Maintaining the

FLX500

■ Flash Programming Handler ■

After initial set up—
Please run and record the Performance Verification Kit to establish a reference speed.

Data i/o

■ **FLX500** ■

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Contents

1 ... Tools and Materials

Installing a Keyboard and Mouse

The **FLX500** incorporates a touch screen; however, some maintenance procedures require the use of a keyboard and mouse. The keyboard and mouse plug into the back of the **FLX500**. See Figure 1 on the next page.

On early models using PS/2 ports, the system power must be recycled after connecting a keyboard and mouse.

Connecting a keyboard and mouse depends on your model. See the configuration in Figure 1 that matches your model.

Connecting a PS/2 Keyboard and Mouse:

1. End a job if one is running.
2. Exit the **FLX500** application—
3. Plug in the keyboard and mouse according to the label. See Figure 1.
4. Switch off the power by pressing the power switch (right side) once and releasing. Then push it and release once more to turn the power back on again.
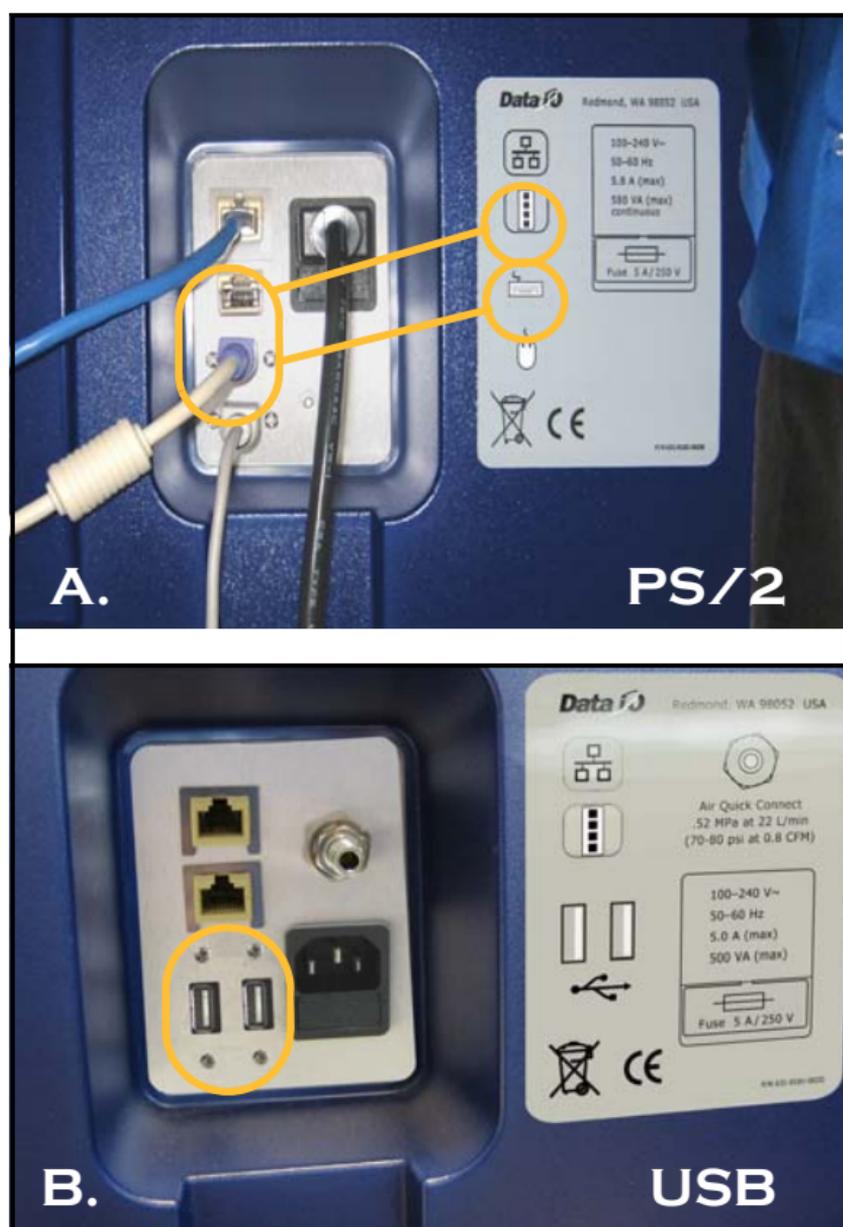
*Figure 1—Keyboard and Mouse Connections on the back of the **FLX500**. Early models require PS/2 connections (A). Later models require USB connections (B).*

Figure 2—Power Switch on the right side of the **FLX500** *is a spring-loaded rocker switch.*

Connecting a USB Keyboard and Mouse:

Plug in the keyboard and mouse using either USB port first. See Figure 1. (Power does not need to be cycled.)

Log File

The **FLX500** provides a log file that helps when diagnosing problems. The file name has the date and time the log was created and ends with .txt. For example: FLX_20070607_162818.txt.

Log files are typically saved to the C: drive of the **FLX500** —C:\Flx_500\Log.

You can also save a log file to a different location:

1. Tap the Version button —

2. Tap Save Log —

3. Select a drive and path where you want the FLXLog.zip file written, or insert a USB memory stick and select (tap) the USB drive listed.

4. Tap OK [✓], then OK, and close the dialog.

Two good ways to view the log files are:

- In the diagnostics—Tap Tools > Enter PIN (Personal Identification Number) > Tap OK > and View Log at bottom.

- Connecting a keyboard and mouse— see previous headings. Then navigate to the Log folder listed above.

Adding Antivirus Software

The FLX contains a CPU that runs Windows® XP operating system.

Tools Required:

- Keyboard and Mouse

CAUTION: Possible virus hazard. The FLX 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 FLX will not be running jobs at that time. A mouse and keyboard may be required for installation; see *Installing a Keyboard and Mouse* on page 1.

NOTE: An antivirus program may affect performance.

Run PV-Kit

Running the Performance Verification Kit establishes a reference speed (PPH) to compare to if you experience trouble in the future.

All hardware required to run the PV-Kit job, including 16 devices, came with the **FLX500**. Contact Data I/O for information about ordering replacement parts for the PV-Kit.

NOTE: Be sure the Socket Adapters are clean before running the PV-Kit job.

1. Set up for the PV-Kit job (Trays, Socket Adapters, Actuator Plates). For instructions see the on-screen Help.
2. Tap the Job File button. 📁
3. Select the PV-Kit job from the Job Window and tap OK.
4. Tap Run. ▶
5. When it finishes, tap the Statistics button on the Run Window and read the Throughput displayed on the statistics window.

