ALPs (Automated Labware Positioners)

User's Manual

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Warranty and Returned Goods Requirements

All standard Beckman Coulter, Inc. policies governing returned goods apply to this product. Subject to the exceptions and upon the conditions stated below, the Company warrants that the products sold under this sales agreement shall be free from defects in workmanship and materials for one year after delivery of the products to the original Purchaser by the Company, and if any such product should prove to be defective within such one year period, the Company agrees, at its option, either (1) to correct by repair or at the Company's election by replacement, any such defective product provided that investigation and factory inspection discloses that such defect developed under normal and proper use, or (2) to refund the purchase price. The exceptions and conditions mentioned above are as follows:

a. Components or accessories manufactured by the Company which by their nature are not intended to and will not function for one year are warranted only to reasonable service for a reasonable time. What constitutes a reasonable time and a reasonable service shall be determined solely by the Company. A complete list of such components and accessories is maintained at the factory.

b. The Company makes no warranty with respect to components or accessories not manufactured by it. In the event of defect in any such component or accessory, the Company will give reasonable assistance to Purchaser in obtaining from the manufacturer's own warranty.

c. Any product claimed to be defective must, if required by the Company, be returned to the factory, transportation charges prepaid, and will be returned to Purchaser with transportation charges collect unless the product is found to be defective, in which case the product must be properly decontaminated of any chemical, biological, or radioactive hazardous material.

d. The Company shall be released from all obligations under all warranties, either expressed or implied, if any product covered hereby is repaired or modified by persons other than its own authorized service personnel, unless such repair by others is made with the written consent of the Company.

e. If the product is a reagent or the like, it is warranted only to conform to the quantity and content and for the period (but not in excess of one year) stated on the label at the time of delivery.

It is expressly agreed that the above warranty shall be in lieu of all warranties of fitness and of the warranty of merchantability, and that the company shall have no liability for special or consequential damages of any kind or from any cause whatsoever arising out of the manufacture, use, sale, handling, repair, maintenance, or replacement of any of the products sold under the sales agreement.

Representatives and warranties made by any person, including dealers and representatives of the Company, which are consistent or in conflict with the terms of this warranty, shall not be binding upon the Company unless reduced in writing and approved by an expressly authorized officer of the Company.

Parts replaced during the warranty period are warranted to the end of the instrument warranty.

Note: Performance characteristics and specifications are only warranted when Beckman Coulter replacement parts are used.

Safety Information

All Warnings and Cautions in this document include an exclamation point, a lightning bolt, or a light burst symbol framed within a triangle. Please pay special attention to the specific safety information associated with these symbols.

WARNING: If the equipment is used in a manner not specified by Beckman Coulter, Inc., the protection provided by the equipment may be impaired.

Warning and Caution Definitions

The exclamation point symbol is an international symbol which serves as a reminder that all safety instructions should be read and understood before installation, use, maintenance, and servicing is attempted.

When this symbol is displayed in this manual, pay special attention to the specific safety information associated with the symbol.

WARNING

A WARNING calls attention to a condition or possible situation that could cause injury to the operator.

CAUTION

A CAUTION calls attention to a condition or possible situation that could damage or destroy the product or the operator's work.

Electrical Safety

To prevent electrically related injuries and property damage, properly inspect all electrical equipment prior to use and immediately report any electrical deficiencies. Contact a Beckman Coulter Service Representative for any servicing of equipment requiring the removal of covers or panels.

High Voltage

This symbol indicates the potential of an electrical shock hazard existing from a high voltage source and that all safety instructions should be read and understood before proceeding with the installation, maintenance, and servicing of all modules.

Do not remove system covers. To avoid electrical shock, use supplied power cords only and connect to properly grounded (three-holed) wall outlets. Do not use multiplug power strips.

Laser Light

This symbol indicates that a potential hazard to personal safety exists from a laser source. When this symbol is displayed in this manual, pay special attention to the specific safety information associated with the symbol.

Laser Specifications

Laser Type:	Class II Laser Diode
Maximum Output:	1mW
Wavelength:	670 nm

Chemical and Biological Safety

Normal operation of labortory equipment may involve the use of materials that are toxic, flammable, or otherwise biologically harmful. When using such materials, observe the following precautions:

- Handle infectious samples according to good laboratory procedures and methods to prevent the spread of disease.
- Observe all cautionary information printed on the original solutions containers prior to their use.
- Dispose of all waste solutions according to your facility's waste disposal procedures.
- Operate the Automated Labware Positioners (ALPs) in accordance with the instructions outlined in this manual, and take all the necessary precautions when using pathological, toxic, or radioactive materials.
- Objects dropped onto plates, accidental tool release, or other accidental collisions may result in splashing of liquids; therefore, take appropriate safety precautions, such as using safety glasses and wearing protective clothing, when working with potentially hazardous liquids.
- Use an appropriately contained environment when using hazardous materials.
- Observe the appropriate cautionary procedures as defined by your safety officer when using flammable solvents in or near a powered-up instrument.
- Observe the appropriate cautionary procedures as defined by your safety officer when using toxic, pathological, or radioactive materials.

Note: Observe all warnings and cautions listed for any external devices attached or used during operation of the instrument. Refer to applicable external device user's manuals for operating procedures of that device.

Moving Parts

To avoid injury due to moving parts, observe the following:

- Never attempt to exchange labware, reagents, or tools while the instrument is operating.
- Never attempt to physically restrict any of the moving components of any of the Automated Labware Positioners (ALPs).

Cleaning

Observe the cleaning procedures outlined in this user's manual for each specific Automated Labware Positioner (ALP). Prior to cleaning equipment that has been exposed to hazardous material:

- Appropriate Chemical and Biological Safety personnel should be contacted.
- The Chemical and Biological Safety information contained in this user's manual should be reviewed.

Maintenance

Perform only the maintenance described in this manual. Maintenance other than that specified in this manual should be performed only by Beckman Coulter Service Representatives.

Important It is your responsibility to decontaminate Automated Labware Positioners (ALPs) before requesting service by a Beckman Coulter Service Representative or returning parts to Beckman Coulter for repair. Beckman Coulter will NOT accept any items which have not been decontaminated where it is appropriate to do so. If any parts are returned, they must be enclosed in a sealed plastic bag stating that the contents are safe to handle and are not contaminated.

Warnings and Cautions Found in this Manual

Please read and observe all cautions and instructions. Remember, the most important key to safety is to operate these Automated Labware Positioners (ALPs) with care.

The WARNINGs and CAUTIONs found within this document are listed below.

WARNING: If the equipment is used in a manner not specified by Beckman Coulter, Inc., the protection provided by the equipment may be impaired.

8-Channel Active Wash ALP

CAUTION: Do not kink the drainage or supply hose.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: SPILL HAZARD.

CAUTION: Make sure the end of the tubing going into the waste container is no more than 6 inches from the top of the container. If the end of tubing is near the bottom, excessive pressure may cause liquid to overflow onto the deck.

WARNING: Always wear protective gloves when draining the 8-Channel Active Wash ALP of fluid.

WARNING: The waste fluid may be contaminated. Follow the appropriate disposal procedures outlined by the laboratory safety officer.

WARNING: The cleaning wells and reservoir of the 8-Channel Active Wash ALP may contain hazardous chemicals and fluids. Follow the appropriate disposal procedures outlined by the laboratory safety officer to dispose of the fluid.

Bar Code Reader ALP

WARNING: CLASS II LASER PRODUCT THIS PRODUCT CONFORMS TO APPLICABLE REQUIREMENTS OF 21 CFR 1040 AT THE DATE OF MANUFACTURE.

WARNING: Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

WARNING: Always have the laser module access cover, located on the Bar Code Reader, in place when operating or troubleshooting the laser module.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING: If labware other than that specified in the Labware Type Editor is used, an increase in bad reads or no reads may occur.

WARNING: If a label is applied by any means other than the SAGIAN™ Print & Apply device, an increase in bad reads or no reads may occur.

CAUTION: Do not use the Bar Code Reader step under the SILAS category in the Step Palette Builder. The Bar Code Reader Step from the Integrated Devices step palette must be used to ensure the Bar Code Reader operates properly.

Drainable/Refillable Reservoir ALP

CAUTION: A maximum of one long CAN cable can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

WARNING: The Drainable/Refillable Reservoir ALP may be contaminated from method solutions. Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

WARNING: SPILL HAZARD

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the Biomek instrument. Clean up any spills immediately according to the procedures defined by the laboratory safety officer.

Half-Position Disposal ALP (NX-S8 only)

WARNING: When using the Half-Position Disposal ALP, do not overfill the disposal bag. Tips may spill over onto the deck, possibly contaminating the deck with hazardous materials.

CAUTION: The Half-Position Disposal ALP must be mounted on the outside columns of the Biomek deck to avoid collisions.

CAUTION: Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

WARNING: Appropriately marked autoclavable biohazard bags are recommended for hazardous applications. The waste bags shipped with the Half-Position Disposal ALP are not biohazard bags. Contact the laboratory safety officer for appropriate biohazard bags and procedures.

CAUTION: Make sure the bag is tight to tops of the flanges. The gripper tool must have enough room to move over the ALP.

WARNING: The waste bag may be contaminated. Follow the appropriate decontamination and disposal procedures outlined by the laboratory safety officer.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: SPILL HAZARD.

CAUTION: The Half-Position Disposal ALP with Slide must be mounted in the left or right outside columns of the Biomek NX deck to avoid collisions.

WARNING: The Half-Position Disposal ALP may be contaminated. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

HDR Pin Drying ALP and Reservoirs (FX only)

WARNING: Do not stick objects through the fan guards.

CAUTION: Turn off power to the Biomek instrument and the Device Controller before attaching or removing any active ALP.

WARNING: SPILL HAZARD.

WARNING: Do not kink the hoses.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: Do not overflow the reservoir.

CAUTION: Do not attempt to access a 96-Channel or 384-Channel Tip Wash ALP with a Multichannel Pod equipped with an HDR Tool Body. The gripper may crash and damage the pod, HDR Tool Body, or Tip Wash ALP.

CAUTION: Do not access labware positioned on a 1 x 5 Passive ALP with the HDR Tool Body. The gripper may crash with the ALP.

CAUTION: Do not access labware on a Stirring ALP with the HDR Tool Body. The magnetic stirrer may bend the pins or interfere with the liquid transfer performance of the pins.

CAUTION: Turn off power to the Biomek FX instrument and the Device Controller before attaching or removing any active ALP.

Heating and Cooling ALP

WARNING: The Heating and Cooling ALP can reach extremely high temperatures. Allow the Heating and Cooling ALP to cool before removing it from the deck.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: Do not detach the hoses over the Biomek deck. Immediately wipe up any spills with a soft cloth.

High-Density Passive ALPs

WARNING: High-Density ALPs may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

High-Density 4 x 3 Passive ALP (NX-S8 only)

WARNING: The NX-S8 High-Density 4 x 3 ALP may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

Magnetic Bead ALP

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

CAUTION: A maximum of one long CAN cable (1 meter [39.37 in.], Part Number 717781) can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

CAUTION: A maximum of one device can be chained to a Magnetic Bead ALP. If more than one device is chained to a Magnetic Bead ALP, the Biomek instrument may not be able to supply sufficient electrical current to operate all devices on the chain.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING: Pinch Point! The clamps used to secure a microplate to the Magnetic Bead ALP could cause personal injury. Avoid interference with the clamps while a microplate is on the ALP.

CAUTION: The Magnetic Bead ALP may be damaged if liquid is dispensed into an ALP that does not have labware positioned on it.

CAUTION: Make sure the labware on the Magnetic Bead ALP matches the labware type specified. The clamps raise to a height set for the labware type before clamping and incorrect settings may result in inaccurate clamping.

Microplate Shaking ALP

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

CAUTION: A maximum of one long CAN cable can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

CAUTION: Set the shaking speed at the lowest setting and increase slowly to the desired setting. This helps prevent spills or splashing.

Multichannel Disposal ALP

WARNING: When using the self-contained Multichannel Disposal ALP without the slide, do not overfill the disposal bag. Tips can spill over onto the deck, possibly contaminating the deck with hazardous materials.

CAUTION: When using the Multichannel Disposal ALP with Slide, remove the bagging extension to avoid collisions between the pod and the Multichannel Disposal ALP.

CAUTION: The self-contained Multichannel Disposal ALP without Slide must be mounted on the back row of the Biomek deck to avoid collisions.

CAUTION: Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

CAUTION: Bagging extensions are not interchangeable between the Multichannel Disposal ALP and the Span-8 Disposal ALP. Each Disposal ALP must use the bagging extension designed for that ALP.

WARNING: Appropriately marked autoclavable biohazard bags are recommended for hazardous applications. The waste bags shipped with the Multichannel Disposal ALP are not biohazard bags. Contact the laboratory safety officer for appropriate biohazard bags and procedures.

CAUTION: The Multichannel Disposal ALP with Slide must be mounted in the 2nd or 3rd row in the left and right outside columns of the Biomek FX deck to avoid collisions.

WARNING: To reduce risk of personal injury, operate only with all protective shields in place.

WARNING: The waste bag may be contaminated. Follow the appropriate decontamination and disposal procedures outlined by the laboratory safety officer.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: SPILL HAZARD.

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING: The Multichannel Disposal ALP may be contaminated. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

Multichannel Tip Wash ALPs

WARNING: SPILL HAZARD.

WARNING: Do not kink the hoses.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: Orient the Multichannel Tip Wash ALPs so the in and out connections face the back of the Biomek instrument.

CAUTION: Use the 96-Channel Tip Wash ALP only with the 96 disposable tip head.

CAUTION: Use the 384-Channel Tip Wash ALP only with the 384 disposable tip head.

CAUTION: Turn off power to the Biomek instrument before attaching or removing AccuFrame from the instrument deck.

WARNING: Make sure the light curtain is not violated by the AccuFrame cable. If the light curtain is violated, the framing process halts immediately.

WARNING: Make sure the AccuFrame cable does not interfere with pod movement.

WARNING: Always wear protective gloves when draining the tip wash fluid.

Orbital Shaker ALP

CAUTION: Clamp all labware positioned on the Orbital Shaker ALP even when using the ALP as a standard deck position, such as a 1 x 1 or a swap space.

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

WARNING: Do not chain Orbital Shaker ALPs together or to any other ALP.

CAUTION: A maximum of four (4) Orbital Shaker ALPs may be used on a deck at one time.

WARNING: Turn off power to the Biomek instrument before attaching or removing the AccuFrame.

CAUTION: Make sure there are no tips on the head.

CAUTION: When creating a method with an Orbital Shaker and a stack of labware, first move the labware to another ALP, preferably a passive ALP, and then move it to the Orbital Shaker. The offsets allowed with stacking may cause the labware to be gripped off center; however, moving labware from a passive ALP ensures it is gripped properly.

CAUTION: Only labware compliant with the Society for Biomolecular Screening (SBS) proposed microplate standards is recommended for use on the Orbital Shaker ALP. Non-compliant labware may not be securely grasped by the ALP or may cause physical damage to the ALP.

WARNING: Do not shake tip boxes, tip box lids, or reservoirs on the Orbital Shaker ALP. The clamps on the ALP cannot hold tip boxes, tip box lids, or reservoirs securely during a shaking procedure.

WARNING: To ensure labware stays securely clamped on the Orbital Shaker ALP, do not exceed the recommended maximum shaking speed.

WARNING: Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, or radioactive materials.

WARNING: The type and amount of fluid being shaken will impact the maximum shaking speed for all types of labware. Conduct testing according to the procedures outlined by the laboratory safety officer to determine the safe maximum shaking speed for any type and amount of liquid.

CAUTION: If using Biomek FX Software version 2.1c or prior, crashes may occur when executing a Continuation method. To avoid crashes, delete any partially completed Orbital Shaker ALP steps and reinsert them into the Continuation method.

Positive Position ALP

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

CAUTION: Orient the Positive Position ALP so the CAN connections are to the right of the ALP and the clamp is in the front right corner of the ALP when facing the Biomek instrument.

CAUTION: A maximum of one long CAN cable can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING: Pinch Point! The clamps used to secure a microplate to the Positive Position ALP could cause personal injury. Avoid interference with the clamps while a microplate is on the ALP.

Solid Phase Extraction (SPE) Vacuum Manifold ALP

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: Turn off power to the Biomek instrument before attaching or removing AccuFrame from the instrument deck.

WARNING: Make sure the light curtain is not violated by the AccuFrame cable. If the light curtain is violated, the framing process halts immediately.

WARNING: Make sure the AccuFrame cable does not interfere with pod movement.

Span-8 Disposal ALP

CAUTION: Older versions of the Span-8 Disposal ALP must be modified with the new bagging extension when upgrading to Biomek Software 3.2. Failure to modify the ALP could result in Span-8 Pod crashes.

WARNING: When using the Span-8 Disposal ALP without Slide, do not overfill the disposal bag. Tips may spill over onto the deck, possibly contaminating the deck with hazardous materials.

CAUTION: The Span-8 Disposal ALP with Slide must be mounted on the outside columns of the Biomek deck to avoid collisions.

CAUTION: The self-contained Span-8 Disposal ALP without Slide must be mounted on the outside columns of the Biomek deck to avoid collisions.

CAUTION: Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

CAUTION: Bagging extensions are not interchangeable between the Multichannel Disposal ALP and the Span-8 Disposal ALP. Each Disposal ALP must use the bagging extension designed for that ALP.

WARNING: Appropriately marked autoclavable biohazard bags are recommended for hazardous applications. The waste bags shipped with the Span-8 Disposal ALP are not biohazard bags. Contact the laboratory safety officer for appropriate biohazard bags and procedures.

CAUTION: The Span-8 Disposal ALP with Slide must be mounted in the left and right outside columns of the Biomek deck to avoid collisions.

WARNING: To reduce risk of personal injury, operate only with all protective shields in place.

WARNING: The waste bag may be contaminated. Follow the appropriate decontamination and disposal procedures outlined by the laboratory safety officer.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory ‘safety officer when using toxic, pathologic, or radioactive materials.

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: SPILL HAZARD.

WARNING: The Span-8 Disposal ALP may be contaminated. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

Span-8 Tip Wash ALP

WARNING: Do not kink the drainage hose.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: SPILL HAZARD.

WARNING: Always wear protective gloves when draining the Span-8 Tip Wash ALP of fluid.

WARNING: The waste fluid may be contaminated. Follow the appropriate disposal procedures outlined by the laboratory safety officer.

WARNING: Follow the appropriate disposal procedures outlined by the laboratory safety officer to dispose of the fluid. The cleaning wells and reservoir of the Span-8 Tip Wash ALP may contain hazardous chemicals and fluids.

Standard Passive ALPs

WARNING: Standard Passive ALPs may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

Stirring ALP

CAUTION: The Stirring ALP continues to stir during a light curtain violation even though the method stops.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

CAUTION: A maximum of one long CAN cable can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

CAUTION: Adjust the stirring speed using the software. Set the stirring speed only as high as absolutely necessary to avoid splashing.

WARNING: Setting the stirring speed too high, or setting the speed too high with an inadequate amount of liquid in the reservoir, or ramping the stirring speed up too fast in a high viscosity liquid may force the stir bar off center. The stir bar would then have to be reset to the center position.

CAUTION: The reservoir and stir bar may be contaminated following use. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

CAUTION: Clean the reservoir before storing or filling with another substance.

Test Tube Rack ALPs

CAUTION: Different sizes of test tubes must not be mixed in one test tube rack. To avoid a collision between the pod and Test Tube Rack ALP, all of the test tubes in the Test Tube Rack must be a uniform height.

CAUTION: Turn off power to the Biomek instrument before attaching or removing AccuFrame from the instrument deck.

WARNING: Make sure the light curtain is not violated by the AccuFrame cable. If the light curtain is violated, the framing process halts immediately.

WARNING: Make sure the AccuFrame cable does not interfere with pod movement.

WARNING: Test Tube Rack ALPs may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

Tip Loader ALP

CAUTION: Clean, dry air must be provided for proper operation of the Tip Loader ALP.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

WARNING: Stay clear of the pinch point when locking rods are moving up into the head/pod.

Device Controller

WARNING: To prevent electrical shock, use standard electrical precautions when plugging the Device Controller into the power supply.

WARNING: Do not remove the cover of the Device Controller.

WARNING: Turn off power to the Biomek instrument before connecting CAN communication cables.

WARNING: Turn off power to the Biomek instrument and the Device Controller before attaching or removing any active ALP.

Source/Waste Sensor

WARNING: Do not place the controller or the source or waste containers on the Biomek instrument deck.

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

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1 Introduction to ALPs

1.1 About This Manual

This *ALPs (Automated Labware Positioners) User's Manual* provides information on using and configuring ALPs on a Biomek Laboratory Automation Workstation. This chapter contains information general on all ALPs, while the individual ALP chapters contain specific hardware and software information applicable to the specific ALP. Generally the individual chapters provide the following information:

- Overview of the ALP
- Installing the ALP to the deck
- Any special hardware information on using the ALP in a method
- Framing instructions
- Specific information on using the ALP in a method
- Specific information on using the ALP outside a method
- Removing the ALP from the deck
- Storage
- Preventive maintenance

Since several ALPs and devices, such as a wash pump or fan, associated with ALPs require an Device Controller to operate, an appendix on the Device Controller is included.

1.1.1 Related User's Manuals

The following related user's manuals for accessing more in-depth information on the Biomek Software and Biomek Laboratory Automation Workstations are provided as links to this *ALPs (Automated Labware Positioners) User's Manual*:

- *Biomek Software User's Manual*
- *Biomek® FX Laboratory Automation Workstation User's Manual*
- *Biomek® NX Multichannel Laboratory Automation Workstation User's Manual*
- *Biomek® NX Span-8 Laboratory Automation Workstation User's Manual*

1.2 ALPs Overview

Automated Labware Positioners (ALPs) are removable and interchangeable platform structures that are installed on the Biomek deck to allow automated assays to be performed.

ALPs are either:

- Passive ALPs — some hold labware in place on the deck while others act as receptacles for by-products from methods, such as system fluid and disposed tips, tip boxes, and labware.

  OR

- Active ALPs — contain mechanisms that may hook to power and/or air sources for mechanical operation, such as tip loading, tip washing, mixing/stirring, shaking, and precisely positioning labware.

Note: Addresses are manually set on some active ALPs to allow the instrument to identify the specific ALP being used. Address switches for ALPs use hexidecimal numbering (refer to Section A.3, *Setting Address Switches*).

The sections in this chapter include:

- *Installing and Configuring ALPs* (Section 1.3)
- *Accessing ALPs in a Biomek® FX Core System Integration* (Section 1.4)
- *About This Manual* (Section 1.1)

1.3 Installing and Configuring ALPs

Each ALP requires a specific procedure for installation and configuration. This procedure includes:

- Physically mounting the ALP to the deck or ALP base — Instructions for mounting each type of ALP on a deck position and for completing the appropriate electrical, air, waste, communications, and liquid connections are provided in the individual ALP chapters in this manual.

  Note: The Deck Editor indicates through dashed, blue lines on which deck positions a specific ALP may be placed (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).

- Setting up the ALP in the Biomek Software for operation — After physically installing an ALP on the deck, some ALPs are detected on the Biomek instrument and must be properly installed and configured in Hardware Setup (refer to Section 1.3.1, *Installing an ALP in Hardware Setup*).

  Note: Only Tip Loader, Stirring, Shaking, Positive Position, Orbital Shaker, and Magnetic Bead ALPs are detected on the Biomek instrument and must be installed in Hardware Setup. For some ALPs, devices such as pumps or fans are also installed in Hardware Setup. Any necessary specific configuration for these ALPs or devices is provided in the individual ALP chapters in this manual.

- Associating the ALP with a position — After configuring Hardware Setup for the new ALP, the software must be told where the ALP is located on the deck using the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).
- Framing the ALP — Using the Deck Editor, the exact coordinates of the position of the ALP on the deck are set. Instructions for framing each type of ALP are provided in the individual ALP chapters in this manual.

  Note: Refer to the user's manual for the specific Biomek instrument, for general information on framing.

- Configuring an ALP within a method — Using the Biomek Software, ALPs are configured to complete required operations at specified times within a method. Any special instructions to configure ALPs within a method are provided in the individual ALP chapters in this manuals.
- Controlling an ALP outside a method — Instructions for using Manual Control to control a specific ALP outside a method are provided in the individual ALP chapters in this manual.

Note: Initial installation and configuration of ALPs is completed by a Beckman Coulter Service Engineer when the Biomek instrument is installed.

1.3.1 Installing an ALP in Hardware Setup

Hardware Setup tells the Biomek Software what ALPs, devices, pods, and heads configured on the instrument by providing a connection between the software and the instrument. This information is established by installing, configuring and removing devices in Hardware Setup.

After physically installing an ALP on the deck, the ALP is detected on the Biomek instrument and must be properly installed and configured in Hardware Setup.

Note: Only Tip Loader, Stirring, Shaking, Positive Position, Orbital Shaker, and Magnetic Bead ALPs and some devices, such as pumps and fans, must be installed in Hardware Setup.

Most ALPs require only installation in Hardware Setup; however, some ALPs, such as the Magnetic Bead ALP, require some configuration. The configurations required for specific ALPs are provided in the individual ALP chapters in this manual.

Installing an ALP in Hardware Setup may be accomplished in two ways.

1. In Hardware Setup, right-click Devices or any device under Devices and choose **Add Device**.

   Note: The devices detected, but not already installed, are available to add.

2. Select the desired ALP. The ALP is added to the installed devices under Devices in the left pane.

   OR

1. Choose **Add Device** from the top of Hardware Setup. New Devices appears (Figure 1-1).

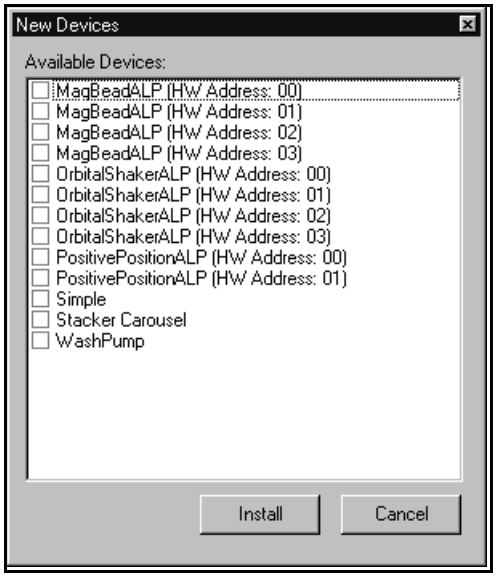

Figure 1-1. New Devices displaying all detected devices

Note: All the devices detected, but not already installed, are available to add in New Devices. Right-click on an available device and choose **Select All** to select all of the available devices or **Clear Selection** to disregard the selection.

2. Select the desired detected device or devices and choose **Install**. The device is added to the installed devices under Devices in the left pane.

Note: An asterisk next to a device indicates the device has been modified since the workspace was loaded.

A blue question mark before the installed device indicates the device has not been fully configured.

A red X before the installed device indicates the device is not detected. Make sure the device is properly connected to a CAN port.

Note: For more information about Hardware Setup, refer to the specific user's manual for the instrument.

2 8-Channel Active Wash ALP

2.1 Overview

The 8-Channel Active Wash ALP is an active ALP that washes fixed or disposable tips on the probes of a Span-8 Pod. The ALP provides a flow of wash fluid from a source reservoir for tip washing. A peristaltic pump circulates the fluid through the 8-Channel Active Wash ALP from a source reservoir to a waste reservoir.

Information in this chapter includes the following:

- *Mounting the 8-Channel Active Wash ALP* (Section 2.2).
- *Framing Instructions* (Section 2.3).
- *Using an 8-Channel Active Wash ALP in a Method* (Section 2.4).
- *Removing the 8-Channel Active Wash ALP* (Section 2.5).
- *Storage* (Section 2.6).
- *Preventive Maintenance* (Section 2.7).
- *Troubleshooting* (Section 2.8).

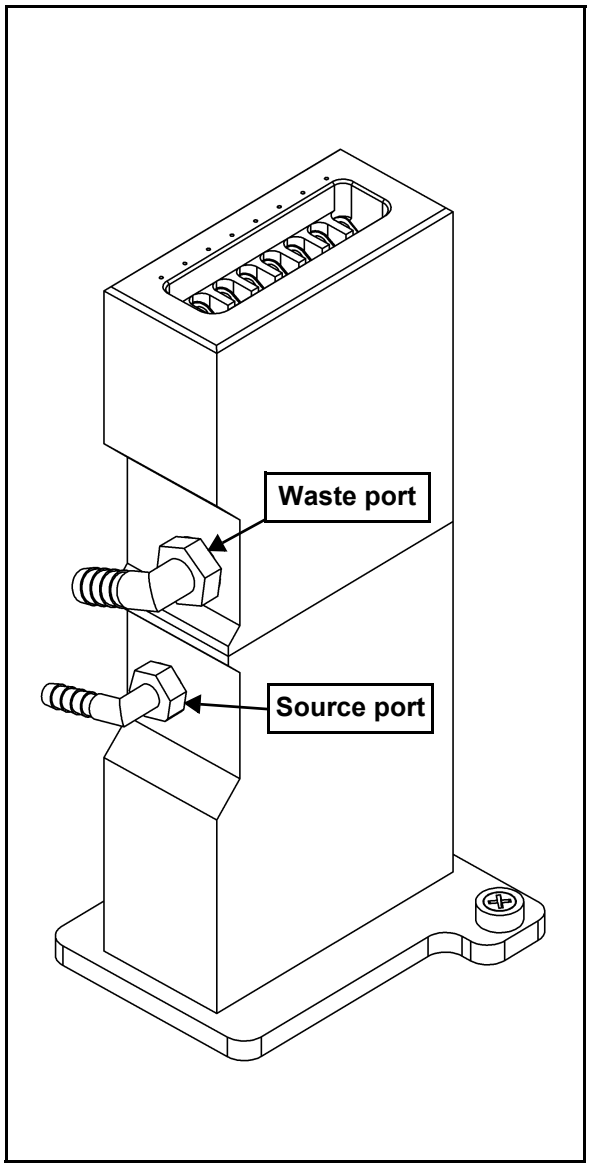

Figure 2-1. 8-Channel Active Wash ALP

2.2 Mounting the 8-Channel Active Wash ALP

When mounted on the Biomek deck, the 8-Channel Active Wash ALP occupies 1/2 of a standard deck position. The 8-Channel Active Wash ALP can also occupy the remaining 1/2 ALP position that occurs when a Test Tube Rack ALP (refer to Chapter 22, *Test Tube Rack ALPs*) or Half-Position Disposal ALP (refer to Chapter 5, *Half-Position Disposal ALP (NX-S8 only)*) is installed on the Biomek deck .

Installing the 8-Channel Active Wash ALP and configuring it in Biomek Software includes:

- *Installing the 8-Channel Active Wash ALP on the Deck* (Section 2.2.1).
- *Routing Tubing for the 8-Channel Active Wash ALP* (Section 2.2.2).
- *Adding a WashPump in Hardware Setup* (Section 2.2.3).
- *Adding and Configuring the 8-Channel Active Wash ALP in the Deck Editor* (Section 2.2.4).

2.2.1 Installing the 8-Channel Active Wash ALP on the Deck

To mount an 8-Channel Active Wash ALP to the deck:

1. Position the 8-Channel Active Wash ALP so the locating pin on the bottom of the ALP slips into a locating hole on the deck. Make sure the Source and Waste ports are pointing towards the back of the instrument for easier tube routing.
2. Fasten the ALP to the deck using the Phillips mounting screw located on the base of the ALP (Figure 2-1).

2.2.2 Routing Tubing for the 8-Channel Active Wash ALP

CAUTION: Do not kink the drainage or supply hose.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: SPILL HAZARD.

CAUTION: Make sure the end of the tubing going into the waste container is no more than 6 inches from the top of the container. If the end of tubing is near the bottom, excessive pressure may cause liquid to overflow onto the deck.

Tubing must be routed properly to circulate system fluid from the source container through the syringes, tubing, and probes on the Span-8 Pod into the 8-Channel Active Wash ALP and to the waste container. The system fluid container for the Span-8 Pod or a separate container may be used as the source container.

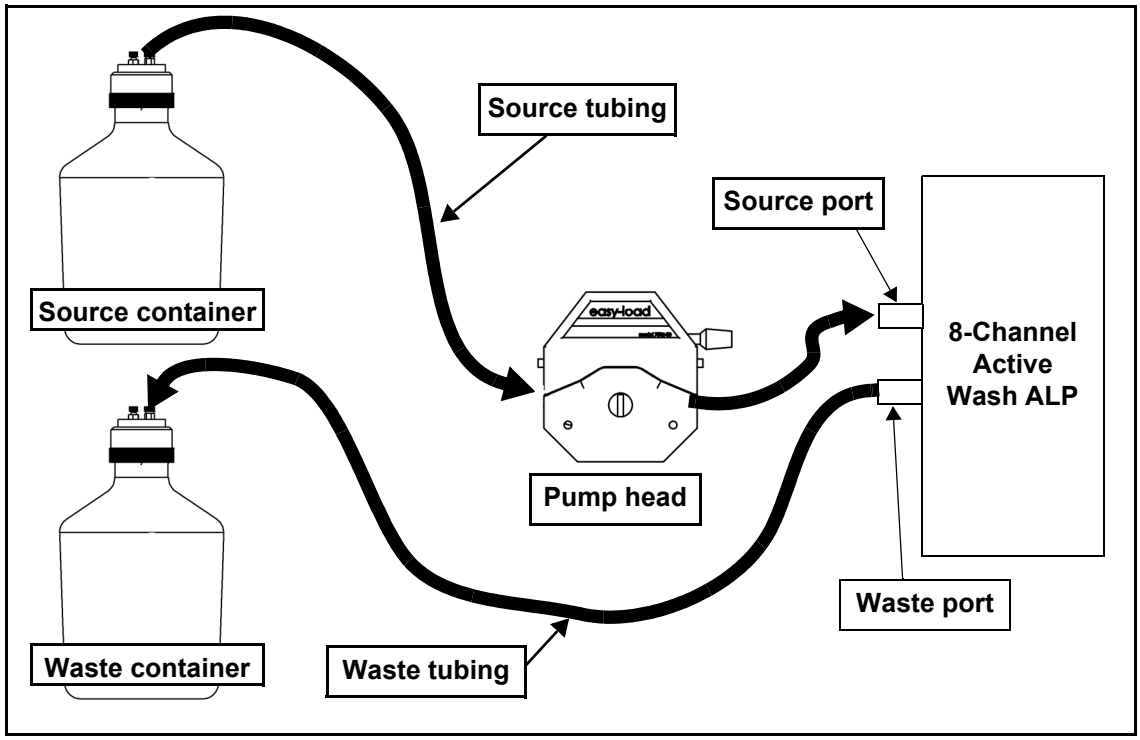

Figure 2-2. Tube routing for 8-Channel Active Wash ALP

Opaque PharMed® tubing is routed from the source container through the pump to the ALP. A clear Tygon® tubing is routed from the ALP to the waste container.

To route the tubing to the peristaltic pump and 8-Channel Active Wash ALP:

1. Position the peristaltic pump at an off-deck location near the ALP.

   Note: The peristaltic pump must be connected to a Device Controller (refer to Appendix A: *Device Controller*).

2. Unlock the pump head by rotating the locking lever counterclockwise (from the front of the pump).
3. Ensure that the supply container contains the desired system (cleaning) fluid.
4. Attach the source tubing to the source port on the ALP.
5. Route the source tubing off the deck by passing it through either the access holes between the towers at the back of the instrument, or between the light curtain and the deck on the side of the Biomek instrument.

   Note: Make sure the tube routing does not interfere with the operation of the Biomek instrument or the light curtain.

6. Route the source tubing through the pump head from right to left (facing the front of the pump).
7. Cut the source tubing to the desired length.
8. Route the source tubing from the pump head to the system fluid or source container.
9. Lock the pump head by rotating the locking lever clockwise (from the front of the pump).
10. Place the waste container under the lab bench or in an accessible space lower than the instrument deck height.
11. Attach the drainage tube to the waste port on the ALP (Figure 2-1).
12. Run the opposite end of the drainage tube to the waste container by passing the tube through either the access holes between the towers at the back of the instrument, or between the light curtain and the deck on the side of the instrument.

    Note: Make sure the tube routing does not interfere with the operation of the Biomek instrument or the light curtain.

13. Cut the drainage tube to the appropriate length to ensure there is no excess that could cause a ‘rise’ or ‘bump’ in the drainage tubes route from the ALP to the waste container and place it in the waste container ensuring the end of the tubing is no more than 6 inches from the top of the container.

    Note: Since the ALP is gravity fed, it is crucial that the drainage tube run down-hill without any rises between the ALP and the waste container.

2.2.3 Adding a WashPump in Hardware Setup

The 8-Channel Active Wash ALP uses a peristaltic pump to wash tips. This pump must be added in Hardware Setup as a digital device and configured with the appropriate Device Controller.

To add a WashPump in Hardware Setup:

1. From Biomek Software, choose **Instrument>Hardware Setup**. Hardware Setup appears.
2. In Hardware Setup, right-click Digital Devices or any device under Digital Devices and choose **Add Device**, then select WashPump.

   OR

   Choose **Add Device** from the top of Hardware Setup. New Devices appears (Figure 2-3). Select WashPump and choose **Install**. The WashPump is added to the installed digital devices under Digital Devices in the left pane.

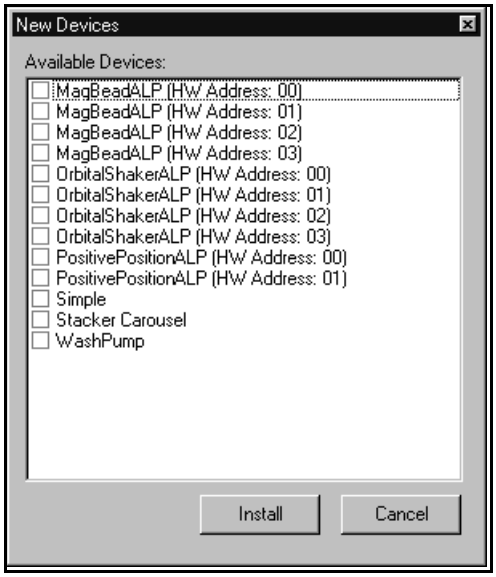

Figure 2-3. New Devices displaying all detected devices

3. Select the **WashPump** under Digital Devices to configure it. The configuration screen for the WashPump appears to the right in Hardware Setup (Figure 2-4).

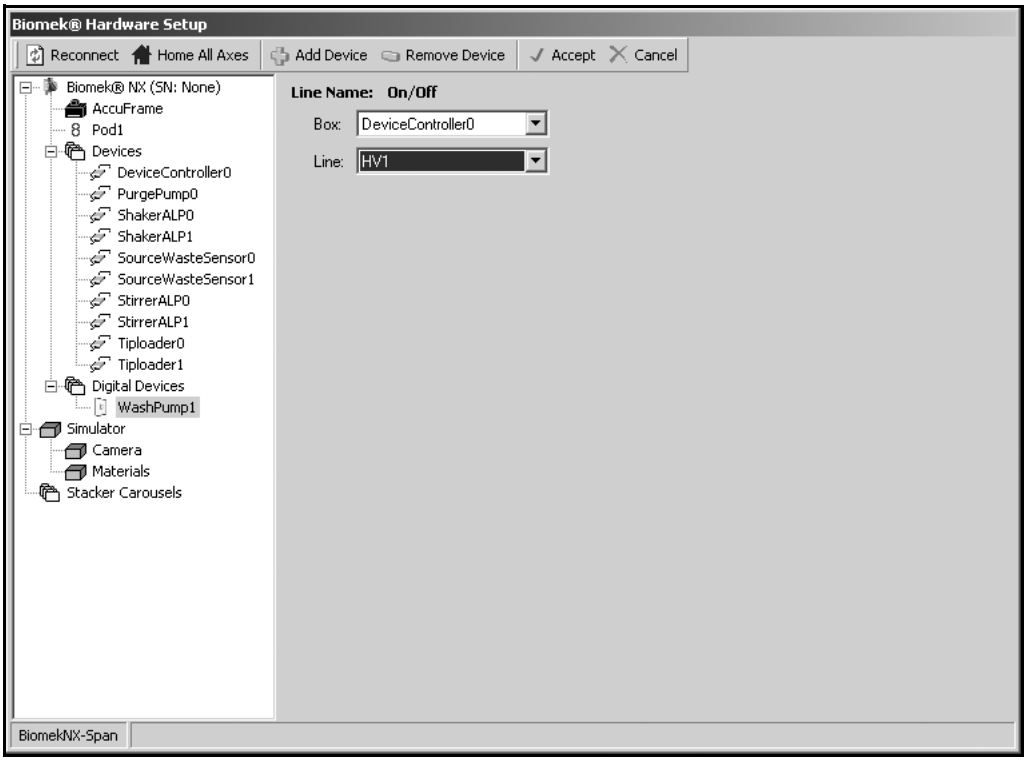

Figure 2-4. WashPump configuration in Hardware Setup

4. In Box, select the Device Controller to which the WashPump is connected.
5. In Line, select to which high voltage (HV) port on the selected Device Controller the WashPump is connected.
6. Choose **Accept** to save the changes and close Hardware Setup.

2.2.4 Adding and Configuring the 8-Channel Active Wash ALP in the Deck Editor

After adding and configuring the WashPump in Hardware Setup, the 8-Channel Active Wash ALP must be added to the deck in the Deck Editor and the WashPump associated as a device with the position.

To add and configure the 8-Channel Active Wash ALP in the Deck Editor:

1. In Biomek Software, choose **Instrument>Deck Editor**. Deck Editor appears.
2. From the ALPs Type List, select either the **Span8ActiveWashRight** or **Span8ActiveWashLeft**.
3. Drag the selected ALP to the desired available deck position to add the ALP to the deck.
4. Double-click the ALP to open Position Properties (Figure 2-5).

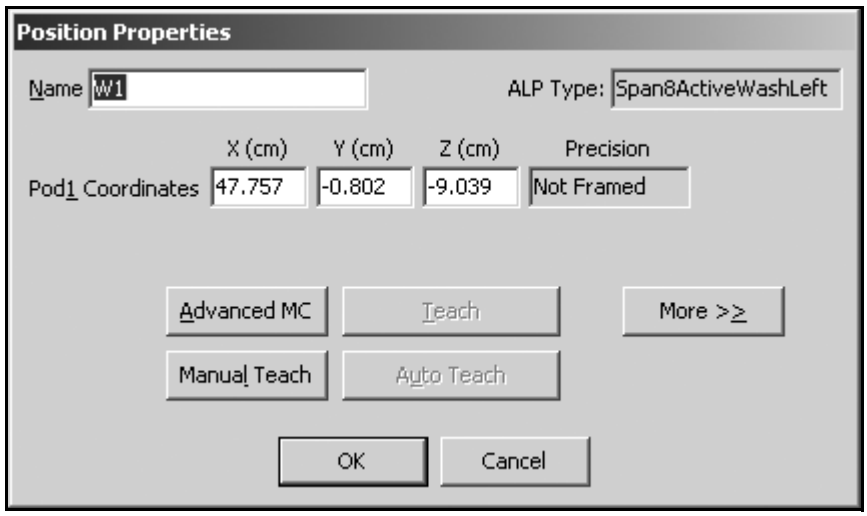

Figure 2-5. Position Properties for 8-Channel Active Wash ALP

5. Choose **More** to display additional configuration options for the ALP (Figure 2-6).

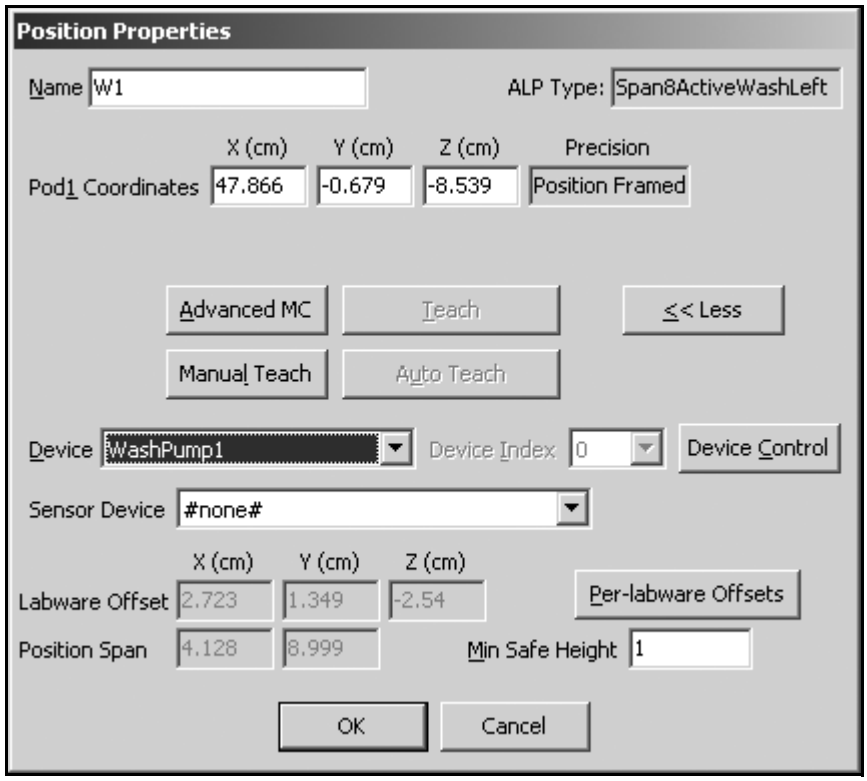

Figure 2-6. Expanded Position Properties for the 8-Channel Active Wash ALP

6. In Device, select the **WashPump** that is connected to the ALP.
7. If a Source/Waste Sensor is configured for the source and/or waste containers, select the **Sensor Device**.

Note: Refer to Appendix B: *Source/Waste Sensor*, for more information on the Source/Waste Sensor.

8. Choose **OK** to save changes and close Position Properties.
9. Choose **Save** to save changes and close Deck Editor.

2.3 Framing Instructions

The 8-Channel Active Wash ALP must be manually framed to ensure that the tips and probes on the Span-8 Pod access the cleaning wells of the ALP without causing any damage to the tips, probes, pod, or ALP. Since the cleaning wells of the ALP are relatively small, it is crucial that the tips on the probes be framed as accurately as possible.

The 8-Channel Active Wash ALP is framed using Biomek® NX Manual Framing Wizard, which is accessed through Position Properties in the Deck Editor. This process involves:

- ***FX*** — The 8-Channel Active Wash ALP on a Biomek FX instrument is framed using the Biomek® FX Manual Framing Wizard. The instructions are the same.
- loading disposable tips to the probes, if necessary
- aligning disposable or fixed tips with the framing targets on the 8-Channel Active Wash ALP (Figure 2-7).

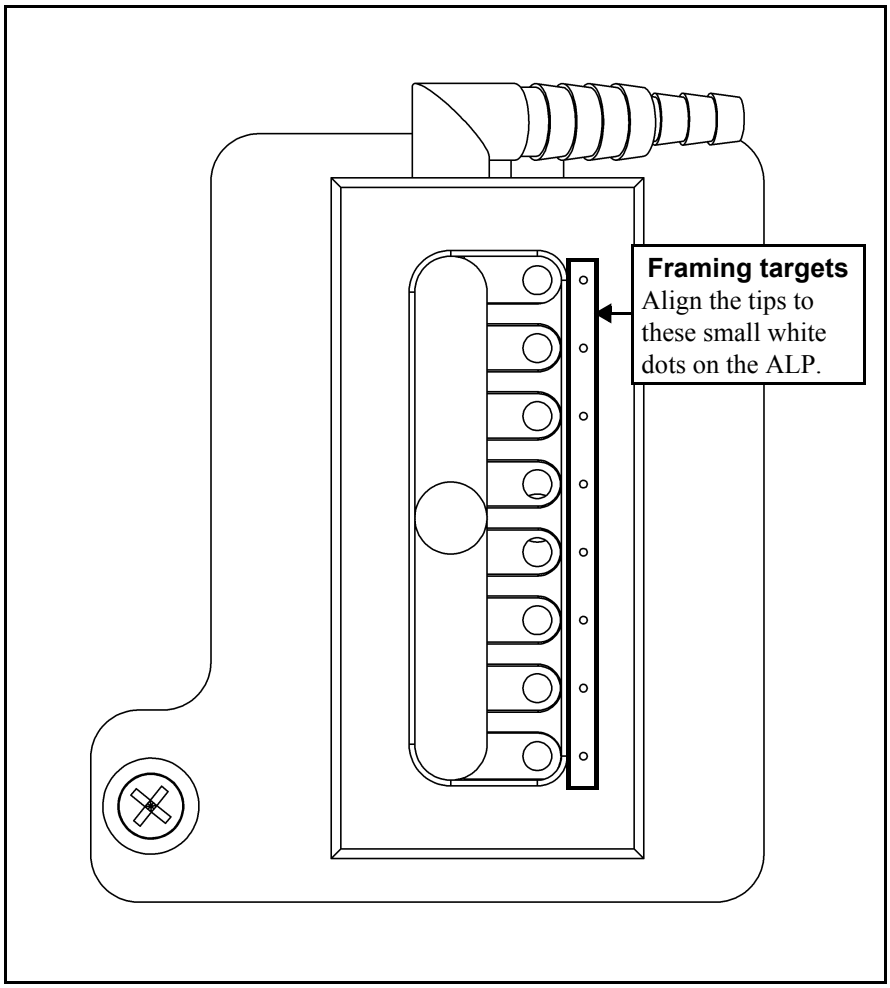

Figure 2-7. Framing targets on 8-Channel Active Wash ALP (top view)

To frame using Biomek® NX Manual Framing Wizard:

- ***FX*** — The 8-Channel Active Wash ALP on a Biomek FX instrument is framed using the Biomek® FX Manual Framing Wizard. The instructions are the same.

1. Choose **Start>Programs>Beckman Coulter>Biomek Software** to open Biomek Software.
2. From the Instrument menu, choose **Deck Editor**. Deck Editor appears (Figure 2-8).

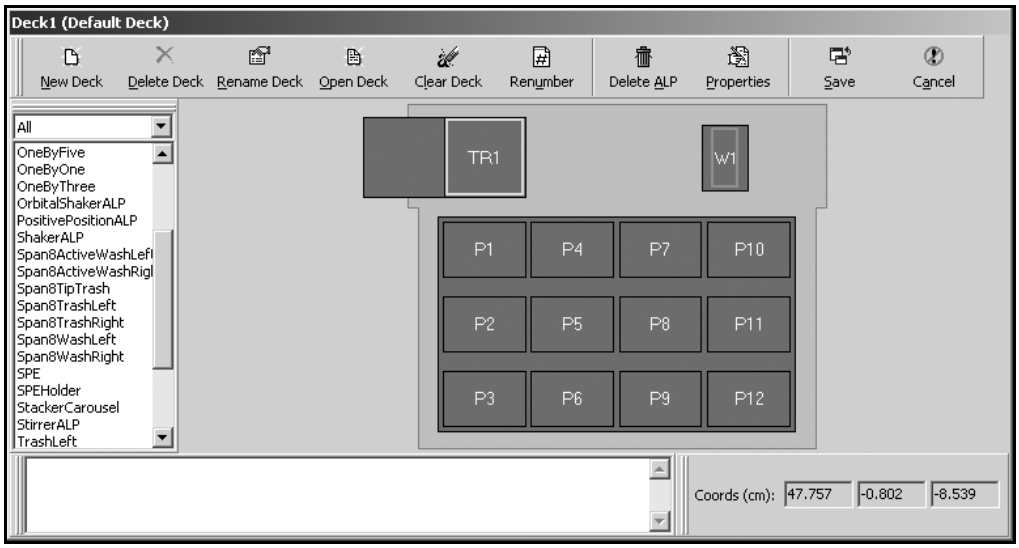

Figure 2-8. Deck Editor

3. Open **Position Properties** for the 8-Channel Active Wash ALP by double-clicking on the deck position. Position Properties appears (Figure 2-9).

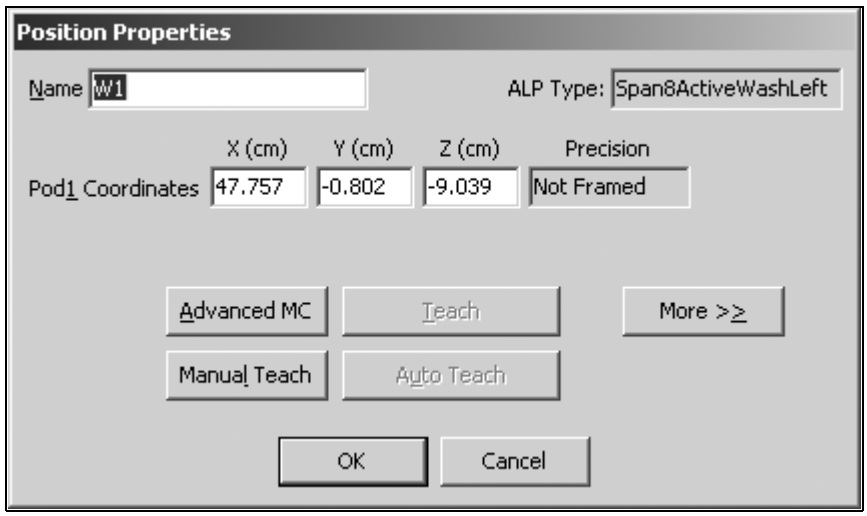

Figure 2-9. Position Properties for an 8-Channel Active Wash ALP

4. In Name, verify that the ALP is assigned a unique name.

5. Choose **Manual Teach**. Biomek® NX Manual Framing Wizard opens with a Warning (Figure 2-10).

Note: On the left side of Manual Framing Wizard, a list of steps required to complete the teaching process is displayed. As the steps of Manual Framing Wizard are accessed, the steps are highlighted on the left.

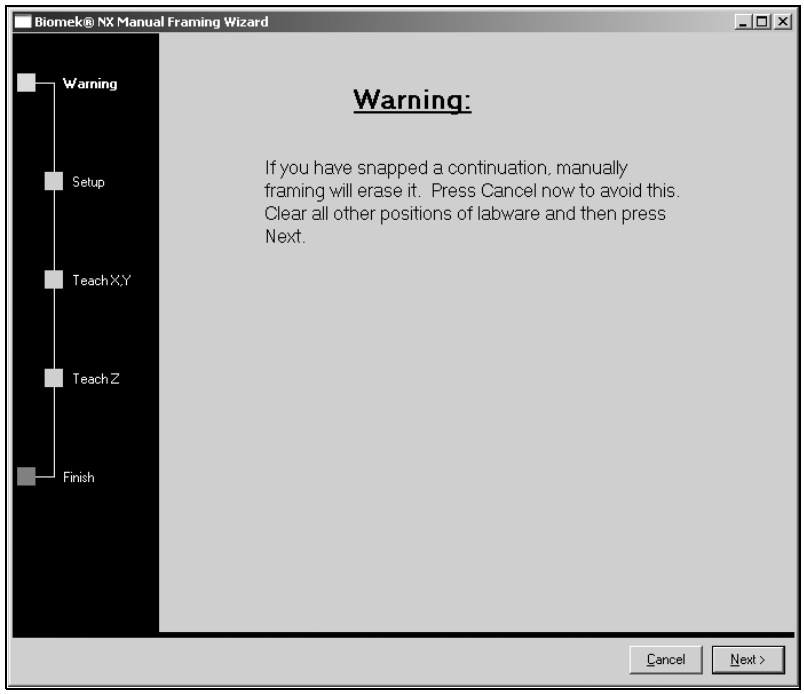

Figure 2-10. Manual Framing Wizard — Warning

6. Choose **Next**. Biomek® NX Manual Framing Wizard — Setup displays either Figure 2-11 or Figure 2-12, depending on whether or not tips are already loaded onto the pod.

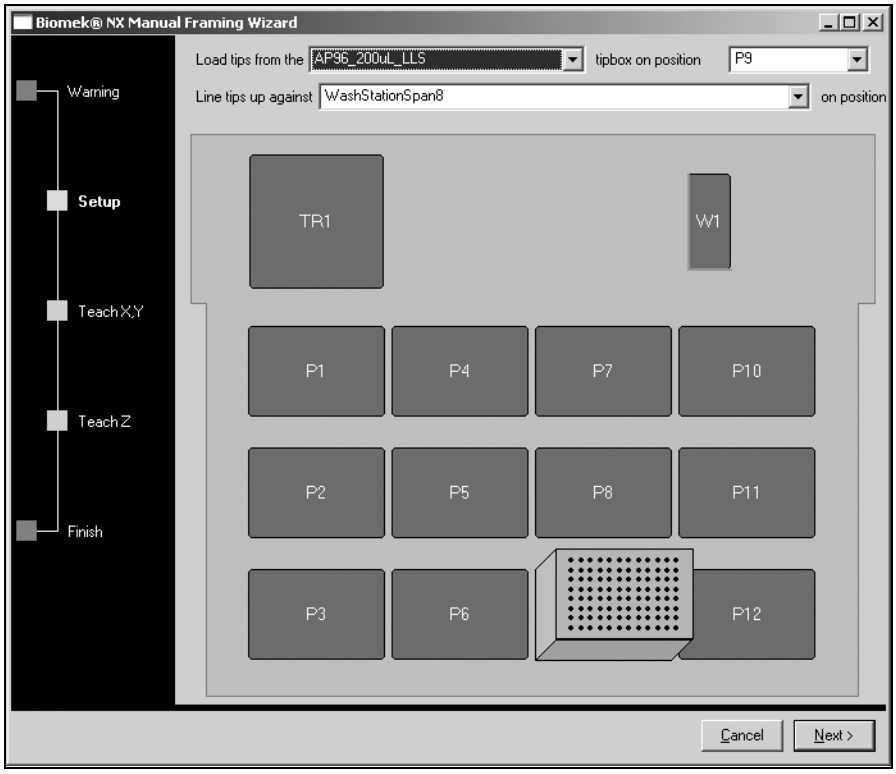

Figure 2-11. Manual Framing Wizard if tips are not already loaded.

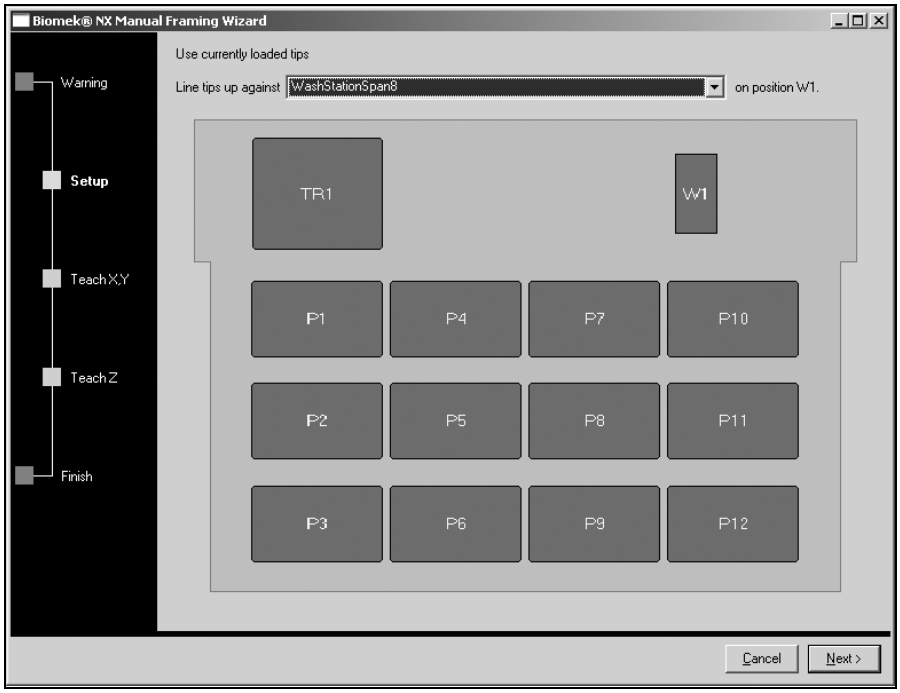

Figure 2-12. Manual Framing Wizard if tips are loaded

7. If no tips are loaded, in Load tips from the, select the type of tips to load and the position on which the tip box is located (Figure 2-13).
8. Choose **Next** to continue to the next screen. Biomek NX Manual Framing Wizard — Teach X,Y appears (Figure 2-13).

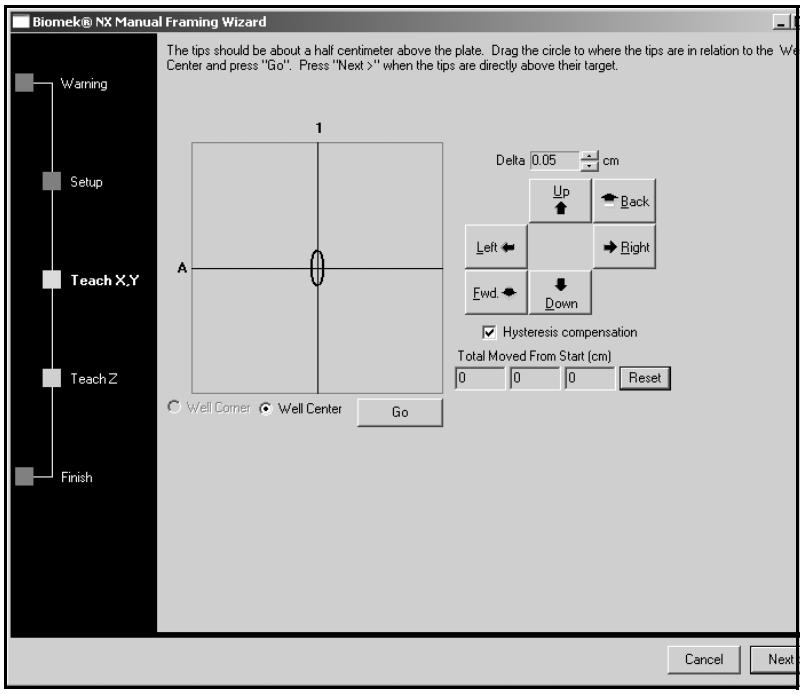

Figure 2-13. Manual Framing Wizard — Teach X, Y

9. To align the tips in the X- and Y-axes with the framing target on top of the ALP, lower the tips in the Z-axis until they are approximately 1 mm above the top of the ALP.

Note: Since tip height is set in the next step in the Manual Teaching process, it is safe to move the pod to any height to make aligning the tips with the microplate easier.

10. Visually verify the physical position of the tips in relation to the framing targets on top of the ALP.
11. Adjust the position of the tip to align it with the framing target by either:
    - *Using the Graphic Alignment Tool* (Section 2.3.1).
    - *Using the Delta Value and Directional Buttons* (Section 2.3.2).

2.3.1 Using the Graphic Alignment Tool

The graphic alignment tool (Figure 2-14) is used to instruct Biomek Software of the current position of the tips in relation to the framing target on top of the ALP. Biomek Software uses the information it is given to move the pod so the tips are directly above the target position.

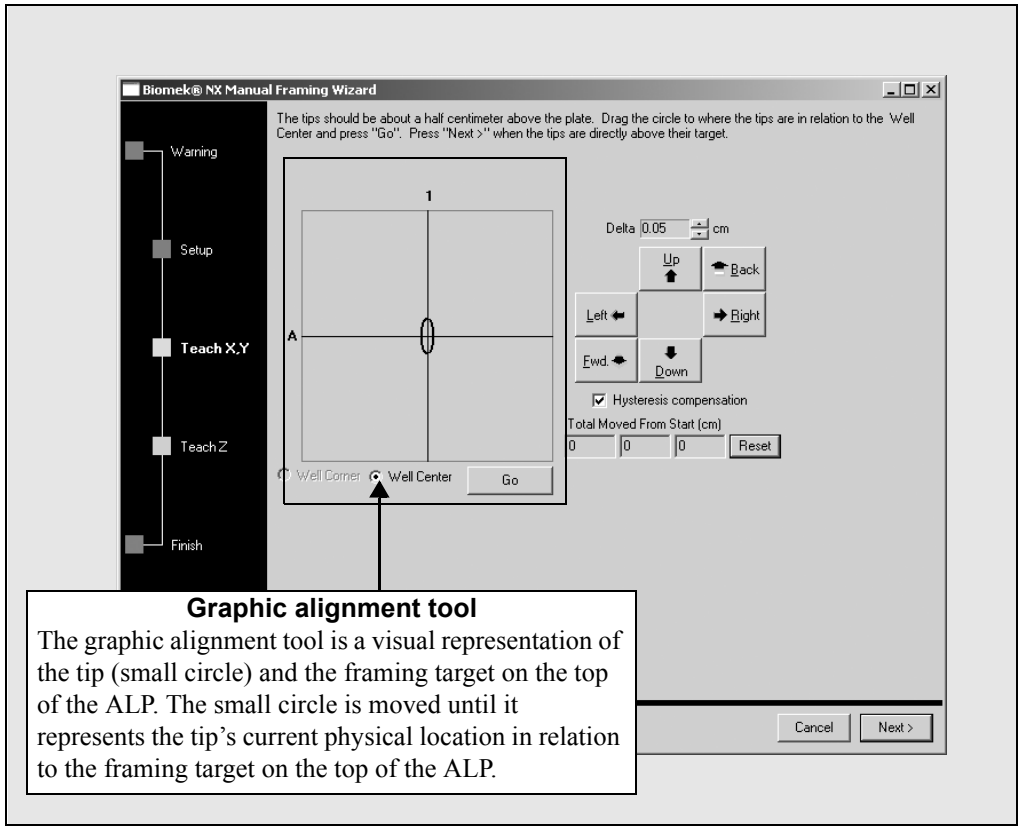

Figure 2-14. Manual Teaching the X- and Y-axes

To use the graphic alignment tool:

1. Drag the small circle until it represents the tip's physical position in relation to the framing target on top of the ALP, represented by the intersection of the two lines in the graphical display.

   Note: The small circle represents the tip on the pod. The objective is to provide the software with a representation of the tip's position in relation to the framing target on top of the ALP. The software uses this graphical representation to know approximately how far in any direction the pod must move to align the tips with the framing target on top of the ALP.

2. Select **Go**. The pod moves in accordance with the position of the small circle in relation to the intersection of the two lines.

   Note: When the move is completed, the small circle resets itself to the center of the graphical display. The values displayed in Total Moved from Start (cm) changes each time steps 1 and 2 are completed. If desired, the values in Total Moved from Start (cm) can be reset to zero by selecting **Reset**.

3. Visually verify the position of the tips on the pod in relation to the framing target on top of the ALP. If the tips are still not accurately positioned above the framing target, repeat steps 1 and 2 until they are accurately positioned above the framing target.

   Note: The tips may also be aligned with the framing target using the delta value and directional buttons (refer to Section 2.3.2, *Using the Delta Value and Directional Buttons*).

4. Once the tip is aligned with the framing target on top of the ALP, choose **Next** to continue. Biomek® NX Manual Framing Wizard displays Teach Z (refer to Section 2.3.3, *Framing the Z-Axis*).

2.3.2 Using the Delta Value and Directional Buttons

The tip can be positioned manually using the delta values and directional buttons to align it with the framing target on top of the ALP. Pressing one of the directional buttons moves the pod in that direction by the distance specified in Delta. Position the tips above the framing target on top of the ALP.

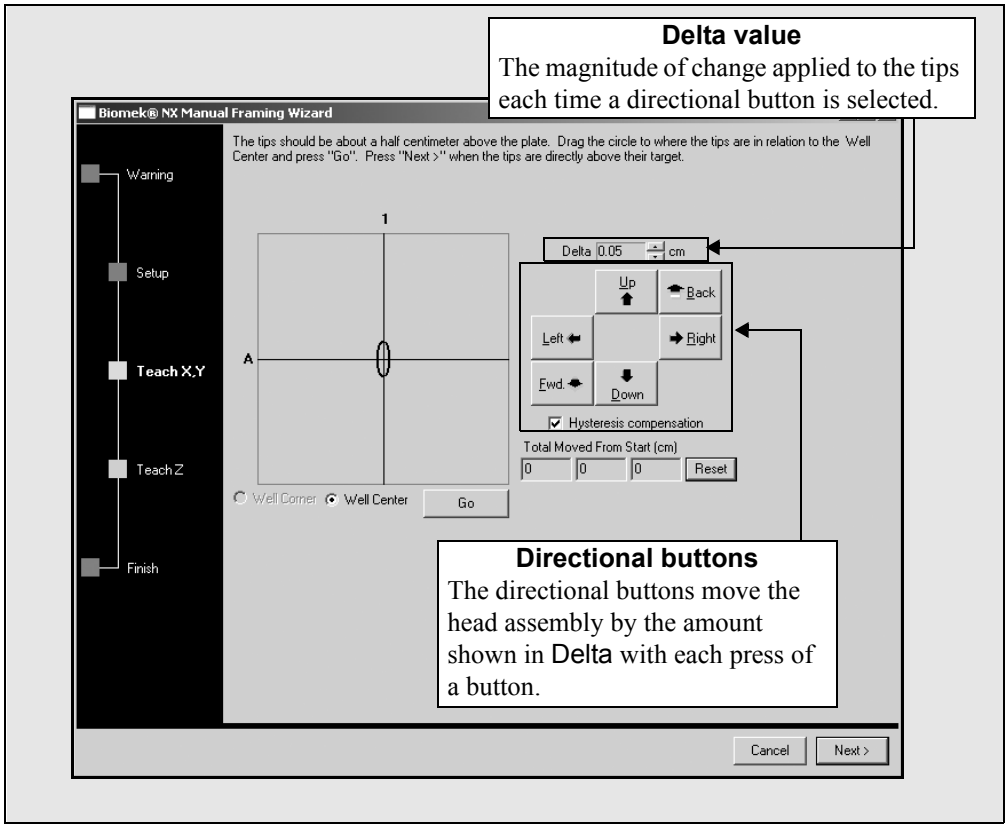

Figure 2-15. Manual Teaching the X- and Y-axes

To use the delta value and directional buttons to position the tip:

1. In **Delta**, select the magnitude of change applied to the tips each time a directional button is selected (Figure 2-15).

   Note: The default Delta value is 0.05 cm. If the tips are a considerable distance from the desired location, increase the distance traveled by increasing the Delta value (maximum setting is 1.0 cm). If the tips are almost to the desired location, reduce the Delta value to fine tune the position (minimum setting is 0.005 cm).

2. Select the **directional button** representing the motion required to physically move the tips into position over the framing target on top of the ALP (Figure 2-15).

   Note: Each time a directional button is selected, the pod and tips move the distance specified in Delta in the indicated direction.

   Note: The tips can be physically positioned over the framing target using:

   - the directional buttons in Manual Teach.
   - the directional keys on the keyboard.
   - the directional keys on the numeric keypad.

   The directional buttons displayed in Manual Teach parallel the keys on the numeric keypad. More specifically, Fwd. correlates to the '1' on the numeric keypad, while Down is found on the '2', Left is found on the '4', Right on '6', Up on '8', and Back on '9'.

3. Visually verify the position of the tips on the pod in relation to the framing target on top of the ALP. If the tips are still not accurately positioned above the framing target on top of the ALP, repeat steps 1 and 2 until they are accurately positioned above the framing target.

   Note: The tips may also be aligned with the framing target using the graphic alignment tool (refer to Section 2.3.1, *Using the Graphic Alignment Tool*).

4. Once the tips are aligned with the framing target, choose **Next** to continue. Biomek® NX Manual Framing Wizard displays Teach Z (refer to Section 2.3.3, *Framing the Z-Axis*).

2.3.3 Framing the Z-Axis

After the X- and Y-axes are framed, the Z-axis must be framed to ensure tips are washed at the desired height. The final screen in Biomek® NX Manual Framing Wizard is for framing the Z-axis (Figure 2-16).

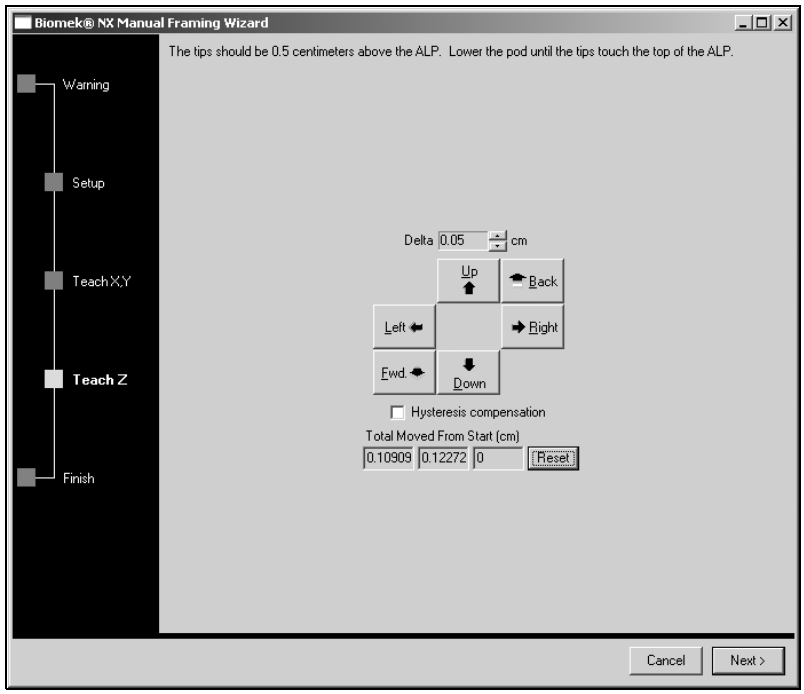

Figure 2-16. Manual Teaching (Teach Z)

1. In **Delta**, select the magnitude of change applied to the pod each time a directional button is selected (Figure 2-16).

Note: The default Delta value is 0.05 cm. If the tip is a considerable distance above the position, increase the distance traveled by increasing the Delta value (maximum setting is 1.0 cm). If the tip is almost to the desired location, reduce the Delta value (minimum setting is 0.005 cm).

Note: Since the X- and Y-axes were framed previously, it is safe to move the pod in the X- and Y-axes if it makes framing the pod in the Z- axis easier.

2. Select the **directional button** representing the motion required to physically move the pod down until the tip just touches the framing target on top of the ALP.

   Note: Each time a directional button is selected, the pod and tips move the distance specified in Delta in the indicated direction.

   Note: The tip can be can physically positioned over the framing target on top of the ALP:

   - the directional buttons in Manual Teach.
   - the directional keys on the keyboard.
   - the directional keys on the numeric keypad.

   The directional buttons displayed in Manual Teach parallel the keys on the numeric keypad. More specifically, Fwd. correlates to the '1' on the numeric keypad, while Down is found on the '2', Left is found on the '4', Right on '6', Up on '8', and Back on '9'.

3. Once the tip is just touching the framing target, select **Finish**. The pod moves up to its maximum height in the Z-axis, Manual Teaching closes, and Position Properties appears (Figure 2-9).

4. Choose **OK** to save the framing information and close Position Properties.

5. If more than one 8-Channel Active Wash ALPs are installed on the deck, repeat the procedure to frame any additional 8-Channel Active Wash ALPs using Manual Teach.

6. Choose **Save** to save framing information for all positions and close the Deck Editor (Figure 2-8).

   Note: Choosing **Cancel** loses all changes to the deck, including framing information, since the Deck Editor was opened.

2.4 Using an 8-Channel Active Wash ALP in a Method

The 8-Channel Active Wash ALP is used automatically when the a Transfer or Combine step is configured to wash tips in the Tip Handling configuration, or a Span-8 Wash Tips step is inserted into the method. However, if multiple wash ALPs are installed on the deck, some extra steps are required to ensure the desired wash ALP is used for each wash operation.

2.4.1 Configuring Multiple 8-Channel Active Wash ALPs on an Instrument

The 8-Channel Active Wash ALPs are referred to as wash ALPs in the Biomek Software. To ensure that the correct wash ALP is used on an instrument with two or more wash ALPs, each wash ALP must be configured to use a unique liquid type.

To configure a unique liquid type for a wash ALP:

1. In the Liquid Type Editor, create a new liquid type or copy an existing liquid type for the wash ALP; for example, create a new liquid type called WS1_Liquid.

   Note: Each liquid type must have a unique name; for example, WS1_Liquid or WS2_Liquid.

   Note: Refer to the *Biomek Software User's Manual,* Chapter 8.2, *Creating New Liquid Types*, for more information on creating new liquid types, and Section 8.4, *Copying and Pasting Liquid Types Within a Project File*, for more information on copying liquid types.

2. In the Instrument Setup step, double-click the desired wash ALP. Labware Properties for the wash ALP appears (Figure 2-17).

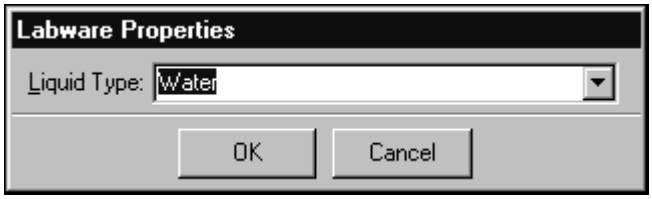

Figure 2-17. Labware Properties for a Wash Station ALP

3. In Liquid Type:, select the unique liquid type created for that wash ALP; for example, WS1_Liquid.
4. Choose **OK** to save the change and close Labware Properties.
5. For each additional wash ALP, repeat steps 2 through 4, selecting the appropriate liquid type for each wash ALP.

