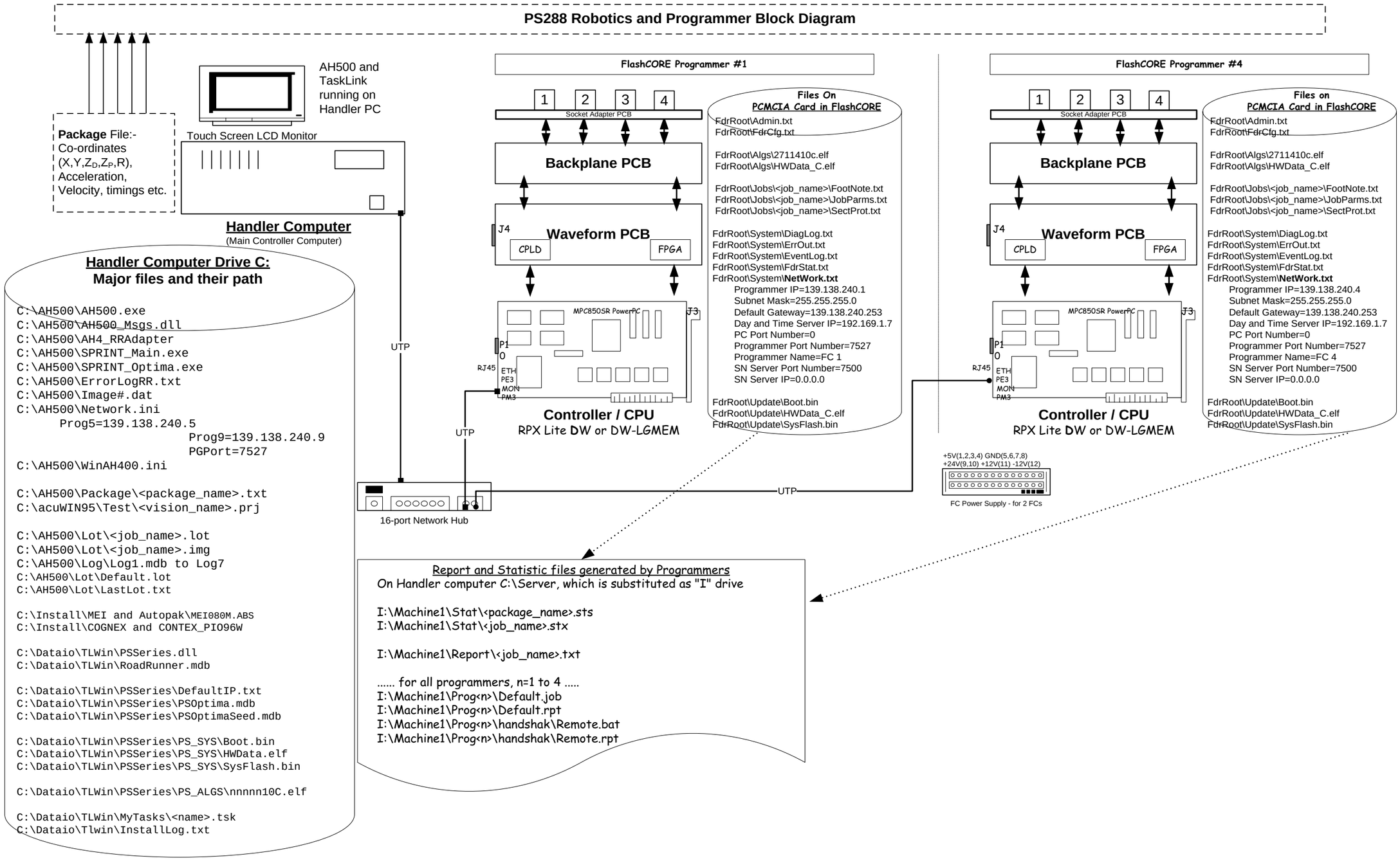
I/O Controller LED Status - by Port Number

ON = LED turned On (i.e. lit green) - indicates logical bit value of 0 (zero).