    Record the PPH in the PV-Kit Performance chart on page 47.
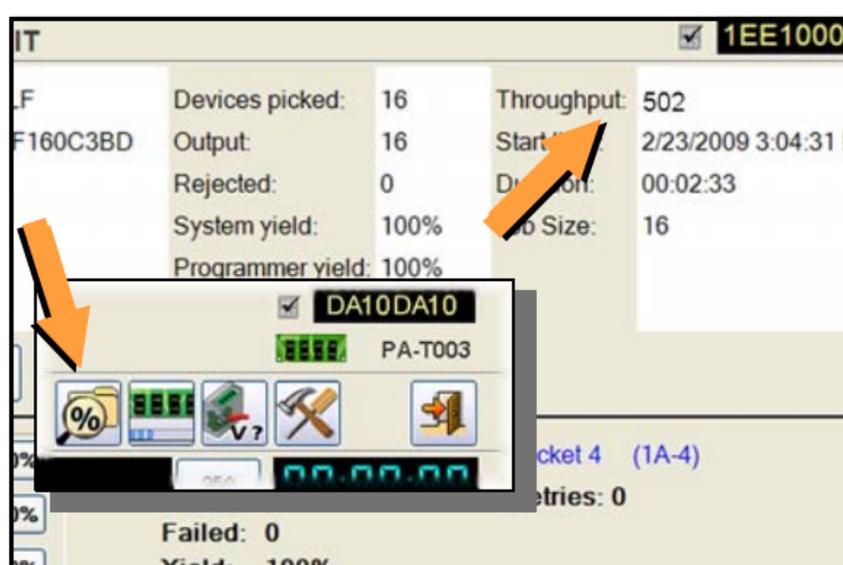
Figure 3—The Statistics Window displays Throughput, *often abbreviated as PPH.*

Spares Kits

A Basic Spares Kit is available for the **FLX500**.

	Data I/O Part Number
Basic Spares Kit	**952-0377**

Hazardous Substance Restrictions

Disposal of FLX500

Dispose in a separately managed collection for electronic equipment (per Directive 2002/96/EC) or return to Data I/O (no charge).

RoHS for China

Restriction of the use of certain hazardous substances in electrical and electronic equipment in China:

部件名称	有害物质成元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr^{6+})	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
框架结构	X	O	O	O	O	O
自动机械臂	X	O	O	O	O	O
控制箱	X	O	O	O	O	O
电源	X	O	O	O	O	O
空气压缩机	X	O	O	O	O	O
编程器模块	X	O	O	O	O	O
单插座压板	X	O	O	O	O	O
电源输入板	X	O	O	O	O	O
触摸视屏	X	O	O	O	O	O

O：表示该有害物质在该器件所有均质材料中的含量均在 SJ/T 11636-2006 标准规定的限量要求以下。
X：表示该有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11636-2006 标准规定的限量要求。

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2 ... Periodic Maintenance

> ### ⚡ **WARNING**
>
> *High voltage.— Do not remove any panels or covers on the **FLX500**. There are no customer-serviceable parts behind the covers. High voltage may be present and exposed if covers are removed. High voltage can cause injury or death.*

> *NOTE: Once a year, **FLX500** Programmer Module performance can be verified or returned to Data I/O for verification. See Annual Performance Verification on page 23.*

Gantry Movement and Alignment

The **FLX500** gantry scans fiducials on the Tray Modules and Programmer Modules using an optical sensor on the PNP Head. This occurs when programming is started after any module receives power for the first time.

If you experience any alignment problems, such as pick and place failures, you can:

- rescan the fiducials at the Diagnostics –Modules Window
- verify system calibrations at the Diagnostics –Alignment Window. If the verification fails, see *Calibration Fails* in the on-screen Help.

For more information, see the on-screen Help in the diagnostics area of the application.

Daily Maintenance

Clean the Sockets

Tools Required:
- Shop air, clean and dry, *.48-.55 MPa (70-80 PSI).*
- 4 mm Hex Key (Allen Wrench)

Remove dust and debris from the sockets with clean, dry, compressed air. Actuate the sockets to ensure dust and debris are cleared from beneath the contacts. If the Socket Adapter is installed in the **FLX500** programmer, the sockets can be actu-

ated by pushing the Socket Actuator button on the monitor.

CAUTION: *Pinch Point. The Actuator Plate lowers onto the sockets to open them. Keep fingers and objects away from the Socket Adapters when actuating them.*

Check the sockets for wear; replace the Socket Adapter if necessary.

If further cleaning is needed for best throughput, remove the Socket Adapter and clean it in an ultrasonic bath with approved cleaning fluid. Isopropyl alcohol (isopropanol) can be used to clean the Socket Adapter.

Weekly Maintenance

- Running the Self-test
- Checking Probe Tips
- Cleaning the Fiducials and Sensors

Running the Self-test

Tools Required:

- Vacuum tweezers

Perform the system Self-test once each week to verify proper operation of all internal electronic systems.

*NOTE: The Self-test runs automatically when power is applied to the **FLX500** unit.*

To run the Self-test:

1. End a job if one is running.

2. Clear all devices or cards from the sockets and from the work surface.

3. Close the **FLX500** Application with the Exit button.

4. Turn off the power by pressing the power switch (right side) once and releasing. Then push it and release once more to turn it on again.

    The Self-test will begin automatically. Check that no system errors display on the monitor.

Checking Probe Tips

Tools Required:

- water and lint-free cloth or swab

1. Clean the rubber PNP probe tips with water on a clean, lint-free cloth or swab.

2. Check for wear or cracking; replace the tips if necessary.

Data I/O Part Numbers	
Probe Tip 4.57 mm OD	**288-0019-001**
Probe Tip 3.05 mm OD	**288-0020-001**

CAUTION: Probe tips could get damaged by isopropyl alcohol. Do not use isopropyl alcohol on the rubber probe tips. It will dry them excessively, making them prone to cracking and leaking air.

Cleaning the Fiducials and Sensors

Tools Required:

- shop air, clean and dry, *.48-.55 MPa (70-80 PSI)*

Tray Modules have two fiducial locations and a sensor, and Programmer Modules have one fiducial location. These fiducials and sensors must be

clean so the PNP Head optic sensor can accurately detect the position of the modules.

NOTE: A fiducial scan is run automatically when starting a job if any modules have been changed and for the first job after startup. The scan can also be run any time via the Diagnostic Windows.