   Note: Each wash ALP must use a unique liquid type.

6. In any steps where tips are washed, such as Transfer or Combine, select a specific wash ALP by selecting the appropriate liquid type in Wash tips in.

2.5 Removing the 8-Channel Active Wash ALP

WARNING: Always wear protective gloves when draining the 8-Channel Active Wash ALP of fluid.

WARNING: The waste fluid may be contaminated. Follow the appropriate disposal procedures outlined by the laboratory safety officer.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: SPILL HAZARD.

To remove the 8-Channel Active Wash ALP:

1. Turn the waste and source ports on the 8-Channel Active Wash ALP up so that no fluid leaks from the ALP onto the deck.
2. Detach the drainage tube from the waste port on the ALP.
3. Raise the drainage tube until the fluid in the tube drains into the waste container.
4. Remove the tubing from the Biomek NX instrument deck and the waste container.
5. Detach the source tubing from the source port on the ALP.
6. Remove the source tubing from the deck carefully so no liquid remaining in the tubing spills onto the deck.
7. Unlock the pump head by rotating the locking lever counterclockwise (from the front of the pump).
8. Remove the source tubing from the pump head.
9. Drain any fluid remaining in the source tubing into an approved waste container or back into the source container.
10. Loosen the Phillips screws on the ALP base from the deck.
11. Remove the ALP from the deck by lifting until the locating pin clears the locating hole on the deck.

WARNING: The cleaning wells and reservoir of the 8-Channel Active Wash ALP may contain hazardous chemicals and fluids. Follow the appropriate disposal procedures outlined by the laboratory safety officer to dispose of the fluid.

12. Carefully empty the ALP of fluids by turning it over and pouring the waste into an approved waste container.

2.6 Storage

Return the 8-Channel ActiveWash ALP to the original packing materials and store in a dry, dust-free, environmentally-controlled area.

Note: Allow the 8-Channel Active Wash ALP to air-dry before returning it to the original packing materials.

Store the peristaltic pump and source and waste tubing according to the instructions from the manufacturer.

2.7 Preventive Maintenance

Follow the appropriate decontamination procedures outlined by the laboratory safety officer. Observe the following guidelines:

- Periodically clean the 8-Channel Active Wash ALP by filling the supply container with a bleach solution and running it through the ALP.
- Check with tubing manufacturer for chemical compatibility information.
- Periodically inspect the tubing for wear and stress fractures.
- Periodically inspect the tubing connections for leakage.
- Replace tubing periodically, or as needed.

Note: Refer to the pump and tubing manufacturer user manuals for their recommended maintenance procedures and intervals.

2.8 Troubleshooting

Do not attempt to repair the unit without first contacting a Beckman Coulter Service Engineer.

Table 2-1. Troubleshooting the 8-Channel Active Wash ALP

IF	THEN
The 8-Channel Active Wash ALP is not functioning correctly	Make sure that the hoses and cables are attached to the ALP properly.
The 8-Channel Active Wash ALP is not draining waste fluid	Look into the wells and reservoir and verify they are not clogged.

3 Bar Code Reader ALP

3.1 Overview

WARNING: CLASS II LASER PRODUCT THIS PRODUCT CONFORMS TO APPLICABLE REQUIREMENTS OF 21 CFR 1040 AT THE DATE OF MANUFACTURE.

The Biomek Bar Code Reader ALP (Figure 3-1) is an active ALP that scans bar code labels applied to the narrow sides of labware. The Biomek Bar Code Reader is powered through an external power supply.

Note: Due to the bar code reader weight and its extension beyond the edge of the Biomek deck, a counterweight has been added to the opposing side of the Bar Code Reader ALP.

The following bar codes are supported by the Bar Code Reader:

- Code 39
- Codabar
- I 2 of 5
- UPC/EAN
- Code 128

The sections in this chapter include:

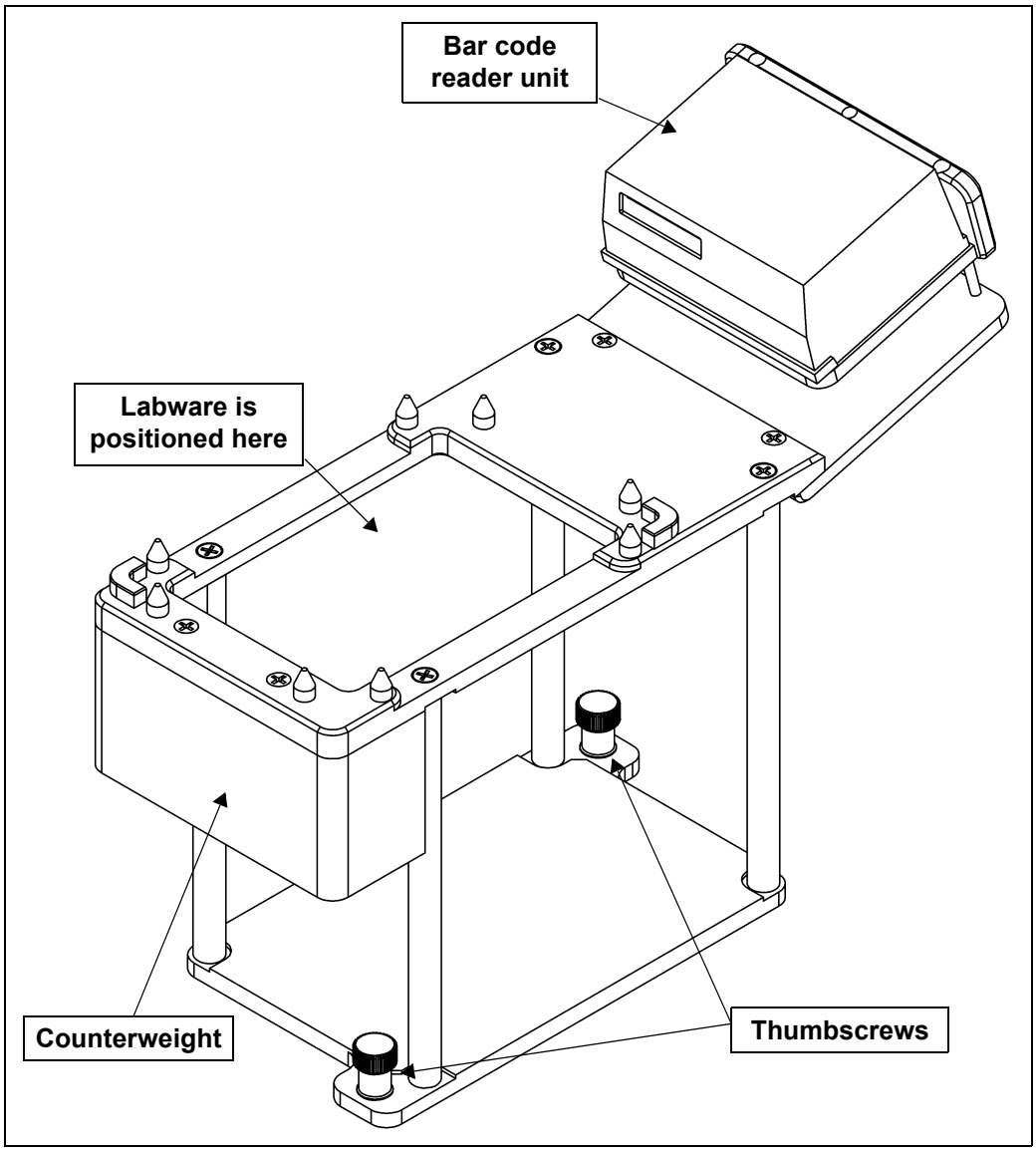

Figure 3-1. Bar Code Reader ALP

3.2 Installing the Bar Code Reader ALP

Installing the Bar Code Reader ALP includes choosing the deck position on the deck, mounting the ALP to the deck, and properly aligning the laser.

3.2.1 Deck Positions for the Bar Code Reader ALP

Because of its size, the Bar Code Reader ALP is mounted on one of the outside deck positions, so that the Bar Code Reader itself extends beyond the edge of the Biomek deck. Use the Biomek Software Deck Editor to determine available deck positions when mounting the Bar Code Reader ALP on the Biomek instrument.

3.2.2 Mounting the Bar Code Reader ALP

WARNING: Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

WARNING: Always have the laser module access cover, located on the Bar Code Reader, in place when operating or troubleshooting the laser module.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

To mount the Bar Code Reader ALP, complete the following:

Note: The Bar Code Reader ALP uses a cable that splits into two destinations: power and communications.

1. Turn off power to the Biomek instrument before adding the Bar Code Reader ALP to the deck.
2. Position the Bar Code Reader ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck.
3. Fasten the Bar Code Reader ALP to the deck using the thumbscrews on the base of the ALP.
4. Connect the power line of the split cable to a power supply using the included power cord.
5. Connect the power supply to an AC outlet.

   Note: Make sure the cable routing does not interfere with the operation of the Biomek instrument.

6. Connect the serial communication cable to a communication port on the back of the PC.

3.2.3 Aligning the Bar Code Reader ALP Laser Beam

WARNING: Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

WARNING: Always have the laser module access cover, located on the Bar Code Reader, in place when operating or troubleshooting the laser module.

Appropriate alignment of the Bar Code Reader ALP laser beam accommodates scanning of slightly skewed labels and requires little adjustment to the Bar Code Reader itself.

To align the laser beam correctly, complete the following:

1. Position a piece of labware labeled with a bar code on the Bar Code Reader ALP.
2. Visually verify that the red laser beam is scanning across the bar code. If not, the Bar Code Reader position needs to be adjusted.
3. The laser beam should pass over all vertical bars on the bar code label simultaneously. Correct and incorrect laser/label alignments are shown below (Figure 3-2). In the graphic, the top laser is aligned correctly, while the bottom laser is not.

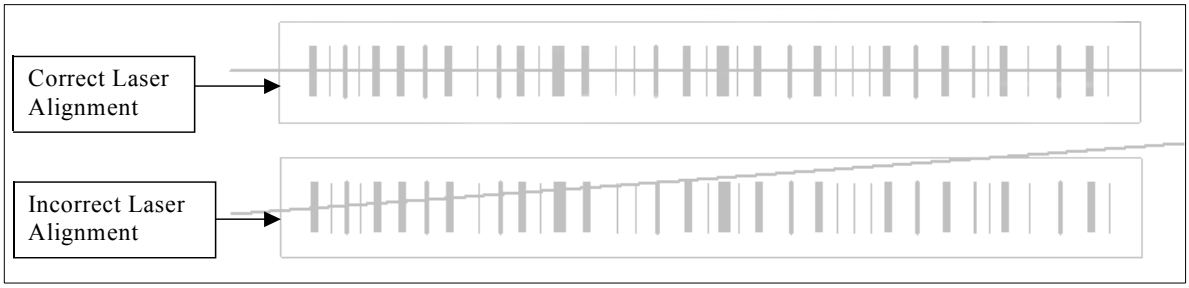

Figure 3-2. Bar Code Reader — Laser beam position over bar code label.

4. Turn the height adjustment screw under the bar code reader on Bar Code Reader ALP until the laser beam is correctly aligned on the bar code.

WARNING: If labware other than that specified in the Labware Type Editor is used, an increase in bad reads or no reads may occur.

WARNING: If a label is applied by any means other than the SAGIAN™ Print & Apply device, an increase in bad reads or no reads may occur.

3.3 Applying Labels to Labware

Incorrect label positioning or poor quality labels can result in inaccurate reading of bar codes; therefore, the use of an automated bar code application instrument, such as the SAGIAN™ Print & Apply or prelabeled microplates, is recommended. Increasing the vertical height of the bars on the label is also suggested to enhance the accuracy of the bar code reader.

Note: If a label needs to be applied to the microplate, it is recommended that a SAGIAN™ Print & Apply device be used to properly position the label on the microplate (Figure 3-3).

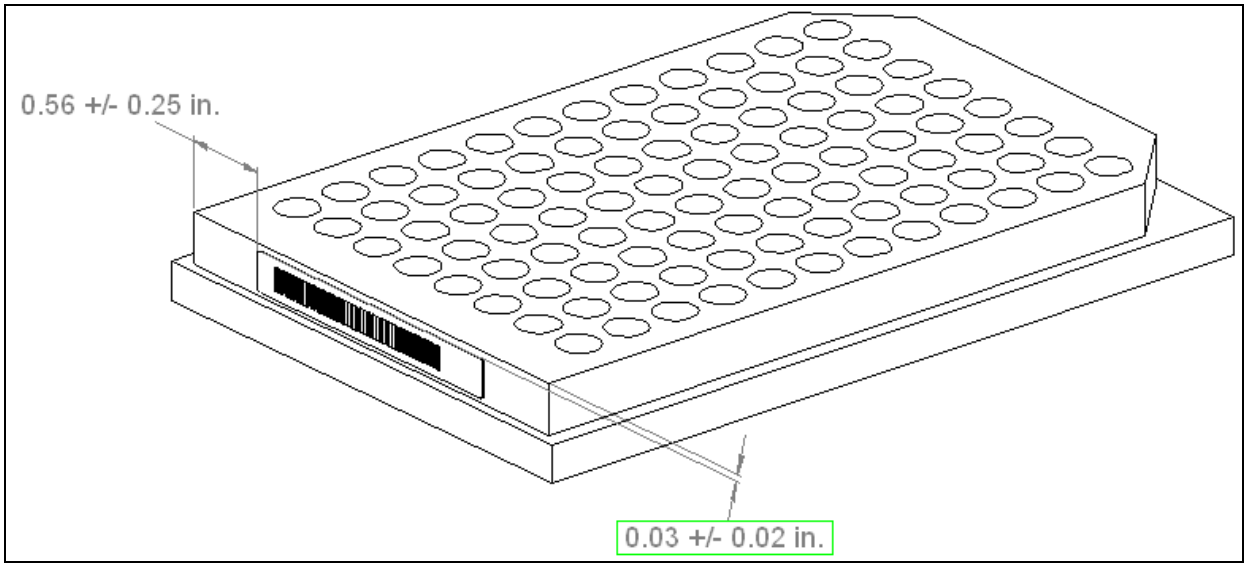

Figure 3-3. Bar Code Reader — Label positioning on a microplate.

3.4 Framing Instructions

Frame the Bar Code Reader ALP according to the framing instructions in the user's manual for the Biomek instrument upon which the ALP is installed.

3.5 Using the Bar Code Reader ALP in a Method

To read bar code labels in a method, a Bar Code Reader step must be configured. Move Labware steps move labware with bar code labels to read to and from the bar code reader as needed.

The Bar Code Reader step is available on the Integrated Devices step palette immediately after performing the Bar Code Reader software installation (Figure 3-4).

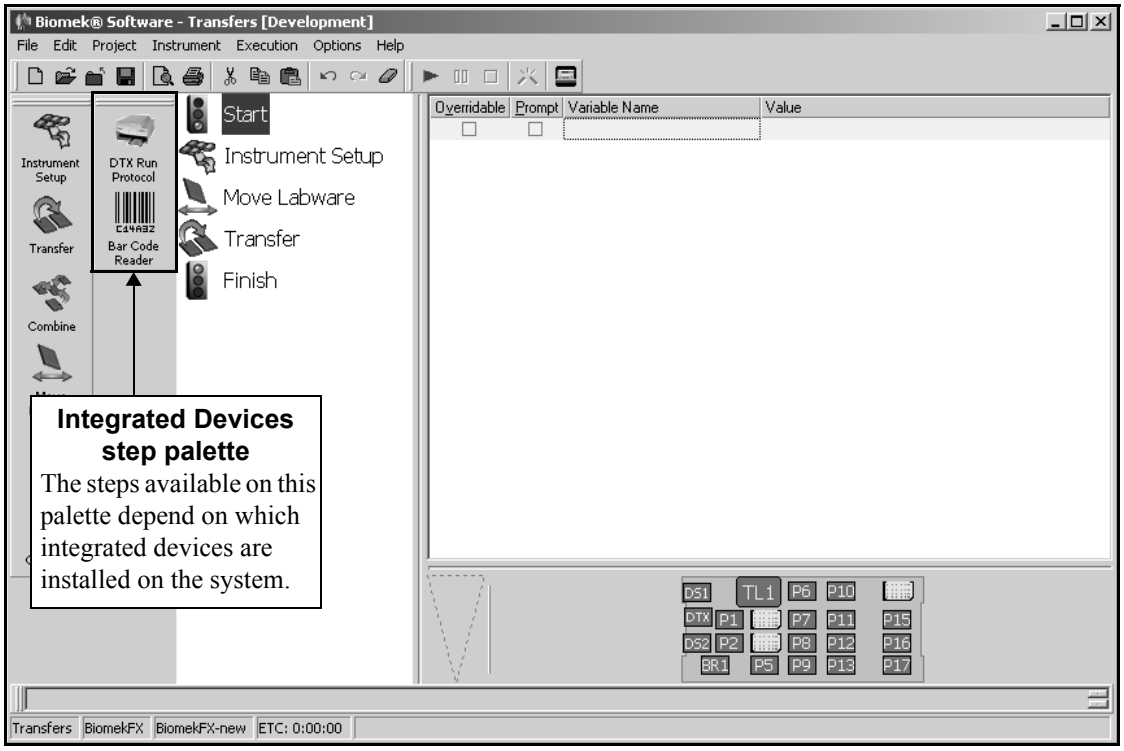

Figure 3-4. The Integrated Devices step palette shown in the main editor

To read bar code labels in a method:

1. To move labware to the Bar Code Reader ALP, insert a Move Labware step into the Method View and configure as desired (refer to the *Biomek Software User's Manual,* Section 15.4, *Move Labware Step*).

CAUTION: Do not use the Bar Code Reader step under the SILAS category in the Step Palette Builder. The Bar Code Reader Step from the Integrated Devices step palette must be used to ensure the Bar Code Reader operates properly.

2. Insert a Bar Code Reader step into the Method View (Figure 3-5).

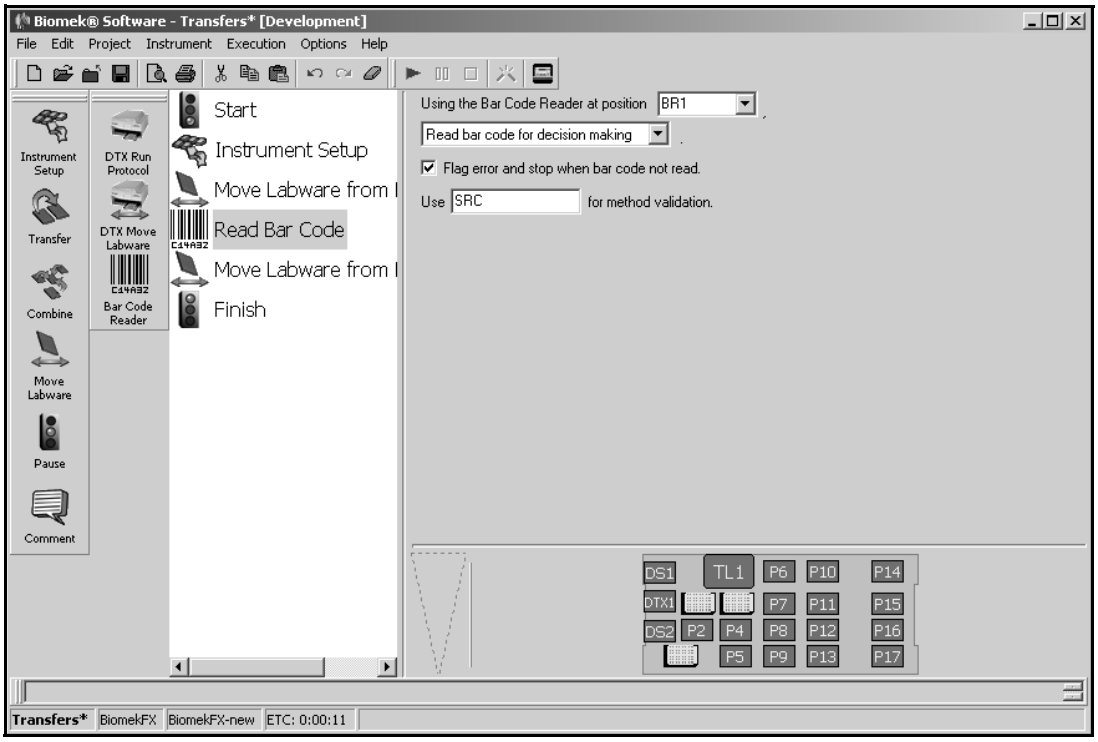

Figure 3-5. Bar Code Reader step inserted in the Method View

3. In Using the Bar Code Reader at position, select the bar code reader to scan bar codes.

4. Select the desired bar code reading option:

   - **Initialize** — establishes communication between Biomek Software and the ALP only; no bar code is read. To read bar codes, insert another Bar Code Reader step into the method and configure it with the desired bar code reading option.

     Note: By default, Biomek Software is configured to establish communication with the ALP automatically at the start of each method run. Initializing the ALP with a Bar Code Reader step is required only when the default configuration has been manually changed to disable automatic loading of the BarcodeReader SILAS module.

   - **Read bar code for logging** — the bar code is saved in the pipetting logs (refer to the *Biomek Software User's Manual,* Sections 26.2.3, *Pipetting Log*, 26.2.4, *Span8Pipetting Log (FX, NX-S8 only)*, and 26.3.6, *UnifiedPipetting Log Contents*).

   - **Read bar code for decision making** — the results of the bar code read determine the next operation performed in the method. Refer to Section 3.5.1, *Configuring a Method Where Bar Codes are Read for Decision Making*, for an example of how this option may be used in a method.

5. When Read bar code for logging or Read bar code for decision making is selected, select **Flag error and stop when bar code is not read** to stop the method immediately and notify users that the bar code was not read successfully.

6. When Read bar code for decision making is selected, in Use. . .for method validation, enter a substitute bar code value to be used during method validation. Validation can be performed satisfactorily only when a substitute value is entered. Refer to Section 3.5.1.1, *Validating Methods When Read Bar Codes for Decision Making is Selected*, for detailed information.

3.5.1 Configuring a Method Where Bar Codes are Read for Decision Making

When Read bar code for decision making is selected in a Bar Code Reader step, the results of the bar code read determine which operations that follow in the method are performed. The example method shown in Figure 3-6 is configured to transfer liquid from source plates to destination plates only when both plates have the correct bar codes.

Bar codes are read for both plates and then compared using an expression configured in an If step. When the bar codes are correct, the transfer is performed. When they are incorrect, the method pauses and displays a message that tells users the bar codes do not match. Table 3-1 provides a detailed description of the example method configuration broken down by the numbered sections shown in Figure 3-6.

Note: Because reading bar codes for decision making creates a dependent operation based on the results of the bar codes read, the validation process during method building will stop while waiting for the results of the read before continuing. Since bar codes are not read during validation, the software does not know which operation to validate next.

To ensure validation completes satisfactorily, the Bar Code Reader step provides the option to enter a value that is substituted in place of actual bar codes during validation (refer to Section 3.5.1.1, *Validating Methods When Read Bar Codes for Decision Making is Selected*).

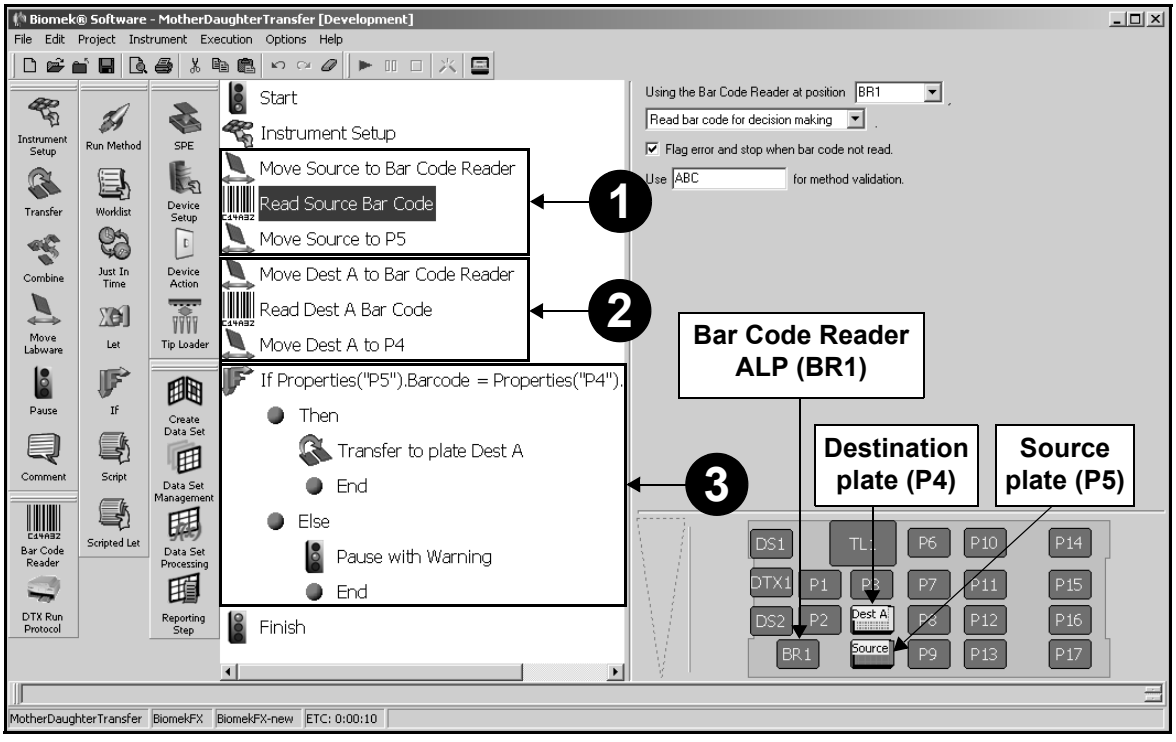

Figure 3-6. A method configured to read bar codes for decision making

Table 3-1. Example of a Method Where Bar Codes are used for Decision Making

Step	Description	Actions
1	Move the source plate to the Bar Code Reader ALP, read the bar code, then move the plate back to the original deck position.	1. Configure a Move Labware step to move the plate Source from P5 to the Bar Code Reader ALP (BR1) (refer to the *Biomek Software User's Manual,* Section 15.4, *Move Labware Step*). 2. Configure a Bar Code Reader step to **Read bar code for decision making**. 3. Configure a Move Labware step to move the source plate from BR1 back to P5.
2	Move the destination plate to the Bar Code Reader ALP, read the bar code, then move the plate back to the original deck position.	1. Configure a Move Labware step to move the plate Dest A from P4 to the Bar Code Reader ALP (BR1). 2. Configure a Bar Code Reader step to **Read bar code for decision making**. 3. Configure a Move Labware step to move the destination plate from the BR1 back to P4.
3	Configure an If step to evaluate the bar codes. In this method, the source and destination plates must have the same base bar code; for example, 1000. All destination plates must end with _A; for example 1000_A. When the bar codes match, a Transfer substep within the If step transfers liquid from the source plate to the destination plate. When the bar codes do not match, A Pause substep stops the method and displays a message prompt to users.	1. Configure an If step with the VBScript expression: Properties("P5").Barcode = Properties("P4").Barcode & "_A". (refer to the *Biomek Software User's Manual,* Section 17.7, *If Step*). 2. Under the Then substep, insert a Transfer step and configure as desired (refer to the *Biomek Software User's Manual,* Section 15.3, *Configuring Transfer and Combine Steps*). 3. Under the Else substep, insert a Pause step configured to pause the instrument for an indefinite period of time and display a message prompt (refer to the *Biomek Software User's Manual,* Section 15.5.2, *Pausing the Whole System and Displaying a Message*).

3.5.1.1 Validating Methods When Read Bar Codes for Decision Making is Selected

Reading bar codes for decision making creates a dependent operation based on the results of the bar codes read. Since bar codes are not read during the validation process during method building, the process will stop because the software does not know which operation to validate next.

To ensure validation completes satisfactorily, the Bar Code Reader step provides the option to enter a value that is substituted in place of actual bar codes during validation.

To configure a substitute value used during validation:

1. In Use. . .for method validation, enter a substitute bar code value to be used during method validation; for example, **ABCD**.
2. In an If step, enter a VBScript expression that checks for the substitute bar code; for example:
   - **= (Labware(“BR1”).Properties.Barcode = “ABCD”)** checks for an exact match to ABCD.
   - **= (Left (Labware(“BR1”).Properties.Barcode,3) = “ABC”)** checks for any barcode beginning with ABC. In this expression, Left instructs the software to begin the match from the first (leftmost) character in the substitute bar code; “3” instructs the software to look at only the first three characters in the substitute barcode.

Note: An If step has two branches: Then and Else. Because both example expressions used in this section result in “true,” only the substeps in the Then branch are validated. To validate the substeps in the Else branch, enter an expression, such as **= (Labware(“BR1”).Properties.Barcode = “WXYZ”)**, that results in “false,” then perform a second validation run.

3.6 Removing the Bar Code Reader ALP

WARNING: Avoid direct exposure to the laser beam. Never look directly into the laser beam, and never leave the laser on, open, or unattended.

WARNING: Always have the laser module access cover, located on the Bar Code Reader, in place when operating or troubleshooting the laser module.

To remove the Bar Code Reader ALP, complete the following:

1. Power down the Biomek instrument before removing the Bar Code Reader ALP
2. Disconnect the interface cable from the back of the PC attached to the Biomek system.
3. Disconnect the power line of the split cable from a wall outlet.
4. Detach the split cable from the cable extending from the back of the Bar Code Reader unit.
5. Remove any labware from the Bar Code Reader ALP, being careful not to spill any residual liquid.
6. Loosen the thumbscrew s on the base of the ALP.
7. Lift the Bar Code Reader ALP in an upward motion to clear the locating pins from the locating holes on the deck.

3.7 Storage

Return the Bar Code Reader ALP to the original packing materials, and store in a dry, dust-free, environmentally controlled area.

Note: It is desirable to allow the Bar Code Reader ALP to air-dry before returning it to the original packing materials.

3.8 Troubleshooting

Do not attempt to repair the Bar Code Reader ALP without first contacting a Beckman Coulter Service Engineer.

Table 3-2. Troubleshooting the Bar Code Reader ALP

IF	THEN
The Bar Code Reader ALP is not functioning correctly	Make sure the power and communication cables are attached to the Bar Code Reader ALP properly.

4 Drainable/Refillable Reservoir ALP

4.1 Overview

The Drainable/Refillable Reservoir ALP is an active ALP featuring a reservoir that can be drained and refilled automatically using steps in a Biomek Software method or manually using Advanced Manual Control (Figure 4-1). The ALP includes the reservoir, which may be placed in any standard position on the Biomek instrument deck, and the Automatic Reservoir Controller, which sits off deck. The controller houses the peristaltic pump head and connections between the ALP and the Biomek instrument.

The sections in this chapter include:

- *Installing the Drainable/Refillable Reservoir ALP* (Section 4.2).
- *Framing Instructions* (Section 4.3).
- *Using the Drainable/Refillable Reservoir ALP in a Method* (Section 4.4).
- *Controlling the Drainable/Refillable Reservoir ALP Outside a Method* (Section 4.5).
- *Removing the Drainable/Refillable Reservoir ALP From the Deck* (Section 4.6).
- *Storage* (Section 4.7).
- *Preventive Maintenance* (Section 4.8).
- *Troubleshooting* (Section 4.9).

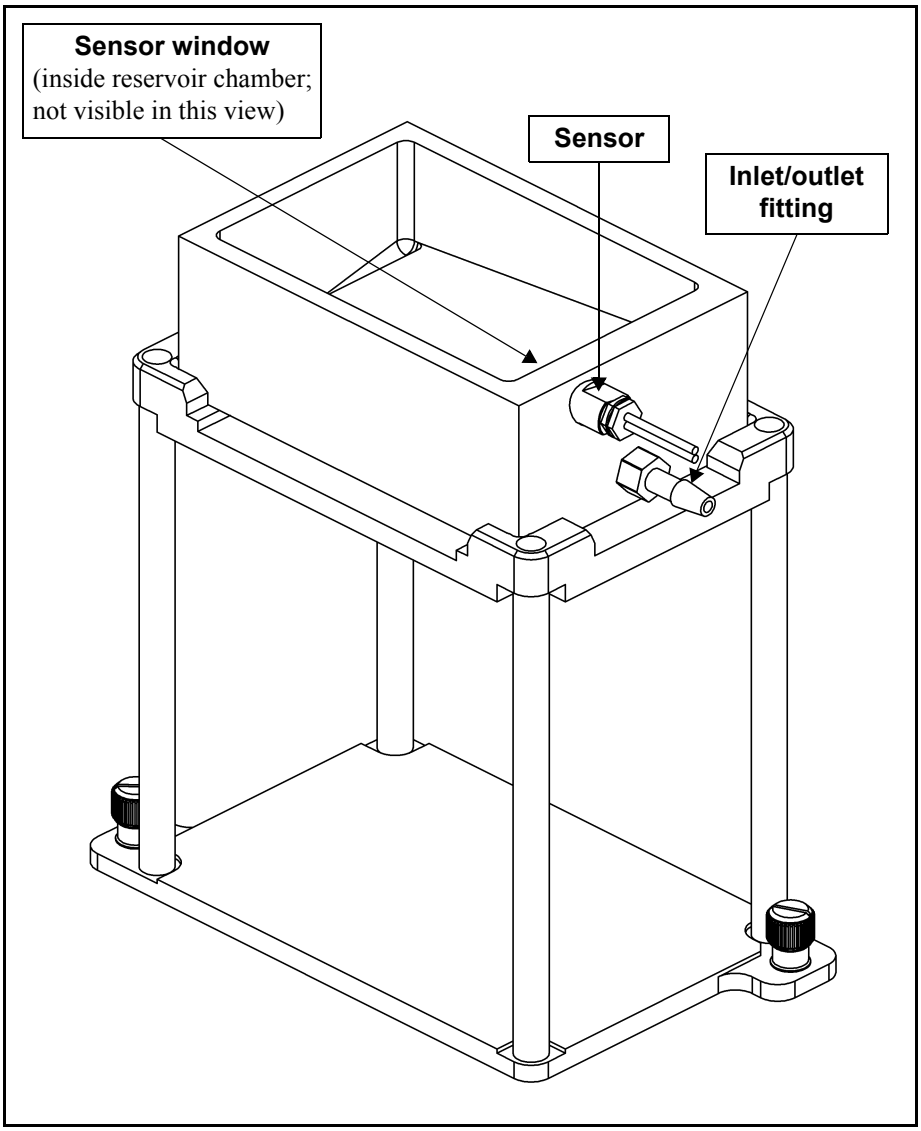

Figure 4-1. Drainable/Refillable Reservoir ALP mounted on a 1x1 Passive ALP

4.2 Installing the Drainable/Refillable Reservoir ALP

Installing the Drainable/Refillable Reservoir ALP includes:

- *Installing the Drainable/Refillable Reservoir on the Deck* (Section 4.2.1).
- *Setting up the Automatic Reservoir Controller* (Section 4.2.2).

4.2.1 Installing the Drainable/Refillable Reservoir on the Deck

A reservoir stand is not included with the ALP. The reservoir may be placed on a standard passive ALP, such as a 1 x 1, in any standard deck position. The reservoir has no specified left and right orientation, which allows it to be positioned facing either direction.

To install the reservoir on the deck:

WARNING: Turn off power to the Biomek instrument before mounting any ALP.

1. Turn off power to the Biomek instrument.
2. Place the reservoir on an existing passive ALP in any standard deck position.
3. When placed on a high-density 4 x 3 passive ALP, the reservoir must occupy one of the outside positions to allow space for the tubing and sensor leads to be routed off the deck.
4. Attach the tubing to the inlet/outlet fitting on the reservoir (Figure 4-1).
5. Route the tubing and sensor leads off the deck through one of the access holes in the back of the instrument.
   - ***FX*** — The tubing may also be routed between the light curtain and deck along the front of the instrument. Be sure the tubing does not interfere with the light curtain or the movement of a Biomek FX bridge.

CAUTION: Do not place the Automatic Reservoir Controller or the supply container on the Biomek instrument deck.

6. Place the Automatic Reservoir Controller at an off-deck location near the ALP.
7. Place the supply container at an off-deck location near the controller, in an accessible position lower than the Biomek instrument height.

4.2.2 Setting up the Automatic Reservoir Controller

The Automatic Reservoir Controller houses the peristaltic pump head, sensor amplifier, and connections between the ALP and Biomek instrument.

Setting up the Automatic Reservoir Controller includes:

- *Mounting the Peristaltic Pump Head and Routing the Tubing* (Section 4.2.2.1).
- *Connecting the CAN Communications Cables and Sensor Leads* (Section 4.2.2.2).
- *Calibrating the Sensor Amplifier Sensitivity* (Section 4.2.2.3).

4.2.2.1 Mounting the Peristaltic Pump Head and Routing the Tubing

The pump head must be installed on the controller before routing the tubing. No tools are required to mount the pump head.

To mount the pump head and route the tubing:

WARNING: Turn off the pump drive and disconnect the CAN cables before installing or removing the pump head or tubing.

1. Place the controller on the back side so that the ports and mounting holes are facing upward.
2. Insert the thumbscews into the pump head (Figure 4-2). The thumbscrews protrude from the back of the pump head.

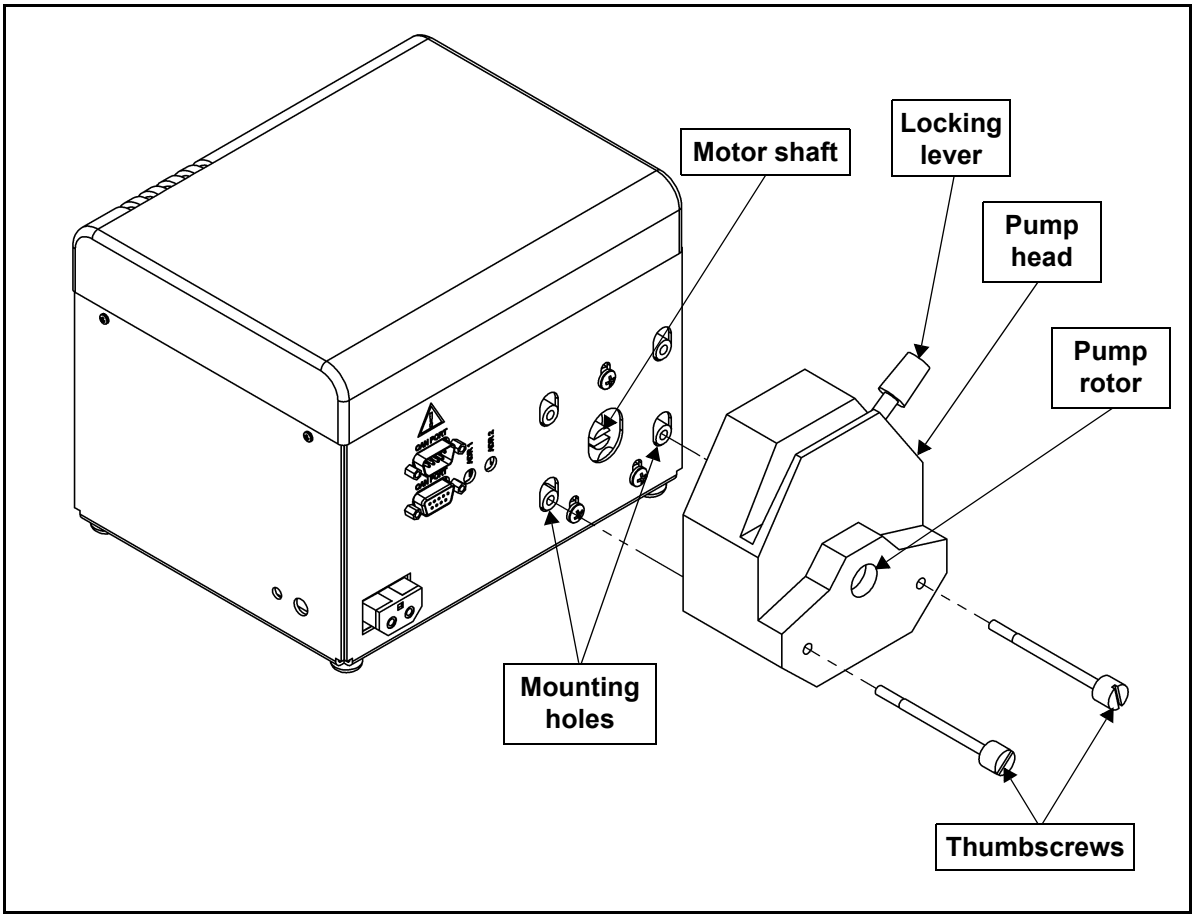

Figure 4-2. Mounting the peristaltic pump head on the controller

3. Align the thumbscrews with the mounting holes on the controller.
4. Turn the thumbscrews until the threads catch in the mounting holes, but do not tighten them further.

5. Push the locking lever to the left to open the pump, and rotate the rotor slowly in either direction until it aligns with the notch in the motor shaft. The pump head rests flush against the controller when the pump rotor and motor shaft are properly aligned.

Note: Refer to the pump head manufacturer's instructions for more information.

6. Tighten the thumbscrews until the pump head is firmly attached to the controller.
7. Place the controller back on the base.
8. Push the locking lever to the left to open the pump, if necessary.
9. Route the tubing so that it runs right to left from the reservoir to the supply container (Figure 4-3).

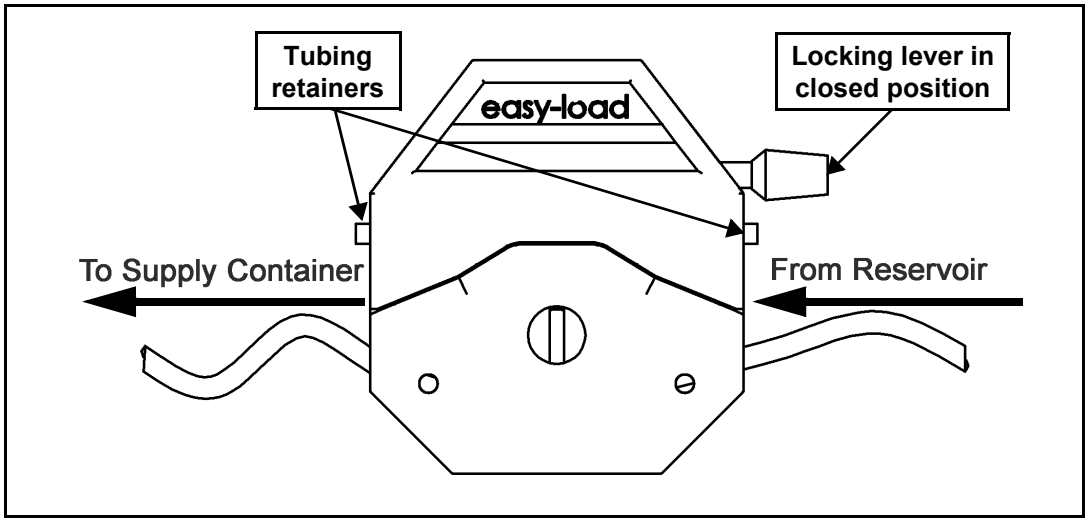

Figure 4-3. Tubing routed correctly through pump head

10. Push the locking lever to the right to lock the pump head closed (Figure 4-3).
11. If necessary, adjust the tubing retainers by pushing them into the pump head body slightly, and then down until firmly in contact with the tubing.

Note: Refer to the pump manufacturer's instructions for more information.

12. Attach the free end of the tubing to the fitting on the container.

4.2.2.2 Connecting the CAN Communications Cables and Sensor Leads

The Drainable/Refillable Reservoir ALP uses a CAN communications connection to communicate with and draw power from the Biomek instrument. The sensor leads from the reservoir connect to the transmitter and receiver ports on the sensor amplifier.

WARNING: Turn off power to the Biomek instrument before connecting CAN communication cables.

1. Turn off power to the Biomek instrument.

CAUTION: A maximum of one long CAN cable can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

2. Plug one end of the CAN communications cable into either of the two connectors labeled “CAN PORT” on the controller (Figure 4-4).

Note: When possible, short CAN cables should be used when connecting devices to each other or to the Biomek instrument.

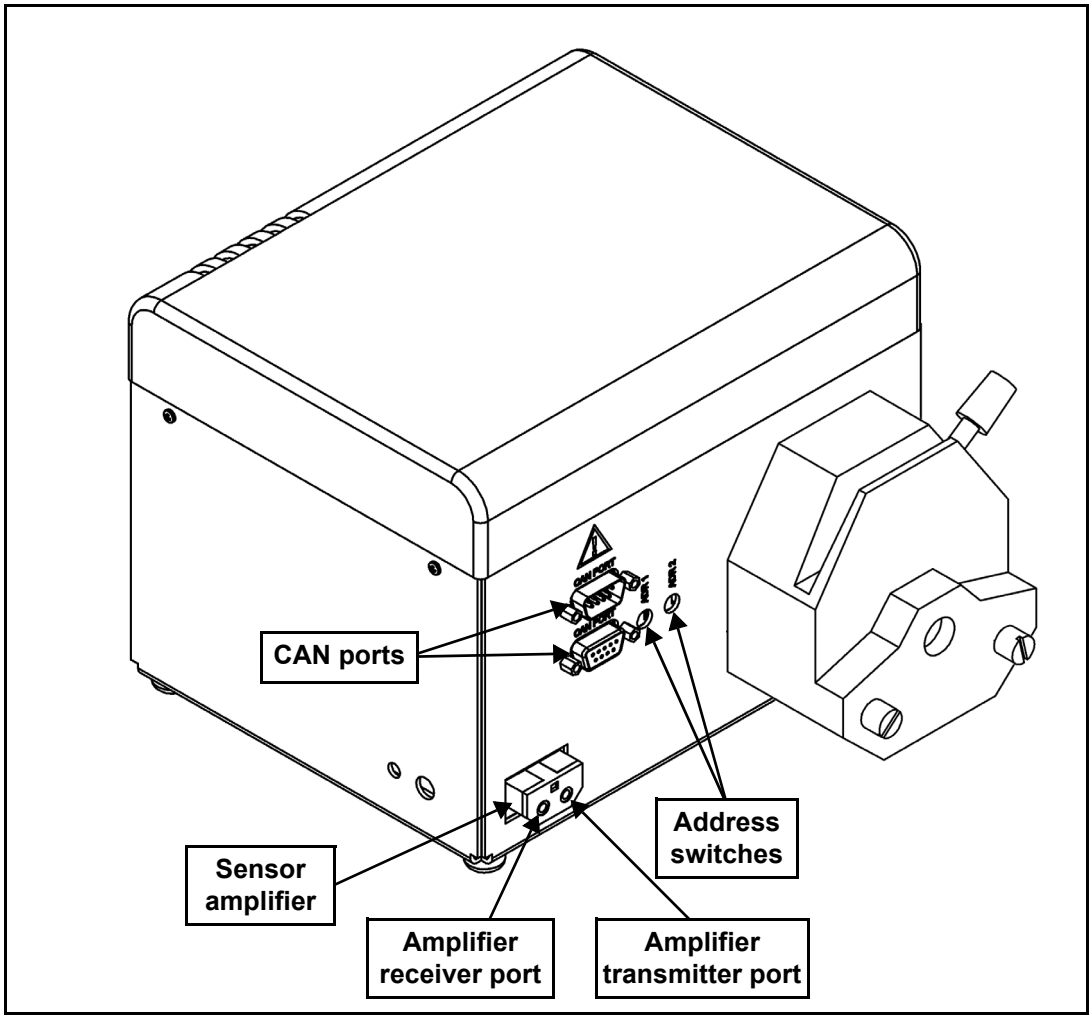

Figure 4-4. Automatic Reservoir Controller ports

3. Verify the ADR1 address switch is set to 1.
4. Set ADR2 to a unique address between zero (0) and F, if multiple Drainable/ Refillable Reservoir ALPs are on the deck.

Note: ADR2 is set to a default address of zero (0). If only one Drainable/ Refillable Reservoir ALP is on the deck, leave the setting at zero (0).

5. Connect the other end of the CAN cable to a CAN port on the Biomek instrument or another active ALP to create a chain.
6. Insert both sensor leads about 1/2" (13 mm) into the 2.2 mm holes in the supplied fiber cutter (Figure 4-5).

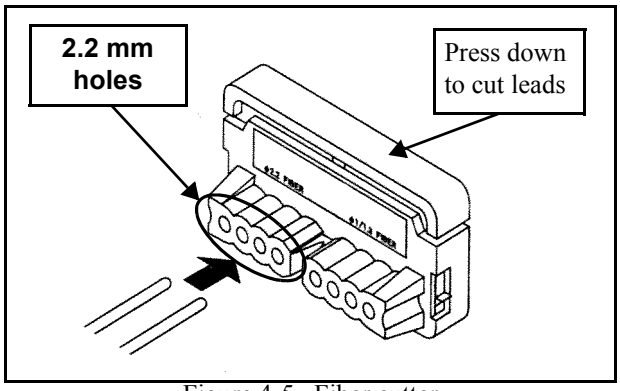

Figure 4-5. Fiber cutter

7. Press down on the top of the cutter to cut the leads simultaneously.
8. On the controller, use the supplied screwdriver to loosen the screw to the left of the sensor amplifier receiver and transmitter ports (Figure 4-4). This screw secures the sensor leads to the amplifier.

9. Identify the transmitter and receiver sensor leads either by the size of the colored dots printed along the length of the lead, or by the fiber core:
    - **Dots printed on leads** — The lead with the larger dots connects to amplifier transmitter port; the lead with smaller dots connects to the amplifier receiver port.
    - **Fiber core** — Look at the cut ends of the fiber leads (Figure 4-6). The lead with a solid core connects to the amplifier transmitter port; the lead with several fibers (multi-core) connects to the amplifier receiver port.

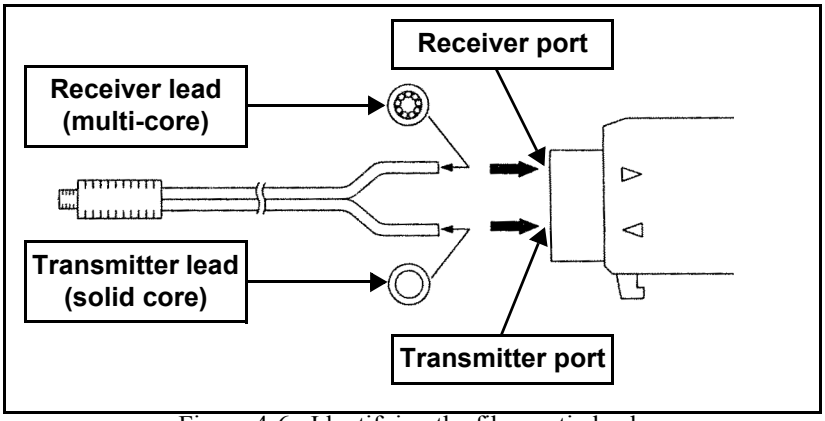

Figure 4-6. Identifying the fiber optic leads

10. Insert the leads into the ports until they stop, and tighten the screw to the left of the ports until the leads are secured.
11. Turn on power to the Biomek instrument.

4.2.2.3 Calibrating the Sensor Amplifier Sensitivity

The sensitivity of the sensor amplifier must be calibrated before the Drainable/ Refillable Reservoir can be used in a method. Calibrating the sensitivity of the sensor amplifier is recommended each time a different type of liquid is used in the reservoir and anytime the draining and refilling process is not working correctly.

Note: The Biomek instrument must be turned on to supply power to the ALP during calibration.

To calibrate the sensitivity:

1. On the controller, locate the amplifier sensitivity adjustment dial, and use the supplied screwdriver to slowly turn the dial clockwise until it stops (Figure 4-7).

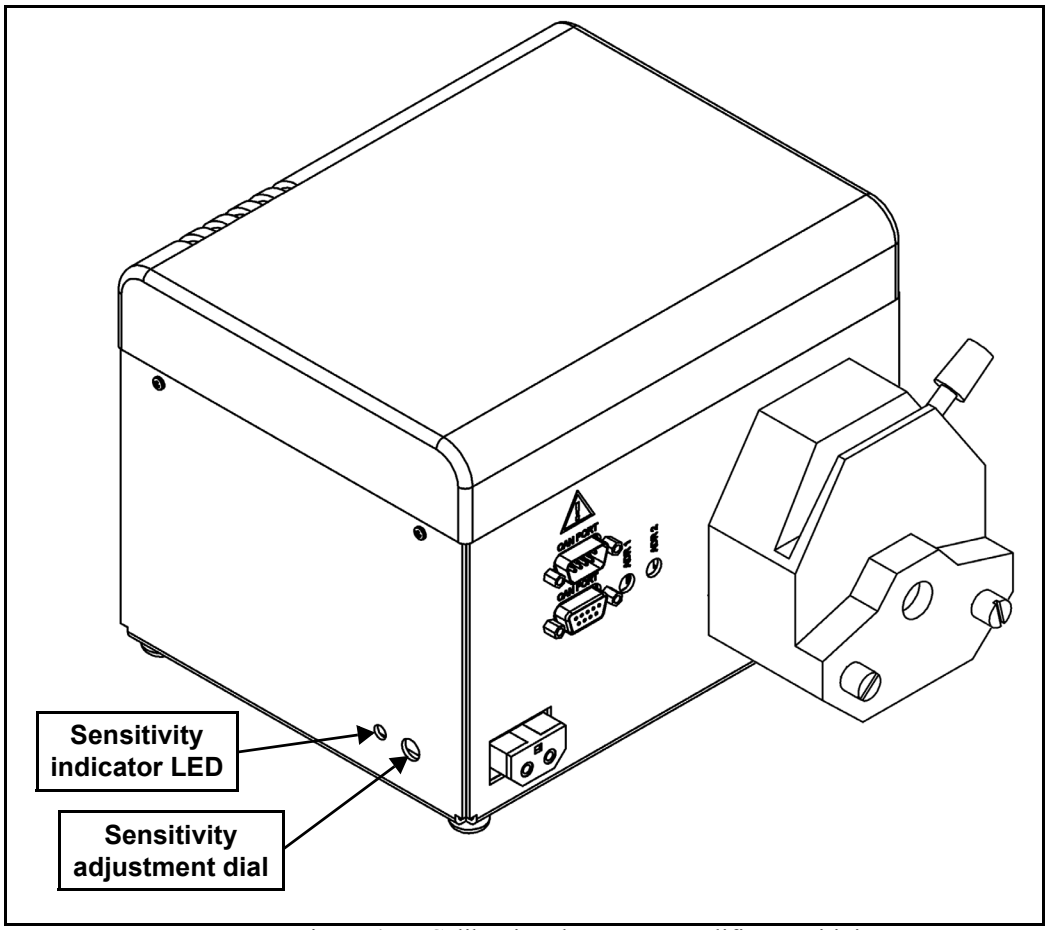

Figure 4-7. Calibrating the sensor amplifier sensitivity

2. Manually fill the reservoir with the desired liquid until the liquid level covers at least half of the reservoir sensor window.
3. Use the supplied screwdriver to slowly turn the sensitivity adjustment dial counterclockwise. When the sensitivity indicator LED turns on, stop turning the dial immediately (Figure 4-7).

   Note: If the LED does not turn on, make sure the sensor leads are connected to the correct ports on the amplifier (refer to Section 4.2.2.2, *Connecting the CAN Communications Cables and Sensor Leads*).

4. Manually drain the reservoir and observe if the indicator LED turns off.
5. If the indicator LED turned off, manually fill the reservoir again. If the LED turns on when the liquid level covers at least half the sensor window, the sensitivity calibration is complete.

   OR

   If the indicator LED did not turn off when the reservoir was drained, repeat the steps in this section again.

4.3 Framing Instructions

Frame the passive ALP the reservoir occupies according to the instructions in the appropriate hardware manual. Biomek Software treats the reservoir as a piece of labware, and does not require additional framing.

4.4 Using the Drainable/Refillable Reservoir ALP in a Method

To use the Drainable/Refillable Reservoir ALP in a method, first it must be added to the list of installed devices in Hardware Setup (refer to Section 1.3.1, *Installing an ALP in Hardware Setup*). Once added to the list, no additional configuration is required in Hardware Setup.

CAUTION: Prior to running a method, make sure there is enough fluid for the method in the container.

Using the Drainable/Refillable Reservoir ALP in a method includes:

- *Configuring an Instrument Setup Step for a Drainable/Refillable Reservoir ALP* (Section 4.4.1).
- *Configuring a Device Action Step for a Drainable/Refillable Reservoir ALP* (Section 4.4.2).

4.4.1 Configuring an Instrument Setup Step for a Drainable/Refillable Reservoir ALP

In a method using a Drainable/Refillable Reservoir ALP, an Instrument Setup step located at the start of the method is necessary for:

- *Adding a Drainable/Refillable Reservoir to the Deck* (Section 4.4.1.1).
- *Configuring Labware Properties for a Drainable/Refillable Reservoir* (Section 4.4.1.2).

4.4.1.1 Adding a Drainable/Refillable Reservoir to the Deck

To add a Drainable/Refillable Reservoir to the deck:

1. Insert an Instrument Setup step at the start of the method.

   OR

   Select the first Instrument Setup step found in the method. The Instrument Setup step configuration appears (Figure 4-8).

Note: The first Instrument Setup step must be located before any pod movement in a method for obstacle avoidance.

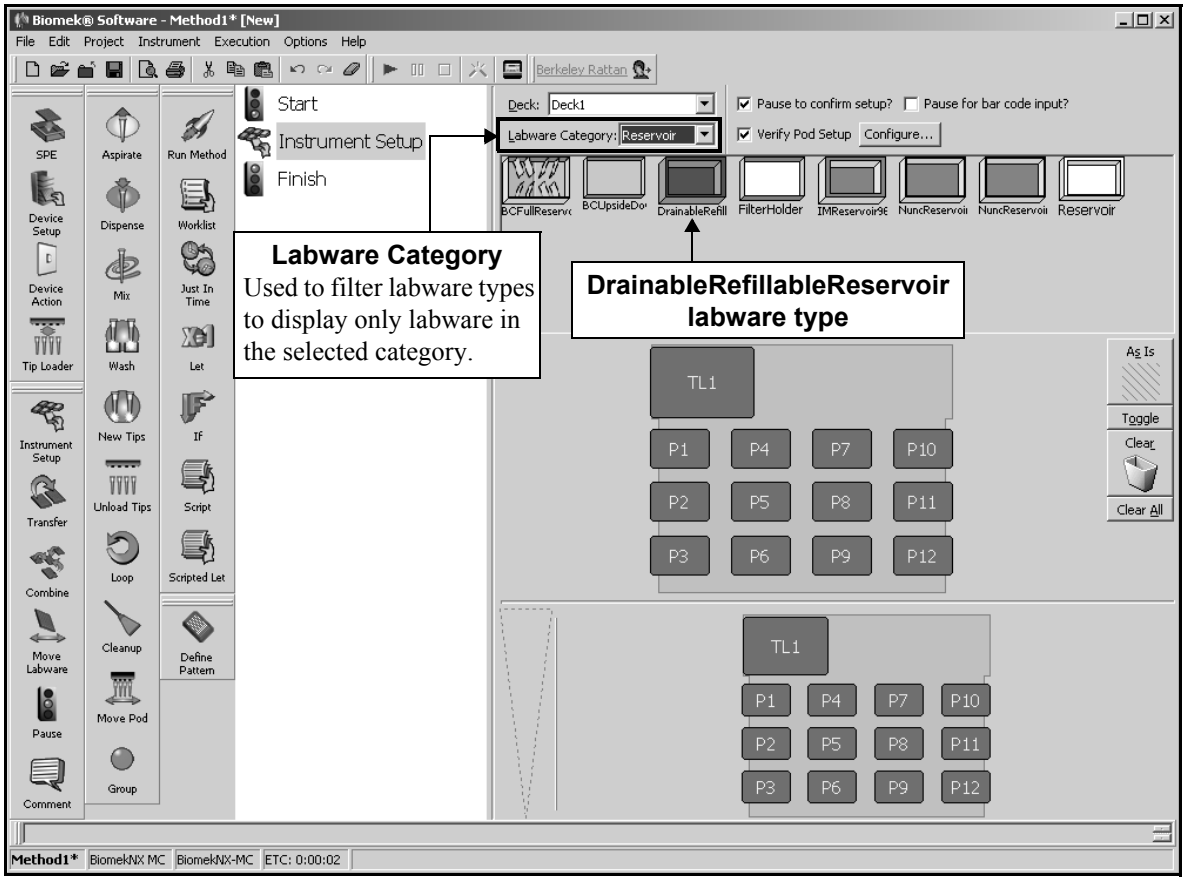

Figure 4-8. Configuring an Instrument Setup step for a Drainable/Refillable Reservoir

2. In Labware Category, choose **Reservoir** to display labware in the Reservoir category only.
3. Drag a **DrainableRefillableReservoir** labware type onto an available standard position.

Note: The reservoir should only be mounted on the outside positions of a 4x3 High-Density Passive ALP; the two inner positions do not provide adequate space to correctly route the tubing and sensor leads.

4.4.1.2 Configuring Labware Properties for a Drainable/ Refillable Reservoir

The Drainable/Refillable Reservoir is a piece of labware and may have parameters configured using Labware Properties.

To configure Labware Properties:

1. Double-click the **DrainableRefillableReservoir** labware type.

   OR

   Right-click on the **DrainableRefillableReservoir** labware type and choose **Properties** from the menu. Labware Properties appears (Figure 4-9).

Figure 4-9. Labware Properties for a drainable/refillable reservoir

2. In Name, enter a name for the reservoir.

   Note: When a deck is populated by numerous pieces of labware, naming labware is recommended. Names should be descriptive of the contents of the labware or the work being accomplished during the method. Naming labware in a meaningful fashion may reduce confusion. Names given to pieces of labware may be entered as variables in other step configurations within the method.

3. In Device, choose the appropriate **DrainableRefillableReservoir** installed in Hardware Setup.

4. Choose **OK** to close Labware Properties and save changes.

   OR

   Choose **Cancel** to close Labware Properties without saving changes.

4.4.2 Configuring a Device Action Step for a Drainable/Refillable Reservoir ALP

The ALP is controlled and operating through the Device Action step in Biomek Software (refer to the *Biomek Software User's Manual,* Section 22.6.1.3, *Configuring the Device Action Step for a Drainable/Refillable Reservoir ALP (FX, NX only)*). Filling, draining, and configuring the sensor state are all configured using a Device Action step in a method.

4.5 Controlling the Drainable/Refillable Reservoir ALP Outside a Method

To control the Drainable/Refillable Reservoir ALP outside a method, use Advanced Manual Control for:

- *Filling the Reservoir* (Section 4.5.1).
- *Draining the Reservoir* (Section 4.5.2).
- *Checking the Sensor State* (Section 4.5.3).

Note: Manual Control is available only when a method is not being executed. If a need for manual control is realized during a method run, stop the method using the Stop button or Snap Continuation button (refer to the *Biomek Software User's Manual,* Chapter 25.11.2, *Snapping a Continuation*) before accessing Manual Control.

4.5.1 Filling the Reservoir

Use Advanced Manual Control to fill the reservoir to the maximum level.

To fill the reservoir:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**. A list of the installed pod and devices appears.
3. Select the desired **DrainableRefillableReservoir**. Advanced Manual Control for the selected ALP appears.
4. In Command, choose **Fill** (Figure 4-10).

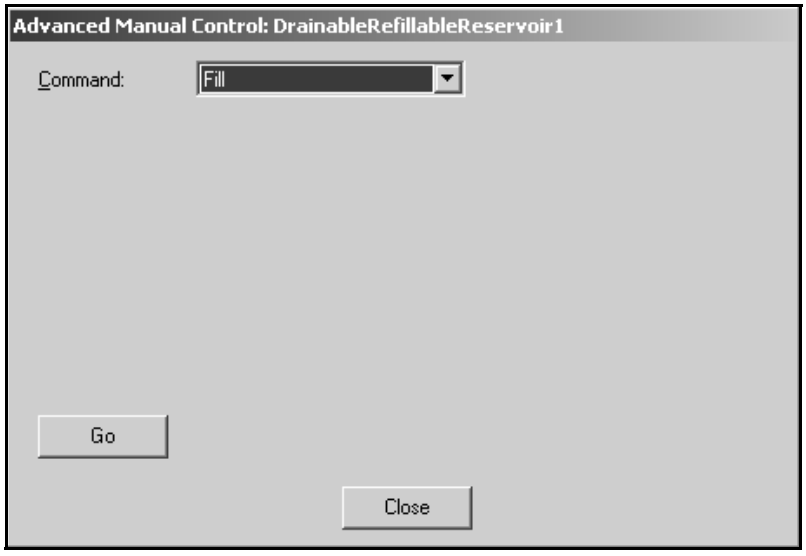

Figure 4-10. Advanced Manual Control for a Drainable/Refillable Reservoir ALP with Fill selected

5. Choose **Go**. The reservoir fills to the maximum level allowed by the sensor.
6. Choose **Close** to close Advanced Manual Control.
7. Choose **Exit** to close Manual Control.

4.5.2 Draining the Reservoir

Use Advanced Manual Control to drain the contents of the reservoir back into the supply container.

To drain a Drainable/Refillable Reservoir ALP:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**. A list of the installed pod and devices appears.
3. Select the desired **DrainableRefillableReservoir**. Advanced Manual Control for the selected ALP appears.
4. In Command, choose **Drain** (Figure 4-11).

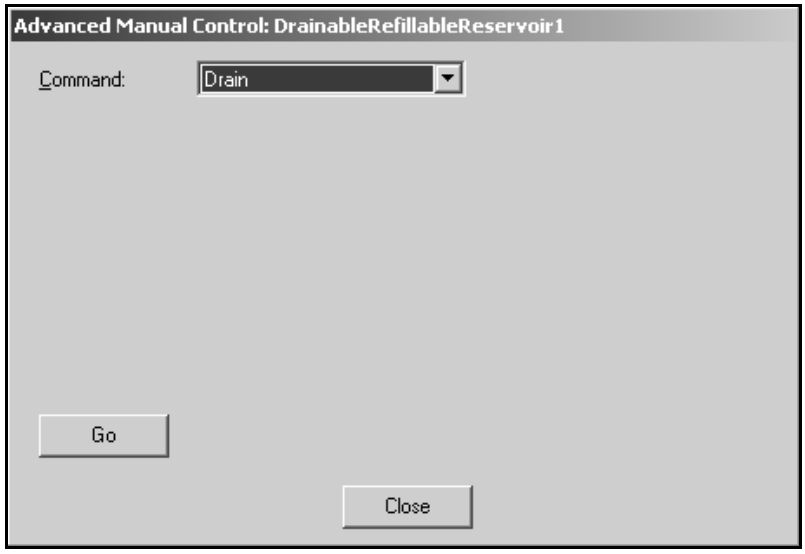

Figure 4-11. Advanced Manual Control for a Drainable/Refillable Reservoir ALP with Drain selected

5. Choose **Go**. The liquid in the reservoir drains back into the supply container.
6. Choose **Close** to close Advanced Manual Control.
7. Choose **Exit** to close Manual Control.

Note: When air bubbles form at the end of the tubing in the supply container, the reservoir and tubing are free of liquid.

4.5.3 Checking the Sensor State

Use Advanced Manual Control to check the sensor state. Checking the sensor state allows method runs to proceed when the liquid level in the reservoir is sufficient.

To check the sensor state:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**. A list of the installed pod and devices appears.
3. Select the desired **DrainableRefillableReservoir**. Advanced Manual Control for the selected ALP appears.
4. In Command, choose **AssertSensor**. Sensor State appears (Figure 4-12).

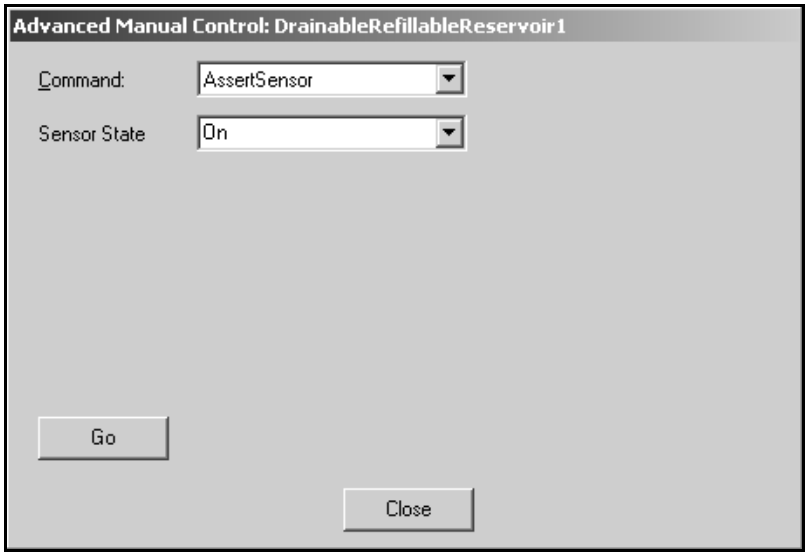

Figure 4-12. Advanced Manual Control for a Drainable/Refillable Reservoir ALP with AssertSensor selected

5. In Sensor State, choose:
   - **On** — allows the method run to proceed when sufficient liquid is detected in the reservoir.
   - **Off** — allows the method run to proceed when liquid is not detected in the reservoir.
6. Choose **Go**. The sensor state is configured.
7. Choose **Close** to close Advanced Manual Control.
8. Choose **Exit** to close Manual Control.

4.6 Removing the Drainable/Refillable Reservoir ALP From the Deck

WARNING: The Drainable/Refillable Reservoir ALP may be contaminated from method solutions. Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

WARNING: SPILL HAZARD

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the Biomek instrument. Clean up any spills immediately according to the procedures defined by the laboratory safety officer.

To remove the Drainable/Refillable Reservoir ALP:

1. Drain the reservoir, if necessary (refer to Section 4.5.2, *Draining the Reservoir*).
2. Turn off power to the Biomek instrument.
3. On the controller, push the pump head locking lever to the left to open it.
4. Remove the tubing from the pump head.
5. Disconnect the CAN cable(s) from the CAN port(s).
6. Using the supplied screwdriver, loosen the screws on the right and left of the sensor amplifier that fasten the sensor leads, then disconnect the leads from the amplifier.
7. Loosen the thumbscrews fastening the pump head to the controller, and gently remove the pump head.

   Note: The pump head needs to be removed only if the ALP will be stored in the original packaging.

8. On the reservoir, disconnect the tubing from the inlet/outlet fitting.
9. Remove the reservoir from the deck.
10. Decontaminate and clean the reservoir following procedures outlined by the laboratory safety officer.

4.7 Storage

To store the Drainable/Refillable Reservoir ALP:

1. Remove the ALP from the deck (refer to Section 4.6, *Removing the Drainable/Refillable Reservoir ALP From the Deck*).

   Note: The ALP should be allowed to air dry before it is repacked for storage.

2. Return the ALP to its original packing materials and store in a dry, dust-free, environmentally controlled area.

4.8 Preventive Maintenance

WARNING: The Drainable/Refillable Reservoir ALP may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

The ALP requires minimal maintenance. Observe the following guidelines:

- Do not overflow the reservoir.
- Drain any solutions from the reservoir when not in use and follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

  Note: Refer to Section 4.5.2, *Draining the Reservoir* for more information about draining the reservoir.

- Periodically inspect the tubing for wear and stress fractures.
- Periodically inspect the tubing connections for leakage.
- Replace tubing when required.

Note: For more information about recommended maintenance procedures and intervals for the peristaltic pump and tubing, refer to the user manuals provided by the manufacturers.

4.9 Troubleshooting

Do not attempt to repair the Drainable/Refillable Reservoir ALP without first contacting a Beckman Coulter Service Engineer.

Table 4-1. Troubleshooting the Drainable/Refillable Reservoir ALP

IF	THEN
The ALP is not operating correctly.	Check the CAN connections on the controller (refer to Section 4.2.2.2, *Connecting the CAN Communications Cables and Sensor Leads*).
The sensitivity indicator LED is not turning on when sufficient liquid is present in the reservoir.	Calibrate the amplifier sensitivity with the desired liquid in the reservoir (refer to Section 4.2.2.3, *Calibrating the Sensor Amplifier Sensitivity*). Make sure the sensor leads are connected to the correct amplifier ports. The lead with the larger dots printed along the length of the lead connects to the transmitter port; the lead with smaller dots connects to the receiver port (refer to Section 4.2.2.2, *Connecting the CAN Communications Cables and Sensor Leads*).
Repeated attempts to calibrate the amplifier sensitivity fail.	Contact Beckman Coulter Technical Support.
The reservoir is not filling and draining correctly.	Reverse direction of the tubing through the pump head. The tubing must run left to right through the pump head from the container to the reservoir. Make sure there are no kinks in the tubing. Make sure the pump head is properly closed on the tubing. Make sure the fitting on the container that supplies the reservoir is in contact with the liquid.

5 Half-Position Disposal ALP (NX-S8 only)

5.1 Overview

The Half-Position Disposal ALP provides a means to dispose of tips during a method. When the slide is attached, it can be used to dispose of tips, tip boxes, and labware during a method. Because this ALP only takes a half position, a Span-8 Wash ALP may be placed on the other half position to conserve space on the Biomek NX deck.

The Half-Position Disposal ALP is used by the Span-8 Pod on the Biomek NX deck in one of two ways:

- Half-Position Disposal ALP—The disposed tips are placed into a waste receptacle positioned inside the ALP base.

  OR

- Half-Position Disposal ALP with Slide — A slide that extends beyond the edge of the Biomek deck is inserted into the ALP. Tips, tip boxes, and labware placed inside the ALP slide down into a receptacle placed below.

  Note: Labware that hangs below the gripper, such as an SPE filter plate or a tip box lid, cannot be placed inside the ALP.

Note: The Half-Position Disposal ALP is shipped so that either of the two options above can be assembled and used.

The information in this chapter includes mounting the ALP to the deck, framing, removing the ALP from the deck, storing, and preventive maintenance for the following:

- Half-Position Disposal ALP (refer to Section 5.2, *Half-Position Disposal ALP*)
- Half-Position Disposal ALP with Slide (refer to Section 5.3, *Half-Position Disposal ALP with Slide*)

5.2 Half-Position Disposal ALP

WARNING: When using the Half-Position Disposal ALP, do not overfill the disposal bag. Tips may spill over onto the deck, possibly contaminating the deck with hazardous materials.

When the Half-Position Disposal ALP is used as a self-contained waste receptacle (without the slide), a waste bag is mounted inside the ALP (Figure 5-1). Because this ALP only takes a half position, a Span-8 Wash ALP may be placed on the other half position to conserve space on the Biomek deck.

Note: The Half-Position Disposal ALP is used only for collecting shucked tips.

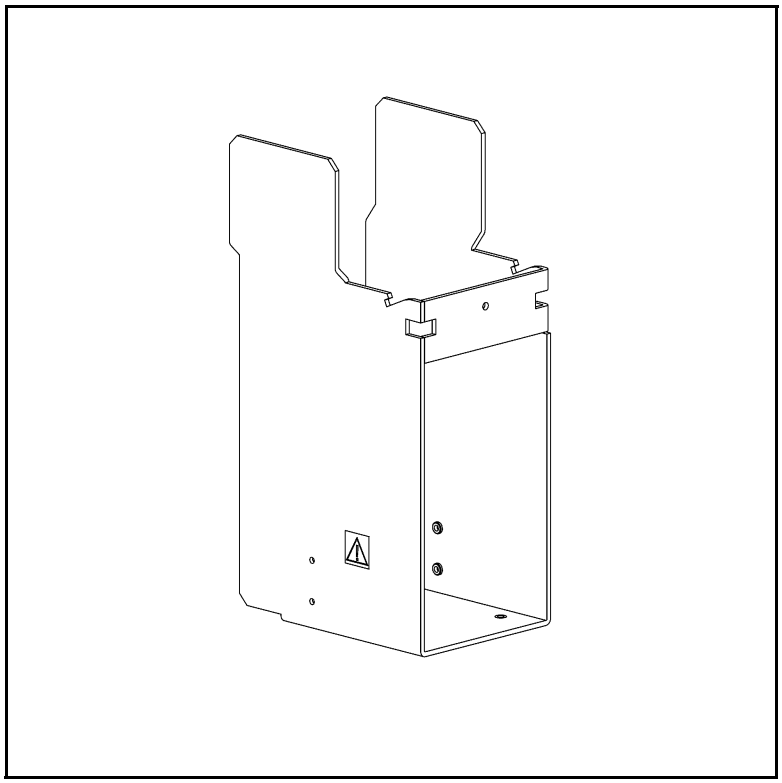

Figure 5-1. Half-Position Disposal ALP

5.2.1 Mounting a Half-Position Disposal ALP

CAUTION: The Half-Position Disposal ALP must be mounted on the outside columns of the Biomek deck to avoid collisions.