Output Ports - Signals generated by I/O Controller (commands from I/O Controller)	
Port-5	
Bit-0	ON = Socket Opener Down command (via Solenoid 1SV1)
Bit-1	ON = Turn on Pickup Head Vacuum @ PnP (SMAC) head (via Solenoid 1SV2)
Bit-2	ON = Turn on Pickup Head Blow-off @ PnP (SMAC) head (via Solenoid 1SV3)
Bit-3	ON = Turn On Vacuum on shuttle pedestal, Cup-1 (Laser Vacuum - 2SV4)
Bit-4	ON = Turn On Vacuum on shuttle pedestal, Cup-2 (Laser Vacuum - 2SV2)
Bit-5	ON = Turn on Blow-off on shuttle pedestal, Cup-1 (via 2SV1)
Bit-6	ON = Turn on Circuit Breaker K1 (Main Contractor)
Bit-7	ON = Turn on Blow-off on shuttle pedestal, Cup-2 (via 2SV3)
Port-6	
Bit-0	Synrad Laser Key
Bit-1	Tray Transfer Cylinder
Bit-2	Tray Position-1 Stop Cylinder
Bit-3	Auto Tray Feeder #1 INDEX command / signal
Bit-4	Auto Tray Feeder #2 INDEX command / signal
Bit-5	Tray Output Support Cylinder
Bit-6	Tray Output Singulate Cylinder
Bit-7	Part Ready at Tape-Out
Port-7	
Bit-0	Output Shutter Piston @ Tape-Out Unit.
Bit-1	Inkmark Vacuum. O = On, Turn On Vacuum on shuttle pedestal
Bit-2	Inkmark Blow-Off. O = On, Turn on Blow-off on shuttle pedestal
Bit-3	ON = Engage Tray Clamps (via Solenoid 1SV7)
Bit-4	Laser Mark Command. ON = Mark the device Command to Synrad Laser System
Bit-5	Input Shutter Piston Command - 0 = On Close Shutter. Tied to Port-3 Bit-1
Bit-6	Label Apply Command - tied to "Applicator" button in AH400
Bit-7	ON = Advance Input Tape Feeder unit by one device
Port-9	
Bit-0	Over Head Lamps - Gantry Light - Not Used
Bit-1	ON = Turn On Tube Feeder Vibratory Motor-1 (Input)
Bit-2	ON = Turn On Tube Feeder Vibratory Motor-2 (Output)
Bit-3	Tube Feeder Vibrator Motor-3 - Not Used
Bit-4	Vision Power - Not Used
Bit-5	Tube Feeder Vibrator Motor-4 - Not Used

Appendix B

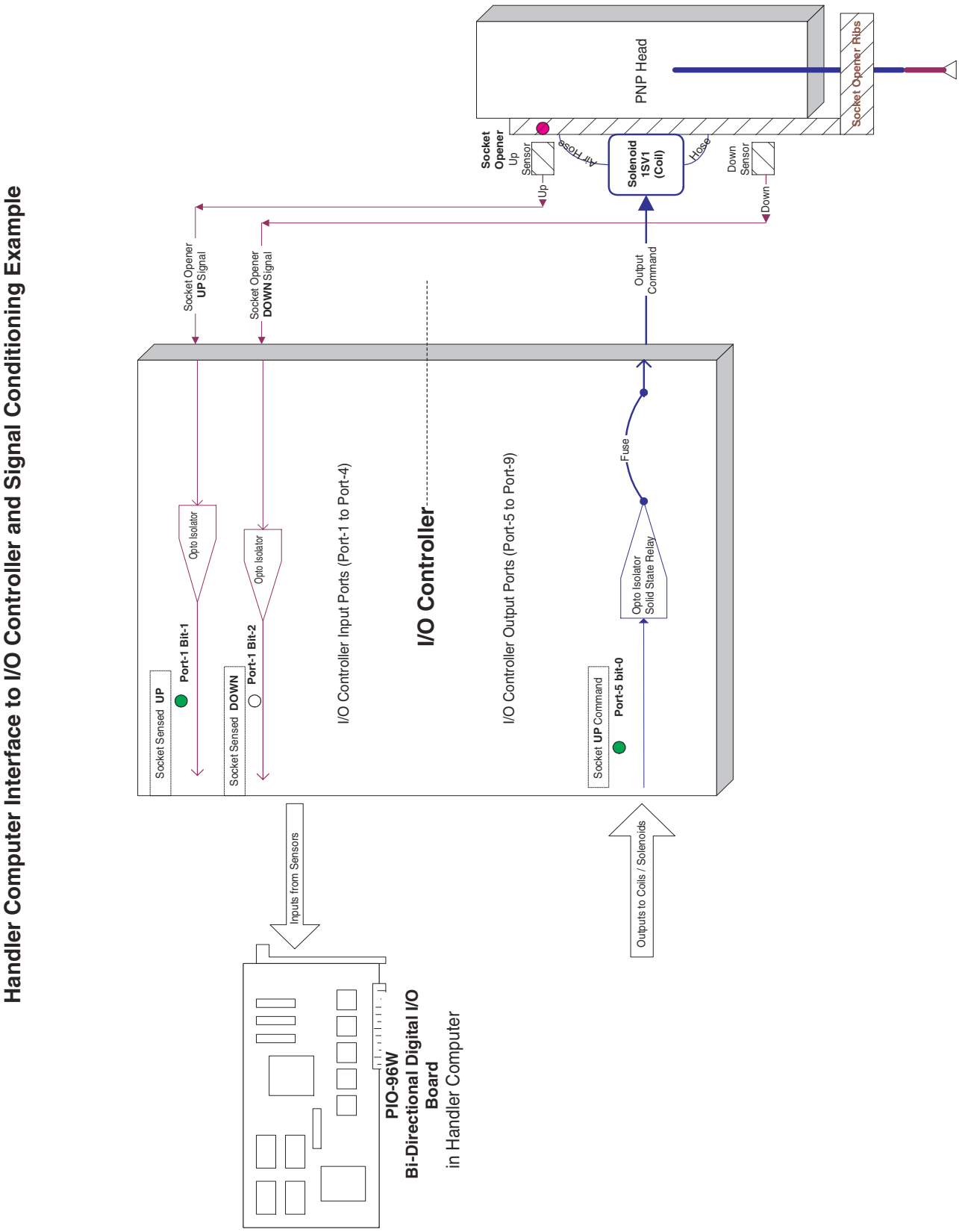
PS288 Robotics and Programmer Block Diagram