To clean fiducials and sensors:
Remove dust and debris from the fiducials and sensors with clean, dry, compressed air. See Figure 4 and Figure 5.
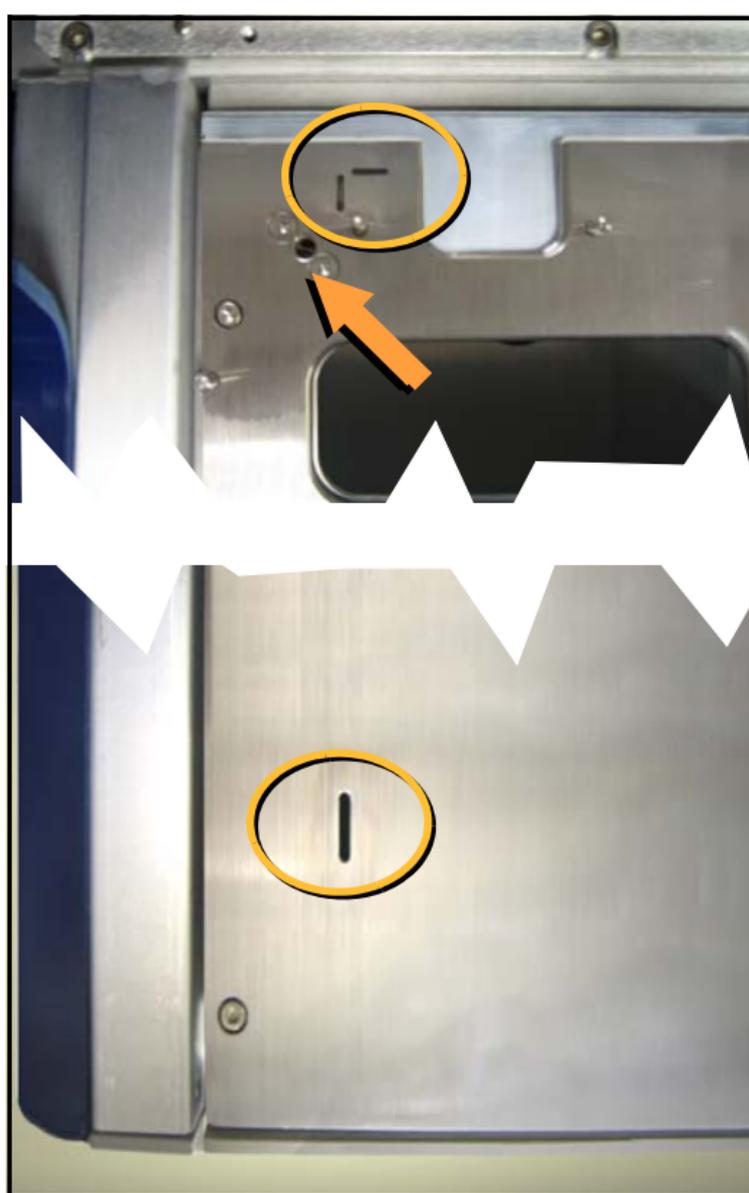
Figure 4—A Tray Module fiducials (circled) and a Tray Module sensor (arrow).
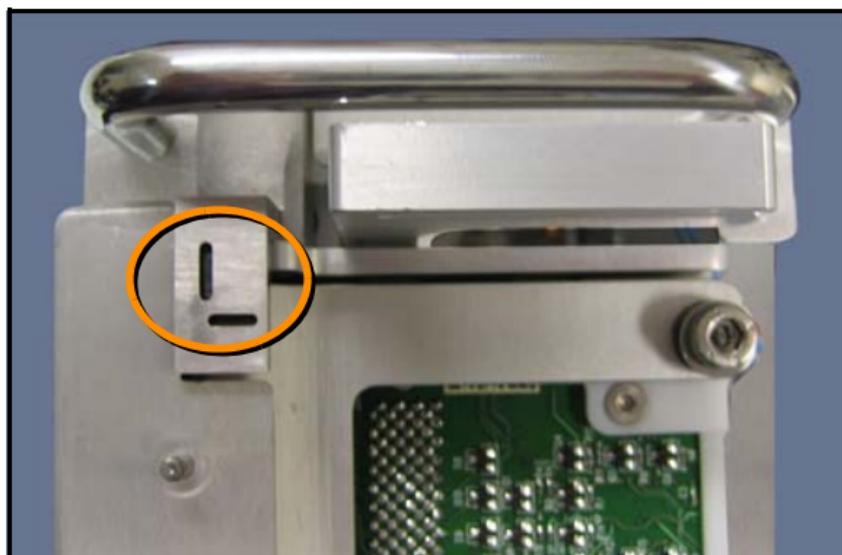
Figure 5—A Programmer Module fiducial.

Module surfaces may be too dark or too bright for a successful scan and may need to be polished (if too dark) or scuffed (if too bright). For optic values and correcting surface reflection, see *Fiducial Scan Errors* on page 28.

Monthly or Quarterly Maintenance

- Calibrating Probe-Offset
- Cleaning the Cover and Work Surface
- Maintaining Air Flow

Calibrating Probe-Offset

Recalibrating the offset of the probes includes the Z-Offset (the height difference between the two probes). Do this procedure each month and:

- after replacing probe tips
- after any repair on the PNP Head or probes
- if you are experiencing problems picking devices, especially with probe two.

To recalibrate the offset, see the on-screen Help for the *Diagnostics –Alignment* Window.