CAUTION: Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

The Half-Position Disposal ALP can be mounted on half of a standard deck position in the outside columns of the Biomek NX deck. Refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*, to learn how to configure the deck and where to place the ALP on the Biomek NX deck. The Half-Position Disposal ALP is referred to as HalfTipTrashLeft or HalfTipTrashRight in the Deck Editor.

The following conditions should be noted before choosing a deck position:

- If the ALP is placed in the first or second row from the front, the gripper cannot grip labware on or off an adjacent ALP from the front or behind.
- If the ALP is placed in the third row from the front, the gripper can grip from behind the ALP, but not from the front.
- If the ALP is placed in the back row, it can grip only from the front.

To mount a Half-Position Disposal ALP to the deck:

1. Choose a deck position in the outside column of the deck, then slip the locating pins on the bottom of the ALP into the locating holes of the desired deck position.
2. Fasten the ALP to the deck using the thumbscrews on the bottom of the ALP.

WARNING: Appropriately marked autoclavable biohazard bags are recommended for hazardous applications. The waste bags shipped with the Half-Position Disposal ALP are not biohazard bags. Contact the laboratory safety officer for appropriate biohazard bags and procedures.

3. Fold the top of a waste bag over the frame so that the bottom of the bag reaches the bottom of the ALP base.
4. Smooth out the bag to allow items to drop directly to the bottom of the bag.
5. To hold the bag in place, stretch the rubber band over the top of ALP and use the notches to position it in the location shown in Figure 5-2. An opening like the one in Figure 5-2 should be created.

CAUTION: Make sure the bag is tight to tops of the flanges. The gripper tool must have enough room to move over the ALP.

6. Ensure the bag is tight to the tops of the flanges (Figure 5-2).

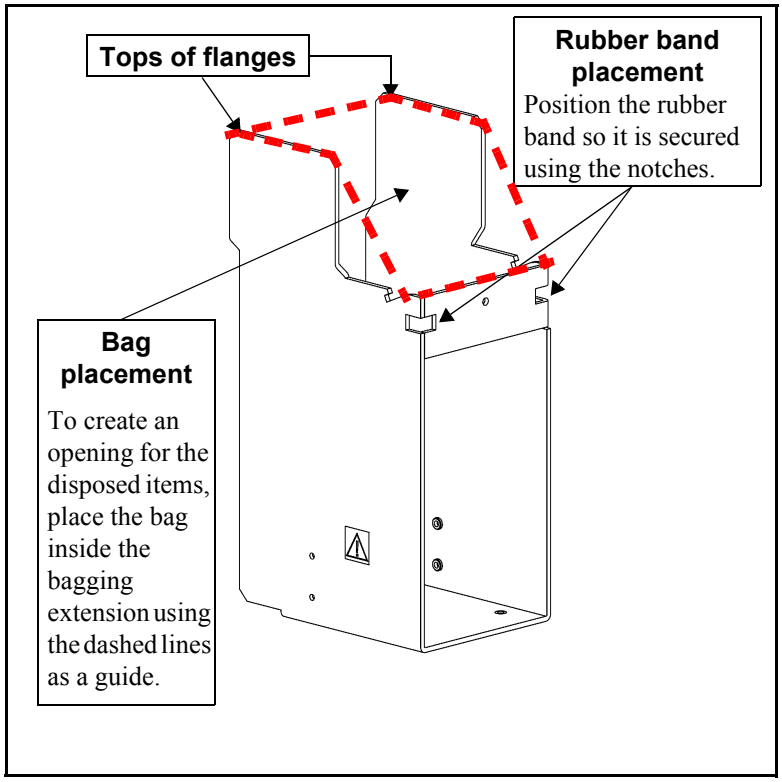

Figure 5-2. Half-Position Disposal ALP rubber band placement

7. Pull the bag through the Half-Position Disposal ALP so the opening looks like the photo in Figure 5-3.

Figure 5-3. Half-Position Disposal ALP with correct bag placement

5.2.2 Removing a Half-Position Disposal ALP

WARNING: The waste bag may be contaminated. Follow the appropriate decontamination and disposal procedures outlined by the laboratory safety officer.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: SPILL HAZARD.

To remove the Half-Position Disposal ALP:

1. Remove the rubber band and waste receptacle from the ALP.
2. Dispose of the bag and contents as specified by the laboratory safety officer.
3. Loosen the thumbscrews on the base of the ALP.
4. Lift the ALP straight up from the deck so that the locating pins on the bottom of the ALP base clear the locating holes on the deck.

5.3 Half-Position Disposal ALP with Slide

When the Half-Position Disposal ALP is used with the slide, it extends off the edge of the deck. The slide is directed through the gap between the deck and Plexiglas shield. A trash receptacle is placed on the floor at the end of the slide to catch the waste. The ALP can be used on half of a standard deck position and is particularly effective when lab space is at a premium.

The Half-Position Disposal ALP with Slide allows the disposal of as many used tips as the trash receptacle is capable of holding. The Span-8 Pod can drop disposable tips directly into this ALP with the slide. Labware that hangs below the gripper, such as an SPE filter, cannot be placed inside the ALP.

Note: Tips may stick to the slide, which could cause tips or labware to jam in the chute. Check the slide periodically during the method run to ensure it is clear of tips.

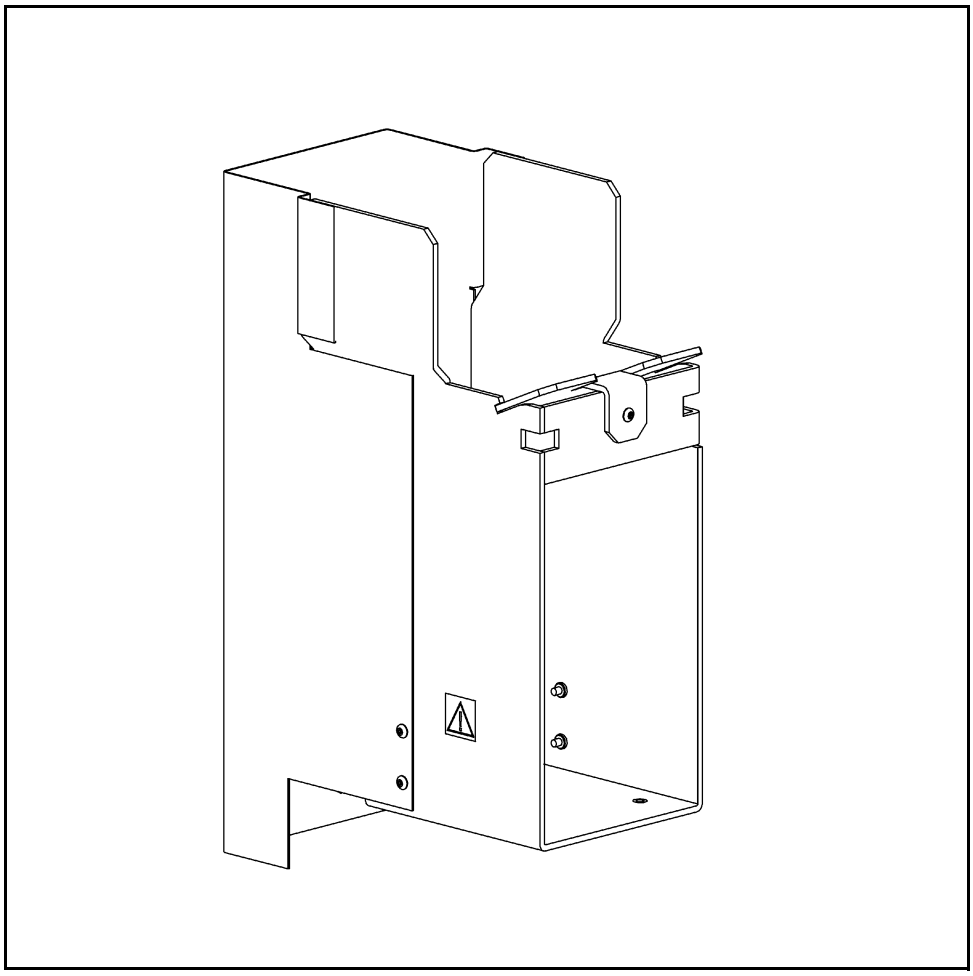

Figure 5-4. Span-8 Disposal ALP with Slide

5.3.1 Mounting the Half-Position Disposal ALP with Slide to the Deck

CAUTION: The Half-Position Disposal ALP with Slide must be mounted in the left or right outside columns of the Biomek NX deck to avoid collisions.

CAUTION: Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

The Half-Position Disposal ALP can be mounted on half of a standard deck position in the outside columns of the Biomek NX deck. Refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*, to learn how to configure the deck and where to place the ALP on the Biomek NX deck. The Half-Position Disposal ALP with Slide is referred to as HalfTrashLeft or HalfTrashRight in the Deck Editor.

The following conditions should be noted before choosing a deck position:

- If the ALP is placed in the first or second row from the front, the gripper cannot grip labware on or off an adjacent ALP from the front or behind.
- If the ALP is placed in the third row from the front, the gripper can grip from behind the ALP, but not from the front.
- If the ALP is placed in the back row, it can grip only from the front.

The bottom panels on the instrument must be removed before mounting the Half-Position Disposal ALP with Slide to the deck (refer to Section 5.3.1.1, *Removing a Bottom Panel*).

5.3.1.1 Removing a Bottom Panel

After choosing an appropriate deck position, the panel that is adjacent to the chosen position must be removed to allow the slide to be directed through the gap between the deck and Plexiglas shield.

To remove a bottom panel:

1. Remove the two screws that attach the bottom panel to the instrument base (Figure 5-5).
2. While holding the loosen panel, remove the two screws that attach it to the side bracket where the Plexiglas shields are also attached (Figure 5-5).
3. Store the removed panel in a dry, dust-free, environmentally-controlled area.

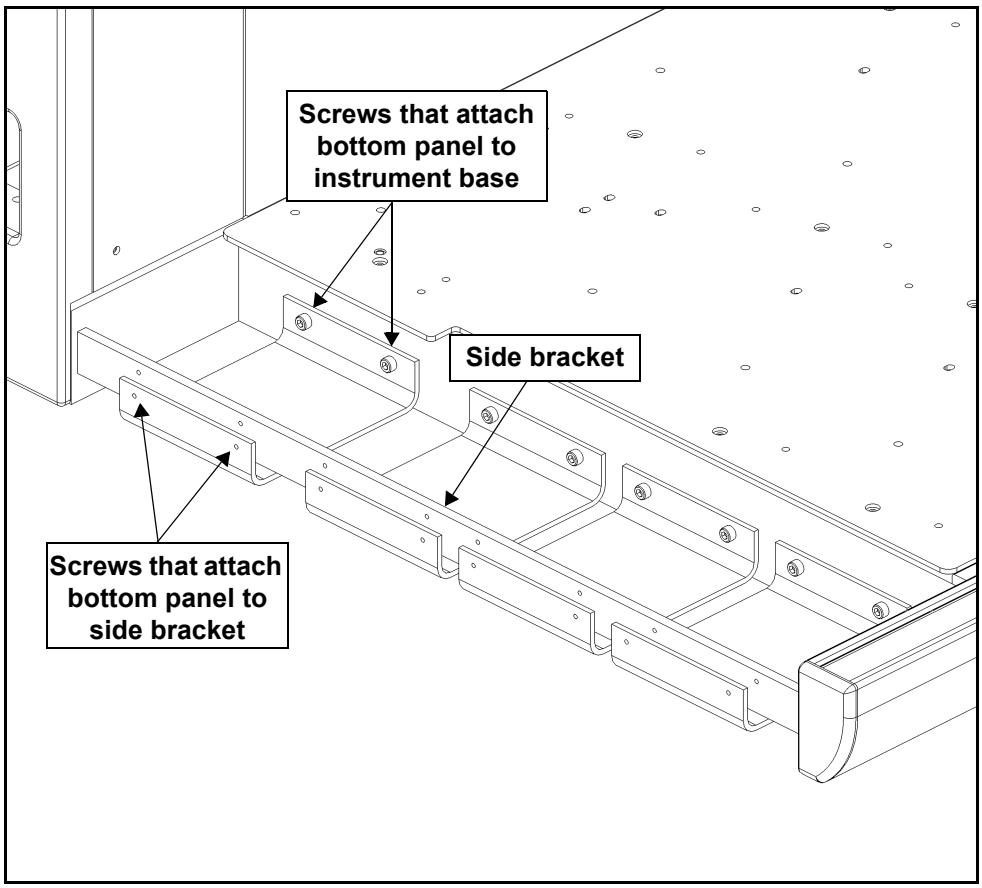

Figure 5-5. Removing bottom panels

5.3.1.2 Mounting the ALP to the Deck

To mount a Half-Position Disposal ALP with Slide:

1. Attach the slide to the ALP by lowering the into the grooves in the ALP.
2. Insert the grounding screw through the tab on the back of the slide and into the threaded hole in the ALP.

Note: This screw is necessary for proper ESD grounding of the ALP and to position the slide.

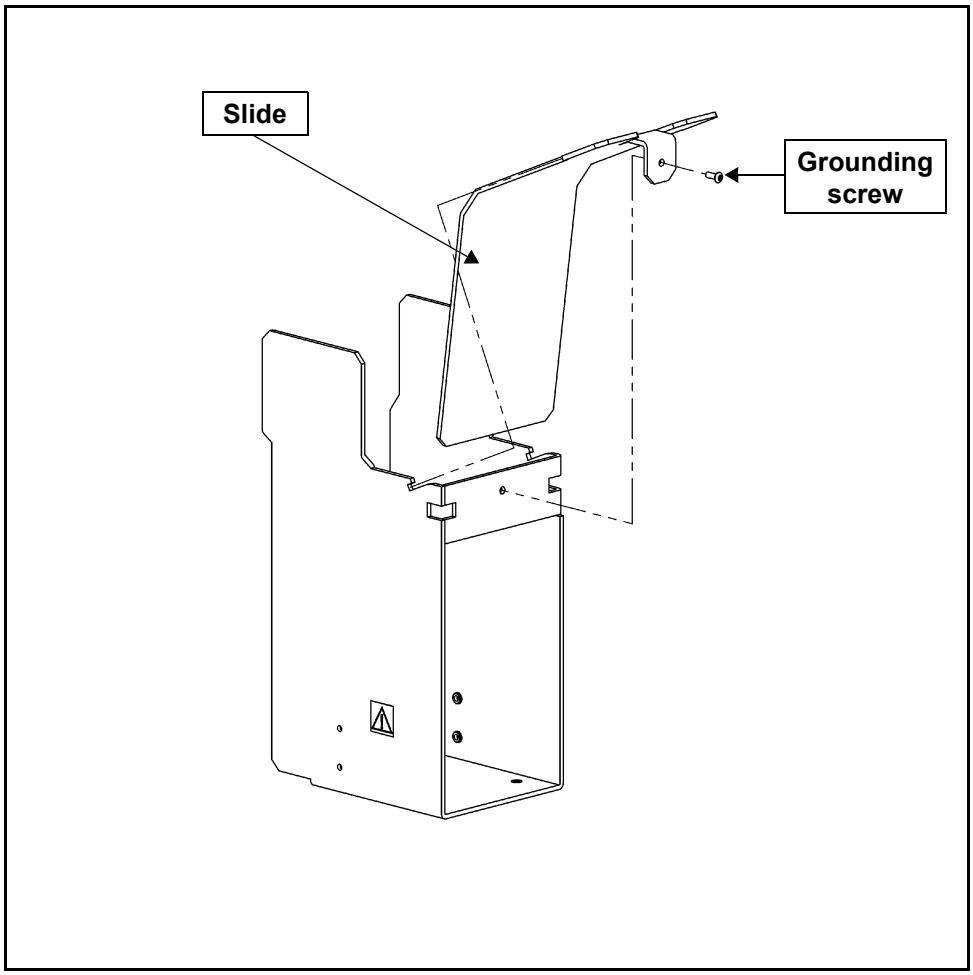

Figure 5-6. Adding the slide to the Half-Position Disposal ALP

3. Attach the slide to the ALP using the supplied grounding screw.
4. Position the disposal chute by lining up the holes in the chute with the threaded holes in the ALP (Figure 5-4).

5. Attach the disposal chute to the ALP using the four screws supplied (Figure 5-4).

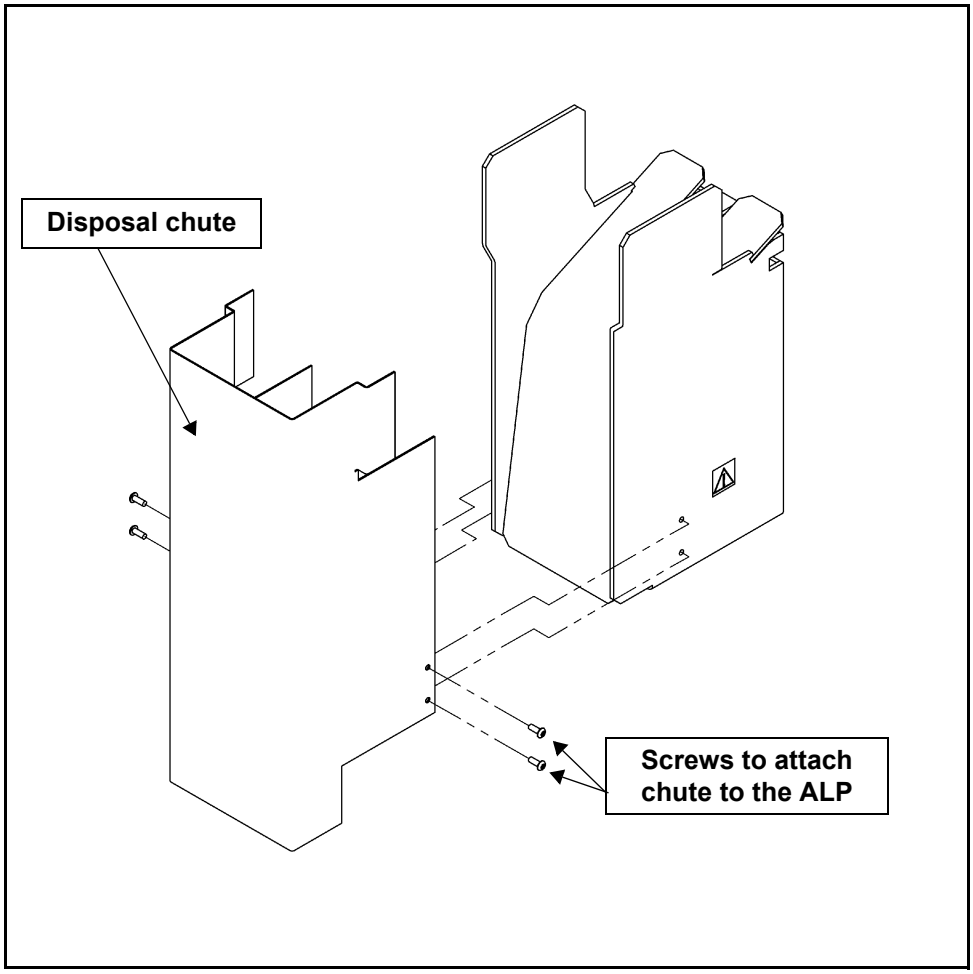

Figure 5-7. Adding the chute to Half-Position Disposal ALP

6. Choose the desired position and remove the bottom shield that is adjacent to the position so the trash can fall through to the receptacle.
7. Place the ALP in an outside column of the deck. This allows the slide to extend downward beyond the left or right side of the deck.
8. Slip the locating pins on the bottom of the ALP into the locating holes on the deck.
9. Place a trash receptacle at the end of the disposal chute to catch disposed items.
10. Look down through the disposal chute, or drop a test item into the ALP, to make sure the trash lands in the receptacle. Adjust the placement of the trash receptacle as required.

5.3.2 Removing a Half-Position Disposal ALP with Slide ALP

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

To remove the Half-Position Disposal ALP with Slide:

1. Verify that no labware remains on the slide. If labware remains on the slide, remove the labware as specified by the laboratory safety officer.
2. Remove the trash receptacle and dispose of the contents as specified by the laboratory safety officer.
3. Remove the grounding screw from the slide.
4. Lift the slide from the base.
5. Loosen the thumbscrew on the base of the ALP.
6. Lift the ALP from the deck so that the locating pins on the bottom of the ALP base clear the locating holes on the deck.
7. To detach the chute, remove the four screws attaching the chute to the ALP and remove the chute.

5.4 Framing Instructions

Framing the Half-Position Disposal ALP occurs when the deck is framed with the Shift Deck command according to the instructions in the *(refer to the Biomek® NX Span-8 Laboratory Automation Workstation User's Manual,* Chapter 4, *Framing Instructions*). It is not necessary to individually frame the Half-Position Disposal ALP.

5.5 Storage

Return the Half-Position Disposal ALP to its original packing materials and store in a dry, dust-free, environmentally-controlled area.

Note: It is desirable to allow the ALP to air-dry before returning it to its original packing materials.

5.6 Preventive Maintenance

WARNING: The Half-Position Disposal ALP may be contaminated. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the Half-Position Disposal ALP with a soft cloth.

6 HDR Pin Drying ALP and Reservoirs (FX only)

6.1 Overview

The HDR Pin Drying ALP (Figure 6-1), an active ALP, and reservoirs (refer to Section 6.1.2, *Reservoirs*) are part of a system for washing and drying pins on the HDR Tool Body between transfers in a method. Pins are washed using a "dunk and dry" approach.

The HDR Tool Body immerses the pins in one or more reservoirs of wash solutions, such as bleach, ethanol, or DMSO. Reservoirs may be static or circulating. The location and liquid type in each reservoir is configured in the Biomek Software using the Instrument Setup step (refer to the *Biomek Software User's Manual,* Chapter 15.2, *Instrument Setup Step*).

After washing the pins in the reservoir(s), the HDR Tool Body moves above the HDR Pin Drying ALP to dry the pins by fan. The HDR Pin Drying ALP must be configured in Hardware Setup and placed on the deck in the Deck Editor.

The HDR Pin Drying ALP includes components such as an adaptor plate, fan and guards, and collar (refer to Section 6.1.1.1, *Components of the HDR Pin Drying ALP*).

The reservoirs that may be used with the HDR Pin Drying ALP include static (refer to Section 6.1.2.1, *Static Reservoirs*) and circulating reservoirs (refer to Section 6.1.2.2, *Circulating Reservoirs*).

The sections in this chapter include:

- *Installing the HDR Pin Drying ALP and Reservoirs* (Section 6.2)
- *Installing and Configuring Devices Associated with the HDR Pin Drying ALP and Circulating Reservoir in Hardware Setup* (Section 6.3)
- *Adding the HDR Pin Drying ALP and Circulating Reservoir to the Deck in Biomek Software* (Section 6.4)
- *Framing Instructions* (Section 6.5)
- *Using the HDR Pin Drying ALP and Reservoirs in a Method* (Section 6.6)
- *Controlling the HDR Pin Drying ALP and Circulating Reservoir Outside a Method* (Section 6.7)
- *Removing the HDR Pin Drying ALP and Circulating Reservoir from the Deck* (Section 6.8)

- *Preventive Maintenance for the HDR Pin Drying ALP and Circulating Reservoir* (Section 6.10)
- *Troubleshooting the HDR Pin Drying ALP and Circulating Reservoir* (Section 6.11)

6.1.1 HDR Pin Drying ALP

The HDR Pin Drying ALP (Figure 6-1) is an active ALP that dries pins on the HDR Tool Body during a method. A fan provides airflow sufficient to quickly dry pins after washing in one or more reservoirs. Fan guards are installed on both sides of the fan to prevent airflow from affecting operation on other ALPs and for safety. The fan is operated by a Device Controller (refer to Appendix A:, *Device Controller*).

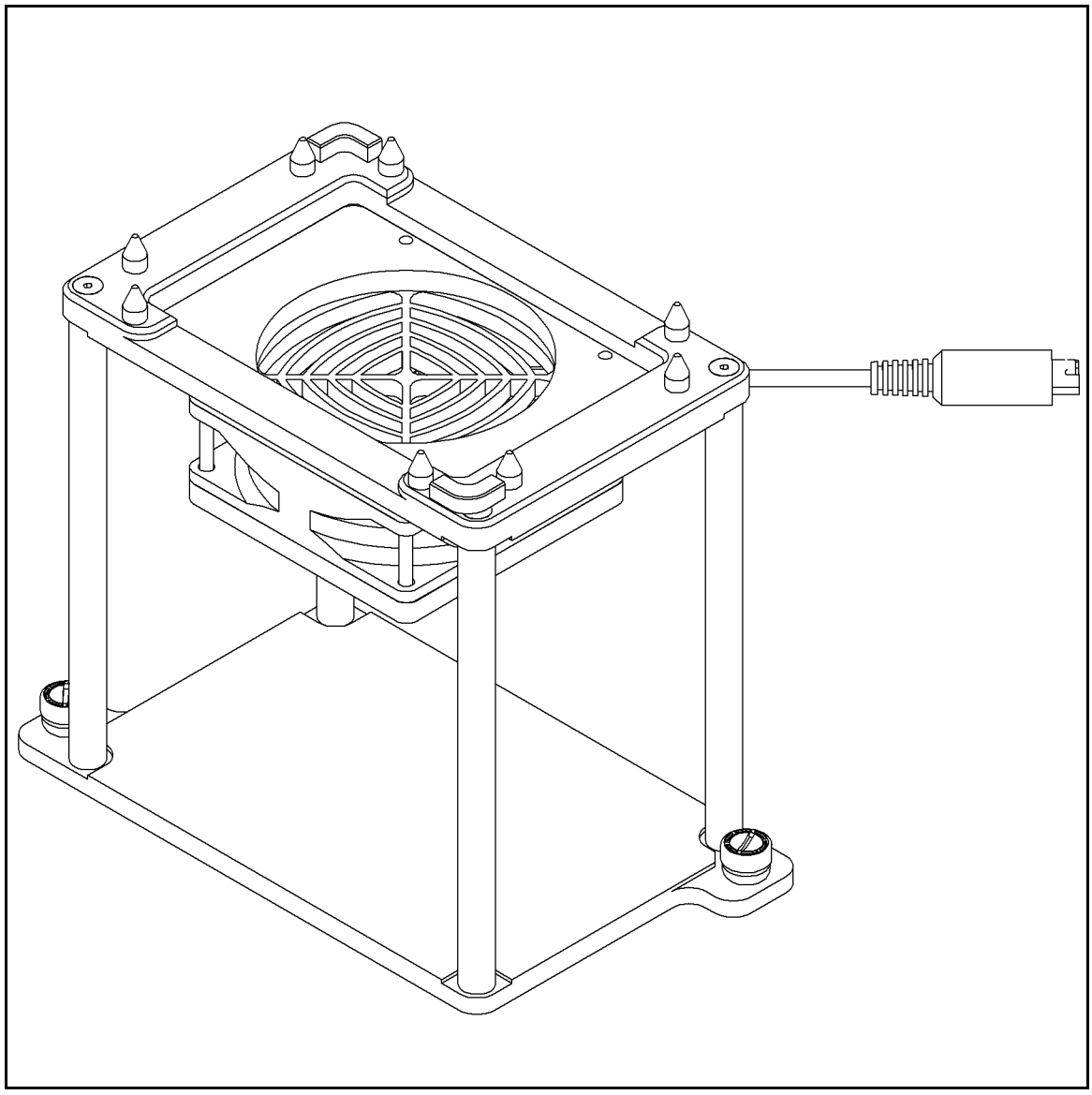

Figure 6-1. HDR Pin Drying ALP

6.1.1.1 Components of the HDR Pin Drying ALP

The HDR Pin Drying ALP comes in a preassembled kit with the following components:

- 1 x 1 Passive ALP — a standard passive ALP with one position.
- adaptor plate — plate mounted to the 1 x 1 Passive ALP that allows the fan and fan guard to be fastened to the ALP.
- fan — active component that provides airflow to dry pins.

WARNING: Do not stick objects through the fan guards.

- two (2) fan guards — located directly above and below the fan, these prevent airflow from affecting operation on other ALPs and provide safety.
- HDR Pin Drying ALP collar — reservoir stand placed on the labware positioner of the HDR Pin Drying ALP to direct air from the fan upwards for better drying results.

Note: The HDR Pin Drying ALP collar is not preassembled.

If desired, the adaptor plate, fan, and fan guards can be removed from the 1 x 1 Passive ALP and mounted onto another ALP with an open-centered position, such as a 4 x 3 High Density ALP (refer to Section 6.2.1.1, *Removing and Installing the Fan Adaptor Plate, Fan, and Fan Guards*).

Note: When the HDR Pin Drying ALP is not used for drying pins in a method, it may be used as a passive ALP position by removing the collar from the labware position. Labware can be placed on the HDR Pin Drying ALP by a lab technician, the ORCA® robot, or the Biomek FX gripper when the HDR Pin Drying ALP is used as a passive ALP position.

6.1.2 Reservoirs

Reservoirs are used to wash pins before the HDR Tool Body moves to the HDR Pin Drying ALP. The HDR Tool Body dips the pins into one or more reservoirs to rinse residue from the pins.

There are two types of reservoirs that may be used with the HDR Pin Drying ALP:

- static reservoir — labware placed on the deck to hold wash solutions for the duration of the method (refer to Section 6.1.2.1, *Static Reservoirs*)
- circulating reservoir — labware placed on the deck with inlet and outlet connections to circulate wash solutions through the labware during the method (refer to Section 6.1.2.2, *Circulating Reservoirs*)

6.1.2.1 Static Reservoirs

A specially designed, chemically resistant static reservoir is used to store wash solutions such as bleach, ethanol, or DMSO. The static reservoir may be placed in any standard deck position and is not gripperable by the Orca® robot or the gripper on the Multichannel Pod. Wash solutions stored in a static reservoir are used throughout the method unless changed manually.

Note: When using static reservoirs as part of the HDR Cleaning System, select the Biomek2000HDRStaticWashReservoir (PN 609443, made of PVC) or BiomekFXHDRStaticWashReservoir (PN 719890, made of polypropylene), depending on the reservoir used, in the Instrument Setup step when placing labware on the deck. Refer to the *Biomek Software User's Manual,* Chapter 15.2, *Instrument Setup Step*, for more information on the Instrument Setup step.

6.1.2.1.1 Preventive Maintenance for Static Reservoirs

To ensure optimum operation, perform the following maintenance procedures on the static reservoirs, as necessary:

- Follow the appropriate decontamination procedures outlined by the laboratory safety officer.
- Empty any cleaning solutions from the static reservoir(s) when not in use and rinse the reservoir(s) thoroughly as outlined by the laboratory safety officer.
- Make sure the reservoir is dry before storing.

6.1.2.2 Circulating Reservoirs

A circulating reservoir option is provided as an alternative to using the static reservoirs. A circulating reservoir (Figure 6-2) may be placed on any open-centered deck position, such as on a 1 x 1 Passive ALP or a 4 x 3 High Density ALP, and provides a flow of wash fluid from a supply container for pin washing.

The bottom of the circulating reservoir has two connections for flow in and out of the reservoir. A peristaltic pump, operated by a Device Controller, circulates wash fluid from the supply container through the reservoir to a waste container.

The circulating reservoir comes in a kit that includes:

- circulating reservoir labware
- supply container
- waste container
- peristaltic pump
- 12 feet of L35 Pharmed tubing
- 12 feet of L36 Pharmed tubing

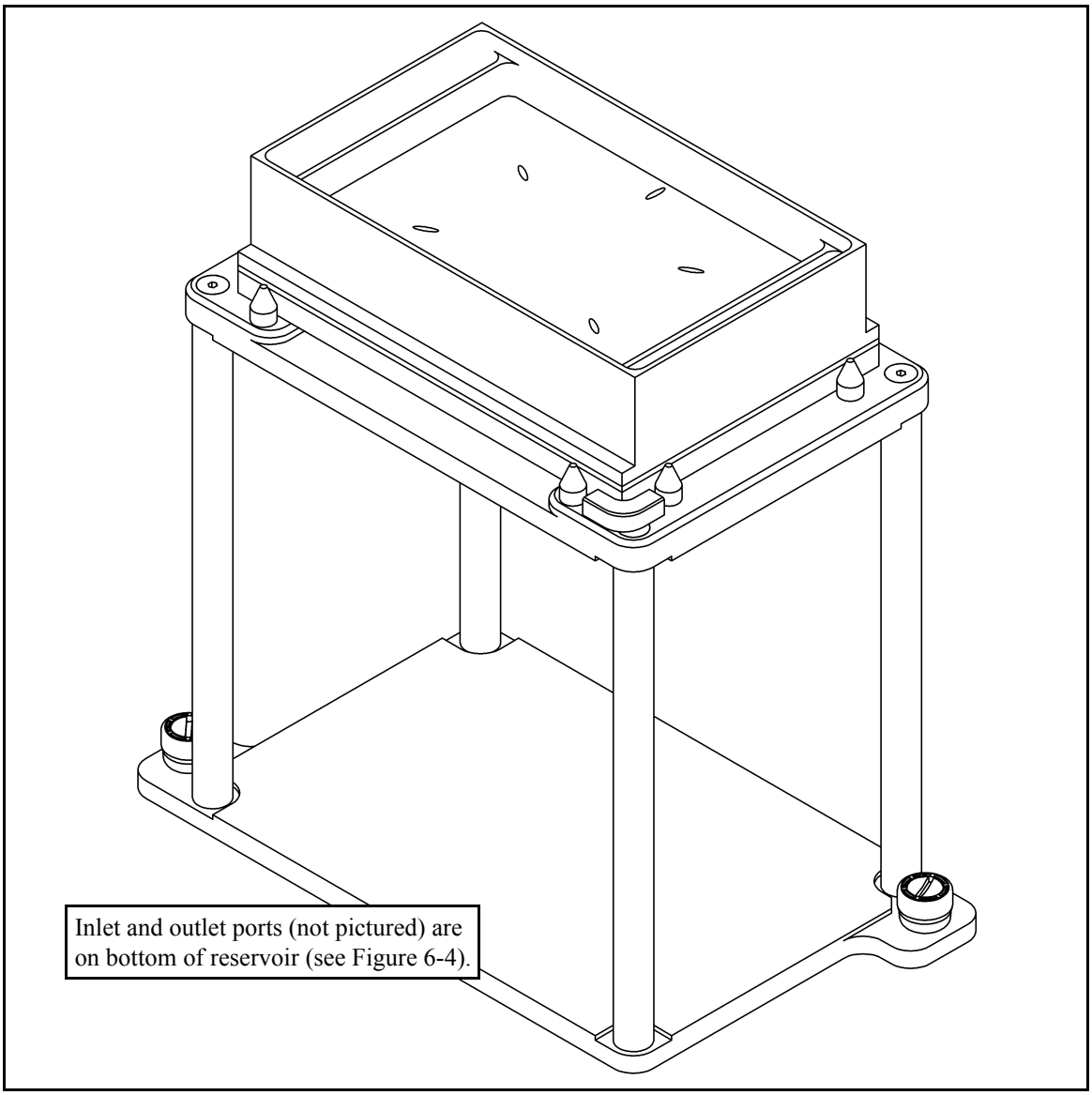

Figure 6-2. Circulating reservoir

6.2 Installing the HDR Pin Drying ALP and Reservoirs

Installing the HDR Pin Drying ALP includes mounting the ALP to the deck and installing the fan adaptor plate, fan, and fan guards (refer to Section 6.2.1, *Installing the HDR Pin Drying ALP*). Installing the circulating reservoir includes placing it on the deck and ensuring the tubing connections are correctly attached and routed (refer to Section 6.2.2, *Installing the HDR Circulating Reservoir on the Deck*).

6.2.1 Installing the HDR Pin Drying ALP

When installed on a 1 x 1 Passive ALP, the HDR Pin Drying ALP can be physically mounted in any standard deck position.

Note: When the fan is installed on a 4 x 3 ALP, refer to Chapter *8.1.2, 4 x 3 High-Density ALP* for mounting locations and instructions.

To mount the HDR Pin Drying ALP to the Biomek FX deck, complete the following:

CAUTION: Turn off power to the Biomek instrument and the Device Controller before attaching or removing any active ALP.

1. Turn off power to the Biomek instrument before mounting any ALP.
2. Position the HDR Pin Drying ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck.
3. Fasten the HDR Pin Drying ALP to the deck using the thumbscrews on the base of the ALP.
4. Connect the HDR Pin Drying ALP to one of the low voltage digital outputs on the Device Controller (refer to Section A.4.2, *Connecting Digital Device Outputs*).

5. Place the HDR Pin Drying ALP collar in the labware position directly above the fan (Figure 6-3).

Note: Operating the HDR Pin Drying ALP without the collar in place allows the air from the fan to disperse and slows the drying rate of the pins.

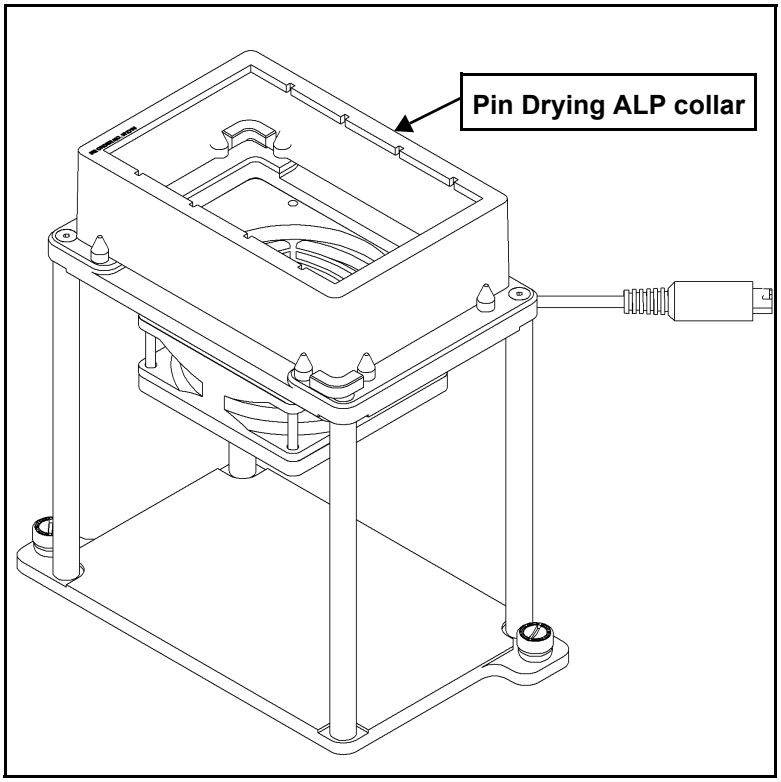

Figure 6-3. HDR Pin Drying ALP and collar

6.2.1.1 Removing and Installing the Fan Adaptor Plate, Fan, and Fan Guards

The adaptor plate, fan, and fan guards on the HDR Pin Drying ALP may be removed as one unit and placed on any open-centered deck position on a 1 x 1 Passive ALP or 4 x 3 High Density ALP.

To remove the adaptor plate, fan, and fan guards from the ALP:

CAUTION: Turn off power to the Biomek instrument and the Device Controller before attaching or removing any active ALP.

1. Remove the ALP with the fan from the deck (refer to Section 6.8, *Removing the HDR Pin Drying ALP and Circulating Reservoir from the Deck*).
2. Place the ALP upside down.
3. Remove the four (4) mounting screws from the adaptor plate.
4. Lift the adaptor plate, along with the fan and fan guards, and remove it from the ALP.

To install the adaptor plate, fan, and fan guards to another ALP or position:

1. Remove the ALP with the desired position from the deck, if necessary.
2. Place the ALP upside down.
3. Position the fan adaptor plate assembly on the desired position on the ALP.
4. Fasten the adaptor plate to the position by tightening the four (4) mounting screws.

CAUTION: Turn off power to the Biomek instrument and the Device Controller before attaching or removing any active ALP.

5. Mount the ALP to the deck as described in the appropriate section of this manual.
6. Place the HDR Pin Drying ALP collar in the labware position directly above the fan.

Note: Operating the HDR Pin Drying ALP without the collar in place allows the air from the fan to disperse and reduces drying efficiency.

6.2.1.2 Connections

The HDR Pin Drying ALP requires a Device Controller to operate. Refer to Appendix A:, *Device Controller*, for information on setting up a Device Controller.

Note: The Device Controller must be turned on to provide power to attached devices. The green light on the Device Controller indicates that the Device Controller is on.

6.2.2 Installing the HDR Circulating Reservoir on the Deck

The HDR circulating reservoir may be placed on any open-centered deck position, such as on a 1 x 1 Passive ALP or a 4 x 3 High Density ALP.

To place a circulating reservoir on the deck:

WARNING: SPILL HAZARD.

WARNING: Do not kink the hoses.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

1. Place the circulating reservoir labware on the desired deck position.

   Note: The circulating reservoir labware must be placed on an open-centered deck position to accommodate the inlet and outlet connections on the bottom of the reservoir.

   Note: If adding multiple Circulating Reservoirs to the deck, it is recommended that all Circulating Reservoirs are placed in the same column, if possible.

2. Connect one end of the smaller (L35 Pharmed) tubing to the inlet quick disconnect fitting on the bottom of the reservoir (Figure 6-4).

   Note: The inlet quick disconnect fitting is located near the center of the reservoir.

3. Connect one end of the larger (L36 Pharmed) tubing to the outlet quick disconnect fitting on the bottom of the reservoir (Figure 6-4).

Note: The outlet quick disconnect fitting is located along the outer edge of the reservoir.

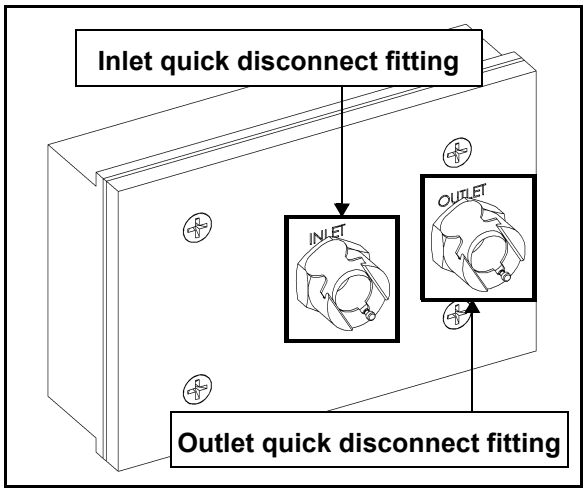

Figure 6-4. Quick disconnect fittings on the HDR circulating reservoir

4. Position the peristaltic pump at an off-deck location near the circulating reservoir.
5. Place the supply and waste containers in an off-deck position near the peristaltic pump.
6. Fill the supply container with the desired wash fluid.
7. Run both the inlet and outlet tubing off the Biomek FX deck either through the access holes on the back of the instrument between the towers, or between the light curtain and the deck on the side of the Biomek FX.

Note: Make sure the tube routing does not interfere with the operation of the Biomek FX.

8. Run the inlet tubing through one of the pump heads from left to right (Figure 6-5).

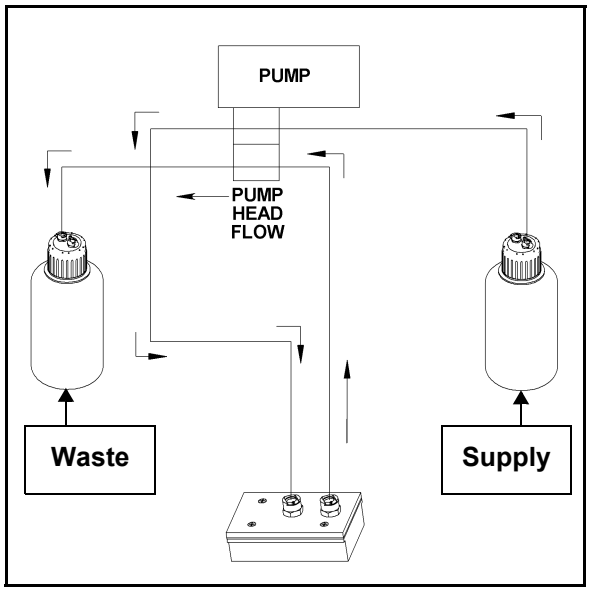

Figure 6-5. Tubing connections between circulating reservoir and pump

9. Insert the opposite end of the inlet tubing into the hole in the lid of the supply container and run the tubing to the bottom of the container.

Note: Make sure the inlet tubing is in contact with liquid.

10. Run the outlet tubing through the other pump head from right to left (Figure 6-5).
11. Insert the opposite end of the outlet tubing into the hole in the lid of the waste container.
12. Connect the peristaltic pump to one of the high voltage outputs on the Device Controller (refer to Section A.4.1, *Connecting High-Voltage Devices*).
13. Connect the Device Controller to one of the CAN ports on the Biomek instrument (refer to Section A.2, *Installing a Device Controller*).
14. Turn on power to the Biomek FX instrument and Device Controller.
15. Turn on power to the peristaltic pump.

CAUTION: Do not overflow the reservoir.

16. Starting at 0, adjust the pump speed by turning the dial on the front of the pump clockwise until fluid fills the circulating reservoir and begins to spill over the inner edges (Figure 6-2).

Note: If fluid spills over the outer edges, slow down the pump.

6.2.2.1 Connections

The inlet tubing for the circulating reservoir is 0.31” inside diameter, while the outlet tubing is 0.38” inside diameter; however, both the inlet and outlet tubing fit a 3/8” barbed connection. When the tubing is connected, the outlet tubing must run through the peristaltic pump in the opposite direction to the inlet tubing and into the waste reservoir.

Note: Make sure the tube routing does not interfere with the operation of the Biomek FX instrument.

6.2.2.2 Operating the Circulating Reservoir

Note: Prior to running a method, make sure there is enough wash fluid for the method in the supply container and that the waste container does not overflow during the method.

The circulating reservoir automatically turns off at the end of a method. A Device Action step may be used to turn the pump on or off at any time in a method (refer to Section 6.6.2.1, *Configuring the Device Action Step for a Circulating Reservoir*). The HDR Tool Cleaning step turns the pump on prior to dipping the pins in the reservoir and off at a set time after leaving the reservoir (refer to Section 6.6, *Using the HDR Pin Drying ALP and Reservoirs in a Method*). Once turned on, the pump remains on until turned off as a part of the HDR Tool Cleaning step, a Device Action step, or the end of the method.

Note: The circulating reservoir can also be controlled using Manual Control in the Biomek FX software (refer to Section 6.7, *Controlling the HDR Pin Drying ALP and Circulating Reservoir Outside a Method*).

If a Light Curtain violation occurs while the pump is powering on or off, the action is completed. The state of the pump does not change when the light curtain is violated or during a pause in a method.

6.3 Installing and Configuring Devices Associated with the HDR Pin Drying ALP and Circulating Reservoir in Hardware Setup

Devices associated with the HDR Pin Drying ALP and circulating reservoirs must be configured in Hardware Setup. A Device Controller must also be installed in Hardware Setup to add digital devices to the system. Both the fan used in the HDR Pin Drying ALP and the wash pump used with the circulating reservoir are digital devices. A separate wash pump is required for each circulating reservoir. For example, if using three circulating reservoirs, a total of three wash pumps need to be added in Hardware Setup—one for each circulating reservoir.

Note: Refer to *Appendix A: Device Controller*, for information on adding and configuring a Device Controller.

When digital devices, such as a fan or wash pump, are installed, they are displayed under Digital Devices in the left pane of Hardware Setup. Installed digital devices must also be configured to the proper Device Controller and proper channel on the Device Controller in Hardware Setup.

6.3.1 Installing Digital Devices for the HDR ALP and Circulating Reservoir

Installing Digital Devices may be accomplished in two ways.

1. In Hardware Setup, right-click Digital Devices or any device under Digital Devices and choose **Add Device** from the menu.

   Note: Fan, Simple or WashPump are the available options.

2. Choose **Fan** to install a fan for the HDR Pin Drying ALP.

   OR

   Choose **WashPump** to install a wash pump for a circulating reservoir. The selected device is added to the list of installed devices under Digital Devices in the left pane.

   Note: The first wash pump added to the system is named WashPump1, and second is named WashPump2, and so forth.

   OR

1. Choose **Add Device** from the top of Hardware Setup. New Devices appears (Figure 6-6).

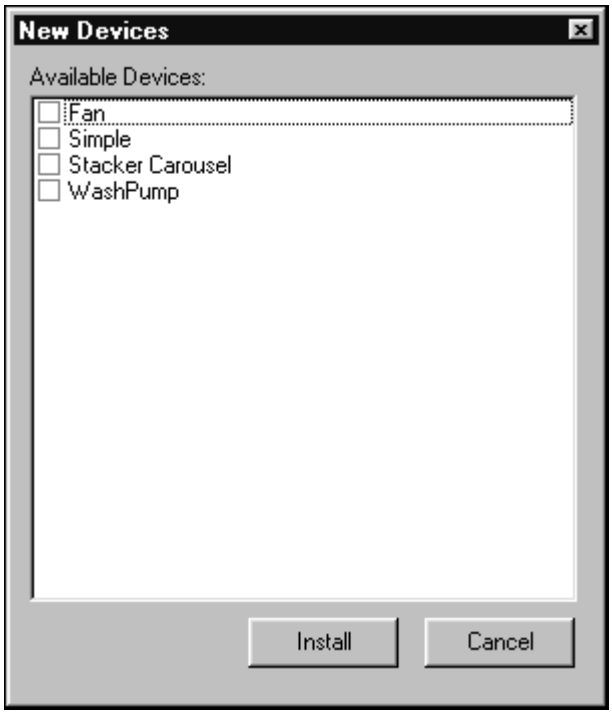

Figure 6-6. New Devices displaying all detected devices

Note: All the devices detected, but not installed, are available to add in New Devices.

Note: Right-click on an available device and choose **Select All** to select all of the available devices or **Clear Selection** to disregard the selection.

2. Select the desired digital device(s) and choose **Install**. The device(s) selected are added to the list of installed devices under Digital Devices in the left pane.

   Note: The first wash pump added to the system is named WashPump1, the second is named WashPump2, and so forth.

Note: In the left pane, an asterisk after a device indicates the device has been modified since the workspace was loaded. A blue question mark before an installed device indicates the device has not been fully configured.

6.3.2 Configuring Digital Devices

Configure digital devices to make sure the correct Device Controller and high-voltage or digital output are selected.

Note: Refer to Appendix A:, *Device Controller*, for more information on configuring devices to the proper Device Controller and channel.

1. In Hardware Setup, select the desired digital device. The configuration for the selected device appears (Figure 6-7).

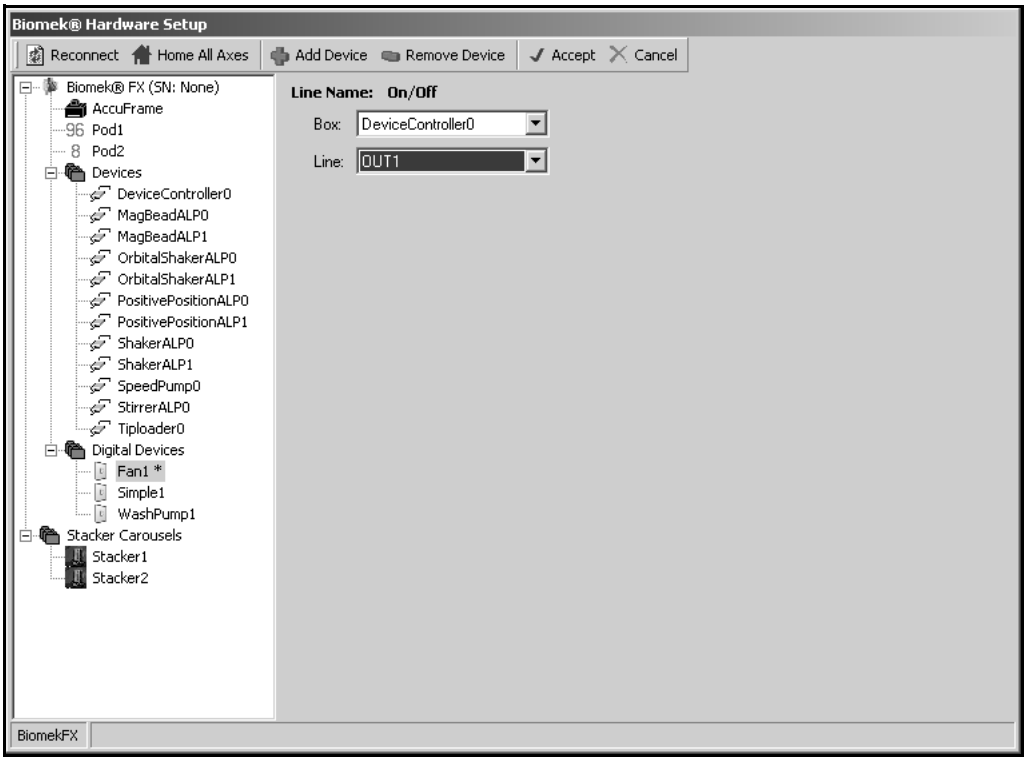

Figure 6-7. Hardware Setup showing the configuration for a digital device

2. In **Box**, select the Device Controller the device is connected to for power.
3. In **Line,** select the high-voltage or digital output to which the device is connected.

   Note: Use a digital output port for a Fan for the HDR Pin Drying ALP and a high-voltage port for a Wash Pump for the circulating reservoir.

   Note: When configuring digital devices, make sure a distinct line on a Device Controller is used for each digital device.

4. Repeat steps 1-3 to configure any remaining digital devices.
5. Choose **Accept**. Hardware Setup saves changes and closes.

Note: Accept must be chosen after the digital device has been configured to allow Hardware Setup to accept the configuration changes. Cancel closes Hardware Setup without saving any changes.

6.3.3 Removing Digital Devices

Digital devices no longer on the Biomek FX deck can be removed.

Note: If a device is removed from Hardware Setup, it may no longer be used when creating methods in the Biomek FX software.

To remove a device:

1. In Hardware Setup, right-click on the desired device under Digital Devices.
2. Choose **Remove Device**. The device is removed from the list of installed devices under Digital Devices.

   OR

1. Select the desired device under Digital Devices.
2. Choose **Remove Device** from the top of Hardware Setup. The device is removed from the list of installed devices under Digital Devices.

6.4 Adding the HDR Pin Drying ALP and Circulating Reservoir to the Deck in Biomek Software

Biomek Software needs to know the location of the HDR Pin Drying ALP and any circulating reservoirs on the deck before they can be used in a method. The software representation of the instrument deck is configured in the Deck Editor.

Note: For more information on the Deck Editor, refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*.

6.4.1 Adding an HDR Pin Drying ALP to the Deck

An HDR Pin Drying ALP is added to the deck in the appropriate locations using the Deck Editor and an Instrument Setup step. The fan must be associated with an open-centered deck position, such as on a 1 x 1 Passive ALP, to provide an air flow to dry the pins.

Then in the first Instrument Setup step in a method, the fan labware must be added to the deck in the appropriate deck position for obstacle avoidance.

The fan is activated by turning on the fan using a Device Action step in the method (refer to Section 6.6.2.2, *Configuring the Device Action Step for the HDR Pin Drying ALP*) or Advanced Manual Control outside of a method (refer to Section 6.7, *Controlling the HDR Pin Drying ALP and Circulating Reservoir Outside a Method*).

6.4.1.1 Associating a Fan with a Deck Position

To associate a fan with a deck position for an HDR Pin Drying ALP:

1. Choose **Instrument>Deck Editor**. The Deck Editor appears.
2. If necessary, drag and drop the **OneByOne** or **FourByThree** ALP from the ALP Types list to the desired location. The ALP appears and deck positions are named automatically.
3. Select the desired deck position on which to place the HDR Pin Drying ALP.

   Note: The selected deck position must have an open center.

4. Select **Properties**.

   OR

   Double-click on the deck position.

   OR

   Right-click on the deck position and select **Properties** from the menu. Position Properties appears (Figure 6-8).

Note: The deck position is highlighted with a pink line inside the ALP.

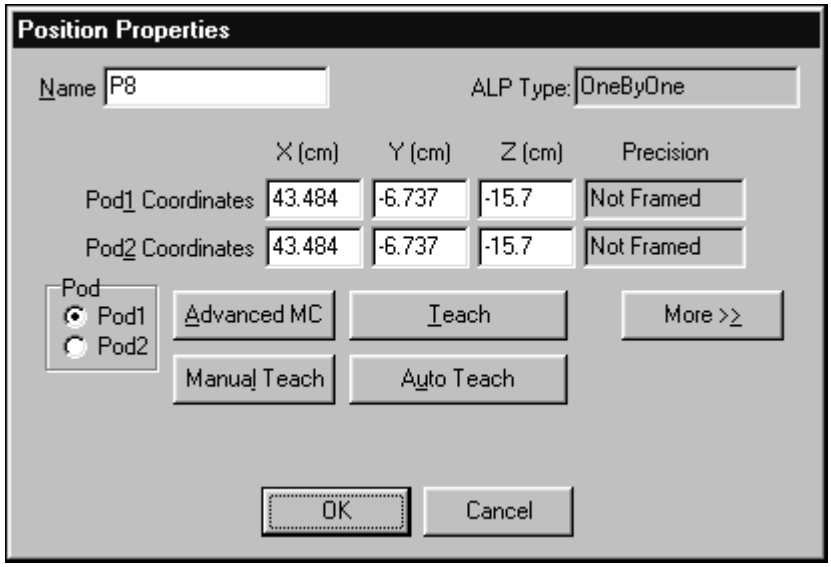

Figure 6-8. Position Properties for deck positions

5. Rename the deck position, if desired.

Note: Names for deck positions must be alphanumeric with no spaces; the only nonalphanumeric character allowed is "_" (underscore). The first character must be a letter.

6. Specify the **X**, **Y**, and **Z Coordinates** of the appropriate pod by framing the ALP.

Note: ALPs are taught indirectly when positions are taught.

Note: If a position is accessible by both pods in a dual-pod system, each pod must be framed to the position.

7. Select **More>>** to display the device association and labware offset options.

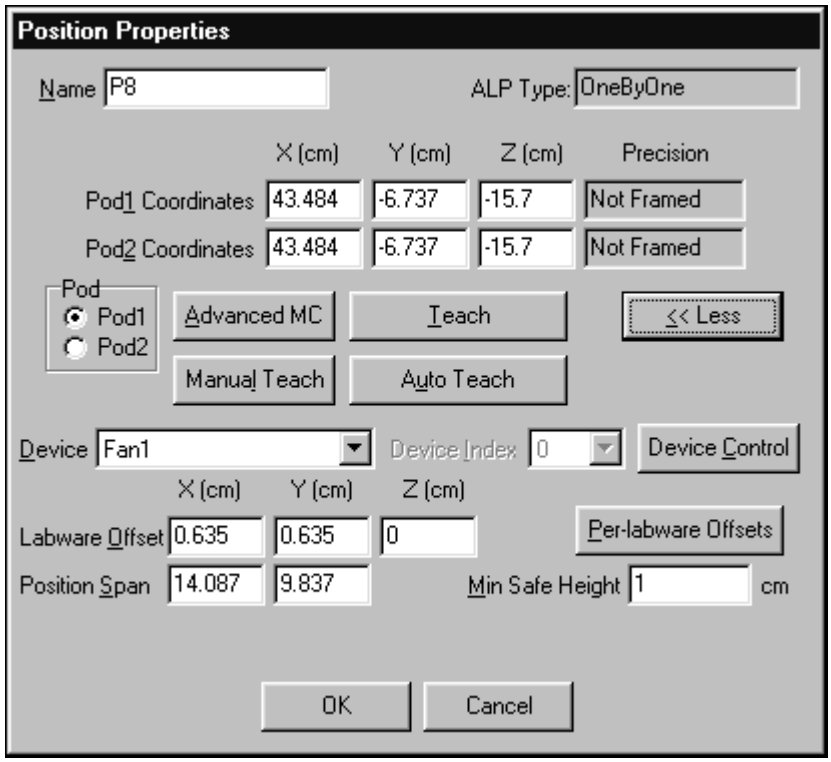

Figure 6-9. Expanded Position Properties for deck positions

8. In Device, choose the appropriate **Fan** to associate with the position.
9. If desired, choose **Per-labware Offsets** to customize the offsets for specific types of labware (refer to the *Biomek Software User's Manual,* Chapter 5.4.3.3, *Changing Per-Labware Offsets*).
10. Adjust the **Min Safe Height**, if necessary. The Min Safe Height is the height at which the pod(s) move when moving to or passing over the specified ALP, and is predefined at a height that avoids collisions between the fan and the pod(s).

Note: The Labware Offsets and Position Span are predefined in the software. Do not modify these properties.

11. Choose **OK** to save and close Position Properties. Deck Editor appears.
12. Choose **Save** to close the Deck Editor.

Note: The deck must be framed (taught) using the framing tools after creating or modifying a deck (refer to the *Biomek® FX Laboratory Automation Workstation User's Manual,* Chapter 5, *Framing the Biomek® FX*).

6.4.1.2 Adding an HDR Pin Drying ALP in Instrument Setup

After associating the fan with the desired deck position, it is necessary to tell the software where the HDR Pin Drying ALP is placed on the deck in an Instrument Setup step for obstacle avoidance.

To add an HDR Pin Drying ALP to the deck:

1. Insert an **Instrument Setup** step at the start of the method.

   OR

   Select the first **Instrument Setup** step found in the method. The Instrument Setup step configuration appears (Figure 6-10).

Note: The first Instrument Setup step must be located before any pod movement for obstacle avoidance.

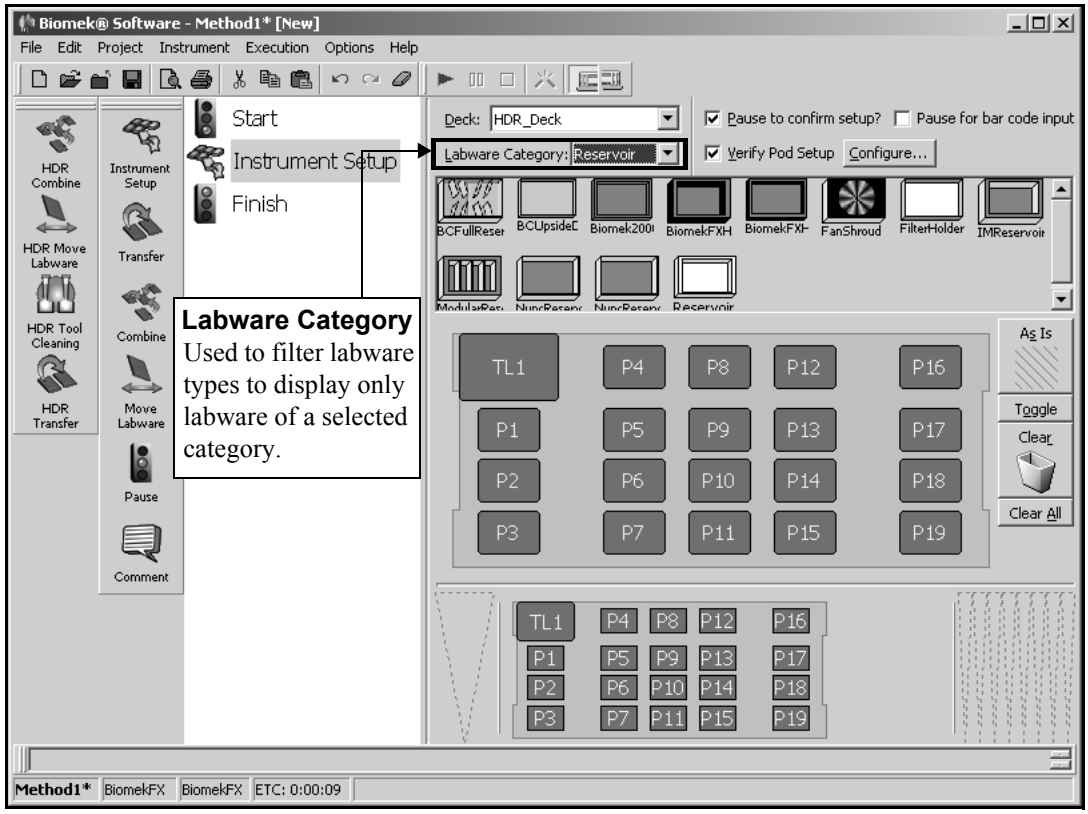

Figure 6-10. Instrument Setup step configuration

2. Place the **FanShroud** labware type on the position(s) that are associated with a Fan in the Deck Editor.

Note: Use Labware Category to filter the labware types to display only Reservoirs to locate the Fan labware type quickly.

6.4.2 Adding a Circulating Reservoir to the Deck

A circulating reservoir is added to the deck in the appropriate locations using the Deck Editor and an Instrument Setup step. The appropriate WashPump must be associated with an open-centered deck position, such as on a 1 x 1 Passive ALP, to provide the flow of wash fluid.

Then in the first Instrument Setup step in a method, the BiomekFXHDRCirculatingWashReservoir must be added to the deck in the appropriate deck position and configured with the wash fluid type for obstacle avoidance and pin washing considerations.

The circulating reservoir is activated by turning on the appropriate wash pump using a Device Action step in the method (refer to Section 6.6.2.1, *Configuring the Device Action Step for a Circulating Reservoir*) or Advanced Manual Control outside of a method (refer to Section 6.7, *Controlling the HDR Pin Drying ALP and Circulating Reservoir Outside a Method*).

6.4.2.1 Associating a Wash Pump with a Deck Position

To associate a WashPump with a deck position for a circulating reservoir:

1. Choose **Instrument>Deck Editor**. The Deck Editor appears.
2. If necessary, drag and drop the **OneByOne** or **FourByThree** ALP from the ALP Types list to the desired location. The ALP appears and deck positions are named automatically.
3. Select the desired deck position to place the circulating reservoir.

Note: The selected deck position must have an open center.

4. Select **Properties**.

   OR

   Double-click on the deck position.

   OR

   Right-click on the deck position and select **Properties** from the menu. Position Properties appears (Figure 6-11).

Note: The deck position is highlighted with a pink line inside the ALP.

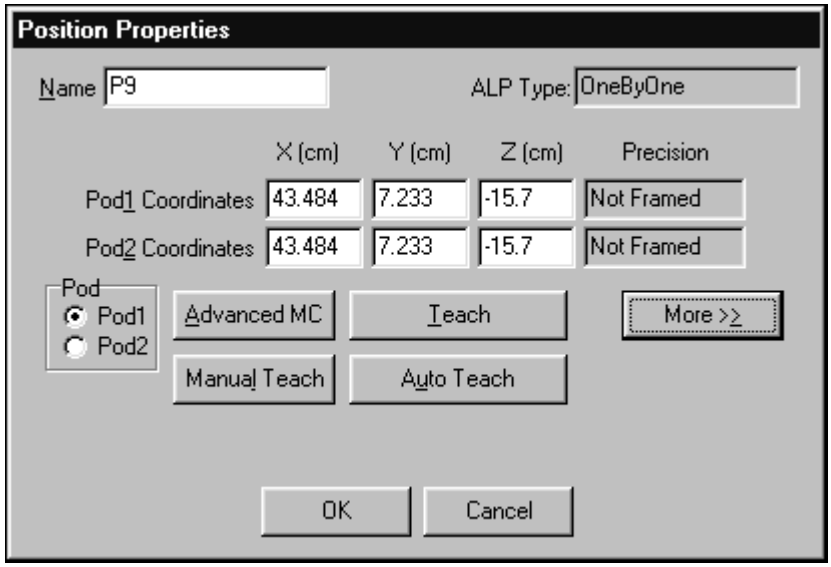

Figure 6-11. Position Properties

5. Rename the deck position, if desired.

Note: Names for deck positions must be alphanumeric with no spaces; the only nonalphanumeric character allowed is "_" (underscore). The first character must be a letter.

6. Specify the **X**, **Y**, and **Z Coordinates** of the appropriate pod by teaching the ALP.

Note: The circulating reservoir acts as a piece of labware. If the deck position holding the circulating reservoir has been properly framed, it is not necessary to reframe the position with the circulating reservoir in place. Prior to placing the circulating reservoir, any deck position that holds a circulating reservoir should be framed normally according to the framing procedure for that ALP.

7. Select **More>>** to display the device association and labware offset options (Figure 6-12).

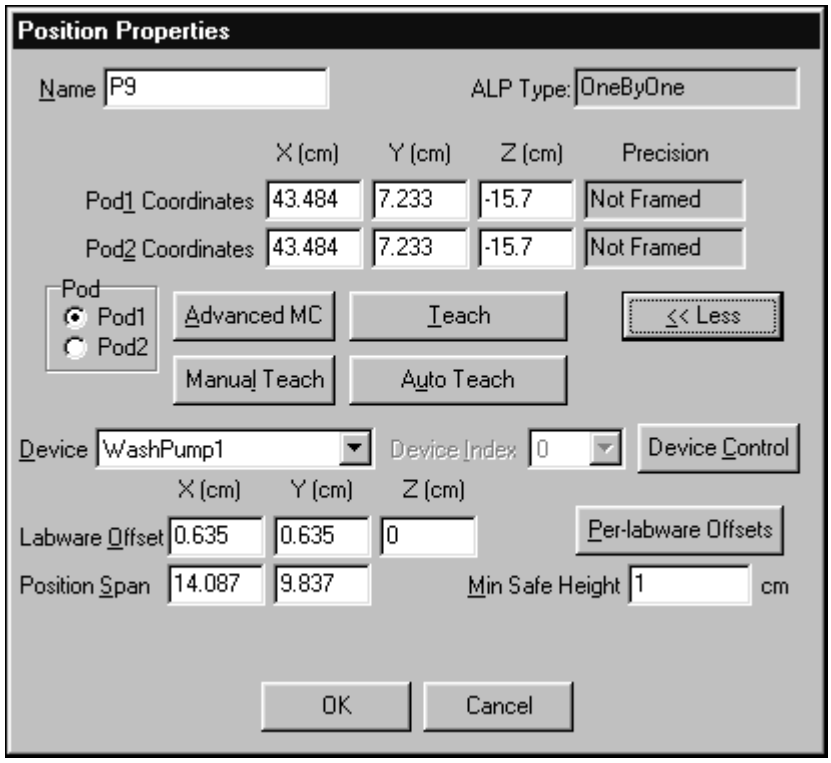

Figure 6-12. Expanded Position Properties for deck positions

8. In Device, choose the appropriate **WashPump** to associate with the position.
9. Adjust the **Min Safe Height**, if necessary. The Min Safe Height is the height at which the pod(s) move when moving to or passing over the specified ALP, and is predefined at a height that avoids collisions between the circulating reservoir and the pod(s).

Note: The Labware Offsets and Position Span are predefined in the software. Do not modify these properties.

10. Choose **OK** to save and close Position Properties. Deck Editor appears.
11. Choose **Save** to close the Deck Editor.

Note: The deck must be framed (taught) using the framing tools after creating or modifying a deck. Refer to the *Biomek® FX Laboratory Automation Workstation User's Manual,* Chapter 5, *Framing the Biomek® FX*.

6.4.2.2 Adding a Circulating Reservoir in Instrument Setup

After associating the wash pump with the desired deck position, it is necessary to tell the software where the circulating reservoir is placed on the deck in an Instrument Setup step for obstacle avoidance.

To add a circulating reservoir to the deck:

1. Insert an **Instrument Setup** step at the start of the method.

   OR

   Select the first **Instrument Setup** step found in the method. The Instrument Setup step configuration appears (Figure 6-13).

Note: The first Instrument Setup step must be located before any pod movement for obstacle avoidance.

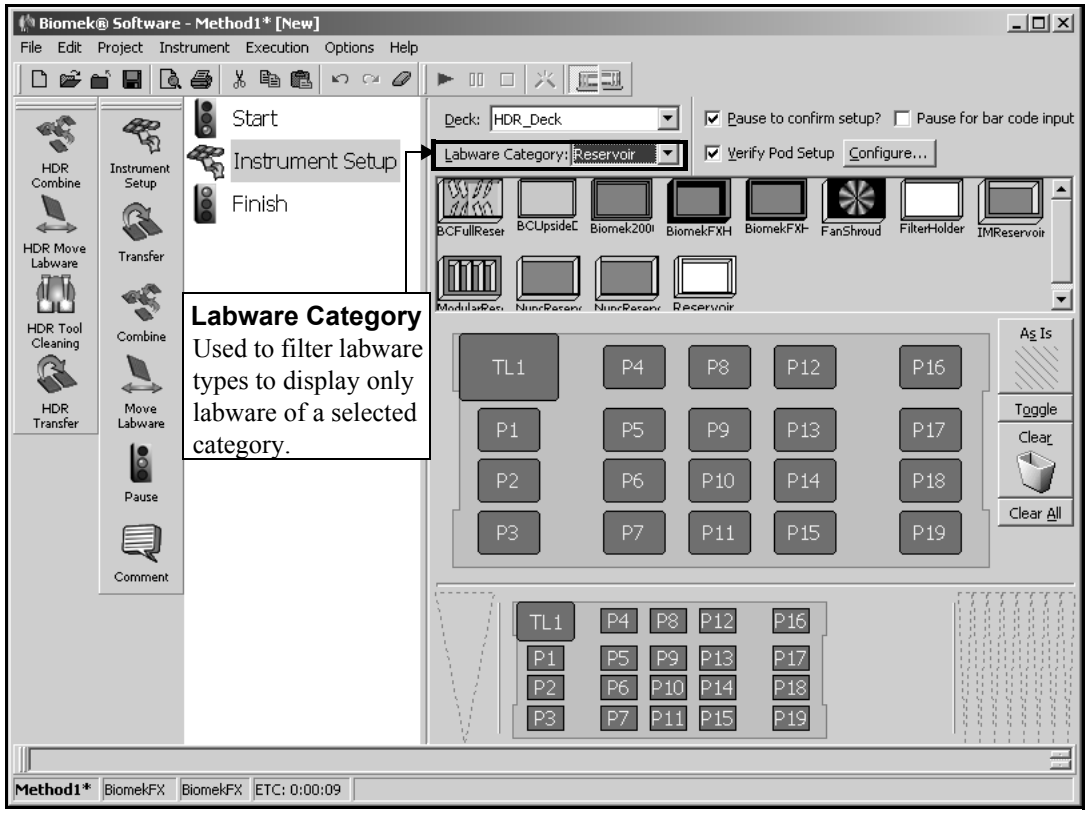

Figure 6-13. Instrument Setup step configuration

2. Place the **BiomekFXHDRCirculatingWashReservoir** labware type on the position(s) that are associated with a WashPump in the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 15.2.4, *Populating the Deck with Labware*).

Note: Use Labware Category to filter the labware types to display only Reservoirs to quickly locate the HDRCirculatingReservoir labware type.

3. Double-click the **HDRCirculatingReservoir** labware type to configure the liquid type. Labware Properties appears (Figure 6-14).

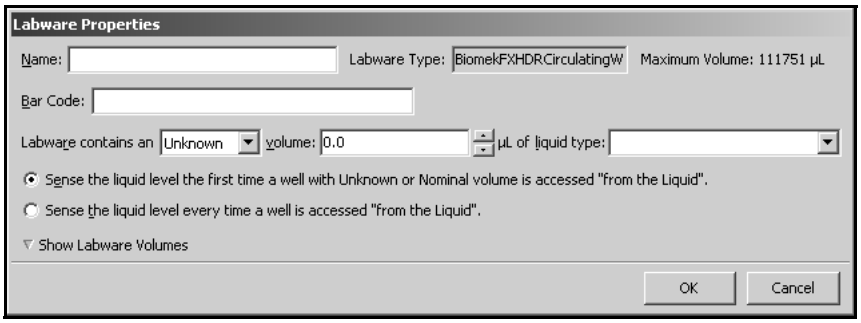

Figure 6-14. Labware Properties

4. In **Name**, enter a name for the labware.

Note: When a deck is populated by numerous pieces of labware, naming labware is recommended. Names should be descriptive of the contents of the labware or the work being accomplished during the method. Naming labware in a meaningful fashion may reduce confusion. Names given to pieces of labware may be entered as variables in other step configurations within the method.

5. In **Bar Code**, enter the bar code.

Note: Use the bar code field to identify a specific plate in certain methods, such as plate replication. This field may be left blank.

6. Make a selection in **Labware contains**. Options are Unknown, Nominal, and Known.

Note: For a Multichannel Pod, Known Volume should be supplied whenever possible. This information is used by many of the techniques supplied with the Biomek FX software when calculating the height to aspirate or dispense liquid. These techniques are specified to aspirate and dispense at certain offsets from the liquid level. If the volume is not supplied, the liquid level cannot be determined by the Multichannel Pod, and the aspirate and dispense heights must be specified in the pipetting steps.

Note: A Span-8 Pod has the ability to detect the liquid level if LLS-capable tips are used.

If Unknown is selected, the liquid level is detected during method run if required by the technique, and the wells are assumed to be full when validating the method.

A selection of Nominal also detects the liquid level during method run, but the volume in the wells is assumed to be the entered value when validating the method.

If Known is selected, the liquid level is not detected during method run and the entered value is used during validation and method run.

7. Enter the **Volume**, if Nominal or Known volume is selected.

   Note: A value entered in Volume is assigned to each well on the selected labware.

