PSV7000

Owner's Manual

Automated Programming and Handling

Snapshot of Features
page 1-2

Specifications
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Setting Up Security
page 3-6

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page 4-2 & page 4-63

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We are interested in your comments. Please e-mail: userdocs@dataio.com

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Preface

This chapter covers

- *Using this Manual* which includes safety symbols and symbols for specific equipment.
- Contact information
- Service information.

Using This Manual

Knowing the conventions used in this manual helps make it easy find information, as well as to make the PSV7000 machine easy-to-use and keep the operator safe.

Warnings and Cautions

Special paragraphs with red lines are safety warnings as follows:

Definition of a Warning.

WARNING: A warning message like this has red text and calls your attention to potentially hazardous situations and practices that might injure people or cause serious monetary loss.

Definition of a Caution.

> CAUTION: *A caution message like this has black text and calls your attention to potentially hazardous situations and practices that <u>might damage equipment.</u> The potential loss is not as serious as a warning.*

Safety Symbols

Safety symbols in this manual mean this:

—Crush Point (Pinch Point) Warning
— Crush (punto de pellizco) ADVERTENCIA
— Crush (Prise Punkt) Warnung

—Electric Shock Warning
— ADVERTENCIA de descarga eléctrica
— Elektroschock Warnung

—General Hazard Warning
— ADVERTENCIA de peligro general
— General Hazard Warning

—Noise Warning; may be over 80 db
— ADVERTENCIA de ruido; puede ser más de 80 decibeles
— Lärm-Warnung; möglicherweise mehr als 80 Dezibel

—Eye Hazard Warning
— ADVERTENCIA de peligro del ojo
— Auge Hazard Warning

—Collision Warning
— ADVERTENCIA de colisión
— Collision Warning

—Laser Hazard Warning
— ADVERTENCIA de peligro del laser
— Laser-Hazard Warning

—Compressed Air Warning
— ADVERTENCIA de aire comprimido
— Druckluft-Warnung

—Electrostatic Discharge Warning (ESD)
— ADVERTENCIA de descarga electrostática
— Elektrostatische Entladung Warnung

Symbols for Specific Models & Options

The following symbols appear in the side bar next to paragraphs or procedural steps that are limited to a specific model or piece of optional equipment. If the symbol is next to a heading, the entire content under that heading is limited to the equipment indicated.

This symbol means . . .	. . . adjacent information is limited to this optional equipment:
3D Insp.	3D Lead Inspection System
	Only Tape Output Systems
	Data I/O Auto-Tray Feeder
	Fiber Laser Marking System.
Tubes	Vibratory Tube Feeder System
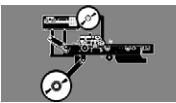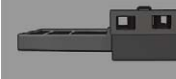
Precautions for Safe Operation

PSV7000 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 are ignored.**

Precaution List

WARNING:

Pinch hazard. The E-Stop does not turn off air. Socket Actuators can still move down when an E-Stop is pushed— and even when Safety doors, are open.

Use caution.

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

General Precautions

☞ Do not use the PSV7000 System for any purpose other than its **intended use**.

☞ Personal injury could be caused from h**igh leakage electrical current** from the main power cable. An Earth (ground) connection is essential before connecting power.

☞ Do not operate the system if the **safety doors and shields** are not in their normal operating positions.

☞ Do not operate the system when any of the **cabinet panels** (sheet metal) are removed.

☞ Do not operate the PSV7000 System unless you have been thoroughly trained and have r**ead and understand the instructions in this manual** (or the Operator's Manual), particularly those that describe the system's safety features (*Safety Systems on page 1-4*).

☞ **Do not disable** or attempt to defeat any of the **safety features** of this system. Serious personal injury and equipment damage can occur if any safety systems are disabled. If you suspect that a safety feature of the system is damaged or malfunctioning, stop using the PSV7000 immediately and contact your local Data I/O Support representative.

☞ Do not place any part of your body near **moving machine parts**.

☞ If **manually moving the gantry or PNP head**, only push or pull on the triangular bracket on the left side of the head and only after the AH700 Application is closed.

Repair Precautions

☞ Only **qualified personnel** trained by Data I/O should install, maintain, repair, or troubleshoot the PSV7000 Systems.

☞ 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 servicing**, replacing components, or adjusting components.

☞ Disconnect the **external air** before servicing pneumatic parts.

Optional Media and Equipment Precautions

☞ Use extra caution when using the **Tape Input module (feeder) or the Tape Output module** options**.** The PSV7000 safety doors do not fully enclose them. It is possible that hands, hair, or loose clothing could get caught or pinched in these mechanisms.

☞ Read and heed the **laser vacuum filter disposal requirements** described later in this section (*Laser Safety on page 1-20*). Always dispose of any other hazardous or residual by-products of the production process in accordance with governing laws and regulations.

Jump Right In

Basic operating instructions are in a separate manual in hard copy format as well as PDF on the Handler computer.

Thanks for reading about the safety symbols, notes, and icons. If your PSV7000 System is already set up and you want to skip ahead:

Be safe —see *Safety Systems on page 1-4*

Where's the _____? —see *Machine Components on page 1-10*

How to run a job —see the separate PSV7000 Operator's Manual.

What if it stops? —see *Troubleshooting on page 4-44*

What info is needed when I request service? -see next page.

Contacting Data I/O

Contact Data I/O for technical assistance by visiting the Data I/O Web site and completing a Web form.

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

- Machine serial number
- TaskLink and AH700 software version numbers
- Detailed description of the problem you are experiencing
- The event log from the FlashCORE programmer site
- Error messages (if any)
- Device manufacturer and part number (if device related)

> *Note: For later versions of this manual, check our web site Technical Library.*

Data I/O Customer Support

The best way to contact technical support is by using our online form: at www.dataio.com click on the **Technical Support** button.

*Want to contact **Sales**?*
USA—
salesDIOAmerica
@dataio.com

China—
ChinaSales@dataio.com

Germany—
salesgmbh@data-io.de

Worldwide: www.dataio.com

Data I/O Corporation Redmond, WA USA 98052	Telephone: in USA: Fax: E-mail:	+1 425-881-6444 1-800-3-DATAIO +1 425-867-6972 support@dataio.com

China: www.dataio.cn

Data I/O Co. Ltd	E-mail:	support@dataio.com

Germany: www.dataio.de

Data I/O GmbH	E-mail:	support@dataio.com

Other Countries

Data I/O Customer Support offices around the world are staffed with factory-trained technicians to provide prompt, quality service. For warranty service, contact Data I/O Customer Support at the numbers listed at our Rep Search on our Web site.

To find your local Data I/O representative on our Web site, click **Technical support** > **Representative Search**.

http://www.dataio.com/en-us/contactus/representativesearch.aspx

Warranty Information

Data I/O Corporation warrants this product will be free from defects in materials and workmanship for one (1) year from delivery.

This warranty and any third party warranties 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.

Repair Service

After the warranty period expires, Annual Service Agreements are available. As the end of your warranty period approaches, our sales group will contact you with the Service Agreement options. Repairs to systems or sub-assemblies that are not on a service agreement will typically be charged for labor and material costs.

For more information or to order a Service Contract, call Data I/O Customer Support at the numbers listed — See "Contacting Data I/O" on page x.

Change of Address

If your address has changed, please notify Data I/O Customer Support via e-mail. This ensures that you receive information about product enhancements. Be sure to include the machine model and serial number.

Chapter 1
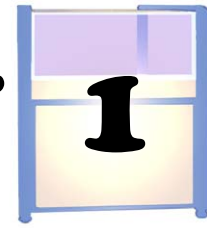
Introduction

This chapter describes PSV7000 and its components, software, safety and room considerations.

The Automated Programming System (PSV7000 System) is a versatile production programmer that handles and programs devices in traditional and fine-pitched packages. These include BGA, FPGA, µBGA, QFP, TQFP, CSP, TSOP, SSOP, SON, WSON, SOIC

Device technologies supported include NOR and NAND Flash, MicroControllers, Serial EEPROM, and the latest e-MMC memories.

Definition of terms:

The **PSV7000 System** refers to the machine, accessories, the software and, more generally, the interactions of all these parts. The **Machine** is used to mean the physical machine, not the software. For example, you might connect an air supply hose to the Machine, but change programming jobs on the PSV7000 System.

The modular design of PSV7000 creates flexibility, allowing you to optimize to the level of production required by your facility.

Snapshot of PSV7000

Flexible options for input & output: • static tray (shown), • automatic tray feeder, • tube, • tape; 2-10

Laser guided Device-position Sensor for precise device placement; 4-12

Light Tower displays machine status

Keyboard and Touch Screen monitor which displays real-time processes & online Help.

E-Stop button on front & back; 1-4

Supports Tape Feeder input (see Operators Manual) or Vibrator Tube Input; 2-18

ESD ground connection (front and inside workspace at back) 1-6

Uses FlashCORE programmer modules offering the latest industry technology

Support for laser marking option (far side); 2-29

Many software options such as the *Automotive Performance Pak*

Built-in mounts for the optional Tray Stacker and Tape Output Modules

Clear safety doors open (front and back)

Adjustable feet for leveling and wheels for relocating ease

Figure 1-1: Features of PSV7000. For a more detailed image with components labeled, see the Operators Manual. For component descriptions see *Component Descriptions on page 1-10*.

Setting the Language

Several other languages are available for the application interface. To change the language, edit the `C:\AH700\winAH400.ini` file as follows:

1. Find "Language Settings" section.
2. Remove the semicolon from the line for desired language.
3. Add a semicolon to the line that initially didn't have one.

```
;-------- Language Settings--------------------------
;Default language is English 1000
;LangId=0    ;German
LangId=1000  ;english
;LangID=2000french
;LangID=3000spanish
;LangID=4000danish
```

Figure 1-2: Sample from the winAH400.ini file. The language in this sample is set to English.

4. Restart AH700 Software for the changes to take effect.

System Description

The PSV7000 System moves devices from input media through a programming and optional marking process to output media for delivery to the next phase of the production process. The PSV7000 System 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 software (AH700) running on the system's Handler Computer direct the PSV7000 System to perform a series of processes, including automatic handling, programming, marking, and placement of devices to the output media of choice.

Safety Systems

The PSV7000 System has several safety systems to prevent personal injury and system damage. These systems include E-Stops and safety doors. If your system has a Laser Module, it comes with a fume extractor.

Emergency Stop (E-Stop) Buttons

Two large, red Emergency Stop buttons are located near the top of the PSV7000 System, one on either side of the machine. When an E-Stop button is pressed, the gantry stops moving immediately. See caution notice below.

Figure 1-3: Two Emergency Stop (E-Stop) buttons.

WARNING: Shock hazard! Pressing an E-Stop button removes power from the motion controller (gantry) only, and stops communication to the Laser Marking head. It does not remove electri-

cal power from PSV7000 or any optional equipment installed. Turn the main power OFF before opening metal access doors.

Pinch hazard! The E-Stop does not shut off air. Socket actuators can still move down and up.

Park Position:
The spot where the head stops when a job is paused or ended (near left side center).

Tool Position:
Near the front center for easy access to the PNP head.

Safety Door with Interlocks

During operation, when the high-speed PNP head is processing devices, the clear plastic doors at the workspace are closed to protect operators from injury. Both doors have a safety interlock which stops gantry movement if the operator forgets to first park the PNP head.

Normally, if the power is ON, the PNP head should be stopped in the *park* position or *Tool* position prior to opening a safety door.

Home Position...
the far, right corner of the workspace where the head travels to before each job is started.

WARNING: Possible collision hazard! The high speed and force of the gantry can seriously harm anyone working inside the workspace.

When working within the machine workspace, moving the PNP head must be the responsibility of only one qualified individual. All others must stay clear of the machine controls to prevent injury to that person.

Ensure that a job is Paused or Finished, or the system power is OFF prior to opening any safety doors.

WARNING: Shock hazard! Opening the safety doors stops motion of the gantry only. It does not remove electrical power from the machine or any optional equipment.

Turn the main power OFF for safety unless otherwise directed.

CAUTION: Possible product damage! Do not use solvents such as acetone, lacquer thinner, mineral spirits, isopropyl alcohol, or any type of abrasive compound on the safety doors. These products will damage the safety door surfaces and ESD coating, and reduce visibility of the work area.

Electrostatic Discharge (ESD) Precautions

Devices (integrated circuits) are very sensitive to static, and could be damaged by unintended electrostatic discharge while being handled. The most effective 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 (Data I/O part number 440-0021-001+) connected to one of the grounding connections on the machine. The wrist strap should contain a 1–10 M-ohm current limiting resistor.

Handling Devices Safely

To prevent damage to device pins, use a vacuum tool, also called a vacuum tweezer, to pick up devices. The vacuum tool is designed to handle devices without damaging them.

⚠️ *CAUTION: Possible device pin damage! Do not touch devices with your hands or any implement other than the vacuum tool. Doing so could damage devices with fine-pitched leads.*

To pick up a device using the vacuum tools use an squeezable air bladder for suction. There are a variety of models, sizes and tips. Some tips are replaceable.

Figure 1-1: A Vacuum Tweezer: Data I/O PN 565-8000-001.

[Laser Marking only] Fume Extractor

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

Note: Refer to Laser Safety on page 1-20 for more information. For maintenance, see Laser Marking Fume Extractor on page 4-35.

Machine Axes

There's a glossary (just before the index) of terms related to programming with the PSV7000 System.

The PSV7000 System gantry operates on three primary axes: *X, Y, Z.* An additional axis, called the **R-axis** (*theta*), is used by the PNP head to change device orientation (rotation).
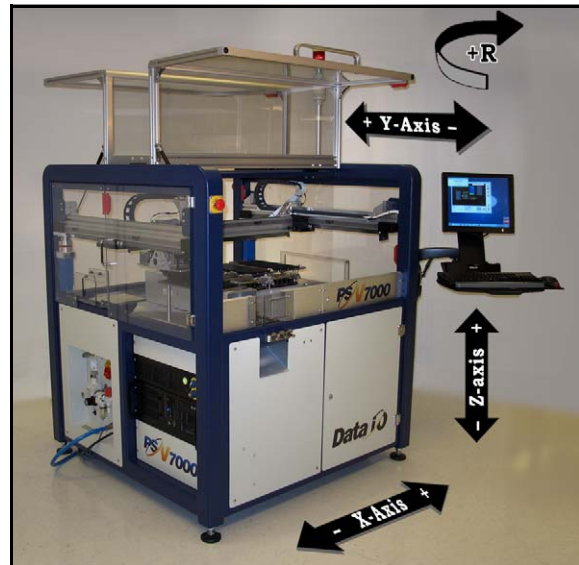
Figure 1-2: These axes describe motion direction on the PSV7000. The X-Y coordinate 0,0 is at the left front corner.

Basic Machine Functions

The PSV7000 System performs these basic operations when processing devices:

1.   Pick 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 into programming sockets in all cases except when **Ignore Programmers** is selected, in which case the head takes devices directly to a different media (repackaging only) or to the shuttle for marking only.

2.   Process devices—

Devices in the programming sockets undergo any or all of the following processes as determined by the job. These processes are set in TaskLink.

- Continuity check
- ID check
- Erase
- Blank check
- Program
- Verify programming
- Read

- Illegal-bit check
- Functional verification operations
- Secure device
- Verify options such as voltage

(Optional) Inspect device leads—
The optional 3D Coplanar Inspection System detects bent leads on devices prior to further processing.

(Optional) Mark devices—
When available, devices that pass the programming and verification operations are marked at the Laser Module or moved to a Label Marker where they are marked for identification.

3. Load devices into the output media—

Devices are moved by the PNP head to output media: trays, tubes, or tape. Devices that fail one of the programming processes are placed into the reject bin or reject tray.

Input and Output Options

PSV7000 System input and output options are: static tray (manual), tray feeder (automatic), tube, and tape.

Most combinations of input and output options may be used. For example, the PSV7000 System can be configured with input as static tray and output as taped. However, the use of a tray feeder precludes the use of static trays and vice versa.

Manuals for Optional Equipment

The manuals that came with any optional equipment on your system contain additional, more in-depth information. Some of the manuals came in hard copy format with your PSV7000 System. Others are PDFs installed on the Handler computer.

Figure 1-3: A few of the Optional equipment manuals, from left to right: 3D Inspection System, Tiger Fume Extractor, Laser Marker, Tape Output Module.

PSV7000 Specifications

Specifications are without optional equipment.

FACILITIES	
Supply Air Pressure	clean, dry, oil-free air at 5.5–8.2 Bar (551–827 kilopascals) (80–120 PSI)
Air Flow	85 liters/minute (3 SCFM) constant
AC Input Voltage	208–230 VAC, single phase
AC Input Frequency	50–60 Hz
AC Input Power (max)	15 Amps (with all options)

PSV7000 DIMENSIONS	
Length (including monitor)[1]	178 cm (70 inches)
Width (including monitor)[1]	178 cm (70 inches)
Height: machine (doors closed) then add [light tower]	150 cm (59 inches) + [48 cm, 19 in.]
Weight (no optional equipment)	227 kg (500 lbs)

ENVIRONMENT	
Operating Temperature	+13° to +30° C (+55° to +86° F)
Relative Humidity	35% to 90% non-condensing
Sound level	≤ 80 dB (without tube vibrators)

OTHER	
Handler PC Operating System	Windows® 7 Professional, 64-bit
Monitor	15 inch LCD Touchscreen

[1] Since the monitor arm rotates, length and width dimensions can be adjusted inversely, up to 13 cm (5 inches). For example, if you subtract 13 cm from length, then add 13 cm to width.

Machine Components

The PSV7000 System has many components, or subassemblies, that work together. Refer to the figure below to locate primary components.

Component Descriptions

Light Tower

Allows monitoring the status of the PSV7000 System from a distance while the system is processing devices. See *Light Tower Interpretation* in the Operator's Manual for a complete description of lamp 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 PNP head is responsible for moving devices to and from their respective stages within the workspace. It moves devices in four axes, *X, Y, Z* and **R**.

The PNP head uses different sized probe tips to accommodate the great number of device types that are available. See *Installing the Correct Probes* in the Operator's Manual. During operation, vacuum at each probe holds a device. Vacuum sensors detect whether or not a device is present on a probe tip.
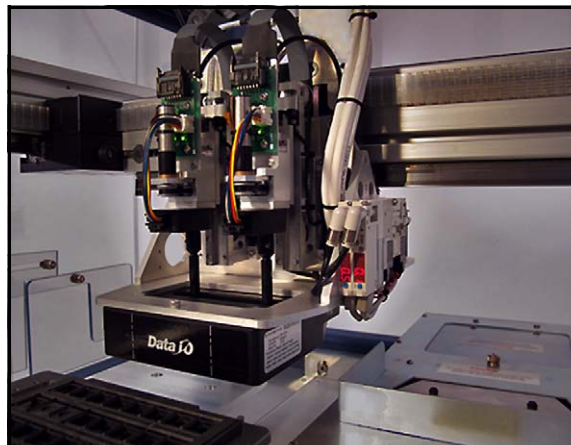
Figure 1-4: The PSV7000 PNP head.

The probes each pick up a device and move it to a programming socket. To place devices at target locations, a probe lowers, vacuum is turned off and blow-off air is momentarily turned on.

⚠️ *WARNING: Collision hazard! The gantry system and associated components move with high speed and force, and have the potential to cause great bodily harm. Do not bypass the safety interlocks or operate the with the safety doors open or removed.*

Programmers

Data I/O's FlashCORE III programming modules are one of the fastest programmer architectures available. FLASHCORE Programmer Modules in the PSV7000 include pneumatic socket actuation.
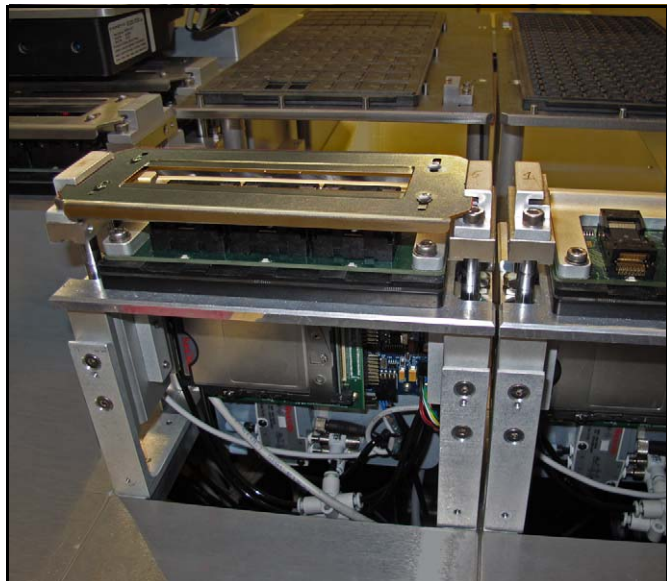
Figure 1-5: A FlashCORE Programmer with a Socket Adapter and Actuator Plate installed on it. The front cover plate is removed.

Device-Position (Vision) System

PSV7000 uses a *Laser-guided Device-position Sensor* attached to the PNP head for precise picking and placing.

Static Tray Mount

Using positioning pins and a magnet, JEDEC and non-JEDEC standard trays are held firm for the PNP head to pick devices and return them after processing.
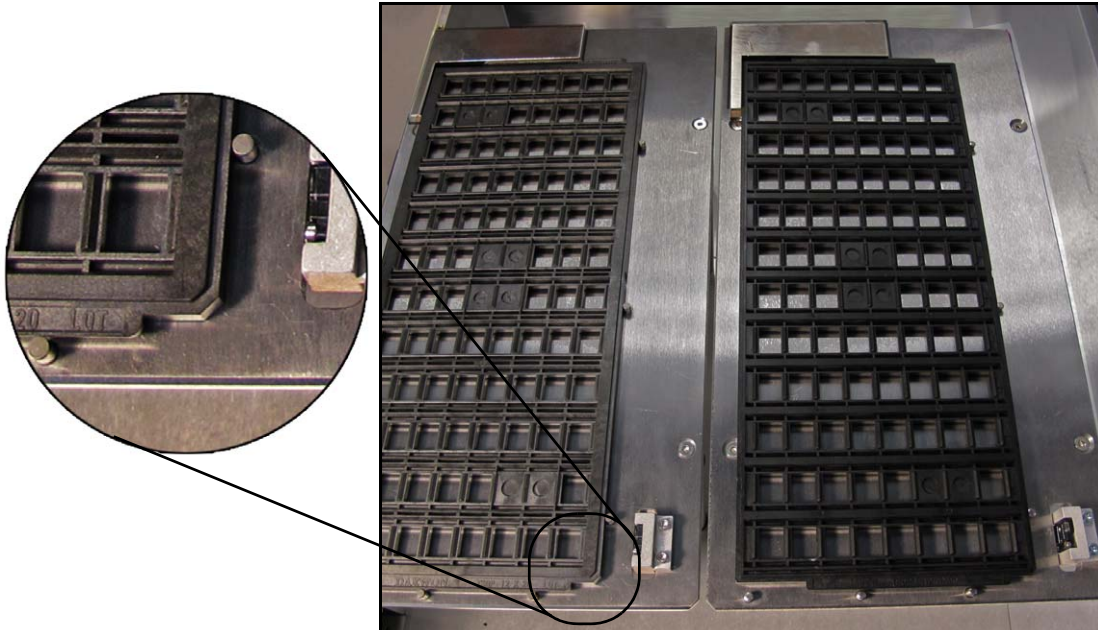
Figure 1-6: Static trays. Note that the beveled corner is at the near right, adjacent to the sensor.

Handler Computer

The on-board Handler computer hosts TaskLink software and the AH700 software, and monitors all sensors. The computer contains a CPU that runs Microsoft Windows 7 Operating System (at time of release).

⚠️ CAUTION: Possible machine damage! Adding software to the PSV7000 System can cause damage 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 if subsequent service is required.

Keyboard and Touch Screen

Both methods of input are available for operation. With the touch-screen, tap the screen with a finger only, not sharp objects such as pens or pencils.

*Note: Throughout this Owner's Manual, the term **click** is also used to mean **tap** when using the touch screen monitor.*

ESD Strap Connection

When operators plug an antistatic wrist strap into the ESD strap connection, it reduces the risk of damage to devices and Socket Adapters from electrostatic discharge (ESD).

Safety Doors

Designed to protect against injury and damage from the PNP head movement, the safety doors are an important safety feature, stopping the gantry when they are opened.

For more information see *Safety Door with Interlocks on page 1-5*.

Power Panel

The Power Panel is on the lower left side of the machine.

Connections

The Power Panel allows for the attachment of AC power and air. Optional connections:

- you can connect an ethernet cable for internet connection
- the Tape Output module connects here also.

Controls

Mounted on the Power Panel are the main power switch and the main air regulator and filter. There is a second regulator with a separate gauge for adjusting socket opener pressure. See *Adjusting the Socket Actuator Air Pressure on the Programmers on page 4-9*.

Figure 1-7: Power Panel on the left side of the machine.

Circuit Breakers

There is one circuit breaker and one toggle switch on the Power Panel.

Main Circuit Breaker	230 V 15 A

The toggle switch allows shutting off power to only the programmers.

Optional Equipment Descriptions

Numerous hardware options can be purchased with PSV7000, most of which are the various input and output modes. Some of the non-input/output options are 3D-Coplanarity, laser marking for devices, and output reel labelling.

(Optional) Labelling Device Reels

A Label Printer can be used to mark output reels for identification.
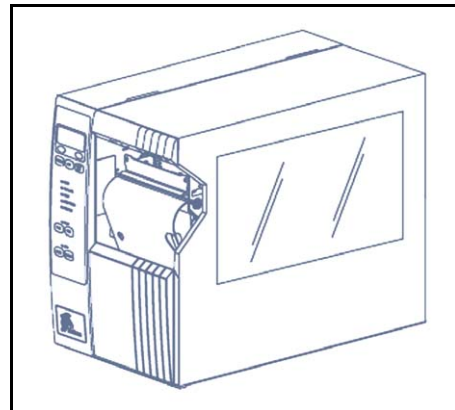
Figure 1-8: Paper Labeler. (Your labeler may look different.)

Laser Marking Devices

The Laser Marking System uses an ultra compact IR Laser to mark devices. The laser applies a customer-defined mark. *Lighter Software* is supplied with the laser for creating marking files. The laser marking system operates as a Class 1 laser system, with a class 4 embedded laser (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. Observe all warnings regarding laser usage.

For additional safety information, see *Laser Safety on page 1-20*.
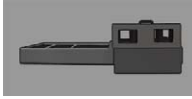
(Optional) Automatic Tray Feeder

Designed to automatically supply trays full of devices to the PSV7000 System, the Data I/O Dual Tray Feeder accepts up to twenty thin or thick JEDEC trays.

Figure 1-9: Data I/O Dual Tray Feeder.
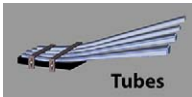
(Optional) Tube Input and Output Modules

The input tube holds blank devices and the output tube collects devices after programming. Vibration mechanisms keep devices sliding freely by gently vibrating the tubes to reduce the likelihood of device jams. Vibration adjustment controls are located on the front of the PSV7000 System.
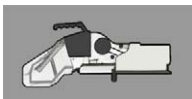
(Optional) Tape Input Module

The tape input module is a chip feeder which provides devices for programming. Each device is picked from a carrier tape pocket and placed into a programming socket.

(Optional) Tape Output Module

The tape output module, mounted on the Option Bay, uses a reel of empty carrier tape to hold devices after they are programmed. Programmed devices are placed into empty pockets on the carrier tape. The carrier tape advances through either a heat seal or pressure seal unit that applies cover tape to the carrier tape.

(Optional) 3D-Coplanarity Inspection

The 3D Coplanarity Inspection System checks for accurate 3-dimensional positions of all the leads on a integrated circuit and can detect lead burrs. The 3D System inspects devices after programming is complete to make sure device contacts are within customer-defined tolerance. The inspection system uses its own computer installed into PSV7000.

Software

Software resides in the Handler Computer. The primary log-on for the Handler Computer is Microsoft Client. The current operating system (at time of this publication) is Windows 7.

⚠ CAUTION: Possible machine damage! Adding software to the PSV7000 System can cause damage 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 if subsequent service is required.

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

Customer-Supplied Software

The PSV7000 System should never have other software added without consulting with Data I/O Customer Support.

Antivirus Software

Customer-supplied antivirus software can be installed on the Handler Computer.

⚠ CAUTION: Check with Data I/O Customer Support to ensure that your software is compatible with the programming system, otherwise the warranty may be voided. Ensure that the antivirus software does not scan during a job run.

Statistical Process Control Software

Customer-supplied Statistical Process Control software can be installed on the Handler Computer. See *Statistical Process Control Software on page 3-15* for more information.

TaskLink

TaskLink™ for Windows® is Data I/O's versatile application for creating jobs to run on the PSV7000 System. TaskLink resides on the Handler Computer.
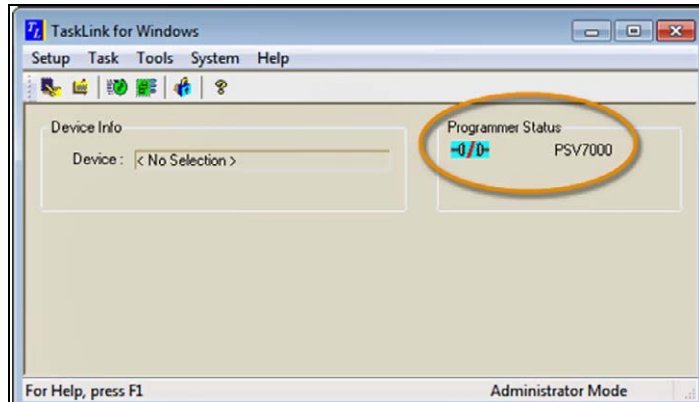
Figure 1-10: TaskLink's main window displays the selected programming system. Jobs created or edited will be for this system.

TaskLink online Help is available by clicking **Help** > **Help Topics**. It offers procedural steps as well as general information.
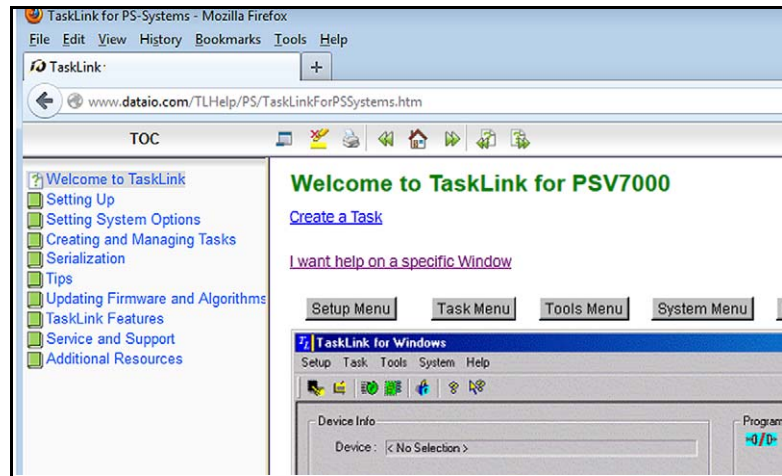
Figure 1-11: TaskLink online Help. It includes update instructions.

Updates and Algorithm Support

Updates to TaskLink (includes algorithm updates) are generally acquired through our APS Agreement (Annual Programmer Support). See *APS Agreement* on our Web site under the SUPPORT tab. For more information, see TaskLink online Help.

AH700 Application

The presence of some features are determined by the winAH400.ini file.

Data I/O's Automated Handler software is a Microsoft® Windows®-based application for setting up and programming integrated circuits (devices) on PSV7000 Systems. It offers a selection of many PSV7000 System options such as input/output configurations, labeling options, and statistical feedback methods. The AH700 resides in the Handler Computer.

For updates to AH700 Software see Software and Firmware on our web site under the SUPPORT tab. Then look for PSV7000 under *Download the Latest Firmware*.

Figure 1-12: AH700 Start-up window.

Laser Software

The Laser software is a Windows®-based application that allows creating parameters required for laser marking jobs as well as initiating laser marking. This *Lighter Laser Editor* software is on the Handler computer.

For more information about the Laser System, see *Setting Up the Laser Marking Module on page 2-29* and *(Optional) Creating a Laser Marking File on page 3-24*.

> **Note:** *The touch screen does not work while in Laser Computer mode.*

When the Laser Marking System is set up and initialized, it receives commands from the AH700 which starts the marking sequence.

Switching Between Computers

PSV7000 has a separate computer for the Laser software.

To switch between the Laser computer and the Handler computers:

1. On the keyboard, press **Scroll Lock** twice and then number **2** (or use the Up Arrow or Down Arrow key).

2. Start the *Lighter Engine* software.

Note: *To switch back to the Handler computer, press* **Scroll Lock** *twice and then number* **1**.

Laser Safety

The PSV7000 Laser option is designed in accordance with the following safety guidelines:

- A fume extractor traps marking fumes and other by-products of the laser marking operation.
- The system designed to comply with Complies with ANSI, IEC, and CDRH guarding standards.
- Refer to and follow laser and safety precautions in ANSI Z136.1 - 2007, 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: Possible eye and skin injury! The laser will fire even when safety doors are open. If equipped with Laser Marking, do NOT interfere with, or work on, the Laser Module while the Laser PC is ON and the Laser Enable selector is ON.

Room Considerations

When planning the space and environment for a PSV7000 machine installation, consider ventilation and access for maintenance and repair.

Ventilation

Summary— Regarding ventilation, the minimum room size for any PSV7000 System is 3 x 3 meters x 2.4 meters high (10 x 10 x 8 feet). However, access space for a some machines require a larger room; see *Access Space* below.

The PSV7000 System, and its optional components, such as a Labeler or Automatic Tray Feeder, contain mechanical components and electrical systems that generate heat and extremely low levels of particulate matter.

The air movement is intended to dissipate heat, odors, and other exhalation products from respiration such as carbon dioxide and water vapor.

The room should have 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/minute (CFM) (0.424 cubic meters/minute) 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.

However, because the PSV7000 System generates heat, an additional 85 CFM (2.40 meter^3/minute) is recommended, bringing the total room air exchange rate to 100 CFM (2.83 meter^3/minute).

In a room with dimensions of **10 feet by 10 feet, with an 8 foot high ceiling** (800 cubic feet of total interior area), 100 CFM would provide approximately six room air changes per hour. (Metric room: 3**.0 M x 3.0 M x 2.4 M high ceiling** equals 22.65 cubic Meters of total interior area).

Based on industrial hygiene monitoring performed during the worst case operating scenario of a PSV7000 System, this rate of air movement is sufficient to provide a safe and healthy work environment regarding air quality.

Access Space

The PSV7000 Machine should be located in a room with adequate space to allow easy access to all enclosures.

The intended area for installation must:

- allow at least one meter (39 inches) of clearance on all sides of the machine for opening access panels as well as repairing and replacing subassemblies,

- provide a solid foundation (for example, a concrete floor). The machine contains a fast-moving gantry with much mass. The area for it must be stable, solid, and mostly level prior to installation. If this is not achievable, consider installing the system at another location.