PS288 Robotics and Programmer Block Diagram
AH500 and TaskLink running on Handler PC
Touch Screen LCD Monitor
Package File:- Co-ordinates (X,Y,ZD,ZP,R), Acceleration, Velocity, timings etc.
Handler Computer
(Main Controller Computer)
UTP
Handler Computer Drive C:
Major files and their path
C:\AH500\AH500.exe
C:\AH500\AH500_Msgs.dll
C:\AH500\AH4_RRAdapter
C:\AH500\SPRINT_Main.exe
C:\AH500\SPRINT_Optima.exe
C:\AH500\ErrorLogRR.txt
C:\AH500\Image#.dat
C:\AH500\Network.ini
Prog5=139.138.240.5
Prog9=139.138.240.9
PGPort=7527
C:\AH500\WinAH400.ini
C:\AH500\Package\<package_name>.txt
C:\acuWIN95\Test\<vision_name>.prj
C:\AH500\Lot\<job_name>.lot
C:\AH500\Lot\<job_name>.img
C:\AH500\Log\Log1.mdb to Log7
C:\AH500\Lot\Default.lot
C:\AH500\Lot\LastLot.txt
C:\Install\MEI and Autopak\MEI080M.ABS
C:\Install\COGNEX and CONTEX_PIO96W
C:\Dataio\TLWin\PSSeries.dll
C:\Dataio\TLWin\RoadRunner.mdb
C:\Dataio\TLWin\PSSeries\DefaultIP.txt
C:\Dataio\TLWin\PSSeries\PSOptima.mdb
C:\Dataio\TLWin\PSSeries\PSOptimaSeed.mdb
C:\Dataio\TLWin\PSSeries\PS_SYS\Boot.bin
C:\Dataio\TLWin\PSSeries\PS_SYS\HWData.elf
C:\Dataio\TLWin\PSSeries\PS_SYS\SysFlash.bin
C:\Dataio\TLWin\PSSeries\PS_ALGS\nnnnn10C.elf
C:\Dataio\TLWin\MyTasks\<name>.tsk
C:\Dataio\Tlwin\InstallLog.txt
FlashCORE Programmer #1
1
2
3
4
Socket Adapter PCB
Backplane PCB
J4
Waveform PCB
CPLD
FPGA
MPC850SR PowerPC
J3
P1
0
RJ45
ETH
PE3
MON
PM3
Controller / CPU
RPX Lite DW or DW-LGMEM
Files On PCMCIA Card in FlashCORE
FdrRoot\Admin.txt
FdrRoot\FdrCfg.txt
FdrRoot\Algs\2711410c.elf
FdrRoot\Algs\HWData_C.elf
FdrRoot\Jobs\<job_name>\FootNote.txt
FdrRoot\Jobs\<job_name>\JobParms.txt
FdrRoot\Jobs\<job_name>\SectProt.txt
FdrRoot\System\DiagLog.txt
FdrRoot\System\ErrOut.txt
FdrRoot\System\EventLog.txt
FdrRoot\System\FdrStat.txt
FdrRoot\System\NetWork.txt
Programmer IP=139.138.240.1
Subnet Mask=255.255.255.0
Default Gateway=139.138.240.253
Day and Time Server IP=192.169.1.7
PC Port Number=0
Programmer Port Number=7527
Programmer Name=FC 1
SN Server Port Number=7500
SN Server IP=0.0.0.0
FdrRoot\Update\Boot.bin
FdrRoot\Update\HWData_C.elf
FdrRoot\Update\SysFlash.bin
FlashCORE Programmer #4
Files on PCMCIA Card in FlashCORE
Programmer Name=FC 4
UTP
16-port Network Hub
+5V(1,2,3,4) GND(5,6,7,8)
+24V(9,10) +12V(11) -12V(12)
FC Power Supply - for 2 FCs
Report and Statistic files generated by Programmers
On Handler computer C:\Server, which is substituted as "I" drive
I:\Machine1\Stat\<package_name>.sts
I:\Machine1\Stat\<job_name>.stx
I:\Machine1\Report\<job_name>.txt
..... for all programmers, n=1 to 4 .....
I:\Machine1\Prog<n>\Default.job
I:\Machine1\Prog<n>\Default.rpt
I:\Machine1\Prog<n>\handshak\Remote.bat
I:\Machine1\Prog<n>\handshak\Remote.rpt

Appendix C

Handler Computer Interface to I/O Controller and Signal Conditioning Example

Handler Computer Interface to I/O Controller and Signal Conditioning Example



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