8. Select the **Liquid Type** contained in the labware. The liquid type is useful information when the Biomek FX auto-selects a pipetting technique for any aspirate and dispense operations acted upon this piece of labware. The pipetting technique auto-selected to aspirate and dispense the liquid is selected based on the physical factors of the liquid, as well as the physical attributes of the labware. For more information on liquid types, (refer to the *Biomek Software User's Manual,* Chapter 8, *Understanding and Creating Liquid Types*).

9. Select **Sense the liquid level the first time a well with Unknown or Nominal volume is accessed "from the Liquid"** to have a Span-8 Pod use Liquid Level Sensing to determine the liquid level only the first time it accesses a well with an Unknown or Nominal volume from the liquid. Any instances in which the same well on the piece of labware is accessed, the liquid level is calculated internally based on the result of the earlier liquid level sense and the amount aspirated or dispensed to the well in previous steps.

   OR

   Select **Sense the liquid level every time a well is accessed "from the Liquid"** to have a Span-8 Pod use Liquid Level Sensing to determine the liquid level every time it accesses a well with an Unknown or Nominal volume from the liquid.

   Note: The liquid level sensing option is only important when using a dual pod system with a Span-8 Pod.

10. Choose **OK** to save Labware Properties and return to the Instrument Setup step configuration.

To turn the circulating reservoir(s) on or off, use a Device Action step to activate the desired wash pump(refer to Section 6.6.2.1, *Configuring the Device Action Step for a Circulating Reservoir*).

6.5 Framing Instructions

Refer to the *Biomek® FX Laboratory Automation Workstation User's Manual,* Chapter 5, *Framing the Biomek® FX*, for instructions on framing the HDR Pin Drying ALP.

Note: The circulating reservoir acts as a piece of labware. If the deck position holding the circulating reservoir has been properly framed, it is not necessary to reframe the position with the circulating reservoir in place. Prior to placing the circulating reservoir, any deck position that holds a circulating reservoir should be framed normally according to the framing procedure for that ALP.

6.6 Using the HDR Pin Drying ALP and Reservoirs in a Method

The HDR Pin Drying ALP and reservoirs are operated in a method using the HDR Tool Cleaning step (refer to Section 6.6.1, *Using the HDR Tool Cleaning Step*) and the Device Action step (refer to Section 6.6.2, *Using the Device Action Step*). The HDR Pin Drying ALP automatically turns off at the end of a method.

The HDR Tool Cleaning step turns the fan on prior to drying the pins at the HDR Pin Drying ALP and off at a set time after leaving the HDR Pin Drying ALP. A Device Action step may be used to turn the fan on or off at any time in a method.

Once turned on, the fan remains on until turned off as a part of the HDR Tool Cleaning step, a Device Action step, or the end of the method.

Note: Refer to the *Biomek Software User's Manual,* Chapter 19, *Using the HDR Step Palette (FX, 3000 only)* for information on using the HDR Transfer, HDR Combine, and HDR Move Labware steps in a method.

Note: The HDR Pin Drying ALP can also be controlled using Manual Control in the Biomek Software (refer to Section 6.7, *Controlling the HDR Pin Drying ALP and Circulating Reservoir Outside a Method*).

Note: If a Light Curtain violation occurs while the fan is powering on or off, the action is completed. The state of the fan does not change when the light curtain is violated or during a pause in a method.

6.6.1 Using the HDR Tool Cleaning Step

The HDR Tool Cleaning step washes pins on the HDR Tool Body. The HDR Tool Cleaning step uses a "dunk and dry" methodology to wash pins by dipping the pins in one or more reservoirs with wash solutions and drying the pins at the HDR Pin Drying ALP.

The HDR Tool Cleaning step configuration is similar to that of the HDR Transfer or HDR Combine step. Instead of Source and Destination configurations, however, a series of wash operations — either dipping the pins into a wash reservoir or drying the pins at the HDR Pin Drying ALP — are configured. Cleaning operations are performed in the order they are configured.

The HDR Tool Cleaning Step Configuration includes specifying:

- Pod that performs the cleaning operations.
- Cleaning operation configuration(s).

To configure an HDR Tool Cleaning step:

1. Insert an HDR Tool Cleaning step into the Method View (Figure 6-15).

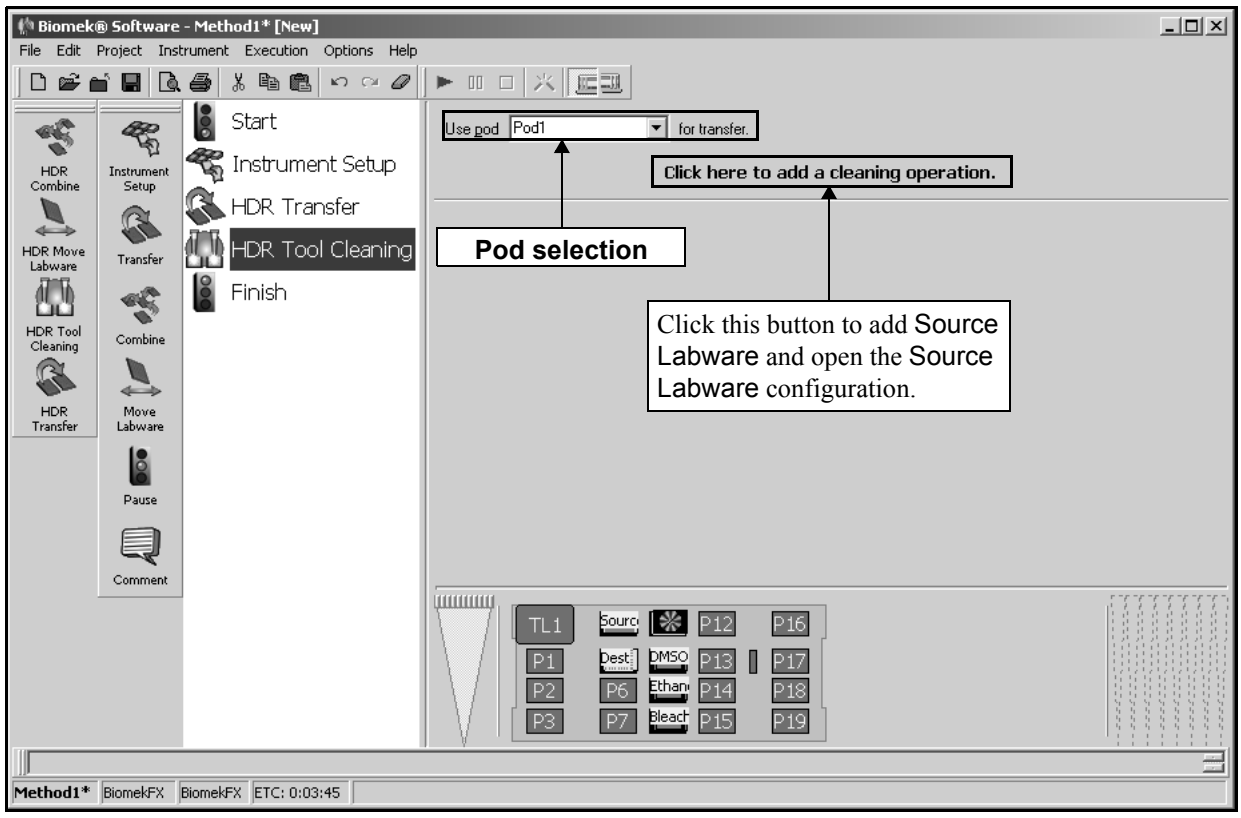

Figure 6-15. HDR Tool Cleaning step configuration

2. In Use Pod, specify the pod with the HDR Tool Body used to perform the transfer operations.
3. Configure Cleaning Operations as described in Section 6.6.1.1, *Configuring Cleaning Operations*.

6.6.1.1 Configuring Cleaning Operations

The HDR Tool Cleaning step is configured through a series of cleaning operations. There are two types of Cleaning Operations:

- Wash Operations — pins are dipped in wash solution in a reservoir, deep-well microplate, or other labware type (refer to Section 6.6.1.1.1, *Configuring a Wash Operation*).
- Drying Operations — pins are air-dried by a fan at the HDR Drying ALP (refer to Section 6.6.1.1.2, *Configuring a Drying Operation*).

As many Cleaning Operations as desired can be configured in the HDR Tool Cleaning step.

Note: Cleaning Operations are performed in the order they appear in the step configuration.

6.6.1.1.1 Configuring a Wash Operation

A Wash operation dips pins in a piece of labware a specified number of times for a specified length of time.

Note: Usually a reservoir is used as wash labware, but pins can be dipped in any labware type.

To configure a wash operation for the HDR Tool Cleaning step:

CAUTION: Do not attempt to access a 96-Channel or 384-Channel Tip Wash ALP with a Multichannel Pod equipped with an HDR Tool Body. The gripper may crash and damage the pod, HDR Tool Body, or Tip Wash ALP.

CAUTION: Do not access labware positioned on a 1 x 5 Passive ALP with the HDR Tool Body. The gripper may crash with the ALP.

CAUTION: Do not access labware on a Stirring ALP with the HDR Tool Body. The magnetic stirrer may bend the pins or interfere with the liquid transfer performance of the pins.

1. Select **Click here to add a cleaning/drying operation** (Figure 6-15). The Cleaning Operation configuration appears.

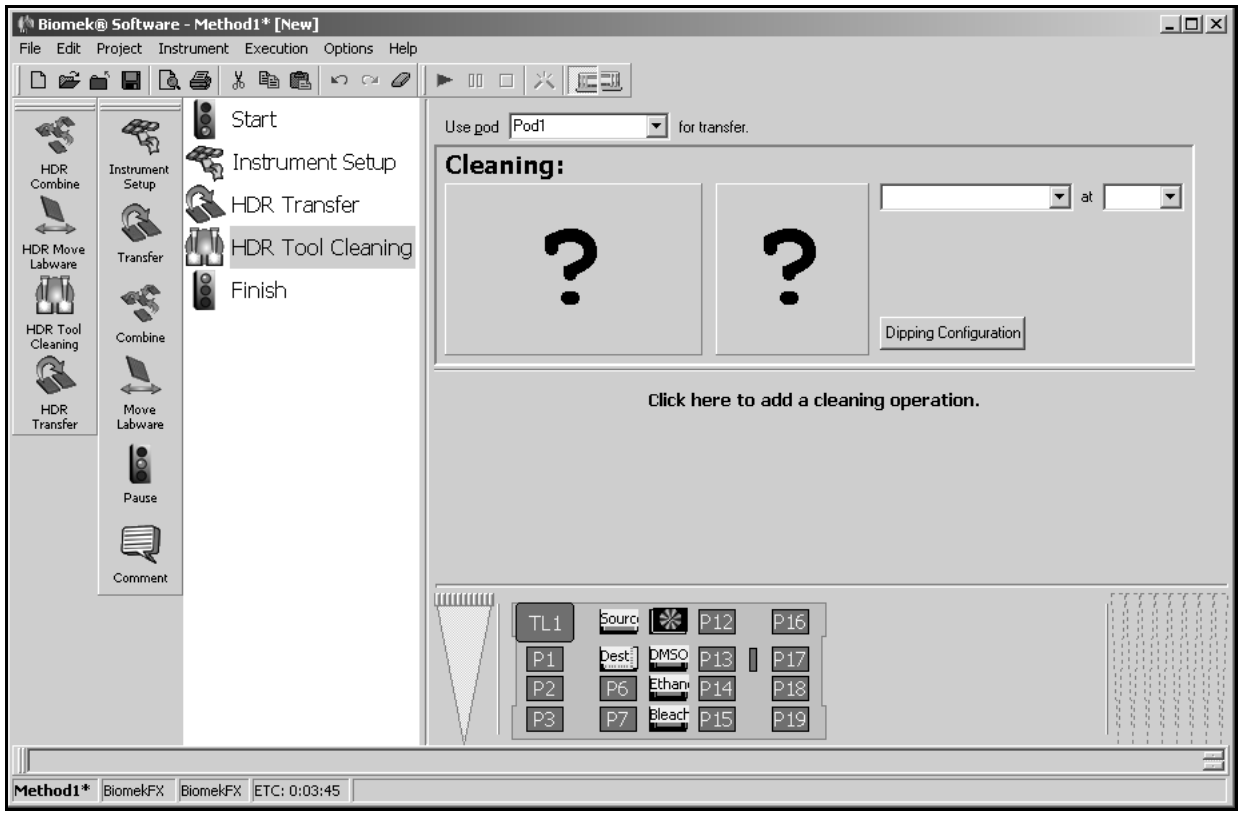

Figure 6-16. HDR Tool Cleaning step — new cleaning operation configuration

2. Click on the piece of labware with the desired wash solution in the Current Deck Display. Information for that piece of labware is entered automatically into the Cleaning Operation configuration (Figure 6-15).

   OR

   Select a **Cleaning** Labware type (Figure 6-15).

Note: Subsequent labware selections modify the active Cleaning Operation configuration. To configure additional Cleaning Operations, select **Click here to add a cleaning/drying operation**, or select outside a cleaning operation configuration, and then select another piece of labware from the Current Deck Display. If an incorrect piece of labware is selected, right-click on the labware title and select **Delete** on the menu that appears.

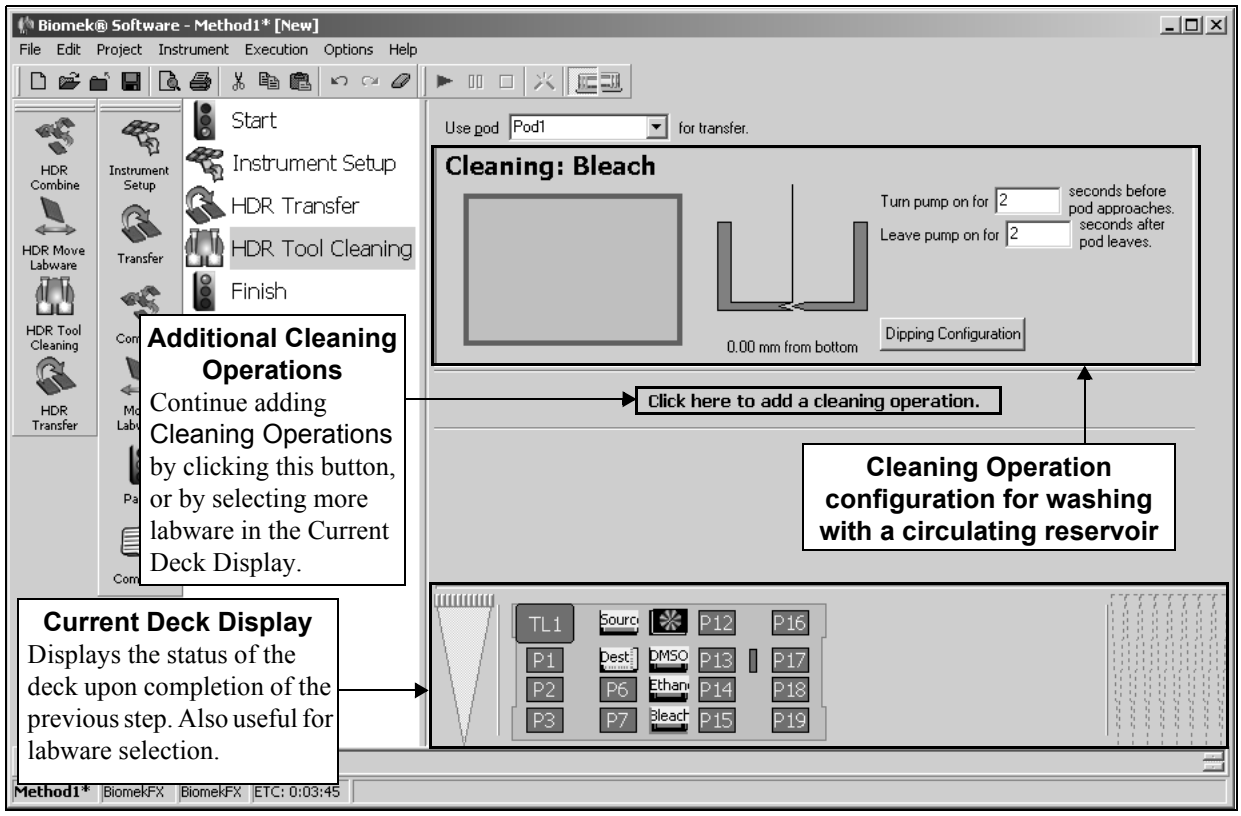

Figure 6-17. HDR Tool Cleaning step — configuration for a wash operation

3. If the Cleaning labware selected is a static reservoir or microplate, verify the labware type and deck position of the labware.

   Note: A bright yellow outline appears in the Current Deck Display around the labware designated for a Cleaning Operation.

   OR

   If the Cleaning labware selected is a circulating reservoir (Figure 6-15):

   - In Turn pump on for, enter the length of time in seconds to turn the wash pump on before the HDR Tool Body moves to the circulating reservoir.

     Note: The default value for Turn pump on for is **2** seconds.

   - In Leave pump on for, enter the length of time in seconds to leave the wash pump on after the HDR Tool Body moves away from the circulating reservoir.

     Note: The default value for Leave pump on for is **2** seconds.

   - Select **Run pump during wash operation** to leave the pump running continuously during the wash operation, if desired.

4. To specify the quadrants of a microplate to access, double-click the source labware in the step configuration to zoom in on the labware.

   Note: To call up a menu for Zoom and a Specify Selection as Text option, right-click on the labware.

   Specify Selection as Text allows selection of quadrants as targets for aspirate and dispense operations. Specify Selection as Text may also be used to enter variables or expressions (refer to the *Biomek Software User's Manual,* Chapter 13, *Using Variables and Expressions in a Method*).

   Note: Specify Selection as Text is not applicable for 96-well microplates, reservoirs, or 384-well microplates accessed by a 384-pin plate.

5. Select the desired quadrant(s) on the zoomed-in graphic of the labware.

   Note: Selecting any well automatically selects all wells in that quadrant.

   Note: To select multiple quadrants, click and drag over the desired quadrants or hold down **Ctrl** or **Shift** and select the desired quadrants.

6. Choose **Zoom Out** to return to the step configuration screen.

7. Choose **Dipping Configuration** to configure the wash operation. Dipping Configuration appears (Figure 6-18).

Note: The Dipping Configuration is similar to a pipetting technique. It specifies the method in which pins are washed.

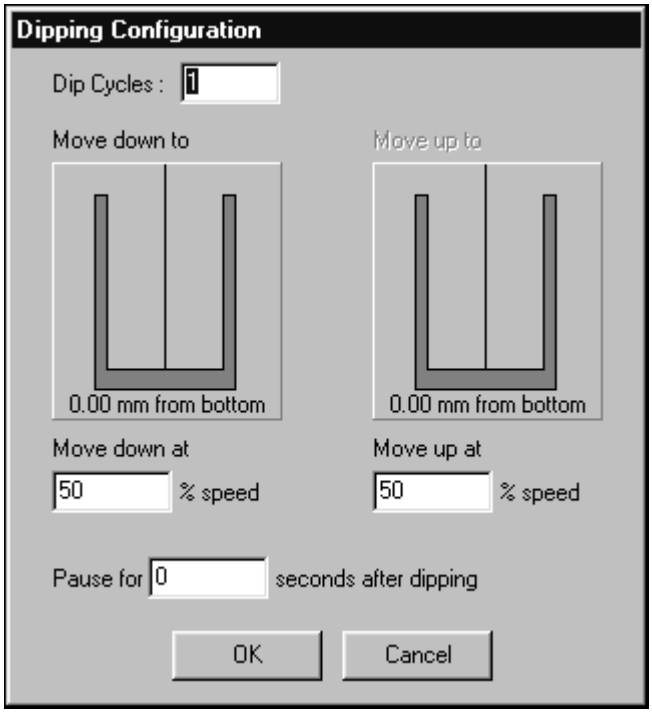

Figure 6-18. Dipping Configuration

8. In Dip Cycles, enter the number of times the pins should descend into the wells.

Note: For Dip Cycles greater than **1**, Move up to must be configured.

9. In Move down to, specify the height the pins descend to for each dipping cycle.

Note: By default, Move down to is measured from bottom of the well. To measure from top of the well or from liquid, right click the graphic of the pin in the well and make the desired selection from the menu.

Note: The Move down to height can go as much as 2 mm below the bottom of the well as long as the pod can descend that far. Descending below the bottom of the well potentially corrects for any slight imperfections in the labware or ALP heights and can be done safely because the pin push plate is in a floating position, allowing the pins to move up and down freely without resistance. To specify a height below the bottom of the well, right-click the graphic of the pin in the well and select Custom Height. Enter a negative value in Custom Height to move the pins below the bottom of the well.

10. In Move down at, enter the speed of the descent of the HDR Tool Body as a percentage of the maximum speed of the pod.

11. In Move up to, specify the height the pins ascend to between each dipping cycle.

Note: If Dip Cycles is set to **1**, Move up to is disabled.

Note: By default, Move up to is measured from bottom of the well. To measure from top of the well or from liquid, right click the graphic of the pin in the well and make the desired selection from the menu.

12. In Move up at, enter the speed at which the HDR Tool Body moves up as a percentage of the maximum speed of the pod.
13. In Pause for, enter the length of time the pod pauses at the down position for each Dip Cycle to wash pins.
14. Choose **OK** to save the Dipping Configuration and return to the source labware configuration.
15. Leave the height as is to use the settings for the Move down to height specified in the Dipping Configuration.

    OR

    Set the aspirate height manually using one of the following methods:

    - Position the cursor over the graphic of a pin inside a well. Click and drag the graphic up or down. The pin moves with the cursor, and the height displayed below the graphic is adjusted as the graphic is manipulated.

Note: The cursor changes to a hand when positioned over the graphic.

    - Selecting the graphic of a pin inside a well, and use the ↑ and ↓ keys. The textual representation of the height, which is displayed below the graphic, adjusts in 0.1 millimeter (mm) increments.
    - Right-click on the graphic of a pin inside a well, and a menu appears. Select **Custom Height**, and Custom Height appears (Figure 6-19). Insert the **Height** in millimeters (mm) and, in **from**, select a reference point from the drop-down list. Choose **OK**.

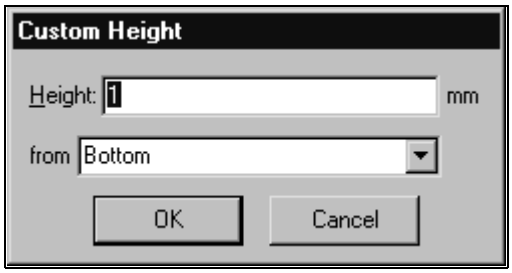

Figure 6-19. Custom Height prompt

16. Configure additional Cleaning Operations following the procedures in Sections 6.6.1.1.1, *Configuring a Wash Operation* and 6.6.1.1.2, *Configuring a Drying Operation*.

6.6.1.1.2 Configuring a Drying Operation

To configure a drying operation for the HDR Tool Cleaning step:

1. Select **Click here to add a cleaning/drying operation**. The Cleaning Operation configuration appears (Figure 6-20).

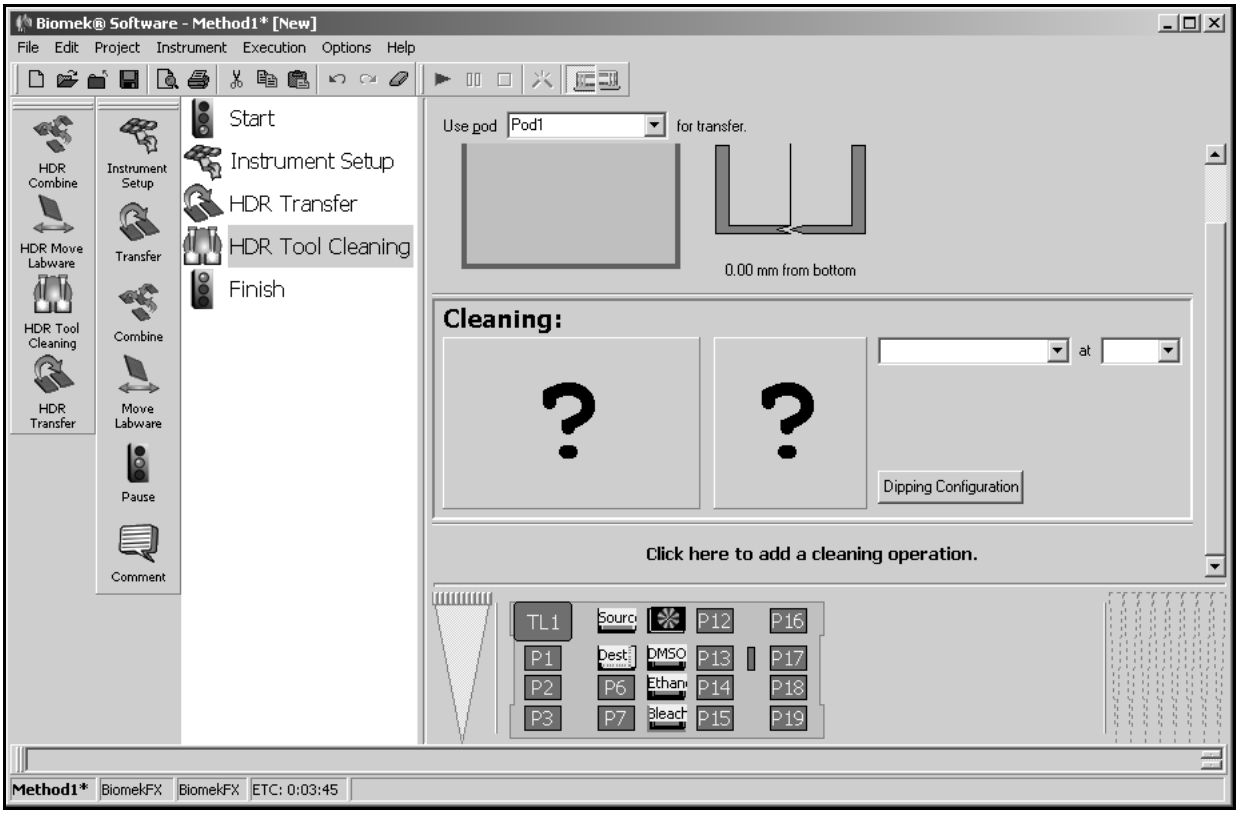

Figure 6-20. HDR Tool Cleaning step — new cleaning operation configuration

2. Click on the HDR Pin Drying ALP in the Current Deck Display. Information for the fan is entered automatically into the Cleaning Operation configuration.

Note: Subsequent labware selections modify the active Cleaning Operation configuration. To configure additional Cleaning Operations, select **Click here to add a cleaning/drying operation**, or select outside a cleaning operation configuration, and then select another piece of labware from the Current Deck Display. If an incorrect piece of labware is selected, right-click on the labware title and select **Delete** on the menu that appears.

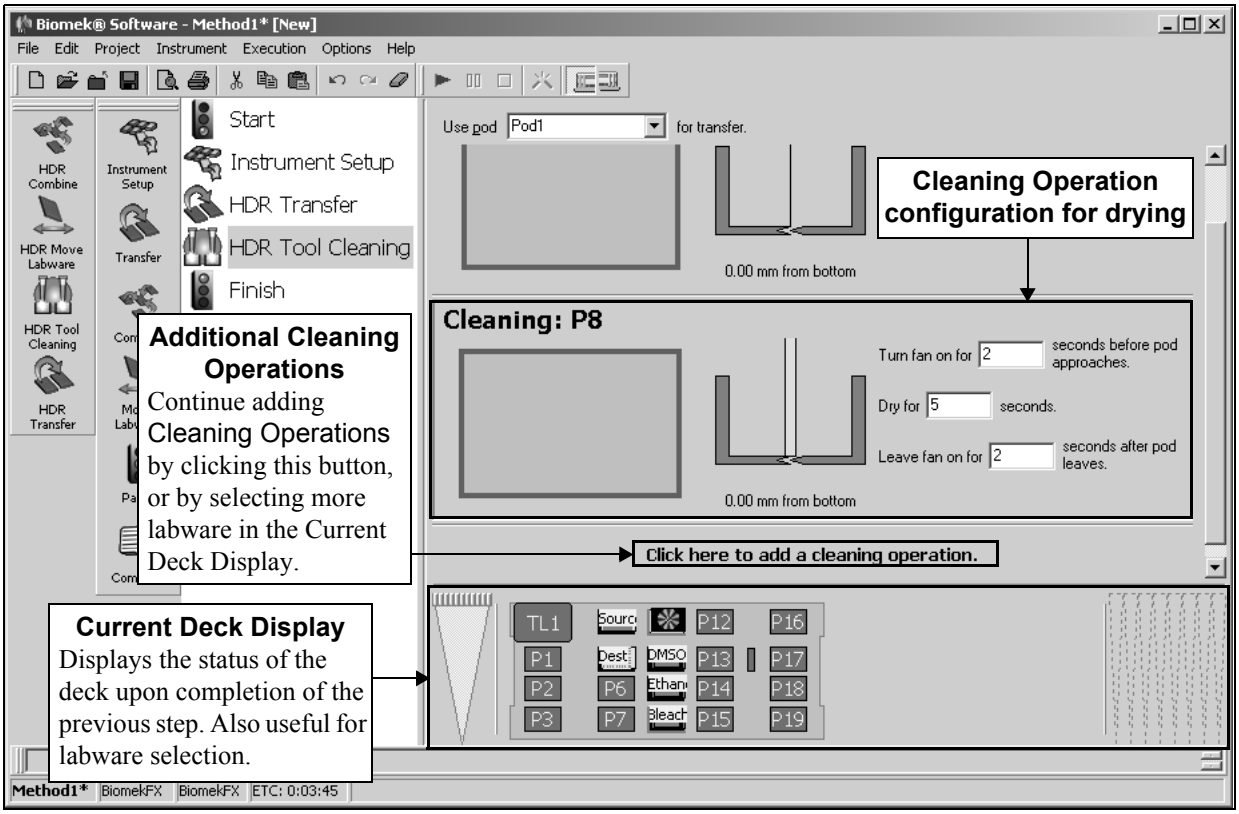

Figure 6-21. HDR Tool Cleaning step — configuration for a drying operation

3. In Turn fan on for, enter the length of time in seconds to turn the fan on before the HDR Tool Body moves to the HDR Pin Drying ALP.

Note: The default value for Turn fan on for is **2** seconds.

4. In Dry for, enter the length of time in seconds to keep the HDR Tool Body at the HDR Pin Drying ALP to dry.

Note: The default value for Dry for is **5** seconds.

5. In Leave fan on for, enter the length of time in seconds to leave the fan on after the HDR Tool Body moves away from the HDR Pin Drying ALP.

Note: The default value for Leave fan on for is **2** seconds.

6. Leave the pin height as is to use the default setting.

   OR

   Set the pin height manually using one of the following methods:

   - Position the cursor over the graphic of a pin inside a well. Click and drag the graphic up or down. The pin moves with the cursor, and the height displayed below the graphic is adjusted as the graphic is manipulated.

Note: The cursor changes to a hand when positioned over the graphic.

   - Selecting the graphic of a pin inside a well, and use the ↑ and ↓ keys. The textual representation of the height, which is displayed below the graphic, adjusts in 0.1 millimeter (mm) increments.
   - Right-click on the graphic of a pin inside a well, and a menu appears. Select **Custom Height**, and Custom Height appears (Figure 6-22). Insert the **Height** in millimeters (mm) and, in **from**, select a reference point from the drop-down list. Choose **OK**.

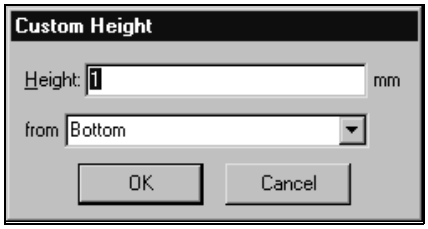

Figure 6-22. Custom Height prompt

7. Configure additional Cleaning Operations following the procedures in Sections 6.6.1.1.1, *Configuring a Wash Operation* and 6.6.1.1.2, *Configuring a Drying Operation*.

6.6.2 Using the Device Action Step

The Device Action step can be used to configure the actions of the HDR Cleaning System on the deck during a method, such as turning the fan in the HDR Drying ALP on and off or turning wash pumps for the circulating reservoir(s) on and off.

Note: An HDR Pin Drying ALP and/or circulating reservoir must be configured in Hardware Setup (refer to Section 6.3, *Installing and Configuring Devices Associated with the HDR Pin Drying ALP and Circulating Reservoir in Hardware Setup*) and placed on the deck in the Deck Editor (refer to Section 6.4, *Adding the HDR Pin Drying ALP and Circulating Reservoir to the Deck in Biomek Software*) prior to using the Device Action step to operate components of the HDR Cleaning System.

Insert a **Device Action** step into the Method View (Figure 6-23).

Note: The Device Action step is located on the Devices Step Palette. Refer to the *Biomek Software User's Manual,* Chapter 22.2, *Displaying the Devices Step Palette*, to display the Devices Step Palette.

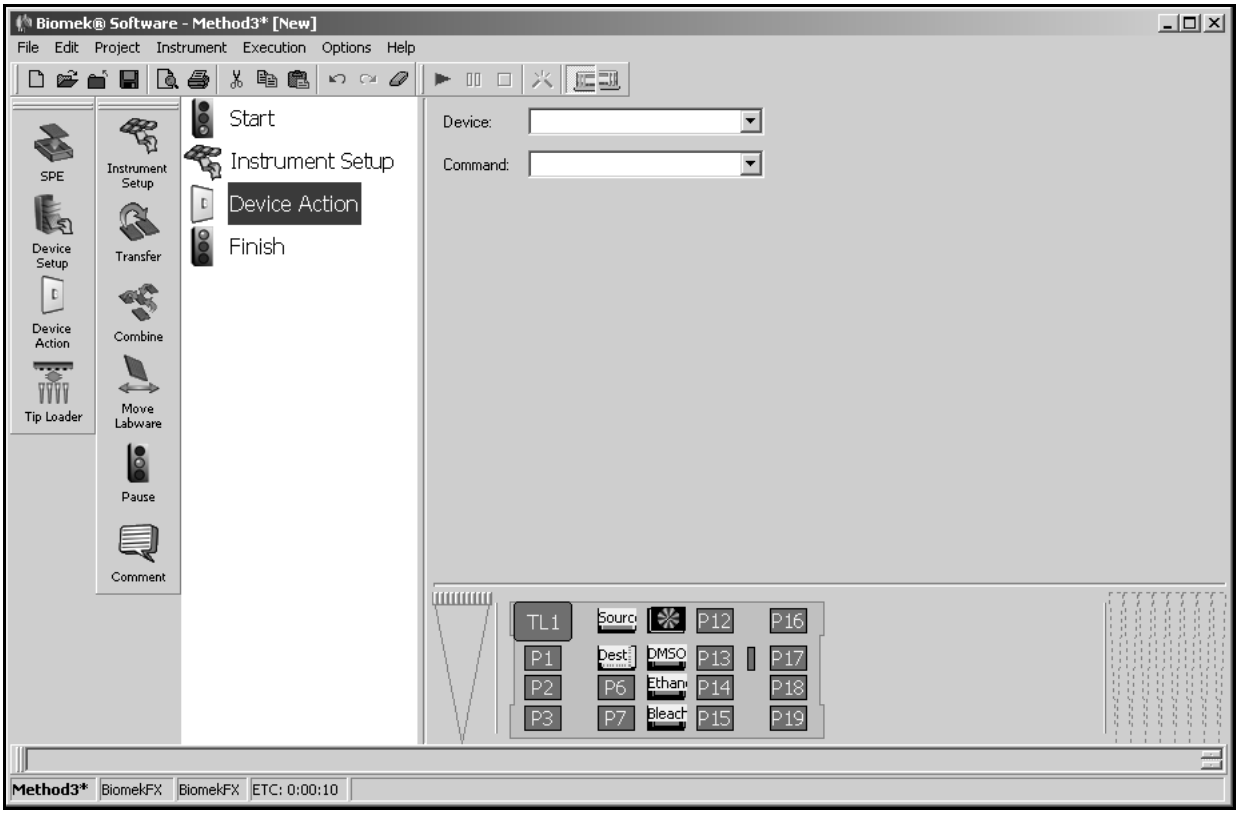

Figure 6-23. Device Action step

6.6.2.1 Configuring the Device Action Step for a Circulating Reservoir

To configure the Device Action step for a Circulating Reservoir (Figure 6-24):

1. Insert a **Device Action** step into the Method View.
2. In **Device**, select the WashPump performing the required operation.

   OR

   Click on the desired circulating reservoir in the Current Deck Display to select it. The configuration for the Wash Pump appears (Figure 6-24)

Note: The deck position has a blue border in the Current Deck Display.

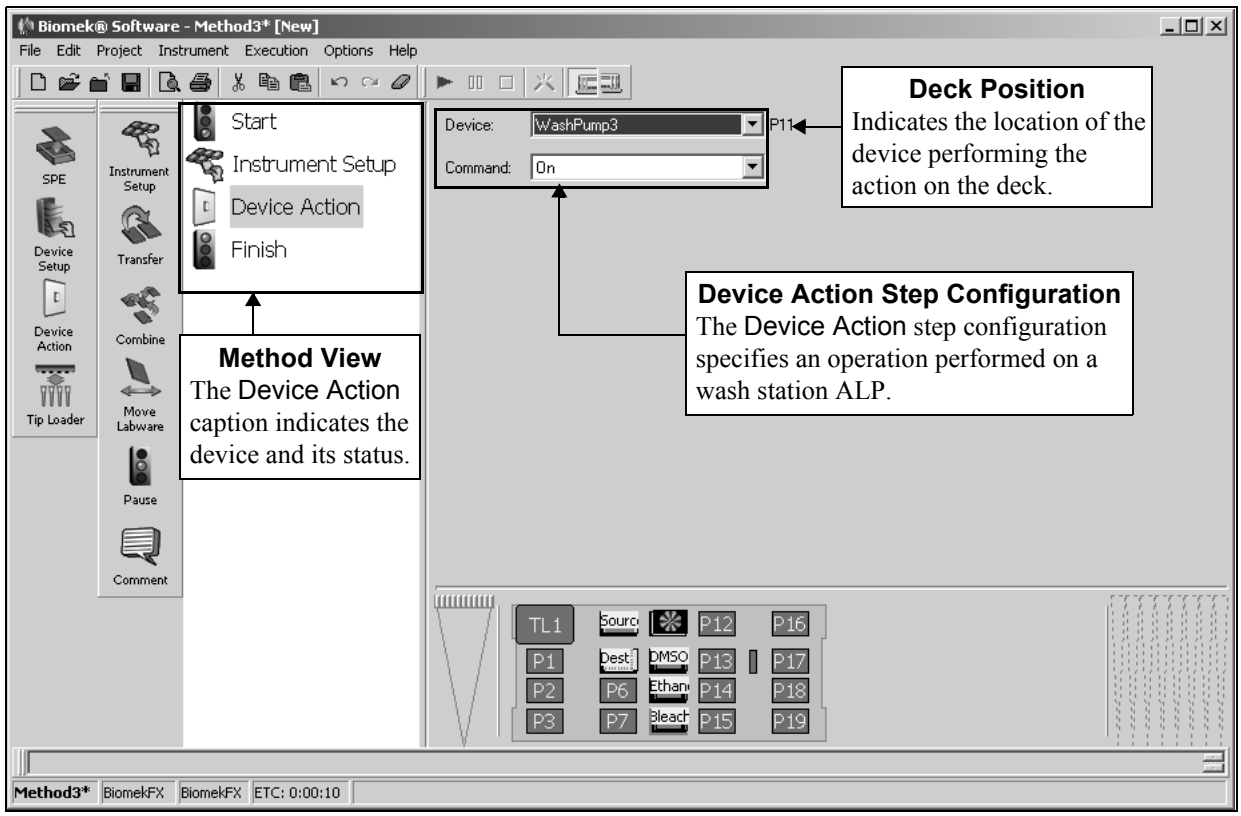

Figure 6-24. Device Action step for the Circulating Reservoir

3. In **Command**, indicate the desired state for the Wash Pump: On or Off.

Note: The Wash Pump automatically stops when the Finish step is executed.

6.6.2.2 Configuring the Device Action Step for the HDR Pin Drying ALP

To configure the Device Action step for the HDR Pin Drying ALP (Figure 6-24):

1. Insert a **Device Action** step into the Method View.
2. In **Device**, select the Fan performing the required operation.

   OR

   Click on the HDR Pin Drying ALP in the Current Deck Display to select it. The configuration for the HDR Pin Drying ALP appears (Figure 6-24)

Note: The deck position has a blue border in the Current Deck Display.

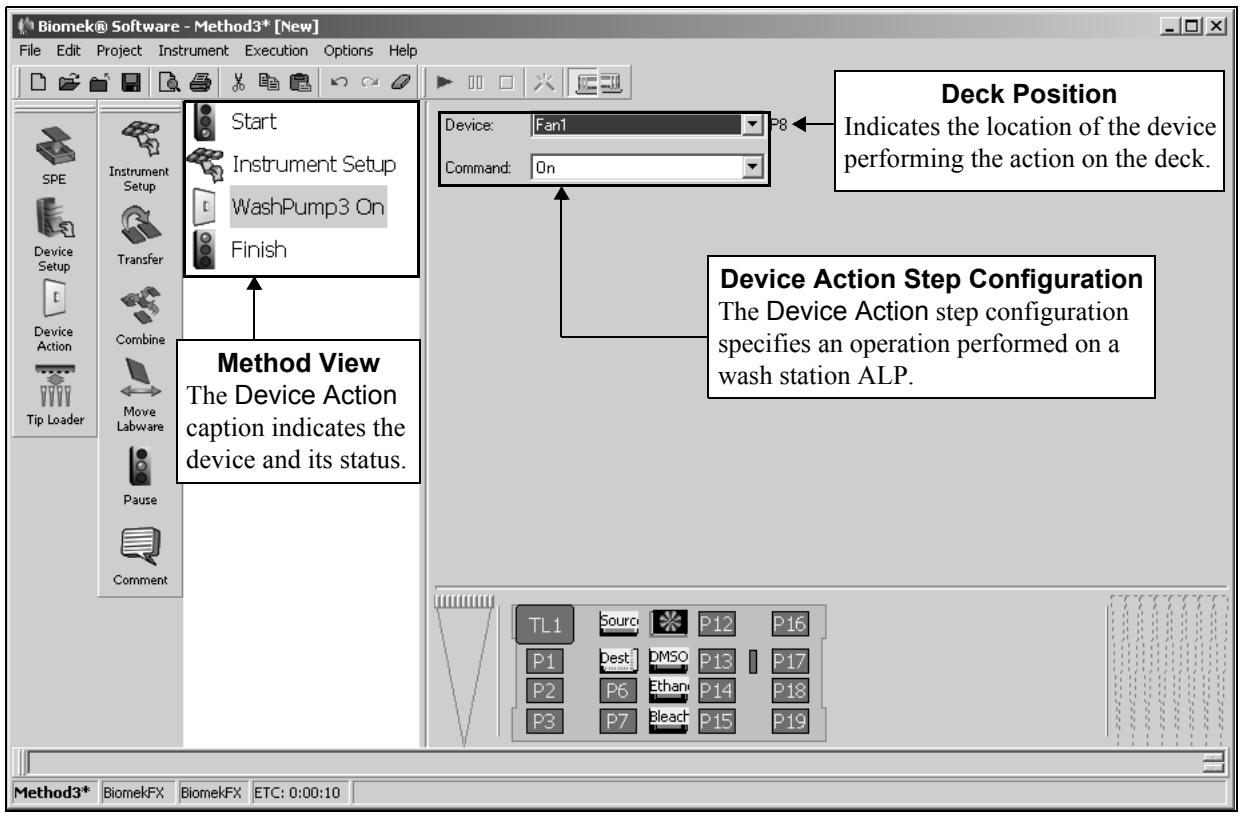

Figure 6-25. Device Action step for the fan

3. In **Command**, indicate the desired state for the fan on the HDR Pin Drying ALP: On or Off.

Note: The fan automatically stops when the Finish step is executed.

6.7 Controlling the HDR Pin Drying ALP and Circulating Reservoir Outside a Method

The HDR Pin Drying ALP and circulating reservoir are both controlled by a Device Controller. Use Advanced Manual Control for a selected Device Controller to:

- Turn the output channels on or off manually.
- Monitor input channels.

When opened, Advanced Manual Control for a selected Device Controller displays which channels are on and which channels are off.

To manually control Device Controller channels:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**. A list of all the devices installed on the Biomek FX instrument appears.
3. Select the desired **Device Controller**. Advanced Manual Control for the selected Device Controller appears (Figure 6-26).
4. To toggle the HDR Drying ALP fan on or off, click the desired Fan On/Off button (Figure 6-26).

   OR

   To toggle the wash pump for the circulating reservoir on or off, click the desired WashPump On/Off button (Figure 6-26).

Note: Channels that are on are highlighted with a bright green color.

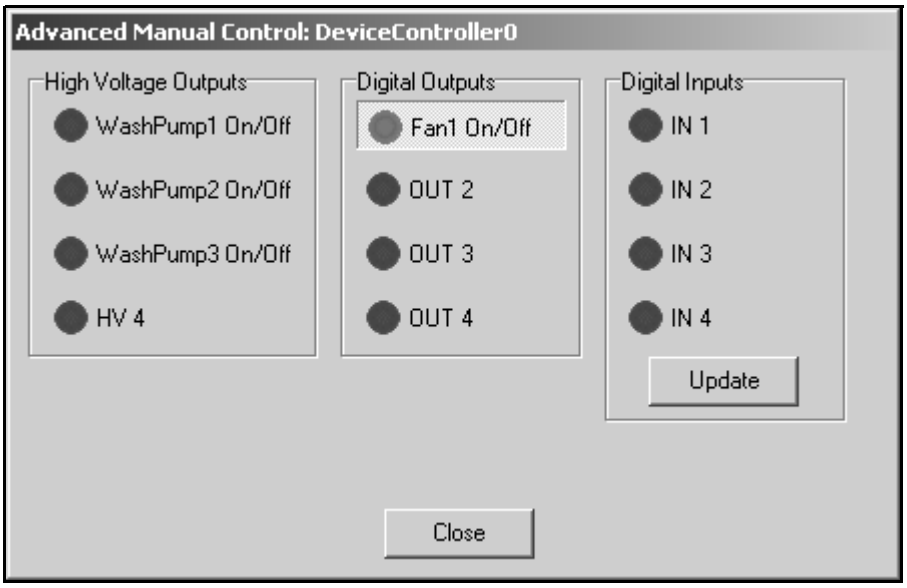

Figure 6-26. Advanced Manual Control for a Device Controller with Fan on

5. When adjustment of channels has been completed as desired, choose **Close**.

Note: Choose Update to view which digital inputs are on or off.

6. Choose **Exit** to close Manual Control.

6.8 Removing the HDR Pin Drying ALP and Circulating Reservoir from the Deck

6.8.1 Removing the HDR Pin Drying ALP

The HDR Pin Drying ALP can be used as a standard deck position when not in use during a method.

To remove the HDR Pin Drying ALP from the deck:

CAUTION: Turn off power to the Biomek FX instrument and the Device Controller before attaching or removing any active ALP.

1. Turn off power to the Biomek FX instrument and Device Controller before removing any ALP.
2. Unplug the fan from the Device Controller.
3. Loosen the thumbscrews on the base of the HDR Pin Drying ALP.
4. Lift the unit in an upward motion to clear the locating pins from the locating holes on the deck.

6.8.2 Removing the Circulating Reservoir

The circulating reservoir needs to be carefully dismantled prior to removing it from the deck. To dismantle and remove the circulating reservoir from the deck:

WARNING: SPILL HAZARD

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

1. Remove the outlet tubing from the peristaltic pump head.
2. Run the peristaltic pump in reverse until the reservoir is sufficiently drained.
3. Replace the outlet tubing in the peristaltic pump head.
4. Remove the inlet tubing from the peristaltic pump head.
5. Run the peristaltic pump forward to empty excess fluid in the bottom of the reservoir.
6. Detach the inlet and outlet tubing from the circulating reservoir.
7. Drain and dispose of excess liquid in the inlet and outlet tubing according to procedures outlined by the laboratory safety officer.
8. Remove the circulating reservoir labware from the deck.
9. Dispose of waste fluid in the waste container as described by the laboratory safety officer.

6.9 Storing the HDR Pin Drying ALP and Circulating Reservoir

6.9.1 Storing the HDR Pin Drying ALP

Return the HDR Pin Drying ALP to the original packing materials and store in a dry, dust-free, environmentally controlled area.

Note: The HDR Pin Drying ALP can be used as a standard 1 x 1 Passive ALP when not in use during a method.

6.9.2 Storing the Circulating Reservoir

Return the circulating reservoir and its accessories to the original packing materials and store in a dry, dust-free, environmentally controlled area.

Note: It is desirable to allow the circulating reservoir to air dry before returning it to the original packing materials.

6.10 Preventive Maintenance for the HDR Pin Drying ALP and Circulating Reservoir

6.10.1 Preventive Maintenance for the HDR Pin Drying ALP

Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

6.10.2 Preventive Maintenance for the Circulating Reservoir

To ensure optimum operation, perform the following maintenance procedures as necessary:

- Follow the appropriate decontamination procedures outlined by the laboratory safety officer.
- Do not overflow the reservoir.
- Empty any cleaning solutions from the reservoirs when not in use and rinse them thoroughly as outlined by the laboratory safety officer.
- Make sure the reservoir is dry before storing.

6.11 Troubleshooting the HDR Pin Drying ALP and Circulating Reservoir

6.11.1 Troubleshooting the HDR Pin Drying ALP

Do not attempt to repair the HDR Pin Drying ALP without first contacting a Beckman Coulter Service Engineer.

Table 6-1. Troubleshooting the HDR Pin Drying ALP

IF	THEN
The HDR Pin Drying ALP is not functioning correctly	Make sure the Device Controller is properly connected to the fan and the Biomek FX instrument.

6.11.2 Troubleshooting the Circulating Reservoir

Do not attempt to repair the circulating reservoir without first contacting a Beckman Coulter Service Engineer.

Table 6-2. Troubleshooting the Circulating Reservoir

IF	THEN
The circulating reservoir is not functioning correctly.	Make sure the circulating reservoir, peristaltic pump, and Device Controller are all properly connected to the Biomek FX instrument.
The circulating reservoir is not filling.	Make sure that the tubing is properly attached to the circulating reservoir and pump and there are no kinks in the line. Make sure the inlet tubing is in contact with the wash solution.

7 Heating and Cooling ALP

7.1 Overview

The Heating and Cooling ALP (Figure 7-1) is an active ALP that heats or cools a reservoir, microplate, or other standard labware. It is connected to an external refrigeration and/or heating device using nylon fittings attached to a hose which circulates cold or hot water through the Heating and Cooling ALP.

This ALP is created using a Standard 1 x 1 Passive ALP, a heating and cooling unit, and a user-supplied circulating bath.

Note: The Heating and Cooling ALP is usually dedicated to a deck position since it cannot be turned on and off via Biomek Software and must be controlled from the circulating bath.

The sections in this chapter include:

- *Installing the Heating and Cooling ALP* (Section 7.2)
- *Framing Instructions* (Section 7.3)
- *Removing the Heating and Cooling ALP* (Section 7.4)
- *Storage* (Section 7.5)
- *Preventive Maintenance* (Section 7.6)
- *Troubleshooting* (Section 7.7)

WARNING: The Heating and Cooling ALP can reach extremely high temperatures. Allow the Heating and Cooling ALP to cool before removing it from the deck.

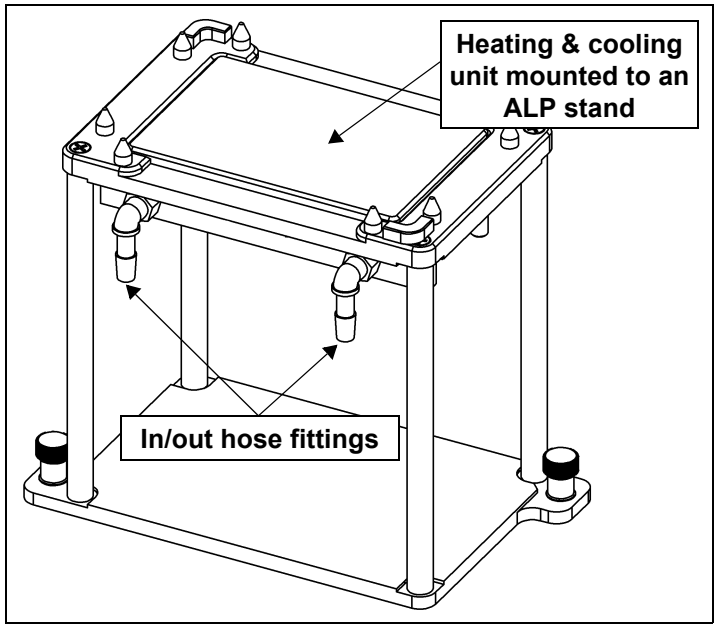

Figure 7-1. Heating and Cooling ALP — top view

7.2 Installing the Heating and Cooling ALP

Installing the Heating and Cooling ALP includes choosing any standard deck position on the deck and mounting the ALP to the deck.

7.2.1 Mounting the Heating and Cooling ALP to the Deck

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

To install the Heating and Cooling ALP:

1. Turn a 1 x 1 Standard Passive ALP upside down and mount the heating & cooling unit (Figure 7-2) to the underside of the ALP stand using the four screws provided (Figure 7-3).
2. Position the Heating and Cooling ALP on the deck so the locating pins on the bottom of the ALP slip into locating holes on the deck.
3. Attach the Heating and Cooling ALP to the deck using the thumbscrews on the base of the ALP.
4. Attach the in and out hoses to the fittings (Figure 7-1).

   Note: The hoses can be attached to either fitting, since the fluid circulation in the Heating and Cooling ALP is not directionally specific.

   Note: Make sure the hose routing does not interfere with the operation of the Biomek instrument.

5. Follow the manufacturer's instructions for hooking up the circulating bath (refer to Section 7.2.2, *Circulator Bath Specifications*).

6. Apply power to the circulating bath.

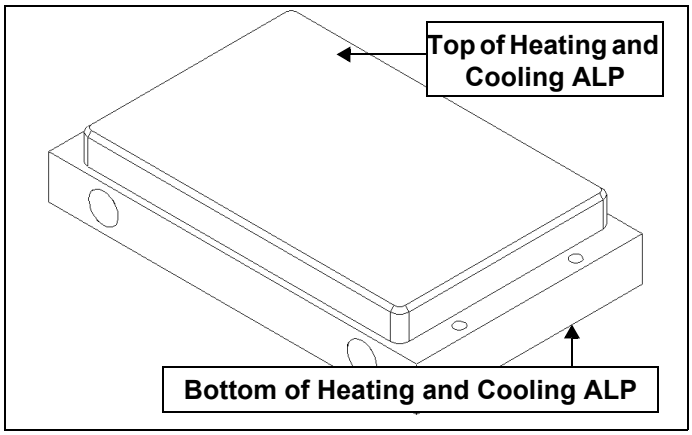

Figure 7-2. Heating & Cooling Unit

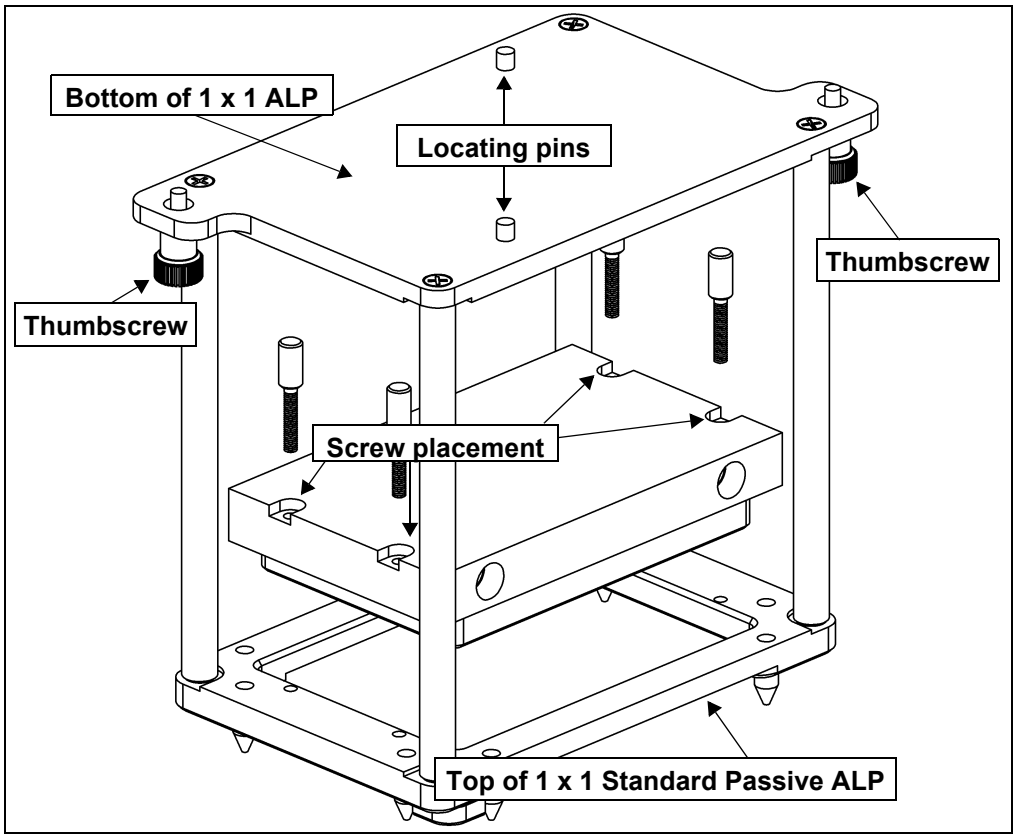

Figure 7-3. Heating and Cooling Unit mounting — bottom view

7.2.2 Circulator Bath Specifications

The user-supplied circulator bath which heats or cools water to a specified temperature to heat or cool the heating & cooling unit on top of the Heating and Cooling ALP requires minimum specifications (see Table 7-1).

While the obtainable temperature range is dependent on the particular bath used; the nominal temperature range for the Biomek heating & cooling unit is 4° C to 25° C.

Table 7-1. Minimum specifications for a Circulator Bath

Temperature Range	4° C (min) to 25° C (max)
Flow	7 to 15 Liters per minute
Reservoir	6 Liters
Heating	1,000 W
Cooling	120 W at zero (0)°C

Note: The temperature difference of approximately 5° to 15° C between the circulator bath and the heating & cooling unit should be considered when choosing a circulator bath.

7.3 Framing Instructions

Frame the Heating and Cooling ALP according to the instructions in the specfic user's manual for the instrument.

7.4 Removing the Heating and Cooling ALP

CAUTION: Do not detach the hoses over the Biomek deck. Immediately wipe up any spills with a soft cloth.

To remove the Heating and Cooling ALP:

1. Power down the circulating bath.
2. Loosen the mounting screws.
3. Remove the ALP from the deck.
4. Remove the hoses over a sink or reservoir container.

7.5 Storage

Return the Heating and Cooling ALP to the original packing materials and store in a dry, dust-free, environmentally controlled area.

Note: It is desirable to allow the Heating and Cooling ALP to air-dry before returning it to the original packing materials.

7.6 Preventive Maintenance

Lime deposits may be removed from the Heating and Cooling ALP using an acidic solution of 0.1M Hydrochloric Acid (HCl). Flush liberally with water when done.

7.7 Troubleshooting

Do not attempt to repair the Heating and Cooling ALP without first contacting a Beckman Coulter Service Engineer.

Table 7-2. Troubleshooting the Heating and Cooling ALP

IF	THEN
The Heating and Cooling ALP is not functioning correctly	Make sure that the hoses are attached properly. Contact the circulating bath manufacturer.

8 High-Density Passive ALPs

8.1 Overview

The High-Density Passive ALPs are open structures that hold multiple pieces of labware, allowing more labware on the Biomek deck at one time while using as few deck positions as possible.

The High-Density Passive ALPs increase deck flexibility when a method requires access to large amounts of labware, but still requires access to other ALPs, such as the Tip Wash ALPs or the Solid Phase Extraction (SPE) Vacuum Manifold ALP. These ALPs are also useful when running the Plate Replication Wizard or when running high-throughput screening methods.

High-Density Passive ALPs include:

- 4 x 4 High-Density Passive ALP (refer to Section 8.1.1, *4 x 4 High-Density Passive ALP*).
- 4 x 3 High-Density Passive ALP (refer to Section 8.1.2, *4 x 3 High-Density ALP*).

Note: An LLS plate can be installed in any or all labware positions on the 4 x 3 High-Density ALP.

The sections in this chapter include:

- *Installing High-Density Passive ALPs* (Section 8.2)
- *Framing Instructions* (Section 8.3)
- *Removing High-Density Passive ALPs from the Deck* (Section 8.4)
- *Storage* (Section 8.5)
- *Preventive Maintenance* (Section 8.6)

8.1.1 4 x 4 High-Density Passive ALP

The 4 x 4 High-Density Passive ALP can hold up to sixteen pieces of labware. Microplates can be added to the ALP by a lab technician or by the Biomek gripper.

Note: Labware positioned on the 4 x 4 High-Density Passive ALP is gripper accessible and stackable (Figure 8-1).

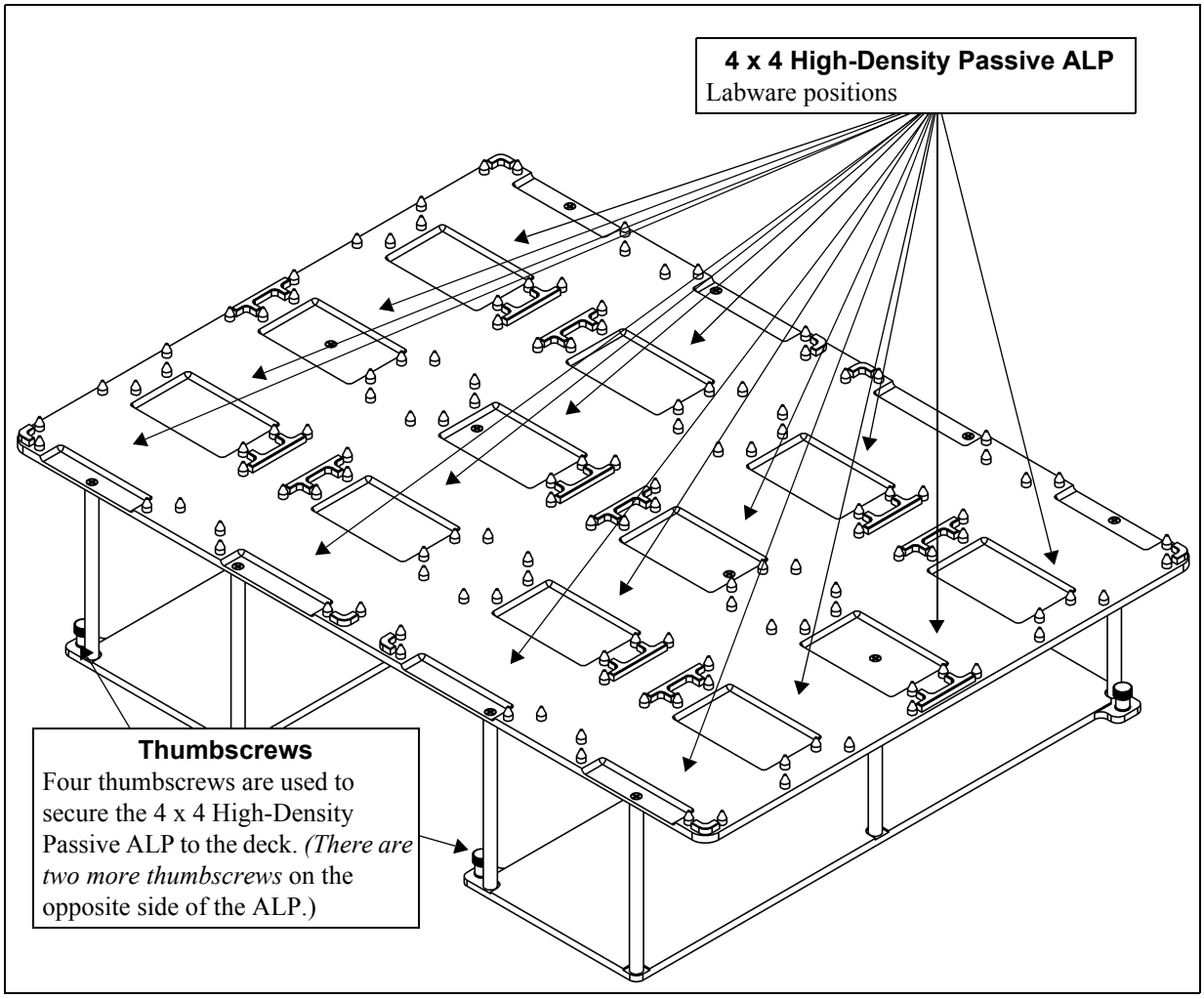

Figure 8-1. 4 x 4 High-Density Passive ALP

8.1.2 4 x 3 High-Density ALP

The 4 x 3 High-Density ALP (Figure 8-2) is a Passive ALP that can hold up to twelve pieces of labware. Microplates can be added to the 4 x 3 High Density ALP by a lab technician or by the Biomek gripper.

Note: Labware positioned on the 4 x 3 ALP High-Density Passive ALP is gripper accessible and stackable.

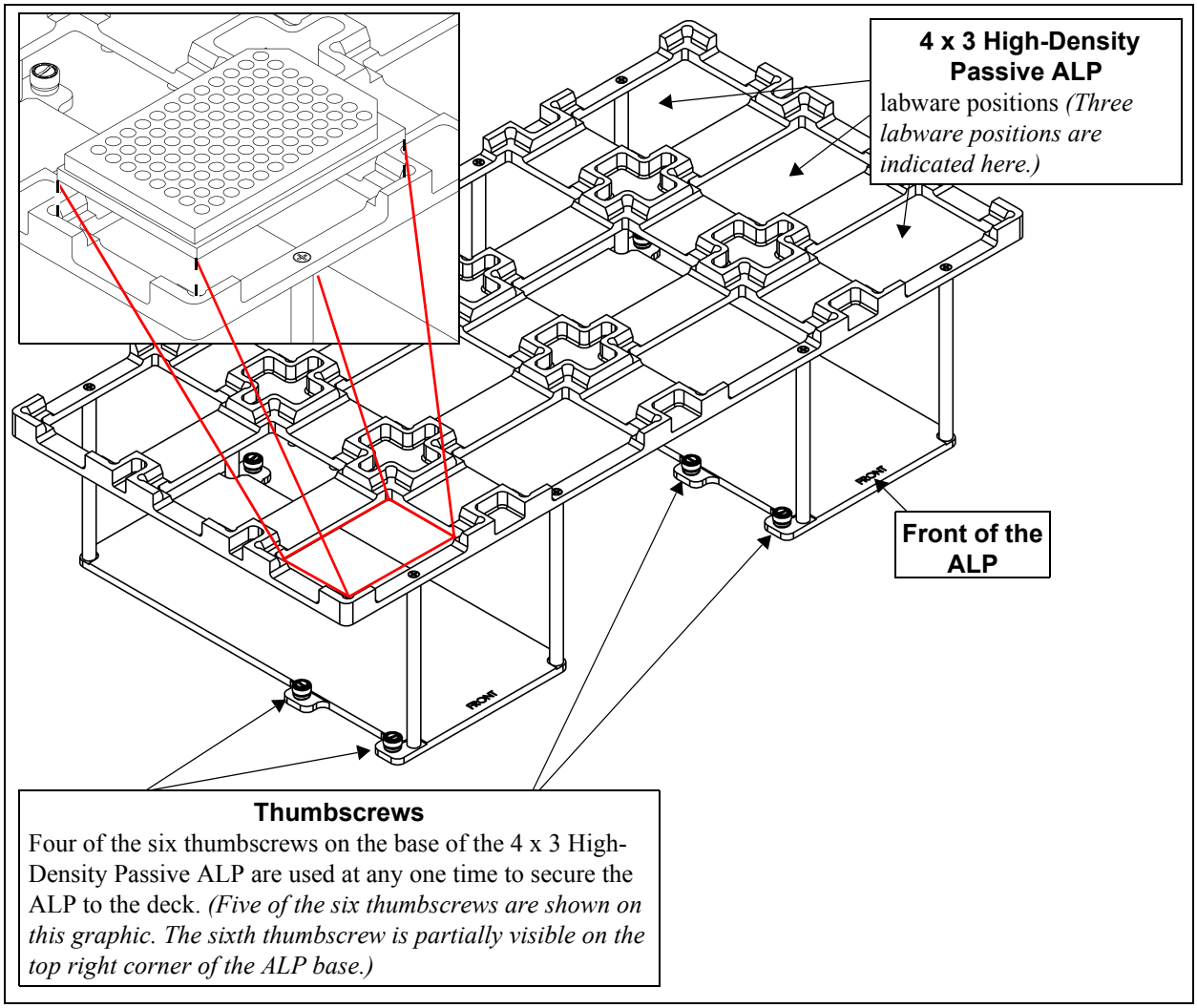

Figure 8-2. 4 x 3 High-Density Passive ALP with a microplate being placed in a labware position

8.1.2.1 Adding a Liquid Level Sensing (LLS) Plate to the 4 x 3 High-Density Passive ALP

The 4 x 3 High-Density Passive ALP stand supports an LLS plate option (Figure 8-3) which when installed improves liquid level sensing capabilities in labware positioned on the ALP. An LLS plate can be installed in any or all labware positions on the ALP.

Note: Labware positioned on a 4 x 3 High-Density Passive ALP with the LLS plate option installed is gripper accessible and stackable.

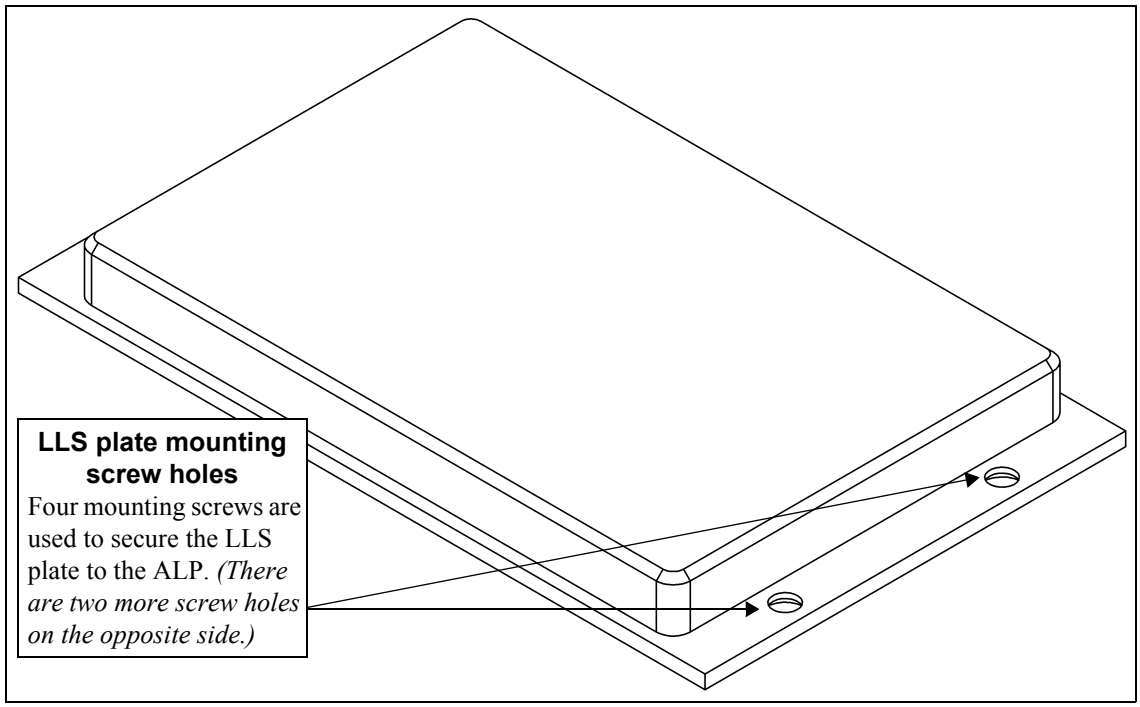

Figure 8-3. LLS Plate (Top View)

8.1.2.1.1 Installing the LLS Plate Option on a 4 x 3 High-Density Passive ALP

To install an LLS plate, complete the following:

1. Turn the High-Density Passive 4 x 3 ALP upside down.
2. Position the LLS plate upside down in the desired position on the ALP stand (Figure 8-4).

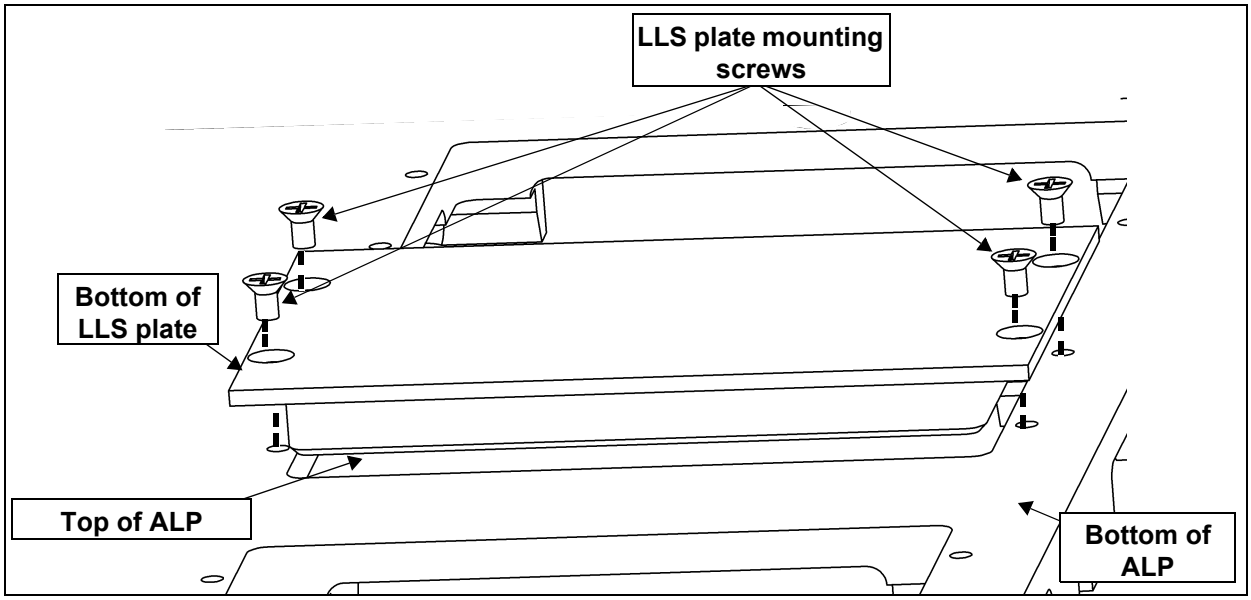

Figure 8-4. Installing an LLS Plate on an High-Density 4 x 3 ALP

3. Attach the LLS plate to the ALP with the four mounting screws provided by turning the screws clockwise until finger tight. The LLS plate is now installed (Figure 8-5).

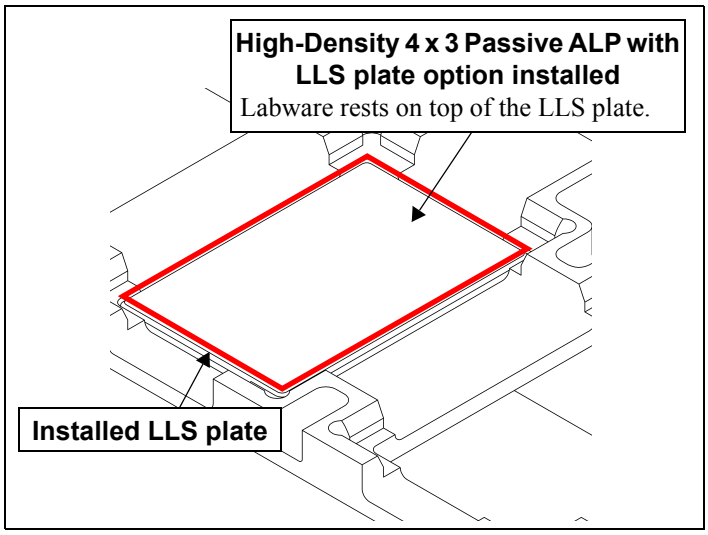

Figure 8-5. High-Density Passive 4 x 3 ALP with the LLS plate option installed

8.2 Installing High-Density Passive ALPs

Installing High-Density Passive ALPS includes choosing the deck position and mounting the ALP to the deck. The 4 x 3 ALP (Sections 8.2.1, *Choosing a Deck Position for the 4 x 3 ALP* and 8.2.2, *Mounting a 4 x 3 ALP to the Deck*) and the 4 x 4 ALP (Sections 8.2.3, *Choosing a Deck Position for the 4 x 4 ALP* and 8.2.4, *Mounting the 4 x 4 ALP to the Deck*) have different deck locations and slightly different instructions for mounting the ALP to the deck.