The table below lists recommended, minimum envelope size determined by the 1 meter access space required on each side:

Minimum Physical Envelope

*Note: The numbers below **do not** include ventilation requirements discussed in the previous heading <u>Ventilation</u>.*

	Machine Configuration ⇩	L (depth) x W (Y-axis x X-axis)	L (depth) x W + 1 m all sides for access
	PSV7000 only	2.4 m x 2.3 m	3.4 m x 3.3
	PSV7000 + Laser	2.4 m x 2.3 m	3.4 m x 3.3 m
	PSV7000 + Tray Feeder	2.4 m x 2.8 m	3.4 m x 3.8 m
	PSV7000 + Tape Out Module with large reel	2.4 m x 3.3 m	3.4 m x 4.3 m
	PSV7000 + Tray Feeder + Tape Out Module with large reel	2.4 m x 3.8	3.4 m x 4.8

For example, a PSV7000 System with a Data I/O Dual Tray Feeder requires a minimum physical area of 3.4 meters deep x 3.8 meters wide for easy access.
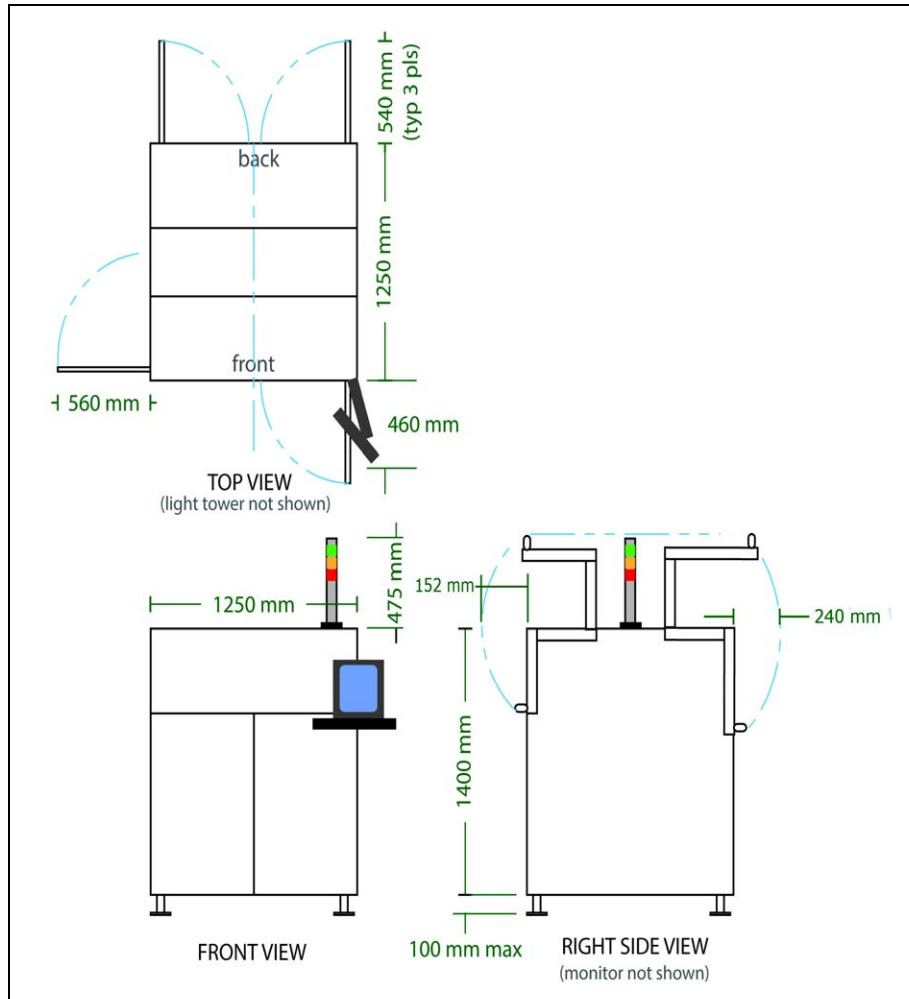
Figure 1-13: Maximum envelope of PSV7000 *without* optional equipment such as marking, Tape-In or Tape Output (to scale).

Chapter 2
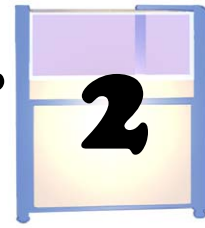
Setup

This chapter covers setting up the PSV7000 machine as well as setting up equipment on the machine. This includes optional equipment such as the Tape Output equipment, as well as the various device media choices for running jobs, such as setting up Static Trays or an Automatic Tray Feeder.

Machine Installation

Installation of the PSV7000 is performed by Data I/O service personnel or an authorized distributor. After the PSV7000 arrives, ensure that there is no damage to the exterior of the crate. Remove the PSV7000 Machine from the crate and inspect for damage that may have occurred during shipping. If no damage is evident, unbolt the machine from the shipping pallet.

For the intended area for PSV7000 installation see *Room Considerations* on page 1-21.

Leveling

When the PSV7000 is at the desired location, adjust the feet to level it.

⚠️ WARNING: Possible machine damage or personal injury! Instability such as vibrating, walking, or rocking, may occur if fewer than four of the installed feet make suitable contact with the floor, or if the leg locknuts are not tightened against the frame.

Only the adjustable feet provided on the PSV7000 Machine should be used for leveling. Do not use shims to assist in leveling.

Connecting Facilities

The PSV7000 requires two external services: pressurized air and electrical power. It also allows one optional connection to an Internet via a Network connection. These services connect to the PSV7000 Machine at the Power Panel located on the left side of the machine. With the two required services, the machine creates all the unique electrical voltages needed as well regulating pneumatic pressure for all systems within the machine.

Connecting Air

The machine requires clean, dry, oil-free air from an industrial grade compressor.

PSV7000 Air Requirements Table

System	Air Volume	@ Air Pressure at inlet regulator on PSV7000	Supply Air	Min. Air Tube Length[1]	Customer supplies a primary filter/regulator required between factory compressor and PSV7000[2]
—Metric	85 L/minute [.084 Nm3/min], constant	5.5 ±0.3 Bar	5.5 - 8.2 Bar	3 Meters	10 micron
—US	3 SCFM constant	80 ±5 PSI	80 to 120 PSI	10 Feet	10 micron

[1] This external air line must allow the supplied air to cool sufficiently so that water vapor in the air condenses and can be extracted.

[2] The air filter on the Power Panel is a secondary filter only.

Note: If the compressor cannot maintain the correct air pressure and stable air volume, PSV7000 System performance will be affected and may damage devices.

Tape Output Module connections

Main regulator and filter; see specs on previous page.

Socket Opener Pressure Control

Programmer Power Restart

Serial Number

Main Power Switch (lockout capable)

Main Breakers, 230 VAC, 15A

Air Shut off valve.

8P8C Ethernet connection

Power cable (does not disconnect here)
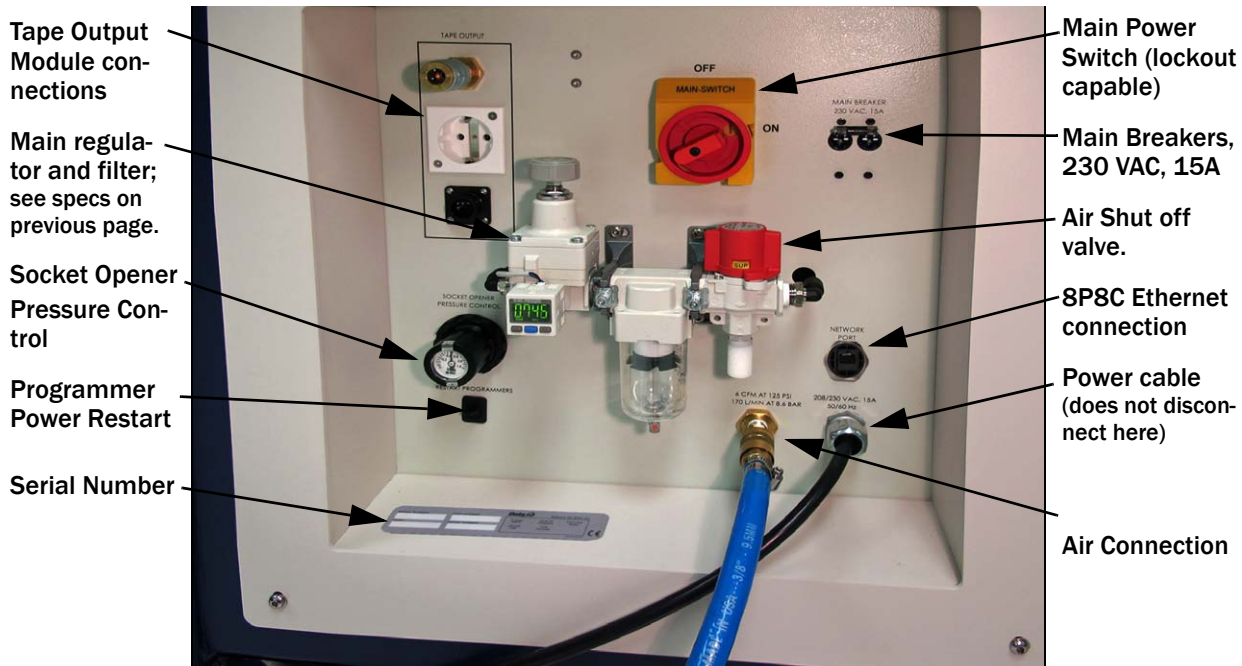
Air Connection

Figure 2-1: The Power Panel on the left side of the machine.

Connect air to PSV7000 at the main regulator and filter.

See Figure 2-1 for the location of the external air line connection.

CAUTION: Possible air system damage! Oil, excessive moisture, or poorly filtered air will obstruct the system's internal air pathways, affect performance, and void the warranty related to air system failure. If oil or excessive moisture is detected, contact Data I/O Customer Support or a local Data I/O approved service representative.

Main Air Pressure Gauge

The main pressure regulator is set at the factory and cannot be changed without the password. See *PSV7000 Air Requirements Table on page 2-3* for the factory setting.

*If there is low air pressure the monitor may display a message reading **No air.***

When air pressure is within range, the regulator readout is green. If air pressure is above or below the acceptable range, the readout displays red. If it is red (out of range), contact Data I/O Support or a qualified service technician.

Connecting Electrical Power

WARNING: Electric shock hazard! Personal injury could be caused from high leakage electrical current from the main power cable. An Earth (ground) connection is essential before connecting power.

Required power is provided through a supplied 3-wire power cable with one end terminated in an electrical plug as required by the customer's facility. For power specifications, see *PSV7000 Specifications* on page 1-9. For cable location see Figure 2-1 on page 2–4.

(Optional) Connecting an Ethernet Cable

A Network connection is on the Power Panel. Plug in an Ethernet cable. Refer to Figure 2-1 on page 2–4.

Network settings are described in *(Optional) Network Settings on page 2-8*.

CAUTION: Possible PC virus hazard! The PSV7000 System has no antivirus software installed from the factory. Prior to connecting to a network, Data I/O recommends installing antivirus software.

To install antivirus software refer to *(Optional) Installing Antivirus Software on page 2-8*.

Applying Power for the First Time

*Normal operating procedure **never** requires the Handler Computer power switch to be turned off manually.*

Before the PSV7000 System is turned on for 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 *Emergency Stop (E-Stop) Buttons* on page 1-4 for location).

☞ All safety doors and access doors are closed.

☞ The circuit breakers on the Power Panel on the left side of the machine are in the **ON** (UP) position.

☞ The power switch on the Handler Computer is set to the **ON** position (although it will not have power yet). The rocker switch is ON when tipped to the down position.

☞ (Optional) The Socket Adapters required for the job have been installed on all necessary programmer sites. See *Installing Socket Adapters* in the Operator's Manual for more information.

When satisfied, rotate the main power switch on the Power Panel to the **ON** position (clockwise).

After power is applied, verify that no obvious failures or electrical anomalies occur. Verify that the Handler Computer starts properly and displays a network log-on dialog.

> *Note: If electrical or mechanical problems are noted, turn OFF the PSV7000 System and notify Data I/O Customer Support.*

At the Microsoft Log-on window, click the user profile (usually labeled **MFG)** to complete the startup procedure.

Figure 2-2: Windows Log-on window.

Shutting Down the PSV7000 System

1. Finish and Exit any job that is running.

2. (Optional) Remove all devices from the system.

3. With Handler PC active (key sequence: scroll-lock > scroll-lock 1), exit AH700 and TaskLink and any other software that you have running.

4. Shut down the Handler Computer PC with the Windows Start menu.

5. [**Laser Marker System only**] At the keyboard switch to the Laser PC (key sequence: scroll-lock > scroll-lock 2).

   5a. (Optional) Save and exit the Laser Marker software.

   5b. Shut down the Laser PC with the Windows START menu. Wait until it finishes shutting down—see the message "I's now safe to shut off the computer."

   5c. Turn OFF (0) the Enable Selector (Laser PC).

   5d. Turn OFF (0) the Key Selector (Laser PC).

6. [**3D Coplanarity Inspection System only**] At the keyboard switch to the 3D Inspection PC. (key sequence: scroll-lock > scroll-lock 3).

   6a. Exit the UltraVim Application software. At the next dialog type **EX** to exit.

   6b. Shut down the 3D Inspection PC with the Windows START menu.

7. WAIT UNTIL WINDOWS COMPLETES SHUTTING DOWN, then rotate the main power switch (on the Power Panel) counter-clockwise to the OFF (vertical) position.

8. (Optional) Padlock the main power switch so that it cannot be turned back ON while the lock is in place.

If the PSV7000 Machine will not be used for several days, the shop air should also be removed or turned off at the Power Panel.

Note that the On/Off switches for the Tube Media Modules do not need to be turned OFF. Power is controlled by the AH700 SW.

(Optional) Installing Antivirus Software

The PSV7000 System has no antivirus software installed from the factory. It is highly recommend that customers install their own antivirus software. The software should be set to run virus scans manually rather than at a scheduled time unless you are sure that the PSV7000 System will not be running jobs at that time.

Note: An antivirus program may affect performance.

The PSV7000 System runs Windows 7 Professional 64-bit operating system. Follow instructions for your antivirus software. Contact Data I/O Service with specific questions. See *Contacting Data I/O* on page x (in Preface).

(Optional) Network Settings

After starting up the PSV7000 System and logging on, double-click **Computer** > **Map Network Drive** (Windows 7).

IP Address and Port Number

If you need the IP Address for communicating with other Data I/O software, they are available via TaskLink. The Port numbers are also displayed. (Port numbers are the same for all programmers on a PSV7000 Machine.)

Addresses and Port numbers can be found as follows.

1. Start TaskLink on the target PSV7000 System. (Closing AH700 will return to TaskLink.)
2. Click **System** > **Options** > **Communication** tab. The IP Address and site numbers are listed in the lower left corner.
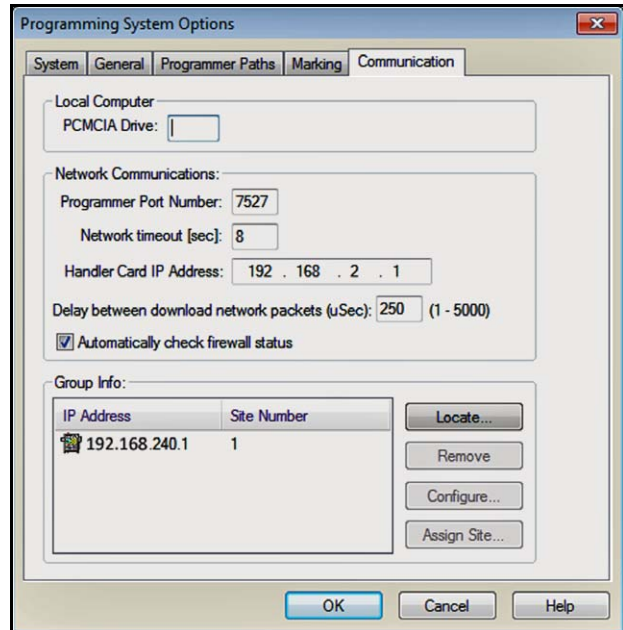
Figure 2-3: TaskLink Communication Tab displays IP Addresses and site numbers.

Setting Up Input and Output Media

There are many options for device input and output. One option for input and one for output must be set up on the PSV7000 Machine for your target job. Further, the setup must correspond with the current software, such as the Job file, winAH400.ini file, and printer file (laser or label marker).

These input/output media are described in this section:
- Static Tray (below)
- Dual Automatic Tray Feeder, page 2-12
- Tube Input/Output Vibration System, page 2-18
- Tape Output Module, page 2-21

Note: The Tape Input feeder installation is covered in the PSV7000 Operator's Manual.

About Static Tray Input and Output

The standard configuration for the PSV7000 System is static tray input and static tray output media. The latest tray mounting configuration uses two rows of locating pins and a magnet. Specific steps for installing trays are described in the PSV7000 Operator's Manual.

Note: Make sure that the correct devices for the target job are loaded into the input tray and that they have the correct pin 1 orientation. (If pin 1 orientation doesn't match pin 1 that is set in the Package File it must be corrected).

Pin 1 on Data I/O sockets is almost always toward the far side of the Socket Adapter (the back of the machine).

Remember that tray arrangement affects:
- the **Setup** window > **Options** tab which must be set to match the workspace setup (covered in the Operator's Manual).
- the Package File which must be taught the Tray locations (covered later in Chapter 3 of this manual).

Removing Tray Platforms

Tray Platforms can be removed to support different mediums such as to install an automatic tray feeder.

Requirements

Metric hex key set.

To remove a Tray Platform:

1. Shut OFF the PSV7000 System. See *Shutting Down the PSV7000 System on page 2-7*.

2. Disconnect the tray sensor—
   2a. Remove two sensor bracket screws (2.5 mm).
   2b. Lift the bracket up and remove the two screws securing the sensor to the bracket (1.5 mm).

Note: Best practice is to re-attach the sensor screws to the bracket, and the bracket to the platform so parts don't get lost.

---

3. Open the front or back access door and remove four screws from the target Tray Platform (3 mm hex key).
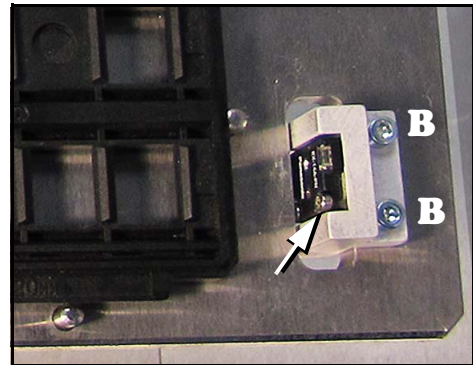

Figure 2-4: Static Tray Sensor and bracket. Two bracket screws shown (at B). Only one of the sensor screws is visible (arrow).

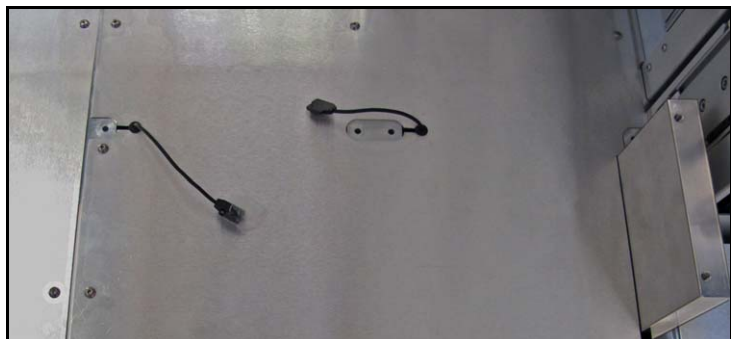4. At the work surface, lift the platform up leaving the sensor lie on the surface.

Figure 2-5: Static Tray sensors left after removing static tray mounts.

To re-install the platform, reverse the steps for removal.

Install Reject Bin

Install a reject container for devices failing any process. Many work-space layouts are possible. Generally, a reject bin (or box) is placed on the front left of the workspace as shown in Figure 2-6, on top the Tape Input media exit chute. However, a box or pad can be placed wher-ever there is room for it as long as its location is taught in the Package File.

Reject Tray
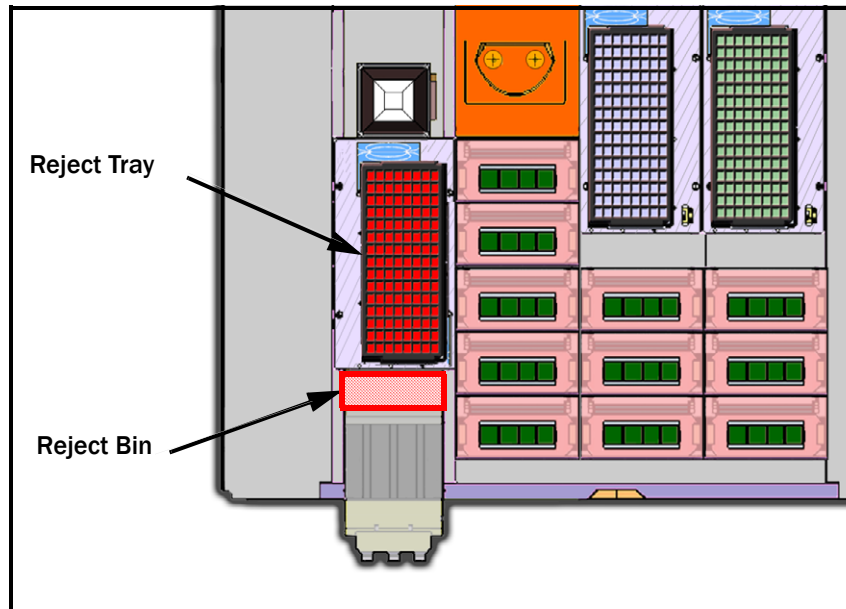
Reject Bin

Figure 2-6: Common locations for the reject tray and bin. Only one is necessary. The reject bin that comes with the PSV7000 should be placed as shown.

> *Note: On the Gantry window, the reject bin or tray is associated with a yellow* position *label that reads* **RTr**.

A tray may be used as a reject container versus a bin. Possible layouts are shown in the above diagram.

Setting Up an Automatic Tray Feeder
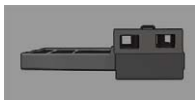
The PSV7000 System can be configured with an Automatic Dual Tray Feeder.

The Tray Feeder must be level to the Gantry and square to the PSV7000 Machine. For general information about setting it up, see the Tray Feeder Owner's Manual that came with your system. Look for the heading *Installation*.

Figure 2-7: The Data I/O Dual Tray Feeder mounted on PSV7000.

The winAH400.ini file requires editing prior to using a Data I/O Dual Tray Feeder if your PSV7000 Machine has not already been set up for one at the factory. See the AH700 on-screen Help file for topic *Editing the winAH400.ini file.*

Prior to editing the winAH400.ini file, make a backup copy.

> *Note: When your winAH400.ini file is set to run Automatic Tray Feeders, before you can run static trays again, the file will need to be changed back to ModelTray1=STD.*

Installing the Tray Feeder

The Data I/O Dual Tray Feeder can only be installed if your PSV7000 was set up for it at the factory or by a Data I/O Service Techncian.

Requirements

- Two people to lift it
- Metric hex key set
- Key to access door
- 12 mm wrench

To install the Data I/O Dual Tray Feeder:

1. Shut OFF PSV7000 power. See *Shutting Down the PSV7000 System on page 2-7*.

2. Remove the Input and Output static tray mounts, if installed. Refer to *Removing Tray Platforms on page 2-10*.

3. On the right side of the machine, locate the clear rectangular shield covering the Data I/O Dual Tray Feeder opening.

4. Remove the left screw with a 4 mm hex key and a 12 mm wrench.
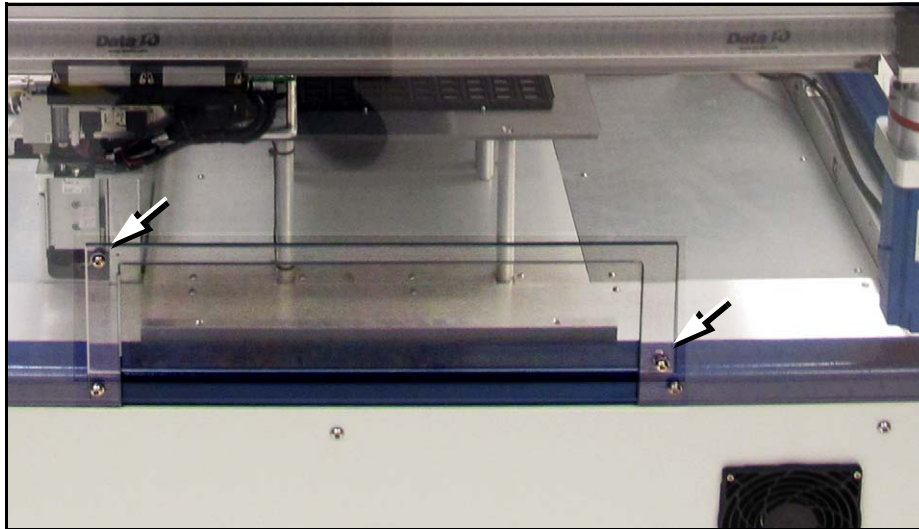
Figure 2-8: The safety shield for the Data I/O Dual Tray Feeder has not yet been rotated out of the way. Note that the tray mounting plates (shown here) would NOT be installed at this time.

5. Loosen the lower right screw.

6. Rotate the shield up 90° clockwise and fasten in place at the extra hole with the screw removed earlier.

7. Get the Data I/O Dual Tray Feeder fasteners ready, and a 5 mm hex key.

CAUTION: Heavy equipment! The Data I/O Dual Tray Feeder weighs 29 kg (64 lb). Two people are required to lift it. A third person is needed to attach fasteners. Use caution.

---

8. With two people lifting the Data I/O Dual Tray Feeder, slide the nose into the shield opening and in far enough to rest on the mount bar inside.

    Refer to Figure 2-9 below.
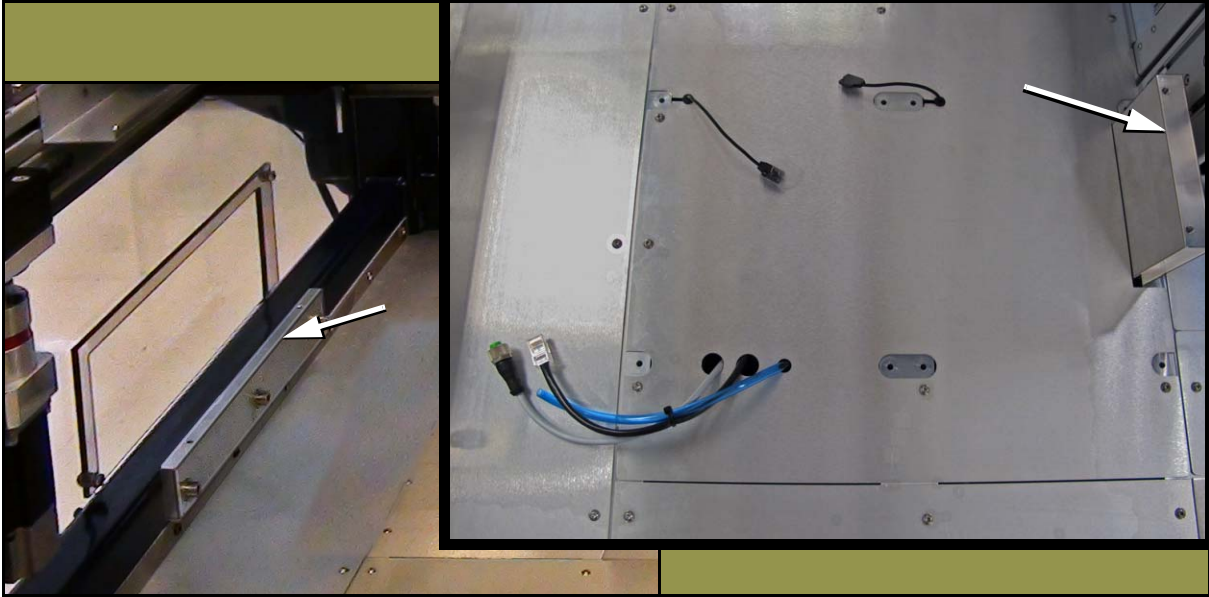
Figure 2-9: The Data I/O Dual Tray Feeder mounting bars (arrows). Views from the back of the machine. (Note that the shield has not been rotated out of the way in this image.)

Refer to the following two figures for Tray Feeder connections.

9. Screw in two screws (5 mm hex key) into each of the two mounting bars to secure the feeder.

10. Remove the utilities connection cover; two screws (2.5 mm hex key).

11. Plug in the three utilities: air, electrical, and ethernet.
    The air connection is a One-Touch fitting.
    Rotate the electrical connector until it slides into the socket, then screw the ring up.

Utilities Cover

Utilities cover is removed
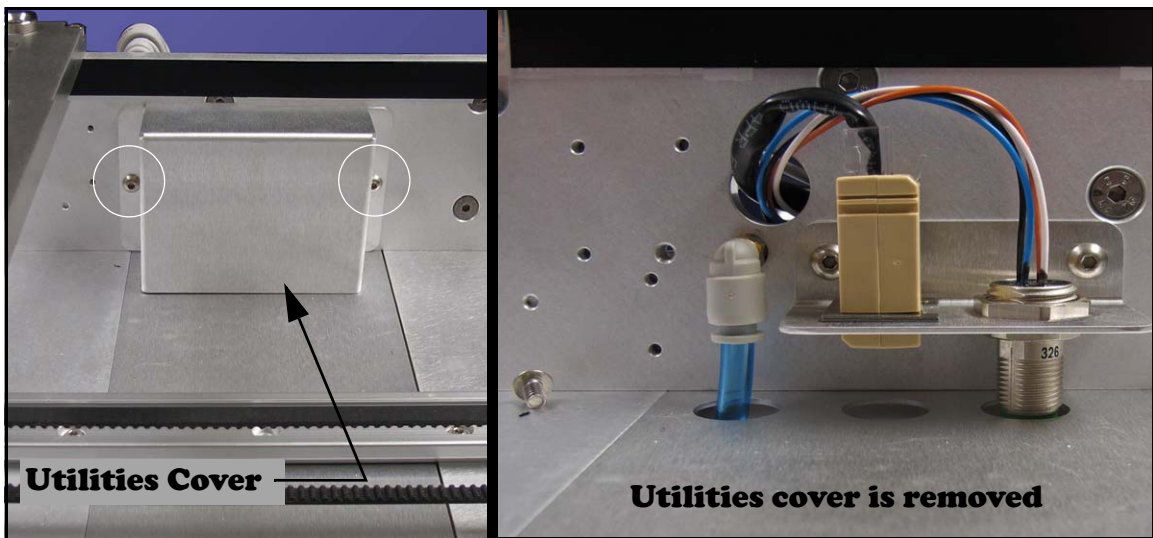
Figure 2-10: The Data I/O Dual Tray Feeder utilities connection cover has two screws (circled). The Ethernet cable is not connected in this view.
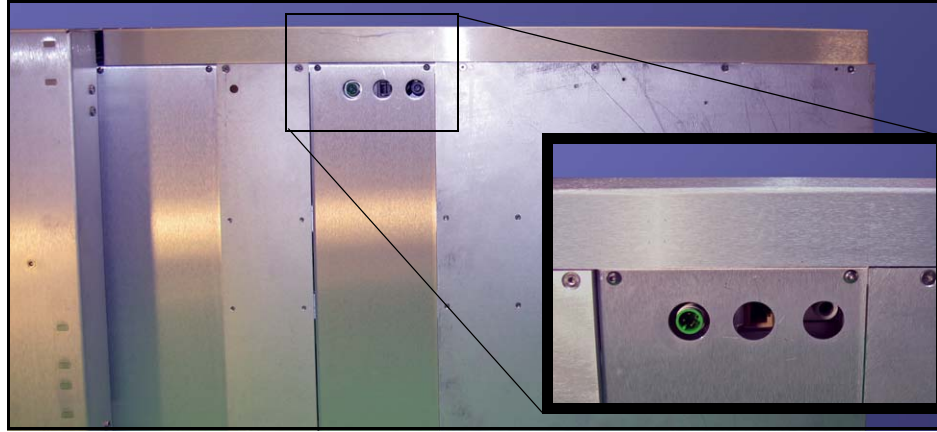
Figure 2-11: Connection for the Data I/O Dual Tray Feeder: electrical, Ethernet, and air (left to right).

12. Re-attach the utilities cover.

Very basic operating instructions are covered in the PSV7000 Operators Manual. Complete instructions are covered in the Data I/O Dual Tray Feeder Owner's Manual.

A 'spare tray' is also referred to as an 'auxiliary static tray.'

Tray Arrangements

You can use a spare tray with an Automatic Tray Feeder (ATF). When tray position two is designated as a spare static tray, the devices from that spare tray are used to replace rejected devices. They are also used during a tray change.

For possible configurations, see the chart on the following page.

TRAY ARRANGEMENTS WITH AN AUTOMATIC TRAY FEEDER

Tray Configurations ▼	Advantages and Disadvantages
Input Only– **Output to other media**	+ Strict lot code processing + Input delivery never impedes output – Output media may require operator mediation
Input / Output	+ Output trays get completely filled except possibly for the last one + No waiting during tray exchange – Empty trays (resulting from Input trays not completely full) need to be removed from the *manual unload* position by operator when signalled (Tray 2 acts like a 'spare tray.') – An unforeseen interruption can cause ambiguity if no device marking is employed
Output Only– **Input from other media**	+ Output trays get completely filled except possibly for the last one + Output trays never impede input – Input media may require operator mediation

Figure 2-12: Possible Input/Output layouts with an Automatic Tray Feeder. A reject bin could be used instead of a tray.

Remember that

- the **Setup** window > **Options** tab must be set to match the work-space setup (covered in the Operator's Manual).
- The Package File must be taught the location of the Reject container (covered in Chapter 3 of this manual).
- (Optional) If the **Sort-On-Error-Code** is used, two Reject Bins are required. Set up for Sort-On-Error-Code by installing a second Reject Bin.

For more about
Sort-On-Error-Code, see
Monitoring Statistics on
page 3-12.
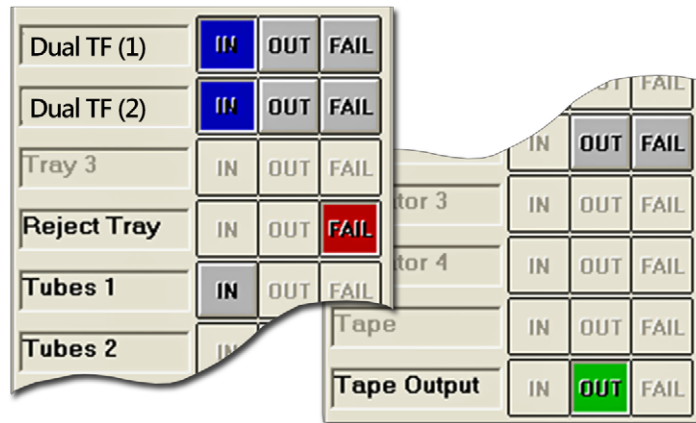
Figure 2-13: With an Automatic Tray Feeder as Input and a spare tray as Auxiliary Input, it's possible to set both trays as input in the **Setup > Options** window as shown.
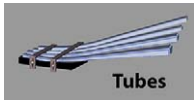
Setting Up the Tube Input and Output Media

As an option, the PSV7000 System can be configured with Tube Input and Tube Output Media.