NOTE: Recalibration takes 5 to 7 minutes to complete, a Calibration Tool, a 4 mm hex key (Allen wrench), and a PIN (Personal Identification Number) to access the Diagnostics Windows (after tapping the Tools button).
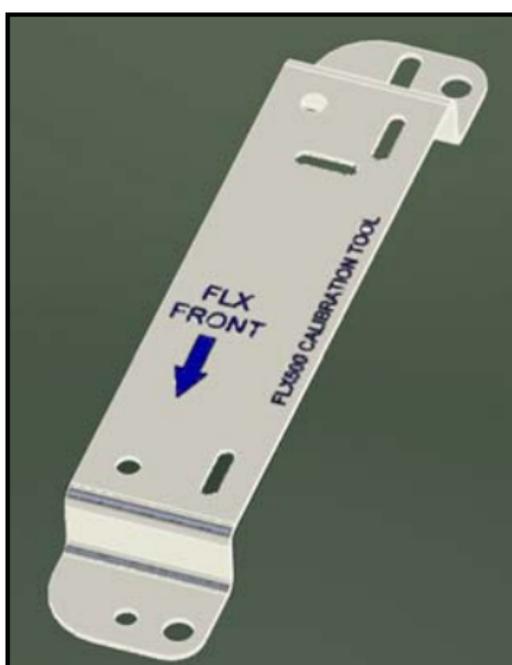
Figure 6 — The FLX programmer calibration tool is Part Number 615-7054 (and came with your 2009 or later FLX500).
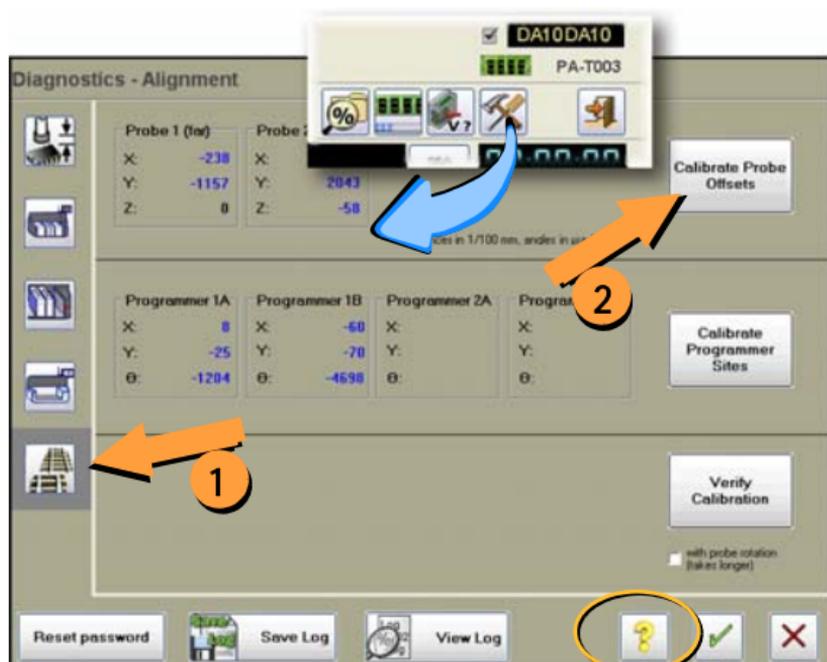
Figure 7—The Alignment Window within the Diagnostics tools offers probe offset calibrations.

Cleaning the Cover and Work Surface

Tools Required:

• isopropyl alcohol and cloth

Lightly clean the cover and work surface with isopropyl alcohol on a cloth every four months.

CAUTION: Do not use solvents such as acetone, lacquer thinner, mineral spirits, or any type of abrasive compound on the cover. Use of these products, or excessive pressure, will damage the surface, reduce visibility and remove the ESD dissipative properties.

Maintaining Air Flow

NOTE: Shop air to the FLX should be .48-.55 MPa @ .028 M^3/min. (70-80 PSI @ 1.0 cfm).

Perform the following probe blowout procedure quarterly and at times when pick failures occur often. This interval is dependent on the amount of machine use and air quality. Adjust your interval as required. For example, preventing the probes from drawing in air for long periods of non-use—using Automatic Air Management (see the on-screen Diagnostic Help) or manually shutting air off to the probes while idle—can reduce the need to perform this blowout procedure as often.
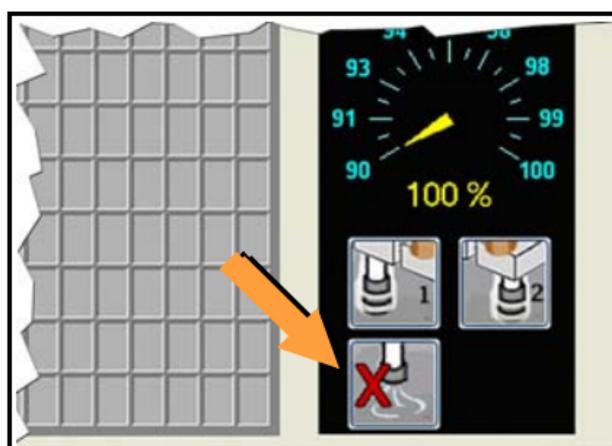
Figure 8—Probe air-shut-off buttons on the Run Window.

Probe Blowout Procedure

Tools Required:

- Standard (flat) screwdriver
- tape or method to mark tubes
- compressed air, clean and dry, *.48-.62 MPa (70-90 PSI)*

1. Stop the job if applicable. For instructions see the on-screen Help.

2. Switch power off.

3. Push the E-Stop

Blow Out the Probes

4. Open the cover and move the PNP Head close for access to its far side.

5. Locate the two clear tubes just to the far side of the head cover, plugged into barbed fittings. With a small flat screwdriver pry each tube off its fitting, marking which tube goes to which fitting.
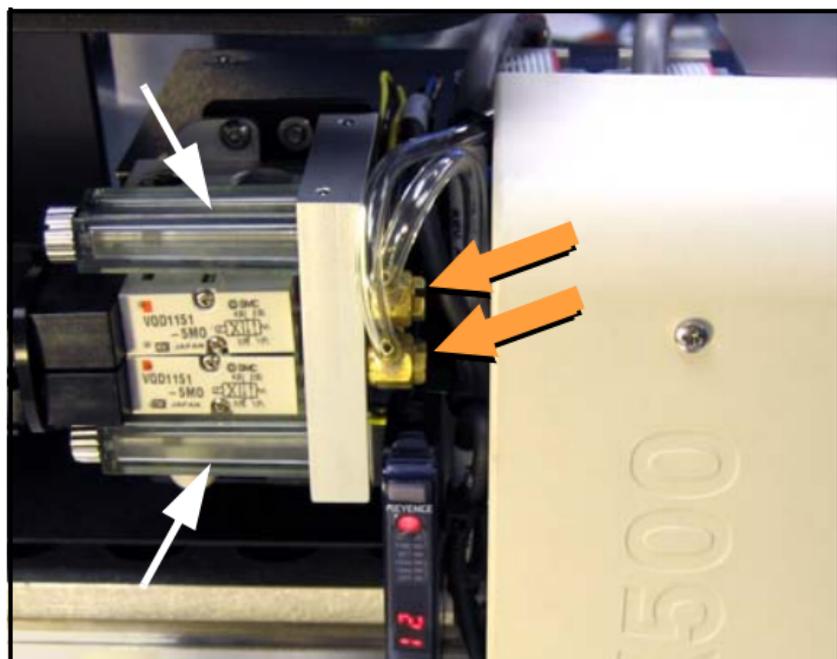
Figure 9—Air tubes on barbed fittings—one for each probe—and air filters.