8.2.1 Choosing a Deck Position for the 4 x 3 ALP

The 4 x 3 ALP occupies four columns and three rows on the Biomek deck. The 4 x 3 ALP can be placed in two separate positions on the Biomek deck, although only one 4 x 3 ALP can appear on the deck at a time. Use the Biomek Software Deck Editor to determine available positions when mounting a 4 x 3 ALP on a Biomek Laboratory Automation Workstation.

Note: When the 4 x 3 ALP is mounted on the Biomek deck, enough space is available in the remaining open row for larger ALPs such as the Tip Wash ALPs or the Solid Phase Extraction (SPE) Vacuum Manifold ALP.

Note: After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).

8.2.2 Mounting a 4 x 3 ALP to the Deck

To mount the 4 x 3 ALP to the Biomek deck, complete the following:

1. Choose an appropriate deck location to mount the ALP to the deck (refer to Section 8.2.1, *Choosing a Deck Position for the 4 x 3 ALP*).
2. Position the ALP so the locating pins on the bottom of the ALP stand slip into locating holes on the deck. Make sure the front of the ALP faces the front of the Biomek deck.

   Note: The front of the 4 x 3 ALP is indicated with the word "FRONT" etched on the base of the ALP stand.

   Note: Use the deck laser etchings as a guide when positioning a 4 x 3 ALP on the deck.

3. Fasten the ALP to the deck using four of the six thumbscrews on the base of the ALP (Figure 8-6) as follows:

Note: The 4 x 3 ALP has two base plates like the one displayed in Figure 8-6. When fastening the ALP to the deck, two thumbscrews on each base plate must be used.

- When positioning the ALP along the front of the Biomek deck, use the 1st (front) thumbscrew and the 3rd thumbscrew.
- When positioning the ALP along the back of the Biomek deck, use the 2nd thumbscrew and the 3rd thumbscrew.

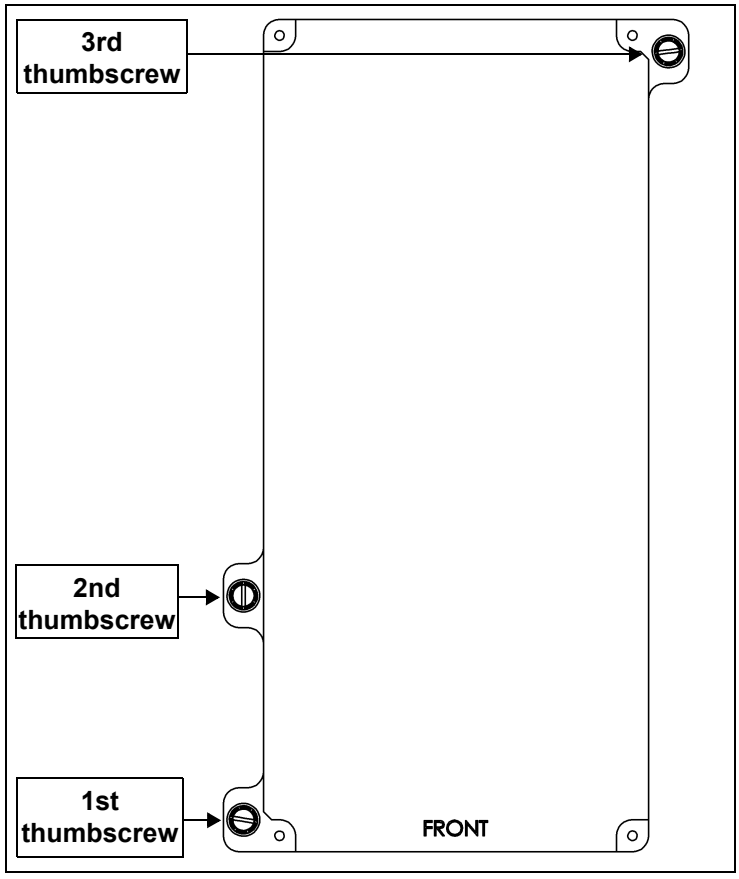

Figure 8-6. Thumbscrew positioning on the base of the 4 x 3 ALP

8.2.3 Choosing a Deck Position for the 4 x 4 ALP

The 4 x 4 ALP occupies four columns and four rows on the Biomek deck. The 4 x 4 ALP can be placed in one location on the deck. When mounting a 4 x 4 ALP on a Biomek instrument, use the Biomek Software Deck Editor to determine the available deck position.

Note: After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).

8.2.4 Mounting the 4 x 4 ALP to the Deck

To mount the 4 x 4 ALP to the Biomek deck, complete the following:

1. Position the ALP so the locating pins on the bottom of the ALP stand slip into locating holes on the deck.

   Note: Use the deck laser etchings as a guide when positioning a 4 x 4 ALP on the deck.

2. Fasten the ALP to the deck using the four thumbscrews on the base of the ALP.

Note: The 4 x 4 ALP does not have a front or back side.

8.3 Framing Instructions

Frame High-Density Passive ALPs according to the instructions in the specific user's manuals for the instruments.

8.4 Removing High-Density Passive ALPs from the Deck

To remove High-Density ALPs from the Biomek FX deck:

1. Remove labware from the ALP.
2. Loosen the thumbscrews on the base of the ALP.
3. Lift the ALP straight up and off the deck so that the locating pins on the bottom of the ALP clear the locating holes on the deck.

8.5 Storage

Return the High-Density Passive ALP to its original packing materials and store in a dry, dust-free, environmentally-controlled area.

Note: It is desirable to allow the High-Density Passive ALP to air-dry before returning it to the original packing materials.

8.6 Preventive Maintenance

WARNING: High-Density ALPs may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the High-Density Passive ALP with a soft cloth.

9 High-Density 4 x 3 Passive ALP (NX-S8 only)

9.1 Overview

The Biomek NX Span-8 High-Density 4 x 3 ALP (Figure 9-1) can hold up to twelve stacks of labware, allowing more labware on the Biomek NX Span-8 deck at one time while using as few deck positions as possible. It is accessible by the Span-8 Pod on the Biomek NX deck.

This ALP increases deck flexibility when a method requires access to large amounts of labware, but still requires access to other ALPs, such as the Tip Wash ALPs or the Solid Phase Extraction (SPE) Vacuum Manifold ALP. It is also useful when running high-throughput screening methods.

Microplates can be added to the Biomek NX Span-8 High-Density 4 x 3 ALP by a lab technician or by the Biomek NX Span-8 gripper. Labware positioned on the High-Density 4 x 3 ALP is gripper accessible and stackable.

The information in this chapter includes the following:

- *Adding a Liquid Level Sensing (LLS) Plate* (Section 9.2).
- *Mounting the High-Density 4 x 3 ALP to the Deck* (Section 9.3).
- *Removing the High-Density 4 x 3 ALP from the Deck* (Section 9.4)
- *Storage* (Section 9.5).
- *Framing the High-Density 4 x 3 ALP* (Section 9.6).
- *Preventive Maintenance* (Section 9.7).

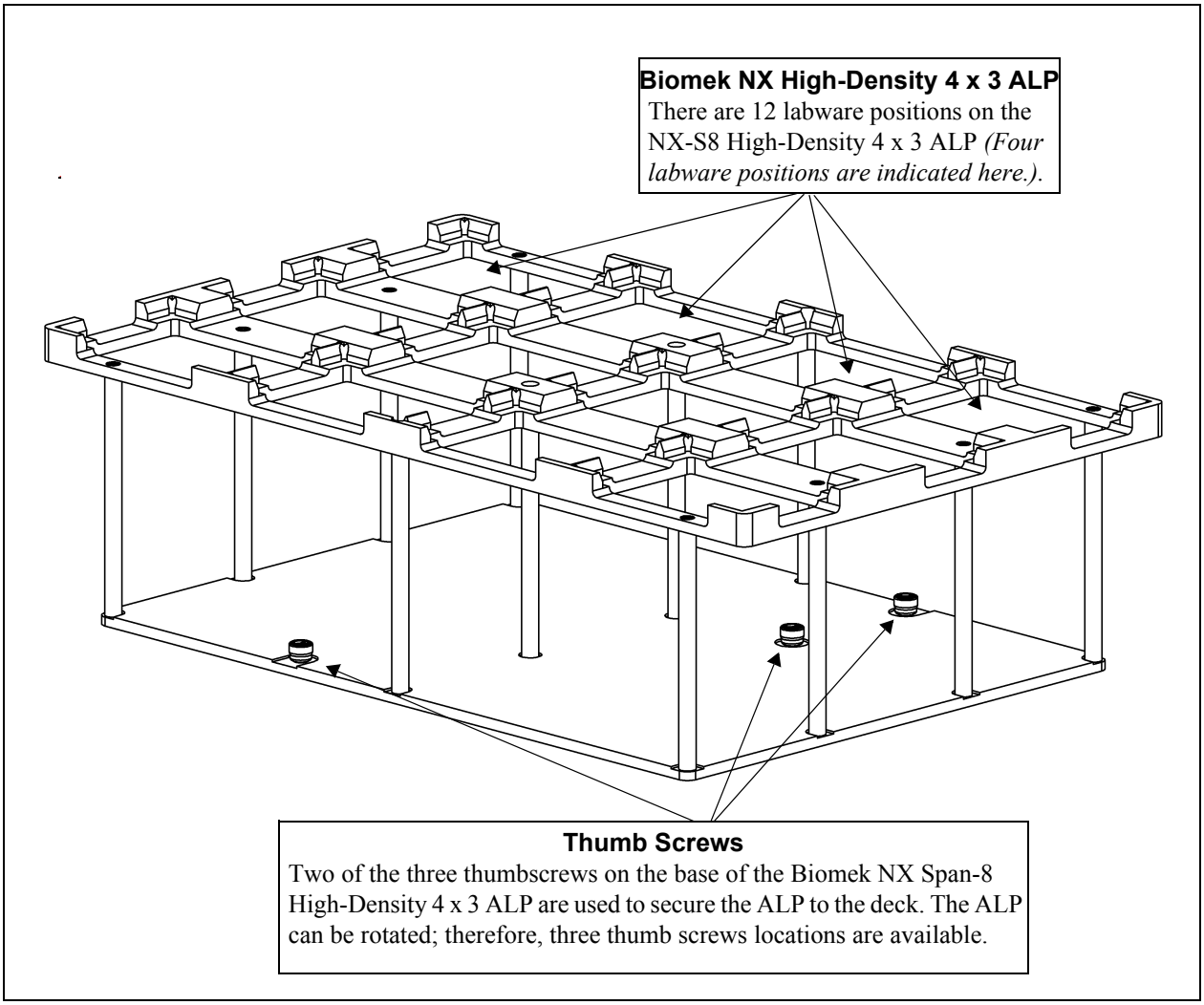

Figure 9-1. Biomek NX Span-8 High-Density 4 x 3 ALP

9.2 Adding a Liquid Level Sensing (LLS) Plate

The Biomek NX Span-8 High-Density 4 x 3 ALP stand supports an LLS plate option (Figure 9-2) which, when installed, improves liquid level sensing capabilities in labware positioned on the ALP. An LLS plate can be installed in any or all labware positions on the Biomek NX Span-8 High-Density 4 x 3 ALP.

Note: Labware positioned on a Biomek NX Span-8 High-Density 4 x 3 ALP with the LLS Plate option installed is gripper accessible and stackable.

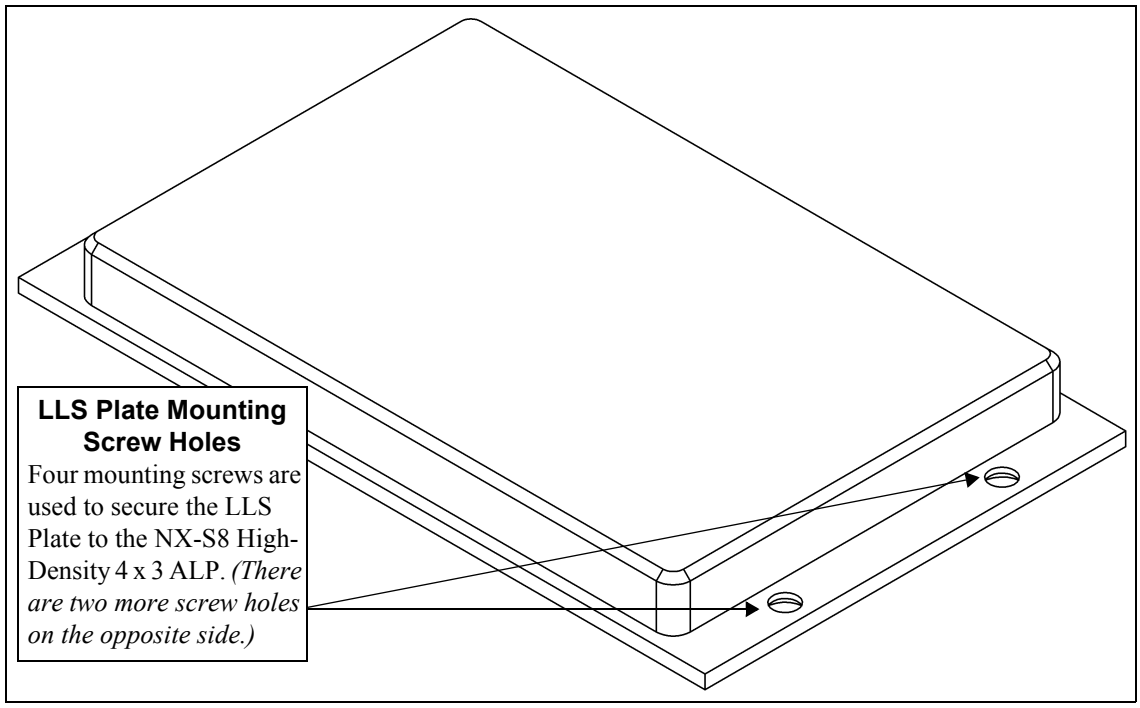

Figure 9-2. LLS Plate (Top View)

To install an LLS plate:

1. Turn ALP upside down.
2. Position the LLS plate upside down in the desired position on the ALP stand (Figure 9-3).

3. Attach the LLS plate to the ALP with the four mounting screws provided by turning the screws clockwise until finger tight. The LLS plate is now installed (Figure 9-4).

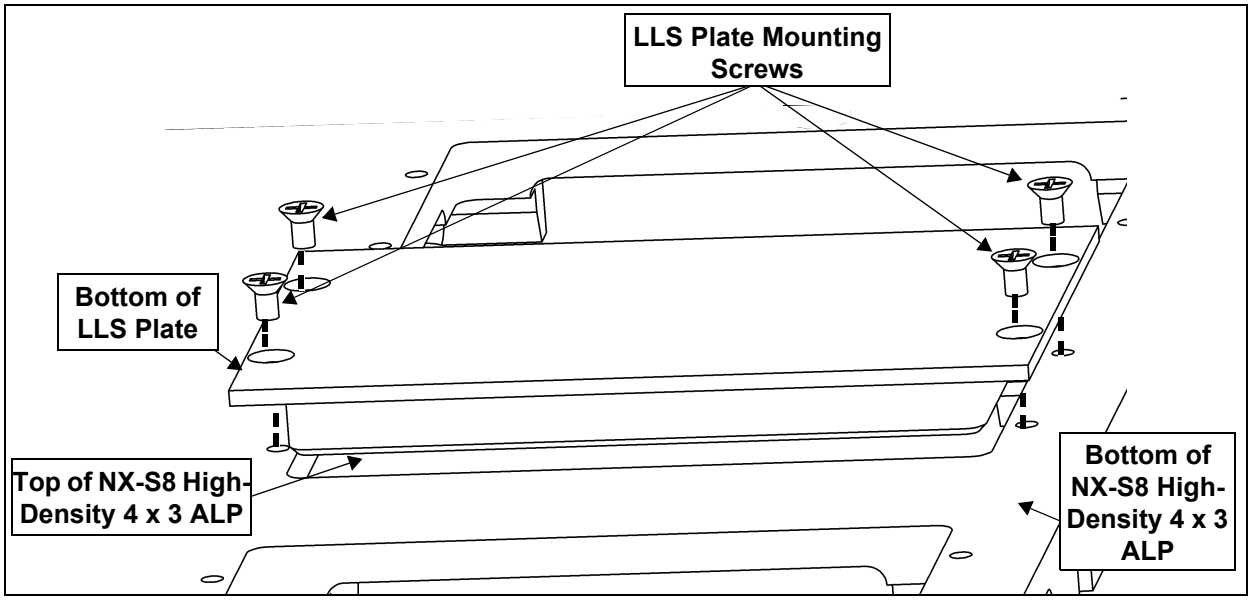

Figure 9-3. Installing an LLS Plate on an NX-S8 High-Density 4 x 3 ALP

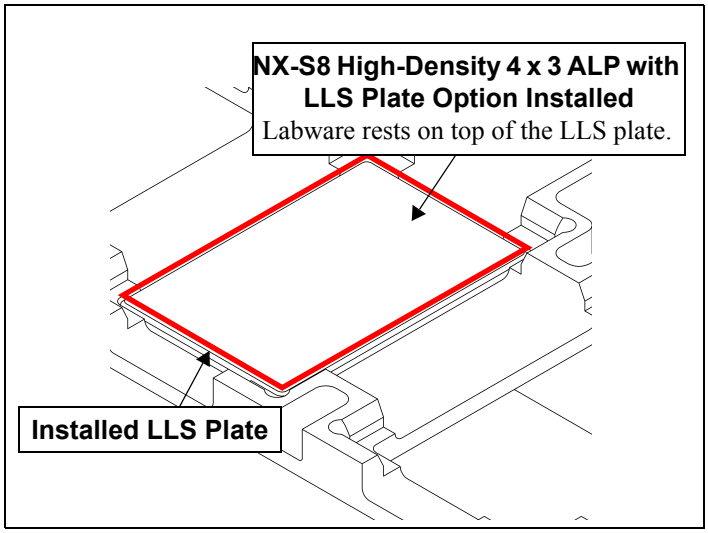

Figure 9-4. NX-S8 High-Density 4 x 3 ALP with the LLS plate option installed

9.3 Mounting the High-Density 4 x 3 ALP to the Deck

When it is mounted, NX-S8 High-Density 4 x 3 ALP occupies four columns and three rows on the Biomek NX deck. Refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*, to determine available positions for mounting the NX-S8 High-Density 4 x 3 ALP on the deck.

Note: When the NX-S8 High-Density 4 x 3 ALP is mounted on the Biomek NX deck, enough space is available in the remaining open row for larger ALPs such as the Tip Wash ALPs or the Solid Phase Extraction (SPE) Vacuum Manifold ALP.

To mount the ALP to the Biomek NX deck:

1. Position the ALP so the locating pins on the bottom of the ALP stand slip into locating holes on the deck. Make sure the front of the ALP faces the front of the Biomek NX deck.

   Note: The front of the NX-S8 High-Density 4 x 3 ALP contains a single set screw.

   Note: Use the deck laser etchings as a guide when positioning an NX-S8 High-Density 4 x 3 ALP on the deck.

2. Fasten the ALP to the deck using two of the three thumb screws on the base of the ALP (Figure 9-5) as follows:

Note: The NX-S8 High-Density 4 x 3 ALP has a single base plate. When fastening the ALP to the deck, two thumb screws on the base plate must be used.

- When positioning the ALP along the front of the deck, use the 1st (front) and 3rd thumb screws.
- When positioning the ALP along the back of the deck, rotate the ALP 180º and use the 1st and 2nd thumb screws.

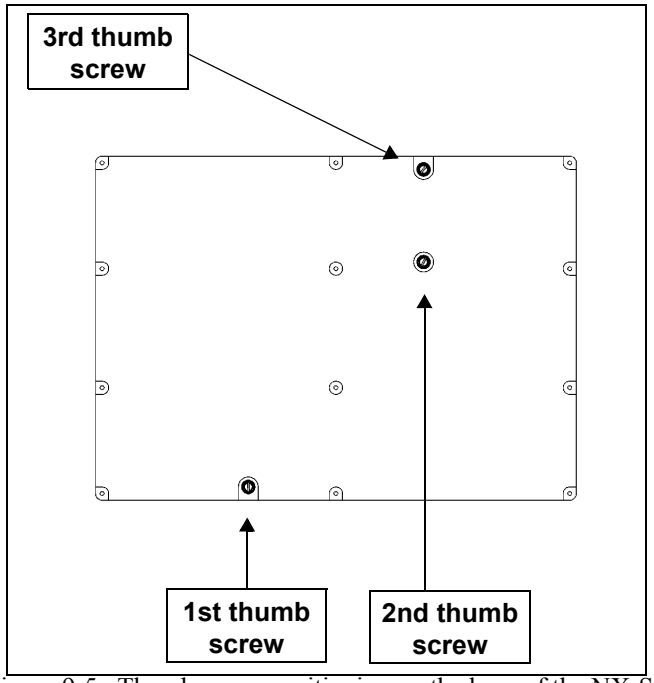

Figure 9-5. Thumb screw positioning on the base of the NX-S8 High-Density 4 x 3 ALP

9.4 Removing the High-Density 4 x 3 ALP from the Deck

To remove the NX-S8 High-Density 4 x 3 ALP from the Biomek NX deck:

1. Remove labware from the ALP.
2. Loosen the two thumb screws on the base of the ALP used to secure the ALP to the Biomek NX deck.
3. Lift the ALP straight up and off the deck so that the locating pins on the bottom of the ALP clear the locating holes on the deck.

9.5 Storage

Return the NX-S8 High-Density 4 x 3 ALP to its original packing materials and store in a dry, dust-free, environmentally-controlled area.

Note: It is desirable to allow the NX-S8 High-Density 4 x 3 ALP to air-dry before returning it to the original packing materials.

9.6 Framing the High-Density 4 x 3 ALP

For instructions to frame the NX-S8 High-Density 4 x 3 ALP, refer to the *Biomek® NX Span-8 Laboratory Automation Workstation User's Manual,* Chapter 4, *Framing Instructions*.

9.7 Preventive Maintenance

WARNING: The NX-S8 High-Density 4 x 3 ALP may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the NX-S8 High-Density 4 x 3 ALP with a soft cloth.

10 Magnetic Bead ALP

10.1 Overview

The Magnetic Bead ALP (Figure 10-1) is an active ALP that positions magnetic beads in microplates for pipetting operations. A magnet is engaged (moved closer to the microplate) and disengaged (moved away from the microplate) to position and release magnetic beads for re-suspension in a microplate. A clamping mechanism is provided to flatten microplates, such as thermocycler plates, for pipetting.

Microplates can be placed on the Magnetic Bead ALP by a lab technician or the Biomek gripper.

Note: The Magnetic Bead ALP has one open-centered position. When using miniskirted labware or other labware in which the bottom of the wells is below the top surface of the ALP, per-labware offsets must be defined for the head(s) to access the bottom of these labware types (refer to Section 10.4.2.3, *Defining Per-Labware Offsets*).

The sections in this chapter include:

- *Installing the Magnetic Bead ALP* (Section 10.2)
- *Framing Instructions* (Section 10.3)
- *Using the Magnetic Bead ALP in a Method* (Section 10.4)
- *Controlling the Magnetic Bead ALP Outside a Method* (Section 10.5)
- *Removing the Magnetic Bead ALP* (Section 10.6)
- *Storage* (Section 10.7)
- *Preventive Maintenance* (Section 10.8)
- *Troubleshooting* (Section 10.9)

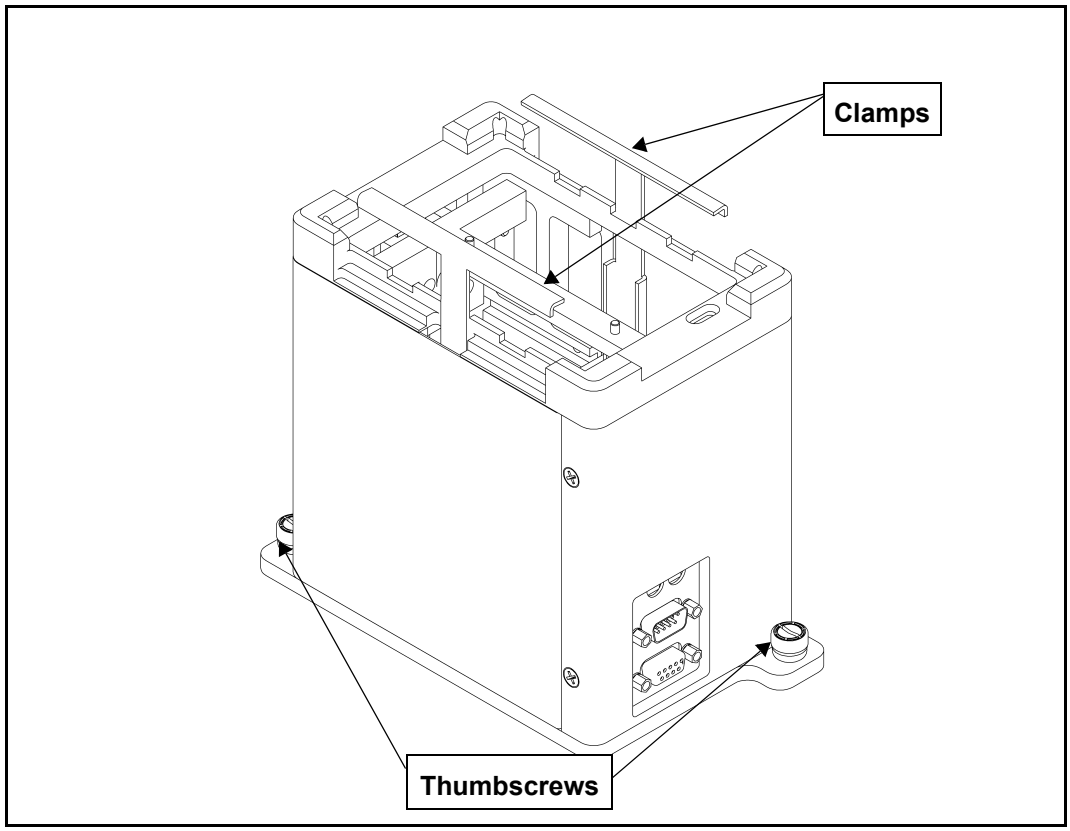

Figure 10-1. Magnetic Bead ALP

10.2 Installing the Magnetic Bead ALP

Installing the Magnetic Bead ALP includes:

- Choosing any standard deck position.

  Note: After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).

- *Mounting the Magnetic Bead ALP to the Deck* (Section 10.2.1).
- *Using Interchangeable Magnets* (Section 10.2.2).

10.2.1 Mounting the Magnetic Bead ALP to the Deck

To mount the Magnetic Bead ALP to the Biomek deck:

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

1. Turn off power to the Biomek instrument before mounting any ALP.
2. Position the Magnetic Bead ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck.
3. Fasten the Magnetic Bead ALP to the deck using the thumbscrews on the base of the ALP.

CAUTION: A maximum of one long CAN cable (1 meter [39.37 in.], Part Number 717781) can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

CAUTION: A maximum of one device can be chained to a Magnetic Bead ALP. If more than one device is chained to a Magnetic Bead ALP, the Biomek instrument may not be able to supply sufficient electrical current to operate all devices on the chain.

4. Plug the female end of the CAN communication cable into the male CAN Port on the Magnetic Bead ALP (Figure 10-2).

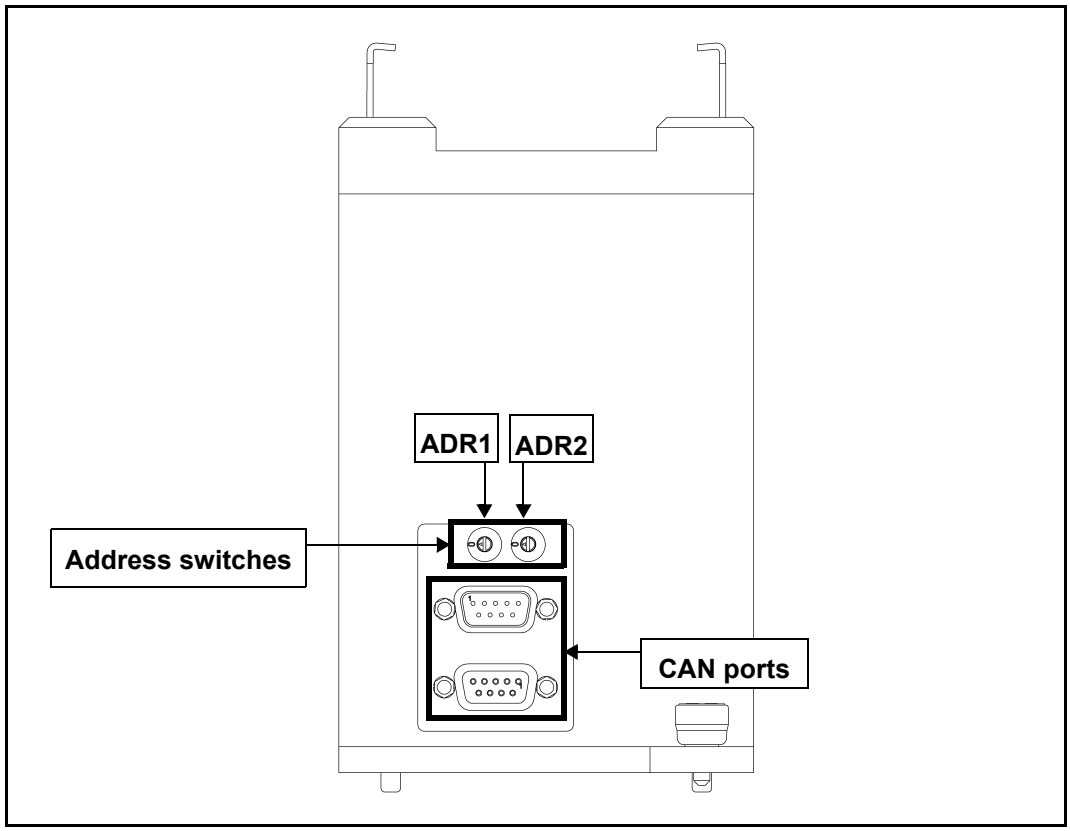

Figure 10-2. Magnetic Bead ALP CAN connections

Note: When possible, short (0.56 meter; 22 in.) CAN cables should be used when connecting devices to each other or to the Biomek instrument.

5. Plug the other end of the CAN communication cable into one of the following connectors:

   Note: Make sure the cable routing does not interfere with the operation of the Biomek FX.

   - Any female connector labeled CAN Port on the main Biomek instrument.
   - Any available female connector labeled CAN Port on another active ALP, creating a chain of connected devices.

     Note: A chain links multiple devices together. The maximum number of devices that can be chained together with a Magnetic Bead ALP is two (including the Magnetic Bead ALP). Each chain of two devices must plug into the main Biomek instrument.

6. Verify that address switch ADR1 is set between 0 and 7.
7. Verify that address switch ADR2 is set between 0 and F.

10.2.2 Using Interchangeable Magnets

The Magnetic Bead ALP uses interchangeable magnets to draw magnetic beads to specific positions in a microplate. Interchangeable magnets make it possible to use different magnet types for different applications. Flat or post magnets designed for laboratory use may be used with the Magnetic Bead ALP.

The Magnetic Bead ALP supports the following magnets:

- 96-Well Post Magnet (Part Number 379511)
- 96-Well Flat Magnet (Part Number 379512)

10.2.2.1 Installing Magnets to the Magnetic Bead ALP

To install a magnet in the Magnetic Bead ALP:

1. In Advanced Manual Control, use the **Move Magnet** command to raise the magnet to a Magnet Position of **5** cm (refer to Section 10.5, *Controlling the Magnetic Bead ALP Outside a Method*). The magnet raises to its highest position and a motion error appears (Figure 10-3).

Figure 10-3. Motion error resulting from magnet reaching Positive Limit

2. Choose **OK** to close the error message.

3. If another magnet is already installed, remove the magnet from the Magnetic Bead ALP (refer to Section 10.2.2.2, *Removing Magnets from the Magnetic Bead ALP*).
4. Position the magnet such that the mounting holes on the bottom of the magnet slip over the dowels on the mounting plate (Figure 10-4).

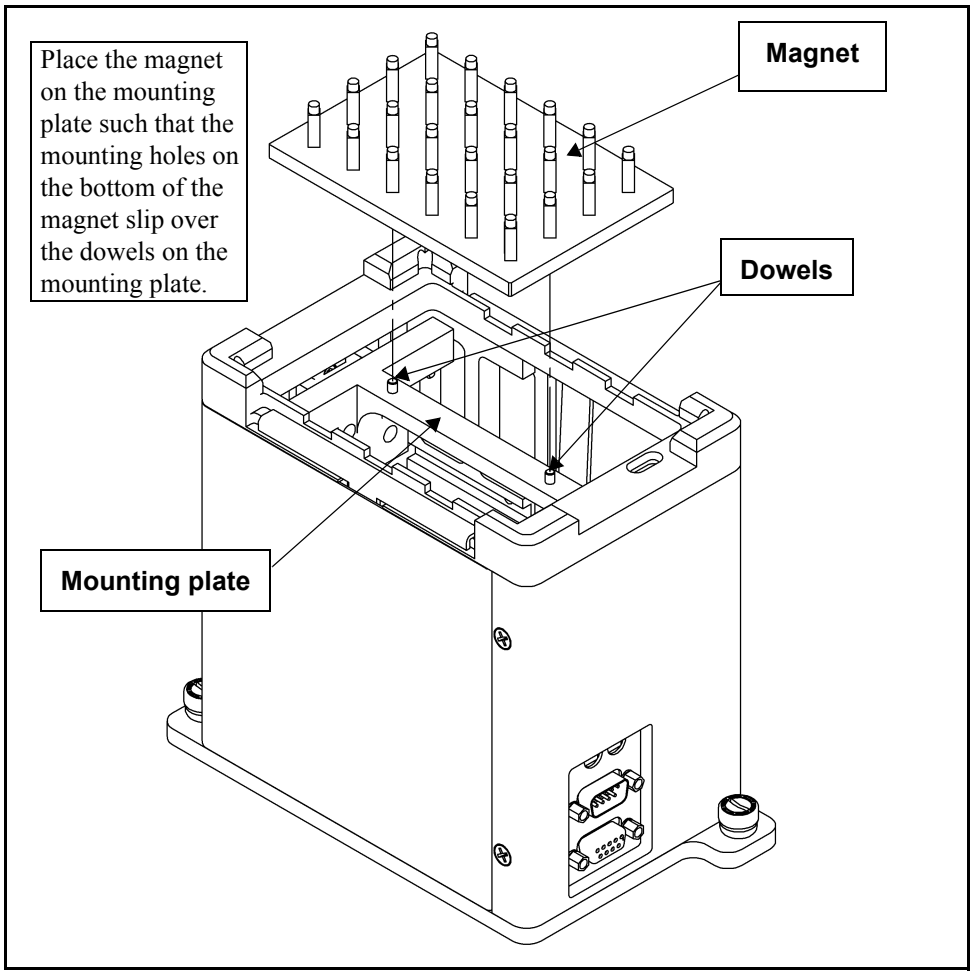

Figure 10-4. Attaching magnet to mounting plate

Note: The magnet type configured in Hardware Setup must match the magnet type installed in the Magnetic Bead ALP. When changing magnet types, make sure appropriate changes are also made in Hardware Setup (refer to Section 10.4.1, *Installing and Configuring a Magnetic Bead ALP in Hardware Setup*).

10.2.2.2 Removing Magnets from the Magnetic Bead ALP

To remove a magnet from the Magnetic Bead ALP:

1. In Advanced Manual Control, use the **Move Magnet** command to raise the magnet to a Magnet Position of **5** cm (refer to Section 10.5, *Controlling the Magnetic Bead ALP Outside a Method*). The magnet moves to its highest position and a motion error appears (Figure 10-5).

Figure 10-5. Motion error resulting from magnet reaching Positive Limit

2. Choose **OK** to close the error message.
3. Lift the magnet in an upward motion to clear the mounting holes from the dowels on the mounting plate and remove the magnet from the ALP.

Note: The magnet type configured in Hardware Setup must match the magnet type installed in the Magnetic Bead ALP. When changing magnet types, make sure appropriate changes are also made in Hardware Setup (refer to Section 10.4.1, *Installing and Configuring a Magnetic Bead ALP in Hardware Setup*).

10.3 Framing Instructions

Special instructions are necessary to frame the Magnetic Bead ALP.

To frame the Magnetic Bead ALP:

1. In Advanced Manual Control, use the **Disengage** command to move the magnet to its home position (refer to Section 10.5.1, *Homing the Magnet*).
2. Frame the Magnetic Bead ALP according to the instructions in the user's manual for the Biomek instrument on which the ALP is installed.

10.4 Using the Magnetic Bead ALP in a Method

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING: Pinch Point! The clamps used to secure a microplate to the Magnetic Bead ALP could cause personal injury. Avoid interference with the clamps while a microplate is on the ALP.

It is important that deck and labware settings are configured appropriately in the Deck Editor (refer to Section 10.4.2, *Configuring a Magnetic Bead ALP in the Deck Editor*) and Labware Type Editor (refer to Section 10.4.3, *Configuring LabwareTypes for Use on the Magnetic Bead ALP*) prior to using the Magnetic Bead ALP in a method for obstacle avoidance and accurate pipetting.

Using the Magnetic Bead ALP in a method includes:

- *Installing and Configuring a Magnetic Bead ALP in Hardware Setup* (Section 10.4.1).
- *Configuring a Magnetic Bead ALP in the Deck Editor* (Section 10.4.2).
- *Configuring LabwareTypes for Use on the Magnetic Bead ALP* (Section 10.4.3).
- *Configuring the Device Action Step for a Magnetic Bead ALP* (Section 10.4.5).

10.4.1 Installing and Configuring a Magnetic Bead ALP in Hardware Setup

After physically installing the Magnetic Bead ALP on the deck, the ALP is detected on the Biomek instrument and must be properly installed and configured in Hardware Setup.

Follow the instructions in Chapter 1.3.1, *Installing an ALP in Hardware Setup* to install the Magnetic Bead ALP.

Follow the instructions in 10.4.1.1, *Configuring a Magnetic Bead ALP in Hardware Setup*

10.4.1.1 Configuring a Magnetic Bead ALP in Hardware Setup

The software needs to know the magnet type installed in the Magnetic Bead ALP to utilize the ALP in a method.

To configure the Magnetic Bead ALP:

1. Select the **MagBeadALP** from the list of Devices in the left pane of Hardware Setup. The configuration view for the Magnetic Bead ALP appears in the right pane (Figure 10-6).

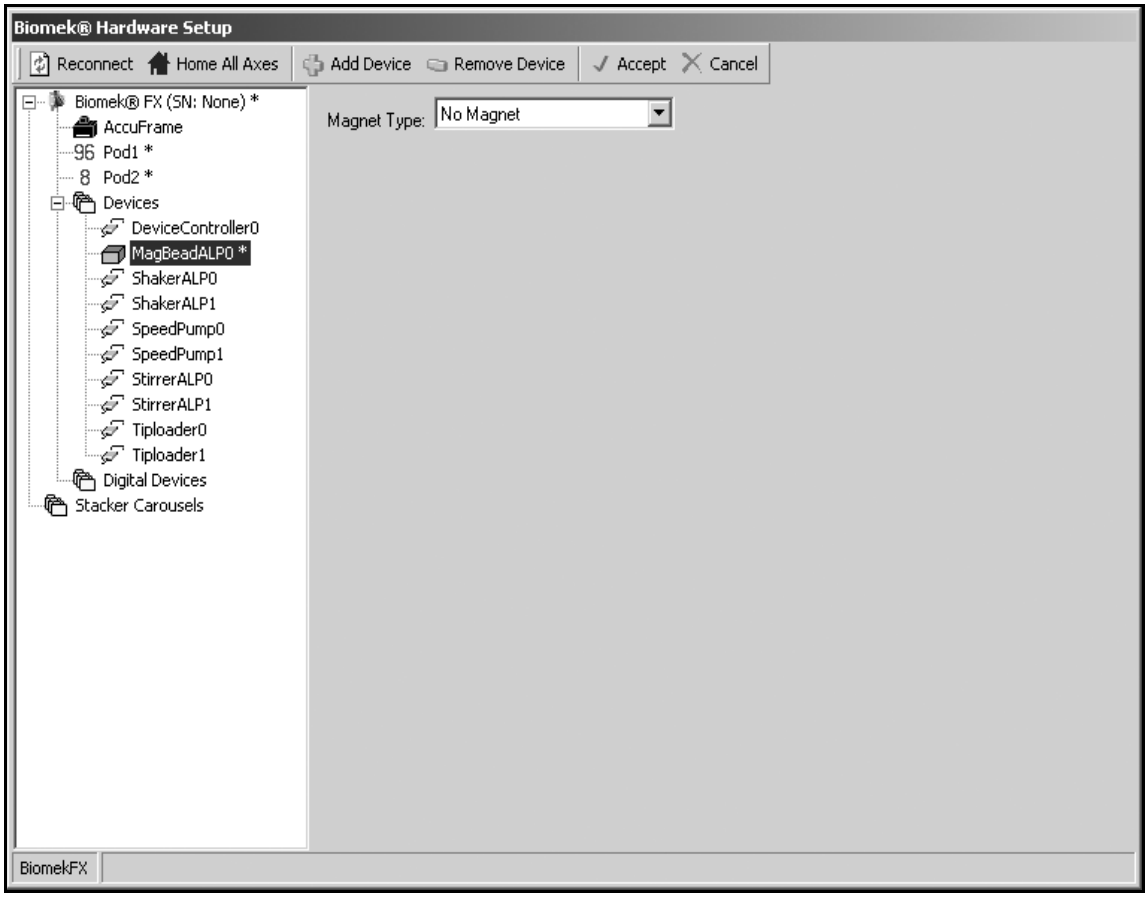

Figure 10-6. Hardware Setup — Magnetic Bead ALP configuration

2. Specify the **Magnet Type**. Options are:
   - 96-Well Flat Magnet
   - 96-Well Post Magnet
   - No Magnet
3. Choose **Accept** to save changes and close Hardware Setup.

10.4.2 Configuring a Magnetic Bead ALP in the Deck Editor

Before the Magnetic Bead ALP can be used in a method, the software needs to know the location of the Magnetic Bead ALP on the deck. The software representation of the instrument deck is configured in the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).

10.4.2.1 Adding a Magnetic Bead ALP to the Deck

A new Magnetic Bead ALP can be added to the deck in the appropriate locations using the Deck Editor. Deck positions are named automatically when a Magnetic Bead ALP is added to the deck.

To add a Magnetic Bead ALP to the deck, complete the following:

1. Select **Instrument>Deck Editor**. The Deck Editor appears.
2. Click and hold the mouse button on the **MagBeadALP** in the ALP Types List. Notice that the locations capable of supporting the ALP are indicated by dashed boxes.
3. Drag and drop the **MagBeadALP** from the ALP Types list to the desired location on the Deck View. The ALP appears and deck positions are named automatically.

Note: Deck positions may be renamed (refer to Section 10.4.2.2, *Setting Magnetic Bead ALP Position Properties*).

Note: If the MagBeadALP is about to be placed where another ALP is currently placed on the deck, the following warning appears (Figure 10-7). Delete the currently-placed ALP before placing the MagBeadALP on the deck (refer to the *Biomek Software User's Manual,* Chapter 5.4.1, *Deleting ALPs and Deck Positions from a Deck*).

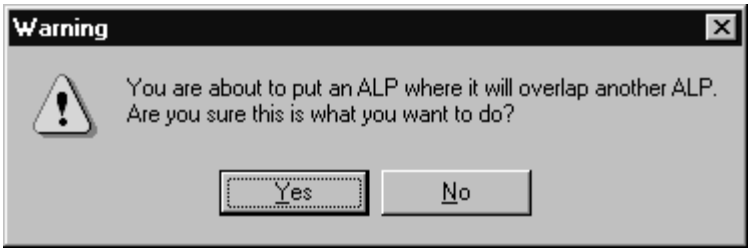

Figure 10-7. Warning appears because an ALP is about to be placed where it overlaps another ALP

10.4.2.2 Setting Magnetic Bead ALP Position Properties

After a Magnetic Bead ALP is placed on the deck, set the properties of the ALP and related deck position.

Note: For a description of all the ALP and deck position properties, refer to the *Biomek Software User's Manual,* Chapter 5.4.3, *Setting ALP Properties and Deck Positions*.

Deck position properties include Labware Offsets that place the labware in the appropriate place for pipetting operations. Because the Magnetic Bead ALP is associated with a device, the Device association must be set for the Magnetic Bead ALP deck position.

To set deck position properties:

1. Select the position to modify on the Deck View of the Deck Editor.
2. Select **Properties** from the Deck Editor toolbar.

OR

Double-click on the deck position.

OR

Right-click on the desired position and select **Properties** from the menu.

Position Properties appears (Figure 10-8).

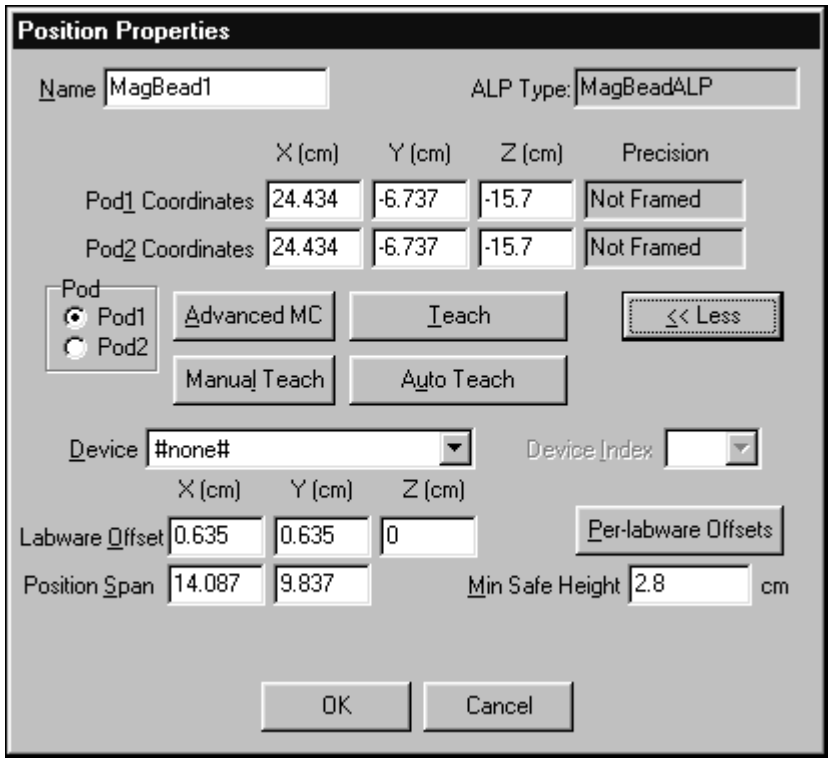

Figure 10-8. Position Properties for Deck Positions

Note: The deck position is highlighted on the Deck View with a pink line inside the ALP.

3. In **Name**, rename the deck position, if desired.

   Note: Names for deck positions must be alphanumeric with no spaces; the only non-alphanumeric character allowed is "_" (underscore). The first character must be a letter.

4. Specify the **X**, **Y**, and **Z Coordinates** of the appropriate pod by teaching the ALP.

   Note: ALPs are taught indirectly when positions are taught.

   - ***FX*** — If a position is accessible by both pods in a dual-pod system, each pod must be framed to the position.

5. Select **More>>** to display the device association and labware offset options.
6. In Device, choose the appropriate **MagBeadALP** to associate with the deck position.
7. If desired, choose **Per-labware Offsets** to customize the offsets for specific types of labware (refer to Section 10.4.2.3, *Defining Per-Labware Offsets*).
8. Adjust the **Min Safe Height**, if necessary. The Min Safe Height is the height at which the pod(s) move when moving to or passing over the Magnetic Bead ALP, and is predefined at a height that avoids collisions between the clamp arms and the pod(s).

   Note: The Labware Offsets and Position Span are predefined in the software. Do not modify these properties.

9. Choose **OK** to save the deck position properties and return to the Deck Editor.
10. Choose **Save** to close the Deck Editor.

    Note: The deck must be framed (taught) using the framing tools after creating or modifying a deck.

10.4.2.3 Defining Per-Labware Offsets

A Per-Labware Offset tells the software that the labware type is offset from the default labware position when placed on the ALP. Some labware types sit differently on a closed-centered ALP than on an open-centered ALP because the edge, or skirt, of the labware is above the bottom of the wells. Because these miniskirted labware types sit at different heights depending on which type of ALP (open- or closed-centered) they are placed on, the software must know which labware types are offset for a particular ALP position.

On a closed-centered ALP, miniskirted labware types sit on the wells, while on an open-centered ALP, the labware sits on the skirt and the wells extend below the top surface of the ALP (Figure 10-9). For example, when a PlasmidFilter is placed on a Magnetic Bead ALP (which is an open-centered ALP), the bottom of the labware is 2.25 centimeters below the top surface of the ALP because the skirt is 2.25 centimeters above the bottom of the wells. This labware type needs a Z offset of -2.25 cm for any open-centered ALP that it is placed on.

Note: For these miniskirted labware types, it is important to properly define per-labware offsets for obstacle avoidance and accurate pipetting.

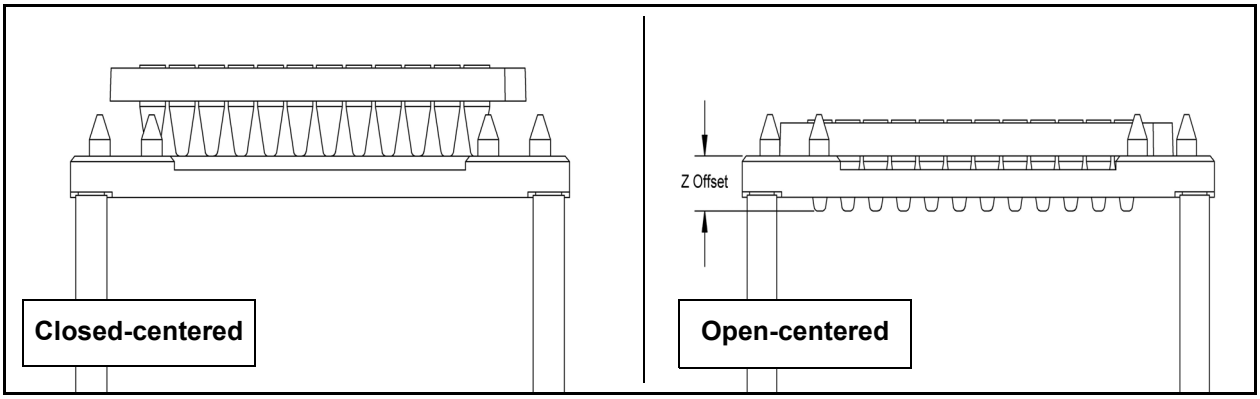

Figure 10-9. Miniskirted labware on closed- and open-centered deck positions

To set per-labware offsets for a deck position:

Note: When creating or modifying a deck, all open-centered positions need to define per-labware offsets for any labware types that extend below the ALP surface.

1. Select **Instrument>Deck Editor**. Deck Editor appears.
2. Select the deck position to modify.
3. Select **Properties**

   OR

   Double-click the deck position

   OR

   Right-click the desired position and select **Properties**. Position Properties appears.

4. Choose **More** to expand Position Properties, if necessary (Figure 10-10).

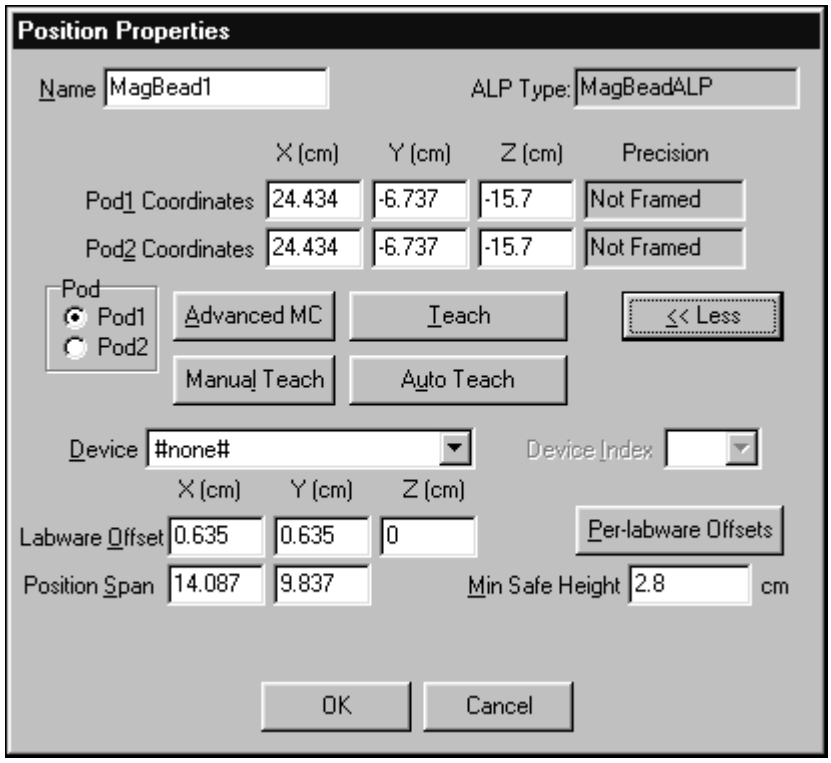

Figure 10-10. Position Properties

5. Choose **Per-Labware Offsets**. Per-Labware Offsets appears (Figure 10-11).

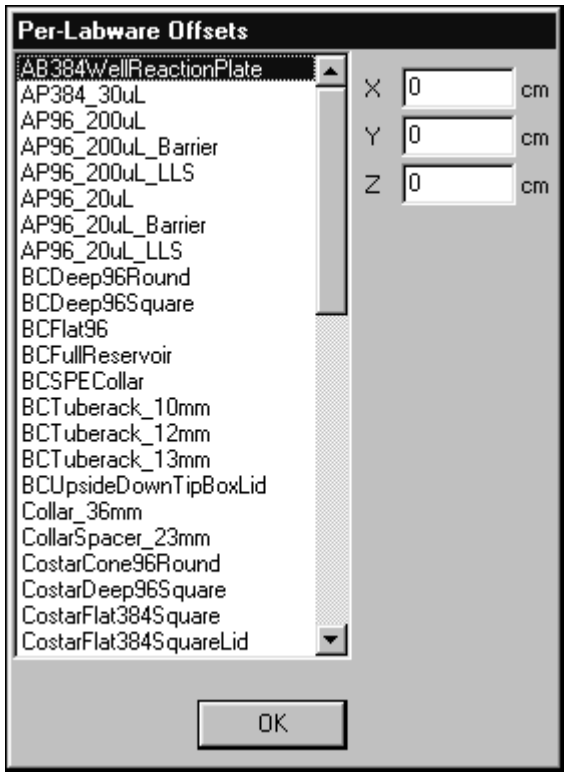

Figure 10-11. Per-Labware Offsets

6. Select the labware type that is not flush with the top surface of the ALP when it is placed on it.
7. In X, enter the distance the left edge of the labware type is offset from the right side of the left-most locating cone when placed on the deck position.

Note: The X offset is **0** if the labware type is positioned against the left-most locating cones.

---

8. In Y, enter the distance the back edge of the labware type is offset from the front of the back-most locating cone when placed on the deck position.

Note: The Y offset is **0** if the labware type is positioned against the back-most locating cones.

---

9. In Z, enter the distance the bottom of the labware type is offset from the top of the ALP surface when placed on the deck position.

Note: A negative Z offset indicates that the bottom of the labware is below the surface of the ALP.

Note: While the offset values in steps 7, 8, and 9 may be calculated using calipers, a more precise measurement should be obtained from the manufacturer's drawings.

---

10. Repeat steps 6-9 for each labware type that requires per-labware offsets at the position.

11. Choose **OK** to save the offset values. Position Properties appears.
12. Choose **OK**. Deck Editor appears.
13. Repeat steps 2-12 for each position that requires per-labware offsets.
14. Choose **Save** to save per-labware offsets, along with any other changes made in the Deck Editor, and close the Deck Editor.

Note: The per-labware offsets are not saved until the deck is saved with those per-labware offsets. Choosing **Cancel** loses all per-labware offsets, along with any other changes made in the Deck Editor, and closes the Deck Editor.

10.4.3 Configuring LabwareTypes for Use on the Magnetic Bead ALP

The Biomek Software needs some additional information about labware types used with the Magnetic Bead ALP. Use the Labware Type Editor to configure the magnet types compatible with a labware type, the magnet engage height, clamp settings, and labware sensing.

Note: Refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*, for more information on creating and modifying labware types.

To configure Magnetic Bead ALP properties for a labware type:

1. Choose **Project>Labware Type Editor.** Labware Types appears. (Figure 10-12).

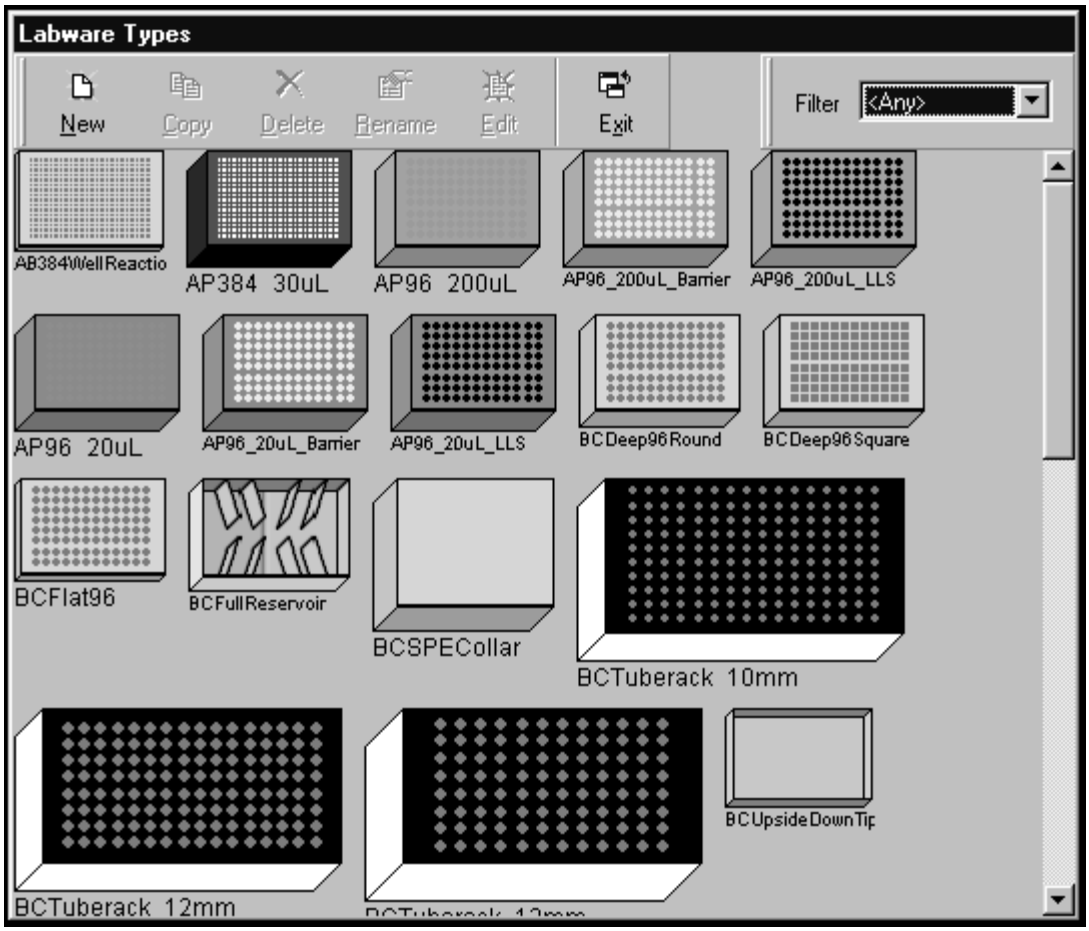

Figure 10-12. Labware Types

2. Select the desired labware type and choose **Edit** from the toolbar.

   OR

   Double-click the desired labware type.

   OR

   Right-click the desired labware type and choose **Edit** from the menu. Basic Information appears (Figure 10-13).

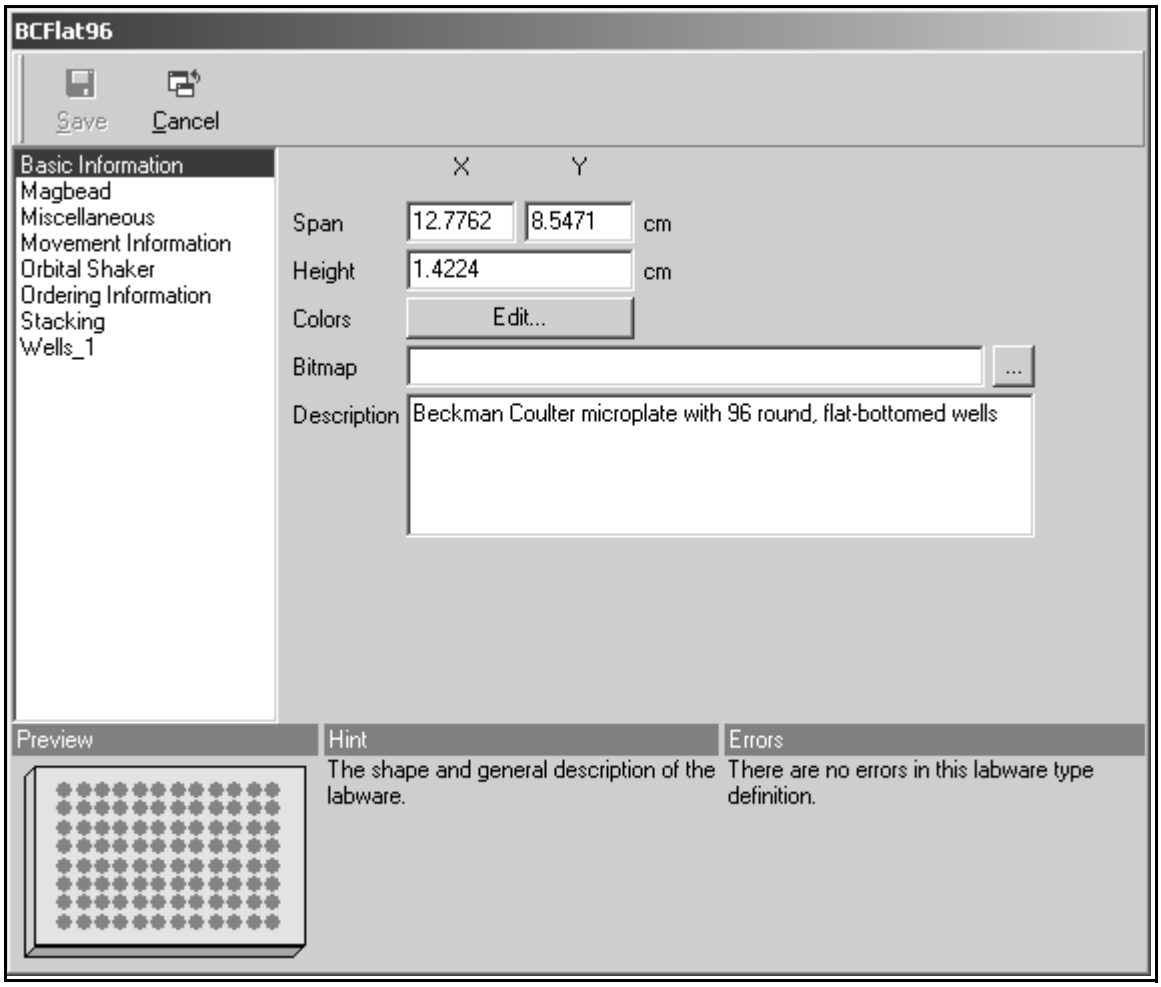

Figure 10-13. Basic Information for the selected labware type

3. Choose **Magbead** in the left pane. The right pane changes to display the Magbead configuration information (Figure 10-14).

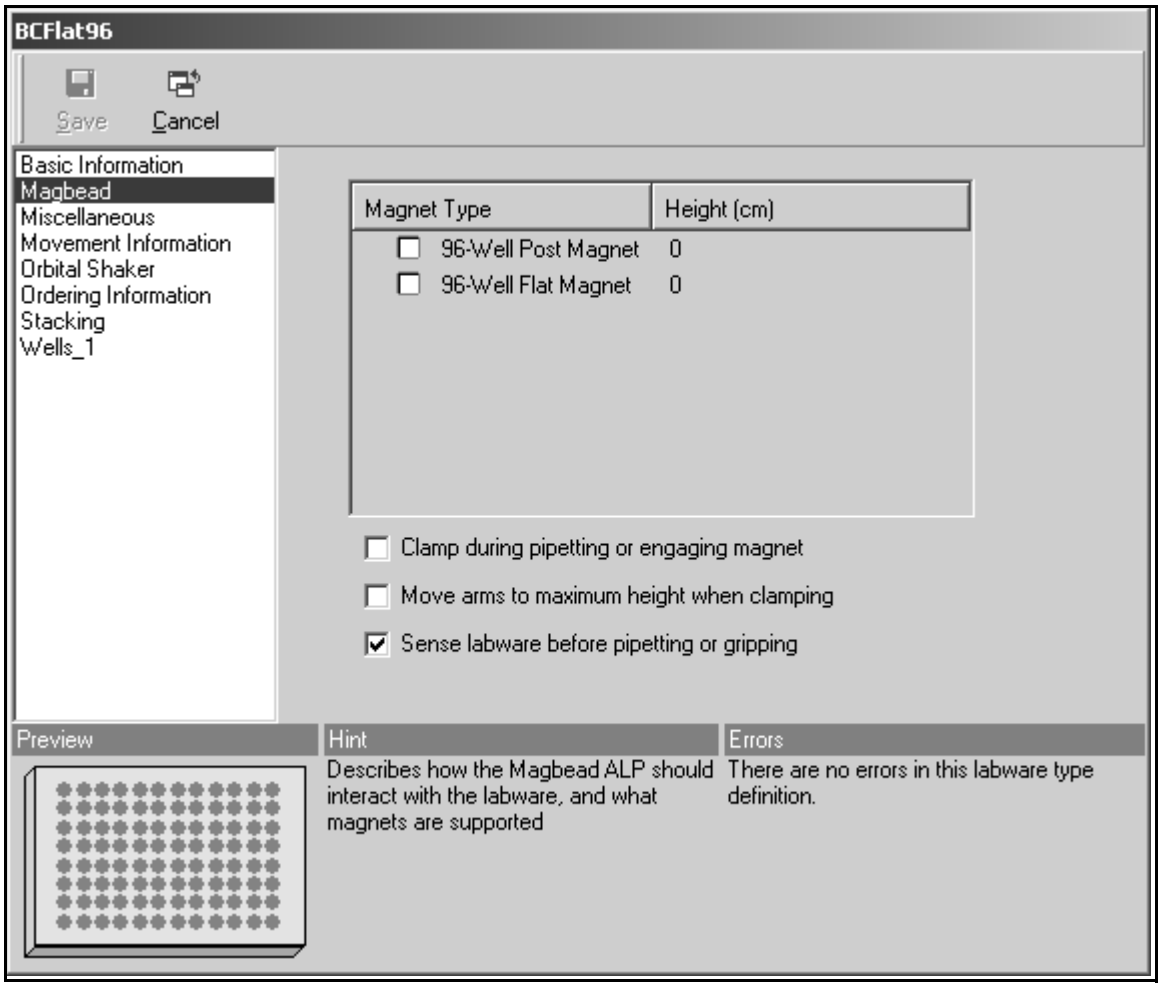

Figure 10-14. Magbead configuration for the selected labware type

4. Magnet Type lists all available magnet types. Select the magnet types that may be used with the selected labware type.

Note: If a magnet type is not selected, the magnet cannot be engaged while the labware type is located on the Magnetic Bead ALP.

5. In Height, enter the distance in centimeters (cm) from the top of the ALP to which the top of the specified magnet raises to when engaged. This Height is used to configure how close the magnet gets to the bottom of the labware type when engaged.

Note: Refer to Section 10.5.3, *Determining Magnet Engage Height for Labware Types*, for instructions on determining the appropriate engage height.

Note: For a value greater than zero, the top of the magnet raises above the top of the ALP. For a value less than zero, the top of the magnet is below the top of the ALP.

6. Select **Clamp during pipetting or engaging magnet** to clamp the labware during all pipetting operations or while the magnet is engaging.

   Note: Clamp during pipetting or engaging magnet is deselected by default.

7. Select **Move arms to maximum height when clamping** to allow the clamps to move to their maximum height before clamping labware.

   Note: Move arms to maximum height when clamping is deselected by default. If Move arms to maximum height when clamping is not selected, the clamps go to a specified height determined by the height of the labware type before clamping.

CAUTION: The Magnetic Bead ALP may be damaged if liquid is dispensed into an ALP that does not have labware positioned on it.

8. Select **Sense labware before pipetting or gripping** to detect the presence of labware on the Magnetic Bead ALP prior to performing pipetting operations on the selected labware type when on the Magnetic Bead ALP.

   Note: Sense labware before pipetting or gripping is selected by default.

9. Choose **Save**.

Note: Three sections of hints are offered at the bottom of the edit option. The first section displays a graphic of the labware, the second section explains the selected field, and the third section explains any errors resulting from editing the labware properties. Place the cursor over the desired labware properties field and click to view these hints.

10.4.4 Understanding How the Magnetic Bead ALP Performs Automatically

When certain steps are used in a method that interact with the Magnetic Bead ALP, some magnet positioning and clamping operations are performed automatically:

- The magnet is disengaged and clamps are deactuated whenever a gripper move is performed at the Magnetic Bead ALP.
- The clamps are actuated whenever a liquid transfer operation is performed at the Magnetic Bead ALP if Clamp during pipetting or engaging magnet is selected in the Labware Type Editor for the specified labware type.

  Note: To access labware on the Magnetic Bead ALP without clamping it, deselect Clamp during pipetting or engaging magnet on the MagBead configuration in the Labware Type Editor for the desired labware type (refer to Section 10.4.3, *Configuring LabwareTypes for Use on the Magnetic Bead ALP*).

Note: A Magnetic Bead ALP must be configured in Hardware Setup (refer to Section 10.4.1, *Installing and Configuring a Magnetic Bead ALP in Hardware Setup*) and placed on the deck in the Deck Editor (refer to Section 10.4.2, *Configuring a Magnetic Bead ALP in the Deck Editor*) prior to using the ALP in a method.

10.4.5 Configuring the Device Action Step for a Magnetic Bead ALP

The Device Action step is used to configure the actions of the Magnetic Bead ALP on the deck during a method, such as positioning the magnet, verifying the presence or absence of labware, or actuating the clamp.

Note: The magnet position remains in the engaged or disengaged state until another Device Action step engages or disengages the magnet.

Insert a **Device Action** step into the Method View (Figure 10-15).

Note: The Device Action step is located on the Devices Step Palette. Refer to the *Biomek Software User's Manual,* Chapter 22.2, *Displaying the Devices Step Palette*, to display the Devices Step Palette.

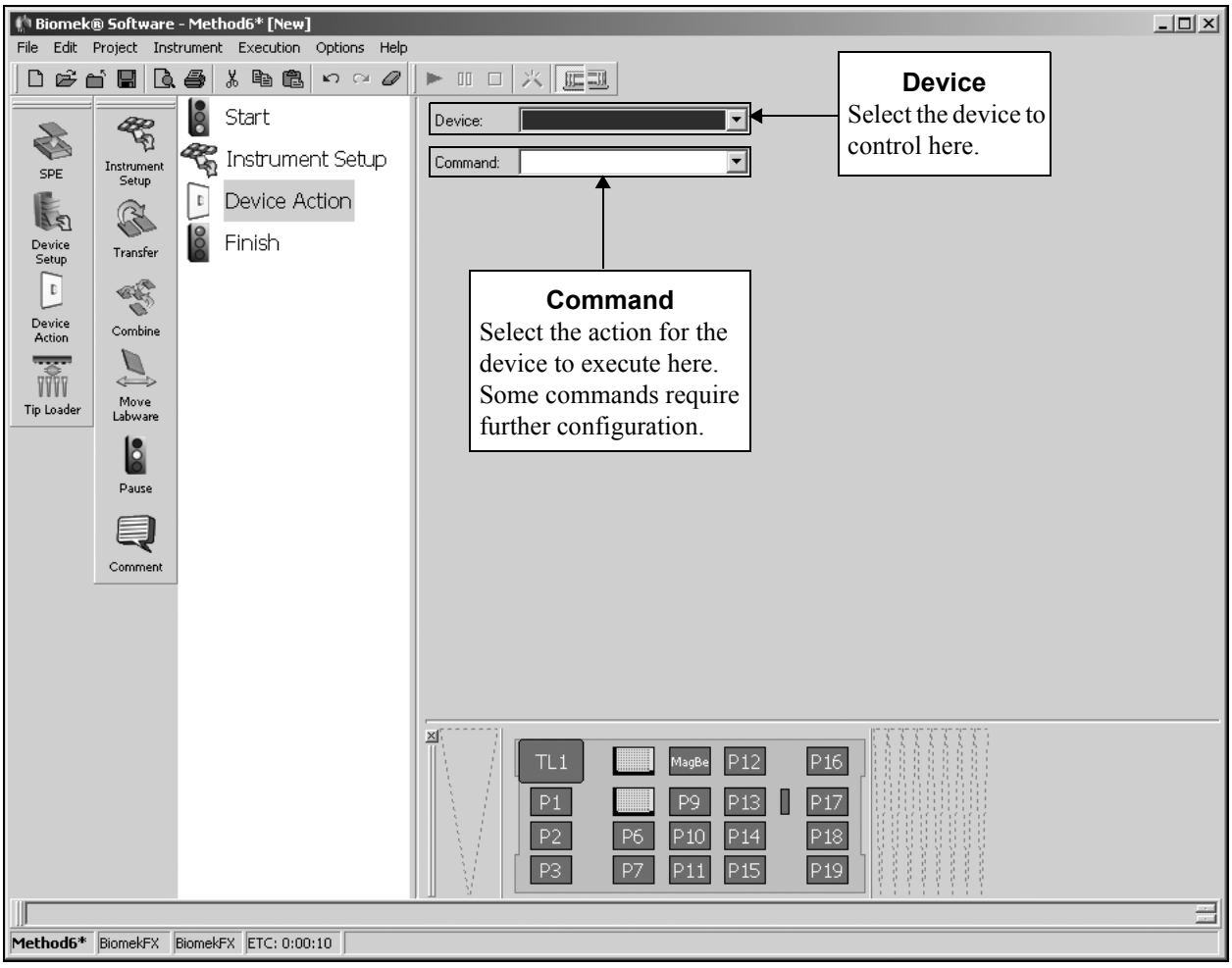

Figure 10-15. Device Action step and configuration

To configure the Device Action step for a Magnetic Bead ALP:

1. From **Device**, select the Magnetic Bead ALP performing the required operation.

   OR

   Click on the Magnetic Bead ALP on the Current Deck Display to select it. The configuration for the Magnetic Bead ALP appears (Figure 10-16).

Note: When selected, the deck position has a blue border in the Current Deck Display.