Tube Media information is subject to change.

To set up the tube input and tube output media:

1. Shut OFF the PSV7000. See *Shutting Down the PSV7000 System on page 2-7*.
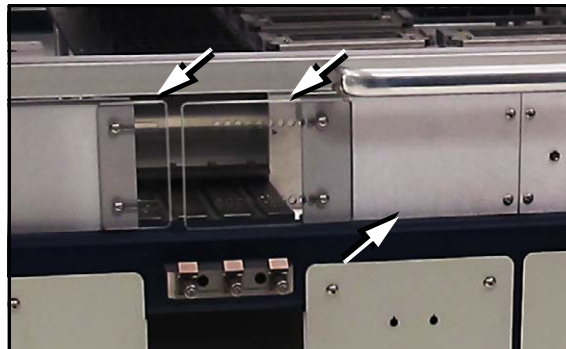
Figure 2-14: Two safety plates and one access plate must be removed for Tube Vibration System. (Safety plate orientation may vary.)

2. Remove the two screws securing each small safety plate (3 mm hex key) and remove the plate(s). Refer to the figures above.

3. If Tube Output is also desired, remove the aluminum access plate adjacent to the feeder mount to install Tube Output media.

4. Align the rail on the bottom of the input vibrator module with the desired channel on the PSV7000 base plate and slide it inward. When the feeder reaches the spring latches, lift it over to

the far side of the latches using the handle and push down to secure. Refer to the figures below.

Latch

Lift over the latch, and then press down in place to engage the latch.
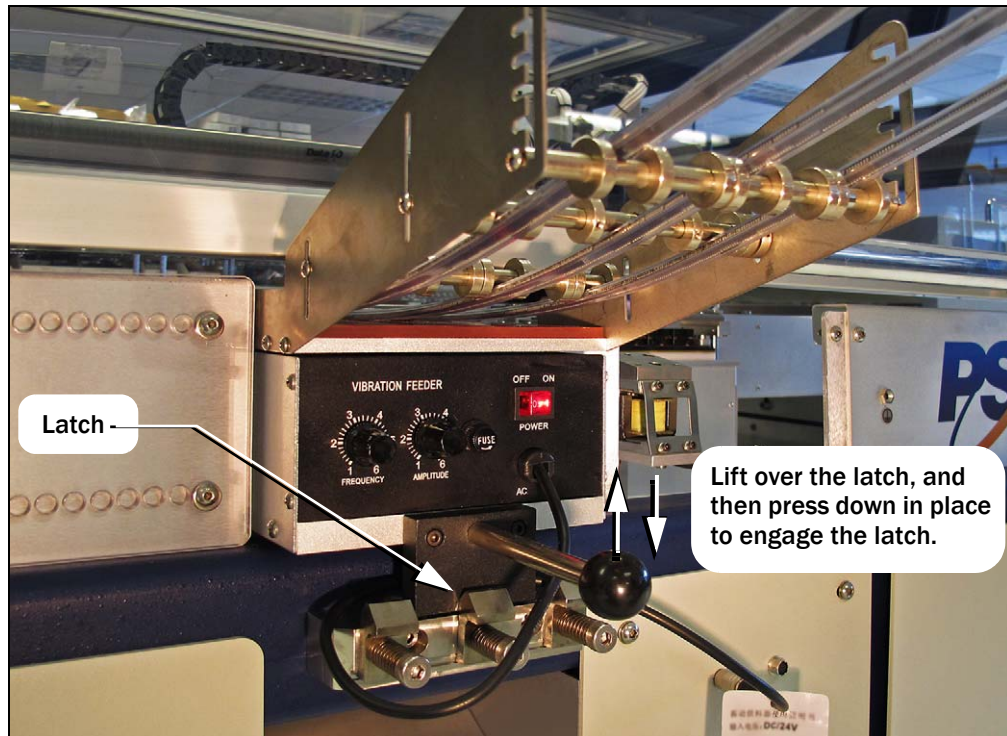
Figure 2-15: Sample Tube Input Module is installed. The Tube Output module has not yet been installed. If no Tube Output is used, the access plate must be in place for safety.

To remove the Tube Feeder communication cable, grasp the collar and pull out.

5. Insert the communication cable part way into the left socket on the handler and, while pushing lightly, rotate until the connector is oriented correctly (it will stop and make a slight click sound when it goes the rest of the way on).

6. Determine the size of the device tube required.

7. Adjust the flat guide bars and the set-screw collars (*guides*) to match the tube locations.
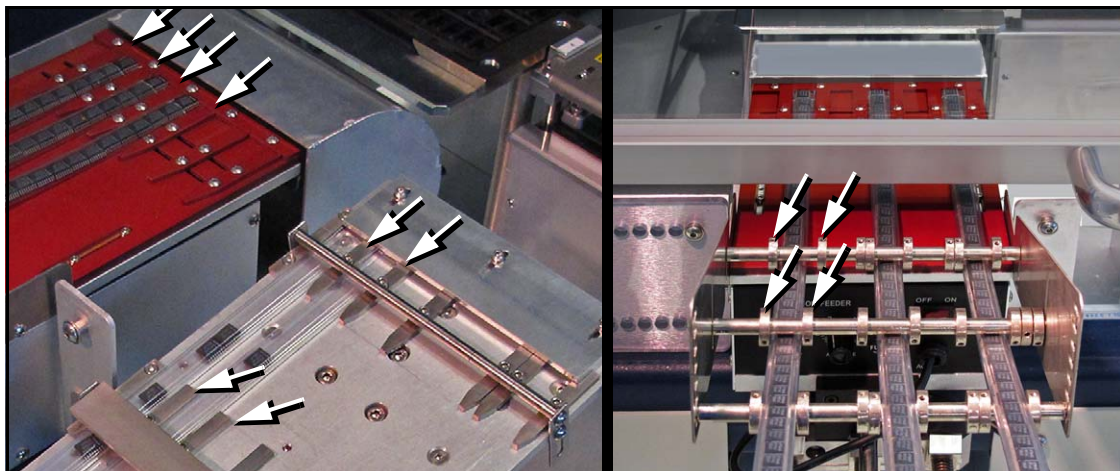
Figure 2-16: Tube input guides.

8. Cut a notch in the tube ends slightly longer than the device for picking and placing devices.
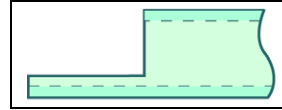
9. Insert tubes into the Tube-In Module.

Note: Stop-plugs help prevent loosing devices until the tubes are in place.

---

10. Teach the tube pick and place locations to the Package file.

11. If using Tube Output, install the output tube **module.**

   11a. Install the mounting base with four screws (3 mm hex key) from underneath the work surface.

   11b. Install one Tube-Out front bracket with two fasteners (2 mm hex key).

   11c. Install the vibrator to the mounting base with four screws (4 mm hex key) and to the front bracket with four screws (2.5 mm hex key and wrench).
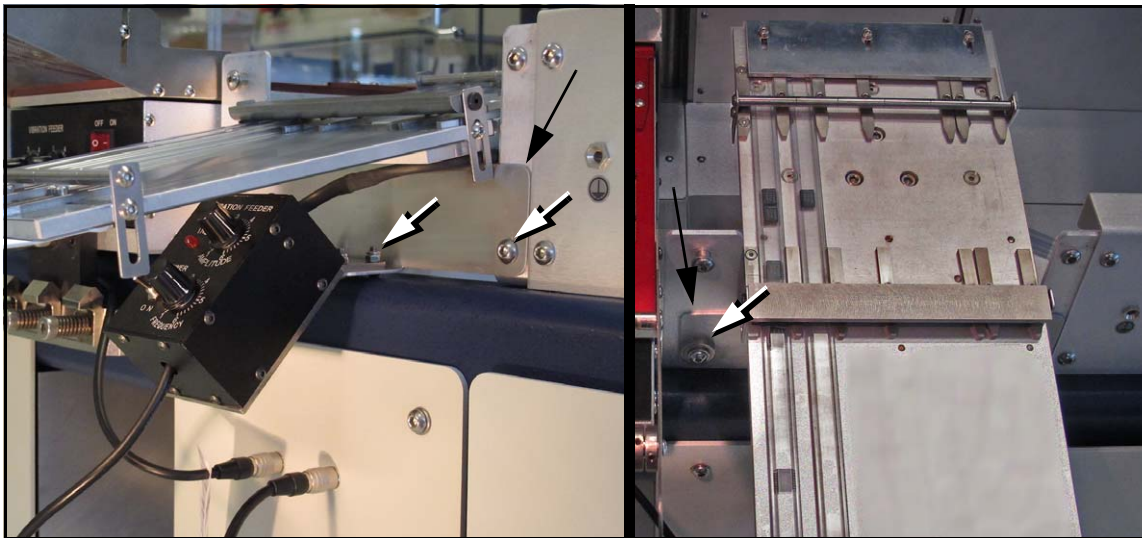
Figure 2-17: Tube Output Module fasteners (white arrows). The mounting base is not visible in these views. The Tube Out Front Bracket is indicated with black arrows.

If you have previously used Tube Feeders you may already have saved a winAH400.ini file (with a temporarily modified name or in a different folder) specifically for a Tube Feeder setup.

12. Insert the communication cable part way into the right socket on the handler and, while pushing lightly, rotate until the connector is oriented correctly (it will stop and make a slight click sound when it goes the rest of the way on).

13. Restart the PSV7000 System.

14. Edit the winAH400.ini file for tube feeders—

   14a. Using Windows Explorer, locate `C:\AH700\winAH400.ini` and make a backup copy, for example, `winAH400backup.ini`.

   14b. Open the original file with Microsoft Notepad.

On the Gantry window, the Tube Feeders are associated with the yellow position labels that read Vib1 and Vib2.

14c. Locate the line
```
TubeFeeder1=FALSE
```
and change to
```
TubeFeeder1=TRUE
```

14d. Locate the line
```
TubeFeeder2=FALSE
```
and change to
```
TubeFeeder2=TRUE
```

14e. Save the winAH400.ini file and exit Windows Explorer.

Running the Tube media is covered in the Operator's Manual, revision B and later.

Running Tube Input and Output

1. Insert tubes and adjust tube guides.

> *Note: Ensure that blank devices are loaded into the input tubes with the correct pin 1 orientation. If pin 1 orientation doesn't match pin 1 on the sockets, the correct rotation much be taught in the Package file.*
>
> *Pin 1 on Data I/O sockets is almost always toward the far side of the adapter (the back of the machine). Some BGAs and PLCCs are marked.*

2. Turn the power switch ON at both the Input vibrator module and output module.

3. Adjust vibration controls if devices do not travel freely in either tube.

Remember that:

- The **Setup** window > **Options** tab must be set to match the workspace setup. This is covered in the Operator's Manual.
- The Package File must be taught the Tube locations.

Setting Up the Tape Output System

The PSV7000 System can be configured with an optional Tape Output System.

The Tape Output System receives programmed devices directly from the PSV7000 System via the PNP head. The Tape Output System advances the carrier tape through a mechanism that seals the tape (using heat or pressure), and rolls the filled tape onto a reel for delivery to the next stage in the manufacturing process.

Figure 2-18: Tape Output System.

Note: For additional information, refer to the TM-50 SMD Taping Module User's Guide that came with your Tape Output System.

Installing the Tape Output Module onto the PSV7000 Machine

Tools Required

- metric hex key set
- 10 mm wrench
- two to three people to lift / install the Tape Output Module

These steps are for installing the TM-50 SMD Taping Module (which can be ordered with the PSV7000).

1. On the left side of the machine prepare the two small clear safety covers and one sensor for receiving the Tape Out Module.

    1a. Loosen three screws that secure an irregular shaped safety shield (4 mm hex key) and slide it to the right.

    1b. Loosen the screw on the lower left of a rectangular safety shield shown in Figure 2-19 on page 2–23 (4 mm hex key).

    1c. Unscrew the top screw (4 mm hex key).

    1d. Rotate the rectangular shield ccw 90° and screw it to the fixed safety shield with the screw you just removed. Refer to the figure below.
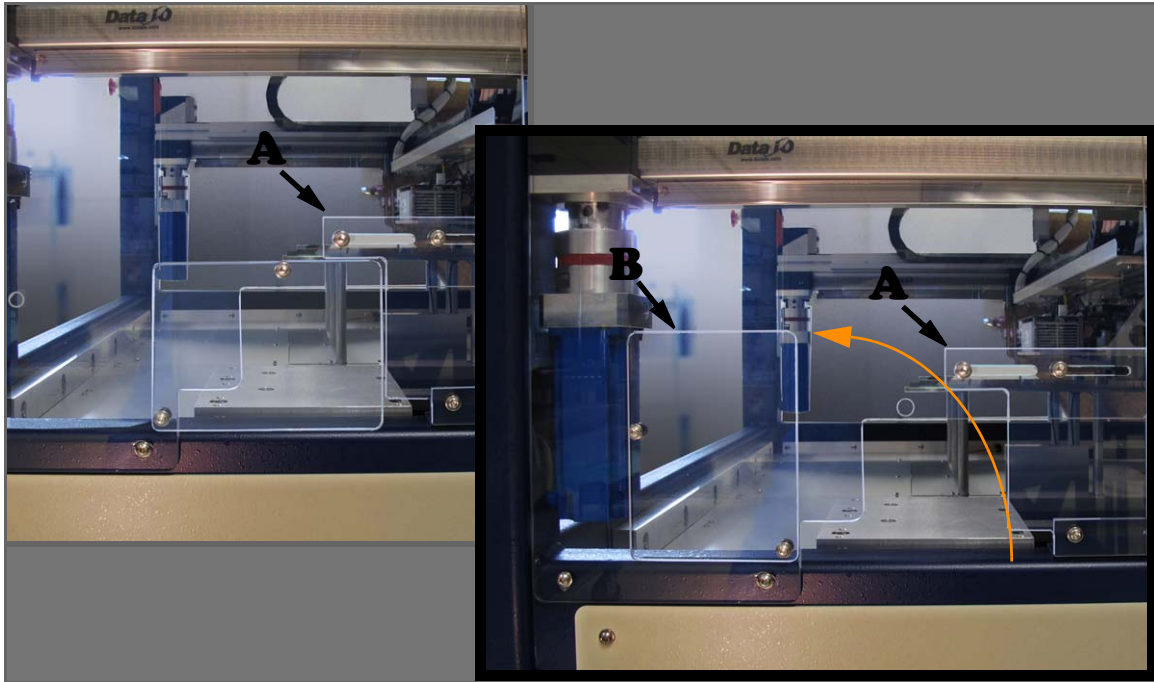
Figure 2-19: To install the Tape Output Module, shield 'A' slides to the right. Shield 'B' rotates counterclockwise 90°.

1e. Unscrew the two screws that secure the safety shield sensor (2.5 mm hex key) and let the sensor hang.

1f. Unscrew the five screws that secure large fixed safety shield (4 mm hex key).

> ⚠️ **WARNING: Possible injury or property damage! The Tape Output Module is heavy. Use caution. Two people are required to lift this equipment. Approximate weight: 47.63 kg (105 lbs.). A third person may be required to bolt it into place.**

2. Install the Tape Output Module onto the plate in the PSV7000 workspace and screw it down with six screws (4 mm hex key). See Figure 2-20.
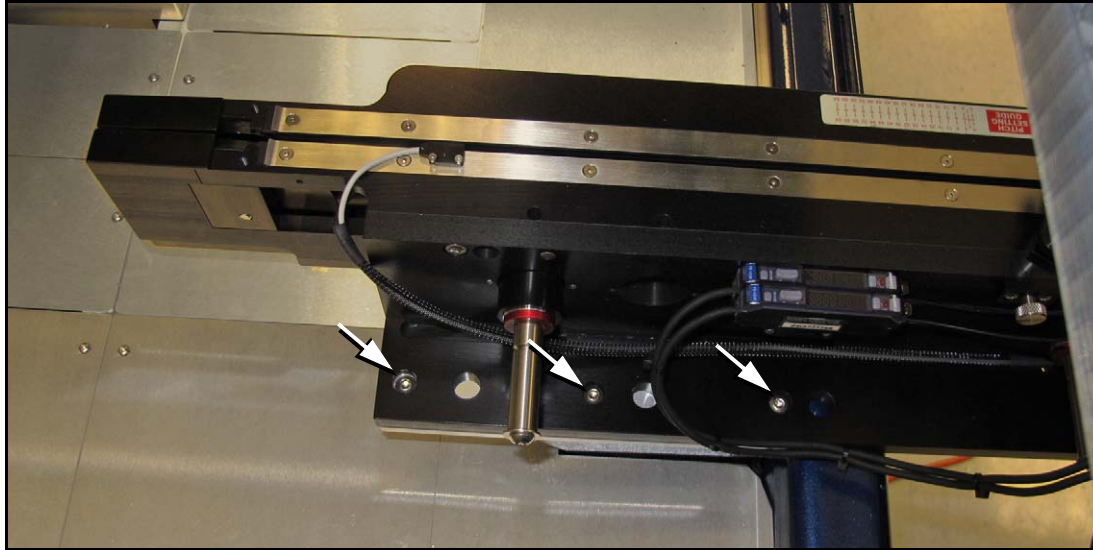
Figure 2-20: TM-50 Tape-Output Module mounting screws. Three more locations on opposite side (hidden in this view). Viewed from the back of the machine.

3. Reinstall the large fixed safety shield with five screws.

4. Reinstall the sensor onto the shield.

5. Re-adjust the irregular shaped safety shield. To fill the gaps, this shield will require adjustment to accommodate the position of the track (table) once it is set to the desired track/tape width.

Setting Up the Tape Output Module

The information that follows is adapted from the TM-50 SMD Taping Module User's Guide that came with your Tape Output System.

CAUTION: Possible tape damage from Excessive Heat! Improper routing of the device tape may cause enough heat to melt the tape. Ensure the correct routing path is followed. See the TM-50 SMD Taping Module User's Guide.

If you have previously used Tape Output, you may already have saved a winAH400.ini file specifically for a Tape Output setup.

To set up the Tape Output System:

1. Edit the winAH400.ini file for Tape Output—

   1a. Using Windows Explorer, locate `C:\AH700\winAH400.ini` and make a backup copy, for example, `winAH400backup.ini`.

   1b. Open the original file with Microsoft Notepad.

   1c. Locate the line:
   `TapeOutPutInstalled=FALSE`

   and change it to True:
   `TapeOutputInstalled=TRUE`

   1d. Save the `winAH400.ini` file and exit Windows Explorer.

*The communication cable may also be called **I/O** or **Sensor Output.***

2. The Tape Output Module gets power and air from the PSV7000 System. Connect the compressed air, electrical power, and communication (top-to-bottom on the PSV7000 power panel).

3. Ensure the PSV7000 System air is connected and power is ON.

4. Switch the Tape Output Module ON by pulling out its Power/E-stop button.

5. Turn the take-up reel tension adjust knob counterclockwise to zero. (Black knob on the controller.)

6. Set the taping job parameters at the controller. For more information see the *TM-50 SMD Taping Module User's Guide*, chapter 3, Controller.

7. Pull the nearest half of the track (table) out to the desired track width. It stops at detents set to specific tape widths.

8. Mount the carrier tape reel—

   8a. Remove the carrier tape quick lock from the carrier tape spindle.

For more information about these steps, see the TM-50 SMD Taping Module User's Guide.
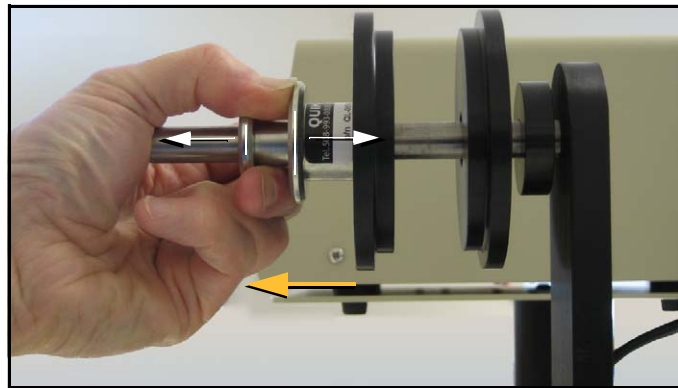
Figure 2-21: Removing the spindle QuickLock.

   8b. Mount the bulk carrier tape reel on the right spindle so the tape unwinds from the top.

   8c. Replace the quick lock.

   8d. Trim the end of the carrier tape so it is clean and straight.

9. Route the carrier tape—

   9a. Guide the carrier tape into the loading track. It should feed right to left through the loading track easily.

   Note: Lowering the feed reel support arm can reduce drag if the angle at which the carrier enters the loading track is too steep.

   9b. Bring the end of the carrier tape past the sealer and engage the sprocket holes on the teeth of the drive sprocket.

   If the carrier tape does not feed to the sprocket easily, see the *TM-50 SMD Taping Module User's Guide*, Chapter 4, Setup, Route the Carrier Tape for items to check.

10. Mount the cover tape—

10a. Place a reel of cover tape of the correct width to match the carrier tape on the cover tape spindle. The tape should unwind to the right from the bottom of the reel.

10b. Set the width of the cover tape guide assembly for your size tape.

10c. Use the Cover Tape Position Adjuster if needed. Turning it clockwise moves the cover tape position toward the sprocket side of the tape.

10d. Using blue tabbing tape, attach the cover tape to the carrier tape. Thread both through the cover tape Guide Sealer Assembly. Run the machine to advance the carrier and cover tapes through the sealer.

Prepare the Seal

For Heat Seal

Heat Seal only

1. To prepare the heat seal—

2. Turn the heat seal toggle switch ON.

Note: Disable the pressure seal by loosening the seal roller pressure screws until the seal rollers are no longer in contact with the cover tape.

3. Set the temperature controls to the appropriate temperature. See the table below.

Carrier Tape Type	Cover Tape Type	Temperature	Air Pressure	Dwell Time
3m Type 3000 Conductive Carrier	3m Type 2675 Static Dissipative Cover	135-155°C	40-60 PSI	250-400 ms
3m Type 2701/2703 Non-conductive				
Advantek Conductive	Advantek Type AA			
Advantek Non-conductive	Advantek Type S			

Figure 2-22: Tape Output suggested temperature and pressure settings. The temperature of each shoe can be increased or decreased according the results of a peel force test.

4. Adjust the heat shoe air pressure to the appropriate setting. This setting controls the amount of force applied when the sealer shoes drop.

Note: The recommended starting point for heat shoe air pressure is 50 PSI. Turning the heat shoe adjuster clockwise increases the pressure.

5. After the heat sealer reaches operating temperature, set the controller parameters, if not already set.

Note: For additional information, refer to the TM-50 SMD Taping Module User's Guide, Chapter 3, Controller.

6. Set the Controller to **RUN** mode.

7. Advance the tape using the foot switch.

8. Check the sealed tape for the desired sealed position.

9. If necessary, adjust the *inner* seal position by turning the inner seal adjuster (thumb wheel) clockwise (to move the seal away from the operator) or counterclockwise. Tighten the position lock to secure it.

10. If necessary, adjust the *outer* seal position by turning the outer seal adjuster (thumb wheel) clockwise to move the seal toward the operator or counterclockwise (to move the seal away from the operator). Lock the adjuster into place using the position lock knob.

For Pressure Seal (PSA)

Pressure Seal only

1. To prepare the pressure seal—

Note: If the heat sealer is On, turn it OFF.

2. Set the controller for Pressure Sensitive Adhesive (PSA) operation. Refer to the Chapter 3, Controller of the *TM-50 SMD Taping Module User's Guide*. Then set the controller to **RUN** mode.

Note: When RUN is selected, the controller is ready to operate. The parameters which have been entered are displayed on the screen along with the running devices count. The controller will begin to advance and seal tape when the foot switch is pressed.

3. Advance the tape using the foot switch.

4. Adjust the inner and outer seal roller *position*. Align the roller position over the strip of adhesive on either side of the PSA cover tape. Both thumb screws have locking devices.

5. Adjust the *pressure* at both sealer wheels to free spinning and then 1/8 revolution tighter. Use a 2 mm hex key.

6. Advance the tape using the foot switch. Re-adjust the seal roller pressure until the PSA adhesive is firmly adhered to the carrier tape.

Note: Excessive roller pressure may cause carrier tape advance problems or elongation of sprocket holes in the carrier tape.

Checks to Perform Prior to Running

1. Mount an empty take-up reel on the spindle.

2. Perform a Peel Force Test
    Perform as many peel force tests as needed while adjusting the sealer controls to obtain the required seal strength.

3. Create the Trailer and Leader
    Before beginning a production reel, determine how long the trailer and the leader should be. Run out enough sealed empty pockets to make the trailer that is required for the current job.

4. Check Carrier Tape Alignment
    To ensure an accurate count, select a spot on the loading track as a reference point for the first and last devices counted.

5. Set the Counter
    Set the counter STOP value in the controller menu to zero.

Remember: when the reel is being taped on the TM-50, the trailer will be the first length of empty carrier tape run before the first device is taped, and the leader will be the length of empty carrier tape run after the last device is taped.

Note: Use the counter on the TM-50 if desired. However, we recommend setting this counter to zero and using the pass quantity on the PSV7000 System to monitor quantity.

Note: When starting a job that uses Tape Output, pull the red "E-Stop/On" button on the taping machine to start it.

Placing Devices

Devices are placed by the PNP head when your job is run.

Ending a Taped Run

See the PSV7000 Operators Manual or the *TM-50 SMD Taping Module User's Guide*.

Replacing a Full Take Up Reel

See the PSV7000 Operators Manual or the *TM-50 SMD Taping Module User's Guide*.

Removing a Tape Output Module

Removal of the Tape Output Module is in the reverse order of installation. See the instructions above.

Setting Up the Laser Marking Module

A PSV7000 System that is ordered with a Laser Marking Module requires no additional set up at your site. All software is installed and all mechanical connections are complete—the Laser Module is ready to use, although different size device tips may be needed for your particular job. For replacing the Laser rotor tips, see the PSV7000 *Operator's Manual*.

Your job file, created in TaskLink, determines whether or not devices get marked.

> *Note: To use the Laser Marking Module, a laser marking file must first be created and added to a job file. For more information, see (Optional) Creating a Laser Marking File on page 3-24.*

> CAUTION: *File corruption hazard! Before making any changes to your winAH400.ini file, save a backup copy.*

If, for some reason, your winAH400.ini file requires changes, you can edit it to accommodate the Laser Marking Module as follows:

Edit the winAH400.ini file for Laser Marking—

If you have previously used a Marking System, you may already have saved a winAH400.ini file (with a modified name) specifically for that marking system setup.

For more ini file information, see the on-screen Help.

1. Using Windows Explorer, locate `C:\AH700\winAH400.ini` and make a backup copy, for example, `winAH400backup.ini`.

2. Open the original file with Microsoft Notepad. Locate the heading:
   ```
   ;------- Marking System Selection -----
   ```

3. There may be a list of marking system names. Remove the semi-colon from the Laser System corresponding to the one installed on your PSV7000 System. Only one line should be without a semicolon.
   ```
   ;If no marking system, remove ; from next line
   ;MarkerSystem=NONE
   ;Possible Marking Systems are...
   MarkerSystem=AREX
   ```

4. Locate the heading:
   ```
   ;----- Laser System Definitions & Options ------
   ```

   and set this line as follows;

   ```
   LaserRemoteConnection=ETHERNET 192.168.2.1
   ```

5. Save the `winAH400.ini` file and exit Windows Explorer.

Note: If you have other options such as Serialization, contact Data I/O Customer Support or a local Data I/O approved service representative.

Setting Up the Label Printing System

If your PSV7000 System has the optional Label Printing System for printing reel labels, it was installed by Data I/O. If you need to remove, repair, or reinstall your Label Printer, refer to the Label Printer Manual that came with your PSV7000 System. For questions and service, contact Data I/O Customer Support or a local Data I/O approved service representative.

Chapter 3
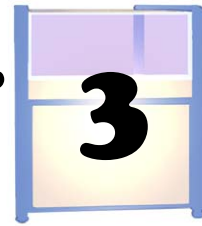
Administrative Functions

The two primary levels of operation of PSV7000 are
• Operator functions, and • Administrator functions.
Only Administrator functions are covered in this
manual.

Operator functions are covered in the separate *PSV7000 Operators Manual*, although Administrators should be familiar with all operator functions.

Administrators generally follow the sequence on the next page to *create* a job:

Creating a Job—Administrator Functions at a Glance

```
→  ┌────────────────────┐     →  ┌────────────────────┐
   │                    │        │ (Optional)         │
   │ Safety Precautions │        │ Create security    │
   │                    │        │ profiles           │
   └────────────────────┘        └────────────────────┘
            ↓
   ┌────────────────────┐        ┌────────────────────┐
   │ Create a Task      │     →  │ (Optional)         │
   │ in TaskLink        │        │ Test First         │
   │                    │        │ Article            │
   └────────────────────┘        └────────────────────┘
            ↓
   ┌────────────────────┐
   │ Install media and  │
   │ optional equipment │
   │                    │
   └────────────────────┘
            ↓
   ┌────────────────────┐        ┌────────────────────┐
   │                    │     →  │ (Optional) Monitor │
   │ Teach the Package  │        │ statistics         │
   │ File,              │        │                    │
   └────────────────────┘        └────────────────────┘
            ↓                              ↓
   ┌────────────────────┐        ┌────────────────────┐
   │ Maximizing Program-│     →  │ (Optional) Data    │
   │ ming Yields        │        │ File from a Master │
   │                    │        │ Device             │
   └────────────────────┘        └────────────────────┘
                                           ↓
                                 ┌────────────────────┐
                                 │ (Optional) Marking │
                                 │ and Labeling       │
                                 │                    │
                                 └────────────────────┘
                                           ↓
                                 ┌────────────────────┐
                                 │ (Optional) Auto-   │
                                 │ motive Performance │
                                 │ Pak functions      │
                                 └────────────────────┘
```
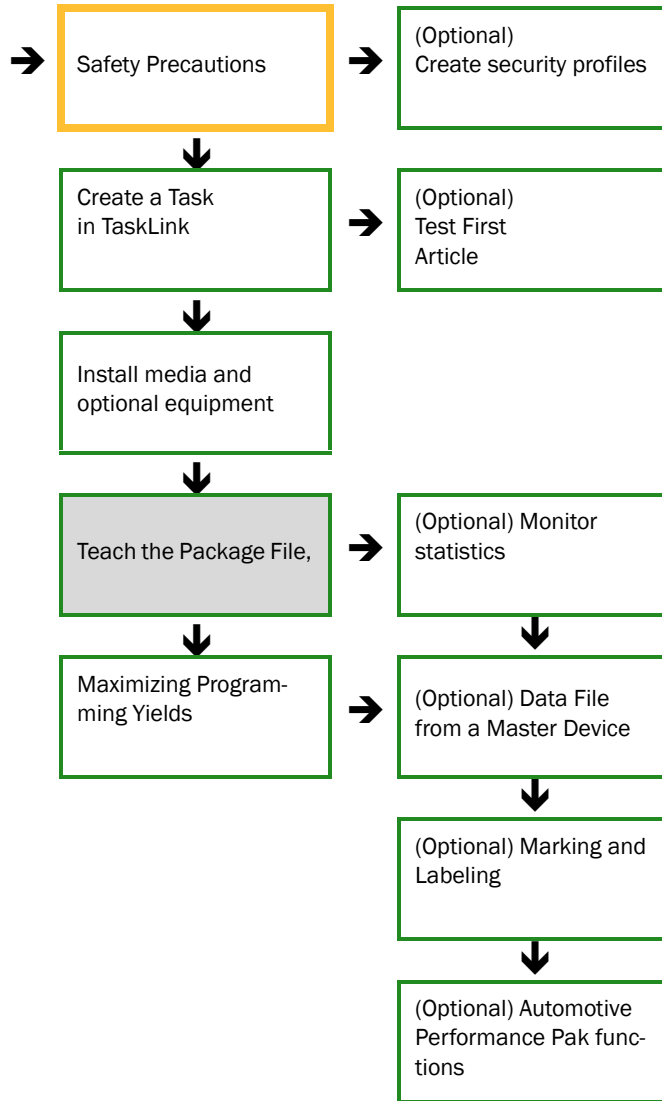
Figure 3-1: Detailed Administrator Functions begin on the next page.
Shaded boxes are activities that are performed once per package type .

Safety Messages and Precautions

For your safety and preventing loss of time and damage to equipment, this manual uses special symbols, paragraphs, and color to call your attention to hazardous situations and recommend safe practices to help avoid them.

Refer to *Using This Manual* on page v (in the Preface) for symbols and fonts used for safety messages.

Refer to *Safety Systems on page 1-4* for safety regarding Emergency Stops, the safety doors, and ESD.

Administrator Functions

Administrators are responsible for creating Tasks in TaskLink™ and other functions **not** generally performed by operators. Administrators would likely perform these functions:

- *Editing the winAH400.ini File on page 3-5*
- *Creating a Task in TaskLink on page 3-5*
- *Creating Security Profiles on page 3-6*
- *(Optional) Do a First Article Test on page 3-7*
- *(Optional) Setting TaskLink to Operator Mode on page 3-8*
- *Enhanced Yield Programming* on page 3-8
- *Teaching the Workspace Locations on page 3-9*
- *Optimize Movetimes on page 3-11*
- *Monitoring Statistics on page 3-12*
- *Maximizing Programming Yields on page 3-20*
- *(Optional) Creating a Data File from a Master Device on page 3-23*
- *(Optional) Creating a Laser Marking File on page 3-24*
- *Automotive Performance Pak on page 3-34*

These functions are discussed in this section.

Reference List of Operator Functions

These functions for operators are **discussed in the separate** Operators Manual. All users, administrators, and operators should know these procedures.

Checking the System

Installing Input/Output Media

Installing Socket Adapters and Actuator Plates

Installing the Correct Probes

(Optional) Installing the Correct Shuttle Cups

Turning PSV7000 System Power ON

Selecting a Job (Starting AH700 via TaskLink)

(Optional) Preselecting Programmers

Setting Media and Options—the Setup window

Starting Programming

—After Starting a Job...

Stopping the System

Light Tower Interpretation

(Optional) Changing Programmer Status

Turning PSV7000 System Power OFF

(Optional) Operating the Data I/O Dual Tray Feeder

Editing the winAH400.ini File

More information about the winAH400.ini file is in the AH700 on-screen Help.

The winAH400.ini file can be edited to add or remove options which determines their availability in the AH700 **Setup** window. It also sets non-programming features such as language and which events cause warnings to display. This is a text file that can be edited in text editors such as Notepad or UltraEdit. Do not use Microsoft Word or other word processors since they may add hidden special characters such as end-of-page characters.