6. Use clean and dry compressed air *.48-.62 MPa* (70-90 PSI max) to blow into one tube. Stop and start the compressed air flow several times.

7. Do the same with the other tube.

Blow Out the Manifold

8. Now locate the two clear, square plastic housings that hold the filters. Unscrew the screws securing the housings.

9. Remove the housings, being careful not to lose their gaskets.

10. Carefully remove the gaskets.

CAUTION: Health Hazard. For the next step, wear eye protection. The tube fittings on the manifold are pointed up. When blowing air through the manifold, protect your eyes and face.

11. Use clean and dry compressed air *.48-.62 MPa* (70-90 PSI max) to blow into the two manifold ports now exposed at each filter site. Stop and start the compressed air flow several times.

Replace Parts in Reverse Order

NOTE: If filters are dirty (not white by several shades and possibly have visible debris) replace the filters with new ones: see Step 6.– of Checking Air Filters on page 20.

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12. Carefully reinstall the filter gaskets and housings, and reinstall each screw.
13. Reconnect both tubes onto the correct fittings.
14. Connect shop air at the back of the FLX if it isn't already.

Check Vacuum

15. Switch the power on and check the pressure at each probe tip. You can accomplish this as follows:

    15a. Clean the probe tips.

    15b. Ensure that there is a standard output module installed (not a Drop Module) without a tray on it.

    15c. Release the E-Stop and close the cover.

    15d. Open the Diagnostic Window by tapping the Tools button and entering your PIN.

    15e. Tap the System button ⬚, and then Check Vacuum.

    If any test fails, see *Insufficient Vacuum* on page 30.

Figure 10—The Check Vacuum button on the System Window in the Diagnostics Tools and the Fail *message when the system does not meet requirements.*

Annual Maintenance

- Checking Air Filters
- Gantry Lubrication
- Annual Performance Verification

Checking Air Filters

The PNP Head uses two air filters. Visually check the filters for dirt each year (filters are not white by several shades and possibly have visible debris). If necessary, or if performance is affected (dropping devices), remove the filters from the PNP Head to inspect them. (Maintenance interval may be adjusted depending on your findings.)

Tools Required:
- Standard screwdriver
- tweezers

To remove the air filters:

1. End the job if one is running. For help ending a job, tap the [**?**] for on-screen Help.

2. Push the Emergency-stop button. (This allows moving the gantry by hand.)

3. Open the cover and move the PNP Head closer to you for access to its far side.

4. Locate the two clear, square plastic housings that hold the filters. Unscrew the screw securing the upper filter.

5. Remove the housing, being careful not to disrupt its gasket.

6. Pull the white strip filter from the housing with tweezers. If it is more than slightly dirty, replace it with a new filter or contact Data I/O.

7. Carefully replace the filter housing without disrupting the gasket, and reinstall the screw.
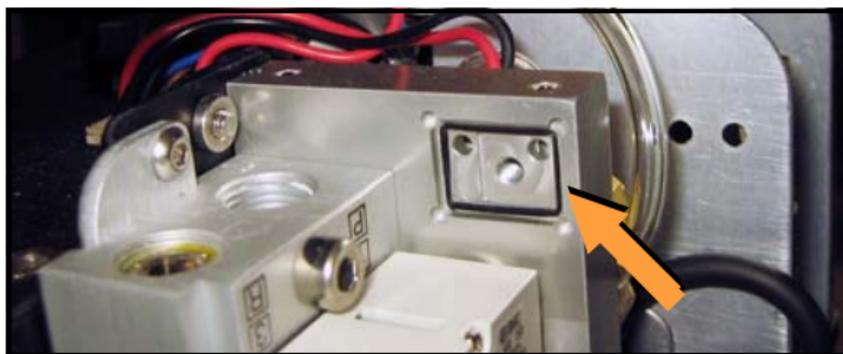
Figure 11—Black Air Filter Housing gasket. (Filter and Housing are removed.)

8.   Repeat for the lower filter.

9.   Release the Emergency-stop button.

Gantry Lubrication

The **FLX500** has two Ball Rail Systems in the gantry. The larger rail defines the X-axis (left-right) and the smaller rail, which is on the PNP Arm, defines the Y-axis (front-back).

> *NOTE: Maintenance intervals may be adjusted depending on the amount of use.*

Oil Specification

The OEM (Original Equipment Manufacturer) recommends mineral oil CLP (DIN 51517) or HLP (DIN 51524) with a viscosity of ISO VG100 in accordance with DIN 51519.

Data I/O Part Number	
Lubricating oil, Guide rail	560-0002-001

Tools Required:

- Lubricating oil (above)
- Clean cloth
- Syringe oil tube (optional)

Lubricate the Small Rail as Follows:

1.   End the job if one is running. For help ending a job, tap the question mark button [**?**] for on-screen Help.

2.   Push the Emergency-stop button. This allows moving the gantry by hand.

3.   Wipe any dust or dirt off the rail.

4. Using the supplied tube with a needle end, apply the lube to the two holes on the bottom side of the carriage.

5. Since the holes on the top side are not accessible, apply the lube generously to the upper V-groove with a soft, lint-free cloth. See Figure 12.
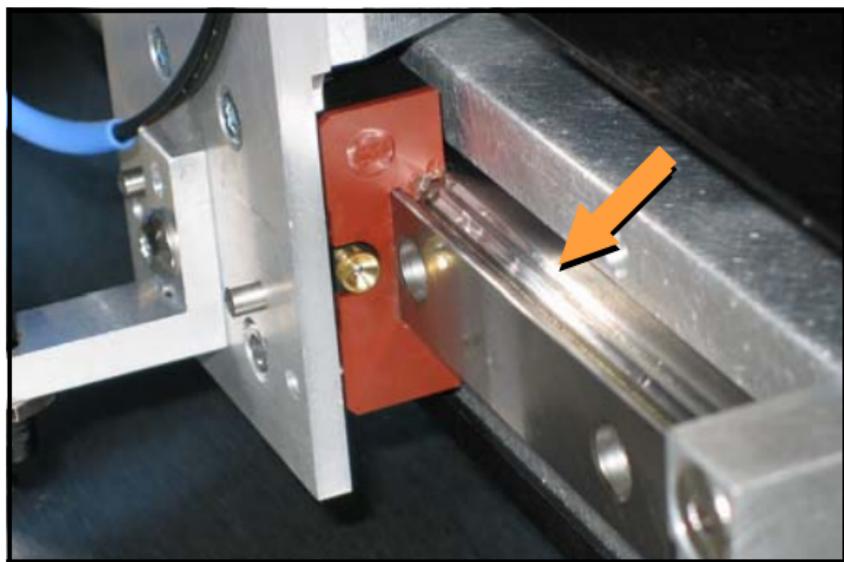
Figure 12—Apply lube to the V-groove on the Y-axis rail

6. Move the PNP Head assembly along the rail. Wipe off excess oil.

7. Repeat as needed.

8. Release the Emergency-stop button.

Lubricate the Large Rail as Follows:

1. End the job if one is running. For help ending a job, tap the question mark button [**?**] for on-screen Help.

2. Push the Emergency-stop button. This allows moving the gantry by hand.

3. Wipe any dust or dirt off the rail.

NOTE: There is one carriage on the large rail with a plate on each end of the carriage. Each plate contains two lubrication holes.