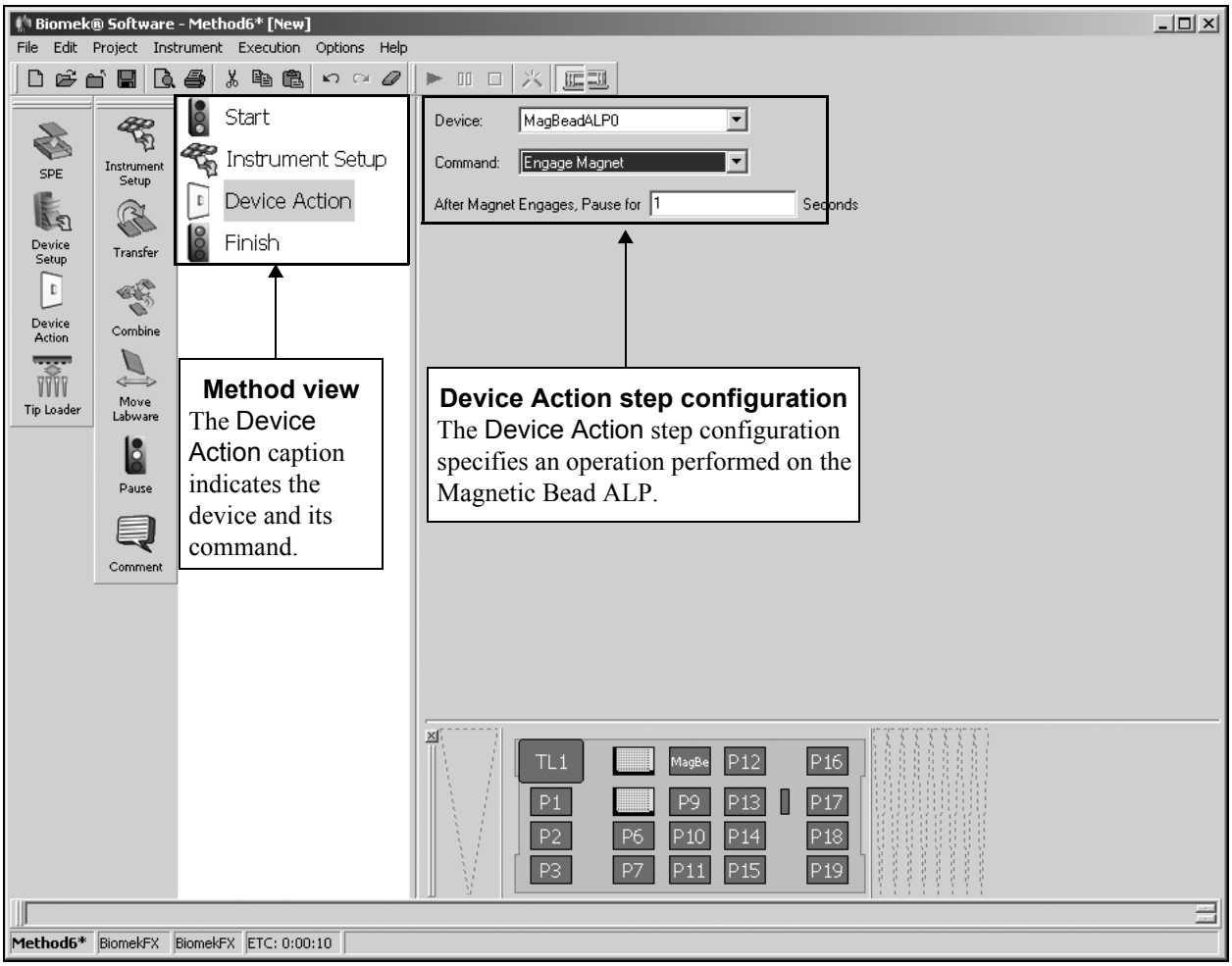

Figure 10-16. Device Action step for the Magnetic Bead ALP

2. In **Command**, indicate the desired action for the Magnetic Bead ALP:
   - Disengage — lowers the magnet to its home position
   - Engage — raises the magnet to the engage position specified in the Labware Type Editor for the labware and magnet type

     Note: The Engage command automatically senses and clamps labware if specified in the Labware Type Editor. Refer to Section 10.4.3, *Configuring LabwareTypes for Use on the Magnetic Bead ALP*, for more information.
   - Clamp — actuates the clamp to hold the labware in place and flatten warped microplates
   - Unclamp — releases the clamp to allow the labware to be removed from the ALP

     Note: Clamping and unclamping of labware occurs automatically if Clamp during pipetting or engaging magnet is selected in the Labware Type Editor for the specified labware type (refer to Section 10.4.3, *Configuring LabwareTypes for Use on the Magnetic Bead ALP*).
   - VerifyLabware — verifies that labware is currently on the Magnetic Bead ALP; an error displays and the method stops if no labware is found
   - VerifyNoLabware — verifies that there is currently no labware on the Magnetic Bead ALP; an error displays and the method stops if labware is found

   Note: The Engage command requires further configuration, as described below. Other commands do not require further configuration.
3. In Pause After Magnet Engages, enter the amount of time in seconds to pause to allow the magnetic beads to be drawn to the magnet before performing additional operations at the position.

   Note: Pause After Magnet Engages pauses only the position. Operations may still be performed at other deck positions while the Magnetic Bead ALP is paused.

10.5 Controlling the Magnetic Bead ALP Outside a Method

To control the Magnetic Bead ALP outside a method, use Advanced Manual Control for:

- *Homing the Magnet* (Section 10.5.1).
- *Engaging and Disengaging the Magnet* (Section 10.5.2).
- *Determining Magnet Engage Height for Labware Types* (Section 10.5.3).
- *Clamping or Unclamping Labware on a Magnetic Bead ALP* (Section 10.5.4).
- *Verifying the Sensor on the Magnetic Bead ALP Recognizes a Labware Type* (Section 10.5.5).

Note: Manual Control is available only when a method is not being executed. If a need for manual control is realized during a method run, stop the method using the Stop button or Snap Continuation button (refer to the *Biomek Software User's Manual,* Chapter 25.11.2, *Snapping a Continuation*) before accessing Manual Control.

10.5.1 Homing the Magnet

Homing the magnet gives the Biomek instrument a point of reference from which to make subsequent magnet moves. Home position for the magnet is fully disengaged to the lowest point in the magnet's travel.

The magnet automatically homes at the beginning and end of each method.

To home the magnet:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**. A list of all the installed pods and devices appears.
3. Select the desired **Magnetic Bead ALP**. Advanced Manual Control for the selected Magnetic Bead ALP appears.

4. From Command, choose **Disengage Magnet** (Figure 10-17).

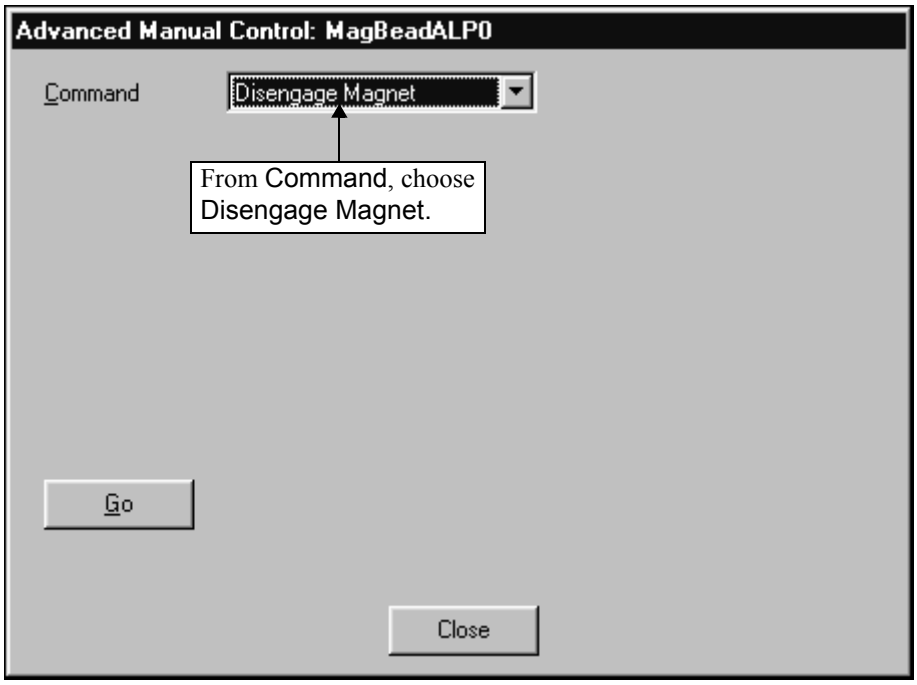

Figure 10-17. Advanced Manual Control for a Magnetic Bead ALP with Disengage Magnet selected

5. Choose **Go**. The magnet disengages to its lowest position.
6. Choose **Close** to close Advanced Manual Control.
7. Choose **Exit** to close Manual Control.

10.5.2 Engaging and Disengaging the Magnet

Use Advanced Manual Control to engage (raise) the magnet to its highest position or disengage (lower) the magnet to its lowest position.

To engage the magnet:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**. A list of all the installed pods and devices appears.
3. Select the desired **Magnetic Bead ALP**. Advanced Manual Control for the selected Magnetic Bead ALP appears.

4. From Command, choose **Manual Engage Magnet** (Figure 10-18).

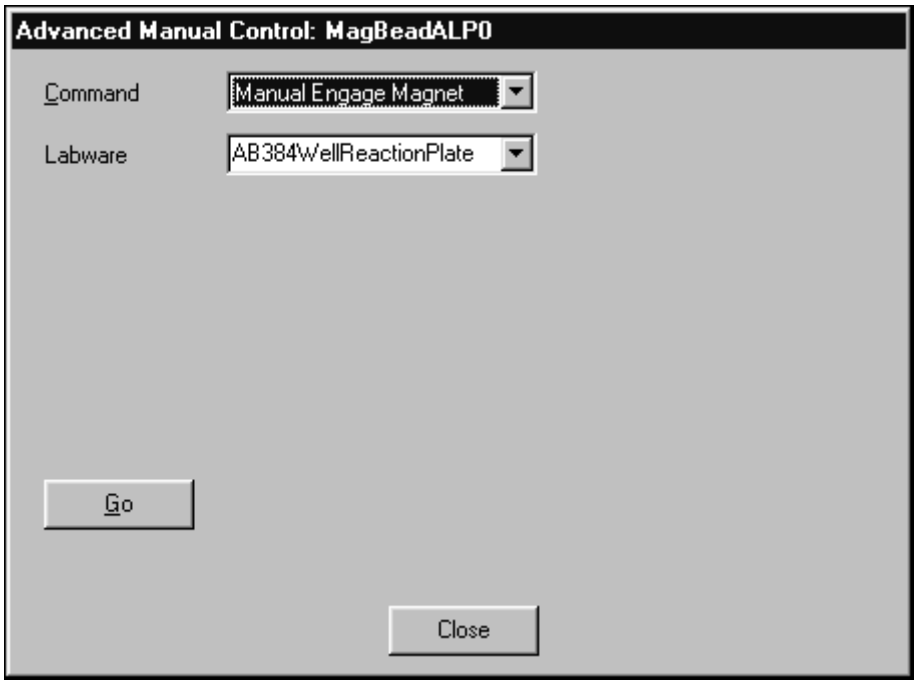

Figure 10-18. Advanced Manual Control for a Magnetic Bead ALP with Manual Engage Magnet selected

5. In Labware, select the labware type of the labware positioned on the Magnetic Bead ALP.

   Note: By default, the labware type listed first alphabetically is the selected Labware.

6. Choose **Go**. The magnet engages to the height specified in the Labware Type Editor for the selected Labware type.
7. Choose **Close** to close Advanced Manual Control.
8. Choose **Exit** to close Manual Control.

To disengage the magnet:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**. A list of all the installed pods and devices appears.
3. Select the desired **Magnetic Bead ALP**. Advanced Manual Control for the selected Magnetic Bead ALP appears.
4. From Command, choose **Disengage Magnet**.
5. Choose **Go**. The magnet disengages to its lowest position.
6. Choose **Close** to close Advanced Manual Control.
7. Choose **Exit** to close Manual Control.

10.5.3 Determining Magnet Engage Height for Labware Types

Different labware types sit differently in the Magnetic Bead ALP. Some labware may have wells that descend below the top surface of the ALP. Different applications may also require a different proximity between the magnet and the labware. For these reasons, it is necessary to specify the magnet engage height for each labware type that is used with the Magnetic Bead ALP.

To determine the desired engage height for a specific labware type:

1. Place the desired labware type on the Magnetic Bead ALP.
2. Choose **Instrument>Manual Control**. Manual Control appears.
3. Choose **Advanced Controls**. A list of all the installed pods and devices appears.
4. Select the desired **Magnetic Bead ALP**. Advanced Manual Control for the selected Magnetic Bead ALP appears.
5. From Command, choose **Disengage Magnet** to home the magnet.
6. Choose **Go**. The magnet disengages to its lowest position.
7. From Command, choose **Move Magnet** (Figure 10-19).

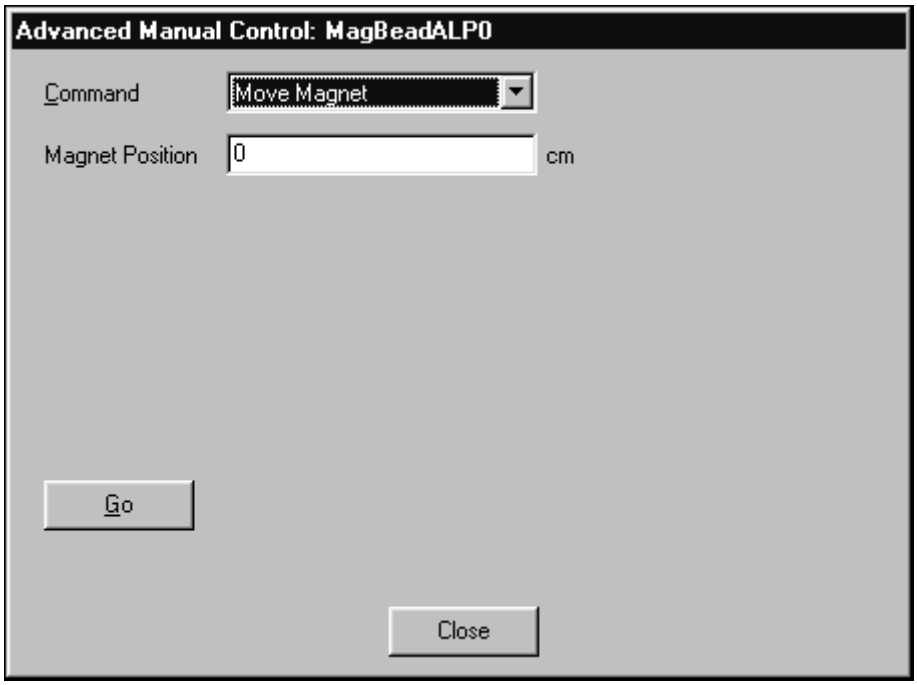

Figure 10-19. Advanced Manual Control for a Magnetic Bead ALP with Move Magnet selected

8. In Magnet Position, enter the desired position for the magnet in centimeters. The magnet moves to a position the specified distance from the top of the Magnetic Bead ALP.

   Note: A magnet position of 0 cm aligns the top of the magnet with the surface of the Magnetic Bead ALP. To move the magnet to a position above the surface of the ALP, enter the value as a positive number; to move the magnet to a position below the surface of the ALP, enter the value as a negative number.

9. Choose **Go**. The magnet moves to the specified position.
10. Repeat steps 6 and 7 as needed until the magnet is in the desired engaged position.
11. Record the Magnet Position once the magnet is in the desired engage position.
12. Choose **Close** to close Advanced Manual Control.
13. Choose **Exit** to close Manual Control.
14. Choose **Project>Labware Type Editor**. Labware Types appears (Figure 10-12).

15. Select the desired labware type and choose **Edit** from the toolbar.

    OR

    Double-click the desired labware type.

    OR

    Right-click the desired labware type and choose **Edit** from the menu. Basic Information appears.

16. Choose **Magbead** (Figure 10-20).

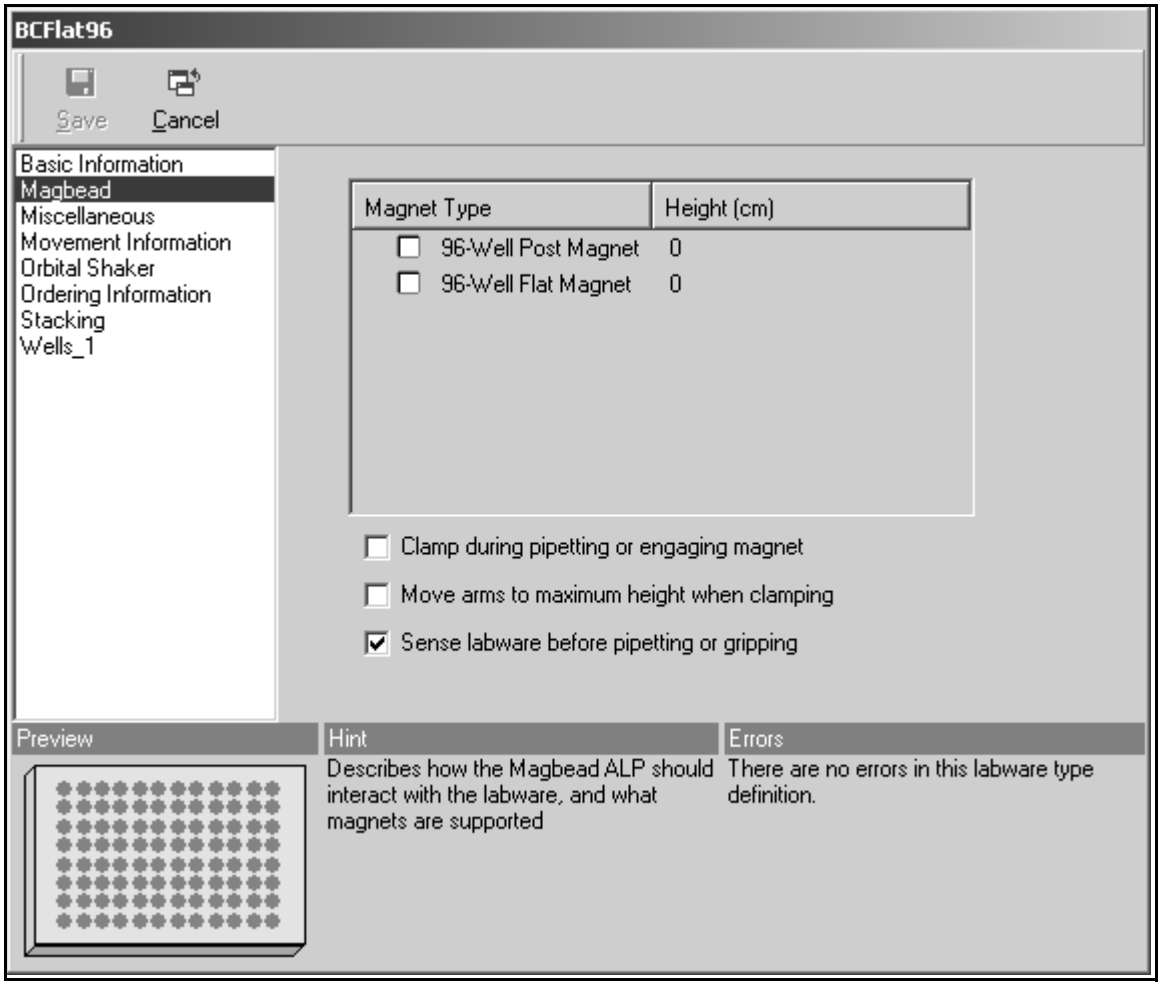

Figure 10-20. Magbead configuration for the selected labware type

17. Magnet Type lists all available magnet types. Select the magnet types that may be used with the selected labware type.

    Note: If a magnet type is not selected, the magnet cannot be engaged or disengaged while the labware type is located on the Magnetic Bead ALP.

18. In Height, enter the Magnet Position recorded in step 9. This is the distance in centimeters (cm) between the top of the ALP and the top of the magnet when the magnet is fully engaged.

    Note: If the desired engage position of the magnet is above the top of the ALP, enter the value as a positive number; if the desired engage position of the magnet is below the top of the ALP, enter the value as a negative number.

19. Choose **Save**.

Note: Refer to Section 10.4.3, *Configuring LabwareTypes for Use on the Magnetic Bead ALP*, for more labware configuration options.

10.5.4 Clamping or Unclamping Labware on a Magnetic Bead ALP

To clamp labware on a Magnetic Bead ALP:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**. A list of all the installed pods and devices appears.
3. Select the desired **Magnetic Bead ALP**. Advanced Manual Control for the selected Magnetic Bead ALP appears.
4. From Command, choose **Manual Clamp** (Figure 10-21).

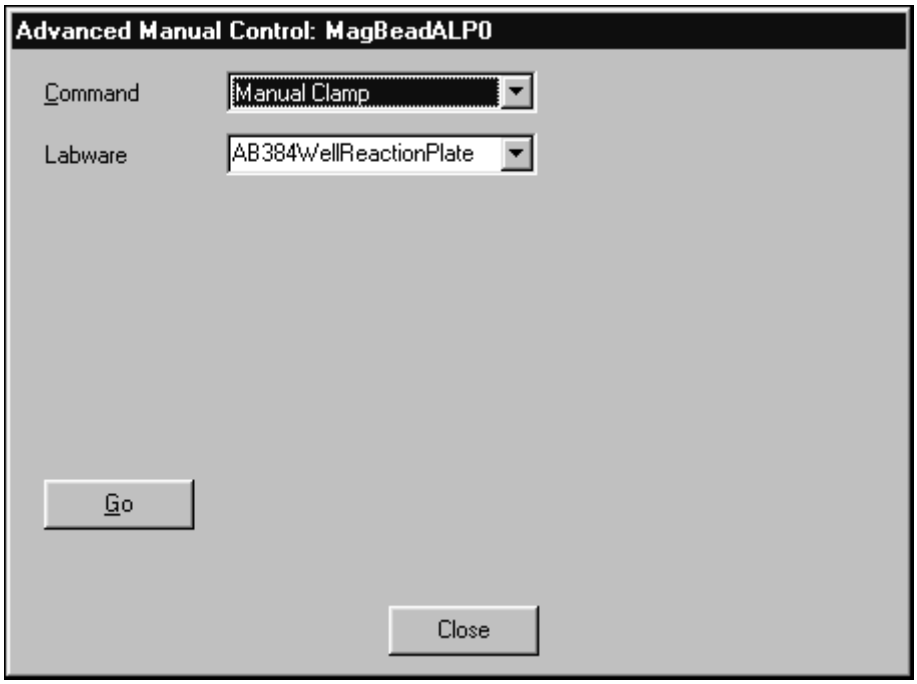

Figure 10-21. Advanced Manual Control for a Magnetic Bead ALP with Manual Clamp selected

5. In Labware, specify the labware type to clamp on the Magnetic Bead ALP.

CAUTION: Make sure the labware on the Magnetic Bead ALP matches the labware type specified. The clamps raise to a height set for the labware type before clamping and incorrect settings may result in inaccurate clamping.

6. Choose **Go**. The Magnetic Bead ALP clamps the selected labware.
7. Choose **Close** to close Advanced Manual Control.
8. Choose **Exit** to close Manual Control.

To unclamp labware from a Magnetic Bead ALP:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**. A list of all the installed pods and devices appears.
3. Select the desired **Magnetic Bead ALP**. Advanced Manual Control for the selected Magnetic Bead ALP appears.
4. From Command, choose **Unclamp**.
5. Choose **Go**.
6. Choose **Close** to close Advanced Manual Control.
7. Choose **Exit** to close Manual Control.

10.5.5 Verifying the Sensor on the Magnetic Bead ALP Recognizes a Labware Type

The sensor on the Magnetic Bead ALP detects all of the default microplates and lids installed with the Biomek Software. However, some other microplate designs may not be recognized by the sensor.

To verify if the sensor on the Magnetic Bead ALP recognizes a specific labware type:

1. Place the desired labware type on the Magnetic Bead ALP.
2. Choose **Instrument>Manual Control**. Manual Control appears.
3. Choose **Advanced Controls**. A list of all the installed pods and devices appears.
4. Select the desired **Magnetic Bead ALP**. Advanced Manual Control for the selected Magnetic Bead ALP appears.

5. From Command, choose **VerifyLabware** (Figure 10-22).

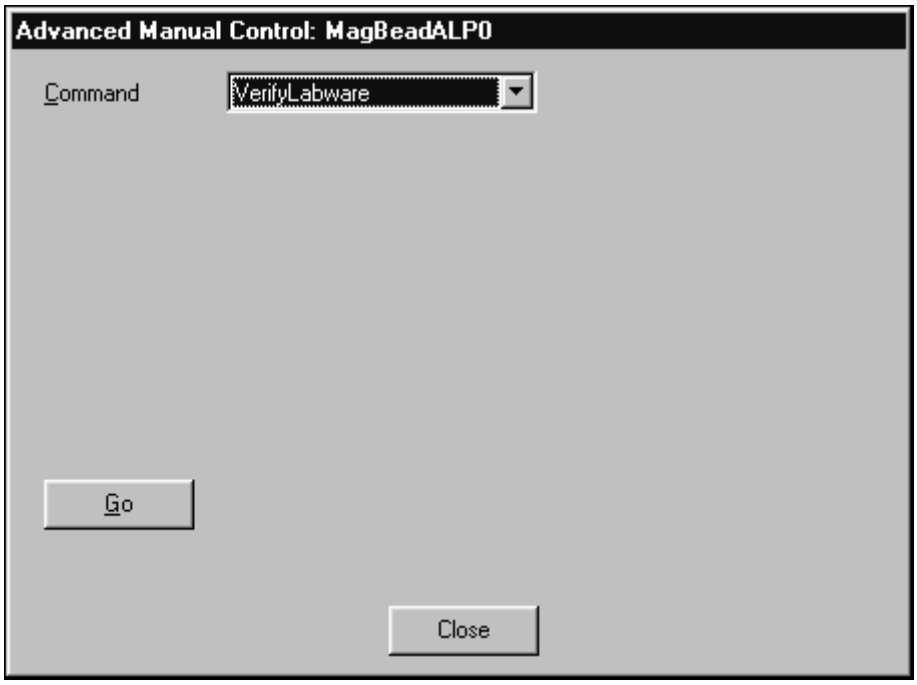

Figure 10-22. Advanced Manual Control for a Magnetic Bead ALP with Verify Labware selected

6. Choose **Go**. The Magnetic Bead ALP recognizes the piece of labware unless an Error appears (Figure 10-23).

Note: If the following Error (Figure 10-23) appears, the sensor does not recognize the labware present on the Magnetic Bead ALP; the sensor is not operating properly or the ALP does not recognize the labware type.

Note: Contact a Beckman Coulter Service Engineer if several labware types are not recognized; the sensor on the Magnetic Bead ALP may not be operating properly, or may need to be cleaned using a cotton swab with an alcohol solution.

Figure 10-23. Error indicating labware not found at sensor

7. Choose **Close** to close Advanced Manual Control.
8. Choose **Exit** to close Manual Control.

Note: If a labware type is not recognized by the sensor, deselect **Always Sense Labware** in the Labware Type Editor for the desired labware type. However, the Magnetic Bead ALP could be damaged if liquid is dispensed into an ALP that does not have labware positioned on it.

10.6 Removing the Magnetic Bead ALP

To remove the Magnetic Bead ALP from the deck:

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

1. Turn off power to the Biomek instrument before removing any ALP.
2. Unplug the CAN communication cable(s) from the CAN Port(s) on the Magnetic Bead ALP.
3. Loosen the thumbscrews on the base of the Magnetic Bead ALP.
4. Lift the unit in an upward motion to clear the locating pins from the locating holes on the deck.

10.7 Storage

To prepare the Magnetic Bead ALP for storage:

1. Remove the installed magnet from the Magnetic Bead ALP (refer to Section 10.2.2.2, *Removing Magnets from the Magnetic Bead ALP*).
2. Disengage the magnet mounting plate to its lowest position (refer to Section 10.5.2, *Engaging and Disengaging the Magnet*).
3. Remove the Magnetic Bead ALP from the deck (refer to Section 10.6, *Removing the Magnetic Bead ALP*).
4. Return the Magnetic Bead ALP to the original packing materials and store in a dry, dust-free, environmentally controlled area.

Note: It is desirable to allow the Magnetic Bead ALP to air-dry before returning it to the original packing materials.

10.8 Preventive Maintenance

Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

10.9 Troubleshooting

Do not attempt to repair the unit without first contacting a Beckman Coulter Service Engineer.

Table 10-1. Troubleshooting the Magnetic Bead ALP

IF	THEN
The magnet does not engage or disengage.	Make sure the labware type is defined properly in the Labware Type Editor. Make sure a good power connection has been established.
The magnet stalls or does not move properly.	Using Advanced Manual Control, home the magnet (refer to Section 10.5.1, *Homing the Magnet*).
The magnet is not drawing beads to the desired position.	Make sure the labware type on the Magnetic Bead ALP is properly identified in Instrument Setup. Adjust the magnet engage height for the labware in the Labware Type Editor (refer to Section 10.4.2.2, *Setting Magnetic Bead ALP Position Properties*).
The clamps are not grasping the labware.	Make sure the labware type is defined properly in the Labware Type Editor (refer to Section 10.4.2.2, *Setting Magnetic Bead ALP Position Properties*).
The sensors are not functioning properly.	Verify the sensors recognize the labware type (refer to Section 10.5.5, *Verifying the Sensor on the Magnetic Bead ALP Recognizes a Labware Type*).

11 Microplate Shaking ALP

11.1 Overview

The Microplate Shaking ALP is an active ALP designed to mix solutions in microplates using a linear shaking motion (Figure 11-1).

The sections in this chapter include:

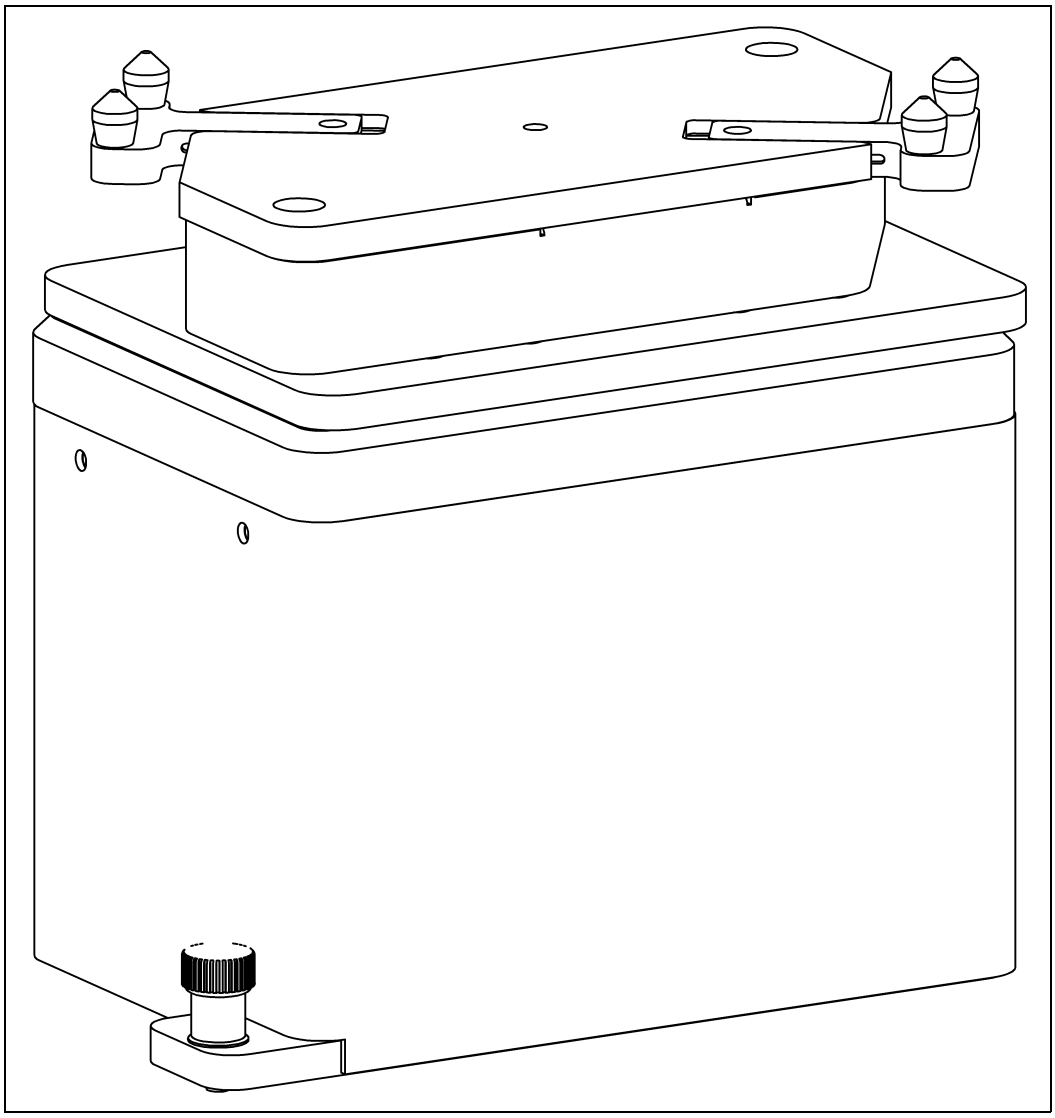

Figure 11-1. Microplate Shaking ALP

11.2 Installing the Microplate Shaking ALP

Installing the Microplate Shaking ALP includes choosing any standard deck position on the deck and mounting the ALP to the deck.

Note: Use Biomek Software Deck Editor to determine available deck positions when mounting the ALP on a Biomek instrument.

11.2.1 Mounting the Microplate Shaking ALP to the Deck

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

To mount the Microplate Shaking ALP:

1. Turn off power to the Biomek instrument before mounting any active ALP.
2. Position the Microplate Shaking ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck.
3. Using the thumbscrews on the base of the ALP, attach the ALP to the deck.

CAUTION: A maximum of one long CAN cable can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

4. Attach the CAN communications cable to the CAN communications port.

   Note: When possible, short CAN cables should be used when connecting devices to each other or to the Biomek instrument.

5. Plug one end of the CAN communication cable into either of the two connectors labeled “CAN Port” on the Microplate Shaking ALP (Figure 11-2).

Note: Make sure the cable routing does not interfere with the operation of the Biomek instrument.

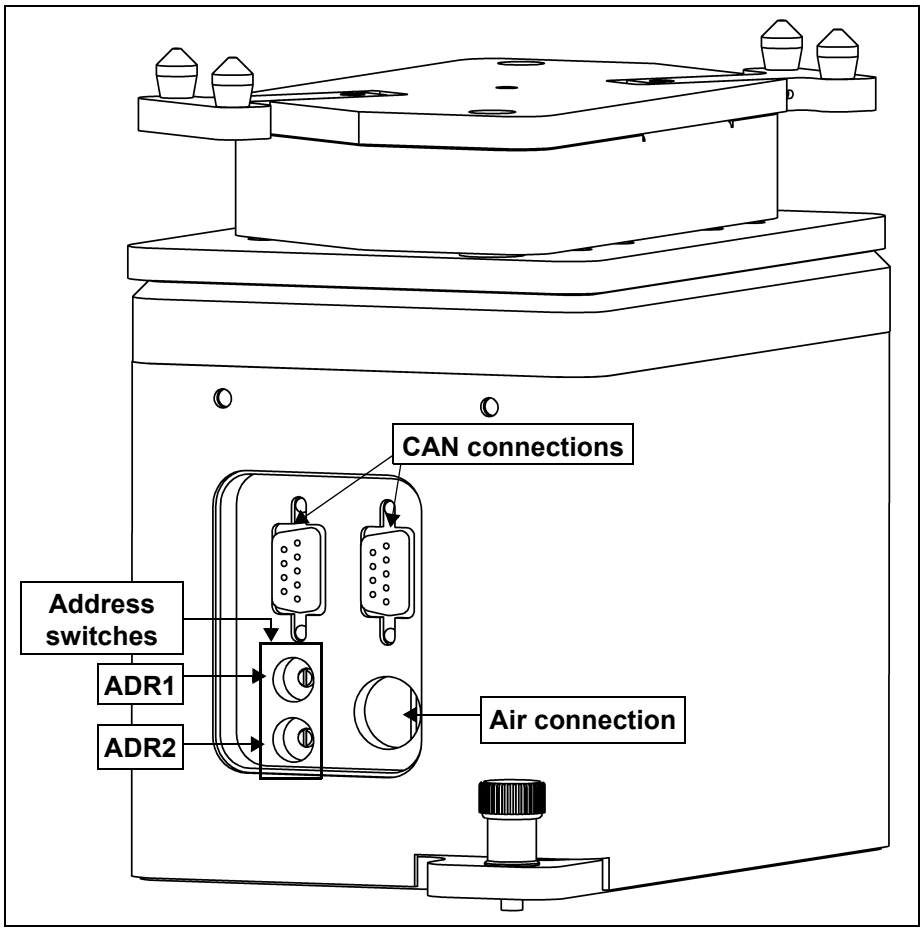

Figure 11-2. Microplate Shaking ALP connections

6. Attach air tubing from a 40 psi port on the outside of the left or right tower to the air inlet on the Microplate Shaking ALP (Figure 11-2).

Note: Make sure the tube routing does not interfere with the operation of the Biomek instrument.

7. Turn on the corresponding air valve.
8. Verify the ADR1 address switch is set to 1 (Figure 11-2).
9. Set ADR2 to a unique address between zero (0) and F, if multiple Microplate Shaking ALPs are on the deck (Figure 11-2).

Note: ADR2 is set to a default address of zero (0). If only one Microplate Shaking ALP is on the deck, ADR2 is the default setting.

11.3 Framing Instructions

Frame the Microplate Shaking ALP according to the instructions in the specific user's manual for the Biomek instrument

11.4 Using the Microplate Shaking ALP in a Method

To use the Microplate Shaking ALP in a method, it must be installed in Hardware Setup (refer to Chapter 1.3, *Installing and Configuring ALPs*).

Note: Configuration in Hardware Setup is not necessary for the ALP.

The Microplate Shaking ALP is controlled and operated through the Device Action step in Biomek Software (refer to the *Biomek Software User's Manual,* Chapter 22.6.1.5, *Configuring the Device Action Step for the Microplate Shaking ALP (FX, NX only)*). The speed, shaking time, and ramp time are all configured through the Device Action step for use in a method.

CAUTION: Set the shaking speed at the lowest setting and increase slowly to the desired setting. This helps prevent spills or splashing.

11.5 Controlling the Microplate Shaking ALP Outside a Method

Use Advanced Manual Control for:

- *Turning On the Microplate Shaking ALP Outside a Method* (Section 11.5.1).
- *Timing a Shaking Operation Outside a Method* (Section 11.5.2).
- *Turning Off the Microplate Shaking ALP Outside a Method* (Section 11.5.3).
- *Clamping or Unclamping a Plate Outside a Method* (Section 11.5.4).

11.5.1 Turning On the Microplate Shaking ALP Outside a Method

To turn on a Microplate Shaking ALP:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**.
3. Select the desired **Shake ALP**. Advanced Manual Control for the selected Microplate Shaking ALP appears (Figure 11-3).

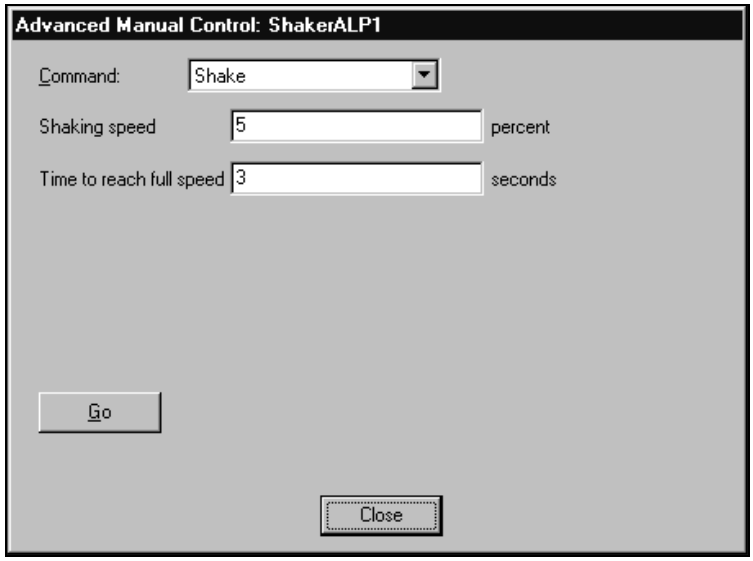

Figure 11-3. Advanced Manual Control for a selected Microplate Shaking ALP

4. From Command, choose **Shake**.
5. Enter a percentage in **Shaking speed**.

   Note: The allowed minimum percentage is 1 and the allowed maximum percentage is 100.

6. Enter a time in seconds in **Time to reach full speed**.
7. Choose **Go**.
8. Choose **Close** to close Advanced Manual Control.
9. Choose **Exit** to close Manual Control.

11.5.2 Timing a Shaking Operation Outside a Method

To time a shaking operation:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**.
3. Select the desired **Shaker ALP**. Advanced Manual Control for the selected Microplate Shaking ALP appears (Figure 11-3).
4. From Command, choose **Timed Shake.** Advanced Manual Control for the Microplate Shaking ALP with Timed Shake appears (Figure 11-4).

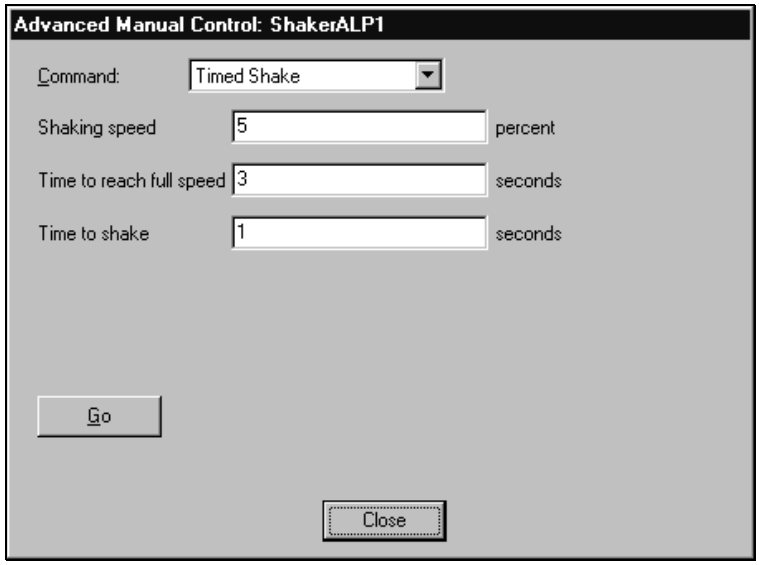

Figure 11-4. Advanced Manual Control for a Microplate Shaking ALP with Timed Shake choices

5. Enter a percentage in **Shaking speed**.

Note: The allowed minimum percentage is 1 and the allowed maximum percentage is 100.

6. Enter a time in seconds in **Time to reach full speed**.
7. Enter a time in seconds in **Time to shake**.
8. Choose **Go**.
9. Choose **Close** to close Advanced Manual Control.
10. Choose **Exit** to close Manual Control.

11.5.3 Turning Off the Microplate Shaking ALP Outside a Method

To turn off the Microplate Shaking ALP:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**.
3. Select the desired **Shaker ALP**. Advanced Manual Control for the selected Microplate Shaking ALP appears (Figure 11-3).
4. From Command, choose **Off**.
5. Choose **Go**.
6. Choose **Close** to close Advanced Manual Control.
7. Choose **Exit** to close Manual Control.

11.5.4 Clamping or Unclamping a Plate Outside a Method

To clamp or unclamp a plate on the Microplate Shaking ALP:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**.
3. Select the desired **Shaker ALP**. Advanced Manual Control for the selected Microplate Shaking ALP appears (Figure 11-3).
4. From Command, choose **Clamp** to activate the clamp on the Microplate Shaking ALP.

   OR

   From Command, choose **Unclamp** to deactivate the clamp on the Microplate Shaking ALP.
5. Choose **Go**.
6. Choose **Close** to close Advanced Manual Control.
7. Choose **Exit** to close Manual Control.

11.6 Removing the Microplate Shaking ALP

To remove the Microplate Shaking ALP:

1. Turn off power to the Biomek instrument before removing any active ALP.
2. Detach power/communication connection.
3. Shut off manual air valve on the tower.
4. Detach air tubing.
5. Loosen the thumbscrews on the base of the ALP.
6. Lift ALP straight up to clear the locating pins on the base of the ALP from the locating holes on the deck.

11.7 Storage

Return the Microplate Shaking ALP to the original packing materials and store in a dry, dust-free, environmentally controlled area.

Note: It is desirable to allow the Microplate Shaking ALP to air-dry before returning it to the original packing materials.

11.8 Preventive Maintenance

Clean up all spills immediately with a soft cloth, dampened with appropriate cleaning compound.

11.9 Troubleshooting

Do not remove covers for any reason. Do not attempt to repair the Microplate Shaking ALP without first contacting a Beckman Coulter Service Engineer.

Table 11-1. Troubleshooting the Microplate Shaking ALP

IF	THEN
The Microplate Shaking ALP is not functioning	Make sure a good power connection has been established.
The clamps are not grasping the labware	Make sure a good air connection has been established.

12 Multichannel Disposal ALP

12.1 Overview

The Multichannel Disposal ALP is a passive ALP that provides a means to dispose of tips during a method. When the slide is attached, it can be used to dispose of tips, tip boxes, and labware during a method.

This ALP is used by the Multichannel Pod in one of two ways:

- Multichannel Disposal ALP without Slide — The disposed tips are placed in a waste receptacle positioned inside the Disposal ALP base.

  OR

- Multichannel Disposal ALP with Slide — A slide that extends beyond the edge of the Biomek deck is inserted into the ALP. Tips, tip boxes, and labware placed inside the ALP slide down into a receptacle placed below.

Note: The Multichannel Disposal ALP is shipped so that either of the two options above can be assembled and used.

The sections in this chapter include:

12.1.1 Multichannel Disposal ALP without Slide

WARNING: When using the self-contained Multichannel Disposal ALP without the slide, do not overfill the disposal bag. Tips can spill over onto the deck, possibly contaminating the deck with hazardous materials.

When the Multichannel Disposal ALP is used as a self-contained waste receptacle without the slide, the bagging extension is attached, and a waste bag is mounted inside the ALP (Figure 12-1). The ALP is used in a standard deck position on the back row of the deck and is particularly effective when lab space is at a premium.

Note: The Multichannel Disposal ALP without Slide is used only for collecting shucked tips.

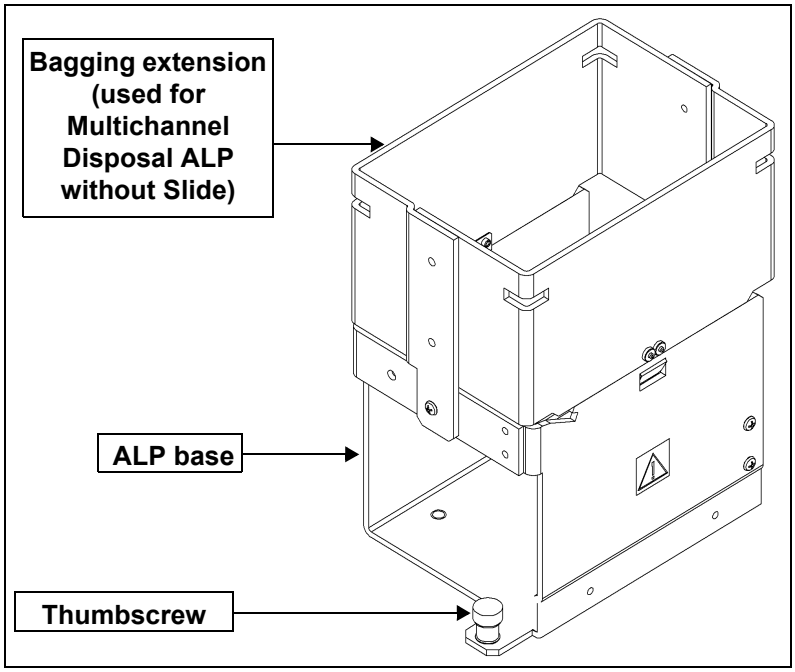

Figure 12-1. Multichannel Disposal ALP without Slide

12.1.2 Multichannel Disposal ALP with Slide

The Multichannel Disposal ALP with Slide (Figure 12-2) is positioned on the deck in one of the two center positions in the outside columns, and extends off the edge of the deck. The slide is directed through the gap between the deck and light curtain (or side safety shield). A trash receptacle is placed on the floor at the end of the slide to catch the waste. The Multichannel Disposal ALP with Slide allows the discard of as many used items as the trash receptacle is capable of holding.

The gripper can drop most types of used labware and tips directly into the Multichannel Disposal ALP with Slide.

Note: Separate Multichannel Disposal ALPs with Slides must be used for disposing of tips and labware. Used tips may stick to the slide, which could cause labware to jam in the chute. Check the slide periodically during the method run to ensure it is clear of tips.

Note: Since the slide of a Multichannel Disposal ALP extends beyond the edge of the Biomek deck, the deck must be modified to accommodate the slide. Refer to Section 12.4, *Installing Protective Shield Blanking Plate*, for more information on modifying the deck to accommodate a Multichannel Disposal ALP with Slide.

CAUTION: When using the Multichannel Disposal ALP with Slide, remove the bagging extension to avoid collisions between the pod and the Multichannel Disposal ALP.

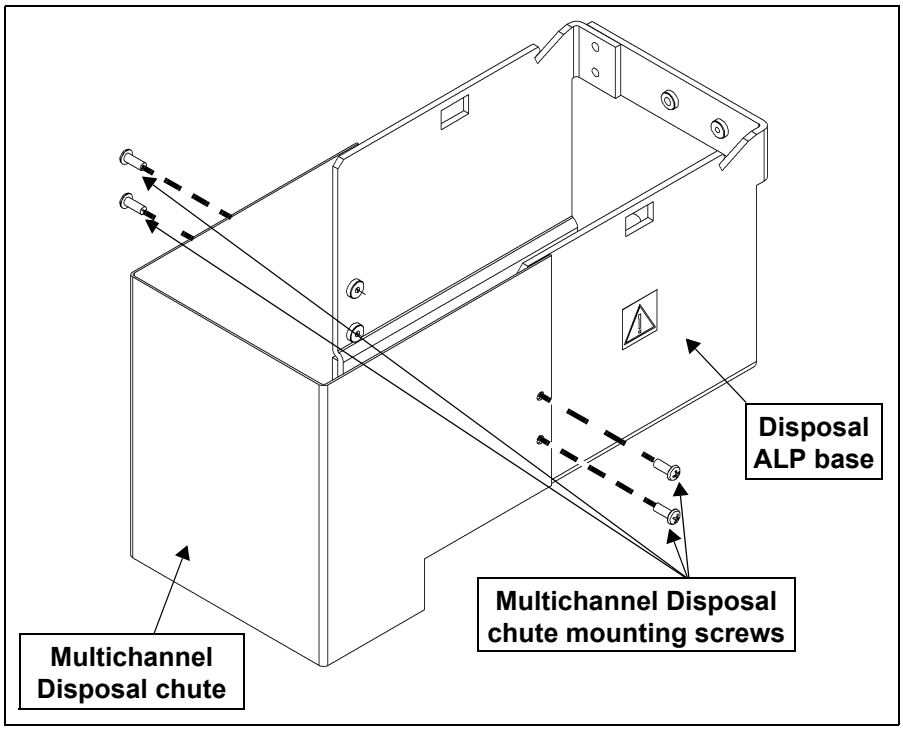

Figure 12-2. Multichannel Disposal ALP with Slide

12.2 Installing the Multichannel Disposal ALP without Slide

Installing the Multichannel Disposal ALP without Slide includes choosing a deck position and mounting the ALP to the deck

12.2.1 Choosing a Deck Position for the Multichannel Disposal ALP without Slide

CAUTION: The self-contained Multichannel Disposal ALP without Slide must be mounted on the back row of the Biomek deck to avoid collisions.

CAUTION: Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

The Multichannel Disposal ALP without Slide can be placed in five separate positions along the back of the Biomek deck.

When adding a Multichannel Disposal ALP without Slide to the Biomek deck, the ALP must be associated with that deck position in the Deck Editor. To associate the Multichannel Disposal ALP without Slide with a deck position in the Deck Editor, drag and drop **TipTrash** to the appropriate position in the deck view. For more information about associating an ALP with a deck position, refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*.

12.2.2 Mounting a Multichannel Disposal ALP without Slide

To mount a Multichannel Disposal ALP without Slide:

1. Remove the slide and chute from the Multichannel Disposal ALP. (12.7, *Removing a Multichannel Disposal ALP with Slide*, and Figure 12-3 for specific instructions and diagrams.)

CAUTION: Bagging extensions are not interchangeable between the Multichannel Disposal ALP and the Span-8 Disposal ALP. Each Disposal ALP must use the bagging extension designed for that ALP.

2. Snap the bagging extension onto the Disposal ALP base by lining up the springs on the bagging extension with the cutouts on the Disposal ALP base (Figure 12-3).

3. Apply downward force to the top of the bagging extension. The springs slip through to the inside of the Disposal ALP base and lock into the cutouts (Figure 12-3).

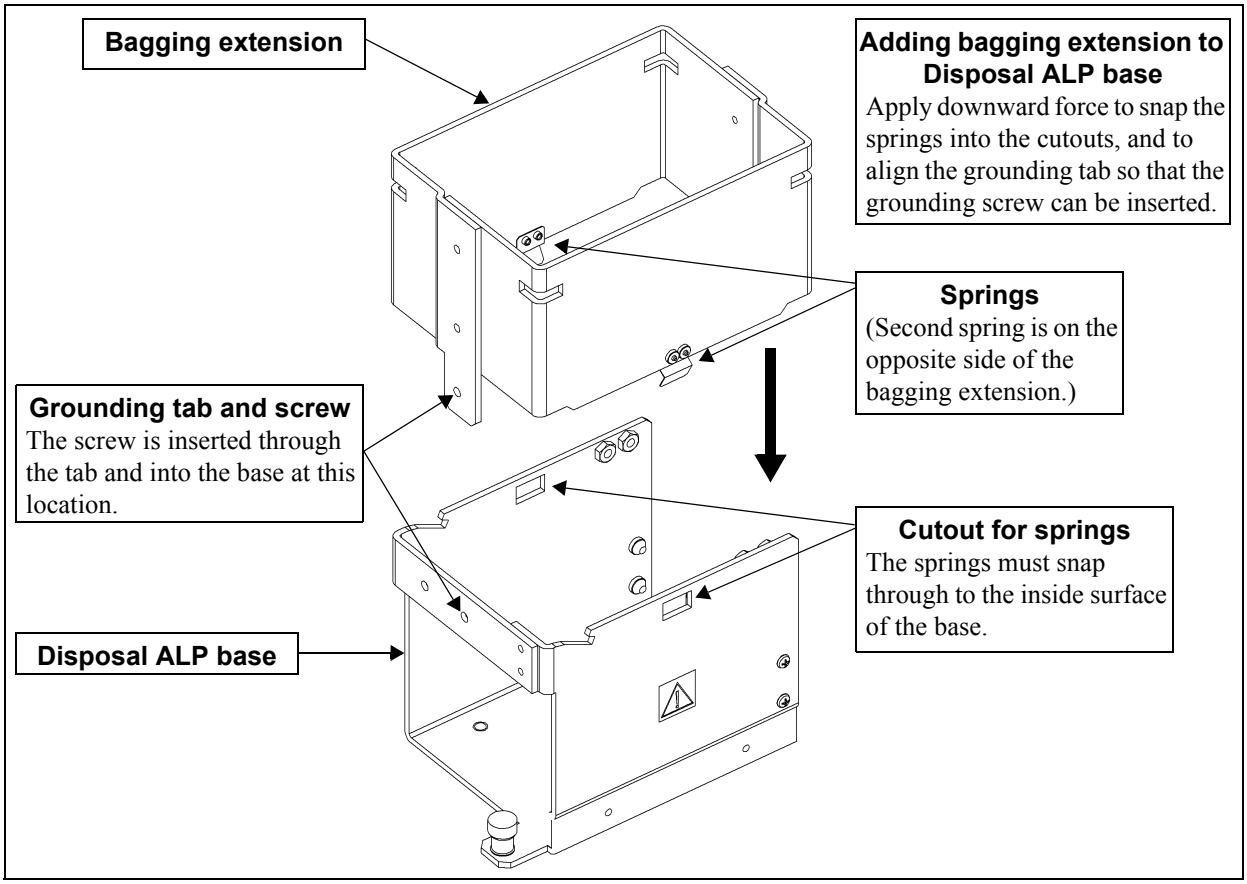

Figure 12-3. Multichannel Disposal ALP without Slide - exploded

4. Insert a screw through the hole in the grounding tab on the bagging extension and into the threaded hole in the Disposal ALP base (Figure 12-4).

Note: This screw is necessary for proper ESD grounding of the ALP.

5. Slip the locating pins on the bottom of the Multichannel Disposal ALP into the locating holes of the desired deck position.

6. Fasten the Multichannel Disposal ALP to the deck using the thumbscrews on the base of the Multichannel Disposal ALP (Figure 12-4).

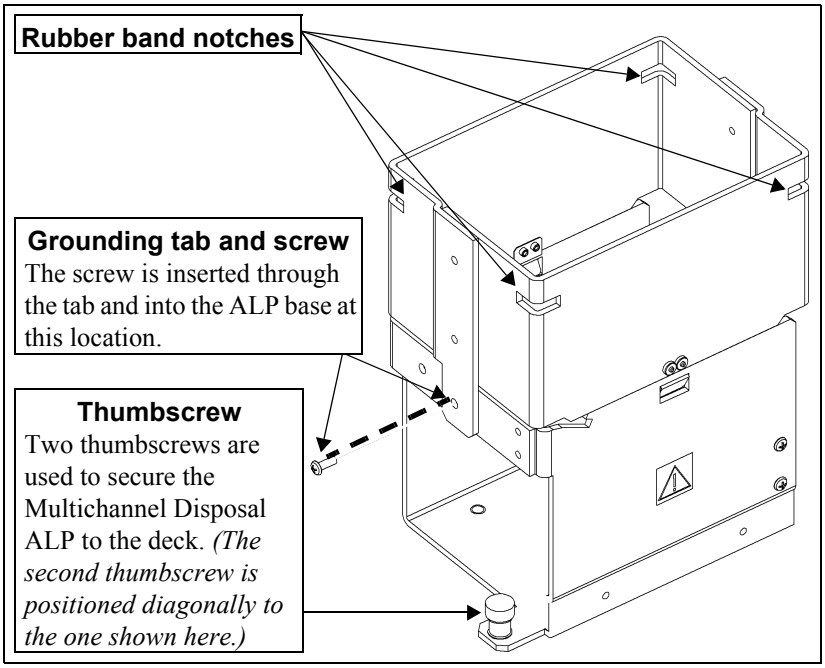

Figure 12-4. Multichannel Disposal ALP without Slide grounding tab and screw

WARNING: Appropriately marked autoclavable biohazard bags are recommended for hazardous applications. The waste bags shipped with the Multichannel Disposal ALP are not biohazard bags. Contact the laboratory safety officer for appropriate biohazard bags and procedures.

7. Fold the top of a waste bag over the frame so that the bottom of the bag reaches the bottom of the ALP base.
8. Smooth out the bag to allow items to drop directly to the bottom of the bag.

Note: For hazardous applications, appropriately marked autoclavable biohazard bags are recommended.

9. To hold the bag in place, stretch the rubber band over the top of the extension and receptacle bag until it fits into the notches on the corners of the extension (Figure 12-4).

12.3 Installing a Multichannel Disposal ALP with Slide

Installing a Multichannel Disposal ALP with Slide includes choosing a deck position and mounting the ALP to the deck.

Note: Since the slide of a Multichannel Disposal ALP extends beyond the edge of the Biomek deck, the deck must be modified to accommodate the slide. Refer to Section 12.4, *Installing Protective Shield Blanking Plate*, for more information on modifying the deck to accommodate a Multichannel Disposal ALP with Slide.

12.3.1 Choosing a Deck Position for the Multichannel Disposal ALP with Slide

CAUTION: The Multichannel Disposal ALP with Slide must be mounted in the 2nd or 3rd row in the left and right outside columns of the Biomek FX deck to avoid collisions.

CAUTION: Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

The Multichannel Disposal ALP with Slide can be placed in one of the two center positions in the outside columns, and extends off the edge of the Biomek deck.

When adding a Multichannel Disposal ALP with Slide on the left or right outside column of the Biomek deck, the ALP must be associated with that deck position in the Deck Editor. To associate the Multichannel Disposal ALP with Slide with a deck position in the Deck Editor, drag and drop **TrashLeft** or **TrashRight** to the appropriate position in the deck view. For more information about associating an ALP with a deck position, refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*.

12.3.1.1 Mounting a Multichannel Disposal ALP with Slide to the Deck

To mount a Multichannel Disposal ALP with Slide:

1. Position the Disposal Chute by lining up the holes in the disposal chute with the threaded holes in the Disposal ALP base (Figure 12-5).

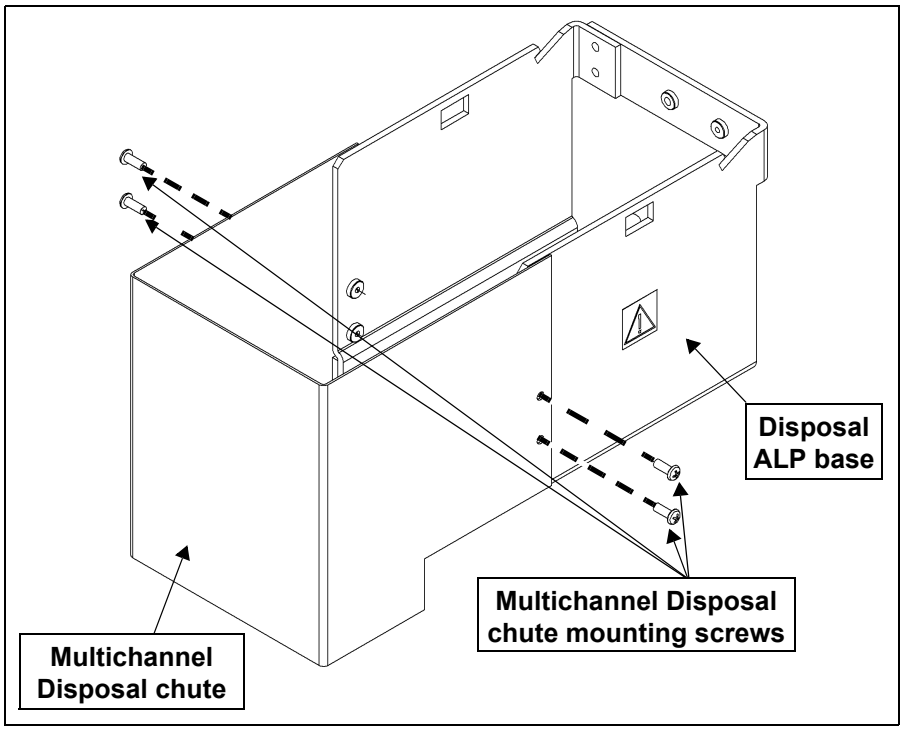

Figure 12-5. Multichannel Disposal ALP with Slide

2. Attach the disposal chute to the Disposal ALP base using the four screws supplied (Figure 12-5).
3. Place the Multichannel Disposal ALP in one of the center positions in an outside column of the deck. This allows the slide to extend downward beyond the left or right side of the deck.
4. Slip the locating pins on the bottom of the Multichannel Disposal ALP into the locating holes on the deck.

5. Fasten the Multichannel Disposal ALP to the deck using the thumbscrews on the base of the Multichannel Disposal ALP (Figure 12-6).

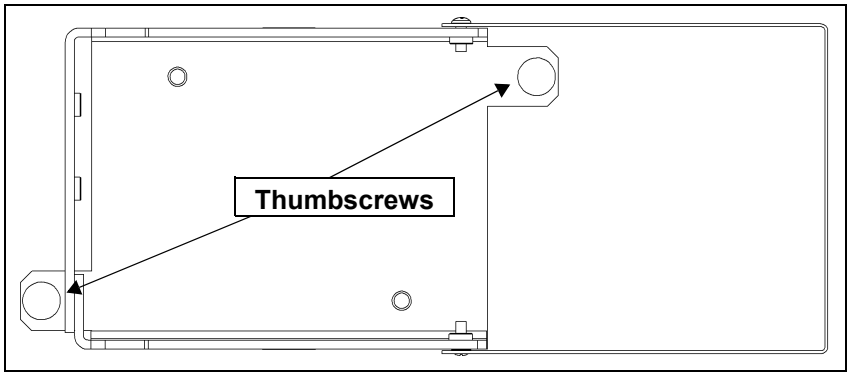

Figure 12-6. Multichannel Disposal ALP with Slide thumbscrews (bottom view)

6. Attach the disposal slide to the Multichannel Disposal ALP by lowering the upper tabs into the grooves in the Disposal ALP base (Figure 12-7). The disposal slide rests its lower tabs on the front of the Multichannel Disposal ALP base.

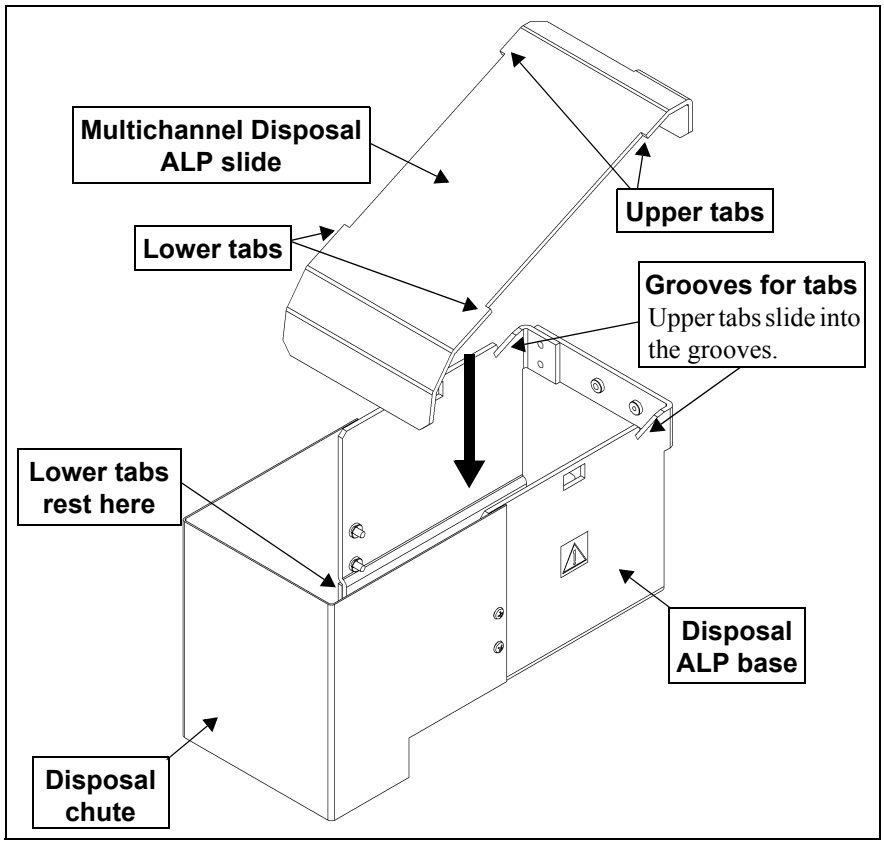

Figure 12-7. Multichannel Disposal ALP slide attachment

7. Insert the ground screw through the tab on the back of the disposal slide and into the threaded hole in the Disposal ALP base (Figure 12-8).

Note: This screw is necessary for proper ESD grounding of the ALP.

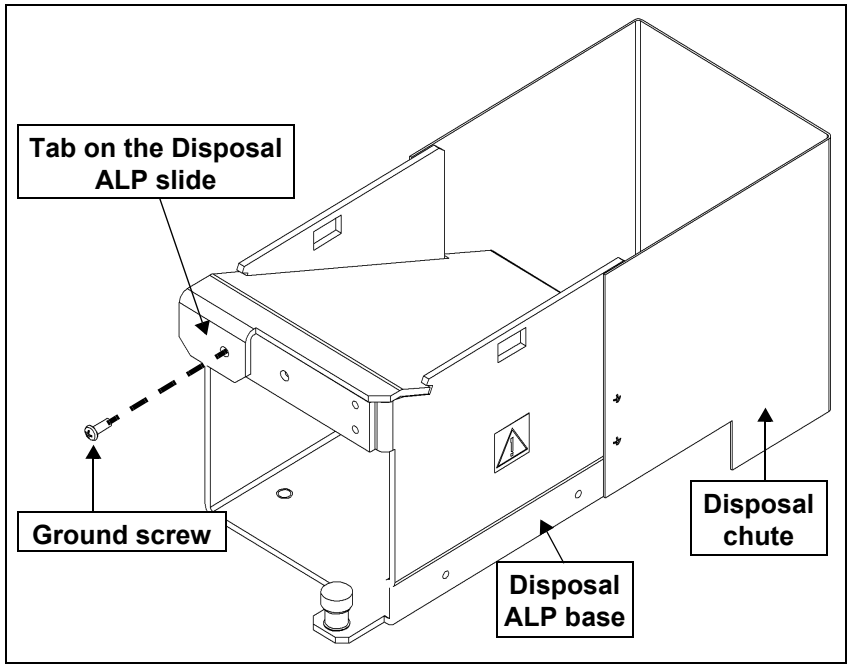

Figure 12-8. Multichannel Disposal ALP with Slide ground screw placement

8. Place a trash receptacle at the end of the disposal chute to catch disposed items.
9. Look down through the disposal chute, or drop a test item into the Multichannel Disposal ALP, to make sure the trash lands in the receptacle. Adjust the placement of the trash receptacle as required.

12.4 Installing Protective Shield Blanking Plate

WARNING: To reduce risk of personal injury, operate only with all protective shields in place.

When components of the Biomek FX instrument are installed so that they extend beyond the edge of the work table, a protective bottom shield must be installed by the Beckman Coulter Service Engineer to ensure operator protection on the side overhanging the table. This protective bottom shield contains a solid blanking plate and a cutout blanking plate (Figure 12-10).

When the Biomek FX instrument does not extend beyond the edge of the work table, the solid blanking plate is installed. To accommodate the slide on the Multichannel Disposal ALP with Slide, the solid blanking plate is replaced with the cutout blanking plate. To accommodate the slides of two Disposal ALPs (Multichannel or Span-8), the solid blanking plate and cutout blanking plate are removed, leaving an opening for two Disposal ALP slides.

There are four deck positions available for a Multichannel Disposal ALP with Slide (Figure 12-9):

- L2
- L3
- R2
- R3

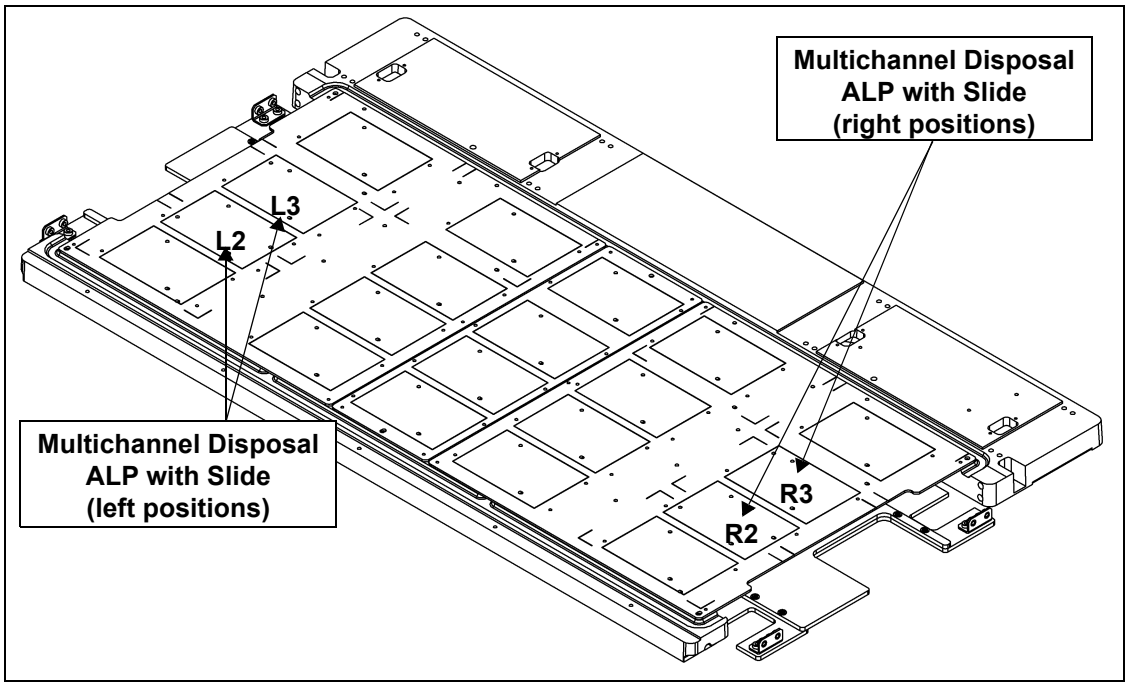

Figure 12-9. Multichannel Disposal ALP with Slide deck positions

12.4.1 Multichannel Disposal ALP with Slide in L2

When a Multichannel Disposal ALP with Slide is installed in L2 on the Biomek FX deck (Figure 12-9), install the blanking plate with the cutout as follows:

1. Remove the four fasteners holding the solid blanking plate.
2. Remove the solid blanking plate.
3. Orient the blanking plate cutout as shown in (Figure 12-10).
4. Attach the blanking plate to the bottom shield. This creates an opening next to L2 for a slide.

Note: Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

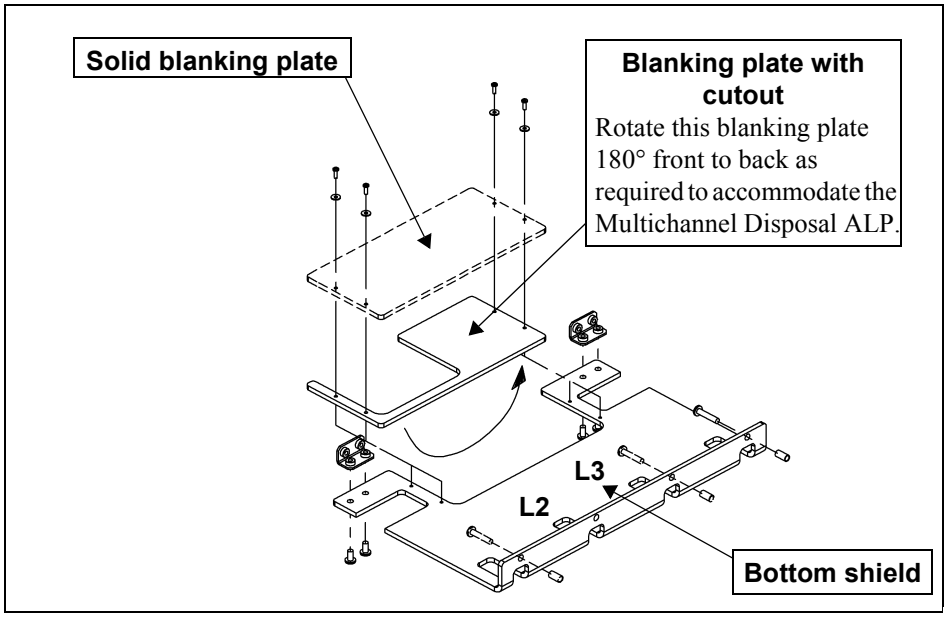

Figure 12-10. Left side bottom shield with solid and cutout blanking plates

12.4.2 Multichannel Disposal ALP with Slide in L3

When a Multichannel Disposal ALP with Slide is installed in L3 on the Biomek FX deck (Figure 12-9), orient and install the blanking plate with the cutout as follows:

1. Remove the four fasteners holding the solid blanking plate.
2. Remove the solid blanking plate.
3. Rotate the blanking plate with the cutout 180° from the one shown in Figure 12-10.
4. Attach the blanking plate to the bottom shield. This creates an opening next to L3 for a slide.

Note: Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

12.4.3 Multichannel Disposal ALPs with Slide in Both L2 and L3

When Multichannel Disposal ALPs with Slide are installed in both L2 and L3:

1. Remove the four fasteners holding the solid blanking plate.
2. Remove the solid blanking plate. This creates an opening large enough for two slides.

12.4.4 Disposal ALP in R2

When a Multichannel Disposal ALP with Slide is installed in R2 on the Biomek FX deck (Figure 12-9), orient and install the blanking plate with the cutout as follows:

1. Remove the four fasteners holding the solid blanking plate.
2. Remove the solid blanking plate.
3. Rotate the blanking plate with the cutout 180° from the one shown in Figure 12-11.
4. Attach the blanking plate with the cutout to the bottom shield. This creates an opening next to R2 for the slide.

Note: Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

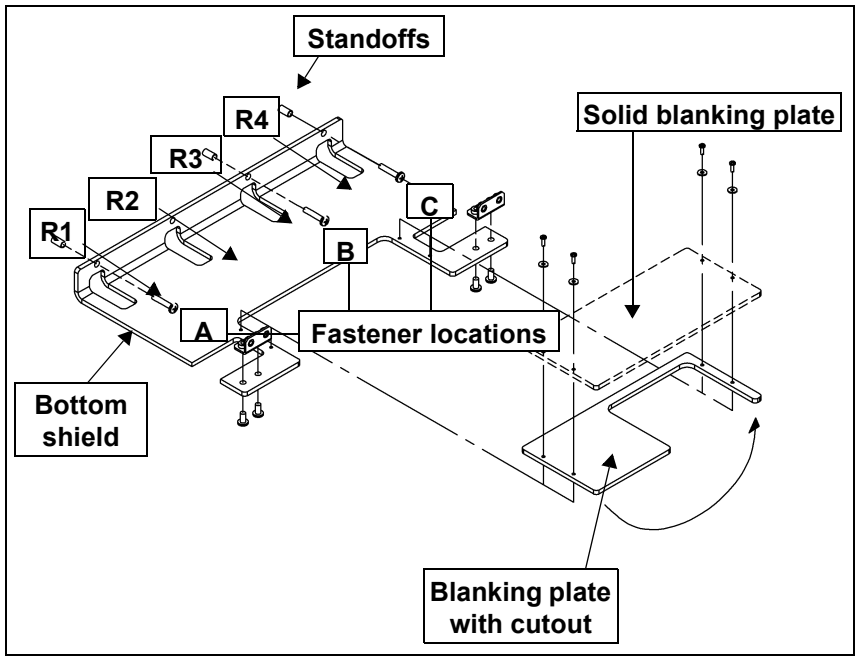

Figure 12-11. Right side bottom shield with solid and cutout blanking plates

12.4.5 Multichannel Disposal ALP with Slide in R3

When a Multichannel Disposal ALP with Slide is installed in R3 on the Biomek FX deck (Figure 12-9), orient and install the blanking plate with the cutout as follows:

1. Remove the four fasteners holding the solid blanking plate.
2. Remove the solid blanking plate.
3. Orient the blanking plate cutout as shown in Figure 12-11.
4. Attach the blanking plate with the cutout to the bottom shield. This creates an opening next to R3 for a slide.