> CAUTION: File corruption hazard! Before making any changes to your winAH400.ini file, save a backup copy.

The winAH400.ini is on the Handler computer in the `C:\AH700\` folder.

Creating a Task in TaskLink

Once a Task is selected and a Pass Limit is set, the Task is referred to as a job to run on the PSV7000 System. The same Task can be used for many jobs.

TaskLink stores *Tasks* (settings for programming job) in a Task database file (*.TSK). A Task contains all the information necessary for programming and testing specific devices with a specific algorithm.

Settings and Files Selected in TaskLink

Tasks include:
- Device settings - identifies a specific device (or family of devices to select from)
- Data file name and apropos settings
- System settings - Package file name
- Process settings - Continuity check, electronic ID check, blank check, erase, verify, program, and device marking/labelling information.
- (Optional) Setting the Pass Limit (the quantity of devices to program for this job) after clicking **Run**.

Note that operators can change the Pass Limit in the AH700 Setup > Job Info tab.

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

File	Information
Package File (*.txt)	For instructions on creating a Package File, see *Teaching the Workspace Locations on page 3-9*.
Data File (*.hex or *.bin, for example)	The data file contains your data to be programmed into the devices.
Laser Marking File	This optional file resides on the Laser PC. See *(Optional) Creating a Laser Marking File on page 3-24*.

Definition: A Task becomes a 'Job' once a Task is set to Run and a Pass Limit is requested and set. A Task can be used for many Jobs.

Task Creation is Detailed in TaskLink Help

For complete instructions on how to create a Task, see TaskLink's online Help Topics.

TaskLink will automatically start the AH700 Application Software when **Run** is clicked.

(Optional) Preselecting Programmers

When the AH700 application starts, programmers that are not used for a particular job can be turned off to improve efficiency; see the PSV7000 Operators Manual for more. Note that operators also have access to this feature.

Creating Security Profiles

With the Security Dialog in AH700, administrators can create and manage user profiles to control security by allowing different rights to different profiles.

To create a new profile:

For best results, use the physical keyboard instead of the on-screen keyboard.

1. At the Main AH700 (start) window, clicking **Start** will open the **Security** Dialog in the background. It may be obscured by other dialogs.
2. In the **Security** Dialog, use the drop-down arrow to select **Supervisor.**
3. Enter the password.
4. Click **Edit Users**.
5. Type a name into the **Name** field.
6. Type a password into the **Password** field.
7. Check the box next to each stated right (privilege) for the new user. For example: if the new user is to create or edit Package Files for jobs, check **Teach Package**.
8. Click **Save** (the diskette image).

(Optional) Do a First Article Test

Prior to programming hundreds of devices, a newly created TaskLink Task is tested. Follow your company's First Article Test Plan. The two methods discussed below are 1) Prior to creating a Package file, and 2) after creating it.

Test Prior to Creating a Package File

"FlashPAK" refers to all FlashPAK models.

Outlined below is a suggested test process using Data I/O's desktop programmer called FlashPAKIII. This method allows testing without first having to create the Package File required for PSV7000.

1. **Create a new Job for FlashPAK—**
   1a. In TaskLink, set the Programming System to FlashPAK (**System > Select Programming System > FlashPAK**).
   1b. Open Task Manager and create a new Task with the **Add** button.
   1c. Create the Task as usual in the Edit dialog.

2. **Test the new Job on FlashPAK—**
   2a. Using the **Load** button, send your new Task to a PC Card, or, if the FlashPAK is on a network, select it.
   2b. Test the Task on the FlashPAK by programming a device and verifying the results.

For help with FlashPAK see the Operator's Guide.

3. **Duplicate the Job for your PSV7000 System—**
   3a. If the job passed the tests, in TaskLink **Task Manager**, select the Task and click Duplicate. Enter a name and click **OK**.
   3b. Edit the Task so that it can be used on your PSV7000 System as follows: 1) Select the Task, 2) Click **Edit**, 3) On the **Task** tab, use the **Programming System Type** drop-down arrow to select PSV7000, 4) On the **Handler Files** tab, select (or create) a Package File name, 5) Click **OK**.

4. **Run the duplicated Task on the PSV7000 System—**

*Note: If you have the option selected to Automatically Switch Programming Systems, (**System > Options > Automatically Switch** . . .) then you can skip the next step.*

   4a. Close **Task Manager** and change the programming system to PSV7000 System (**System > Select Programming System**). Re-open the **Task Manager**.
   4b. Select the duplicated job and click **Run**.

Note: The Package File must be taught if it is new.

Test After Creating a Package File

After a Package File is created (described in the next few headings) or it already exists for this package type and job, then this first article test method is best when your job includes Laser Marking or Labeling.

Programmers that are not used for a particular job can be turned off in the AH700 Start window.

1. **Create the PSV7000 job—**
   1a. In TaskLink, create a new job for PSV7000 Systems.
   1b. Click **Run** (or **Load**) in TaskLink to start the AH700.

2. **Run one device—**
   2a. In AH700, click **Start**.
   2b. In the Setup window, select media options as usual.
   2c. At the PSV7000 workspace, set up the input and output media as usual.
   2d. Click **Run** > **Run One**.
   2e. After it finishes, verify that the job passed the tests.

Note: *If a programmer does not have a Socket Adapter, or an incorrect Socket Adapter is installed, the programmer will automatically be disabled.*

(Optional) Setting TaskLink to Operator Mode

Options to add, remove, and edit Tasks are found in TaskLink's Task Manager dialog when in Administrator Mode (the default). You can set TaskLink to Operator Mode which limits actions to running and viewing tasks in the **Operator** Dialog but not but not editing or deleting Tasks, Kits, or Archived Jobs.

To switch between Operator Mode and Administrator Mode, see TaskLink's online Help.

Enhanced Yield Programming

For more information on the AP Pak, see the AH700 on-screen Help.

1. Several selections on the **Setup** window > **Options** tab affect yield that are not set in TaskLink. Administrators may wish to advise operators regarding the setting of the **Continuity Retries** field and the **Fail Retries** field.

2. **[Automotive Performance Pak only]** Optional: Determine if any of the five utilities available with the AP Pak are required for this job. They must be set in the AH700 **Setup** window > **Options** tab.

2a. Set security rights for each operator that you do—and do not—authorize to make AP Pak changes. Changes to User Rights are made in the **Security** Dialog.

For more information about Security see Creating Security Profiles on page 3-6.

Note: Only installed options are available for selection on the **Options** *tab. If different input media (tube, tape, or tray) is desired, the winAH400.ini file may need to be edited. See the online Help for instructions editing the WinAH400.int file or contact Data I/O support or an authorized technician.*

Dry Run (Ignore Programmers)

(Optional) If you want to do a Dry Run or transfer devices from input media to output media with no programming, click **Ignore Programmers** so it is **ON** (green); the PNP head will not stop at the programmers. Laser marking can be used with Ignore Programmers turned ON. The default is Off.

Note: Set security rights for each operator to use—or not use—the **Ignore Programmers** *option. Changes to* **User Rights** *are made in the* **Security** *Dialog.*

Teaching the Workspace Locations

The *Package File* is a text file containing calibration information that the PNP head uses to properly pick, rotate and place devices.

Package Files reside in the Handler Computer in folder `C:\AH700\Package`.

After your new Package File is taught, it will contain information about the specific device package and Socket Adapter as well as the number of programmers, input and output media, and optional equipment such as laser marking, if applicable.

A Package File must be created for each device that uses a different Socket Adapter. If a Package File already exists that can be reused (same device package, same Socket Adapter, and same input/output media) a new one is not necessary.

Prerequisites
- A Task and a Package File must exist. For more information, see topics above.
- A primary device has been selected.

To teach locations

1. Run the job in TaskLink that uses your new (renamed) Package File.

    1a. Select a Task and click **Run**.

    1b. In the AH700 Application, click **Start**.

    1c. At the **Setup** window, make setup selections.

    1d. Click **System** > **Gantry**. A password may be required—refer to *Creating Security Profiles on page 3-6*.

2. To continue, see the AH700 on-screen Help (*Teaching Locations > Printable list of the steps*). It covers teaching workspace locations for all media options.

Note: The PSV7000 System can have static trays or a Data I/O Dual Tray Feeder. Teaching tray locations is the same for both.
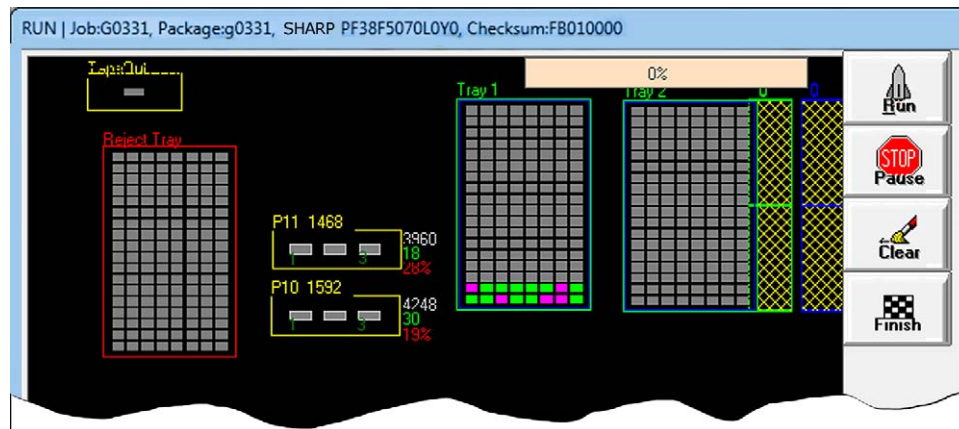
Figure 3-2: **Run window shown with a Data I/O Dual Tray Feeder (crosshatch).**

Errors

Axis Limit Error

During the process of teaching locations 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. Record the error message—

    1a. Note what item was being taught when the error appeared, such as Programmer 5 or Tray 1 or Tube 2.

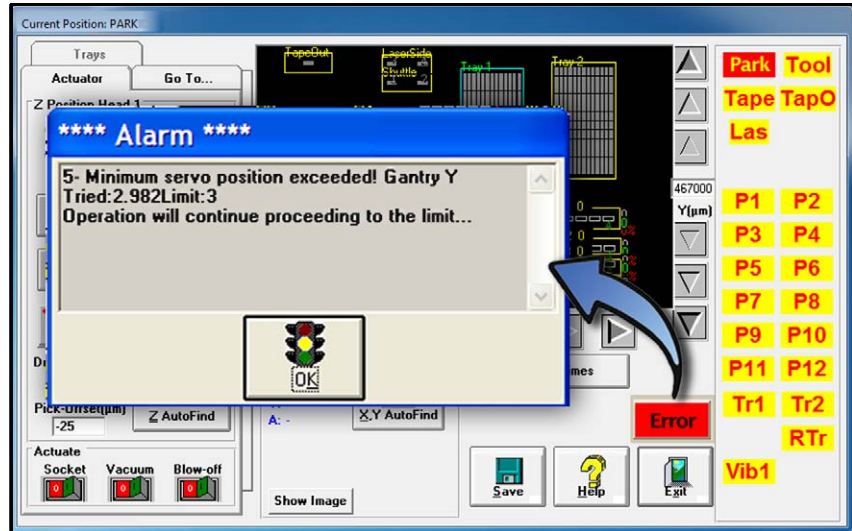   1b. Click the Error button to display the error message.

Figure 3-3: Error messages don't display until you click the red Error
pop-up button to open the Alarm dialog.

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 = 2.982 and Limit = 3).

1d. Click **OK**.

2. Contact Data I/O Service or your nearest authorized representative.

3. The item that was being taught when the error occurred (tray, programmer, reject bin, etc.) needs to be re-taught. See *Teaching the Package File* in the AH700 Help.

*For contact
information see
Contacting Data I/O
on page ix.*

Optimize Movetimes

After the equipment locations are taught, you can optimize the movement of the PNP head in the work envelope. This command (**Get Movetimes**) calculates programming times versus head travel time to decide the best PNP head path, especially effective when some programmers are not used.

To get movetimes:

1. On the **Gantry** window, click **Get Movetimes**.
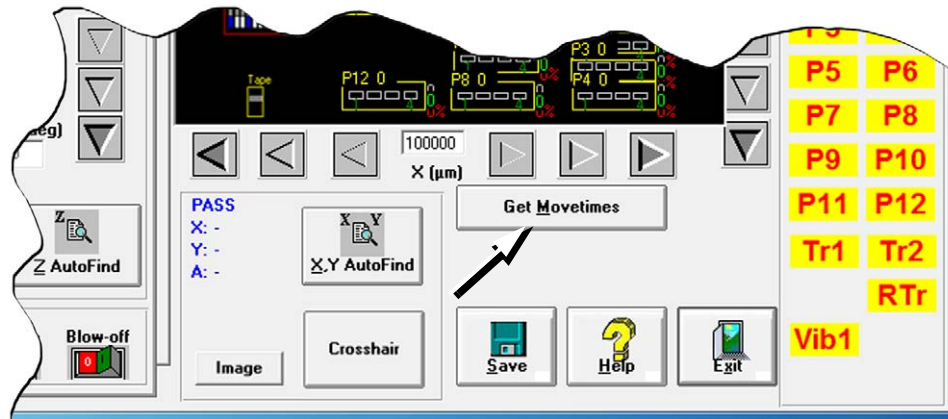
Figure 3-4: Click Get Movetimes to optimize head travel.

2. Click **Yes** when prompted to save positions.

Monitoring 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 described on the next pages:

- TaskLink's Session Data Logging feature
- the AH700 Statistics window
- (optional) Statistical Process Control Software (customer-supplied)
- Sort-on-Error-Code separates devices that fail specific, customer specified processes.

In addition, Data I/O offers additional utilities for enhancing yield and reducing errors. These include the Automotive Performance Pak (see page 3-34) and several other software packages and hardware such as Factory Integration Software (FIS) and Serial Number Server (SNS).

For turning ON Sort-On-Error-Code in the winAH400.ini file, see the AH700 on-screen Help.
For setting up Sort-On-Error-Code see TaskLink Help for PSV7000.
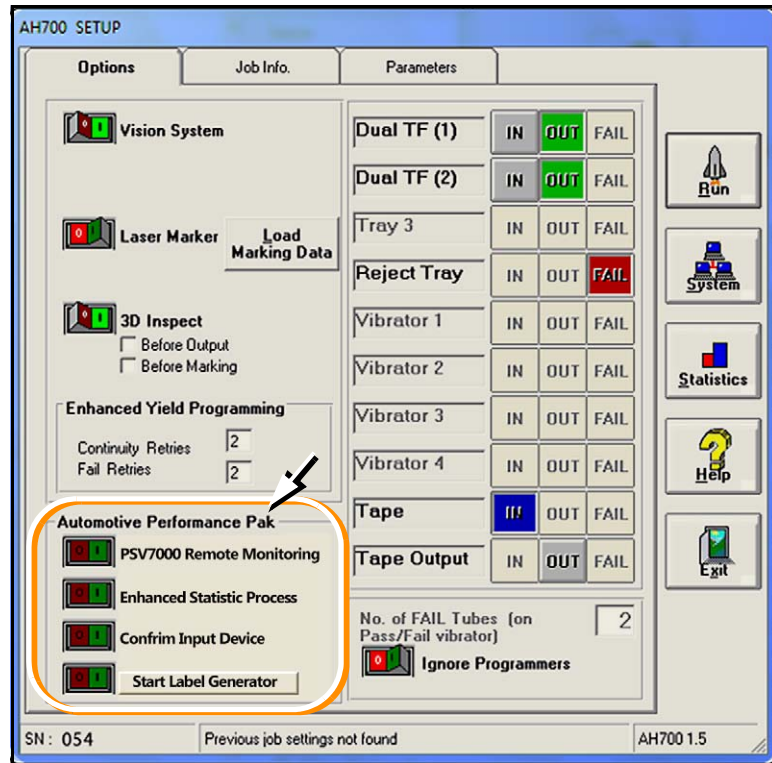
Figure 3-5: Automotive Performance Pak and some of its features.

TaskLink Session Data Logging

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

AH700 Statistics Window

PSV7000's AH700 software provides statistics that include: devices programmed successfully, *continuity* failures, and *verify* failures.

To view programming statistics using the AH700 software:

1. At either the **Setup** window or at the **Run** window, click **Statistics**.

2. Select either **Package Type** or **Job Statistics** from the drop-down field in the upper left corner.
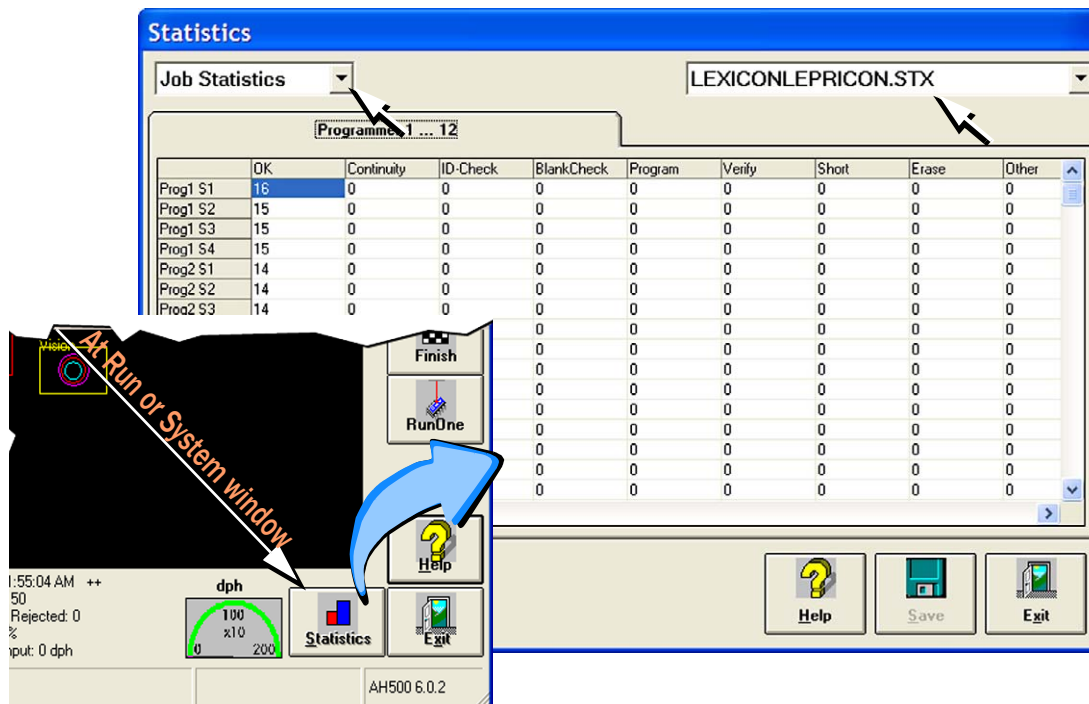
Figure 3-6: At the Statistics window, the Job Statistic file can be viewed (`Jobname.stx`) as shown. When Job Statistics is selected, Pass/Fail criteria are logged for each individual socket and programmer listed in the left column.
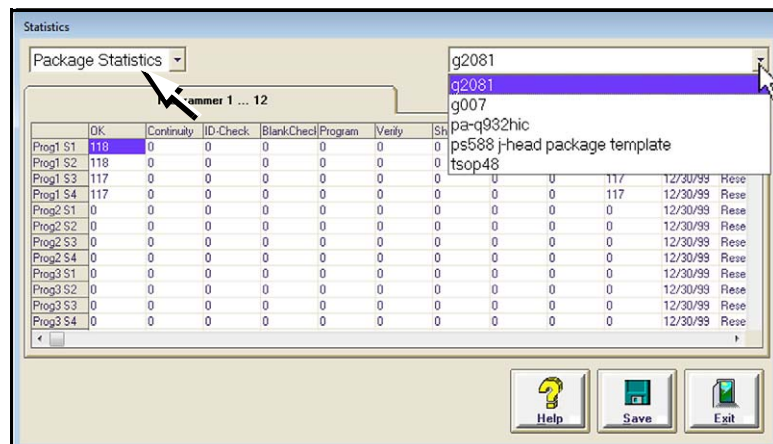

Figure 3-7: At the Package Statistics window, statistic can be viewed by Package Type (`PackageType.sts`).

Resetting Package Statistics

The Package statistics displayed correspond to the Package File and therefore to the Socket Adapter used. When a Socket Adapter is replaced on a FlashCORE programmer, statistics for that Socket Adapter must be reset.

To reset Package statistics:

1. Select **Package Statistics** in the drop-down field in the upper left corner.
2. Click **Reset** in the right-most column corresponding to the Flash-CORE programmer on which the Socket Adapter 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 all reset to zero.

*Only HIC Socket Adapters and HPS Socket Adapters are designed to accommodate replacement of individual sockets on the adapter board.

Figure 3-8: Resetting Package statistics. Open the Statistics window from either the Setup window or the Run window.

Statistical Process Control Software

The AH700 can be set to generate a semicolon-delimited file whose fields are described on the next page. A (customer-supplied) Statistical Control SW can be used to import and process data output by the AH700. Or use Data I/O's Enhanced Statistical Software that comes with the AH700; see page 3-34.

⚠️ *CAUTION: File corruption hazard! Before making any changes to your winAH400.ini file, save a backup copy.*

To generate a semicolon-delimited output file:

1. On the Handler Computer, navigate to C:\AH700 and open winAH400.ini (with Microsoft® Notepad or IDM Computer Solutions's UltraEdit®).

2. Locate the section for **SPC Logging**. It will look like this:

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

3. Set the second line (LoggingEnabled) to TRUE.

4. (Optional) Edit the location of the output file at the line "TempLogFile=..." entering the drive and path desired.

5. Save and close winAH400.ini.

Note: In the above example the SPC logging file is saved to `C:\` directory. It can, however, be saved elsewhere on the Handler Computer hard drive, or on a networked drive if network connected.

The SPCOut.txt file contains semicolon-delimited fields. A partial list follows:

The SPCOut.txt Field Descriptions

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

The SPCOut.txt Field Descriptions

18   Package - A *Package* File used for the job

If the Automotive Performance Pak is installed, an *extended* SPC log file (with APP enabled) would have the following delimited fields:

TimeStamp

JobName

JobDescription

Device

Package

VisionPRJ

RecordID

SystemStatus

SystemMSG

FromAreaID

FromPosID

DeviceStatus

WhichCup

SNused

ToAreaID

ToPosID

DevicesInspected

InspectionPassed

InspectionQuality

DevicesInserted-
Socket

SocketYield

ProgrammerYield

ProgSysYield

DevicesProcessed-
Marker

DevicesMarked

DevicesInputSys-
tem

SystemYield

SystemThrough-
putExcWait

SystemTo-
talThrough-
putIncWait

DevicesOutputSys-
tem

MachineID

ProgTime

*Inspection quality contains a 4 number record divided by the pipe [|], such as 1|2|3|4.

1: 100.0-> vision pass or XXX.X->vision error code
2: dX
3: dY
4: dZ

Example:
```
100.0|85.0|-152.4|-1022.4
```
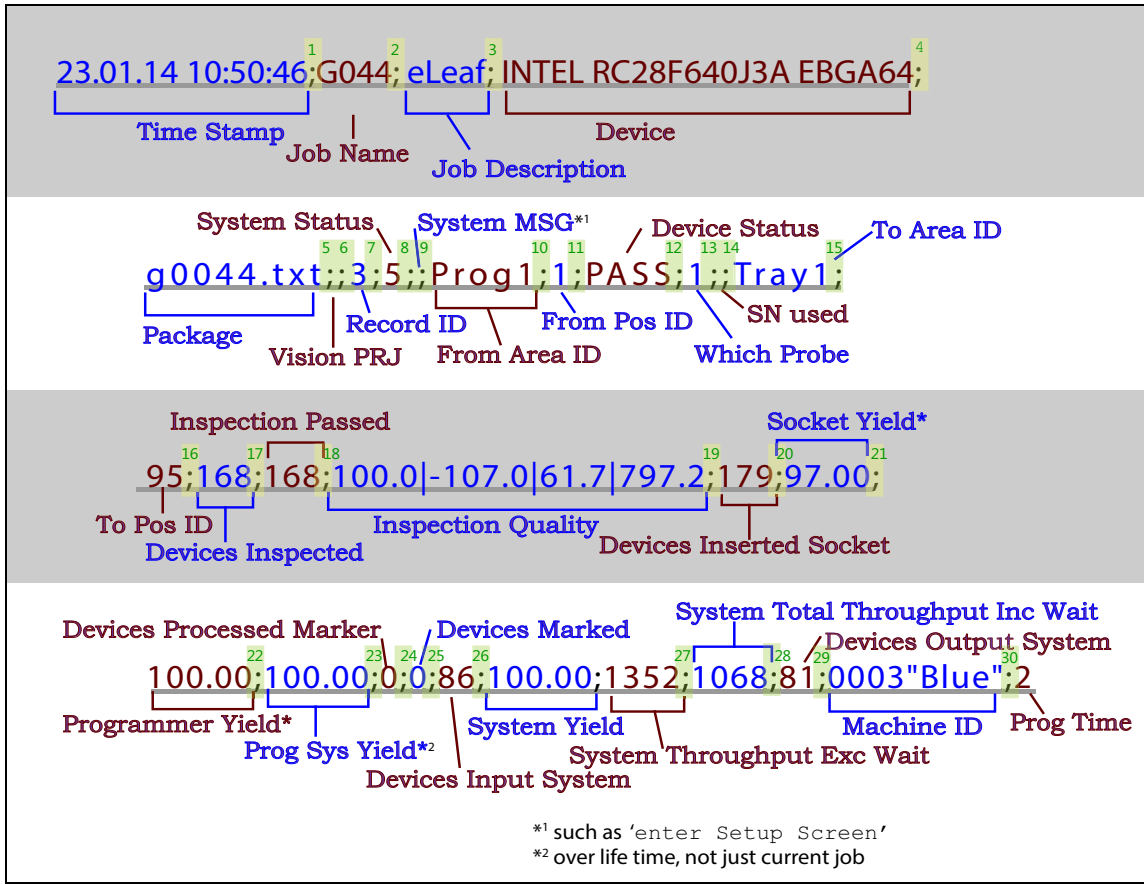
dX,dY are recorded in µm, dR is in µdegree

Figure 3-9: Sample SPC Log File line entry defined.

Maximizing Programming Yields

Occasional declines in system yields may occur during day to day operation of the PSV7000 System. While overall yield levels can vary depending on device manufacture, any steep change in yields is sufficient reason for investigation of an immediate cause of variation. These changes in yield can be attributed to a number of causes, including device quality control, socket issues, system maintenance, and process errors.

Quality Control 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 reteaching the Package File 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 vary. Programming yields can sometimes vary on a normal die. Device families recently introduced to the market tend to have more fluctuations in yields until 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 storage conditions.

☞ Programming yields decrease with the number of programming cycles. Devices that are processed more than once are more likely to experience problems.

Socket Issues

Socket life is generally rated by the manufacturer as the number of insertions per socket after which yields may drop significantly.

The programming sockets are perhaps the most important and vulnerable element of the PSV7000 System. 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 conditions that cause varying yields include the following:

☞ Debris of any type can prevent sockets from closing completely. Debris may not be visible. Simple actuation may clear debris, or

it may be necessary to clean sockets with low pressure, clean dry air.

Blow out sockets every day. Refer to *Inspecting the Socket Adapters on page 4-8*. Actuate the socket to blow out debris from beneath the contacts. More frequent cleaning is recommended in a dirty environment.

☞   Bent or distorted contact pins can cause intermittent socket failures.

System Maintenance that Affects Yield

PSV7000 machine maintenance is critical to maintaining high yields. Periodic cleaning, adjustment and replacement of worn elements ensures the best possible performance. These periodic procedures are outlined in *Maintenance Schedule on page 4-2* and should be followed closely.

Part of regular maintenance is ensuring that the system hardware is in good working order, and that settings are accurate.

To check programmer hardware see *FlashCORE Programmer Diagnostics on page 4-28*.

For accurate placement, ensure that workspace locations (also known as a Package File) are taught correctly.

If throughput is down, perform Get Movetimes again: see *Optimize Movetimes on page 3-11*.

Process Errors

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

☞   Using old algorithms may affect programming yields. PSV7000 System algorithms are updated weekly at http://www.dataio.com/algorithms/ and are available depending on your maintenance plan. Algorithms are updated vis TaskLink. See TaskLink Help for more information.

☞   Selecting the wrong device part number for the job in TaskLink, and therefore the wrong algorithm.

☞   Selecting unintended programming processes in TaskLink (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 (selected in TaskLink).

☞ Socket abuse, such as digging failed devices out with sharp instruments.

☞ Changing to a questionable vendor source. Lower quality devices tend to produce lower yields.

(Optional) Creating a Data File from a Master Device

The PSV7000 System can read data from a master device and create a data file (also called a *PC File*) that can then be used in programming jobs.

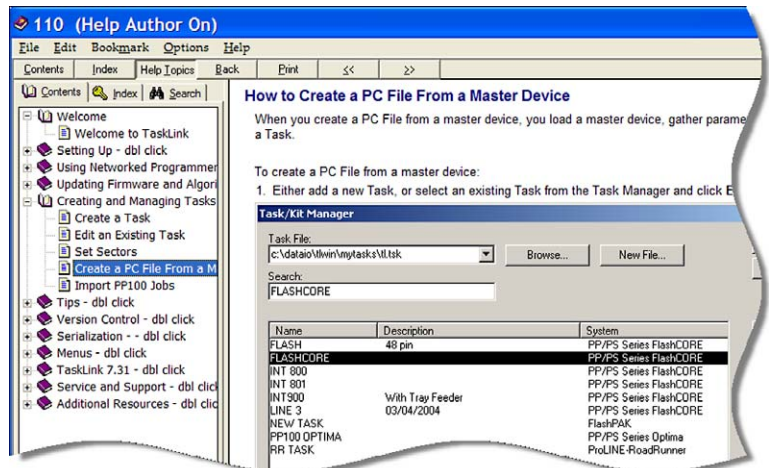For complete instructions on creating a data file from a master device, see TaskLink online Help.
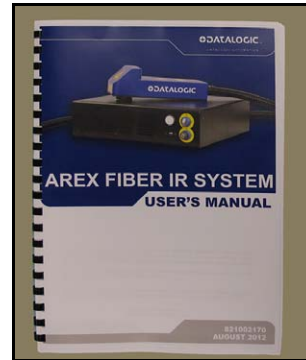

Figure 3-10: TaskLink's online Help includes steps for creating a computer file from a master device.

Marking Options

A laser Laser Module is an option which marks the surface of the devices. It has a separate Operation Manual which came with your PSV7000 System if it has the option.

Laser

Figure 3-11: Manual for the laser device marker.

(Optional) Creating a Laser Marking File

Laser graphics used to mark devices are generated using the Lighter Editor software included with the Laser Option. It resides in 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.

For instructions creating an image file for the Laser System, see the AH700 on-screen Help topic *Setting up and Teaching > Create a Laser Marking File*.

Verifying Proper Laser Operation

> *WARNING: Possible health hazard from toxic fumes! Laser marking generates vapors, fumes, and particles that can be noxious, toxic, or even fatal. Follow maintenance procedures. Use proper ventilation.*

Requirements
- An image file is in the Lighter Editor SW application.

To verify that the laser is marking as expected:

1. At the Run window, click **RunOne**.
   Only one device will be processed.
2. Verify that the marking graphic placement on the device is as desired. If not, adjust the laser file in the Lighter application or see the next heading on troubleshooting.

Aligning Laser Marking

Requirements
- Two people
- An image file is in the Lighter Editor SW application.

If the device is not marked, check that the laser is aimed at the device correctly:

1. Stop any job that is running by clicking **Finish** on the Run window.
2. Turn the Laser PC *Enable Selector* OFF. (The Key Selector should be ON.)

> *WARNING: Serious injury hazard to eyes and skin! Do not open or work on the Laser Module when the Enable Selector is in the ON position. Always make sure it is OFF. The two lamps on the back of the Laser Module must be green.*

Figure 3-12: The Laser PC Enable Selector (arrow) and the Key Selector.

The Laser is warmed up when you see a tooltip in lower right corner of the Windows tray.

3. Switch to the Laser PC by pressing the Scroll Lock (ScrLk) keyboard key twice and then number 2.

4. If the Lighter SW Engine is open, close it.

5. Navigate to your laser art file on the Laser PC: `D:\Data\docs\layouts\`. Files have a **.xlp** extension. Double-click your file to open it in the Lighter Editor SW.

6. Click **Switch to Manual Mode**. The **Limits All** button becomes available.
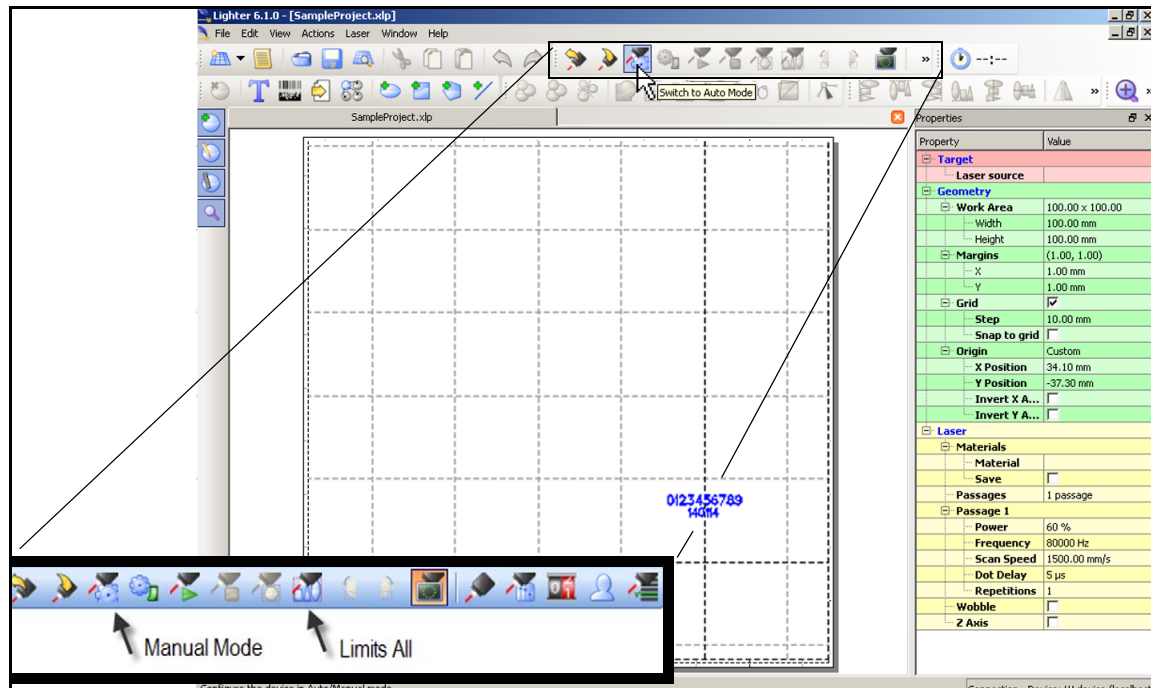

Figure 3-13: The Manual Mode button enables the Limits All button.