4. Using the supplied tube with a needle end, apply the lube to the two holes in the plate at one end of the carriage. See Figure 13. Apply 0.33 cm^3 (.33 milliliters) (.011 oz.) per plate, with half (0.17cm^3) applied to each lubrication hole.
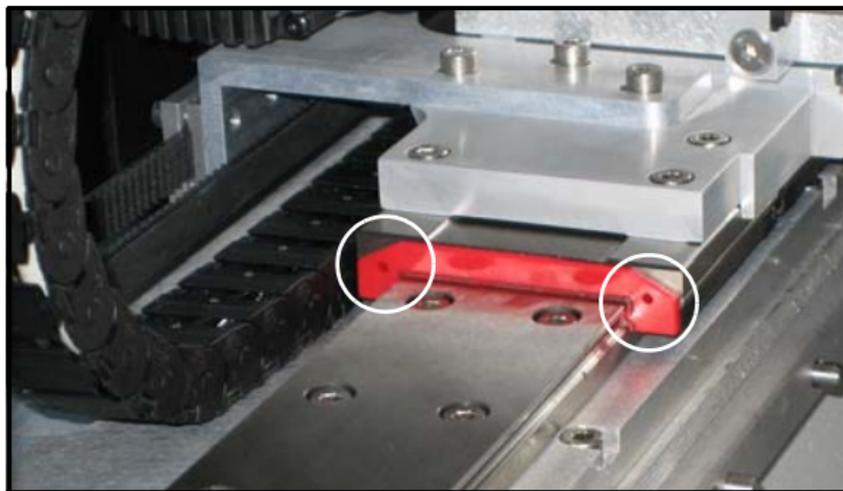
Figure 13—Two lubrication holes on plate.

5. Slide the arm to the other side of the rail for access to the plate on the other end of the carriage.

6. Repeat Step 4 for the plate on the other end of the carriage.

7. Slide the arm to the left and right and wipe excess oil from the rail.

8. Release the Emergency-stop button.

Annual Performance Verification

Performance verification uses the Diagnostic Adapter Board (DAB) to provide a thorough hardware test of the programmer electronics as well as check that precision references are within operating ranges.

Tools Required:

- 4 mm Hex Key (Allen wrench)
- DAB (Use PN below to purchase)

Data I/O Part Number	
Diagnostic Adapter Board	**910-2200-003**

Once a year, perform the Performance Verification using the DAB, or send the **FLX500** Programmer Modules to Data I/O for performance verification. Include the PPH results from the PV-Kit when sending the **FLX500** unit to Data I/O.

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3 ...
Troubleshooting

For troubleshooting items not found here, see the FLX on-screen Diagnostics Help for a thorough troubleshooting tree. This Help is only available when in the diagnostics area of the software interface (opened with the Tools button). The Diagnostics Windows require a PIN (Personal Identification Number) for access.

Rerunning the PV-Kit

If you suspect a problem with the **FLX500**, you can check to see if the problem is the **FLX500** and not a device, algorithm, or power source, by rerunning the PV-Kit job. All hardware required to run the PV-Kit job, including 16 devices, came with the **FLX500**. Contact Data I/O for information about ordering replacement parts for the PV-Kit.

NOTE: Be sure the Socket Adapters are clean before running the PV-Kit job.

1. Rerun the PV-Kit job. For instructions see *Run PV-Kit* on page 5.

2. Read the Throughput displayed on the statistics screen on the monitor by tapping the Statistics button on the Run Window.

    Record the PPH in the PV-Kit Performance chart on page 47.

	☑ 1EE10000			
	Devices picked:	16	Throughput:	502
3BD	Output:	16	Start:	2/23/2009 3:04:31 PM
	Rejected:	0	Duration:	00:02:33
	System yield:	100%	Job Size:	16
	Programmer yield:	100%		
	Handler yield:	100%		

Socket statistics for programmer 1A, socket 4 (1A-4)	
Passed: 1	Retries: 0
Failed: 0	

Figure 14—The Statistics Window displays Throughput, often abbreviated as PPH.

If the PPH is the same as when the machine was new (approximately 500 PPH) then you can eliminate many of the possible error causes.

If you are experiencing low throughput during normal operation, and your PPH when running the PV-Kit job is . . .

. . . *greatly reduced* from the original, then contact Data I/O or your local representative. For contact information see *Customer Support* on page 35.

. . . *the same as when it was new,* then you can generally eliminate suspected problems with the **FLX500**. The problem may have to do with your device, algorithm, job file, etc. (things related to device or job file).

Actuating a Programmer Without Power

If you have a Programmer Module that is not installed on an **FLX500** and still has a Socket Adapter in it, the Actuator Plate should be in the up position for removal of the Socket Adapter. If it is in the down position, you can remove the adapter by manually actuating the Actuator Plate to the up (sockets closed) position.