Note: Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

12.4.6 Multichannel Disposal ALPs with Slide in Both R2 and R3

When Multichannel Disposal ALPs with Slide are installed in both R2 and R3:

1. Remove the four fasteners holding the solid blanking plate.
2. Remove the solid blanking plate. This creates an opening large enough for two slides.

12.5 Framing Instructions

No special framing is necessary for the Multichannel Disposal ALP (with or without Slide). Framing the ALP occurred when the deck was framed with the Shift Deck command. For more information refer the the specific user's manual for the instrument.

12.6 Removing a Multichannel Disposal ALP without Slide

Removing a Multichannel Disposal ALP without Slide includes removing the ALP and the bagging extension (refer to Section 12.6.1, *Removing the Bagging Extension*).

WARNING: The waste bag may be contaminated. Follow the appropriate decontamination and disposal procedures outlined by the laboratory safety officer.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: SPILL HAZARD.

To remove the Multichannel Disposal ALP without Slide:

1. Remove the rubber band and waste receptacle from the ALP.
2. Dispose of the bag and contents as specified by the safety officer.
3. Loosen the thumbscrews on the base of the Multichannel Disposal ALP.
4. Lift the Multichannel Disposal ALP from the deck so that the locating pins on the bottom of the ALP base clear the locating holes on the deck.

12.6.1 Removing the Bagging Extension

To remove the bagging extension from the Multichannel Disposal ALP:

1. Remove the grounding screw.
2. Grasp the bagging extension firmly with one hand and the base firmly with the other.
3. Pull the bagging extension forcefully from the ALP base to separate the extension from the base.
4. Store the extension in a clean, dry, dust-free area.
5. Insert the screw back into the threaded hole on the Multichannel Disposal ALP base.

12.7 Removing a Multichannel Disposal ALP with Slide

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

To remove the Multichannel Disposal ALP with Slide:

1. Verify that no labware or tips remains on the slide. If labware remains on the slide, remove the labware as specified by the laboratory safety officer.
2. Remove the trash receptacle and dispose of the contents as specified by the laboratory safety officer.
3. Remove the grounding screw from the grounding tab on the slide.
4. Lift the slide from the base.
5. Insert the grounding screw back into the threaded hole on the disposal base.
6. Loosen the Multichannel Disposal ALP thumbscrews on the base of the Multichannel Disposal ALP.
7. Lift the Multichannel Disposal ALP from the deck so that the locating pins on the bottom of the ALP base clear the locating holes on the deck.
8. To detach the chute, remove the four screws attaching the chute to the disposal base.
9. Insert the four screws back into the threaded holes in the disposal base.

12.8 Storage

Return the Multichannel Disposal ALPs (with and without Slide) to their original packing materials and store in a dry, dust-free, environmentally-controlled area.

Note: It is desirable to allow the Multichannel Disposal ALPs to air-dry before returning them to their original packing materials.

12.9 Preventive Maintenance

WARNING: The Multichannel Disposal ALP may be contaminated. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the Multichannel Disposal ALP with a soft cloth.

13 Multichannel Tip Wash ALPs

13.1 Overview

Using a step in a method, the 96-Channel Tip Wash ALP (Figure 13-1) and 384-Channel Tip Wash ALP (Figure 13-2) are active ALPs that wash tips on the deck. The 96-Channel Tip Wash ALP, used with a 96-Channel Head, has 96 cleaning wells, while the 384-Channel Tip Wash ALP, used with the 384-Channel Head, has 384 cleaning wells.

Note: Washing tips in a method using a Multichannel Tip Wash ALP is configured in the Transfer or Combine steps (refer to the *Biomek Software User's Manual,* Chapter 15.3, *Configuring Transfer and Combine Steps*), and Wash (refer to the *Biomek Software User's Manual,* Chapter 16.6, *Wash Step*) steps.

Note: Use the Device Action step for a Multichannel Tip Wash ALP to allow the ALP to continue washing until the Finish step is executed (refer to the *Biomek Software User's Manual,* Chapter 22.6.1.6, *Configuring the Device Action Step for a Multichannel Tip Wash ALP (FX, NX-MC only)*).

These ALPs provide a flow of wash fluid from a source reservoir for tip washing. A peristaltic pump, also known as a passive or pulsating pump, circulates the fluid through the ALP from the source reservoir to a waste reservoir.

To ensure that the correct Multichannel Tip Wash ALP is used on an instrument with two or more Multichannel Tip Wash ALPs, each ALP must be configured to use a unique liquid type (refer to Section 13.3, *Configuring Multiple Wash Stations on an Instrument*).

Both Multichannel Tip Wash ALPs are installed and removed in the same manner. While they are also framed using the same procedure, specific Framing Tool Adaptors are used with each type. If a more precise location of the tips when they are submerged into the cleaning wells during a wash is desired, offsets for framing both ALPs may be entered (refer to Section 13.5, *Entering Offsets for the Multichannel Tip Wash ALPs*).

Note: The adaptor for the 96-Channel Tip Wash ALP is red and the adaptor for the 384-Channel Tip Wash ALP is blue. Make sure the correct adaptor is used.

The sections in this chapter include:

- *Installing Multichannel Tip Wash ALPs* (Section 13.2)
- *Configuring Multiple Wash Stations on an Instrument* (Section 13.3)
- *Framing Instructions* (Section 13.4)
- *Entering Offsets for the Multichannel Tip Wash ALPs* (Section 13.5)
- *Removing the Multichannel Tip Wash ALPs* (Section 13.6)
- *Storage* (Section 13.7)
- *Preventive Maintenance* (Section 13.8)
- *Troubleshooting* (Section 13.9)

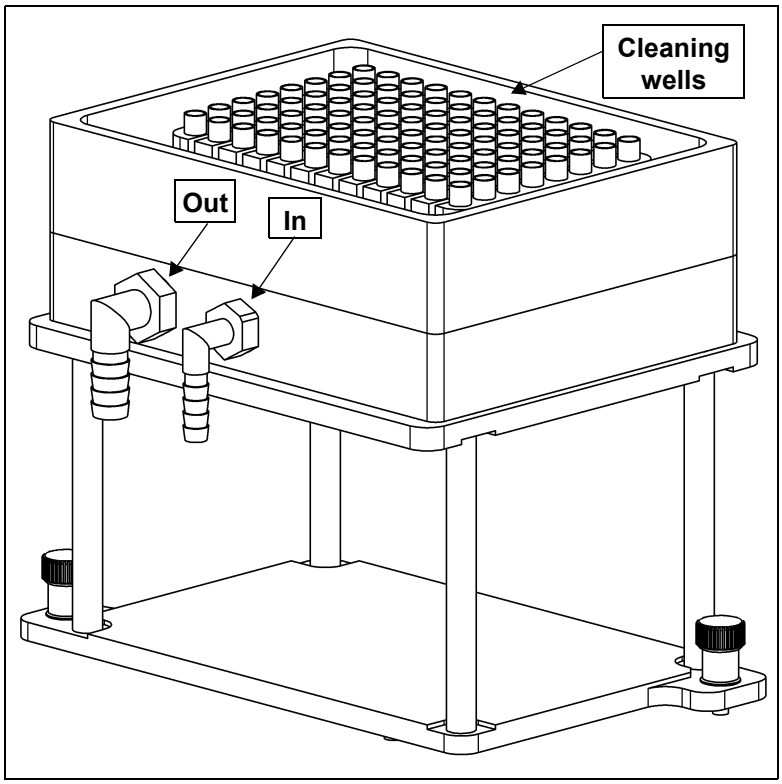

Figure 13-1. 96-Channel Tip Wash ALP

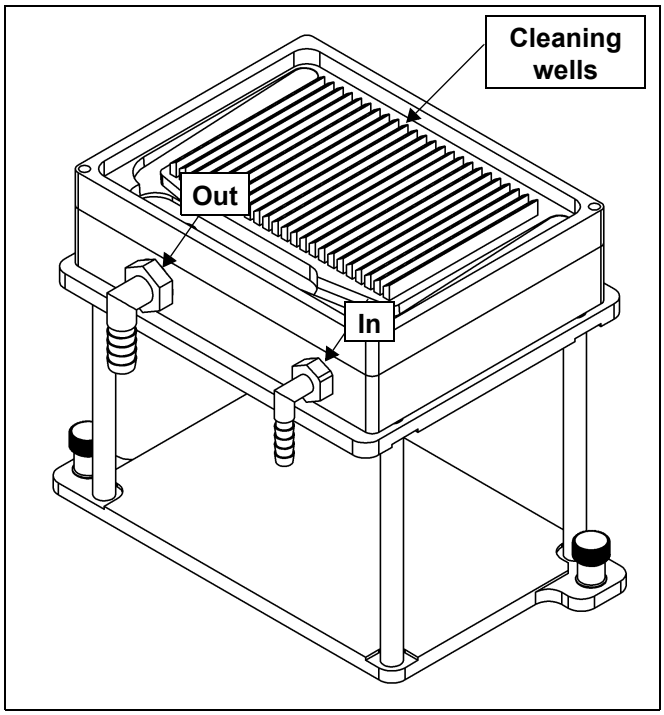

Figure 13-2. 384-Channel Tip Wash ALP

13.2 Installing Multichannel Tip Wash ALPs

Installing Multichannel Tip Wash ALPs to the deck includes choosing the deck position and mounting the ALP to the deck.

WARNING: SPILL HAZARD.

WARNING: Do not kink the hoses.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: Orient the Multichannel Tip Wash ALPs so the in and out connections face the back of the Biomek instrument.

CAUTION: Use the 96-Channel Tip Wash ALP only with the 96 disposable tip head.

CAUTION: Use the 384-Channel Tip Wash ALP only with the 384 disposable tip head.

Note: The Multichannel Tip Wash ALPs require both an in and an out hose to attach the ALP to the pump.

13.2.1 Choosing a Deck Position

Use the Deck Editor to determine where the ALP may be mounted on the deck. The positions capable of supporting the ALP are indicated by dashed lines.

Note: In the Deck Editor, the 96-Channel Tip Wash ALP is referred to as WashStation96 and the 384-Channel Tip Wash ALP is referred to as WashStation384.

Note: After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).

13.2.2 Mounting Multichannel Tip Wash ALPs to the Deck

Before mounting the Multichannel Tip Wash ALPs to the deck, ensure the requirements for tubing are met (refer to Section 13.2.2.1, *Tubing*).

13.2.2.1 Tubing

The supply tubing for the Multichannel Tip Wash ALPs is 1/4" inside diameter, while the drain tubing is 3/8" inside diameter. When the tubing is connected, the drain tubing must run through the peristaltic pump in the opposite direction to the supply tubing and into the waste reservoir.

Note: Make sure the tube routing does not interfere with the operation of the Biomek instrument.

To mount Multichannel Tip Wash ALPs to the deck:

1. Ensure the requirements for tubing are met (refer to Section 13.2.2.1, *Tubing*).
2. Attach the tip wash reservoir to the tip wash stand using the supplied thumbscrews to create the Multichannel Tip Wash ALP (Figure 13-3).

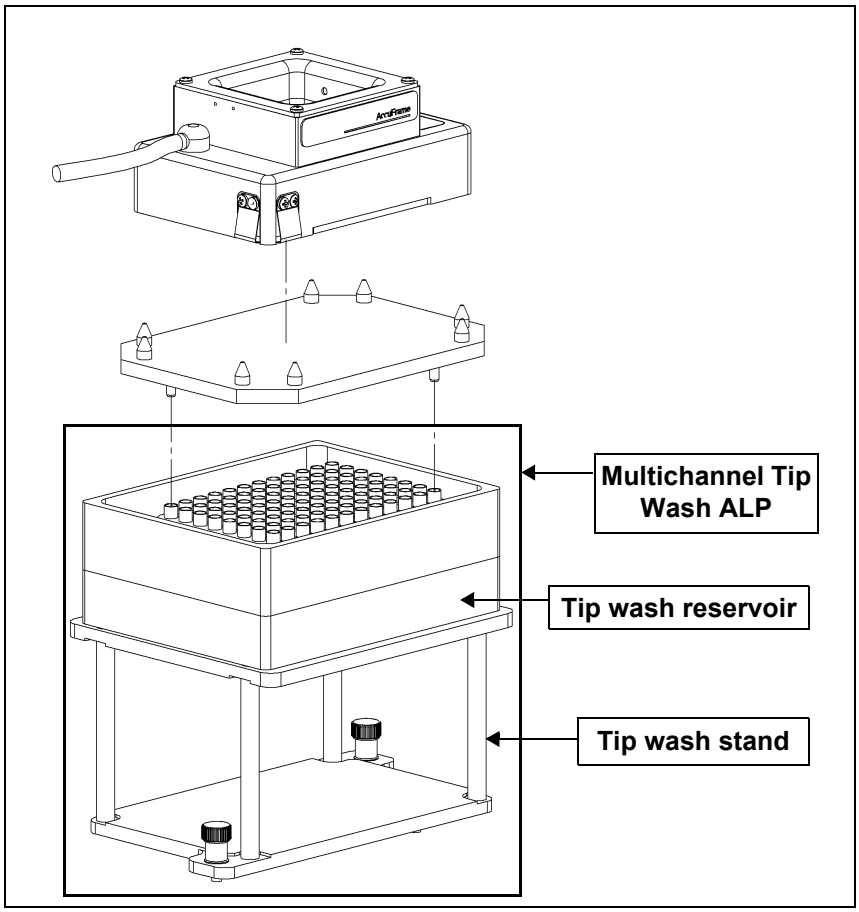

Figure 13-3. Tip wash reservoir and tip wash stand to create the 96-Channel Tip Wash ALP

3. Position the ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck, and the hoses are on the back side of the ALP.

Note: The in/out hose connections on the 384-Channel Tip Wash ALP MUST face the back of the Biomek instrument.

4. Fasten the ALP to the deck using the thumbscrews located on the base of the tip wash stand (Figure 13-3).
5. Position the peristaltic pump at an off-deck location close to the ALP.
6. Place the source and waste reservoirs under the lab bench or in an accessible space lower than the instrument height.
7. Attach the in hose (part number 6485-35) to the small hole on the ALP (Figure 13-1or Figure 13-2).
8. Run the in hose through the appropriate pump head of the peristaltic pump.

9. Attach the opposite end of the in hose to the source reservoir. Run the hoses through either the access holes on the back of the instrument between the towers, or between the light curtain and the deck on the side of the Biomek instrument.

   Note: Make sure the tube routing does not interfere with the operation of the Biomek instrument.

10. Attach the out hose to the large hole on the Multichannel Tip Wash ALP (Figure 13-1 or Figure 13-2).

11. Run the out hose (part number 6485-36) in the opposite direction through the out pump head on the peristaltic pump.

    Note: The peristaltic pump must be connected to the Device Controller. The Device Controller turns the pump On and Off as requested by the software (refer to Appendix A:, *Device Controller*).

12. Attach the opposite end of the out hose to the waste reservoir.

13. Fill the source reservoir with the desired cleaning fluid.

14. Turn on the pump.

13.3 Configuring Multiple Wash Stations on an Instrument

Multichannel Tip Wash ALPs and other wash ALPs are identified as wash stations in the Biomek Software. To ensure that the correct wash station is used on an instrument with two or more wash stations, each wash station must be configured to use a unique liquid type.

To configure a unique liquid type for a wash station:

1. In the Liquid Type Editor, create a new liquid type or copy an existing liquid type for the wash station; for example, create a new liquid type called WS1_Liquid.

   Note: Each liquid type must have a unique name; for example, WS1_Liquid or WS2_Liquid.

   Note: Refer to the *Biomek Software User's Manual,* Chapter 8.2, *Creating New Liquid Types*, for more information on creating new liquid types, and Section 8.4, *Copying and Pasting Liquid Types Within a Project File*, for more information on copying liquid types.

2. In the Instrument Setup step, double-click the desired wash station. Labware Properties for the wash station appears (Figure 13-4).

Figure 13-4. Labware Properties for a Wash Station ALP

3. In Liquid Type:, select the unique liquid type created for that wash station; for example, WS1_Liquid.
4. Choose **OK** to save the change and close Labware Properties.
5. For each additional wash station, repeat steps 2 through 4, selecting the appropriate liquid type for each wash station.

   Note: Each wash station must use a unique liquid type.

6. In any steps where tips are washed, such as Transfer or Combine, select a specific wash station by selecting the appropriate liquid type in Wash tips in.

13.4 Framing Instructions

Special framing instructions are necessary for Multichannel Tip Wash ALPs which are framed using the AccuFrame and a Framing Tool Adaptor.

The Framing Tool Adaptor for the 96-Channel Tip Wash ALP is red and the Framing Tool Adaptor for the 384-Channel Tip Wash ALP is blue. Make sure the correct Framing Tool Adaptor is used for each type of Multichannel Tip Wash ALP.

If a more precise location of the tips when they are submerged into the cleaning wells during a wash is desired, offsets for framing both ALPs may be entered (refer to Section 13.5, *Entering Offsets for the Multichannel Tip Wash ALPs*).

To frame the Multichannel Tip Wash ALPs:

1. Place the Framing Tool Adaptor on the ALP (Figure 13-5) ensuring that the correct adaptor is used.

Note: The Framing Tool Adaptor for the 96-Channel Tip Wash ALP is red and the Framing Tool Adaptor for the 384-Channel Tip Wash ALP is blue.

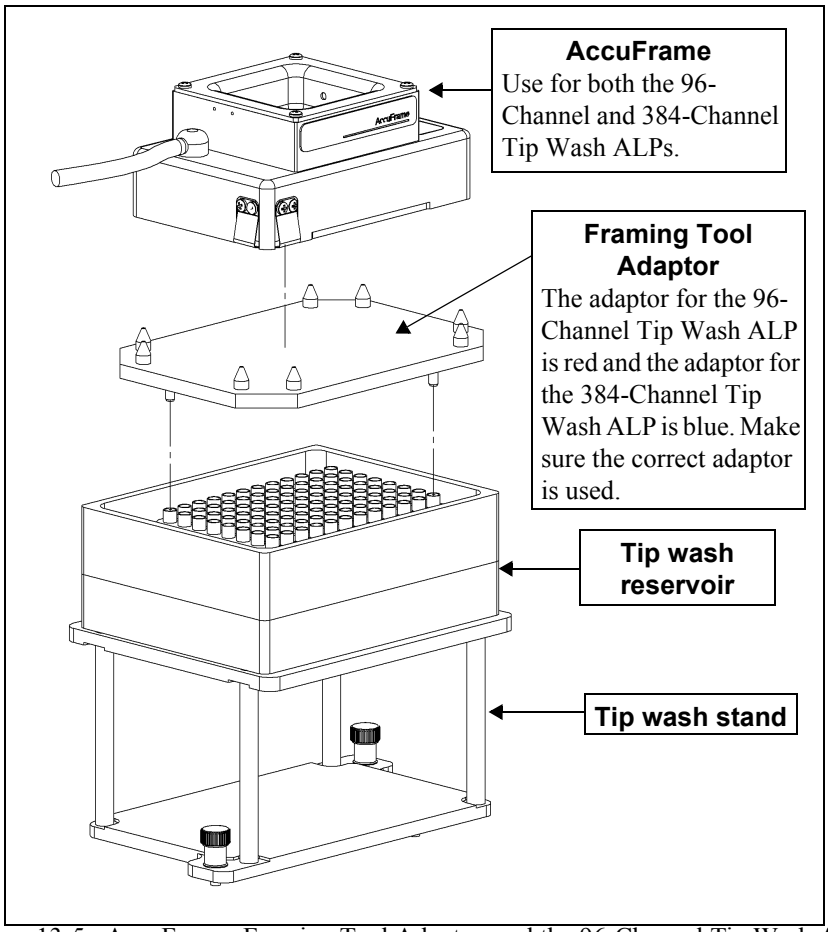

Figure 13-5. AccuFrame, Framing Tool Adaptor, and the 96-Channel Tip Wash ALP

CAUTION: Turn off power to the Biomek instrument before attaching or removing AccuFrame from the instrument deck.

2. Turn off power to Biomek instrument before connecting the AccuFrame.

3. Plug the AccuFrame into an available CAN port on the Biomek tower.

WARNING: Make sure the light curtain is not violated by the AccuFrame cable. If the light curtain is violated, the framing process halts immediately.

WARNING: Make sure the AccuFrame cable does not interfere with pod movement.

4. Turn on power to Biomek instrument.
5. Manually place the AccuFrame into the Framing Tool Adaptor by placing the front right corner first and pushing the AccuFrame gently down into the adaptor (Figure 13-5).
6. Frame the ALP according to procedures outlined in the specific user's manual for the instrument.

13.5 Entering Offsets for the Multichannel Tip Wash ALPs

If a more precise location of the tips in the cleaning wells of the Multichannel Tip Wash ALPs during a wash is desired, offsets for framing the Multichannel Tip Wash ALPs may be entered.

Refer to the *Biomek Software User's Manual,* Section 5.4.3.3, *Changing Per-Labware Offsets* for instructions on changing Per-labware Offsets. The X and Y offsets are entered using the following instructions:

1. Create a short method using the Multichannel Tip Wash ALP.

   Note: Washing tips in a method using a Multichannel Tip Wash ALP is configured in the Transfer or Combine steps (refer to the *Biomek Software User's Manual,* Chapter 15.3, *Configuring Transfer and Combine Steps*), and Wash steps (refer to the *Biomek Software User's Manual,* Chapter 16.6, *Wash Step*).

2. Based on a visual observation during the method run, use the following explanation to determine the offsets:

   - If the tips are positioned too much to the left of the center of the wells, increase the number in the X cm (Figure 13-6).
   - If the tips are positioned too much to the right of the center of the wells, decrease the number in the X cm (Figure 13-6).
   - If the tips are positioned too much to the back of the center of the wells, increase the number in the Y cm (Figure 13-6).
   - If the tips are positioned too much to the front of the center of the wells, decrease the number in the Y cm (Figure 13-6).
   - If the tips are positioned are positioned too far down into the wells, increase the number in the Z cm (Figure 13-6).
   - If the tips are positioned are positioned too far above the wells, decrease the number in the Z cm (Figure 13-6).

   Note: Estimate the amount or measure with a ruler or calipers.

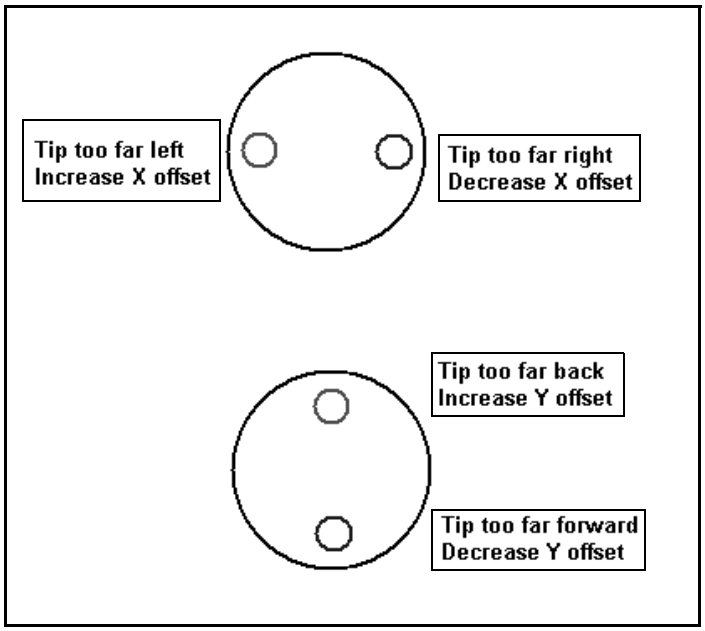

Figure 13-6. Tip and offset explanation

3. When the offsets have been determined, choose **WashStation** or **WashStation384**, depending on the type of Multichannel Tip Wash ALP, and enter them in X cm, Y cm, and Z cm (Figure 13-7).

Note: WashStation refers to the 96-Channel Tip Wash ALP while WashStation384 refers to the 384-Channel Tip Wash ALP.

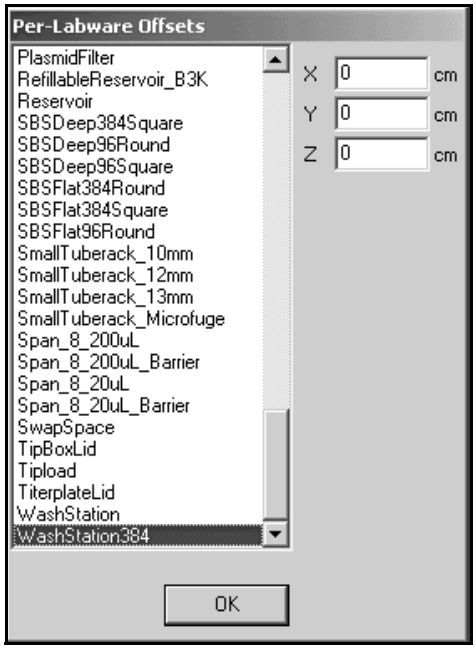

Figure 13-7. Per-Labware Offsets

4. Choose **OK**.
5. Reframe the Multichannel Tip Wash ALP according to the instructions in Section 13.4, *Framing Instructions*, ensuring the correct Framing Tool Adaptor is used.

13.6 Removing the Multichannel Tip Wash ALPs

To remove Multichannel Tip Wash ALPs from the deck:

1. Power down the external pump.

WARNING: SPILL HAZARD

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

2. Detach the in and out hoses from the tip wash reservoir (Figure 13-1 or Figure 13-2).
3. Remove the tip wash reservoir carefully; a small amount of fluid normally remains after draining and could spill.
4. Loosen the thumbscrews from the deck.

WARNING: Always wear protective gloves when draining the tip wash fluid.

5. Lift and tilt the tip wash reservoir slightly to the back right corner to allow the fluid to drain.
6. Remove the ALP from the deck.

13.7 Storage

Return Multichannel Tip Wash ALPs to the original packing materials and store in a dry, dust-free, environmentally controlled area.

Note: It is desirable to allow Multichannel Tip Wash ALPs to air-dry before returning them to the original packing materials.

13.8 Preventive Maintenance

Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

13.9 Troubleshooting

Do not attempt to repair a Multichannel Tip Wash ALP without first contacting a Beckman Coulter Service Engineer.

Table 13-1. Troubleshooting the Multichannel Tip Wash ALP

IF	THEN
A Multichannel Tip Wash ALP is not functioning correctly	Make sure that the hoses and cables are attached and routed to the Multichannel Tip Wash ALP properly.
The pod is not using the correct wash station	Make sure the desired liquid type is selected for use during the wash process. OR Make sure a specific wash station is selected when the wash process is configured.

14 Orbital Shaker ALP

14.1 Overview

The Orbital Shaker ALP (Figure 14-1) is an active ALP that shakes labware using an orbital shaking motion. Thumbscrews attach the ALP to the Biomek deck and a clamping mechanism anchors and positions labware for shaking and pipetting operations.

Microplates can be added to the Orbital Shaker ALP by a lab technician or the gripper.

Note: When labware is manually placed on the Orbital Shaker ALP, it should be placed in the back, left corner of the device.

Note: Labware positioned on the Orbital Shaker ALP is gripper accessible, but not stackable.

Note: The Orbital Shaker ALP supports pipetting to and from all labware except 1536-well microplates and PCR microplates.

The sections in this chapter include:

CAUTION: Clamp all labware positioned on the Orbital Shaker ALP even when using the ALP as a standard deck position, such as a 1 x 1 or a swap space.

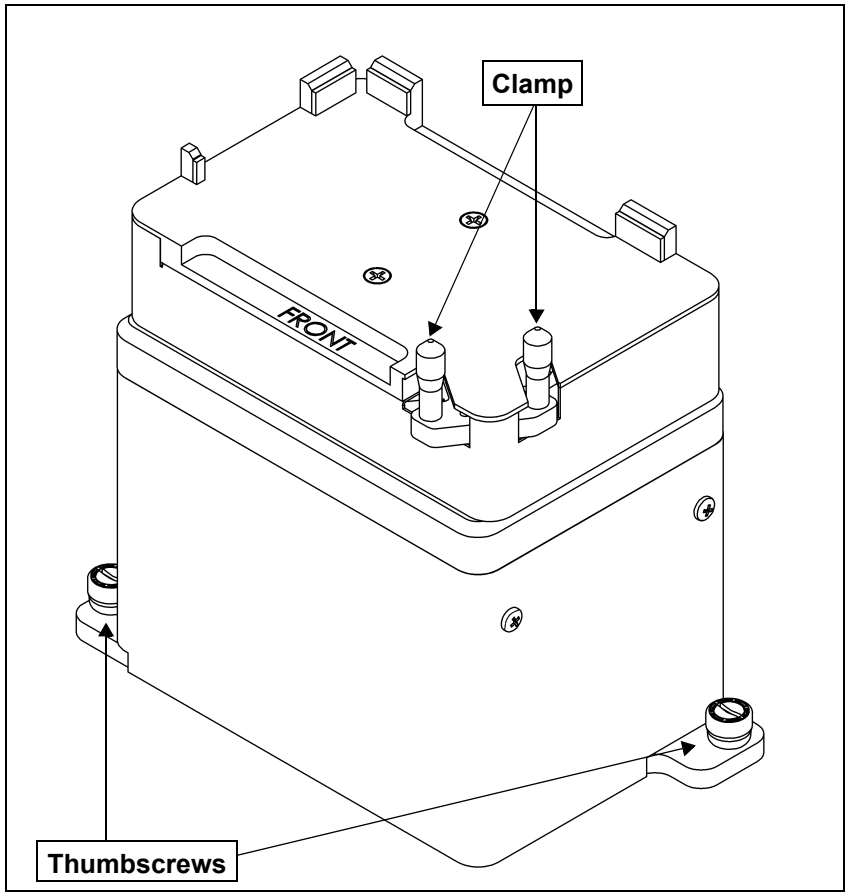

Figure 14-1. Orbital Shaker ALP

14.2 Installing the Orbital Shaker ALP

Installing the Orbital Shaker ALP includes choosing any standard position and mounting the ALP to the deck.

Note: After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).

14.2.1 Mounting an Orbital Shaker ALP to the Deck

Note: Orbital Shaker ALPs cannot be chained together or to any other ALP.

To mount the Orbital Shaker ALP to the deck:

1. Turn off power to Biomek instrument before mounting any active ALP.
2. Position the ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck, the CAN connections are oriented to the left and back of the Biomek deck, and the clamp is on the right front corner of the ALP.

   Note: The front of the ALP is indicated with the word "FRONT" etched on the microplate platform of the ALP.

   Note: Use the deck laser etchings as a guide when positioning an Orbital Shaker ALP on the deck.
3. Fasten the ALP to the deck using the thumbscrews on the base of the ALP.

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

4. Plug the female end of the CAN communication cable into the male CAN Port on the ALP (Figure 14-2).

   Note: Short CAN cables should be used whenever possible, especially when positioning the ALP in the back row of the Biomek deck. Long CAN cables can be used when positioning the ALP in the first three rows on the Biomek deck.

WARNING: Do not chain Orbital Shaker ALPs together or to any other ALP.

CAUTION: A maximum of four (4) Orbital Shaker ALPs may be used on a deck at one time.

5. Plug the male end of the CAN communication cable into any female connector labeled CAN Port on the Biomek instrument.

   Note: Make sure the cable routing does not interfere with the operation of the Biomek instrument or any other active ALP.

6. Verify that one of the address switches (ADR1 or ADR2) is set to a unique address between zero (0) and F (Figure 14-2).

Note: ADR2 is set to a default address of zero (0). If only one Orbital Shaker ALP is on the deck, ADR2 should be left at the default setting and ADR1 should be set to a unique address.

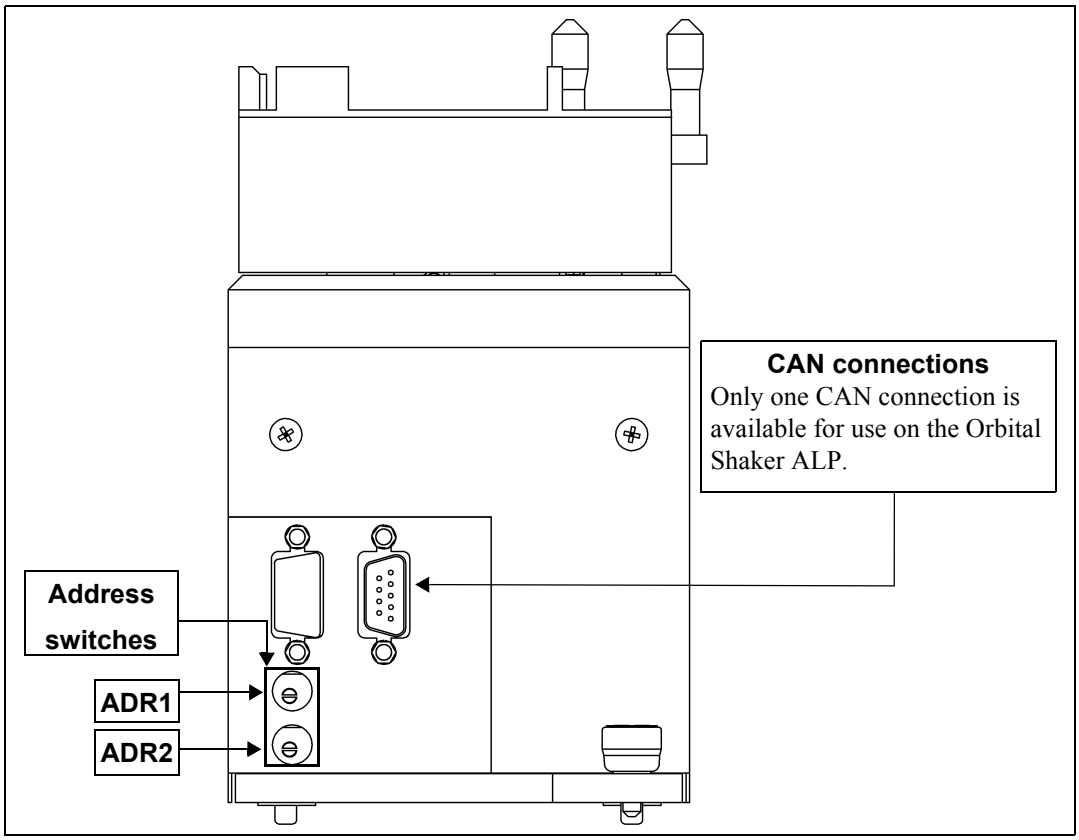

Figure 14-2. Orbital Shaker ALP connections

14.3 Framing Instructions

Special framing instructions are necessary for the Orbital Shaker ALP to ensure gripper access to labware and tip access to all wells of a microplate positioned on the ALP without damaging the tips, probes, gripper, pod, labware, or ALP.

Note: The Orbital Shaker ALP supports pipetting to and from all labware supported by the Biomek instrument except 1536-well microplates and PCR microplates.

The framing process for the Orbital Shaker ALP includes accessing different functions of the Biomek Software, mounting some hardware to the pod, and accurately positioning the AccuFrame Tool on the ALP.

The framing process includes:

- *Installing the Framing Fixture, Homing the Axes, and Installing the AccuFrame Tool*.
- *Homing the Microplate Platform and Actuating the Clamps*.
- *Framing the Deck Position with the Deck Editor*.
- *Removing the AccuFrame from the ALP and the Framing Fixture from the Biomek Instrument Pod*.

14.3.1 Installing the Framing Fixture, Homing the Axes, and Installing the AccuFrame Tool

To frame the Orbital Shaker ALP, the AccuFrame Tool and framing fixture must be installed:

WARNING: Turn off power to the Biomek instrument before attaching or removing the AccuFrame.

1. Plug the AccuFrame into any available CAN port on a Biomek tower.
2. Turn on power to the Biomek instrument.
3. Choose **Instrument>Manual Control** to open Manual Control. An Information dialog (Figure 14-3) briefly appears as a connection is established with the Biomek instrument, immediately followed by Manual Control (Figure 14-4).

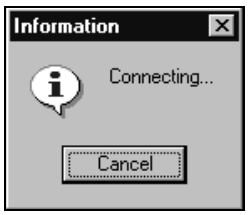

Figure 14-3. Confirms Manual Control is connecting

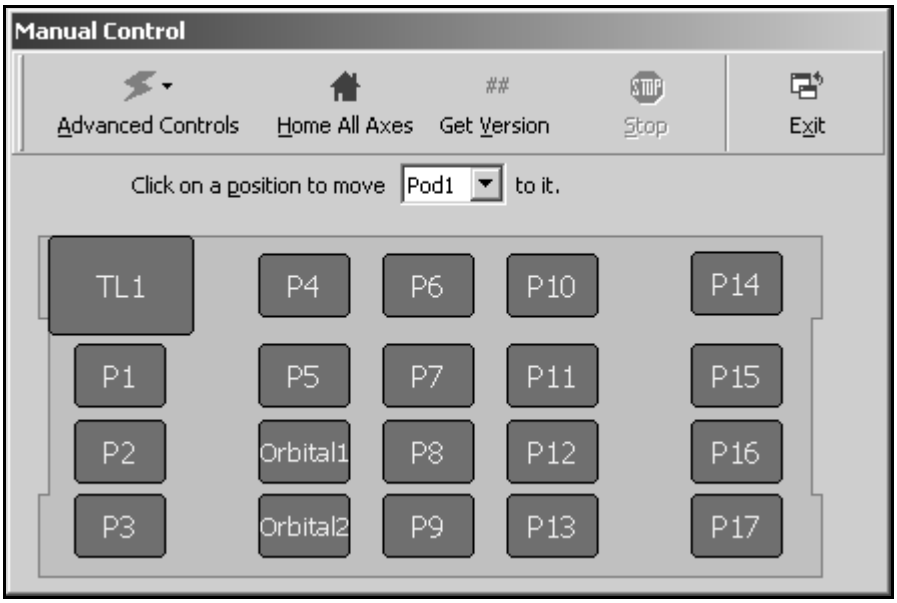

Figure 14-4. Manual Control

4. Choose **Home All Axes** (Figure 14-4). A Warning appears (Figure 14-5).

Figure 14-5. Warning that appears when homing all axes

5. Meet the conditions and, when conditions have been met, select **OK**. The Biomek instrument homes the pod in the X, Y, Z, and D axes.

CAUTION: Make sure there are no tips on the head.

6. Attach the framing fixture (Figure 14-6) to the pod by holding the framing fixture against the head with the framing guides pressed to the outside of the back row and left column of mandrels.

Note: Make sure the front of the framing fixture is to the front of the instrument, and the framing guides are to the back and left of the instrument (Figure 14-6).

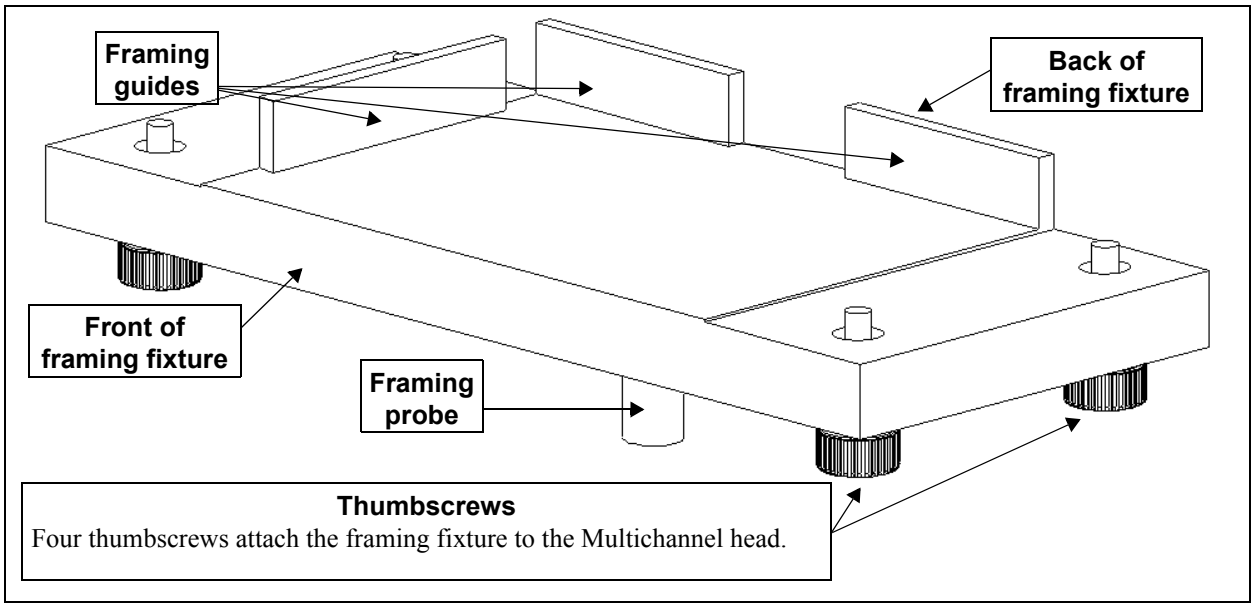

Figure 14-6. Framing fixture

7. Gently pull the framing fixture to the front and right. Verify the framing guides are touching the mandrels.
8. Tighten each thumbscrew by turning to the right until the framing fixture is firmly attached to the head. The pod is now ready for framing.

Now that the AccuFrame Tool and the framing fixture have been installed, continue the framing procedure by homing the microplate platform and actuating the clamps.

14.3.2 Homing the Microplate Platform and Actuating the Clamps

The framing process for the Orbital Shaker ALP continues by accessing Advanced Manual Control to home the microplate platform and actuate the clamps.

1. Choose **Instrument>Manual Control** to open Manual Control. An Information dialog (Figure 14-3) briefly appears as a connection is established with the Biomek instrument, immediately followed by Manual Control (Figure 14-4).

2. Choose **Advanced Controls**. A list of all the installed pods and devices appears (Figure 14-7).

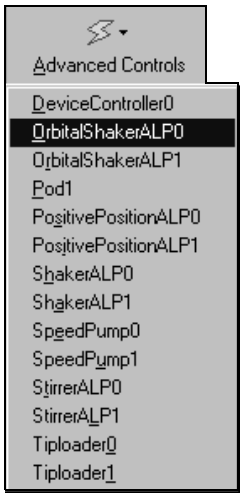

Figure 14-7. Advanced Controls

3. Select the desired **OrbitalShakerALP**. Advanced Manual Control for the selected Orbital Shaker ALP appears (Figure 14-8).

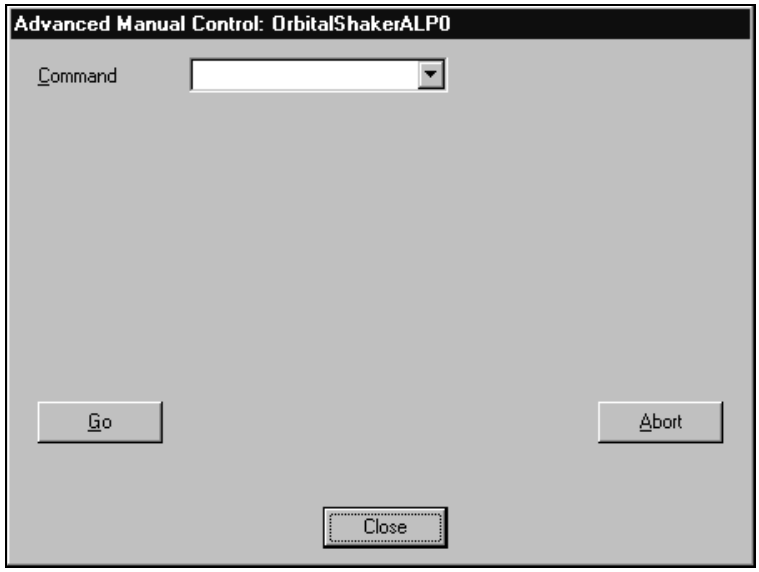

Figure 14-8. Advanced Manual Control for an Orbital Shaker ALP

4. In Command, select **Unclamp** (Figure 14-9).

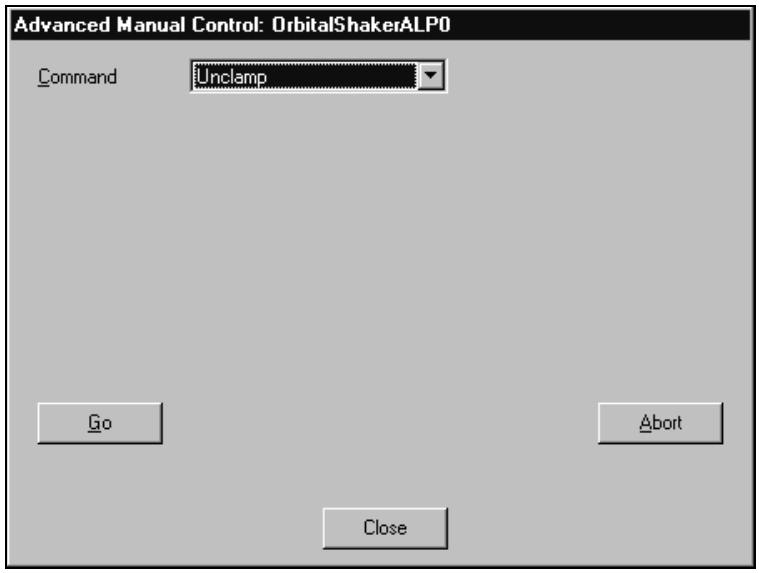

Figure 14-9. Using Advanced Manual Control to unclamp an Orbital Shaker ALP

5. Choose **Go**. The Orbital Shaker ALP actuates the clamps.
6. Manually place the AccuFrame against the back, left corner of the Orbital Shaker ALP.

Note: Make sure that the AccuFrame is fully seated along the posts along the back and left sides of the ALP.

7. In Command, select **Clamp** (Figure 14-10).

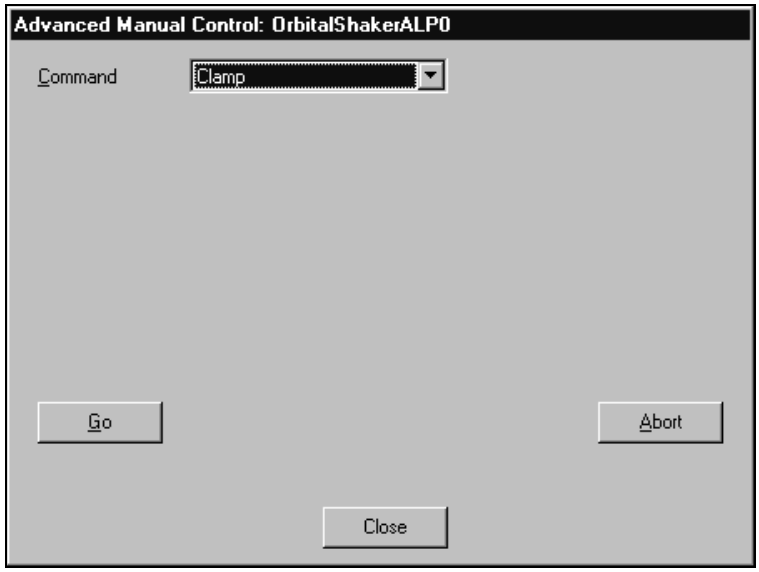

Figure 14-10. Using Advanced Manual Control to actuate the clamp on an Orbital Shaker ALP

8. Choose **Go**. The Orbital Shaker ALP securely clamps the AccuFrame.

9. In Command, select **Home** (Figure 14-11).

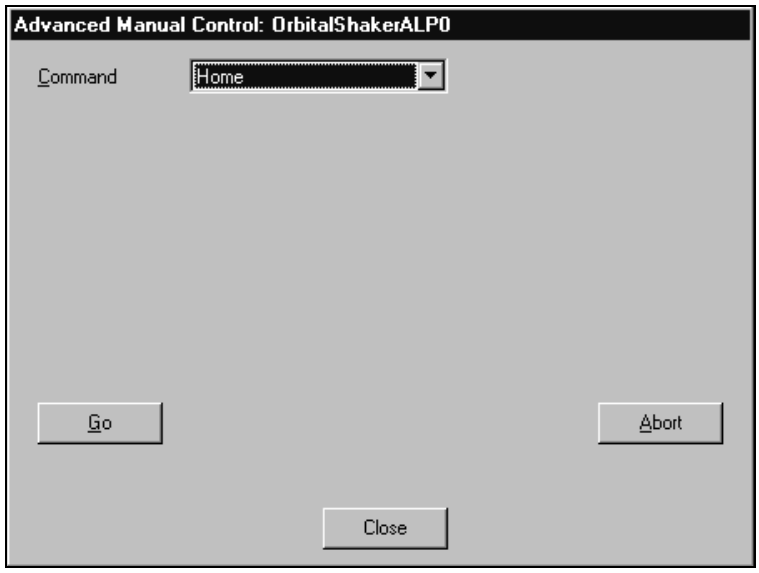

Figure 14-11. Using Advanced Manual Control to home the microplate platform on an Orbital Shaker ALP

10. Choose **Go**. The Orbital Shaker ALP homes the microplate platform.
11. Choose **Close** to close Advanced Manual Control.
12. Choose **Exit** to close Manual Control.

Now that the microplate platform has been homed and the clamp has been actuated to securely position and hold the AccuFrame, continue the framing process by accessing the Deck Editor.

14.3.3 Framing the Deck Position with the Deck Editor

The framing process for the Orbital Shaker ALP continues using the Deck Editor to frame the deck position.

1. Choose **Instrument>Deck Editor** to open the Deck Editor.
2. Open the deck that requires framing. Verify that the deck displayed in the Deck View reflects the current configuration of ALPs on the physical deck of the Biomek instrument.

Note: If the Deck View does not reflect the current physical deck, place ALPs on the appropriate deck locations by dragging and dropping ALPs from the ALP Types List onto the Deck View. When the Deck View reflects the configuration of the current physical deck, proceed to step 3.

3. Double-click on the deck position in the deck view that contains the AccuFrame. Position Properties appears (Figure 14-12).

Note: The coordinates displayed in Position Properties are default values; the software must be taught precisely where the ALPs physical position is on the deck.

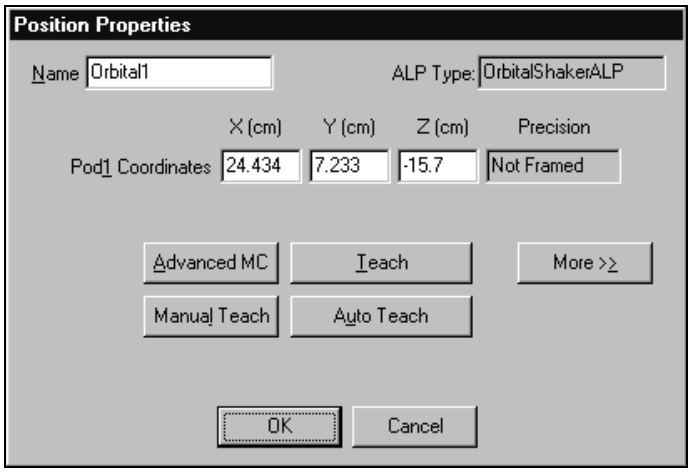

Figure 14-12. Position Properties for the selected Orbital Shaker ALP

4. In Pod, choose the pod used to frame the ALP: **Pod 1** or **Pod 2**.

   - ***FX*** — Pod is available only if the Biomek instrument is configured as a dual-pod instrument.

Note: Any pod accessing an ALP must be framed to that ALP.

5. Choose **Auto Teach**. The pod moves to the position being taught. The framing probe on the framing fixture should be above the AccuFrame in that position.
6. Visually verify that the framing probe is positioned to lower within the AccuFrame Tool without hitting the walls of the AccuFrame.
7. Choose **OK** to begin framing the position.

Note: The pod lowers and moves around inside the AccuFrame automatically until it breaks both light beams. The pod stops after framing is completed, and the two light beam indicators are illuminated.

Note: An error message appears if both light beams are not broken when the pod is lowered into the AccuFrame. If this occurs, using Advanced Manual Control, move the pod until the probe breaks both light beams and all the indicator lights are on. Choose **Teach**, and the pod continues the teaching process. The pod may also be moved by hand until the probe breaks both light beams and all the indicator lights are on.

8. Wait until the pod stops moving and **Teaching Instructions** appears (Figure 14-13).

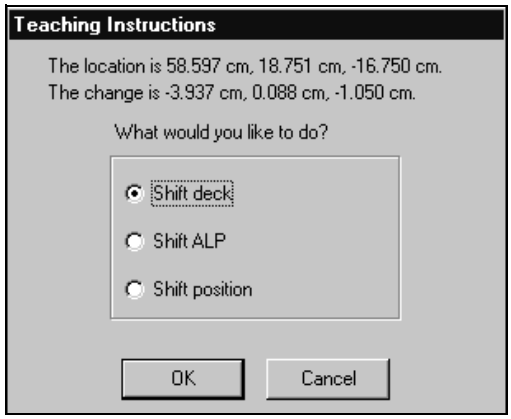

Figure 14-13. Teaching Instructions

9. Choose from **Shift deck**, **Shift ALP**, or **Shift position** for appropriate teaching instructions.
10. Choose **OK** if the coordinates displayed in Teaching Instructions appear reasonable. Position Properties appears again, and the position is framed for the selected pod.
11. Choose **OK** to save changes and close Position Properties.
12. Choose **Save** to close the Deck Editor.

Now that the ALP has been framed, finish the framing procedure by removing the framing fixture and the AccuFrame.

14.3.4 Removing the AccuFrame from the ALP and the Framing Fixture from the Biomek Instrument Pod

The framing process for the Orbital Shaker ALP concludes by removing the framing fixture from the pod and accessing Advanced Manual Control to remove the AccuFrame from the ALP.

1. Choose **Instrument>Manual Control>Advanced Controls** to open Advanced Manual Control.
2. Select the desired **OrbitalShakerALP**. Advanced Manual Control for the selected Orbital Shaker ALP appears (Figure 14-8).
3. In Command, select **Unclamp** (Figure 14-9).
4. Choose **Go**. The Orbital Shaker ALP opens the clamps.

WARNING: Turn off power to the Biomek instrument before attaching or removing the AccuFrame.

5. Turn off power to the Biomek instrument.
6. Remove the AccuFrame from the ALP.

Note: To frame additional Orbital Shaker ALPs, repeat the framing procedure, while moving the AccuFrame to each Orbital Shaker ALP on the physical deck. If not framing other ALPs, continue with step 7.

7. Choose **Close** to close Advanced Manual Control.
8. Choose **Exit** to close Manual Control.
9. Remove the framing fixture from the head of the Multichannel Pod after all Orbital Shaker ALPs have been framed.

Note: Any pod accessing an ALP must be framed to that ALP.

- ***FX*** — On a dual-pod system in which both pods access an ALP, both pods must be framed to that ALP.

The Orbital Shaker ALP has been successfully framed. For additional information on framing, refer to the specific user's manual for the instrument.

14.4 Using the Orbital Shaker ALP in a Method

To use the Orbital Shaker ALP in a method, it must be installed in Hardware Setup (refer to Section 1.3.1, *Installing an ALP in Hardware Setup*).

CAUTION: When creating a method with an Orbital Shaker and a stack of labware, first move the labware to another ALP, preferably a passive ALP, and then move it to the Orbital Shaker. The offsets allowed with stacking may cause the labware to be gripped off center; however, moving labware from a passive ALP ensures it is gripped properly.

Using the Orbital Shaker ALP in a method includes:

- *Establishing a Safe Maximum Shaking Speed* (Section 14.4.1)
- *Configuring a New Labware Type for Use on the Orbital Shaker ALP* (Section 14.4.2)
- *Controlling the Actions of an Orbital Shaker ALP* (Section 14.4.3)
- *Stopping and Restarting a Method* (Section 14.4.4)

14.4.1 Establishing a Safe Maximum Shaking Speed

CAUTION: Only labware compliant with the Society for Biomolecular Screening (SBS) proposed microplate standards is recommended for use on the Orbital Shaker ALP. Non-compliant labware may not be securely grasped by the ALP or may cause physical damage to the ALP.

WARNING: Do not shake tip boxes, tip box lids, or reservoirs on the Orbital Shaker ALP. The clamps on the ALP cannot hold tip boxes, tip box lids, or reservoirs securely during a shaking procedure.

The Orbital Shaker ALP supports most labware used on the Biomek instrument, although not all labware should be shaken at the same speed. The maximum shaking speed appropriate for each type of labware is of particular concern since fluid in labware may splash or spill at different shaking speeds due to labware parameters and fluid viscosity.

14.4.1.1 Recommended Maximum Shaking Speeds

WARNING: To ensure labware stays securely clamped on the Orbital Shaker ALP, do not exceed the recommended maximum shaking speed.

Recommended maximum shaking speeds were determined for a variety of labware from each class of labware supported by the Biomek instrument. A variety of fluids and shaking parameters were used to establish a recommended maximum shaking speed.

Testing on each piece of labware was conducted by filling the labware with the specified liquid to a percentage of the labware's maximum well capacity and executing a shaking operation.

The maximum shaking speeds presented in Table 14-1 show the results of testing.

Note: Table 14-1 should be used only as general reference material. Conduct testing according to the procedures outlined by the laboratory safety officer to determine the safe maximum shaking speed for all labware, liquid, and shaking sequence combinations.

WARNING: The type and amount of fluid being shaken will impact the maximum shaking speed for all types of labware. Conduct testing according to the procedures outlined by the laboratory safety officer to determine the safe maximum shaking speed for any type and amount of liquid.

WARNING: Always observe appropriate cautionary procedures as defined by your safety officer when using flammable solvents or toxic, pathological, or radioactive materials.

Table 14-1. Recommended Maximum Labware Shaking Speeds

Labware Type	Liquid	With Fluid			Default Maximum Shaking Speed (Empty) [3]
		Volume in µL [1]	Volume as % [2]	Shaking Speed (RPM) [3]	
10 mm test tubes	Water	2136	51	800	1000
12 mm test tubes	Water	3100	50	400	400
13 mm test tubes	Water	4984	49	700	800
AB384Well Reaction	Water	20	50	1800	1800
BCFlat96	Water	100	27	1700	1800
BCDeep96Round	Water	712	54	1100	1600
BCDeep96Square	Water	1200	50	1100	1400
CostarCone96Round	Water	178	56	1200	1800
CostarCone96Round	Water	100	31	1700	1800
CostarFlat384Square	Water	100	82	1170	1800
Greiner96Ubottom	Water	239	75	1000	1800
Greiner96Ubottom	Water	100	31	1600	1800
GreinerFlat384Square	Water	100	71	1170	1800
GreinerShallow384Round	Water	15	52	1000	1800
Microfuge Tubes	Water	890	40	900	900
NuncFlat384Square	Water	100	64	1170	1800
CostarDeep96Square	Cell Pellet plus buffer	90 + pellet	4	950	1400
CostarDeep96Square	Cell Pellet plus buffer	210 + cells	8	1000	1400
CostarDeep96Square	Cell Pellet plus buffer	330 + cells	13	1000	1400

[1] Volume in µL provides the number of µL of liquid added to each of the wells of the specified labware.
[2] Volume as % provides the percent of each well filled by the value in Volume in µL.
[3] Shaking Speed (RPM) is the recommended maximum speed the specified piece of labware should be shaken when the labware contains fluid. Exceeding this speed may spill or splash fluid out of the labware.
[4] Default Maximum Shaking Speed (Empty) is the maximum shaking speed for the specified labware when it is empty. Exceeding this speed may compromise the ability of the clamping mechanism to securely hold the labware. (Refer to Section 14.4.2, *Configuring a New Labware Type for Use on the Orbital Shaker ALP*, for additional information on Maximum Shaking Speeds.)

Table 14-1. Recommended Maximum Labware Shaking Speeds (Continued)

Labware Type	Liquid	With Fluid			Default Maximum Shaking Speed (Empty) [3]
		Volume in µL [1]	Volume as % [2]	Shaking Speed (RPM) [3]	
CostarDeep96Square	Cell Pellet plus buffer plus MagneSil Blue	355 + cells	15	1000	1400
Greiner96Ubottom	MagneSil Blue	30	9	720	1800
Greiner96Ubottom	MagneSil Red	55	17	720	1800
Greiner96Ubottom	MagneSil Red plus buffers	145	46	1000	1800
Greiner96Ubottom	MagneSil Red plus Ethanol	150	47	800	1800
Greiner96Ubottom	MagneSil Red plus water	150	47	1000	1800
Greiner96Ubottom	MagneSil Yellow plus Ethanol	100	31	800	1800
Greiner96Ubottom	MagneSil Yellow plus Wash	100	31	1000	1800
Greiner96Ubottom	MagneSil Yellow plus water	100	31	1000	1800

[1] Volume in µL provides the number of µL of liquid added to each of the wells of the specified labware.
[2] Volume as % provides the percent of each well filled by the value in Volume in µL.
[3] Shaking Speed (RPM) is the recommended maximum speed the specified piece of labware should be shaken when the labware contains fluid. Exceeding this speed may spill or splash fluid out of the labware.
[4] Default Maximum Shaking Speed (Empty) is the maximum shaking speed for the specified labware when it is empty. Exceeding this speed may compromise the ability of the clamping mechanism to securely hold the labware. (Refer to Section 14.4.2, *Configuring a New Labware Type for Use on the Orbital Shaker ALP*, for additional information on Maximum Shaking Speeds.)

14.4.2 Configuring a New Labware Type for Use on the Orbital Shaker ALP

CAUTION: Only labware compliant with the Society for Biomolecular Screening (SBS) proposed microplate standards is recommended for use on the Orbital Shaker ALP. Non-compliant labware may not be securely grasped by the ALP or may cause physical damage to the ALP.

If a piece of labware other than that supported by Biomek Software is used on the Orbital Shaker ALP, the parameters of the labware must be configured in the Labware Type Editor. Use the Labware Type Editor to configure parameters for each new piece of labware.

Note: Refer to the *Biomek Software User's Manual,* Chapter 7, *Creating and Modifying Tip and Labware Types*, for more information on creating and modifying labware types.

To configure a new piece of labware for use on the Orbital Shaker ALP:

1. Choose **Project>Labware Type Editor.** Labware Types appears (Figure 14-14).

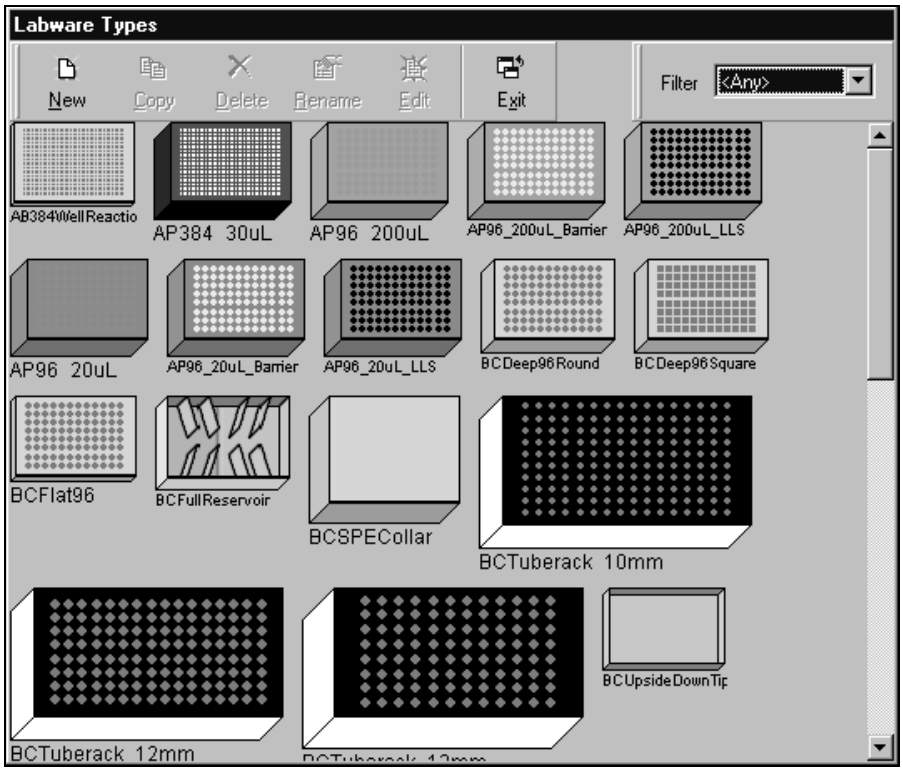

Figure 14-14. Labware Types

2. Select a piece of labware that closely resembles the new labware and select **Edit** on the toolbar.

Note: To preserve the selected labware type, first copy it and then edit the copy (refer to the *Biomek Software User's Manual,* Chapter 7.3.3, *Copying a Labware Type*)

OR

Double-click the desired labware type.

OR

Right-click the desired labware type and choose **Edit** from the menu. Basic Information for the selected labware appears (Figure 14-15).

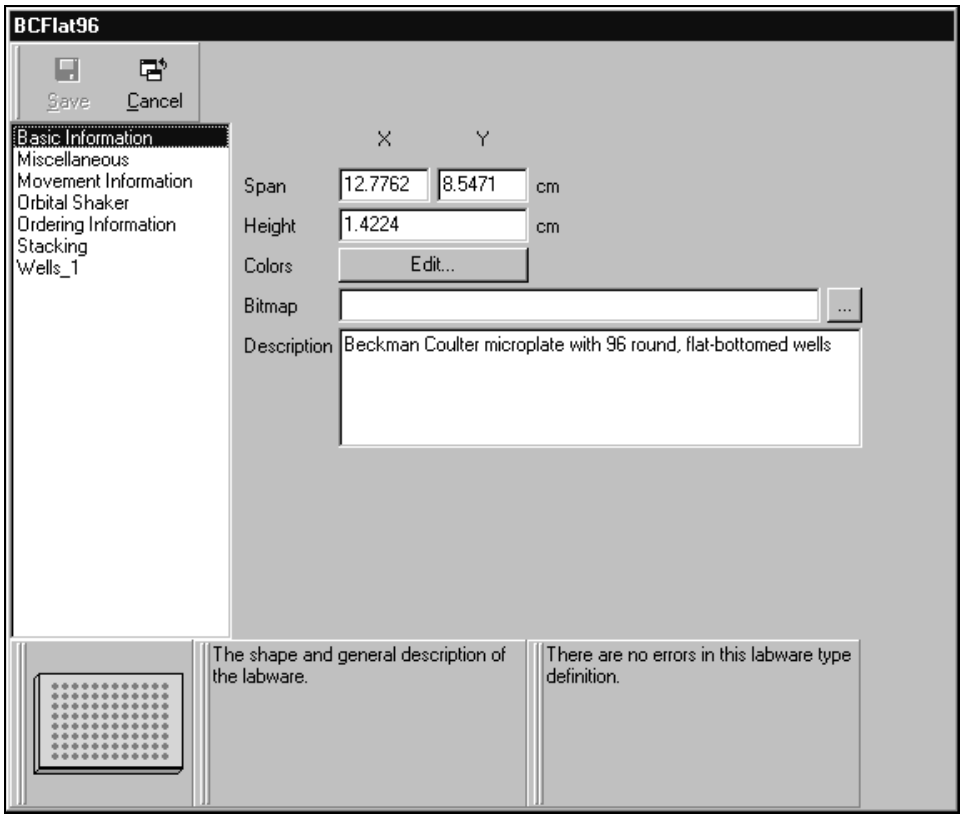

Figure 14-15. Basic Information for the selected labware type

3. Choose **Orbital Shaker** in the left pane. The right pane changes to display the Maximum Speed for that piece of labware (Figure 14-16).

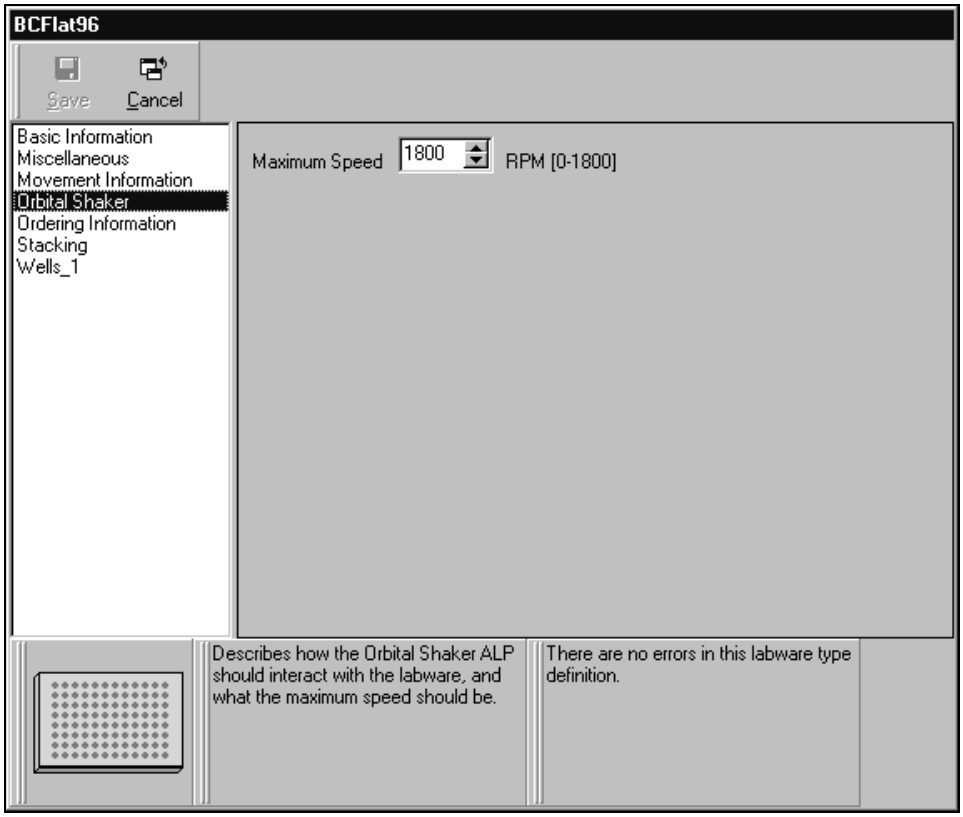

Figure 14-16. Orbital Shaking configuration for the selected labware type

4. In **Maximum Speed**, enter the highest safe maximum shaking speed for that piece of labware.

Note: If the speed configured in a Device Action step exceeds the Maximum Speed allowed in the Labware Type Editor, an error occurs when the method is validated.

Note: For more information on how to establish a safe Maximum Speed for a piece of labware, refer to Section 14.4.1, *Establishing a Safe Maximum Shaking Speed*.

5. Choose **Save**.

Note: Three sections of hints are offered at the bottom of the edit option. The first section displays a graphic of the labware, the second section explains the selected field, and the third section explains any errors resulting from editing the labware properties. Place the cursor over the desired labware properties field and click to view these hints.

14.4.3 Controlling the Actions of an Orbital Shaker ALP

CAUTION: Clamp all labware positioned on the Orbital Shaker ALP even when using the ALP as a standard deck position, such as a 1 x 1 or a swap space.

After an Orbital Shaker ALP has been physically added to the deck, configured in Hardware Setup, and associated with a device and a deck position in the Deck Editor, Biomek Software understands the attributes of the ALP and can receive information on how to control it. The Device Action step on the Devices Step Palette is used to control the actions of the Orbital Shaker ALP during a method run.

Note: Refer to the *Biomek Software User's Manual,* Chapter 22, *Using the Devices Step Palette*, for information on how to display the Devices Step Palette.

Note: An Orbital Shaker ALP must be configured in Hardware Setup (refer to Chapter 1.3.1, *Installing an ALP in Hardware Setup*) and associated with a device and deck position in the Deck Editor prior to using the Orbital Shaker ALP in a method.

When a Device Action step is added to a method, the configuration associated with the selected device appears in the Step Configuration (Figure 14-18).

Note: Device Action steps that have not been appropriately configured generate errors when a method is validated or run.

To configure the Device Action step for an Orbital Shaker ALP:

1. Insert a **Device Action** step into the Method View (Figure 14-17).

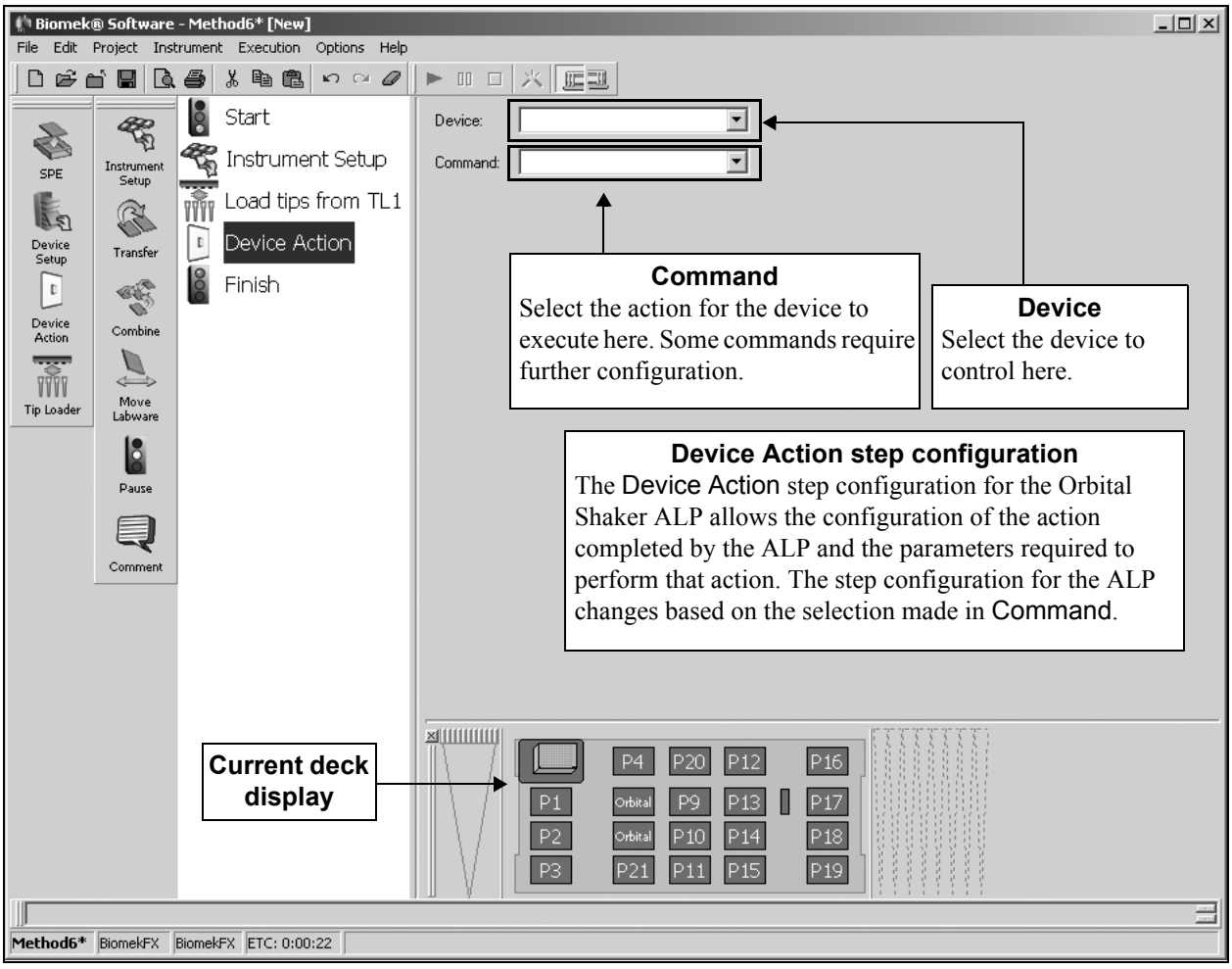

Figure 14-17. Device Action step and configuration

2. In Device, select the desired **OrbitalShakerALP**.

   OR

   Click on the Orbital Shaker ALP in the current deck display to select it. The configuration for the ALP appears (Figure 14-18).

Note: Any devices installed in Hardware Setup, except Tip Loaders and Device Controllers, are listed under Device in the Device Action step configuration.

Note: When an Orbital Shaker ALP is selected in Device, the ALP is highlighted by a blue border in the current deck display.