7. Click **Limits All** to turn on a low power laser target light.

8. Have operator #2 open the PSV7000 rear safety door and unscrew the knurled screw on the inspection door of the Laser Module.

9. Push the hinged inspection door down (open) about just enough (about 20 mm) to see the red laser light striking the rotor. See the figure below.
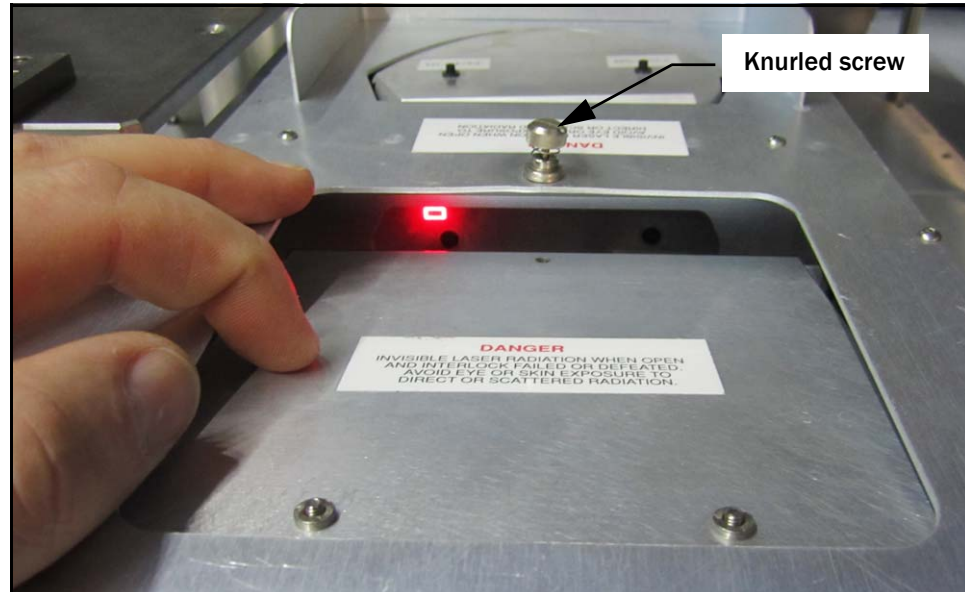

Knurled screw

DANGER
INVISIBLE LASER RADIATION WHEN OPEN
AND INTERLOCK FAILED OR DEFEATED.
AVOID EYE OR SKIN EXPOSURE TO
DIRECT OR SCATTERED RADIATION.

Figure 3-14: The laser is missing the target in this photo. Only this left target position must be aligned.

10. If the laser light is not centered on the device tip, then select the art to be marked and drag it as directed by operator #2. Zoom in for ease of use.

Note: The actual target laser light moves in the opposite direction of art movement in the Lighter Editor.

11. When satisfied, Save your changes.

12. Close the inspection door and tighten the knob.

13. Retry Running One device. Refer to the previous heading.

If all appears correct and still there is no mark, contact Data I/O Customer Support.

Note: The Laser rotor has been leveled at the factory. If you experience trouble, contact Data I/O Customer Support.

3D Coplanarity Option

The 3D Coplanarity Inspection System should already have the correct prism Reticle installed. If it has been changed or altered, refer to the UltraVim User Manual or contact Data I/O.

Requirements

*   UltraVim Scanner Technologies Accessories Case (all equipment required is in this case)
*   UltraVim Software User Manual
*   TaskLink Ver 7.5 or higher
*   The 3D Coplanarity Inspection System should already have the correct prism *Reticle* installed. If it has been changed or altered, refer to the UltraVim User Manual or contact Data I/O.
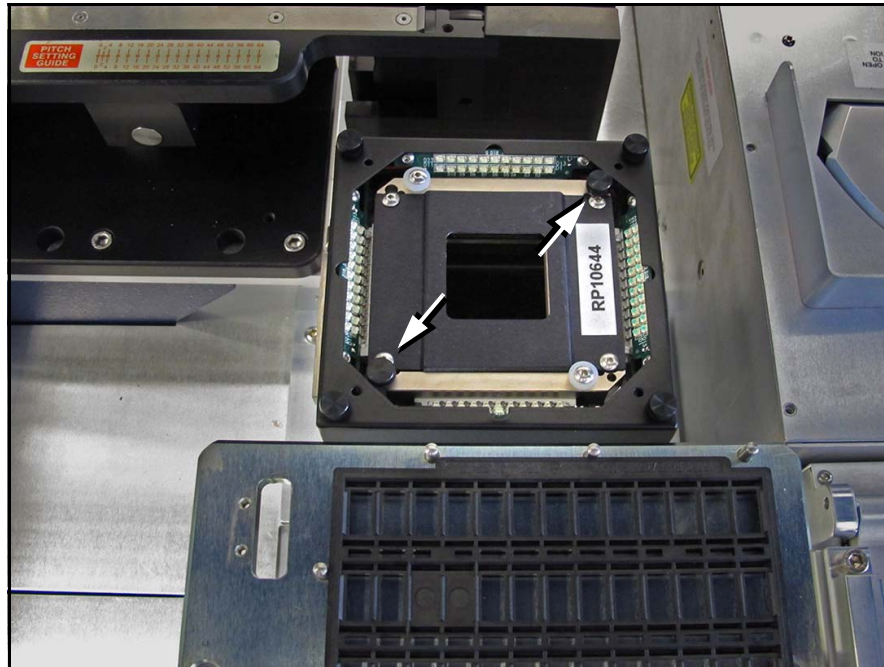

Figure 3-15: Top view with Prism Reticle installed. (Reticle fasteners at arrows). Ref: also visible in this view are the Laser Module Option and the Tape-Out Option.

Running a Job with 3D Inspection

1. Start the 3D Inspection PC as follows:
    1a. The 3D Inspection PC is just below the Handler PC. Open the PC door with the key and push the Power switch ON and release.
    1b. Close and lock the door.

2. Toggle the monitor connection to the 3D Inspection PC by pressing keyboard **Scroll Lock** key twice, and then press 2 or 3 immediately (depending on the number of options installed).

Note: NOTE: When viewing the 3D Inspection PC, use the keyboard and touch-pad. The PSV7000 touchscreen monitor will not register touches.

---

3. Open the UltraVim application (double-clicking the desktop icon).

4. A file for your device type is required. There are three choices to accomplish this:
   A) Use an existing file in the UltraVim Package Library,
   B) Copy, paste, and rename an existing file, or
   C) Create a new file.

   File extensions are:

*.BGA	Ball Grid Array
*.PAR	Gull Wing and J-Lead
*.LCC	QFN and LCC

---

*Note: There is also a *.MRK file for Mark & Package inspection.*

---

*When creating your job in TaskLink, you may want to check the **UltraVim Package Library** to ensure that your target package is available.*
1. Open the UltraVim Application.
2. Click Select.
3. View library

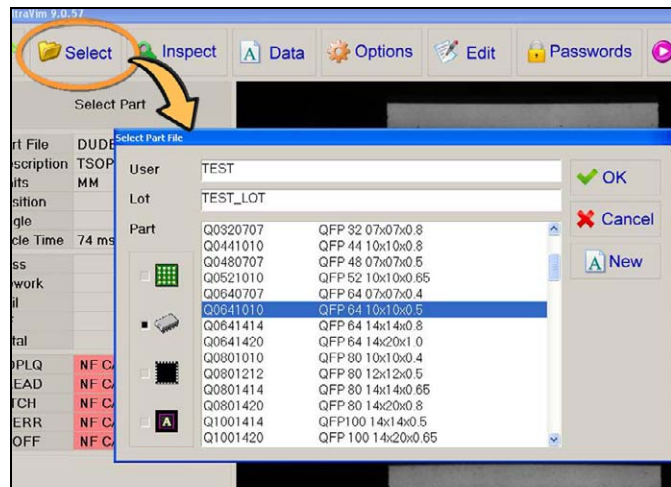*Refer to the UltraVim User Manual for instructions.*

Figure 3-16: In the UltraVim application, clicking Select (circled) opens the 'Package' library. This window may be password protected. See the UltraVim User Manual for Help.

To create a new device file, or edit an existing one, click Edit and enter data from the device specifications.
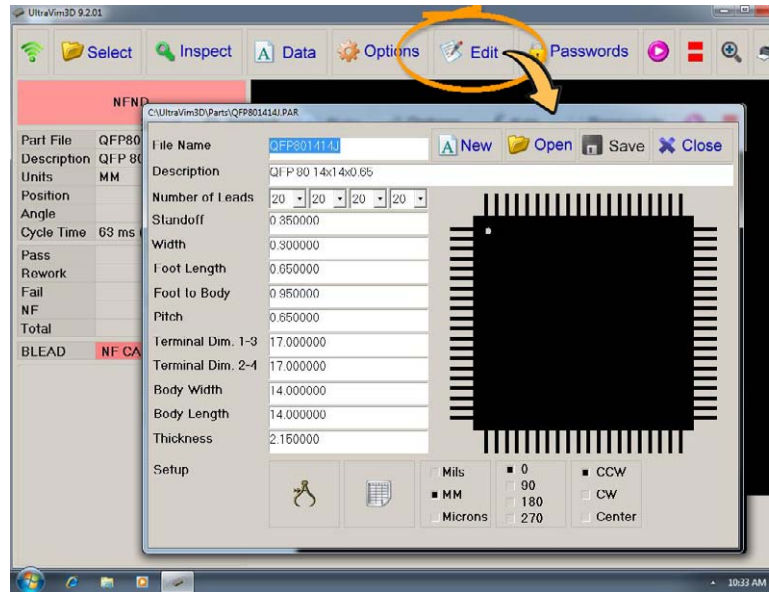
Figure 3-17: Adding or editing a device specifications file.

5.   On the PSV7000 keyboard, push the monitor toggle sequence to switch back to the PS Handler computer (**scroll lock** key twice and then 1).

6.   For the desired job in TaskLink, open the **Edit Task** dialog > **Handler Files** tab. In the **PS Job Options** field, type in the name of the device file you created; (the UltraVim manual terminology is *part* file). These files are stored on the 3D Inspection System computer.
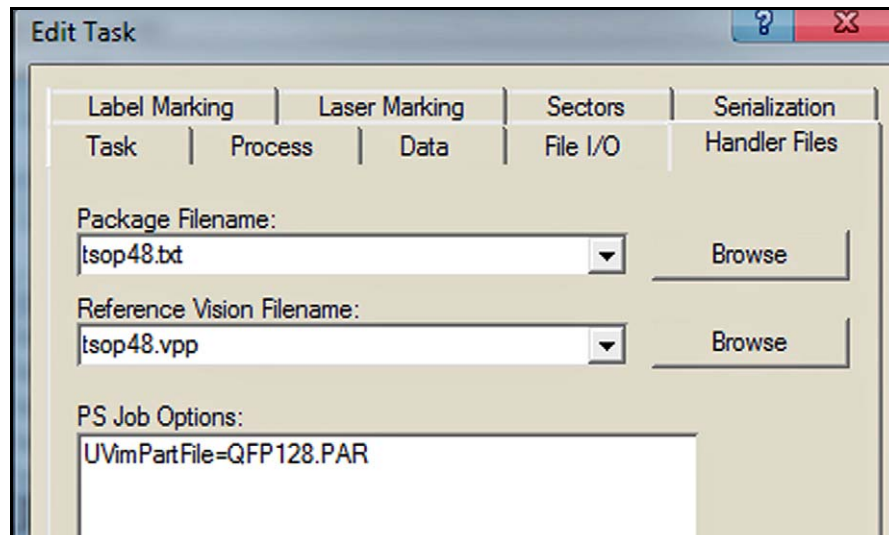

Figure 3-18: : The PS Job Options field (TaskLink > Edit Task > Handler Files) is an editor that you type into directly which passes parameters to the AH700 Software.

7.   Save the job.

8. If your job has not been run before using the 3D Inspection System, the Package File will need to be taught the location of the 3D Inspection System. (Refer to the AH700 on-screen Help for similar edits to the Package, such as teaching a tray location.)

9. Run your job.

*Note: Typical AH700 options are available such as the **Ignore Programmers** feature (on the Options tab) if 3D inspection only is desired without programming devices.*

3D Inspection Results

For each device inspected, UltraVim displays an image of the device as well as a graph and other data.

A good inspection image displays all green dots on the all the leads. See the two images below.

Note: Specifications for Rework and Fail can be edited.

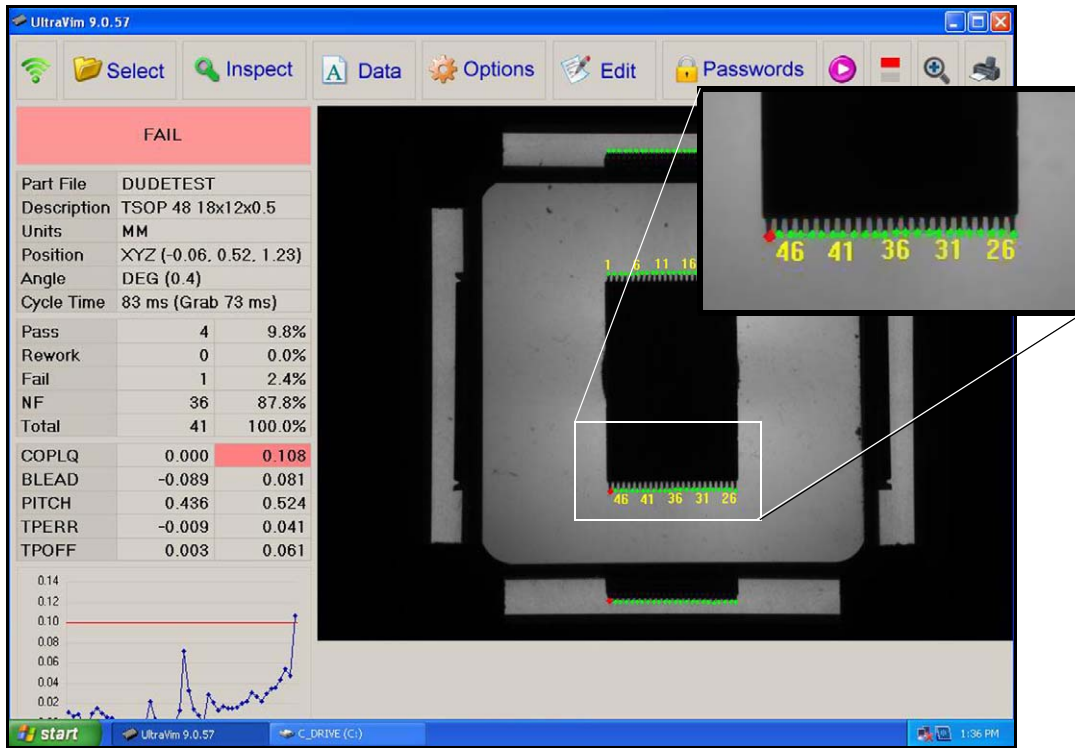Figure 3-19: A good inspection image. The dot at each lead is green.

Figure 3-20: This inspection image shows 1 lead failed (see the red dot).

3D Troubleshooting
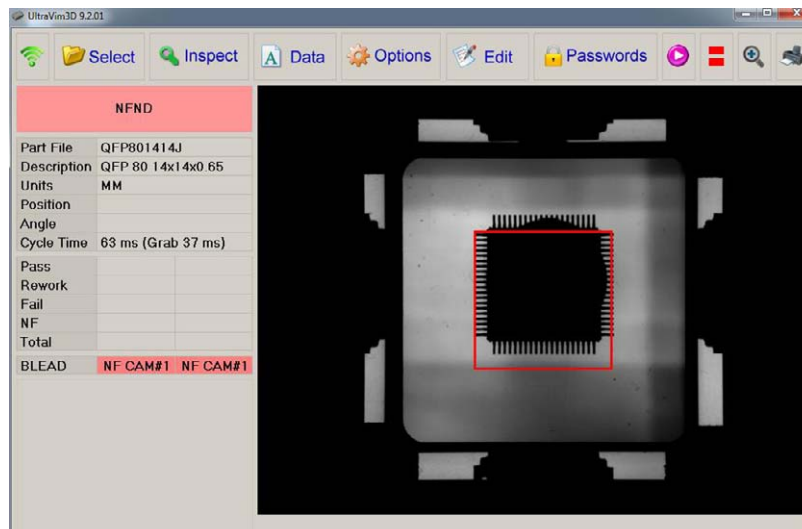
●●➢Probe goes down too low.

Figure 3-21: Probe is too low: you can see the probe tip all four of the side views.

☞   Resolution: Adjust the Z-height in AH700.

Turning OFF the 3D Inspection Computer

The 3D Inspection PC generally does not need to be turned off until the PSV7000 System is shut down. However, if it will not be used again for several days, follow this procedure:

1. Toggle back to the 3D Inspection PC (keyboard key sequence **Scroll-Lock > Scroll-Lock > 3**) if not already there.

2. Shut down the PC **using the Windows Start menu**. (It is not necessary to close the UltraVim software first.)

To turn the 3D Inspection PC back ON, open the PC door with the key and push the Power switch ON and release.

Additional Features

Automotive Performance Pak

Data I/O offers several utilities that are especially useful to certain industries. These utilities, labeled the Automotive Performance Pak (AP Pak), are described below. If your PSV7000 System does not have this feature, it can be ordered and installed.
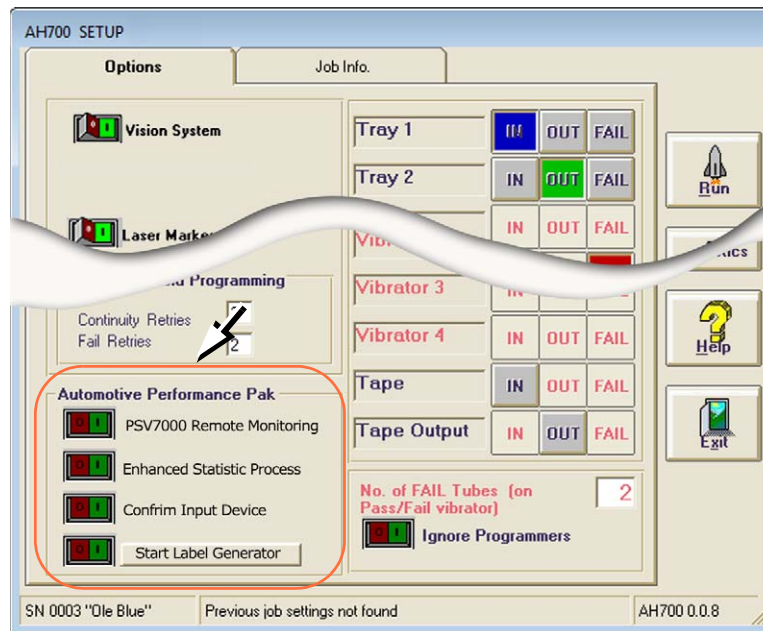
Contact Data I/O Sales.

Figure 3-22: The Automotive Performance Pak features appear in the Setup window.

Automotive Performance Pak Software Descriptions

The Automotive Performance Pak (AP Pak) includes the following software and hardware components.

Remote Monitoring

This application runs on a remote PC and displays Pass, Fail, and Yield information of networked PSV7000 Systems. Up to ten systems can be monitored.

Enhanced Statistics

The Enhanced SPC (Statistical Process Control) application is a standard feature on AH700 Ver 1.5+ and allows precise tracking of machine behavior such as uptime, downtime, yields, and

throughput. It produces job log files that are readable with Microsoft® Excel and Access software to graph the data. (Excel and Access required.)

Confirm Input Device (AP Pak Option)

This safety enhancement checks that the input device is the correct one for the job each time the input media is changed. When a job starts or when the input media (such as Tape-In or Tray Feeder) is empty, a barcode must be scanned to continue. This barcode must match the value setup in the TaskLink task. Typically, it is the raw material part number of the devices.

For information about setting Confirm Input Device, see TaskLink online Help.

Label Generator (AP Pak Option)

This separate application is a utility for designing labels for reels of device tape or other media. Choose size, number of fields, and layout. Call up variables from TaskLink or enter new content. Print on-demand or automatically after each reel of devices.

Ordering and Installing

Ordering the AP Pak involves sending Data I/O a number from the **Setup** window in AH700 with your purchase order. Data I/O will send a security file via return e-mail. Complete instructions along with the installation procedure are in the AH700 online Help: find *Automotive Performance Pak* in the online Help index.

Maintenance

Performing the maintenance procedures described in this chapter optimizes operation of your PSV7000 System, enhances longevity by minimizing wear and malfunctions, and reduces any downtime.

The manuals that came with any optional equipment on your system may contain additional maintenance procedures.

> *Note: Only individuals trained on these procedures by Data I/O or its representatives are qualified to perform maintenance on the PSV7000 System.*

A handy sign-off chart is at the end of this chapter.

This section describes the preventive maintenance schedule for the PSV7000 System and equipment options, with topics appearing in this order:

Maintenance Schedule

This Maintenance Interval Chart below recommends intervals based on single-shift daily usage. Information about the specified procedures and intervals can be found on the pages referenced in the right column.

Make copies of this chart and post near your work area.

Date completed / initials	Component	Action (see precautions also, on page listed)	Page
Items to check Every Day			
Every day	Sockets	Clean with dry compressed air. Check for wear; replace if necessary. For HIC Socket Adapters, see more information in customer letter *Cleaning HIC Sockets* (PN 983-5053) on our web site Technical Library. This link opens the PDF which lists cautions and suggested items, such as Cleaning brush (PN 5655500901) and ProGold Wipes (PN 5705500902).	page 4-8
Every day	Input air pressure	Verify the input air pressure at the regulator is within specifications and that it is constant, that is the Nm3/min. [Normal Cubic Meter/min.] (SCFM) must be stable. For specifications, see *PSV7000 Air Requirements Table on page 2-3*.	—
Items to check Every Week			

* denotes optional equipment

Date completed / initials	Component	Action (see precautions also, on page listed)	Page
Every week	Programmers	To help ensure there are no problems with the programmer hardware, run the programmers' Self-test once a week at a minimum; more often is even better. The Power-On-Self-test (POST), which sets precision to a laser-trimmed reference, runs when programmers are powered up . This insures proper operation of the programmers voltage sources. **CAUTION: Possible damage to programmers and devices! DO NOT TURN AIR OR POWER OFF to the PSV7000 Machine while a job is running.** *A job must be* Finished *before turning OFF compressed air or electrical power. Wait for the gantry to park before turning OFF.* Run the Self-test by either **A**) turning the PSV7000 System power OFF properly and then ON (*Shutting Down the PSV7000 System on page 2-7*) or **B**) turning OFF only power to the programmers, and then ON, with the *Programmer Power Switch* on the Power Panel. If there is a programmer issue, a message will display when the next TaskLink job is run. RESTART PROGRAMMERS ON OFF —Refer to the Operator's Manual for switch locations.	—
Every week	General system	Clean surfaces of equipment and all areas in workspace with a clean brush, cloth, or dry compressed air.	page 4-12

* denotes optional equipment

Date completed / initials	Component	Action (see precautions also, on page listed)	Page
Every week	Probe tips, on the PNP head	• Inspect Probe Tips to make certain they can create a good vacuum seal on the device. Replace if probe tip is worn, cut, or damaged. • Clean the PNP Probe tips with alcohol wipes (Data I/O PN 570-0410-001) or a damp cloth. *Note: Do not touch the probe tip with bare hands. Finger oils can cause small devices to stick.*	page 4-14
Every week	Laser Marking*	Clean the Rotor Probe tips.	page 4-35
Every week	Data I/O Dual Tray Feeder*	Check the Data I/O Dual Tray Feeder for damaged or broken parts. Check the conveyor belt and the black inside side guides for dirt, nicks, or other signs of damage. For more information, refer to the Dual-Tray Feeder Operator's Manual.	—
Every week, or as needed	3D Coplanarity Inspection System*	Blow off the 3D Inspection System glass lens with clean and dry compressed air, or wipe gently with lens tissue or soft cloth. Pre-moistened wipes (Data I/O PN 5700410) can also be used. Check the Accessories that came with your system.	—
Items to check Every Month			
Every month	Data I/O Dual Tray Feeder*	Clean and Inspect the Data I/O Dual Tray Feeder.	page 4-61
Every month	Supply line air filter	Check the main air filter and replace if necessary. Drain fluid.	page 4-18
Every month	Vacuum Generator filters at PNP head	Check vacuum generator filters; replace as necessary.	page 4-19
Every month	Laser Marking*	Clean the Laser housing to remove laser marking dust.	page 4-34
Item to check Every Three Months			
Every quarter	Device Position Sensor	Clean the sensor windows. Clean more often in environments that demand it. Click the AH700 **Check Image** button to determine if cleaning is necessary.	page 4-12
Every quarter	LCD Display	(Quarterly or as needed) Clean the monitor with consumer-grade ammonia glass cleaner. Spray window cleaner onto a soft, lint-free cloth and wipe the screen. DO NOT APPLY liquids directly to the screen. DO NOT USE alcohol or industrial chemical cleaners.	—

* denotes optional equipment

Date completed / initials	Component	Action (see precautions also, on page listed)	Page
Every quarter	Safety doors	Clean with damp cloth.	—
Items to check Every Six Months			
6-mos.	PNP head	Check; tighten if necessary.	page 4-22
Every 6-mos. or as needed depending on use	Laser Marking System* Tiger Fume Extractor	Clean the **nozzle and extraction tube**. Replace the **Pre-Filter**. . . . . Replace the Tiger **main filte**r twice yearly, or whenever the Tiger System alarm sounds and blinks the red lamp.	page 4-36 page 4-36 page 4-36
Every 6-mos.	Handler Computer	Clean the Handler Computer air filter.	page 4-41
Every 6-mos.	Laser Computer*	Clean the Laser Computer air filter.	page 4-39
Every 6-mos.	3D Inspection Computer*	Clean the 3D Coplanarity Inspection Computer air filter.	page 4-43
Items to check Once a Year			
Every year	Gantry guide rails (every 2 million devices or one year, whichever comes first)	Clean and lubricate annually, or sooner if the gantry becomes noisy.	page 4-22
Every year	FlashCORE programmers	Run conformance verification test using Data I/O's DAB, part number 910-2200-003 or higher. Or have a Data I/O Service Technician perform the test. Customers with an APS contract have some costs of the test covered in the agreement.	page 4-28
Every year	Vacuum Generator silencers PNP head	Check vacuum generator silencers; replace as necessary.	page 4-21
Every year or as needed	Gantry Belt	Check Gantry belt tension. Required: PSV7000 SELF-SERVICE SPARES KIT	page 4-23

* denotes optional equipment

Materials Required

To perform preventive maintenance procedures on the PSV7000 System, in general you need the following materials.

Note: Specific items are noted at each individual procedure.

Generally Required Items

- Lens cleaning paper (Data I/O PN 570041)
- Water dampened cloth for cleaning
- Isopropyl alcohol
- Antistatic cleaner
- Dry, compressed air
- Safety goggles
- Disposable protective gloves
- Particle (dust) mask
- SAE *and* metric hex socket wrenches and hex keys (Allen Wrenches). Data I/O hex key set PNs: Metric 565-0006-001, and Standard 565-0007-001
- Screw driver sets, flat and Phillips
- Metric open end wrenches for the probe tips
- Shop vacuum cleaner
- Self-Serve Spares Kit (page 4-7)

Turning Off the System

When the PSV7000 System will not be used for several days, or before performing a service procedure, turn OFF the system.

See *Shutting Down the PSV7000 System on page 2-7*.

Self-Service Spares Kit

The Self-Service Spares Kit, Data I/O part number 952-0508-001 or higher, can be purchased at any time.

Some items the kit contains:

910-2200-00d or higher: Diagnostics Adapter Board (DAB) for programmer calibration (Sales PN: FC-DIAGNOSTICS BOARD)	565-0222-001 or higher: Gantry Belt tension tool
750-2474-001 or higher: an entire probe assembly	480-0070-001 or higher: 16-port VLAN Ethernet hub
750-2464-001 or higher: programmer power supply	2940220001 or higher: Pneumatic Silencer

Workspace, Head and Gantry

The workspace includes the Socket Adapters and items on the working surface, except not the programmers. They are covered in a separate heading.

Socket Adapters and Actuation

Under this heading you will learn about visually inspecting, cleaning and adjusting sockets, actuation, and air pressure for the workspace items.

Inspecting the Socket Adapters

The condition of the Socket Adapters has great throughput consequences.

Socket Life

The Run window displays the Socket Adapter lifetime actuation count in yellow until it is exceeded at which time it changes to red.
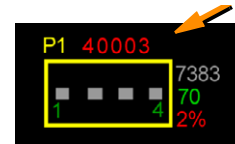
Socket Cleaning

> **WARNING:** Vision hazard! Pressurized air or debris blown into the eyes or skin could cause bodily damage. Always use care and wear protective eye goggles when cleaning with pressurized air.

1. Use clean, dry compressed air (at 6.2 Bars (90 PSI or less) to remove dirt from the sockets. Actuate the sockets while blowing them out.
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.

Turning OFF Input Air

Prior to turning off the input air, ensure that no job is running.

> ⚠️ **CAUTION:** *Possible damage to programmers and devices! DO NOT TURN AIR OR POWER OFF to the PSV7000 Machine while a job is running.*
>
> *A job must be* Finished *before turning OFF compressed air or electrical power. Wait for the gantry to park before turning OFF.*

1. If a job is running, **Pause** or **Finish** it.
2. On the Power Panel, rotate the valve clockwise to turn OFF the input air; it is off when the lock rings line up. See Figure 4-1.

Figure 4-1: The input air regulator/filter on the Power Panel (on the left side of the machine). When the lock rings on the valve line up, the air supply to the PSV7000 Machine is OFF.

3. (Optional) Paddle lock the air shutoff valve.

Adjusting the Socket Actuator Air Pressure on the Programmers

Socket Actuators are built into the FlashCORE programmers on PSV7000. Socket actuation is controlled by air pressure. If Socket Actuators are slamming up and down loudly, or devices are bouncing, the air pressure may be too high. If the PNP head does not properly pick or place a device in a socket because the socket is not opening completely, the air pressure might be set too low.

Adjust the air pressure setting as follows:

1. Finish a job if one is running.
2. Navigate to the Gantry window and click the yellow label for a programmer that is easy to see.

3. At the **Actuator** Tab, click **Actuate Socket** ON and OFF to visually verify performance for reference.

Figure 4-2: The Socket Opener Pressure Control knob with built-in gauge on the Power Panel.

4. At the Power Panel on the left side, adjust the air pressure up or down as desired by pulling the collar on the black knob out and then rotating it.

5. Push the collar back in.

6. Actuate the socket as before to verify the change in action.

7. Repeat if necessary.

Note: If Socket Actuator problems persist, set the actuator speed (refer to the next heading).

Adjusting the Socket Actuator Speed on the Programmers

THE SOCKET ACTUATOR SPEED WAS SET AT THE FACTORY AND SHOULD NOT NEED ADJUSTMENT. If it is determined that adjustment is necessary, this procedure requires a Data I/O trained technician since it requires having an access door open while the machine power is on.

Requirements

• Programmer air pressure must be correct. See previous heading.
• Small flat screw driver.

To adjust the speed of the Socket Actuators:

1. Ensure that power and air are connected and ON, and a Socket Adapter is installed on the target programmer.

2. At the Gantry window, click the label for a programmer with the adapter installed. Probe 1 will stop over socket 1.

WARNING: Electric shock hazard! Opening any access doors while the power is ON can be dangerous even when steps instruct you to do so. Use extreme caution and do not touch any electronic equipment except as directed.

3. Open the access door nearest the target programmer and locate the in-line air flow control for the up (sockets closed) position. Refer to Figure 4-3.

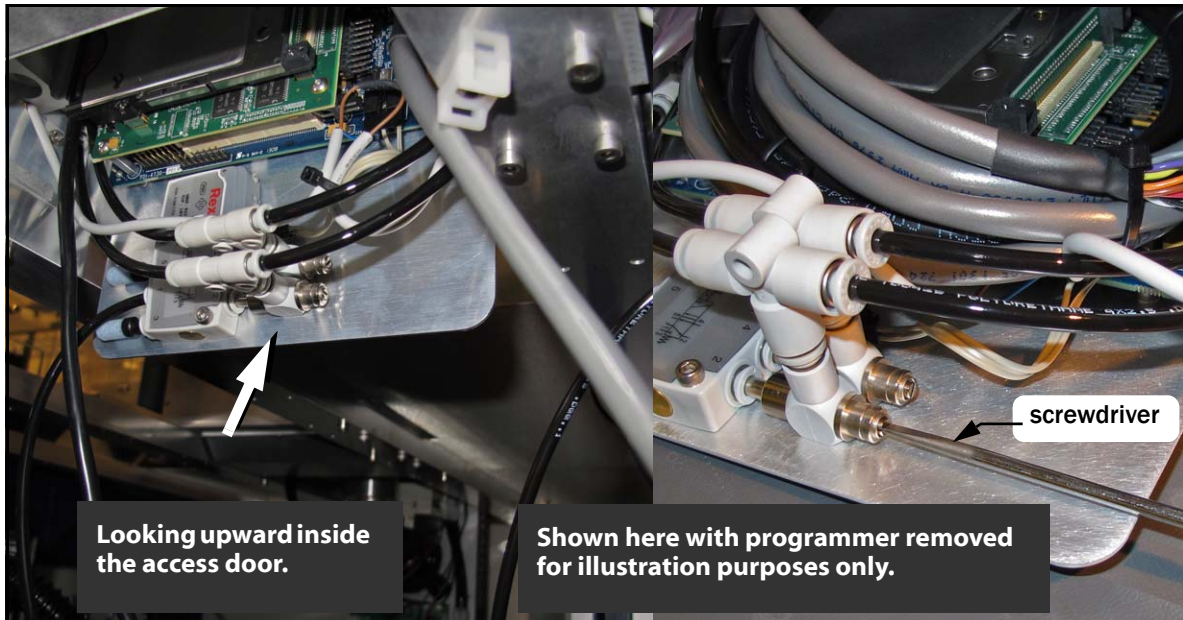**screwdriver**

Looking upward inside the access door.

Shown here with programmer removed for illustration purposes only.

Figure 4-3: Actuator flow controls (arrow). The lower one (that the screwdriver is at) sets the UP speed.

4. Adjust the appropriate flow control 1/2 to 1 revolution clockwise for slower action, or counter-clockwise for faster action.

5. Close the access door, and clear the *door open* warning on the monitor.

6. At the **Actuate** tab of the Gantry window, click the **Actuate Socket** switch to ON while listening and watching the opener.

If it is too fast it will produce a louder noise than optimum when it operates. If it is too slow it will look slow.

7. Click **Actuate Socket** OFF.

8. Adjust the flow controls as necessary and repeat the test.

9. Perform the same procedure for the other flow control if necessary.

Cleaning the PSV7000 Machine

General Machine Cleaning

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

WARNING: Vision hazard! Pressurized air or debris blown into the eyes or skin could cause bodily damage. Always use care and wear protective eye goggles when cleaning with pressurized air.