To manually actuate the plate on a programmer without power:

1. Lay the Programmer Module on its side to access the bottom.
2. With a flat screwdriver, rotate the actuator screw shown in Figure 15 as many revolutions as necessary to free the Actuator Plate so it can be slid out.
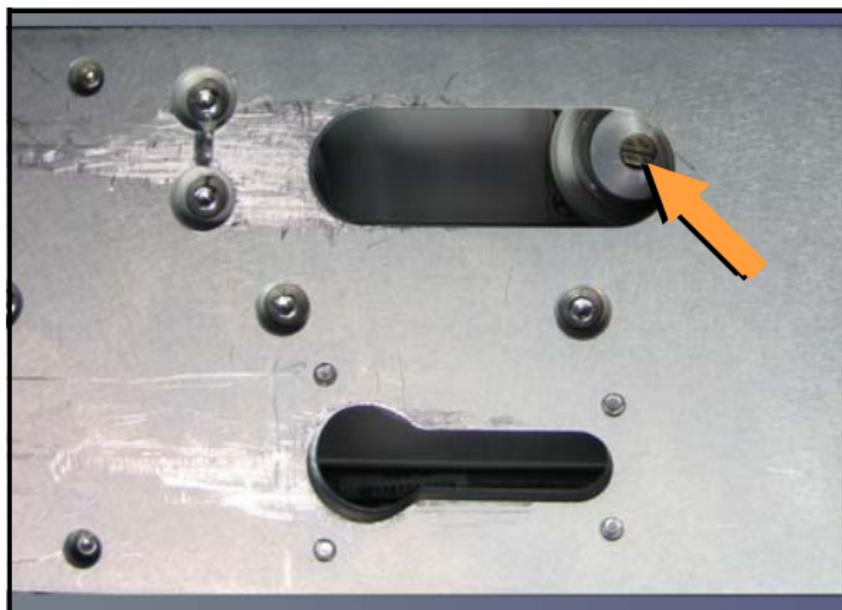
*Figure 15—The bottom of a Programmer Module
allows access to the actuating screws when power to
the programmer is unavailable.*

3. Slide the Actuator Plate out from the pro-
    grammer.

4. Remove the Socket Adapter in the usual
    way. For help removing the adapter, see the
    on-screen Help.

Fiducial Scan Errors

If the **FLX500** fails to program after the PNP Head
scans the modules, there may be a problem with
the scanning.

> *NOTE: For accurate scanning, the fiducials
> and sensors must be clean and the FLX cover
> must be closed. For cleaning instructions,
> see Cleaning the Fiducials and Sensors on
> page 12.*

For this check only, open the cover and view the
PNP Head optic sensor during scanning. The
digital display should read:

*   1000+ on the top surface (shiny, metal) of the
    module

*   0 — 500 within the fiducial slot

Figure 16—PNP Head optic sensor digital display showing a reading of 12.

The reading on the **top surface of the module** should be approximately in the range 1000--2500. If it is too high (>2500), then roughen the top surface with 400 grit sandpaper. If the reading is too low (<1000), then polish the top surface with fine emery cloth.

If the reading on the **fiducial slot** is not within the allowed range (0– 500), gently blow out the fiducial slot with clean, dry, compressed air.

NOTE: When running the Fiducial Scan from the Diagnostic Window, repeatability on subsequent scans should be ±10 counts. (One count is 1/100 mm.)

If problems with the fiducial scan continue, see the on-screen Diagnostics Help, which includes further diagnostics. You need a PIN to enter the Diagnostics Windows (Tools button) prior to tapping the Help button.

Insufficient Vacuum

If you notice insufficient vacuum on the probe tips (e.g., devices are dropped), perform the Vacuum Check: see *Check Vacuum* on page 19. If some of the checks fail (red Xs on report when the *details* check box is checked) then check that:

• all hose fittings are tight and hoses are not pinched or clogged.
  Perform the probe blowout procedure; see *Maintaining Air Flow* on page 16.

• the air filters are not dirty. Replace air filters if necessary. See *Checking Air Filters* on page 20.

• the input air to the FLX is at *.48-.55 MPa (70-80 PSI).*

If you can't find the source of the problem, save the detailed *Check Vacuum* report and send it to support@dataio.com.

Failures Picking and Placing

If probes drop devices or fail to pick and place devices accurately, check the following:

• check for insufficient vacuum; see previous heading.

• check the Z-Offset; see *Calibrating Probe-Offset* on page 15.

• check the module alignment; see *Gantry Movement and Alignment* on page 10.

PIN

The **FLX500** uses a PIN (Personal Identification Number) to access tools that offer fine adjustments, diagnostics, or other special functions. *PIN* is used synonymously with *password*.

When the **FLX500** left the factory, the default PIN was 2468. If you have reset and forgotten your PIN, contact Data I/O or your local representative for assistance. For contact information see *Customer Support* on page 35.

Electrical Fuse

The **FLX500** uses one fuse that is located at the back of the machine below the power connection. If you suspect the fuse has failed, replace it with another 5 Amp, 250 Volt fuse—5 x 20 mm.

To replace the fuse:

1. Exit the **FLX500** Application.
2. Turn off the power by pressing the power switch once and releasing, and tapping OK to close the FLX Application if it was open.
3. Unplug the power cord from the FLX.
4. With a small, flat screwdriver, placed at the small tab, pry the fuse block straight out like a drawer. See Figure 17.
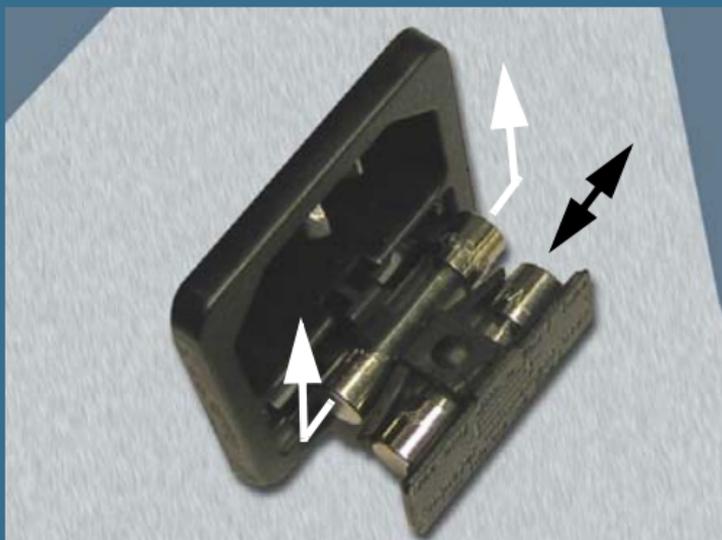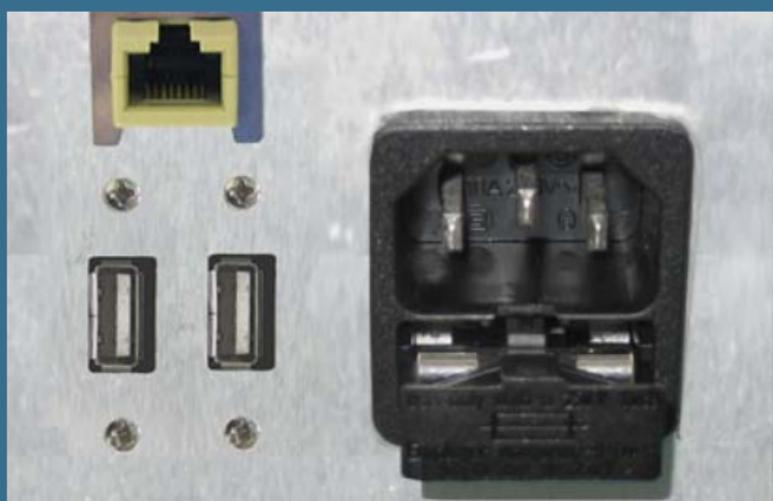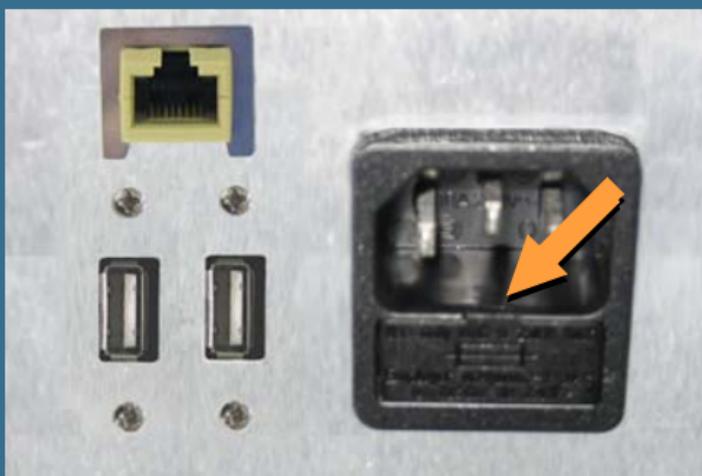
Figure 17—Fuse Access is in the Back. Closed (top) and open. The nearest fuse is a spare. The spare fuse slides out left/right unlike the main fuse.