For instructions to turn OFF the air, see page 4-9.

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

Cleaning the Device Position Sensor

Fingerprints and excessive amounts of dust or other residue on the optical windows of the Device Position Sensor will degrade the performance of the sensor. The sensor is mounted on the bottom of the PNP head.

If the sensors are not providing a good image, it may be an indicator that the windows need cleaning.
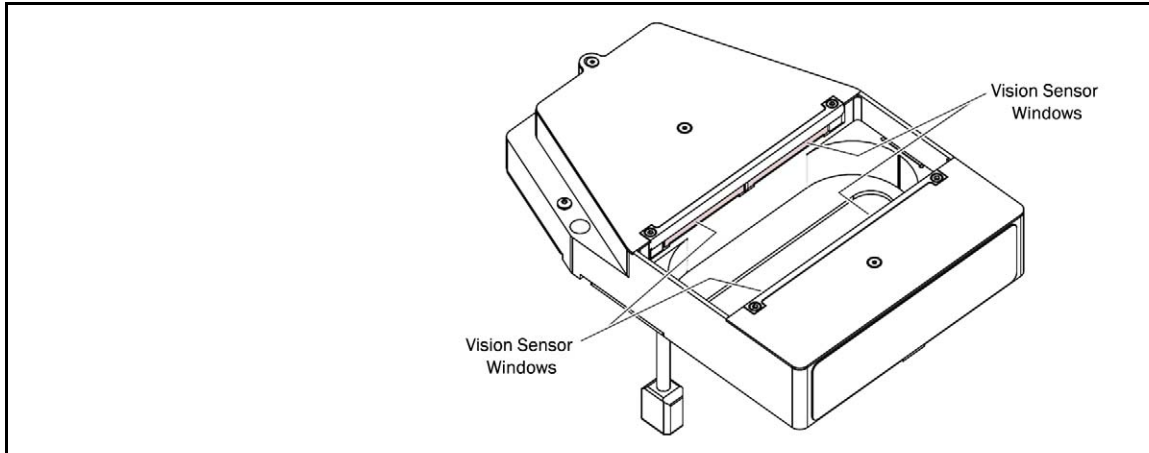
Figure 4-4: The Device Position Sensor.

Check the Sensor Windows

To check to see if the sensor windows are currently providing a good image:

• Open the Gantry window in the AH700 and click **Check Image**. The wavy line should be smooth. If it is jagged, clean the windows. For more information and an image, refer to the on-screen Help.

Clean the Sensor Windows

Requirements

• pre-moistened wipes (PN 5700410), or
• lens tissue (PN 570041)

The cleaning wipes are part of the Self-Service Spare Parts Kits.

To clean the sensor windows:

1. Brush dust off the sensor windows using a camel-hair brush such as an artist brush.
2. Remove fingerprints or other oily deposits; either use pre-moistened wipes or moistened lens tissue or cotton swab with a small amount of isopropyl alcohol.

> ⚠ *CAUTION: Product damage hazard! Wiping back and forth may re-deposit the debris and may damage the window glass. Wipe in a single direction, lift and repeat.*

3. Wipe each window once IN A SINGLE DIRECTION.
4. Using a dry tissue or swab, lightly wipe each window IN A SINGLE DIRECTION to remove any remaining alcohol or acetone residue.

Pick and Place Probes

The workspace Pick and Place head has two probes which require periodic maintenance. The headings below describe maintenance.

Checking the Probe Tips

Worn or damaged probe tips on the PNP head can cause dropped devices and placement problems.

1. Check the probe tips for cracks or tears. If necessary, replace with a probe tip of the same size.
2. Test the probe tip—
    2a. At the **Setup** window, click **System > Gantry**.
    2b. Click the **Vacuum** switch to **ON**.
    2c. Open the safety door and place a device on the target probe.
    2d. If the vacuum does not firmly hold the device, replace the probe tip with a probe tip of the same size.

Checking the Probes

Check that each probe is not loose. Tighten the set screw on the stem if necessary. If you suspect or hear an air leak (and your style of probe has a set screw):

1. Remove the set screw on the probe stem.
2. Pull off the probe stem and check the O-ring. Replace if necessary.
3. Reassemble.

Cleaning the Probe Tips

To clean the Probe tips:

1. Move the PNP head to a convenient position by clicking one of the yellow labels on the **Gantry** window. The **Tool** position is recommended.
2. Open the safety door.
3. Wipe the tip with alcohol wipes (Data I/O PN 570-0410-001) or a damp cloth.

Note: Do not touch the probe tip with bare hands. Finger oils can cause small devices to stick.

Adjusting Probe 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 air applied at the probes during the device drop event to assist in removing a device from the probe. *Blow-off* is produced by a vacuum generator on the PNP head. If set too high, *blow-off* could cause device misalignment during placement.

Tools Required

- Large flat screwdriver
- Very small flat screwdriver

To adjust blow-off pressure on any vacuum generator:

1. Click **System > Misc**. **I/O**.
2. At the **I/O Interface** window, select the desired vacuum generator, probe 1 or probe 2 (or both).
3. Click **Vacuum** to the **OFF** position. Refer to Figure 4-5.
4. Click **Blow-off** to the **ON** position.
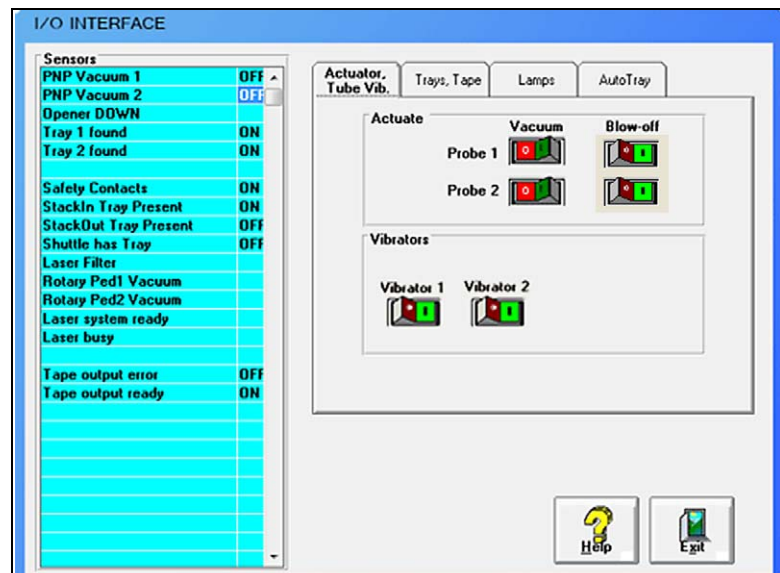
Figure 4-5: Vacuum and Blow-off on the I/O Interface window.

WARNING: Possible collision hazard! The high speed and force of the gantry can seriously harm anyone working inside the workspace.

When working within the machine workspace, moving the PNP head must be the responsibility of only one qualified individual. All others must stay clear of the machine controls to prevent injury to that person.

Ensure that a job is Paused or Finished, or the system power is OFF prior to opening any safety doors.

5. Locate the actual vacuum generator (Data I/O PN 815-0047-001+) on the right side of the PNP head. Find the blow-off adjustment set-screw. It is inside a long knurled stem which needs to be loosened before adjusting the set-screw. See Figure 4-6.
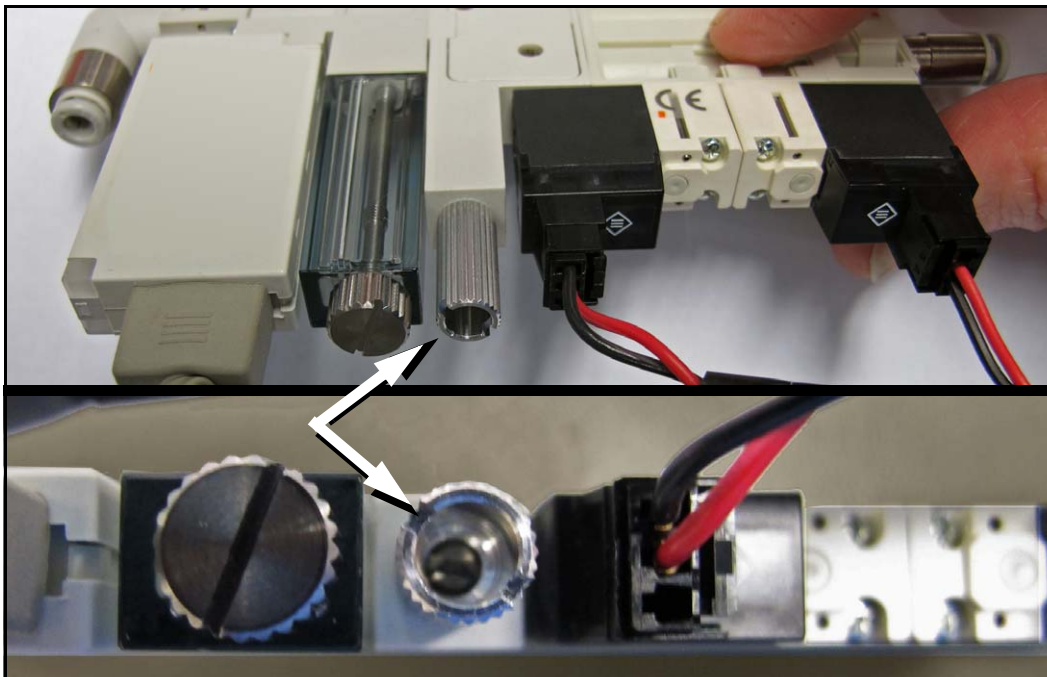
Figure 4-6: The Blow-off adjustment set-screw on the vacuum generator is inside a knurled locking stem (arrow). (The vacuum block must NOT be removed as shown here.)

6. Turn the adjustment screw until the vacuum generator readout displays +1.5 to 2.0 kPa.

7. While holding the set screw with the screwdriver, tighten the knurled stem.

8. Do the same for the other probe.

9. Click **Blow-off** to the OFF position.

If you had a blow-off problem, test your results.

Adjusting the Vacuum Generator Sensors

> *Note:* *If you notice consecutive programming pick errors, before adjusting vacuum sensors complete the Z-Axis adjustment. For instructions on Z-Axis adjustment, see Teaching the Workspace Locations on page 3-9. If completing the Z-Axis adjustment does not reduce or eliminate subsequent pick errors, complete the vacuum sensor adjustments described here.*

Vacuum sensors on the PSV7000 System are adjustable. The **I/O Interface** window displays a list of the sensors in the PSV7000 System and the status of each sensor.

> *Note:* *The number of sensors on the PSV7000 System depends on the options installed.*

To view the status of sensors at the main **AH700 Setup** window, click **System** > **Misc. I/O**.
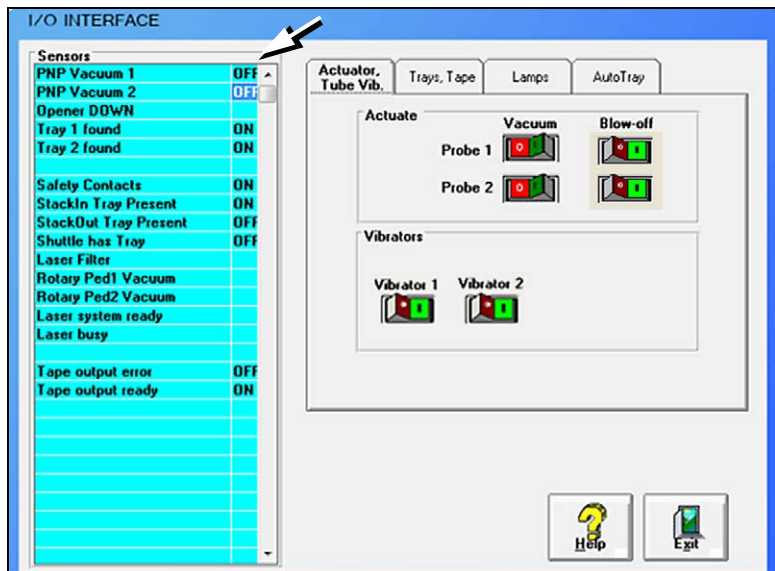
Figure 4-7: The I/O Interface window reports sensor status and allows switching options on or off. (The number of tabs vary.)

*Click the **Tool** label on the Gantry window to move the head for easy access; front and center.*

To Adjust Probe Vacuum Generator Sensors:

1. Finish a job.

2. At the Gantry window, move the PNP head to the **Tool** position

3. Close the Gantry window and at the System window click **Misc. I/O**.

4. At the I/O Interface tab, for both probes, click the Vacuum toggle ON and the Blow-off toggle OFF. Refer to the figure above.

5. Open the safety door.

6. With a device or clean finger, plug probe tip 1 and ensure the green generator lamp comes on. See Figure 4-8.
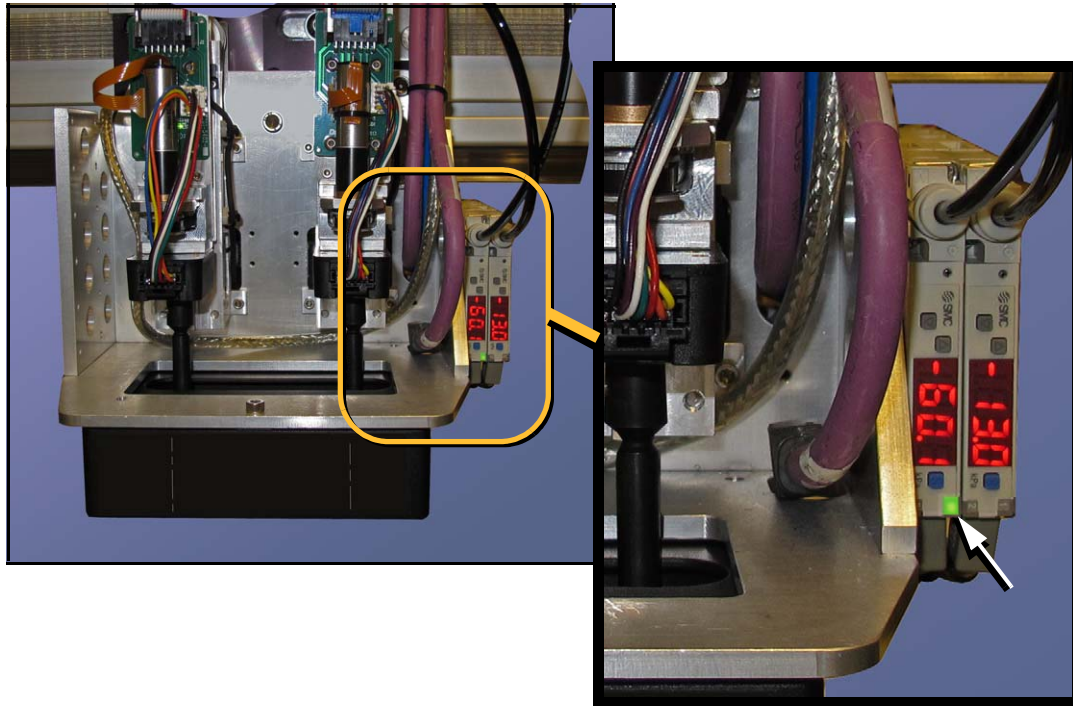
Figure 4-8: The PNP Probe vacuum generator adjustments. In this image, the green lamp for probe #2 is ON.

7. Read the high and low values each time you plug the air with your finger and release it. They are needed for the next step.

8. Set the trigger value on the sensor by pressing the S (blue SET) button on the vacuum generator block and then using the UP or DOWN buttons, set the value to midway between the high value and the low value. It should be approximately -40 kPa.

9. Press the SET button again.

10. Check adjustment by blocking and unblocking the probe tip several times and ensuring the green lamp goes on and off each time.

11. Repeat these steps for probe 2.

12. Turn OFF the vacuum switches for both probes.

Wipe the probe tips with a clean dry cloth.

Replacing the Input Air Filter

1. If a job is running, Pause or Finish the job.

2. Turn off shop air and disconnect the input air line from the Air Filter/Regulator at the quick connect fitting.

3. Unscrew the air contamination collection bowl housing.

4. Pull off the clear collection bowl. Clean out any dirt, oil, or water.

5. Unscrew the black knob below the filter.

6. Pull off the filter. Clean or replace as necessary.

Reinstall in reverse order being careful not to damage the O-ring on the bowl.

Reconnect the shop air supply line.
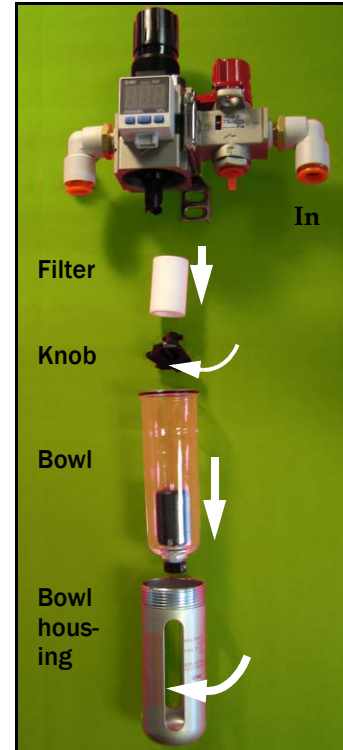
Figure 4-9: Replacing the Air Filter/Regulator.

Vacuum Generator Filters and Silencers

These procedures cover removing and cleaning or replacing vacuum generator parts for vacuum generators on PSV7000 head.

A clogged or dirty vacuum filter or silencer can cause dropped devices and placement problems at the PNP head.

Requirements

- metric hex key set
- flat screwdriver
- small Phillips screwdriver

Vacuum Generator Filters

1. Finish a job if one is running.

2. Use the **Gantry** window to move the PNP head to an accessible location such as the **Tool** position.

3. Properly shut OFF the PSV7000 System. See *Shutting Down the PSV7000 System on page 2-7*.

⚠ WARNING: Shock hazard! Opening the safety doors stops motion of the gantry only. It does not remove electrical power from the machine or any optional equipment.

Turn the main power OFF for safety unless otherwise directed.

4.   Open the front safety door and mark the wire connectors at the two vacuum pressure switches on the right side of the head for returning them to the correct location.

5.   For access, unplug the two wire connectors (just marked) by pulling them out. See Figure 4-10 below.

6.   With a flat screwdriver, unscrew the knurled fastener on the underside of the nearest filter housing. See the figure below.

7.   Remove the filter housing and ensure that the o-ring doesn't fall.

8.   Remove the next housing.

9.   Remove the filter from the each housing. They should be white or nearly white. If dirty or clogged, replace with new filter (Data I/O PN 294-0219-001+). See the figure below.
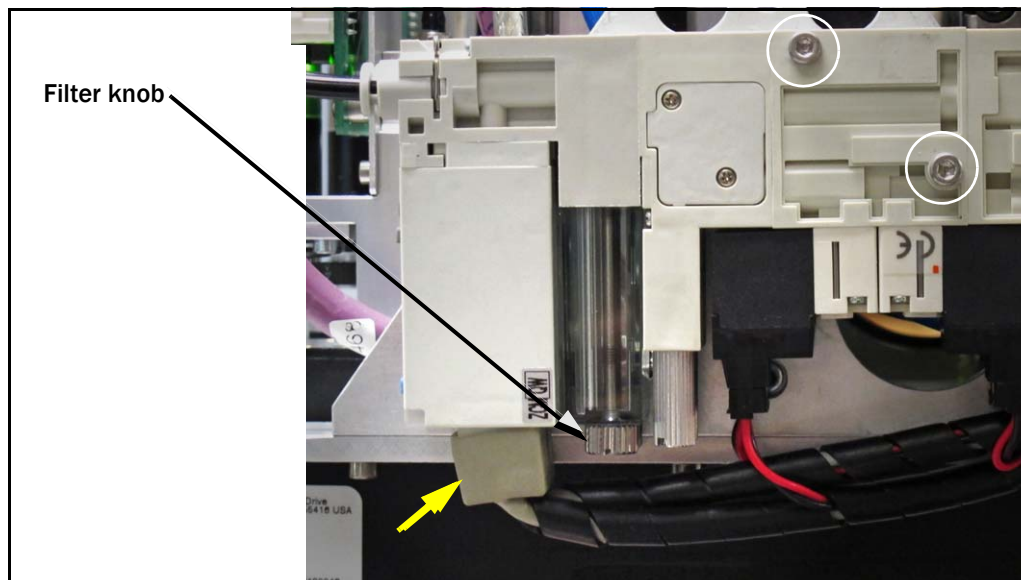
**Figure 4-10: Removing the PNP head Vacuum Generator filter. The filters are adjacent so only one is visible in this view. The yellow arrow points to the wiring connectors.
Two fasteners attach the inner and outer pneumatic generator blocks (circled).**

Reinstall in reverse order and plug the two wire connectors back in at the same locations.

Vacuum Generator Silencers

There is one silencer for each vacuum generator block at the PNP head. To inspect or replace the silencer:

1.   Finish a job if one is running.

2.   Use the **Gantry** window to move the PNP head to an accessible location such as the **Tool** position.

3.   Properly shut OFF the PSV7000 System. See *Shutting Down the PSV7000 System on page 2-7*.

WARNING: Shock hazard! Opening the safety doors stops motion of the gantry only. It does not remove electrical power from the machine or any optional equipment.

Turn the main power OFF for safety unless otherwise directed.

4.   Open the safety door and remove the small silencer cover plate on the accessible vacuum generator (two 1.5 mm hex key).
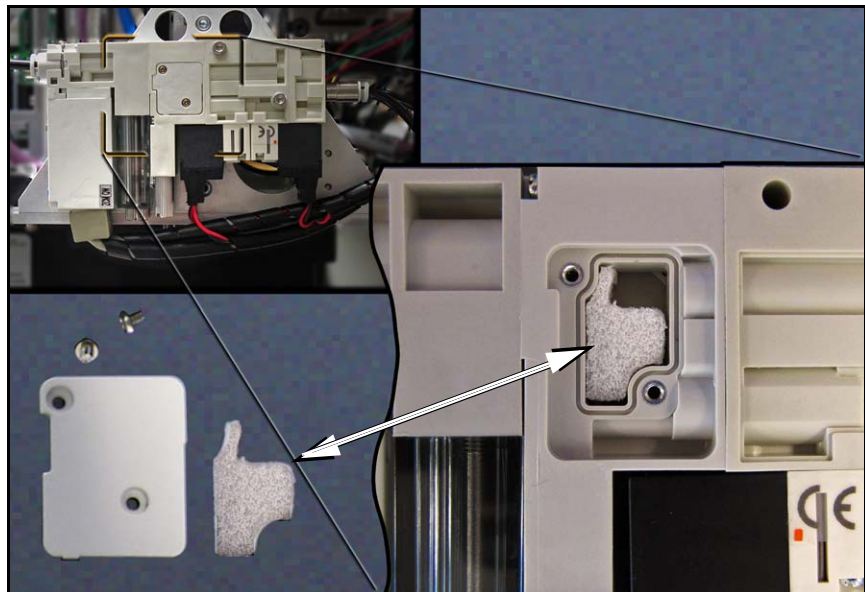
Figure 4-11: The vacuum generator silencer. It is included in the Self-Service Spares Kit.

5.   Inspect the silencer. If it looks dirty—not white—replace it.

6.   Replace the cover plate.

7.   Repeat the process for the inner (hidden) pneumatic block by removing the outer block; two screws (2.5 mm hex key). Refer to Figure 4-10 on page 4–20.

8.   Reinstall the outer block when done.

Inspecting Gantry Parts

Checking the PNP Head

1. Properly shut OFF the PSV7000 sub-systems and machine power. Refer to *Shutting Down the PSV7000 System on page 2-7*.

2. Check that all connectors are secure.

3. Turn on the system air and check that there are no vacuum leaks.

Lubricating the Gantry

Requirements

- NSK Grease (Data I/O PN 560-0034-001) and Grease Gun MG70 (Data I/O PN 560-0035-001)

> WARNING: Possible collision hazard! The high speed and force of the gantry can seriously harm anyone working inside the workspace.
>
> When working within the machine workspace, moving the PNP head must be the responsibility of only one qualified individual. All others must stay clear of the machine controls to prevent injury to that person.
>
> Ensure that a job is Paused or Finished, or the system power is OFF prior to opening any safety doors.

1. Move the PNP head to a programmer near the center of the workspace.

2. Properly shut OFF the PSV7000 sub-systems and machine power. See *Shutting Down the PSV7000 System on page 2-7*.

3. Open the safety door and remove the old grease and dirt build up from the guide rails using shop towels.

4. Apply grease to the grease fitting on each end of all three runner blocks. Use grease that meets DIN 51825 requirements. using an MG70 (or equivalent) grease gun. See Figure 4-12.

Examples of grease conforming to DIN 51825 are:
- *Mobil SHC-100*
- *UNIREX N*
- *Mobilith SHC Series*
- *Castrol Longtime PD 1 and PD 2*

Note: Too much grease may cause grease to splatter inside the work envelope. Do not over-apply the grease.

Figure 4-12: Grease fitting on the X-axis guide, shown.

5.   Close the safety door.

Gantry Belt Tension

The Gantry drive belt may need tension adjusted depending on use. If you hear the belt slapping or experience any anomalies, check the tension as follows.

Requirements

- • PSV7000 SELF-SERVICE SPARES KIT (PN 952-0507-001 or higher)
- • Torque wrench capable of 8.5 Nm (75 lbf-in.)
- • The PSV7000 must be level

To check the belt tension:

1.   Stop a job if one is running.

2.   Click the **Tool** label to move the gantry to an accessible position.

3.   Properly turn OFF the PSV7000 sub-systems and machine power. See *Shutting Down the PSV7000 System on page 2-7*.

4.   Open the front or rear safety door.

5.   Set a torque wrench to 8.5 Nm (75 lbf-in.) and attach it to the Belt Tension Tool (PN 952-0508-001 or higher).
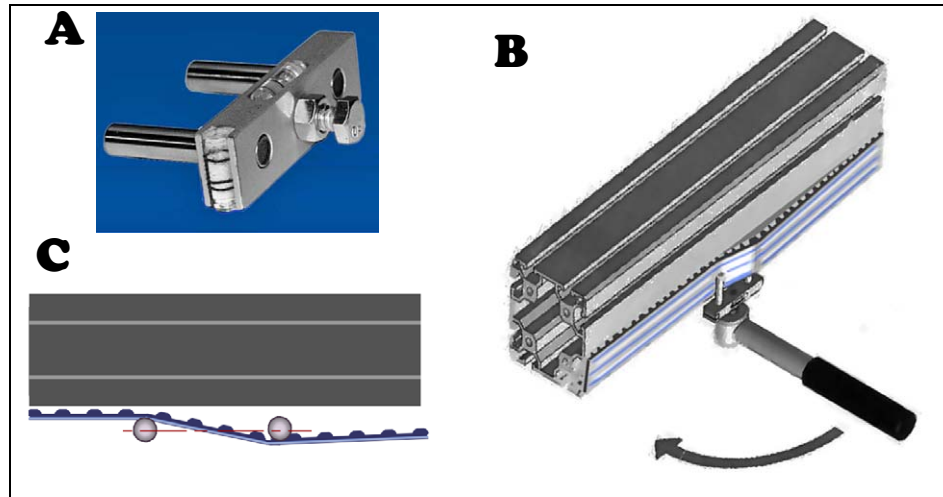
**Figure 4-13: A— The Gantry Belt Tensioning tool.
B—The tool in position. (Torque wrench not included.) In this orientation, ignore the bubble-levels on the tool.
C—Plan view of the two posts parallel with the beam at the specified torque.**

6. Attach the Belt Tension Tool as shown above near the greatest **expanse** of belt such as at the center of the beam. (There is only one gantry belt.)
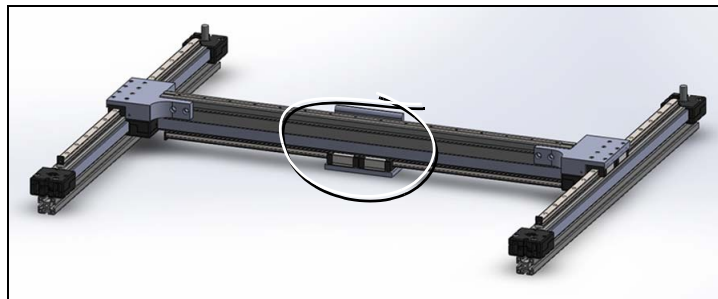
Figure 4-14: Attach the tool to the greatest unsupported expanse of belt.

7. Turn the wrench keeping the tool level. The two posts on the tool should be in line (parallel with the beam) when the torque is reached.

8. If the posts are not in line, contact Data I/O Customer Support or a local Data I/O approved service representative.

Replacing a PNP Probe Assembly

A spare Probe Assembly comes with the Self-Service Spares Kit.

Technicians trained on the PSV7000 can remove and re-install a Probe Assembly if it is damaged or malfunctioning.

Requirement

- Long metric hex key set (extended reach)
- Spare Probe Assembly

To remove a Probe Assembly

1. End a job and move the PNP head to the TOOL position (click **System** > **Gantry** > **Tool**) to move it to an accessible position.

2. Properly shut down the PSV7000 System; refer to *Shutting Down the PSV7000 System on page 2-7*.

CAUTION: Possible Machine Damage! The PNP head, Device-position Sensor, and gantry can be damaged by pushing or pulling it improperly.
• Make sure the AH700 Application is closed.
• Only push or pull the head by gripping the triangular bracket on the left side of the head.

---
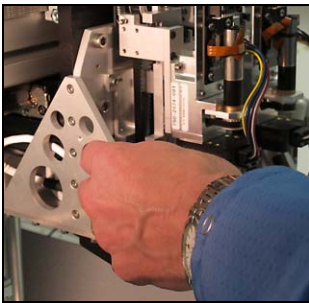
3. Remove the probe from the target Probe Assembly. See *Installing the Correct Probes* in the PSV7000 Operator's Manual.

4. Disconnect the appropriate air hose form the vacuum generator on the right side of the PNP head.
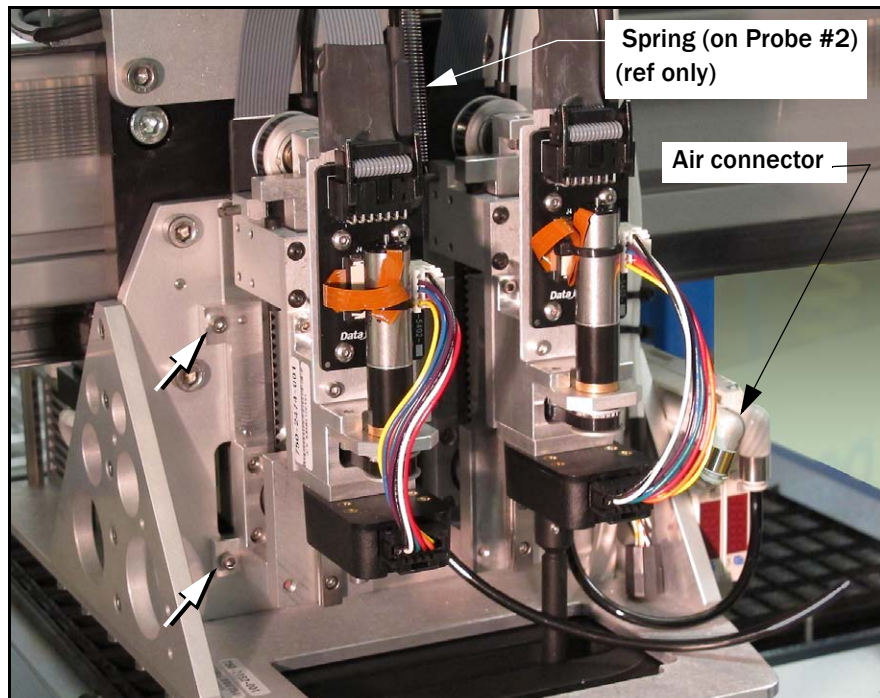
Figure 4-15: Probe Assembly #1 (on left) has air hose disconnected and the Z-axis retention spring removed. Two of the four fasteners are shown (arrows).

Spring (on Probe #2) (ref only)

Air connector

---

5. Disconnect the four electrical connectors from the Control Board on the back of the PNP head.
   For the 1Home and two Z connectors: push the thumb-tab up to disconnect the latch.
   For the Theta PNP 1: lift the two arms up as shown below.
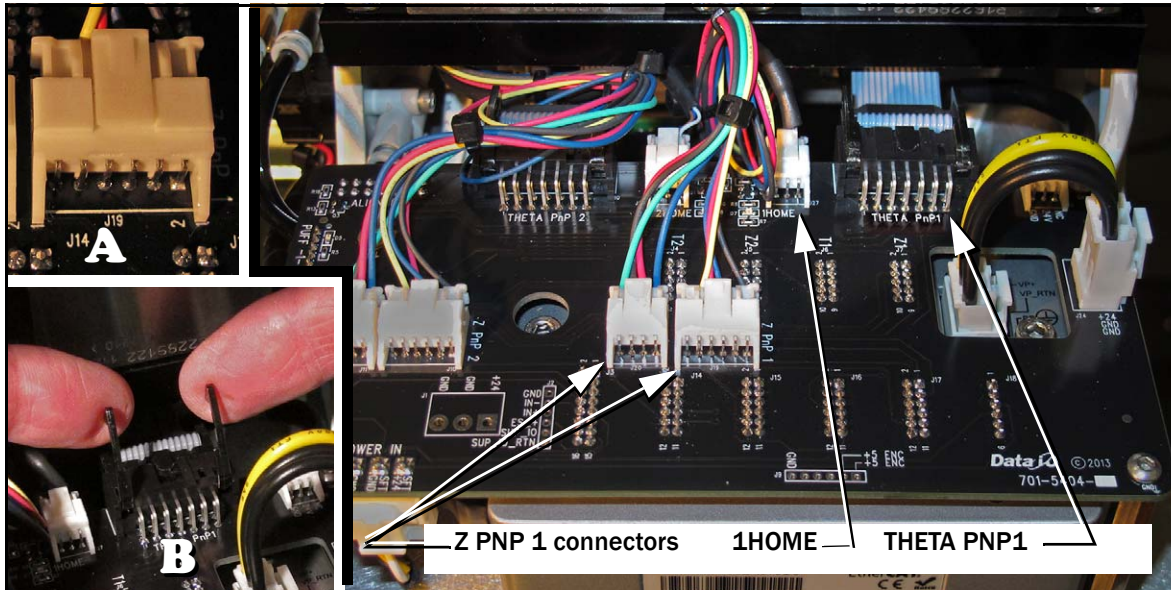
Figure 4-16: Four Probe Assembly connectors. Detail of THETA PNP1 is at 'B.' All others are style 'A.'

6. Disconnect and remove the Z-axis retention spring.

7. Remove the four fasteners that hold the Probe Assembly to the PNP head. Refer to Figure 4-15. (A long 2.5 mm hex key is required.)

8. Carefully pull the Probe Assembly and air tubing toward the front of the machine while guiding the cables on the back side through the small opening.

Reinstalling the Probe Assembly

Generally, the reinstallation is in the reverse order of removal with these precautions:

• Ensure the ribbon cable fits into the slot on the head bracket and does not get pinched.

• Make sure the Probe Assembly mates up to the two locating pins on the head bracket. See figure below.
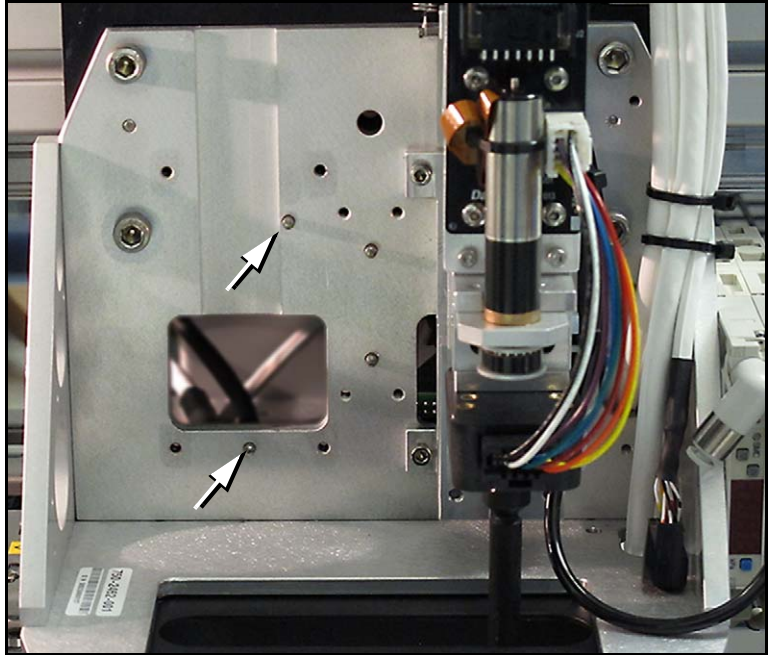
Figure 4-17: The PNP head with Probe Assembly #1 removed. The slot for the ribbon cable and the two locating pins (arrows) are visible.

- Make sure that the probe set screw lines up with the flat on the nub, and that the probe gets pushed up all the way past the o-ring to the base of the head assembly.
- Make sure tubes and wires are securely stowed and fixed to avoid being rubbed by any moving part. Slide the Z-axis movement up and down by hand to verify clearance.

Programmers

FlashCORE Programmer Diagnostics

To optimize programming yields, voltages within the FlashCORE programmer need to be calibrated *once each year*. This is a more thorough HW test than the 'POST' (Power-On-Self-Test) as well as ensuring that each programmer's precision reference is still within its specified operating range.

Annual programmer Compliance Verification (CV) can be performed by Data I/O at customer sites. This on-site visit is included if you have an APS (Annual Programmer Support) contract (customer pays travel costs).

Optionally, customer can purchase a Diagnostic Adaptor Board (DAB) and perform the compliance diagnostics themselves. Contact sales to purchase a DAB.

Tools required

- Diagnostic Adapter Board (DAB), Data I/O part number 910-2200-003 (or higher).

This Diagnostic Adapter Board detects problems related to FlashCORE (FC) programmer hardware failure. 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.

The DAB performs these nine tests:

• Bus Test	• Vpp Overcurrent Test
• Adapter ID Test	• I2C Bus Test
• LED Driver Test	• DAC Calibration Test
• G Node Test	• Gslew Test
• Vcc Overcurrent Test	

Running the Programmer Diagnostic Test

To run diagnostic tests on FlashCORE programmer(s):

1. Finish a job if one is running; wait for the PNP head to park.
2. Turn OFF the programmer circuit breaker at the Power Panel (down position).

3. Exit AH700 to return to TaskLink.

---

*The wrist strap
Data I/O PN is
440-0021-001.*

WARNING: ESD hazard! 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.

When at the PSV7000 Machine, always wear a wrist strap containing a 1 M-ohm min. to 10 M-ohm max. current limiting resistor. Connect the antistatic wrist strap to the grounding socket on the front or back of the PSV7000 Machine.

WARNING: Possible collision hazard! The high speed and force of the gantry can seriously harm anyone working inside the workspace.

When working within the machine workspace, moving the PNP head must be the responsibility of only one qualified individual. All others must stay clear of the machine controls to prevent injury to that person.

Ensure that a job is Paused or Finished, or the system power is OFF prior to opening any safety doors.

---

4. Remove the Socket Adapter from the target programmer and insert the Diagnostic Adapter Board, ensuring that it aligns correctly on the adapter pins. Screw down the two bracket screws (4 mm hex key).

5. Turn the programmer circuit breaker at the Power Panel ON (up position).

6. Start TaskLink and click **Tools** > **Run Programmer Diagnostics**.

7. On the Diagnostics window, select the programmer with the DAB installed.

8. Click **Test All**.

The pass/fail test results are displayed in TaskLink and are also written to /fdrroot/system/diaglog.txt (and to the CF-card of the target FlashCORE programmer). These files can be viewed in 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 personnel diagnose the problem, please e-mail both the eventlog.txt and diaglog.txt files.

Sample `dialog.txt` file:

```
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.
```

Replacing a FlashCORE Programmer

If a programmer is not working properly, it can be removed and replaced with another one.

Tools Required

- Cable Tie tool
- Clippers to cut cable tie
- 3 mm hex key (Allen wrench)
- Access door key that came with your PSV7000

WARNING: Electric shock hazard! Injury or death may result from contact to parts inside the machine. Shut off the PSV7000 System by turning OFF the main power switch before working on or near the gantry, before opening any access doors or removing any cabinet panels.

To remove a FlashCORE programmer:

1. Properly turn OFF the PSV7000 sub-systems and machine power. See *Shutting Down the PSV7000 System on page 2-7.*

2. With the supplied door key, open the lower, right front access door.

3. Locate the target programmer and follow the heavy gray power cable to the connection panel on the right side of the machine. Refer to Figure 4-18 on page 4–31.

4. Mark the cable (to re-install in the same place) and pull the connector straight out.
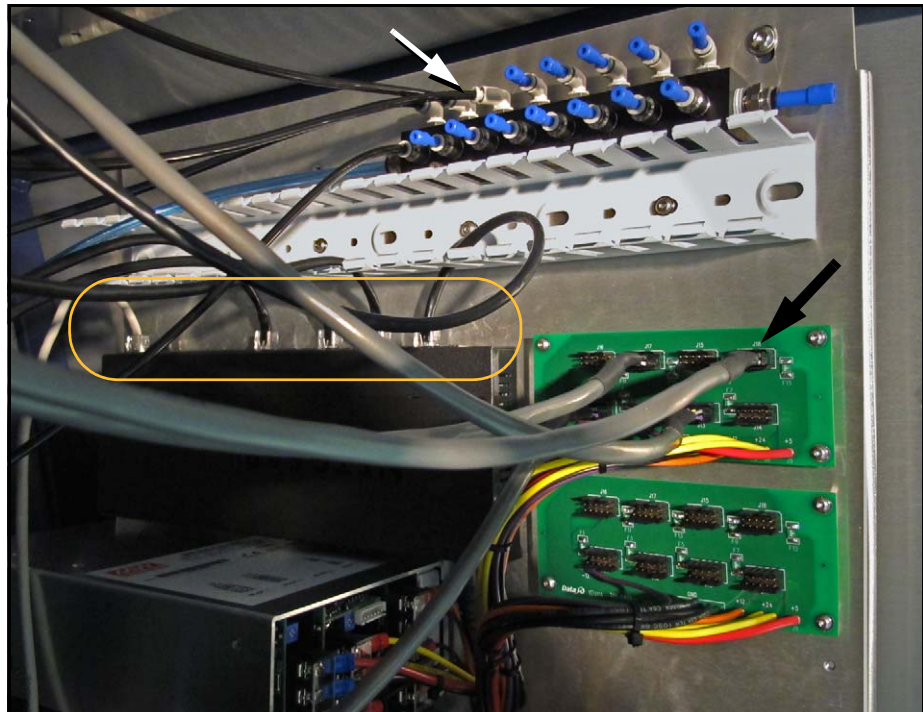
Figure 4-18: The right side connection panel inside the right front access door. Power cables (black arrow), Pneumatic tubing (white arrow), and the Ethernet connections (circled).

5. Follow and mark the thin black tubing to the air manifold on the right mounting plate.

6. Disconnect the air tube at the one-touch connector (push in on the collar while pulling the tube out).
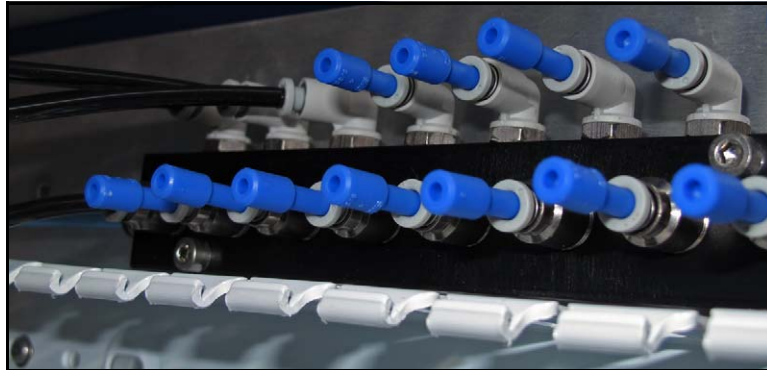
Figure 4-19: The Programmer air manifold. Only two programmers are connected in this view. Blue plugs must be installed into all unused ports.

7. Follow and mark the heavy Ethernet cable to the router on the right mounting plate.

8. Disconnect the Ethernet cable by pinching the clip and pulling up. Refer to Figure 4-18 on page 4–31.

9. Remove four screws (3 mm hex key) from the bottom side of the programmer. One screw also holds a cable tie which must be cut first. Save the cable tie mount for reuse (as well as the screws).

Figure 4-20: Inside the machine looking up at the programmers. There are four attachment screws (arrows) per programmer.

10. Open the front or back safety door to access the workspace.

11. Lift up on the target programmer being cautious of the cables that will come out with it.

Replacement is in the reverse order of removal.

The Laser Module

[**Laser Marking only**] Laser Marker System is optional equipment on your PSV7000 Programming System. The Laser Module employs a rotor. The Laser System includes a fume extractor.

The Laser Module

The Laser rotor transports devices to and from the enclosed lasing area. The Laser rotor may require periodic cleaning or new probe tips.

Cleaning the Rotor Housing and Device Tips

Requirements

- Disposable gloves and protective goggles
- Sealable Plastic bags
- Antistatic cleaner
- Cloth Paper towels

Housing

WARNING: Possible health hazard! Lased materials can contain hazardous toxins in the dust that cause eye and skin damage! DO NOT use compressed air to remove laser dust or any method that allows the particulate to be released into the work environment. Wear safety goggles and disposable protective gloves.

1. Properly shut off the PSV7000 sub-systems and machine power. See *Shutting Down the PSV7000 System on page 2-7*.

2. Wear eye protection and put on disposable protective gloves.

3. Use a damp cloth or paper towel and antistatic cleaner to wipe laser marking dust and other foreign material from the housing.

4. Rotate the Laser Rotor by hand (it will only rotate in one direction) and wipe the remaining rotor surfaces.

5. Place paper towels, cloth, and protective gloves into a sealable plastic bag. Seal the bag and dispose of as hazardous waste. Remove safety goggles.

WARNING: Possible health hazard from toxic materials! Government regulations apply to the storage of hazardous waste. Ensure that contaminated filters are:
• properly labeled and stored in your hazardous waste stor-

age area
• not stored on your site longer than government regulations allow (the typical limit is 90 days)—check your government regulations for hazardous waste storage requirements.

Cleaning Rotor Tips

[**Laser Marking only**] The rotor used for laser marking has four rubber tips for vacuum seals. Dirty tips may leak enough air that devices fall from the rotor. Cleaning intervals depend on amount of use.

To clean the tips:

1.   If machine power in ON, move the head: either
At the **Run** window: click Pause or Finish.
Or at the **Gantry** window: click Park or Tool.

2.   Open the rear safety door.

3.   Wipe the two exposed rotor tips with a damp cloth.; soapy water is okay. (Do NOT use alcohols or solvents.)

4.   Rotate the rotor to expose the two hidden tips using one of the following methods:
    • If the main machine power is OFF, rotate the rotor manually.
    • If the main machine power is ON, close the safety door and at the **Run** window right-click the laser box to open a submenu > click **ROTATE**.

5.   Open the rear safety door and wipe these two tips with a clean damp cloth.

This requires Laser Marker to be selected in your winAH400.ini file.

Note: To replace the Laser rotor probe tips, see Installing the Correct Shuttle Tips in the PSV7000 Operators Manual.

Laser Marking Fume Extractor

[**Laser Marking only**] All models with Laser Marking have a fume extractor. The fume extractor requires some attention as described below.

Start-up

CAUTION: Possible health hazard! Dust from the main filter may be expelled on start-up after PSV7000 transportation. Turn the system ON in a room with appropriate ventilation or wear dust respirator and goggles.

The Tiger Filter System starts automatically by the PSV7000.

Figure 4-21: Tiger Fume Extractor power switch, utilities, reset button (circled), and fuse location (arrow).

WARNING: Possible health hazard! Lased materials can contain hazardous toxins in the dust that cause eye and skin damage! DO NOT use compressed air to remove laser dust or any method that allows the particulate to be released into the work environment. Wear safety goggles and disposable protective gloves.

Cleaning the Laser Module and Fume Extractor Tube

The filter extraction tube and nozzle should be cleaned occasionally for best flow. Prior to cleaning the tube, the lasing chamber should be cleaned with the Fume Extractor running.

For both these procedures contact Data I/O Customer Support or a local Data I/O approved service representative.

To clean the outer Laser housing, see *Cleaning the Rotor Housing and Device Tips on page 4-34*.

Removing the Fume Extractor Filters

The Laser Filter Kit Part Number is 952-0509-001 or higher.

The Tiger Fume Extractor sets off an alarm and blinks a red indicator when main filter has exceeded its life. Push the filter reset button and see the filter Operating Manual that came with PSV7000 for instructions to replace the filter.

The Fume Extractor also sounds an alarm and lights a red lamp when suction capacity is low. Push the reset button and refer to the filter Operating Manual that came with PSV7000 for instructions.

Figure 4-22: The Tiger 130 Manual.

The Handler Computer software monitors the air flow sensor on the laser filter system. If the sensor detects low air flow, an error message is displayed on the PSV7000 Monitor:

Insufficient airflow at laser filter.

Verify that the filter is turned on.

Service might be required.

When this error message displays, the laser system will mark up to ten more devices (as defined in the winAH400.ini file) before the message displays again.

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

WARNING: Hazardous Materials—Possible health hazard! This procedure involves exposure to hazardous by-products from the laser marking process. Some device material may be carcinogenic.

Perform the following procedure only if you have training regarding laser etching processes or handling hazardous materials.

Wear safety goggles and disposable protective gloves..

Tools Required for removing the filters

- sealable plastic bag (approximately .06 M^3 [2 cu. ft.])
- protective gloves and goggles

- a particle (dust) mask
- access door key that came with your PSV7000

1. Turn OFF the subsystems and PSV7000 System power and ensure the main power switch is in the **OFF** position. See *Shutting Down the PSV7000 System on page 2-7*.

2. Open the rear access door on the PSV7000.

3. Unbuckle the strap securing the Fume Extractor to the machine.
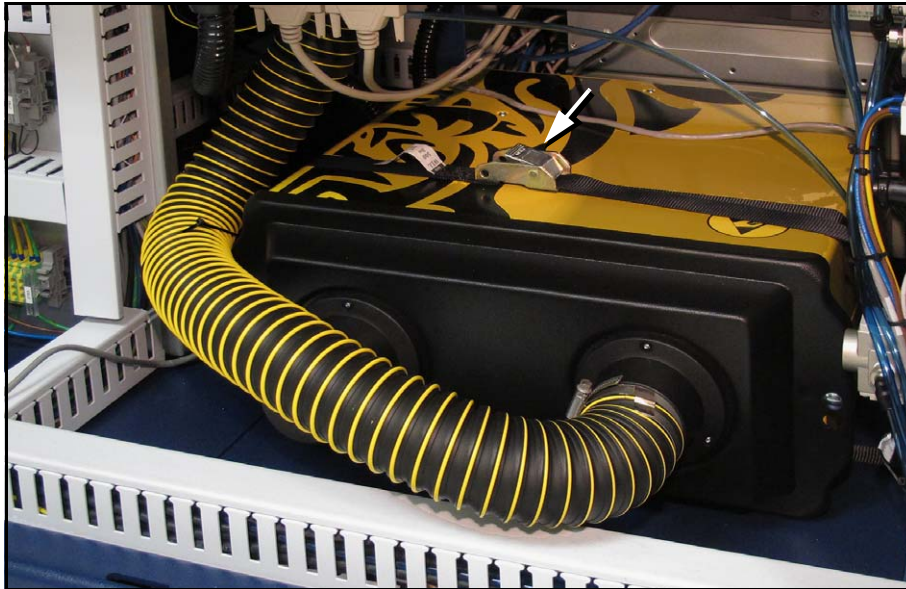
Figure 4-23: The Laser Fume Extractor box is strapped into place. After unbuckling the strap and removing the lid, the box needs to be raised for the filters to clear the wire track. Read the warning above before starting this task.

Note: If the wire cable is removed from the exhaust hose, it needs to be replaced.

To continue, see the replacement instructions and part numbers of the Tiger pre-filter and main filter in the Tiger Operating Manual that came with PSV7000. A PDF copy is included on the CD with this Owner's Manual.

Figure 4-24: The Pre-Filter is removed from the Main Filter.

To finish, place the filters and your gloves in the bag and seal the bag and dispose of as hazardous waste. Close the access door on PSV7000.

WARNING: Possible health hazard from toxic materials! Government regulations apply to the storage of hazardous waste. Ensure that contaminated filters are:
• properly labeled and stored in your hazardous waste storage area
• not stored on your site longer than government regulations allow (the typical limit is 90 days)—check your government regulations for hazardous waste storage requirements.

Cleaning the Laser Computer Air Filter

Requirements

• Very small (jeweler's) Phillips screwdriver

[**Laser Marking only**] The Laser Computer is located above the Handler Computer on the left side of the machine.

In general, clean this filter every year, depending on environment and amount of use. See the figure below.
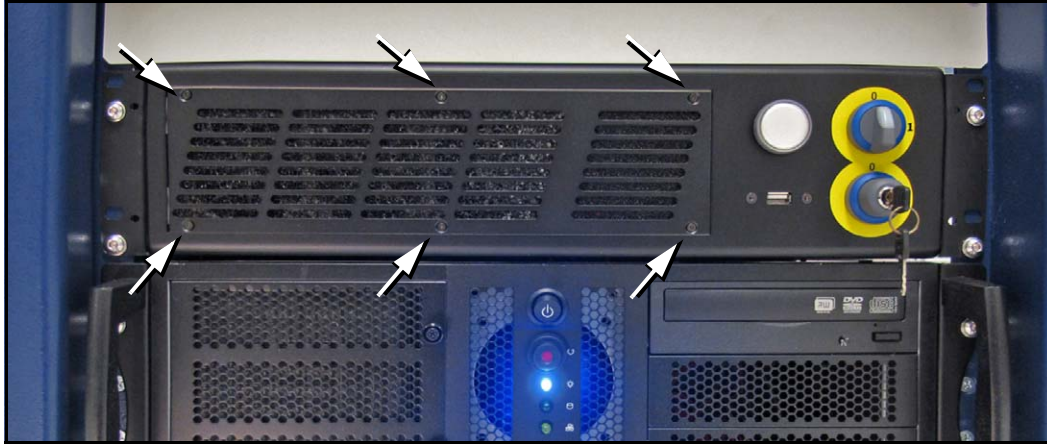
Figure 4-25: The location of Laser Computer filter (Laser Marker equipped models only). Six screws (arrows) attach the filter grille.

To remove the Laser Computer air filter:

1. Turn OFF the Laser computer.
   1a. Switch to the Laser PC by pressing the keyboard key Scroll-Lock twice and then immediately press **2**.
   1b. Exit the Lighter Laser software.
   1c. Shut down the PC using the Windows Start Menu.
2. Unscrew the six small Phillips screws on the filter grille and remove it.
3. Remove the old air filter and clean such as with a light-duty vacuum (or replace with a new air filter if necessary).
4. Replace the filter grille and attach with the six screws.

Handler Computer

The main PSV7000 Machine computer, or Handler Computer, is at the left side of the machine and requires little maintenance.

Handler Computer Air Filter

The Handler Computer has an air filter that requires periodic cleaning or replacing.

To remove the air filter:

1. Properly shut off the PSV7000 sub-systems and machine power. See *Shutting Down the PSV7000 System on page 2-7*.

2. Open the filter door by unscrewing the two knurled knobs. See Figure 4-26.
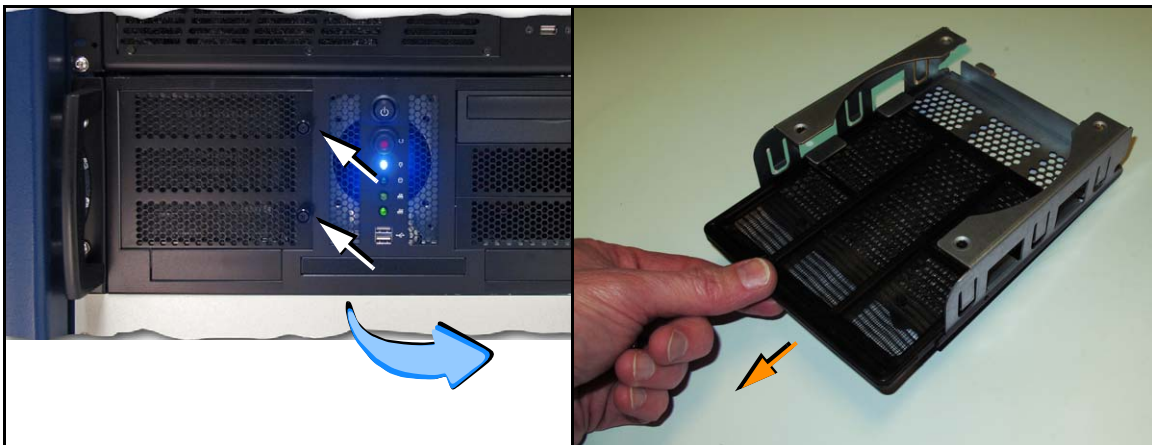
Figure 4-26: The Handler Computer filter door has two knurled knobs (white arrows). The filter (screen) slides out.

3. Open the filter door or lift it out.
4. Pull out the filter tray out of the door.
5. Clean filter as necessary such as with a light-duty vacuum.

Installing AH700 Software Updates

AH700 Software updates are periodically published with improvements. Delivery depends on contract options.

To install new AH700 Updates on the Handler Computer, insert the AH700 CD and follow instructions in the `Installation Instructions.rtf` file.

Note: Your existing `winAH400.ini` *will not be replaced so all your settings will remain the same.*

Note: Updating TaskLink is a different CD. For more TaskLink information, see TaskLink's online Help.

Note: PSV7000 System algorithms are updated weekly at http://www.dataio.com/algorithms/ and are available depending on your maintenance plan. Algorithms are updated vis TaskLink. See TaskLink Help for more information.

3D Coplanarity Inspection System

The 3D Inspection System requires little maintenance. The 3D Inspection PC is just below the Handler PC on the left side of the machine.

Cleaning the 3D Inspection PC Filter

1. Shut down the 3D Inspection PC using the Windows Start menu as follows:

   1a. Use the Scroll Lock key on the keyboard to switch to the 3D Inspection PC. (**Scroll-Lock** > **Scroll-Lock** > **3**.)

   1b. Exit the UltraVim Application software. Then at the dialog, type **EX** to exit.

   1c. Shut down the 3D Coplanar PC <u>with the Windows START menu</u>.

2. Open the PC door with the key.

3. Pull the small tab on the filter tray toward you and slide to the right.
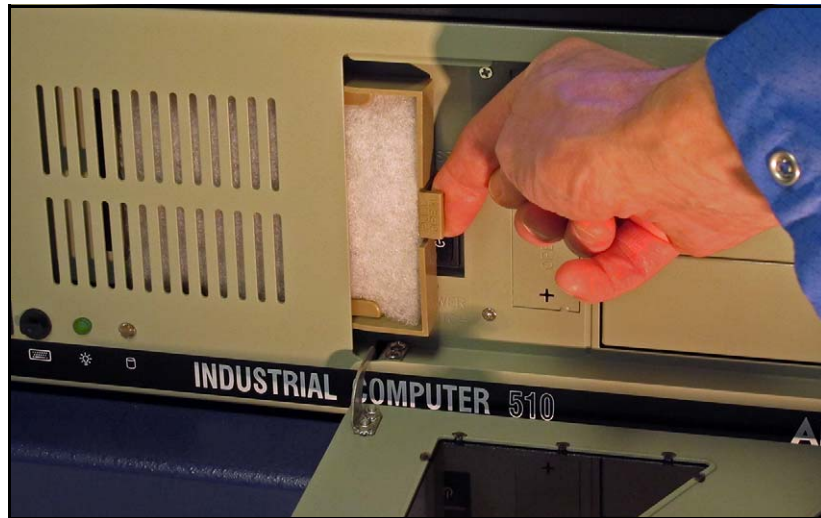
4. Inspect the filter. It should be white. Clean or replace with a new filter.

5. Replace the filter tray and close and lock the PC door.

To turn

Troubleshooting

This section contains solutions to problems that may arise during operation of the PSV7000.

Troubleshooting for the Tape Output System is covered in a separate heading; see *Troubleshooting the Tape Output System on page 4-57*.

Also, see PSV7000 on-screen Help for a more detailed Troubleshooting chart.

Headings below cover:

Common Error Messages

Lamp color	Error Messages	Possible Resolution
Red	●●➢"Cannot connect to the motion controller."	• Check that both Emergency Stop buttons are OFF. • Check that all safety doors are closed. • Properly shut down the PSV7000 Machine if possible, and restart the system.
Red	●●➢"E-STOP ACTIVATED" but the **OK** button is grayed out (unavailable)	• Check that both E-Stop buttons are released. • Check that all safety doors are closed. • If a restart is necessary, press **Ctrl + Alt + Del** on the keyboard

Lamp color	Error Messages	Possible Resolution
Yellow	●●➤TRAY NOT PRESENT	Conditions: You swapped the input tray but PSV7000 does not detect the tray and when you click **Run**, you get error message **Tray Not Present**; or the Run window shows a tray where there is none. • Re-install the tray. • At the Run window, the Tray Present Sensor should be ON. • If the tray is still not detected, remove the tray and place a finger over tray present sensor. –If sensor is working, tray outline appears. Re-install tray. –If sensor is not working, the tray outline does not appear—contact Data I/O Customer Support or a local Data I/O approved service representative.
Red	●●➤Z MOTION ERROR 800: LIMIT EXCEEDED ON AXIS 2	Conditions: A Red ERROR box appears in bottom right corner of the Monitor. Contact Data I/O Customer Support or a local Data I/O approved service representative.
Red/Yellow	●●➤ERROR: TAPE OUT	• If a device is jammed in the Tape Output System, clear it. Acknowledge the error message by pressing the **ESC** key. Then click **OK** on the PSV7000 Monitor. • If above doesn't work, call the Service Technician.
Red	●●➤MAIN AIR OFF	• Check that the main input air valve is in the ON position. • Check that the main air hose is connected. • Check that the air pressure is within the required range (green LED readout instead of red.) • Contact Data I/O Customer Support or a local Data I/O approved service representative.
Red	●●➤VACUUM ERROR	• See *Adjusting the Vacuum Generator Sensors on page 4-17*. • Contact Data I/O Customer Support or a local Data I/O approved service representative.

Restarting after Trouble

If the AH700 Software closes, locks up, or experiences some trouble that qualifies as a crash, then the PSV7000 Machine power must be turned OFF for 20 seconds prior to restarting the software.

Collect all PSV7000 System Logs

*Collect PS Log*s is a software utility on AH700 Software that collects all log files from PSV7000. It creates a ZIP file containing all the information that Data I/O or trained service technicians need to evaluate your PSV7000 Machine status.

Programmer Related Problems

When you experience a *programmer* related problem:

1. Force the error to re-appear by running a job, or performing the same steps that led to the trouble.

2. (Note any dialogs with the **Collect Logs** button) and close AH700 the usual way as follows:

   2a. Click **Finish** to stop a job.

   2b. Exit the Run window.

   2c. Exit the System window.

   2d. Exit the Setup window.

3. Start Collect PS Logs. See heading *Starting 'Collect PS Logs'* below.

Other Problems

For problems that are NOT programmer related, run the *Collect PS Logs* application anytime after the problem has been seen.

Starting 'Collect PS Logs'

There are three methods to start the Collect PS Logs application.

Auto Method (the App doesn't open)

AUTO Method uses default settings— The Auto Method itself has two ways to collect logs. The **Collect Logs** Application does not open with these auto methods.

- FIRST AUTO METHOD: The AH700 Software displays a button in each message box that allows you to start the Collect PS Logs application in AUTO Mode.
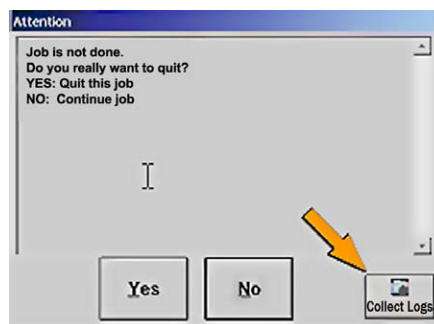
- • SECOND AUTO METHOD: The AH700 Software also displays a button in the System window.
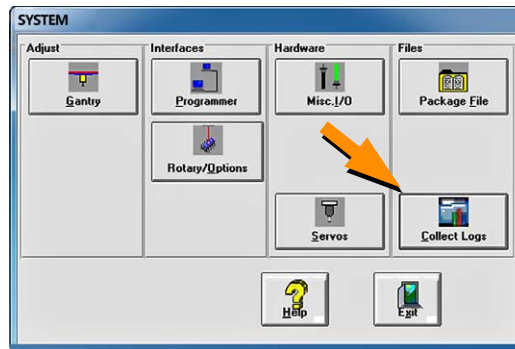
When starting Collect PS Logs in AUTO Mode), only a progress screen is shown on the lower left corner of the screen. All defaults are used and no user action is required. A log zip file named with the current date and time is saved in the Documents folder (`C:\Documents`, or C:\Libraries\Documents.)

Start App Method in Windows OS

The Start App (non-auto) method is the Windows method using the Windows Start menu; it offers some options. Click Window **Start > All Programs > Data IO > Collect PS Logs**.

After starting **Collect PS Logs** from the Start menu, the main window appears where you can select which items you need to collected.

1. Select or clear check boxes for files as desired.
2. (Optional) Check additional SPC files if the error rarely appears or appeared a long time ago.
3. (Optional) In Collect PSV7000 Logs, to enter a text description to the Zip file:
   3a. Click **Add description**.
   3b. Type a description into the field available. In addition to what you type, the description will include the Date and Time the log was captured and the serial number information from the winAH400.ini file.
4. Click **Collect and ZIP**.

A ZIP file is created and copied to the Windows Clipboard. A message advises pasting it into a folder you choose.

5. Click **OK** to the message about pasting the ZIP file to a desired folder.

For more information see the AH700 on-screen Help.

Programming Problems

Lamp Color	Programmer Trouble	Possible Resolutions
	●●➢One programmer has many continuity failures (in Statistics window).	☞ Move the Socket Adapter to another programmer to see if the problem is the programmer or the adapter, as follows: 1. If a job is running click **Pause** and wait until all programmer activity is done. 2. Check that there are no devices in the target adapter. If there are, click **Finish**. 3. Replace the target Socket Adapter with another empty adapter. If the failure moves with the Socket Adapter, check for bent, damaged or worn pins on the sockets. If continuity failures persists in the same programmer, see *Pick and Place Problems on page 4-49*. *Note: If a programmer is not performing and you cannot correct the error, you can continue to use other programmer sites after disabling the non-functional programmer.* See *Disabling Programmers* in the PSV7000 Operators Manual or the AH700 on-screen Help.
	●●➢Many Programmers have continuity failures.	☞ The Device Position Sensor may need cleaning. Refer to *Cleaning the Device Position Sensor on page 4-12*.
Red	●●➢All programmers fail to program devices.	☞ Check that the **Programmer Simulation** switch on the **Setup** window is **OFF**. If not, switch it to OFF. ☞ Check that the **Programmers** circuit switch on the Power Panel is On. ☞ Check the Log file for helpful information as follows: 1. Pause the job. 2. Exit the **Run** window. 3. At the **Setup** window click **System > Log File**.

Pick and Place Problems

Lamp Color	Pick and Place Trouble	Possible Resolutions
Red/ Yellow	●●➤Devices are not being placed into sockets or output media accurately. ●●➤The PNP head does not center on the devices.	☞ Check that the probe is not bent. ☞ Check all fasteners and connections on the head and gantry. Also see *Inspecting Gantry Parts on page 4-22*. ☞ Clean the Device-position Sensor. See *Cleaning the Device Position Sensor on page 4-12*. ☞ Adjust the X-, Y-, and Z-axis positions using the adjustment arrows on the **Gantry** window. For more information, see *Teaching the Workspace Locations on page 3-9*.
Yellow/ Red	●●➤One of the probes experiences pick and/or place errors regularly while the other does not.	☞ Contact Data I/O Customer Support or a local Data I/O approved service representative.
	●●➤The Probe is dropping devices.	☞ Clean or replace the Probe Tips. See *Pick and Place Probes on page 4-14*. ☞ Clean the vacuum filters. See *Vacuum Generator Filters on page 4-19*. ☞ Check the main input air pressure; refer to *Connecting Air* on page 2-3.
	●●➤A probe attempts to pick a device twice even though it picked up the device the first time.	☞ The Vacuum sensor may need calibrating. See *To Adjust Probe Vacuum Generator Sensors: on page 4-17*. ☞ If programming TQFP 144, you can increase the value for 'suckup time' in the Package File to maximum value of 500 ms. See the **Setup window** > **System** > **Package File**. Refer to the on-screen Help.
	●●➤Devices are bouncing.	The socket air pressure may be too high. ☞ Reduce the socket actuation air pressure. See *Adjusting the Socket Actuator Air Pressure on the Programmers on page 4-9*
Red/ Yellow	●●➤Pick or place errors at all programmers.	The socket is not opening completely—the air pressure might be set too low. ☞ *Adjusting the Vacuum Generator Sensors on page 4-17*. ☞ Increase the socket actuation air pressure. See *Adjusting the Socket Actuator Air Pressure on the Programmers on page 4-9*

Air Pressure Problems

Lamp Color	Air Pressure Trouble	Possible Resolutions
Red	●●➤There is no main air pressure.	☞ Make sure that the main air switch on the Power Panel is in the **ON** position. ☞ Check that the air regulator on the Power Panel displays within the acceptable range: *PSV7000 Specifications* on page 1-9. If not: • Check your shop air pressure. • Shut down and replace the filter. See *Replacing the Input Air Filter on page 4-18*. The digital display on the regulator will be green when air pressure is within the correct range and red when it is out of range. The regulator has been set at the factory and is not adjustable.
Red	●●➤There is no (or low) vacuum on the PNP probes.	☞ Check that the probes are not loose and that the o-rings are not destroyed or leaking. See *Pick and Place Probes on page 4-14*. ☞ Determine if the PNP head probes are clogged. Clean if necessary. Refer to *Removing and Installing a Probe* in the PSV7000 Operator's Manual. ☞ Check the probe vacuum and *Blow-off* solenoids; *Adjusting the Vacuum Generator Sensors on page 4-17*. ☞ Clean the vacuum generator filters and silencers; *Vacuum Generator Filters and Silencers on page 4-19*

Tube Input and Output Problems

This information is subject to change.