5. To remove the active fuse (farthest in), press down lightly on the drawer while pushing up on the fuse.

6. If the fuse is burnt, replace it with the spare, which slides out left or right.

7. Close the drawer.

8. Plug the power cord back into the FLX.

4 ... Correspondence

If you wish to contact Data I/O Technical Support or a service center, see the following pages for information we need from you as well as how to contact us.

Information We Need

Please remember to include the following:

* The **FLX** Serial Number. It is printed on the communication wall that is visible when the modules are removed.

Figure 18—The Serial Number Label is visible after removing the modules.

* The **FLX** software and firmware version numbers. These are displayed by tapping the *Version* button on the Run Window.

* The log file. See *Log File* on page 3.
* Results from running the PV-Kit job. See *Rerunning the PV-Kit* on page 26.
* Error message, if there is one.
* Device manufacturer and part number, if device-related.

NOTE: For the latest version of this manual, see Support > Technical Library > Manuals *on our Web site.*

Customer Support

Worldwide

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E-mail: support@dataio.com
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Germany

www.dataio.de

China

www.dataio.cn

Other Countries

Contact your local Data I/O representative.

To find your local representative, visit
http://www.dataio.com/contact/repsearch.asp

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5 ... Sign-off Charts

Serial Number _____

The charts on the following pages can be used to record maintenance performed on the **FLX**:

Daily Sign-off

Clean the sockets, page 10.

Date	Initials	Notes

Daily Sign-off

Date	Initials	Notes

Daily Sign-off

Date	Initials	Notes

Daily Sign-off

Date	Initials	Notes

Daily Sign-off

Date	Initials	Notes

Weekly Sign-off

Run the Self-test, page 11. Clean the probe tips, page 12. Clean the fiducials and sensors, page 12.

Date	Initials	Notes

Weekly Sign-off

Date	Initials	Notes

Monthly/Quarterly Sign-off

Calibrate Probe Offset, page 15. Clean the cover and work surface, page 16. Maintaining air flow, page 16.

Date	Initials	Notes

Annual Sign-off

Check the air filters, page 20. Lubricate the gantry, page 21. Return the **FLX** unit to Data I/O for performance verification, page 23.

Date	Initials	Notes

PV-Kit Performance

Run the PV-Kit job and record the PPH. See *Run PV-Kit* on page 5, or *Rerunning the PV-Kit* on page 26.

Date	PPH	Initials

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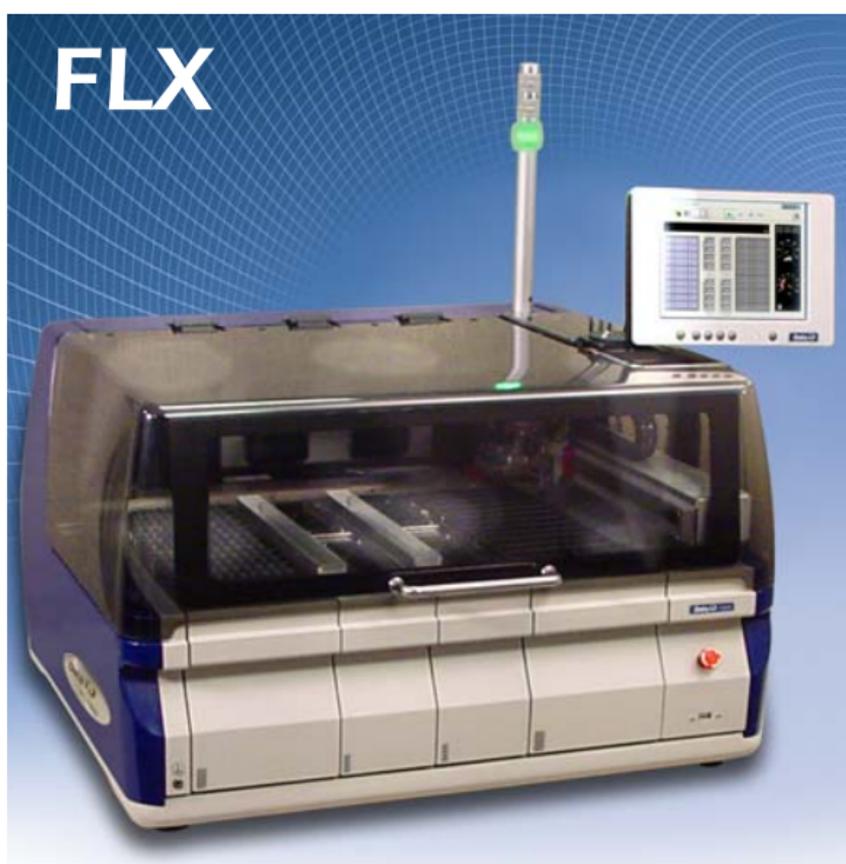**SMT** 15th Annual
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FLX

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