Lamp Color	Vibrator Tube Trouble	Possible Resolutions
	●●➤Neither of the tube platforms vibrates.	☞ Make sure that tube input or tube output has been selected on the **Setup** window. ☞ Check that the power switch at each Tube Module is ON. ☞ Make sure the vibration and frequency controls are set properly.
	●●➤Only one tube platform vibrates.	☞ Check that the power switch at each Tube Module is ON. ☞ Check the power cable source connection. ☞ Check the fuse on the input module.
	●●➤PSV7000 is putting the wrong number of devices into the output tubes.	☞ Reset devices per tube in the **Gantry** window as follows: 1. At the **Setup** window, **Options** tab, ensure that Input and/or Output options are set to **tubes**. 2. Click **System > Gantry** (you may be prompted to enter your password). Click the yellow **Vib1** label to move the PNP head to the first position of the input vibrator.
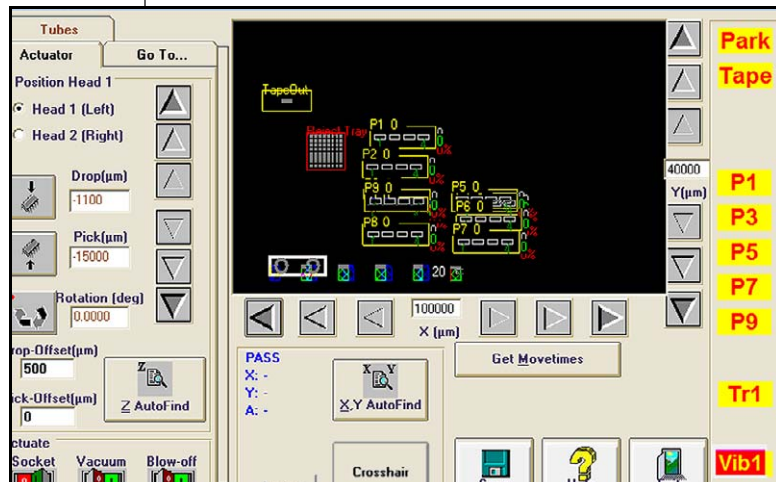
Figure 4-27: The Vib1 label has been clicked.

3. Click the **Tubes** tab, then enter the correct number of devices per tube in the **Chips/Tube** field.

4. Click **Save** to store the new settings to the Package File.

Tray Feeder Problems

Lamp Color	Tray Feeder Trouble	Possible Resolutions
Yellow	●●➢The Run window indicates a tray is present on the Data I/O Dual Tray Feeder when there is no tray there, or vice versa.	☞ Navigate to the **System** > **MISC I/O** window and verify that the **Tray Present Sensor = ON**.
	●●➢Probes miss-pick or misplace devices at the trays. ●●➢Probes hit devices in a tray hard at one end and not the other.	☞ Check that the tray feeder is level. Adjust the outside mounting bar if necessary.

Handler Computer Failure

A Handler computer drive fails. A message or behavior indicates that a computer has crashed.

Your PSV7000 System is equipped with a mirror-backup system called RAID that creates a *real-time* ghost image. You will see an error message display very quickly at system start-up.

Figure 4-28: This message, DEGRADED, will display for about seven seconds at startup if a Handler drive has failed.

Your PSV7000 System will continue to operate as normal on the backup drive. However, the failed drive must be replaced for continued safety. After the failed drive is identified and replaced, the message on-screen will read REBUILDING. After it has rebuilt, the next time you start up it will read NORMAL.

Contact Data I/O Support or your nearest Data I/O representative.
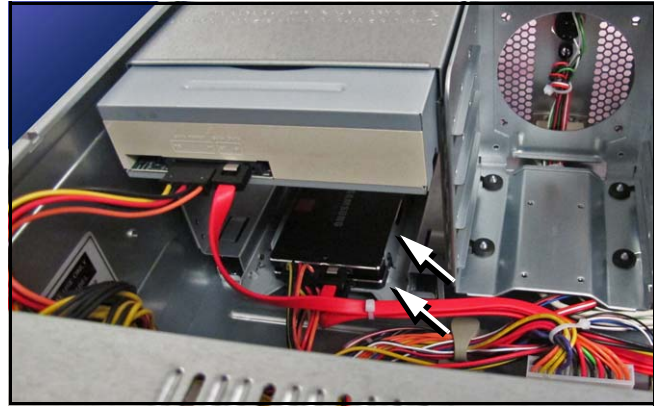
Figure 4-29: The RAID solid state hard drives. The Handler PC cover
has been removed.

Laser Marking Problems

Lamp color	Trouble	Possible Resolutions
	●●➤The Fume Extractor doesn't start when powered up (power switch is ON).	☞ Properly turn OFF the PSV7000 System. Open the PSV7000 access door and check the fuse just below the power switch on the filter enclosure. See Figure 4-21 on page 4–36.

Tape Output System

The Tape Output System is an optional system for placing and taping programmed devices into device tape.

Items not covered here can be found in the *TM-50 Taping Module User's Guide* that came with your PSV7000 System.

Cleaning the Pressure Seal

The Pressure Seal Tape Output System requires cleaning to prevent problems with breaking the device tape or tearing the tape sprocket holes. Cleaning removes build up from the cover tape application rollers and the drive sprocket top pressure idler wheel.

Cleaning Tools Required

- Dry or damp shop towel
- A reel of empty device tape (carrier tape)
- A reel of cover tape

To clean the Pressure Seal Tape Output System:

1. Turn ON the PSV7000 System power and air.

2. Start TaskLink.

3. Select a job that requires the use of the tape output.

4. Click **Run** (and **Yes** or **OK** to subsequent dialogs), which opens AH700 automatically.

5. Click **Start**.

6. Turn on the Tape Output Controller by pushing the red **Power** button. Refer to Figure 4-30.

7. At the V-TEK start-up screen, select **Setup** by pressing the left arrow button.

Figure 4-30: Tape Output Module Controller. The arrow points to the Power On/Off button which is also the Emergency-Stop (for the Tape-Out Module only!).

8. Configure the Tape Output Controller by setting the following:

For more information, see the TM-50 Taping Module Users Guide that came with your equipment.

At the Setup menu:

- reset **Count Stop** to desired amount:
  Press 1, to re-zero the present count
  Press 2, then enter the desired number, then press the **ENT** button.
- select the desired device tape pitch from the **Pitch Selection** menu. Then press **ENT**.

Note: The pitch can be determined by using the pitch setting decal located on the loading track or the pitch setting guide found at the front of the TM-50 Taping Module User's Guide.

At the Advance menu:

- set the number of pockets to advance to 1. Then press **ENT**.

At the Speed menu:

- set the advance speed between 40 to 100 depending on the device tape width and device size. Then press **ENT**.

Note: Prevent device tape breakage and advancement problems with small devices and narrower tape widths by setting 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.

At the Jog menu

- jog the device tape forward to align the pocket with the PNP head.

At the Mode menu

- select PSA mode for pressure seal cover tape. An asterisk indicates the current setting. Then press **ESC**.

Note: The Heat Seal switch should be OFF.

At the Run menu

- select **Run Mode**. The run window displays all the selected setup parameters.
- verify all settings for accuracy.

9. Inspect the PSA seal rollers for build up of grime from the cover tape. See *Figure 4-31*.
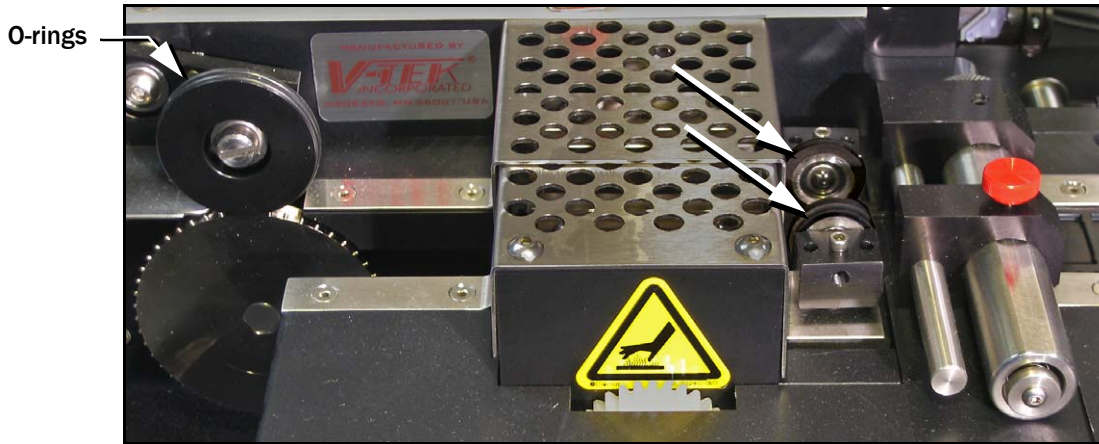
O-rings

Figure 4-31: On the Tape Out Module, the PSA Seal Rollers (arrows) and Sprocket Idler with O-rings.

⚠ *CAUTION: Possible Machine Damage! Do not use solvents other than alcohol when cleaning the black polyurethane wheels.*

---

10. If grime buildup exists on the PSA Seal rollers—

10a. Using a shop towel and alcohol or alcohol wipes, clean the build up from the cover tape application rollers. Hold the alcohol cloth on the roller and rotate the roller 360°.

10b. Repeat procedure for the other application roller.

11. Inspect the drive sprocket top idler and rubber O-rings for any build up from the cover tape. See *Figure 4-31*.

12. If grime buildup exists on the idler and O-rings—

⚠ *CAUTION: O-rings might be easily damaged. Handle gently to avoid breaking them.*

12a. Gently remove the two O-rings from the drive sprocket idler.

12b. Using a shop cloth and alcohol or a commercial alcohol wipe, remove all grime from O-rings.

12c. Wipe the idler clean.

12d. Reinstall the dry O-rings onto the idler.

Adjusting Pressure of the PSA Seal Rollers

1. Advance the device tape with the cover tape through the Seal Rollers using the manual advance pedal. Advance enough pockets to correctly align the cover tape on the carrier tape.

2. Perform a *peel back* test by peeling the cover tape from the carrier tape. Notice how well the cover tape adheres to the device tape. Perform a *twist* test by giving the tape a slight twist. Notice if the cover tape detaches from the device tape.

   If either test produces loose cover tape, increase the application roller pressure by screwing the PSA Seal pressure adjustment screw in (clockwise).

   If both tests look acceptable, visually inspect the sealed device tape for adhesive that may have been squeezed out during application. If adhesive is visible, the Seal Roller pressure is too high. Decrease the application roller pressure by screwing the PSA Seal pressure adjustment screw out and retest.

Troubleshooting the Tape Output System

The Tape Output System contains sensors that detect these fault conditions:

- a device is on top the device tape (carrier tape)—Track Jam Sensor
- no cover tape is on the reel—Cover Tape Sensor
- device tape is not properly inserted in the device tape track—Device Tape Present Sensor
- a pocket in the carrier tape is empty—Pocket Empty Sensor

When the AH700 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 Device Tape sensors. See Figure 4-32 on .
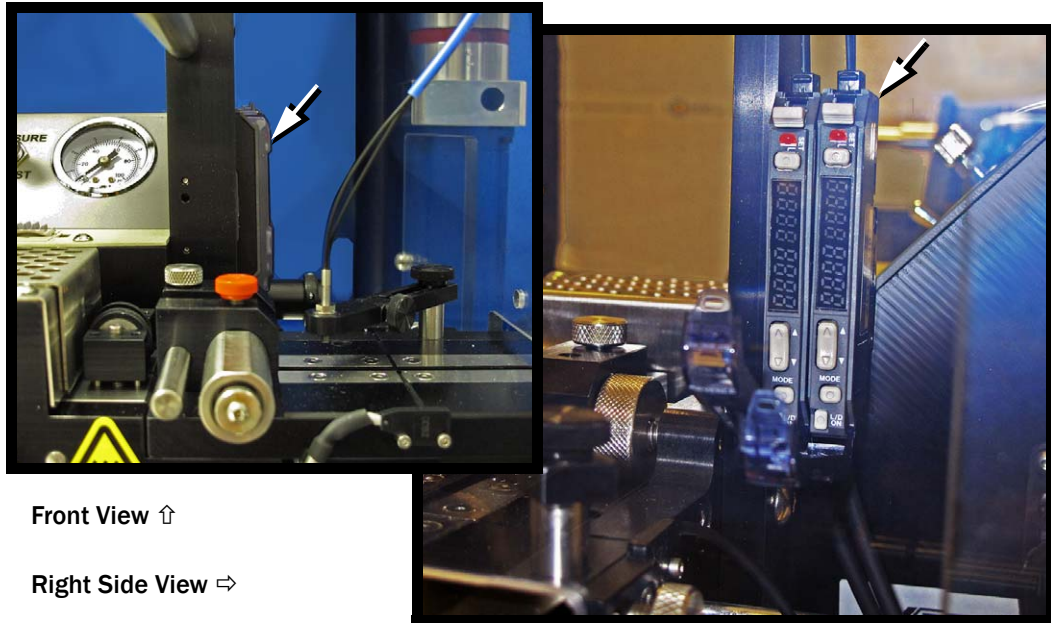
Front View ⇧

Right Side View ⇨

Figure 4-32: Optical Fiber Amplifiers. Cover Tape Present and Empty Pocket, respectively. Amplifier doors are open in the right side view.

Lamp color	Trouble Tape Output Sensors	Resolutions
	Track Jam Sensor Tape Out Unit error message displays and a red LED lights in the Device Jam Sensor.	☞ Use a vacuum tool to seat the device in the device tape pocket. ☞ Re-seat the device 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 *Track Jam Sensor and Controller on page 4-59*.
	Cover Tape Sensor and Amplifier Error message on the Tape Out Unit displays and a red LED is illuminated in the Cover Tape Sensor amplifier (left amplifier).	☞ Replace the empty cover tape reel with a full one. ☞ If the reel still contains cover tape, adjust the Cover Tape Sensor Controller. See *Track Jam Sensor and Controller on page 4-59*.
	Pocket Empty Sensor and Amplifier A Tape Out Unit error message displays and a red LED is illuminated on the Pocket Empty Sensor amplifier.	☞ Adjust the pocket-Empty Sensor. See *Adjust the Pocket-Empty Sensor as follows: on page 4-59*.

Track Jam Sensor and Controller
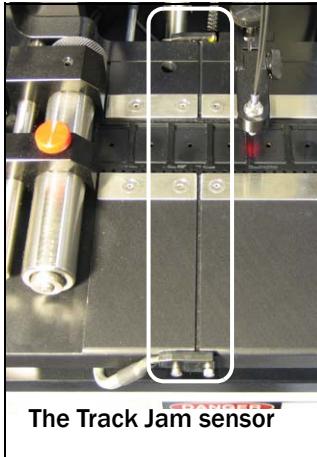
The Track Jam sensor detects when a device is not properly seated in the pocket. This sensor is located on the Adjustable Loading Track immediately before the carrier tape enters the cover taping area.

Cover Tape Sensor and Amplifier

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.

Adjusting the Cover Tape Sensor Controller

The Track Jam sensor

1. Ensure that the Output Selector mode is set to D.ON by pressing the **Mode** button. (There may be an **L/D ON** button or toggle to change the mode.)
2. Install a roll of cover tape onto the spindle.
3. Press and release the **SET** button in the left amplifier.
4. Remove the cover tape.
5. Press and release the **SET** button again.

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.*

Pocket Empty Sensor and Amplifier

The Pocket Empty sensor alerts the operator when a pocket is empty as the device tape approaches the cover taping location. This is the middle sensor in Figure 4-32 on page 4–58.

Adjust the Pocket-Empty Sensor as follows:

1. Set the track width for the target device tape
   A) loosen the two Track Width Lock knobs,
   B) pull or push the side nearest the operator to correct width,
   C) tighten lock knobs.
2. Load a roll of device tape onto the spindle and into the track.
3. Loosen the knob on the left side of the Pocket Empty Sensor bracket to adjust the height above the tape. Retighten.
4. Loosen the knob on top to center the sensor on the tape. Retighten.
5. Advance the tape until a pocket with a device in it is centered under the sensor.
6. Ensure that the Output Selector mode on the middle amplifier is set to D.ON by pressing the **Mode** button. (There may be an **L/D ON** button or toggle to change the mode.)
7. Press and release the **SET** button in the right amplifier.
8. Remove the device from the tape pocket.

9. Press and release the SET button again.

> *Note:* The **Pocket-Empty Sensor** *must be reset for each new device type to be taped.*

Dual Tray Feeder
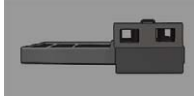
The Automatic Data I/O Dual Tray Feeder is optional equipment to the PSV7000 System. It is a high-speed tray exchanger, delivering JEDEC trays to pick and place positions.

Information not found here, but important, can be found in the *Tray Feeder Operation Manual*, such as the location of possible pinch points.

Cleaning and Inspecting the Dual Tray Feeder
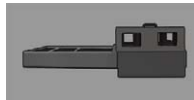
For more information, see the Tray Feeder Manual that came with your system.

[**Data I/O Dual Tray Feeder Tray Feeder only**]

1. Stop or Pause a job if one is running.
2. Check the automatic Tray Feeder for damaged or broken parts and replace as necessary.
3. Visually inspect the shuttle belts for dirt, nicks, or other signs of damage.
4. If the shuttle belts are dirty, clean with dry, compressed air and wipe with a dry, lint-free cloth and isopropyl alcohol.
5. Check that the black teflon strips on both long, inside walls are clean. Clean with a dry, lint-free cloth and isopropyl alcohol.
6. Check that the shuttle/elevator is clean and that trays lay flat.

Electrical Equipment Disposal Notice
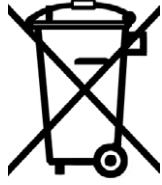
For customers in the European Union, this symbol displayed on your Data I/O product indicates that the item must NOT be discarded with general municipal waste. Either return products displaying this symbol to Data I/O so that they may be recycled, reused, or otherwise properly disposed of, in accordance with the European Union's WEEE Directive, or you may dispose of it yourself in accordance with the European Union's WEEE Directive.

Data I/O will collect this equipment at no cost to the equipment owner and process it accordingly. (This includes auxiliary equipment that came with your PSV7000 System such as Tape-Out Module, and Tray Feeder.) Contact your nearest Data I/O office to receive information about returning WEEE labeled products with no charge.

Maintenance Sign-off Chart

PSV7000 SN_____
For maintenance instructions see
Maintenance Schedule on page 4-2.

**Copy this chart
to use near your
PSV7000 Machine**

Enter name of people responsible or daily check marks:

Daily
• Blow off sockets
• Check input air
  pressure

Name Sunday ▶	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Enter initials and date:

Weekly
• Run programmer
  Self-test, (cycle
  power)
• Clean surfaces
• Clean probe tips.
• Check Tray Feeder*
• Clean 3D Inspection
  System*

Jan. ▼	Feb.	Mar.	Apr.	May	Jun.

Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

Jan.	Feb.	Mar.	Apr.	May	Jun.

Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

Enter initials and date:

Monthly
- Clean/inspect Tray Feeder*
- Check input air filter; drain fluid
- Check vacuum generator filters on head
- Clean Laser Rotor tips and Laser housing*

Jan. ▶	Feb.	Mar.	Apr.	May	Jun.

Jul.	Aug.	Sep.	Oct.	Nov.	Dec.

'Enter initials and date:

Quarterly
- Clean the Device Position System windows under PNP head
- Clean safety doors
- Clean the monitor

Initial— Jan.–Feb.–Mar.	Apr.–May–Jun.	Jul.–Aug.–Sep.	Oct.–Nov.–Dec.

'Enter initials and date:

Semi-Annually
- Check PNP head connections & fasteners
- Clean Fume extraction tubes and clean or replace the filters*
- Clean Handler PC filter
- Clean Laser PC filter*
- Clean 3D Inspection PC filter*

Initial— Jan.–Jun.	Jul.–Dec.

Enter initials and date:

Annually
- Clean and lube Gantry guide rails
- Perform Programmer *Performance Verification* test
- Check vacuum generator silencers on head
- Inspect the gantry belt tension

Initial— 20___

* denotes optional equipment

Chapter G
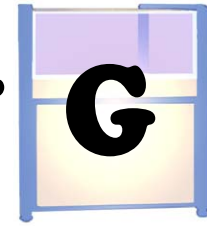
Glossary

This glossary defines terms and acronyms used in this manual as they relate to the PSV7000 Programmers.

A	
8P8C	~ 8 Position 8 Contact (also 8 position 8 conductor; it is often incorrectly called RJ45).
Access door	~ Large sheet-steel hinged panels with latches on most sides of the machine. See also, *safety door*, and Cabinet panels.
Actuator Plate	~ A plate that opens a socket(s) for loading a device(s).
AH700(	~ The Software for operating PSV7000 Systems. Also, a folder on the C: drive in Handler computer.
Air regulator	~ a valve which reduces the pressure of the incoming air to a set value.
algorithm	~ A software file containing specific step-by-step calculations required by the programmer to program a device.
Allen wrench	~ Hex Key, Umbrako key,
APS	~ Annual Programmer Support contract
B	
boot	~ see Start.
bus	~ A set of connections for connecting various functional units in a computer.
C	
Cabinet panel	~ Large sheet-steel sides screwed to the machine frame. See also, Access Doors.
CFM	~ Cubic Feet per Minute, a volume/time measure of the rate of air flow. One CFM = 28.32 liters per minute.

checksum	~	A computed value which is transmitted or stored along with the data in order to detect corruption of the data.
chip	~	See Device.
chip feeder	~	A component feeder system which mounts onto, and feeds devices to, electronic SMT Machines. Also called a tape feeder.
contacts	~	The electrically conductive metal leads on a socket module which conduct programming signals from the programmer to the pins on the device in the socket.
continuity check	~	A preprogramming test that checks the device for electrical connections to the socket. (No electrical connection to the die). Not all pins are checked during this test.

D

DAB	~	See Diagnostic Adapter Board
device	~	A programmable integrated circuit. You may have heard other terms such as chip, microchip, semiconductor device, PROM, or DUT (Device Under Test).
device package	~	The protective container or housing for an electronic device with external terminals to provide electrical access to the components inside.
device tape	~	The device pocket tape, the devices, and the cover tape before they are separated.
Device-position Sensor		Also called, 'Laser guided Device-position Sensor.' The laser optic sensor under the PNP head that measures the device position on each probe.
Diagnostic Adaptor Board	~	(DAB) A circuit board that replaces the Socket Adapter Board for performing programmer hardware diagnostics.
Digital I/O	~	Provides 24 VDC for sensor systems throughout the PSV7000 System.
Door	~	See Access Doors.
Dual Tray Feeder	~	An optional automatic tray feeder by Data I/O that mounts onto the PSV7000 to deliver trays to the workspace.

E

Enable selector		The switch on the Laser PC just above the Key selector.
E-plate 1	~	A vertical plate that supports the DC Distribution PCB and power supply and generally supplies services to the programmers.
E-plate 2	~	A vertical plate inside the back of the machine that distribute AC and DC power.
End a job	~	See Finish a job.
ESD	~	Electrostatic Discharge. ESD can damage programmable devices and other static sensitive electronic components.
E-Stop	~	Same as Emergency Stop. Stops machine motion immediately. Intended to prevent injury in an emergency situation.
Ethernet	~	The most popular type of local area network, which sends its communications through radio frequency signals carried by a coaxial cable. Software protocols used by Ethernet systems vary, but include Novell Netware and TCP/IP.

F		
FC III DC Distribution board	~	A PCB that provides DC power to the programmers. It is on the E-Plate.
FEPROM	~	Flash Erasable Programmable Read Only Memory. Similar to EEPROM but erasing can be done in blocks or to the whole chip.
firmware	~	Software stored in ROM or PROM; essential programs that remain even when the system is turned off.
Finish a job	~	Let the machine program the preset number of devices for that job, or end it prematurely by clicking the Finish button on the Run window.
FLASH	~	See FEPROM.
FlashCORE	~	A programming architecture for socketed devices.
FlashCORE Adapter	~	A circuit board with 1 to 4 programming sockets that fit on any FlashCORE programmer.
FlashCORE III (FC III)	~	FlashCORE III is the name of the third generation of FlashCORE programmers which can download jobs and program much faster than its predecessors.
G		
gantry	~	The rails that supports the pick and place head and moves it horizontally in the X and Y directions.
GND	~	Ground
H		
Handler Computer		This is the main PSV7000 System computer is access at the front of the machine in the lower left corner.
Head	~	see PNP head
HEPA	~	High Efficiency Particulate Air
Hex Key	~	A tool for removing screws; also called Allen wrench or Unbrako wrench.
HIC Socket Adapters	~	Socket Adapters with High Insertion Count sockets.
Home position	~	A place at the back, right rear of the workspace where the PNP head travels for automatic initialization when a job is started.
I		
I/O	~	Input/Output.
I/O Controller		A Digital I/O.
J		
JEDEC	~	Joint Electron Device Engineering Council.
job	~	A set of instructions, used by the programmers, containing all the device programming parameters required to set up and program a specific set of semiconductor devices. Used interchangeably with '*task*.'
JTAG	~	Joint Test Action Group

K		
Key selector		The switch on the Laser PC with the key in it.
kgf/cm^2	~	kilograms force per square centimeter.
kit	~	A collection of tasks that are run successively.

L		
laptop	~	A portable computer.
Laser Module	~	A laser marker which marks the surface of the devices. The module comprises the whole Laser box, laser, and a rotor., as well as the Laser PC.
Laser rotor	~	The rotating platform that supports the laser tips. It might also be referred to the Laser shuttle or Laser platform.
Laser tip	~	The device tips on the rotor that seal vacuum to hold devices.
lead	~	The connection legs that extend from the body of a device.
Leader	~	(Applies to Tape Output System) The length of empty carrier tape required at the beginning of the finished reel of taped devices.
LED	~	**L**ight **E**mitting **D**iode.
Light Tower	~	The pole on top the PSV7000 System with colored lights indicating different machine statuses.

M		
mA	~	milliampere
Machine workspace		See **Workspace**.
Main window		AH700 main window. This is the first window to display when the AH700 starts after clicking RUN in TaskLink. The window title bar simply says -To-do-
Marker	~	A system to inscribe identification onto devices, in this case by a laser.
MB	~	**M**ega**b**yte; 1,048,576 bytes (1,024 x 1,024, or 1024^2).
μBGA	~	**M**icro **B**all **G**rid **A**rray. Sometimes written as MBGA.
MCBI	~	**M**ean **C**ount **B**etween **Interruption**
menu	~	A screen display that lists available command choices.
motion controller	~	There are two electronic controllers for gantry movement. Theta motion controller is located on the PNP head.

N		
Nm3/min.	~	Air (gas) volume. **Nm3/min.** = Normal cubic metres per minute / Volume at ambient temperature or 0°C.
NVM	~	**N**on-**V**olatile **M**emory
NVRAM	~	**N**on-**V**olatile **R**andom **A**ccess **M**emory

O		
OEM	~	**O**riginal **E**quipment **M**anufacturer.

OPTIMA Programmer	~	A Flash programmer with many Socket Adapters and Tops making it useful in programming a large variety of different package types such as logic devices and older Flash EEPROMs.

<table>
<tr><td colspan="3">P</td></tr>
<tr><td>P&P head</td><td>~</td><td>See PNP.</td></tr>
<tr><td>Package File</td><td>~</td><td>A package file contains information about the physical dimension of a specific device package and associated Socket Adapter, as well as position information of each socket on the workspace.</td></tr>
<tr><td>Park Position</td><td>~</td><td>A place at the back, right corner of the workspace where the PNP head stops after a job is stopped.</td></tr>
<tr><td>PC</td><td>~</td><td>Personal Computer.</td></tr>
<tr><td>PCI</td><td>~</td><td>Peripheral Component Interconnect. A standard for connecting peripherals to a personal computer.</td></tr>
<tr><td>Pick and Place head</td><td>~</td><td>The mechanism that supports the probe that picks up and places devices.</td></tr>
<tr><td>pick position</td><td>~</td><td>The physical positions where the pick-and-place head picks up devices such as at the input media and at sockets.</td></tr>
<tr><td>PLC Controller</td><td>~</td><td>Taping Module toggle switches</td></tr>
<tr><td>PN</td><td>~</td><td>Part Number</td></tr>
<tr><td>PNP</td><td>~</td><td>Pick and Place. Also referred to as P&P.</td></tr>
<tr><td>PNP head</td><td>~</td><td>The Pick and Place head controlled by the Gantry for moving devices between sockets and media.</td></tr>
<tr><td>PNP Taping Head</td><td>~</td><td>The pick and place head on the Tape Output Module.</td></tr>
<tr><td>pocket tape</td><td>~</td><td>The pocketed film that carries the devices. This term usually implies that the cover tape has been removed. Also called device pocket tape.</td></tr>
<tr><td>Power Panel</td><td>~</td><td>Panel on the back of the Machine where AC power and air are connected.</td></tr>
<tr><td>probe</td><td>~</td><td>A tube attached to the pick and place head that picks up, carries, and releases devices. Usually a probe has a rubber tip on the end that allows it to create a good vacuum seal on the device.</td></tr>
<tr><td>Programmer</td><td></td><td>A FlashCORE assembly that accepts Socket Adapters and programs the devices.</td></tr>
<tr><td>programming</td><td>~</td><td>The process of electronically writing data into a device. (Burning is another term used to describe this operation.) "Input devices" are usually blank or un-pro-grammed; "output devices" are usually programmed devices.</td></tr>
<tr><td>PSI</td><td>~</td><td>Pounds per Square Inch; a measurement of pressure. One PSI = 0.07031 kg per cm^2.</td></tr>
<tr><td>Puff</td><td>~</td><td>A surge of air through the pick and place probes to release a device.</td></tr>
<tr><td colspan="3">Q</td></tr>
<tr><td>QFP</td><td>~</td><td>Quad Flat Pack.</td></tr>
<tr><td colspan="3">R</td></tr>
<tr><td>register</td><td>~</td><td>A high-speed memory location in a computer's CPU.</td></tr>
<tr><td>reject bin</td><td></td><td>A bin or box for depositing rejected devices. See also, reject tray.</td></tr>
</table>

reject tray		A tray that holds the rejected devices. See also, reject bin.
rotor [Laser]		The mechanical, half moon-shaped platform on the Laser Module that rotates when marking devices.

S		
safety door (safety shield)	~	One of the hinged plastic doors that allow access to the workspace. See also, *Access door*.
SCFM	~	**S**tandard **C**ubic **F**eet per **M**inute, a measurement of flow.
SHCS	~	Socket Head Cap Screws
semiconductor	~	A programmable integrated circuit. Also called "devices," they are made of a material whose electrical conductivity is between that of a conductor and that of an insulator.
SHCS	~	Socket-Head Cap Screw
Shuttle Carriage	~	The part of the Shuttle Pedestal that clamps to the belt.
Shuttle Pedestal	~	A small round support, or table top, that holds a device, It is part of the Shuttle Transfer System.
Shuttle Transfer System	~	The belt-driven shuttle system that transports devices to a marker or labeler,.
SNS	~	Serial Number Server. Data I/O software that manages serial numbers to devices.
Socket Adapter [Board]	~	A printed circuit board that connects the programmer (via the Backplane Board) to device sockets allowing communication between the two.
socket module	~	The device-specific part of the programmer that holds a device in place so that it can be programmed.
SRAM	~	**S**tatic **R**andom **A**ccess **M**emory
Start	~	To load and initialize the operating system on a computer. Synonym: boot.
submenu	~	small menus that are usually accessed by right-clicking an object on the screen and usually on the **Run** window.

T		
Tape feeder	~	See Chip Feeder.
Tape Output [Tape Output Module]	~	Attaches to the PSV7000 System for placing programmed devices into device tape. (Usually a TM-50 Taping Module.)
TaskLink	~	Data I/O's software for creating programming jobs for PSV7000 Programmers (as well as RoadRunner3, FlashPAK III, FLX500, Sprint™ Family Programmers and UniSite™ family Programmers). It is a Windows® based program that simplifies task management.
teach	~	To communicate your directives to the system via software routines.
throughput	~	The rate at which correctly-programmed devices are produced.
tip [probe tip]	~	A rubber fitting often inserted onto the end of a probe that allows it to achieve the vacuum seal required to pick and hold a device.
Trailer	~	(Applies to Tape Output System) The length of empty carrier tape required at the end of the finished reel of taped devices.

Tray Feeder	~	The Dual Tray Feeder that mounts onto PSV7000 Systems to automatically deliver trays of unprogrammed devices to the work space and return trays of programmed devices to the feeder stack.
Tray 1 position		The left tray position (excluding the reject tray). This us usually the input tray.
Tray 2 position		The right tray position (adjacent to Tray 1). This is usually the output tray.
TSOP	~	**T**hin **S**mall **O**utline **P**ackage.
V		
vacuum tool	~	A hand tool that uses suction to manipulate objects. "Handy-Vac" is such a tool.
V$_{CC}$ DAC	~	**V**oltage **C**ollector **C**ommon **D**igital to **A**nalog **C**onverter. Used to generate the supply power for the devices to be programmed or verified.
VDC	~	**V**olts (of) **D**irect **C**urrent
verify	~	A device operation that compares data in a programmed device with data in RAM or in a disk file. With logic devices, verifying can also include functional testing.
VPP DAC	~	**V**oltage **P**rogramming **P**ower **D**igital to **A**nalog **C**onverter. A DAC that controls the programming power supply for devices.
W		
winAH400.ini	~	An initialization text file required by the AH700 software to define various features and options on PSV7000.
Work Environment	~	The area in the room surrounding the PSV7000 Machine and the qualities of that area. (This term is sometimes used to also mean *Machine Workspace*.)
Work Surface	~	The main surface of PSV7000 where programmers and Socket Adapters are installed.
Workspace [Machine workspace]	~	The area defined by the absolute limits of the PNP head.and where programming is done. Workspace includes the Socket Adapters and Actuator Plates but not the programmers themselves.
X		

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Programmable media experts