3. In **Command**, select the desired action for the Orbital Shaker ALP:
    - Shake — shakes labware at the indicated number of revolutions per minute (RPM) in the specified direction (refer to Section 14.4.3.1, *Configuring the ALP to Run a Standard Shaking Procedure*).
    - Timed Shake — shakes labware at the indicated RPM in the specified direction for the indicated number of seconds (refer to Section 14.4.3.2, *Configuring the ALP to Run for a Specific Length of Time*).
    - Run — shakes labware using parameters from a previously created shaking profile (refer to Section 14.4.3.3, *Configuring the ALP to Run a Previously Defined Shaking Profile*).
    - Pulse — shakes labware using a pulsing sequence at a specific velocity for the indicated number of seconds, then for the indicated number of seconds in the opposite direction. This sequence of events is repeated the specified number of times. (refer to Section 14.4.3.4, *Configuring a Pulsing Shake Sequence*).
    - Stop — stops any shaking procedure by slowing the shaking action within the specified number of seconds(refer to Section 14.4.3.5, *Stopping a Shaking Procedure Already in Process*).
    - Clamp — tightens the clamp to hold the labware in place (refer to Section 14.4.3.6, *Clamping and Unclamping Labware on the Orbital Shaker ALP*).
    - Home — centers the microplate shaking plate on the ALP base (refer to Section 14.4.3.7, *Homing the Microplate Platform on the Orbital Shaker ALP*).
    - Unclamp — releases the clamp to allow the labware to be removed from the ALP (refer to Section 14.4.3.6, *Clamping and Unclamping Labware on the Orbital Shaker ALP*).

Note: The configuration for the Orbital Shaker ALP changes based on the selection made in Command.

Note: If a light curtain violation occurs while the Orbital Shaker ALP is operating, the shaking operation is completed.

14.4.3.1 Configuring the ALP to Run a Standard Shaking Procedure

Shaking operations on the Orbital Shaker ALP can be configured to run continuously in a specified direction. The number of RPM applied during the shaking operation and the amount of time the device uses to ramp up to the specified shaking speed are configured when using the Shake command.

Note: The default configuration for the Orbital Shaker ALP is to shake labware **CounterClockwise** with a **1** (one) second ramp-up to **300** revolutions per minute (RPM).

To configure the Orbital Shaker ALP to shake labware using new parameters:

1. In Command, select **Shake** (Figure 14-18).

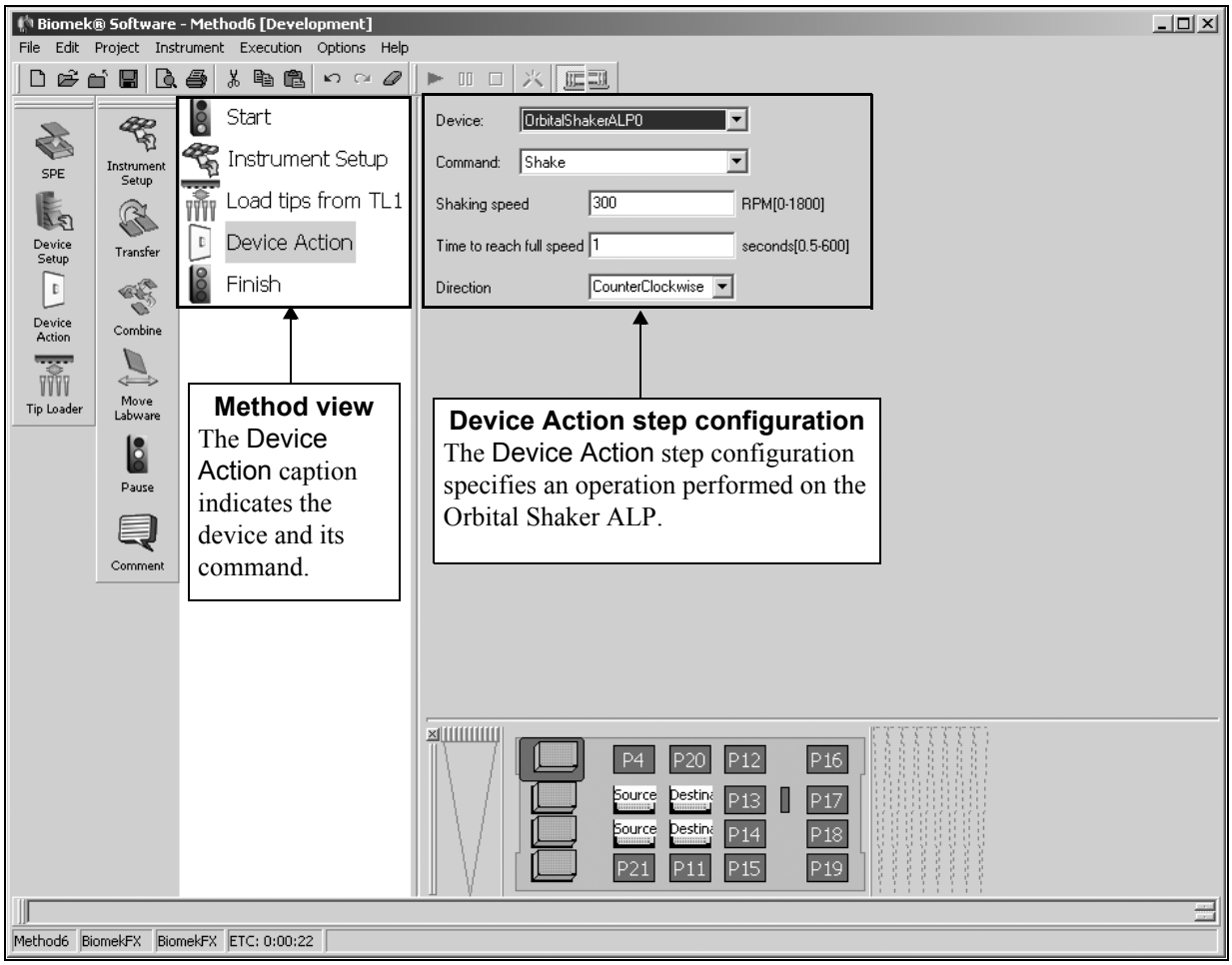

Figure 14-18. Device Action step configured for a continuous shaking motion on an Orbital Shaker ALP

2. In **Shaking speed**, indicate the desired shaking speed in RPM.

Note: The minimum Shaking speed allowed is 0 RPM while the maximum Shaking speed allowed is 1800 RPM. Refer to Section 14.4.1, *Establishing a Safe Maximum Shaking Speed*, for more information.

3. In **Time to reach full speed**, enter the duration (in seconds) the Orbital Shaker ALP takes to reach full shaking speed.

   Note: The minimum value allowed in Time to reach full speed is 0.5 seconds while the maximum value is 600 seconds.

4. In Direction, select whether the orbital shaking motion shakes in a **CounterClockwise** or **Clockwise** direction.

   Note: The default Direction is CounterClockwise.

14.4.3.2 Configuring the ALP to Run for a Specific Length of Time

Shaking operations on the Orbital Shaker ALP can be configured to run a specified length of time. The Timed Shake configuration controls how many seconds and in which direction labware is shaken. The maximum shaking speed and the amount of time used to reach that speed are also configured in the Timed Shake command.

Note: The default configuration for a timed shaking sequence is to shake labware for **10** seconds in a **CounterClockwise** direction with a **1** second ramp-up to **300** RPM.

To configure the Orbital Shaker ALP to shake labware a specific length of time:

1. In Command, select **Timed Shake** (Figure 14-19).

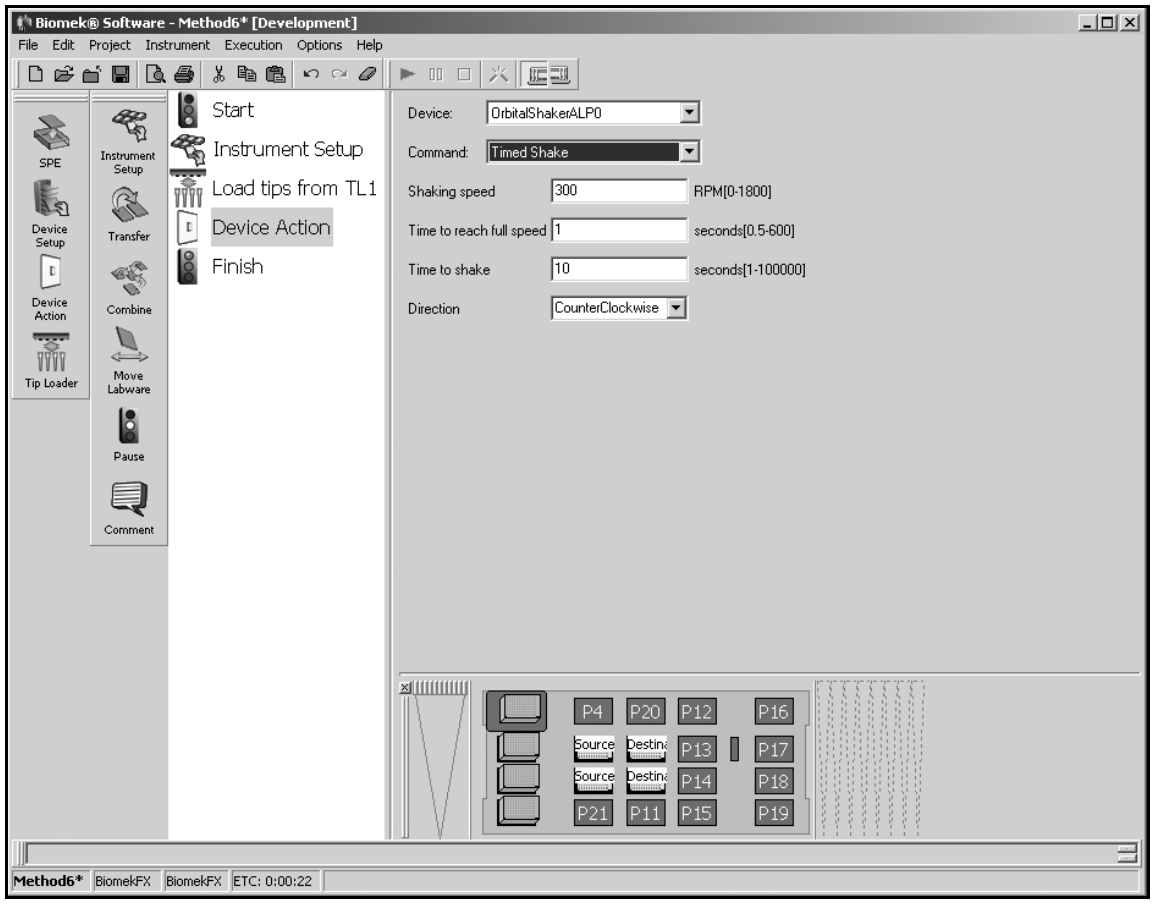

Figure 14-19. Device Action step configured for a timed shaking motion on an Orbital Shaker ALP

2. In **Shaking speed**, indicate the desired shaking speed in RPM.

Note: The minimum Shaking speed allowed is 0 RPM while the maximum is 1800 RPM. Refer to Section 14.4.1, *Establishing a Safe Maximum Shaking Speed*, for more information.

3. In **Time to reach full speed**, enter the duration (in seconds) the Orbital Shaker ALP takes to reach full shaking speed.

   Note: The minimum value allowed in Time to reach full speed is 0.5 second while the maximum value is 600 seconds.

   Note: The Time to reach full speed is also used when ramping down at the end of the configured Time to Shake.

4. In **Time to Shake**, enter the duration (in seconds) the ALP shakes the labware.

   Note: The minimum value allowed in Time to shake is 1 second while the maximum value is 100,000 seconds.

   Note: The Time to shake does not include the Time to reach full speed or the time to ramp down and return to a full stop.

5. In Direction, select whether the orbital shaking motion shakes in a **CounterClockwise** or **Clockwise** direction.

   Note: The default Direction is CounterClockwise.

14.4.3.3 Configuring the ALP to Run a Previously Defined Shaking Profile

The Orbital Shaker ALP is capable of running previously defined shaking profiles. Profiles are loaded to the Biomek Software directory when the Orbital Shaker ALP is installed.

To configure the Orbital Shaker ALP to follow previously defined shaking profiles:

1. In Command, select **Run** (Figure 14-20).

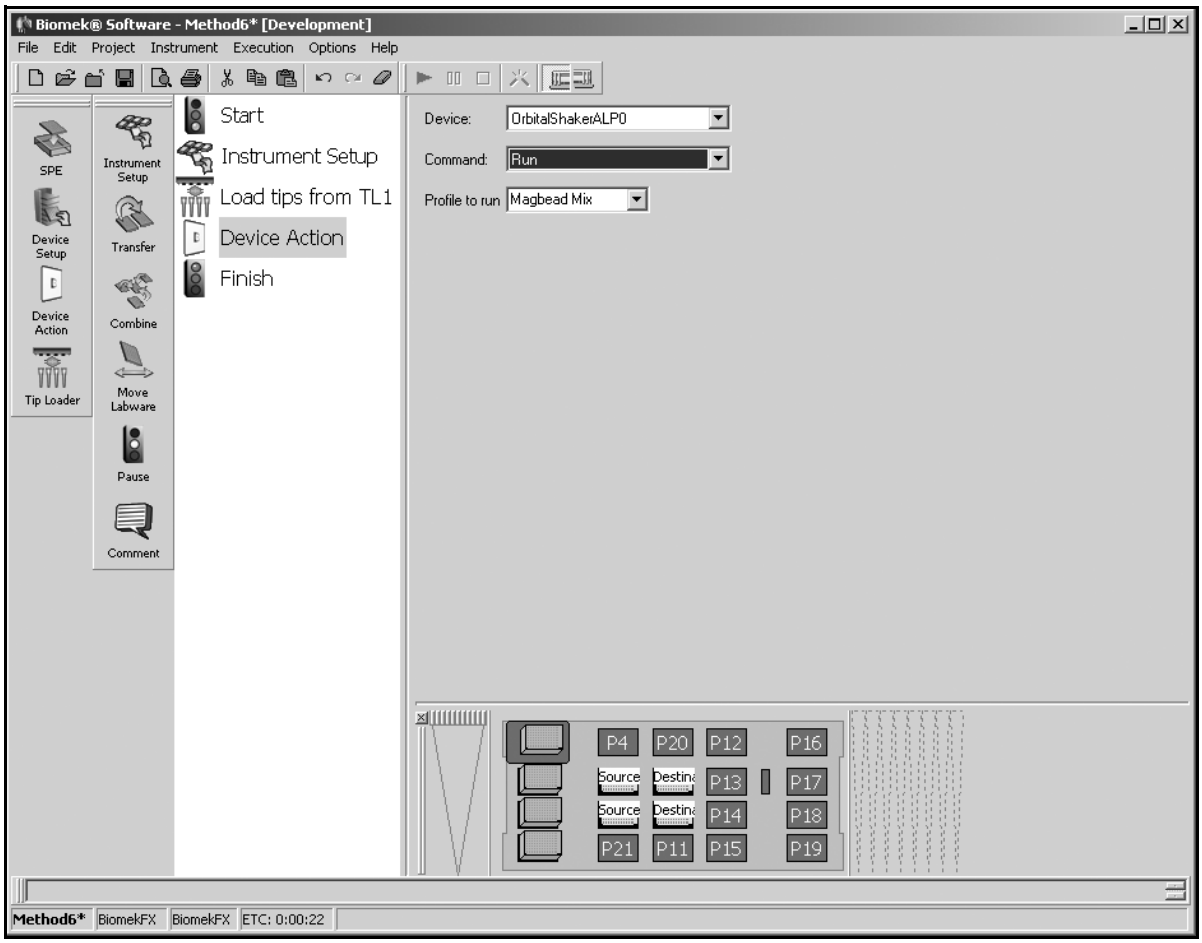

Figure 14-20. Device Action step configured to run a previously designed shaking profile on an Orbital Shaker ALP

2. In **Profile to Run**, select the desired profile. There are three profiles available for selection:

   - Cell pellet breakup — resuspends cells using 190µL Promega™ Cell Resuspension Solution in a Costar 96 square, deep-well microplate. The Cell pellet breakup profile completes five 1-second pulses at 950 RPM, then 28 5-second pulses at 900 RPM, and, finally, 90 seconds of shaking in a counterclockwise direction at 900 RPM.
   - Magbead Mix— mixes MagneSil™ particles in low-viscosity fluids.The Magbead Mix profile completes three 2-second pulses at 800 RPM, followed by 60 seconds of shaking in a constant direction at 750 RPM.

     Note: More gentle mix typically used for particles in low-viscosity fluids.

   - MagneSil Yellow— mixes MagneSil™ Yellow particles in a water or wash solution.The MagneSil profile completes 12 4-second pulses at 1000 RPM.

     Note: More vigorous mix typically used with small volumes and higher-viscosity fluids.

14.4.3.4 Configuring a Pulsing Shake Sequence

The Orbital Shaker ALP is capable of performing a pulsing shake sequence. A pulsing shake sequence applies a series of shaking motions to a piece of labware. The Pulse configuration shakes labware in one direction at the indicated speed for the specified length of time followed by shaking the labware at the same speed for the same length of time in the opposite direction. The labware is shaken in this manner in alternating directions the specified number of times.

Note: The default configuration for a pulsing shake sequence on the ALP is to pulse labware **1** time each direction for **1** second at **300** RPM. The default values do not correspond with the parameters displayed in Table 14-1. Refer to Table 14-1(for recommended shaking speeds for tested labware and fluid combinations.

WARNING: The type and amount of fluid being shaken will impact the maximum shaking speed for all types of labware. Conduct testing according to the procedures outlined by the laboratory safety officer to determine the safe maximum shaking speed for any type and amount of liquid.

To configure the Orbital Shaker ALP to shake labware using a pulsing motion:

1. In Command, select **Pulse** (Figure 14-21).

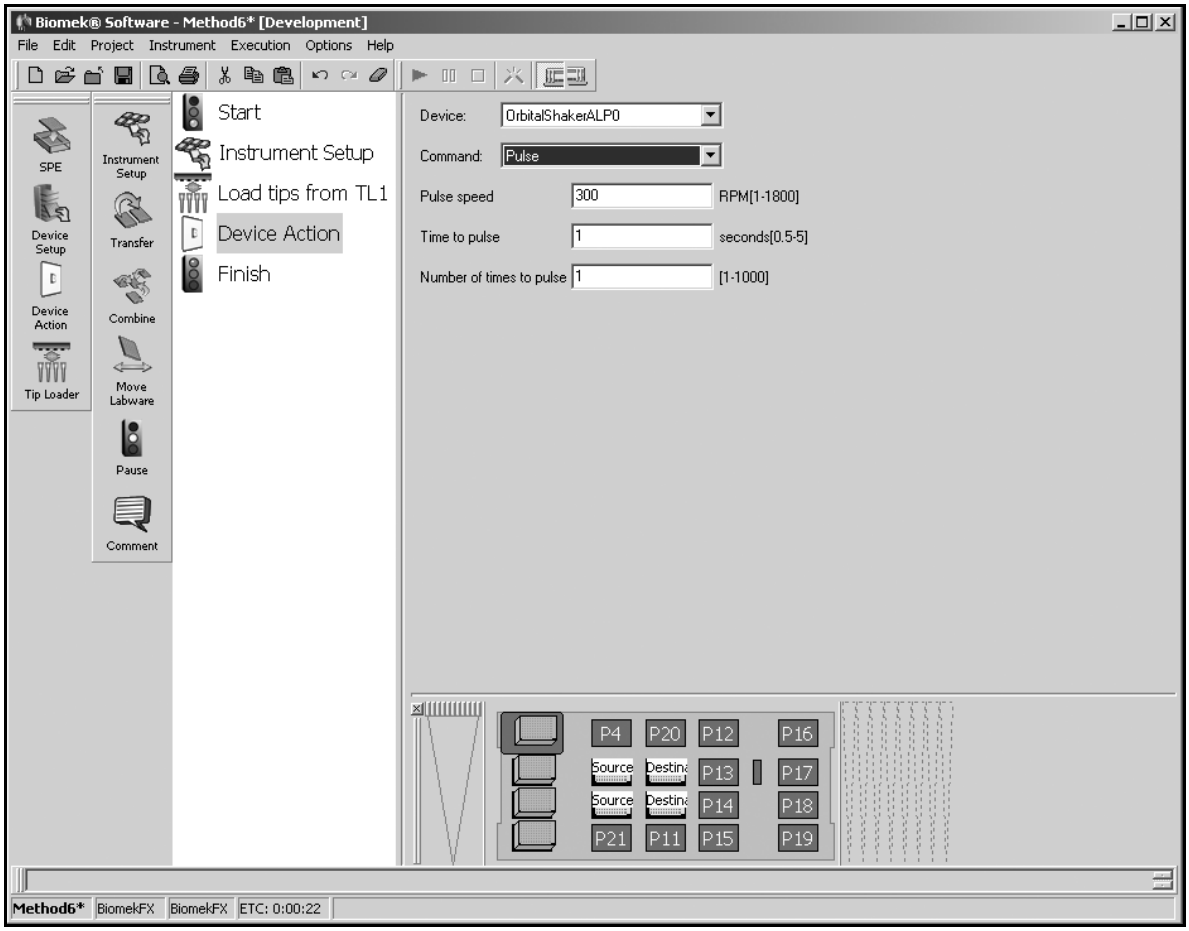

Figure 14-21. Device Action step configured for a pulsing shake motion on an Orbital Shaker ALP

2. Enter a **Pulse Speed** in RPM.

   Note: The minimum Pulse Speed allowed is 1 RPM and the maximum is 1800 RPM.

3. In **Time to Pulse**, enter the duration (in seconds) the Orbital Shaker ALP shakes in each direction.

   Note: The minimum value allowed in Time to Pulse is 0.5 second while the maximum value allowed in Time to Pulse is 5 seconds.

4. Enter the **Number of times to Pulse** within the time frame specified in Time to Pulse.

   Note: The minimum value allowed in Number of times to Pulse is 1 and the maximum is1000.

Note: A pulsing shake sequence is an effective technique for removing bubbles from solutions. Some experimentation may be necessary when designing a pulsing shake sequence effective at removing bubbles from a specific solution.

14.4.3.5 Stopping a Shaking Procedure Already in Process

Stopping a shaking procedure already in process is accomplished using the Stop command. The number of seconds the Orbital Shaker ALP has to stop the shaking procedure is specified in the Stop command configuration.

Note: The default configuration for stopping a shaking procedure is **1** second.

To configure the Orbital Shaker ALP to stop a shaking procedure already in process:

1. In Command, select **Stop** (Figure 14-22).

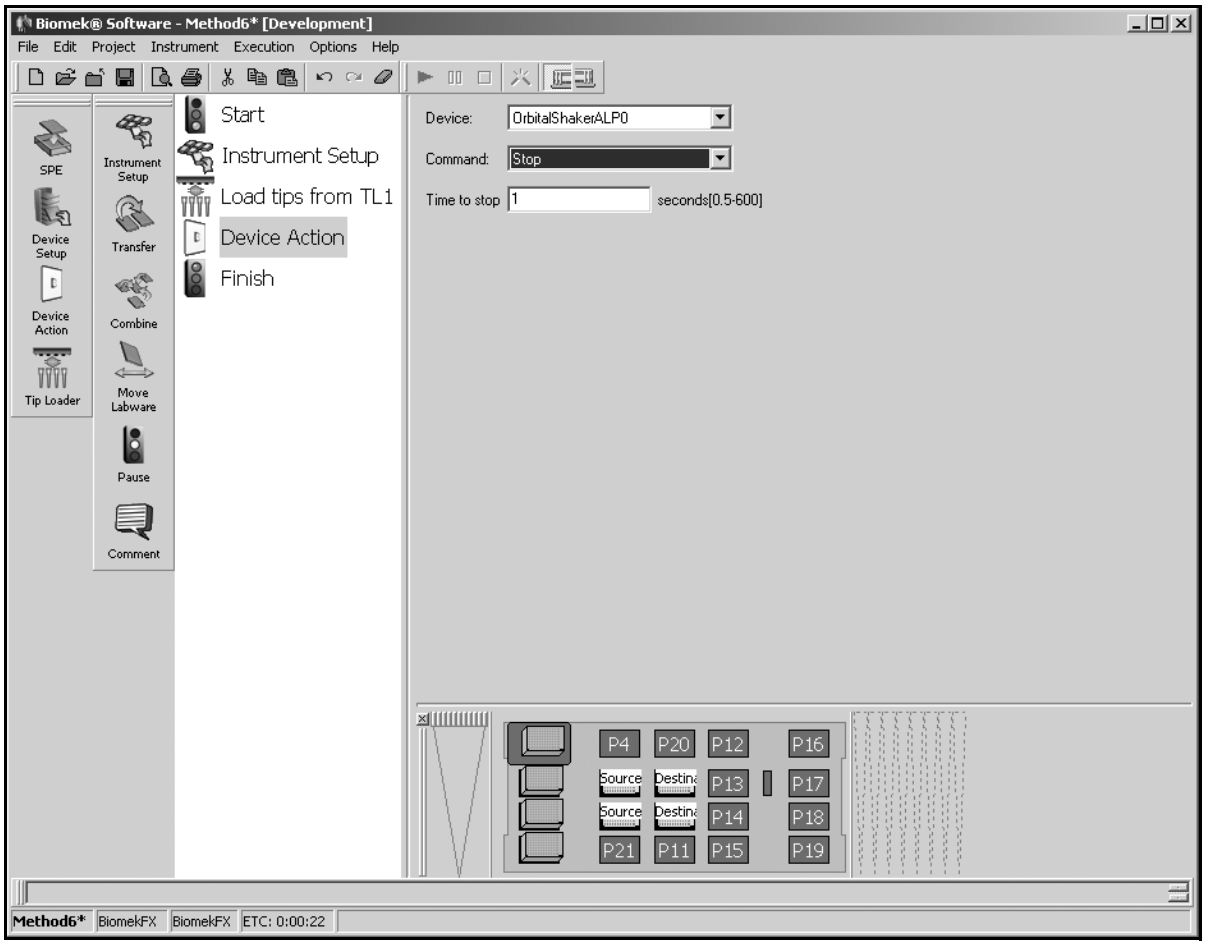

Figure 14-22. Device Action step configured to stop all shaking motion on an Orbital Shaker ALP

2. In **Time to stop**, enter the duration (in seconds) the device has to move from full speed to a full stop.

Note: The minimum value allowed in Time to stop is 0.5 second while the maximum value is 600 seconds.

14.4.3.6 Clamping and Unclamping Labware on the Orbital Shaker ALP

The Orbital Shaker ALP clamps automatically before a microplate is accessed for pipetting and before any shaking procedure is initiated. It remains clamped until a gripper move, the Device Action step, or the end of a method releases the microplate; however, a Device Action step can be used to actuate the clamps at any time during a method.

CAUTION: Clamp all labware positioned on the Orbital Shaker ALP even when using the ALP as a standard deck position, such as a 1 x 1 or a swap space.

The Clamp and Unclamp commands found in the Device Action step configuration for the Orbital Shaker ALP are used to actuate the clamps at any time during a method. No configuration is necessary beyond the selection of Clamp or Unclamp in the step configuration.

Note: The microplate platform on the Orbital Shaker ALP must be in the home position before labware on the ALP can be accessed for a pipetting operation. If access to a microplate is required, the ALP actuates the clamps and homes the microplate platform, if necessary, prior to allowing access to the labware on the ALP.

Note: If a light curtain violation occurs while the clamp on the Orbital Shaker ALP is in motion, the motion is completed. The state of the clamp on the ALP does not change when the light curtain is violated or during a pause in a method.

Note: The Orbital Shaker ALP can also be controlled outside a method using Manual Control in Biomek Software (refer to Section 14.5.6, *Manually Clamping and Unclamping Labware*).

To configure the Orbital Shaker ALP to clamp or unclamp labware during a method run:

In Command, select **Clamp** or **Unclamp** (Figure 14-23).

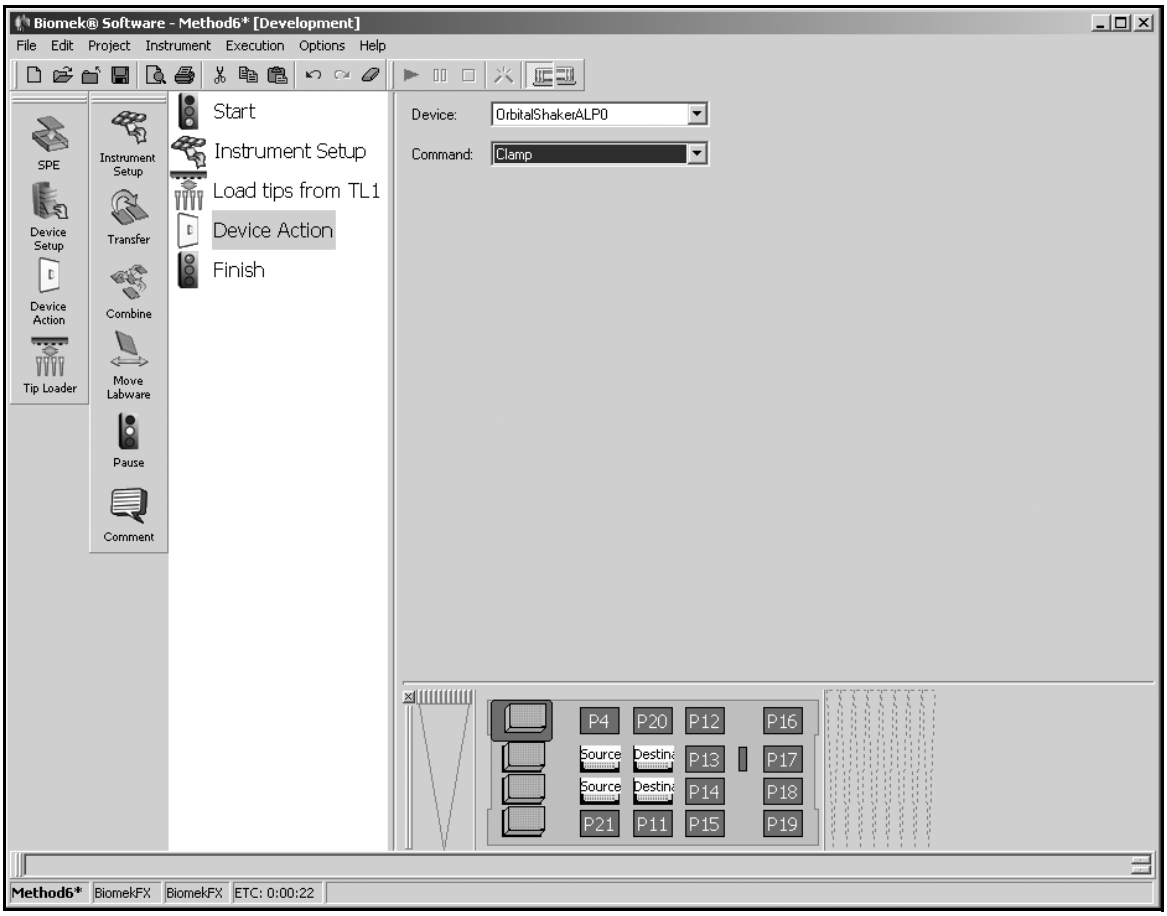

Figure 14-23. Device Action step configured to actuate the clamps on an Orbital Shaker ALP

14.4.3.7 Homing the Microplate Platform on the Orbital Shaker ALP

Homing the microplate platform ensures that the Biomek instrument can accurately access labware on the ALP for pipetting operations. The microplate platform on the Orbital Shaker ALP can be homed at any time during a method run, as long as a shaking operation is not already in process on the ALP. The home position for the microplate shaking platform is in the center of the ALP.

Note: The microplate platform automatically homes at the beginning of each method.

No configuration is necessary beyond the selection of Home in the step configuration. To configure the Orbital Shaker ALP to home the microplate platform during a method run:

In Command, select **Home** (Figure 14-24). The microplate platform moves to the center of the ALP.

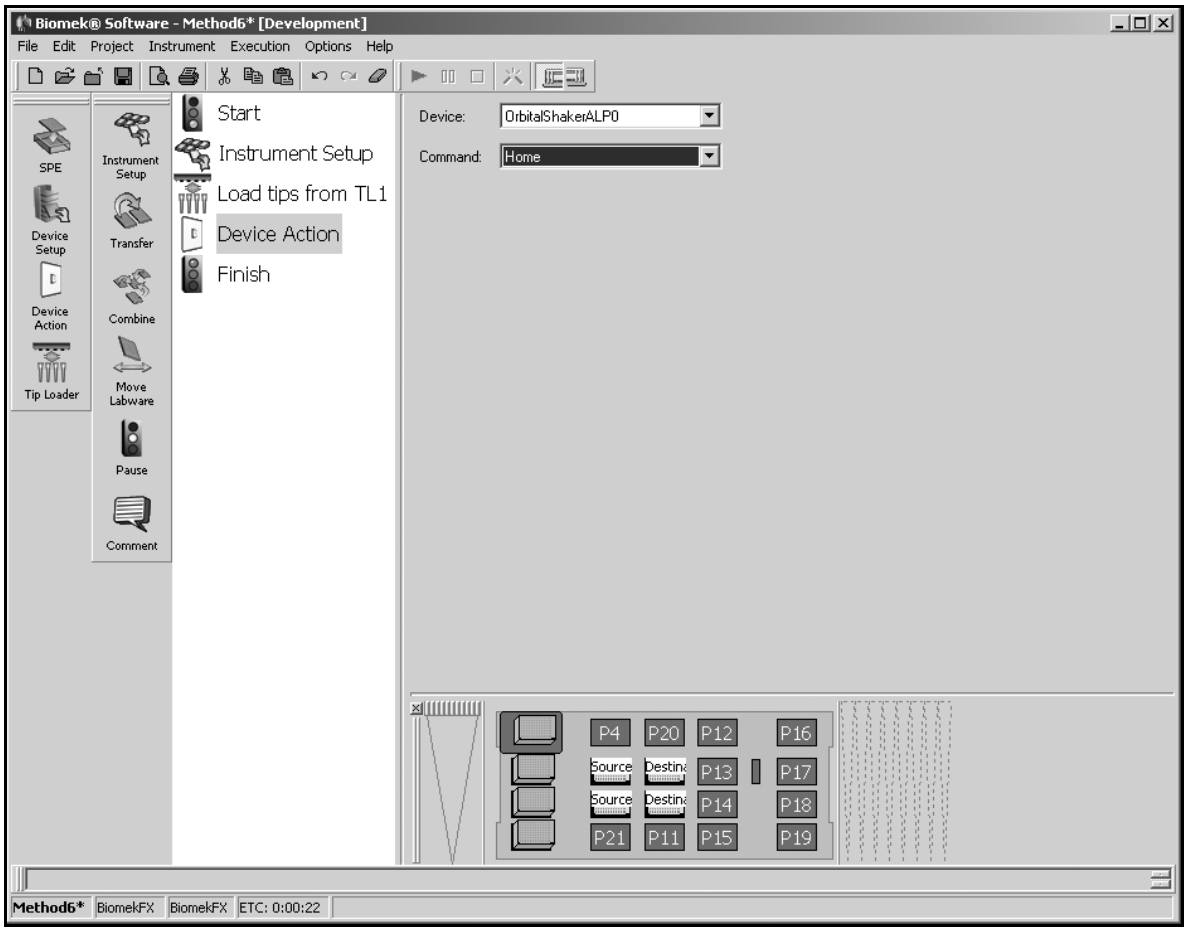

Figure 14-24. Device Action step configured to home the microplate shaking platform on an Orbital Shaker ALP

14.4.4 Stopping and Restarting a Method

If a need for manual control is realized during a method run and the method is stopped using either the Stop or Snap Continuation buttons (refer to the *Biomek Software User's Manual,* Chapter 25.11.2, *Snapping a Continuation*), the Orbital Shaker ALP does not automatically restart the shaking procedure when the Continuation method is started. In order to restart a shaking operation, a Device Action step must be inserted into the Continuation method.

Snap Continuation stops the method after Biomek instrument completes the move in progress and creates a Continuation method (refer to the *Biomek Software User's Manual,* Chapter 25.6, *Light Curtain Errors*).

CAUTION: If using Biomek FX Software version 2.1c or prior, crashes may occur when executing a Continuation method. To avoid crashes, delete any partially completed Orbital Shaker ALP steps and reinsert them into the Continuation method.

Note: Manual Control is available only when a method is not being executed.

Note: If the method is in the process of performing a move, such as aspirating or dispensing, the Biomek instrument completes the move; however, the instrument may not complete the entire step. For example, if the Biomek instrument is in the process of performing a Transfer step and an error occurs while it is aspirating, selecting Snap results in completing the aspiration but not the Transfer step.

14.4.4.1 Choosing Snap

Snap allows the method to be modified without changing the original method. When Snap is chosen, a Continuation is created. A Continuation is a new method consisting of the step causing the error, any steps not yet completed, and, if applicable, any incomplete substeps of the step which generated the error (refer to the *Biomek Software User's Manual,* Chapter 25.11.2, *Snapping a Continuation*).

To use Snap:

1. Choose **Snap** to create a Continuation (refer to the *Biomek Software User's Manual,* Chapter 25.11.2, *Snapping a Continuation*).
2. Delete all partially completed Orbital Shaker ALP Device Action steps.

3. Reinsert the deleted Orbital Shaker ALP Device Action steps by inserting a new **Device Action** step into the Method View (Figure 14-17).

   Note: A new Device Action step must be inserted for each Orbital Shaker ALP step deleted.

4. In Device, select the desired **OrbitalShakerALP**.

   OR

   Click on the Orbital Shaker ALP in the Current Deck Display to select it. The configuration for the ALP appears (Figure 14-18).

   Note: Any devices installed in Hardware Setup, except Tip Loaders and Device Controllers, are listed under Device in the Device Action Step Configuration.

   Note: When an Orbital Shaker ALP is selected in Device, the ALP is highlighted by a blue border in the Current Deck Display.

5. In **Command**, select the desired action for the Orbital Shaker ALP.

   Note: The configuration for the Orbital Shaker ALP changes based on the selection made in Command.

   Note: If a light curtain violation occurs while the Orbital Shaker ALP is operating, the shaking operation is completed.

14.5 Controlling the Orbital Shaker ALP Outside a Method

Advanced Manual Control is used to control the Orbital Shaker ALP outside a method. Controlling the Orbital Shaker ALP outside a method includes:

- *Manually Controlling a Standard Shaking Procedure* (Section 14.5.1).
- *Manually Controlling a Shaking Procedure of a Specific Length of Time* (Section 14.5.2).
- *Manually Executing a Previously Defined Shaking Profile* (Section 14.5.3).
- *Manually Controlling a Pulsing Shake* (Section 14.5.4).
- *Manually Stopping a Shaking Procedure Already in Process* (Section 14.5.5).
- *Manually Clamping and Unclamping Labware* (Section 14.5.6).
- *Manually Homing the Microplate Platform* (Section 14.5.7).

To open Manual Control, choose **Instrument>Manual Control**. An Information dialog (Figure 14-25) briefly appears as a connection is established with the Biomek instrument, immediately followed by Manual Control (Figure 14-26).

Note: Manual Control is available only when a method is not being executed. If a need for manual control is realized during a method run, stop the method using the Stop button or the Snap Continuation button (refer to the *Biomek Software User's Manual,* Chapter 25.11.2, *Snapping a Continuation*) before accessing Manual Control.

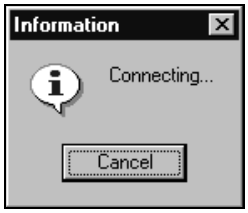

Figure 14-25. Confirms Manual Control is connecting

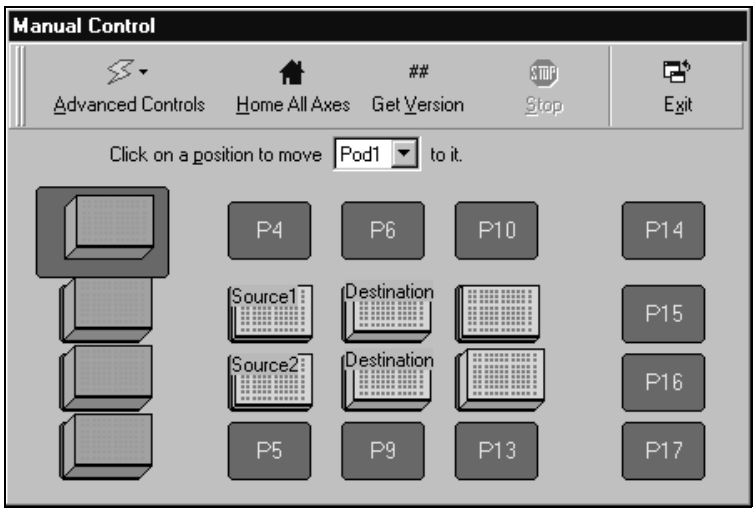

Figure 14-26. Manual Control

Access Advanced Manual Control to select and control the appropriate Orbital Shaker ALP. Advanced Manual Control can be used to command the ALP to:

- Shake — shake labware at the indicated RPM in the specified direction.
- Timed Shake — shake labware at the indicated RPM in the specified direction for the indicated number of seconds.
- Run — shake labware using parameters from a previously defined shaking profile.
- Pulse — shake labware using a sequence of actions that pulse the labware in alternating directions at a specific velocity for an indicated number of seconds.
- Stop — stop any shaking procedure by slowing the shaking action within the indicated number of seconds.
- Clamp — actuate the clamp to hold the labware in place.
- Home — center the microplate platform on the ALP base.
- Unclamp — release the clamp, allowing removal of the labware from the ALP.

To open Advanced Manual Control for a specific Orbital Shaker ALP:

1. Choose **Instrument>Manual Control**. Manual Control appears (Figure 14-26).
2. Click on **Advanced Controls** and a list of all the installed pods and devices appears (Figure 14-27).

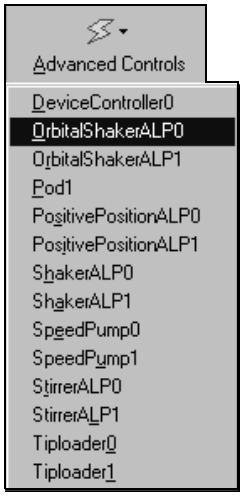

Figure 14-27. Selecting an Orbital Microplate Shaking in Advanced Manual Control

3. Select the desired **Orbital Shaker ALP**. Advanced Manual Control for the selected ALP appears.
4. Configure the device to perform the desired action.

14.5.1 Manually Controlling a Standard Shaking Procedure

To configure the Orbital Shaker ALP to shake labware:

Note: The default configuration for the Orbital Shaker ALP is to shake labware **CounterClockwise** with a **1** (one) second ramp-up to **300** revolutions per minute (RPM).

1. In Command, select **Shake** (Figure 14-28).

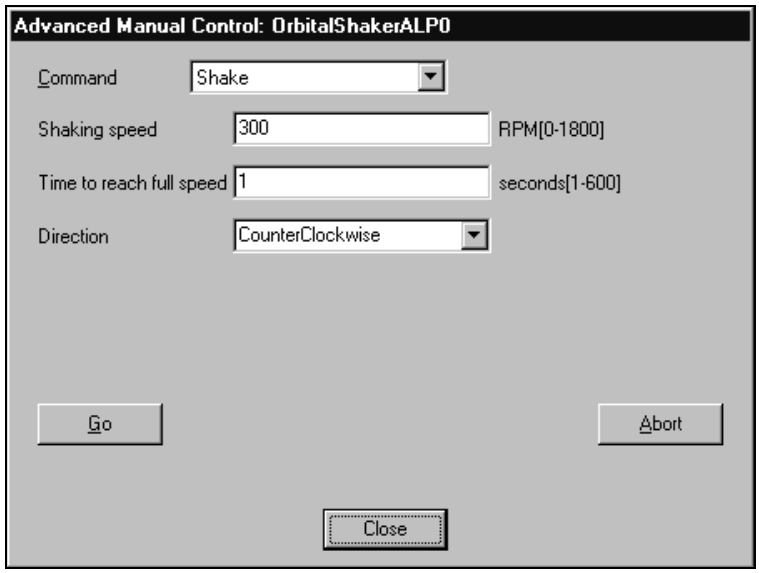

Figure 14-28. Using Advanced Manual Control for a continuous shaking motion on an Orbital Shaker ALP

2. In **Shaking speed**, indicate the desired shaking speed in RPM.

   Note: The minimum Shaking speed allowed is 0 RPM while the maximum Shaking speed allowed is 1800 RPM. Refer to Section 14.4.1, *Establishing a Safe Maximum Shaking Speed*, for more information.

3. In **Time to reach full speed**, enter the duration (in seconds) the Orbital Shaker ALP takes to reach full shaking speed.

   Note: The minimum value allowed in Time to reach full speed is 1 second while the maximum value allowed in Time to reach full speed is 600 seconds.

4. In Direction, select whether the orbital shaking motion shakes in a **Clockwise** or **CounterClockwise** direction.

   Note: The default Direction is CounterClockwise.

5. Choose **Go**. The ALP shakes the microplate platform according to the specified parameters.

   OR

   Choose **Abort** to immediately stop the action in process.

6. Choose **Close** to close Advanced Manual Control.

7. Choose **Exit** to close Manual Control.

14.5.2 Manually Controlling a Shaking Procedure of a Specific Length of Time

To configure the Orbital Shaker ALP to shake labware a specific length of time:

Note: The default configuration for a timed shaking sequence is to shake labware for **10** seconds in a **CounterClockwise** direction with a **1** (one) second ramp-up to **300** revolutions per minute (RPM).

1. In Command, select **Timed Shake** (Figure 14-29).

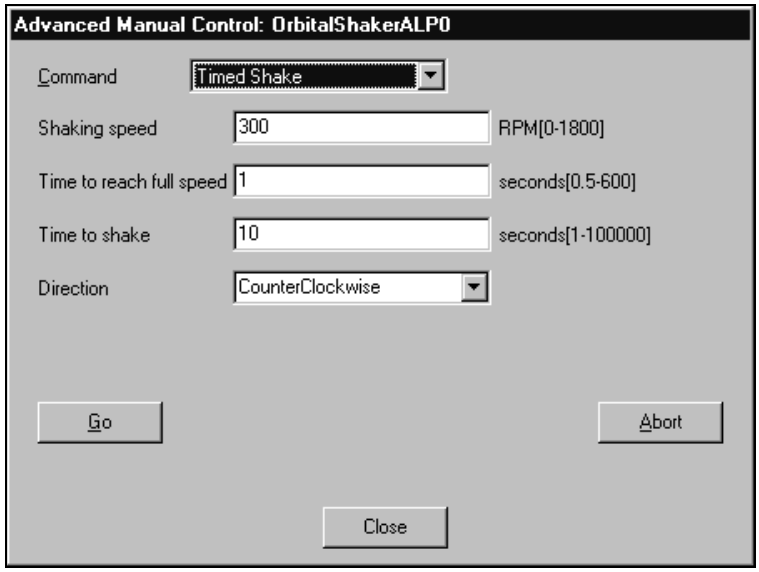

Figure 14-29. Using Advanced Manual Control to control a timed shaking motion on an Orbital Shaker ALP

2. In **Shaking speed**, indicate the desired shaking speed in RPM.

   Note: The minimum Shaking speed allowed is 0 RPM while the maximum Shaking speed allowed is 1800 RPM. Refer to Section 14.4.1, *Establishing a Safe Maximum Shaking Speed*, for more information.

3. In **Time to reach full speed**, enter the duration (in seconds) the Orbital Shaker ALP takes to reach full shaking speed.

   Note: The minimum value allowed in Time to reach full speed is 0.5 seconds while the maximum value is 600 seconds.

4. In **Time to Shake**, enter the duration (in seconds) the ALP shakes the labware.

   Note: The minimum value allowed in Time to shake is 1 second while the maximum is 100,000 seconds.

5. In Direction, select whether the orbital shaking motion shakes in a **CounterClockwise** or **Clockwise** direction.

   Note: The default Direction is CounterClockwise.

6. Choose **Go**. The ALP shakes the labware according to the specified parameters.

   OR

   Choose **Abort** to immediately stop the action in process.

7. Choose **Close** to close Advanced Manual Control.
8. Choose **Exit** to close Manual Control.

14.5.3 Manually Executing a Previously Defined Shaking Profile

To configure the Orbital Shaker ALP to follow previously defined shaking profiles:

1. In Command, select **Run** (Figure 14-30).

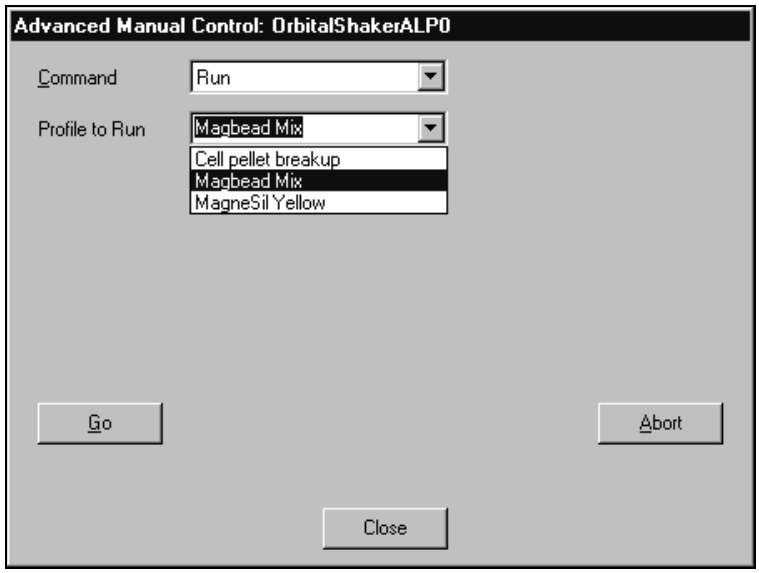

Figure 14-30. Using Advanced Manual Control to run a previously defined shaking profile on an Orbital Shaker ALP

2. In **Profile to Run**, select the desired profile. There are three profiles available for selection:

   - Cell pellet breakup — resuspends cells using 190µL Promega™ Cell Resuspension Solution in a Costar 96 square, deep-well microplate. The Cell pellet breakup profile completes five 1-second pulses at 950 RPM, then 28 5-second pulses at 900 RPM, and, finally, 90 seconds of shaking in a counterclockwise direction at 900 RPM.
   - Magbead Mix— mixes MagneSil™ particles in low-viscosity fluids.The Magbead Mix profile completes three 2-second pulses at 800 RPM, followed by 60 seconds of shaking in a constant direction at 750 RPM.

     Note: More gentle mix typically used for particles in low-viscosity fluids.

   - MagneSil Yellow— mixes MagneSil™ Yellow particles in a water or wash solution.The MagneSil profile completes 12 4-second pulses at 1000 RPM.

     Note: More vigorous mix typically used with small volumes and higher-viscosity fluids.

3. Choose **Go**. The ALP runs the selected profile.

   OR

   Choose **Abort** to immediately stop the action in process.

4. Choose **Close** to close Advanced Manual Control.
5. Choose **Exit** to close Manual Control.

14.5.4 Manually Controlling a Pulsing Shake

WARNING: The type and amount of fluid being shaken will impact the maximum shaking speed for all types of labware. Conduct testing according to the procedures outlined by the laboratory safety officer to determine the safe maximum shaking speed for any type and amount of liquid.

To configure the Orbital Shaker ALP to shake labware using a pulsing motion:

Note: The default values for Pulse do not correspond with the parameters displayed in Table 14-1. (Refer to Table 14-1, *Recommended Maximum Labware Shaking Speeds*, for recommended shaking speeds for tested labware and fluid combinations.)

1. In Command, select **Pulse** (Figure 14-31).

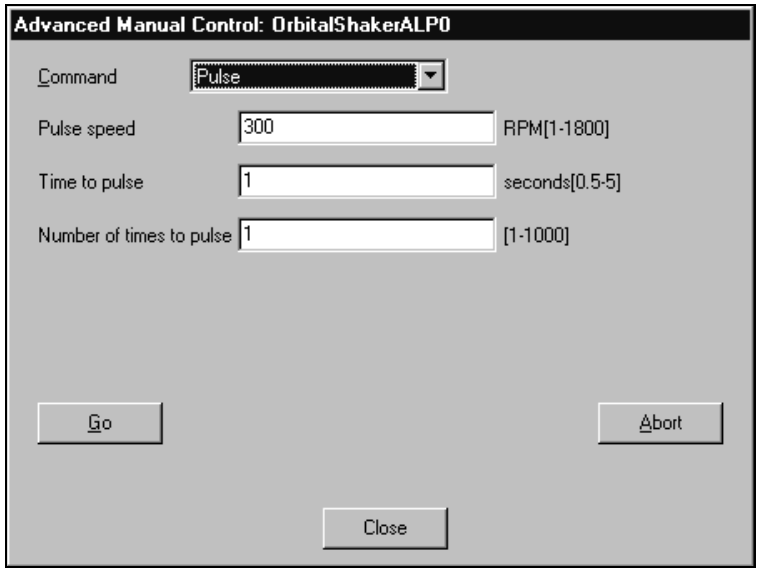

Figure 14-31. Using Advanced Manual Control for a pulsing shake motion on an Orbital Shaker ALP

2. Enter a **Pulse Speed** in RPM.

   Note: The minimum Pulse Speed allowed is 1 RPM and the maximum is 1800 RPM.

3. In **Time to Pulse**, enter the duration (in seconds) the Orbital Shaker ALP shakes in each direction.

   Note: The minimum value allowed in Time to Pulse is 0.5 seconds while the maximum value allowed in Time to Pulse is 5 seconds.

4. Enter the **Number of times to Pulse** to execute the pulsing sequence.

   Note: The minimum value allowed in Number of times to Pulse is 1 and the maximum is 1000.

5. Choose **Go**. The ALP pulses the labware according to the specified parameters.

   OR

   Choose **Abort** to immediately stop the action in process.

6. Choose **Close** to close Advanced Manual Control.
7. Choose **Exit** to close Manual Control.

14.5.5 Manually Stopping a Shaking Procedure Already in Process

To configure the Orbital Shaker ALP to stop a Manual Shake procedure already in process:

Note: Stop will not halt a timed shake, pulse shake, or profile shake procedure already in process. Abort must be used to stop a timed shake, pulse shake, or profile shake procedure.

Note: The default configuration for stopping a shaking procedure is **1** second.

1. In Command, select **Stop** (Figure 14-32).

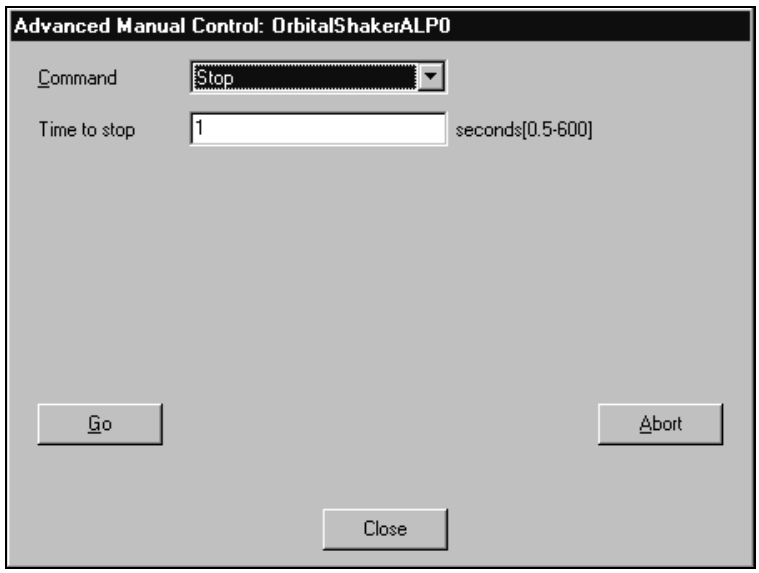

Figure 14-32. Using Advanced Manual Control to stop all shaking motion on an Orbital Shaker ALP

2. In **Time to stop**, enter the duration (in seconds) the device has to move from full speed to a full stop.

   Note: The minimum value allowed in Time to stop is 0.5 seconds while the maximum value is 600 seconds.

3. Choose **Go**. The ALP stops all shaking motion.

   OR

   Choose **Abort** to immediately stop the action in process.

4. Choose **Close** to close Advanced Manual Control.
5. Choose **Exit** to close Manual Control.

14.5.6 Manually Clamping and Unclamping Labware

To configure the Orbital Shaker ALP to clamp or unclamp labware:

Note: Clamp and Unclamp cannot interrupt a shaking operation. All shaking operations must stop before using Clamp or Unclamp.

Note: If a light curtain violation occurs while the clamp is in motion, the motion is completed. The state of the clamp does not change when the light curtain is violated or during a pause in a method.

1. In Command, select **Clamp** or **Unclamp** (Figure 14-33).

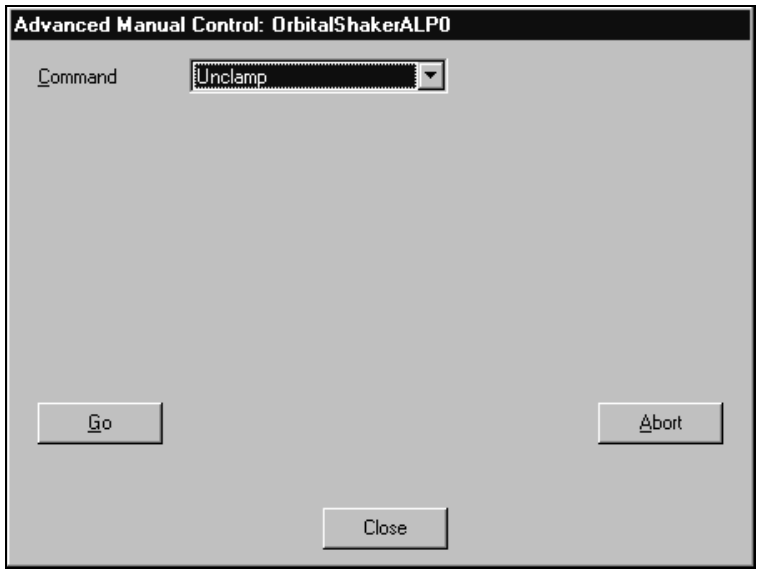

Figure 14-33. Using Advanced Manual Control to actuate the clamps on an Orbital Shaker ALP

2. Choose **Go**. The ALP actuates the clamps.

   OR

   Choose **Abort** to immediately stop the action in process.

3. Choose **Close** to close Advanced Manual Control.
4. Choose **Exit** to close Manual Control.

14.5.7 Manually Homing the Microplate Platform

To configure the Orbital Shaker ALP to home the microplate platform:

Note: All shaking operations must stop before using Home.

Note: The ALP must be clamped prior to homing.

1. In Command, select **Home** (Figure 14-34).

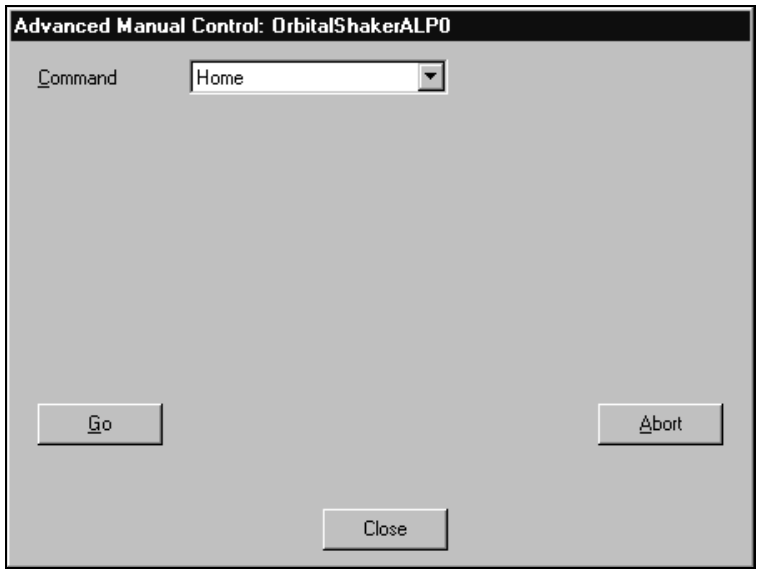

Figure 14-34. Using Advanced Manual Control to home the microplate platform on an Orbital Shaker ALP

2. Choose **Go**. The ALP homes the microplate platform.

   OR

   Choose **Abort** to immediately stop the action in process.
3. Choose **Close** to close Advanced Manual Control.
4. Choose **Exit** to close Manual Control.

14.6 Removing the Orbital Shaker ALP from the Deck

To remove the Orbital Shaker ALP:

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

1. Turn off power to Biomek instrument.
2. Unplug the CAN communication cable from the CAN Port on the Orbital Shaker ALP.
3. Unplug the CAN communication cable from the CAN Port on the Biomek instrument.
4. Loosen the thumbscrews on the base of the ALP.
5. Lift ALP straight up to clear the locating pins on the base of the ALP from the locating holes on the deck.

14.7 Storage

Return the Orbital Shaker ALP and CAN communications cable to the original packing materials and store in a dry, dust-free, environmentally controlled area.

Note: It is desirable to allow the Orbital Shaker ALP to air-dry before returning it to the original packing materials.

14.8 Preventive Maintenance

Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

14.9 Troubleshooting

Do not remove covers for any reason. Do not attempt to repair the Orbital Shaker ALP without first contacting a Beckman Coulter Service Engineer.

Table 14-2. Troubleshooting the Orbital Shaker ALP

IF	THEN
The Orbital Shaker ALP is not functioning	Make sure a good CAN connection has been established.
The clamps are not grasping the labware	Make sure the labware is supported by the Biomek instrument. Make sure the labware is defined properly in the Labware Type Editor. Refer to the *Biomek Software User's Manual,* Chapter 7, *Creating and Modifying Tip and Labware Types* for more information on defining labware. Contact a Beckman Coulter Service Engineer.

15 Positive Position ALP

15.1 Overview

The Positive Position ALP (Figure 15-1) is an active ALP that verifies the presence or absence of a microplate on the ALP and accurately and precisely positions it for interaction with the Biomek instrument. The Positive Position ALP accepts most microplates; however, its main function is to accurately position microplates requiring high precision within wells. Microplates can be loaded to the Positive Position ALP by a lab technician, the ORCA Robot, or by the Biomek gripper.

Note: The Positive Position ALP may not be able to detect unskirted microplates. Verify that the Positive Position ALP is capable of detecting unskirted microplates using a Device Action step (refer to the *Biomek Software User's Manual,* Chapter 22.6, *Device Action Step*). The Positive Position ALP can also be manually controlled using Advanced Manual Control in the Biomek Software (refer to Section 15.5, *Controlling the Positive Position ALP Outside a Method*).

Note: The Positive Position ALP does not support the Costar Deep 96-well microplate.

The sections in this chapter include:

- *Installing the Positive Position ALP* (Section 15.2)
- *Framing Instructions* (Section 15.3)
- *Using the Positive Position ALP in a Method* (Section 15.4)
- *Controlling the Positive Position ALP Outside a Method* (Section 15.5)
- *Removing the Positive Position ALP from the Deck* (Section 15.6)
- *Storage* (Section 15.7)
- *Preventive Maintenance* (Section 15.8)
- *Troubleshooting* (Section 15.9)

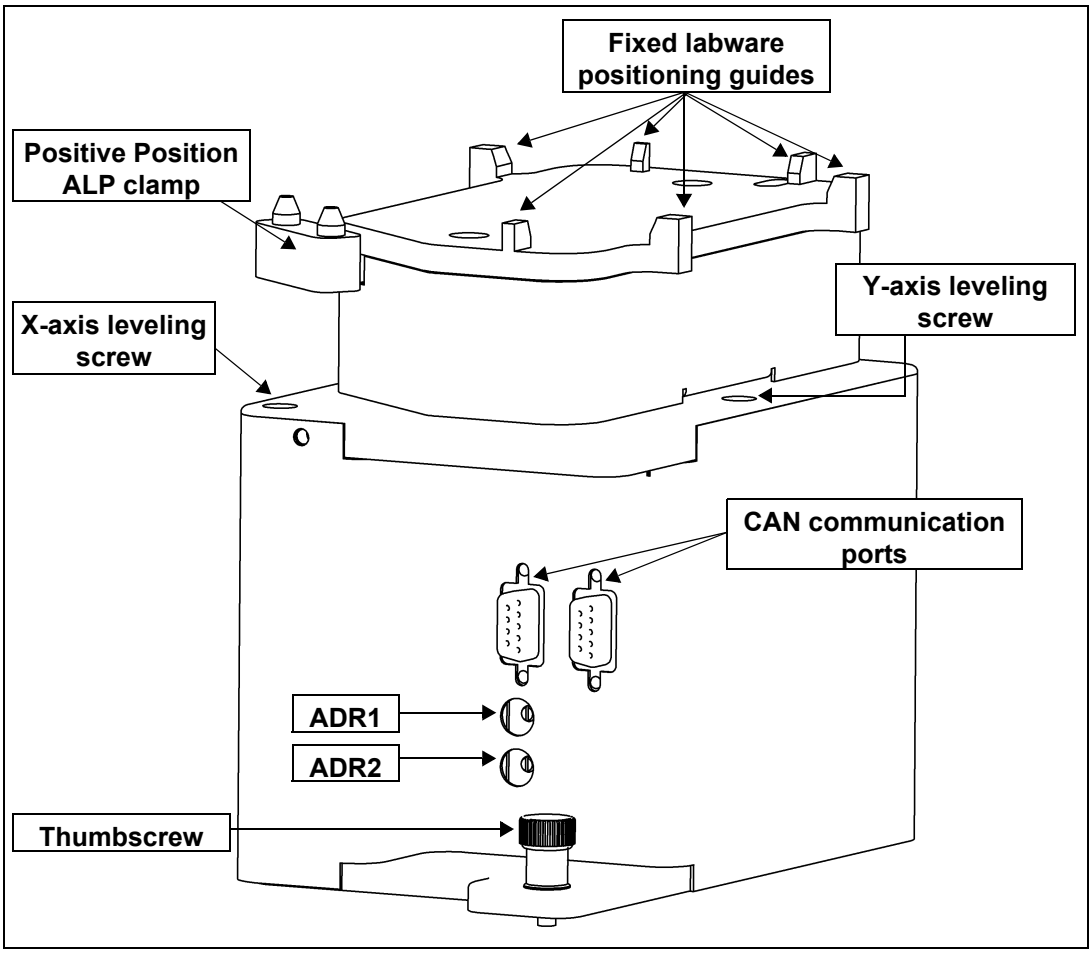

Figure 15-1. Positive Position ALP

15.2 Installing the Positive Position ALP

Installing the Positive Position ALP includes:

- Choosing any standard deck position.

  Note: After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).

- *Mounting a Positive Position ALP to the Deck* (Section 15.2.1).
- *Leveling the Positive Position ALP* (Section 15.2.2).
- *Aligning the Top of the Positive Position ALP with the Multichannel Head or Span-8 Probes* (Section 15.2.3).

15.2.1 Mounting a Positive Position ALP to the Deck

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

To mount the Positive Position ALP:

1. Turn off power to the Biomek instrument before mounting any ALP.

CAUTION: Orient the Positive Position ALP so the CAN connections are to the right of the ALP and the clamp is in the front right corner of the ALP when facing the Biomek instrument.

2. Position the Positive Position ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck, the CAN connections are to the right of the ALP, and the clamp is in the front right corner of the ALP when facing the Biomek instrument.
3. Fasten the Positive Position ALP to the deck using the thumbscrews on the base of the ALP.

CAUTION: A maximum of one long CAN cable can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

4. Plug the female end of the CAN communication cable into the male CAN Port on the Positive Position ALP.

   Note: When possible, short CAN cables should be used when connecting devices to each other or to the Biomek instrument.

5. Plug the other end of the CAN communication cable into one of the following connectors:

   Note: Make sure the cable routing does not interfere with the operation of the Biomek instrument.

   - Any female connector labeled “CAN Port” on the main Biomek instrument.
   - Any available female connector labeled “CAN Port” on another Active ALP, creating a chain of connected cables.

     Note: A chain links multiple devices together. The maximum number of devices that can be chained together is three. Each chain of three devices must plug into the main Biomek instrument at some point.

     Note: The maximum number of Positive Position ALPs allowed on the Biomek deck is 20.

6. Verify that address switch ADR1 is set between 0 and 7.

   Note: The device address for a Positive Position ALP is set by both ADR1 and ADR2.

   Note: The default setting for ADR1 is 0, with legal addresses for ADR1 being 0 through 7. If ADR1 is set to addresses 8, it is remapped to 0; if ADR1 is set to 9, it is remapped to 1; and if ADR1 is set to addresses A through F, they are remapped down to addresses 2 through 7.

7. Verify that address switch ADR2 is set between 0 and F.

   Note: The default setting for ADR2 is 0.

15.2.2 Leveling the Positive Position ALP

Once the Positive Position ALP is installed, it must be leveled.

To level the Positive Position ALP:

1. Loosen the three leveling screws two full counterclockwise rotations.
2. Load tips to the pod, if tips are not already loaded.
3. Lower tips until slightly above the top of the Positive Position ALP.
4. Level the X axis to the tips using the two X axis leveling screws by turning the screws clockwise one at a time (Figure 15-2 and Figure 15-3).

   Note: Tightening a screw lowers that side of the Positive Position ALP.

5. Level the Y axis to the tips using the Y axis leveling screw by turning the screw clockwise (Figure 15-1 and Figure 15-2).

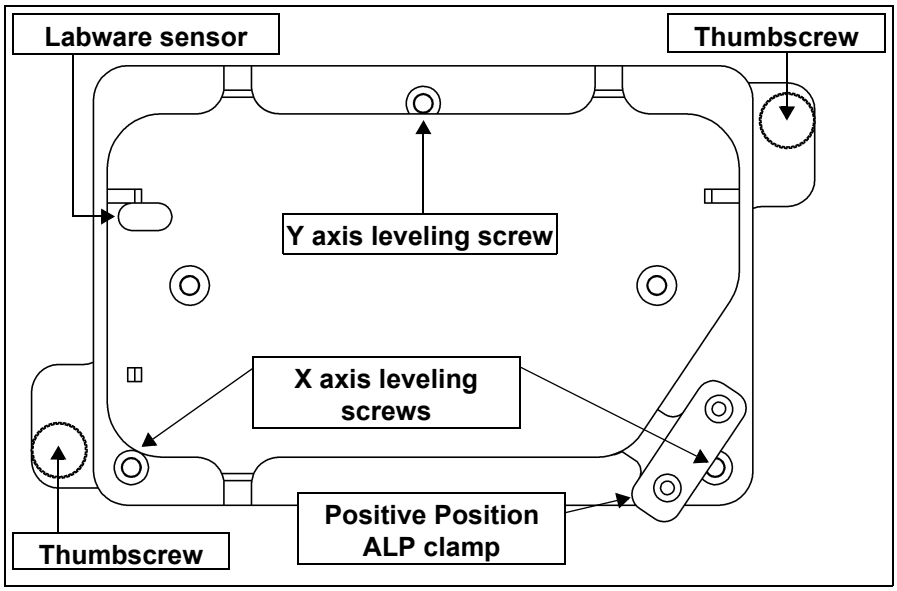

Figure 15-2. Leveling screws for the Positive Position ALP (top-down view)

15.2.3 Aligning the Top of the Positive Position ALP with the Multichannel Head or Span-8 Probes

Once the Positive Position ALP is installed and leveled, it must be aligned with the pod accessing it. Proper alignment prevents damage to the pod, head, probes, tips, ALP, and labware.

To align the Positive Position ALP:

1. Load tips to the pod if tips are not already loaded.
2. Position a microplate on the top of the Positive Position ALP.
3. Lower tips until slightly above the labware on top of the Positive Position ALP.
4. Verify that the microplate wells align with the tips. If necessary, tighten the rotational adjustment screw using the screwdriver provided to rotate the top of the Positive Position ALP counterclockwise (Figure 15-3).

   OR

   Loosen the rotational adjustment screw using the screwdriver provided to rotate the top of the Positive Position ALP clockwise (Figure 15-3).

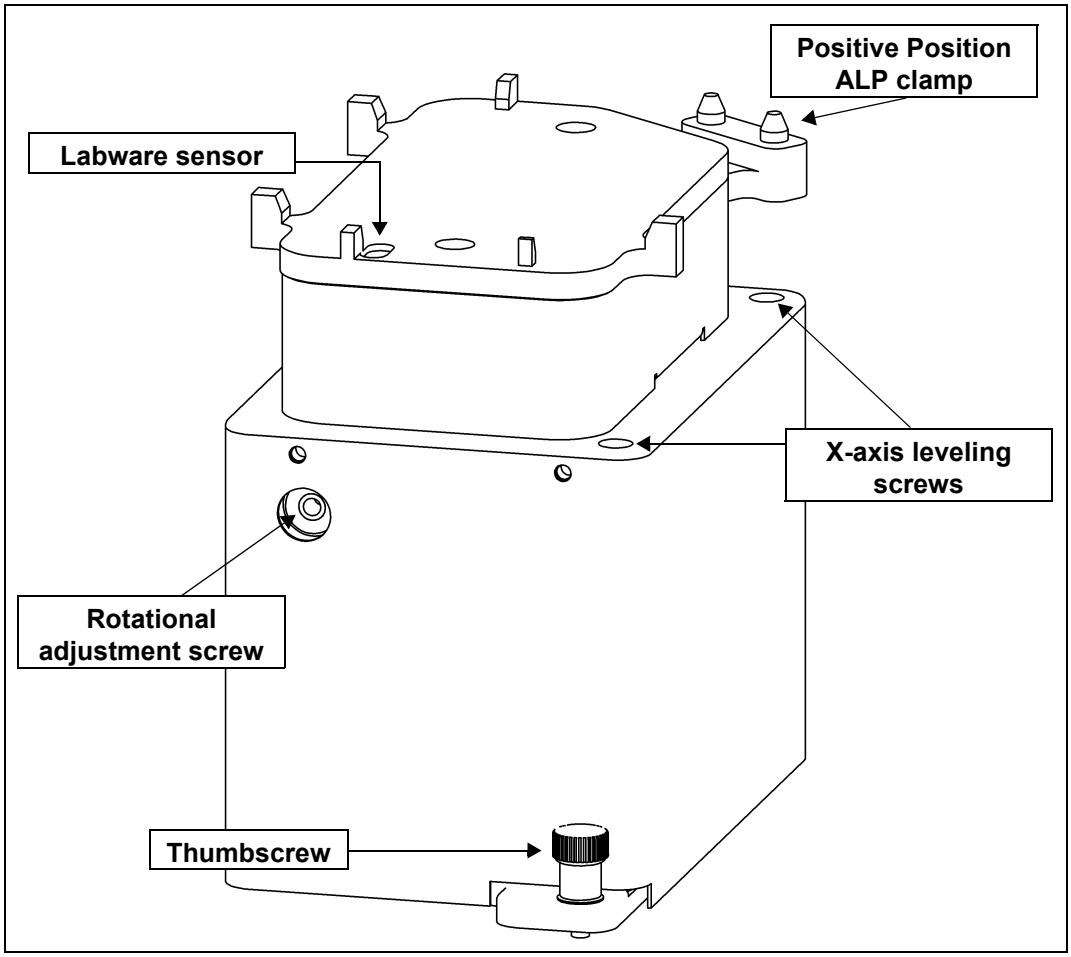

Figure 15-3. Rotational adjustment screw for the Positive Position ALP (left side view)

15.3 Framing Instructions

When using the Positive Position ALP with high-density labware, the ALP may need to be manually framed using Manual Teach to ensure that the tips can access the wells without causing any damage to the tips, probes, pod, or ALP. Manual Teach is accessed through Position Properties in the Deck Editor.

To frame the Positive Position ALP using Manual Teach, follow the instructions outlined in specific user's manual for the instrument.

Note: When using labware other than 1536-well on the Positive Position ALP, the standard framing procedure using the AccuFrame is usually acceptable. To frame the ALP using the AccuFrame, manually position the AccuFrame against the locating surfaces in the back, left corner of the ALP and refer to the specific user's manual for the instrument to complete the process.

15.4 Using the Positive Position ALP in a Method

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING: Pinch Point! The clamps used to secure a microplate to the Positive Position ALP could cause personal injury. Avoid interference with the clamps while a microplate is on the ALP.

To use the Positive Position ALP in a method, it must be installed in Hardware Setup (refer to Chapter 1.3, *Installing and Configuring ALPs*).

The Positive Position ALP unclamps automatically at the end of a method; however, a Device Action step can be used to actuate the clamps in the middle of a method or to verify the presence or absence of labware on the ALP. If access to an unclamped microplate is required, the Positive Position ALP clamps before a pod is allowed to access the microplate. After access to the microplate is completed, the ALP remains clamped until a gripper move, the Device Action step, or the end of the method releases the microplate.

Note: If a light curtain violation occurs while the clamp on the Positive Position ALP is in motion, the motion is completed. The state of the clamps on the Positive Position ALP do not change when the light curtain is violated or during a pause in a method.

Note: The amount of force applied to accurately position a microplate depends upon the type of microplate placed on the Positive Position ALP. When the Positive Position ALP is used in a method, the force applied by the clamp is determined by the type of labware positioned on the ALP (refer to the *Biomek Software User's Manual,* Chapter 7, *Creating and Modifying Tip and Labware Types*). The force applied to clamp a microplate is a percentage of the total clamping force available.

To configure the Device Action step for the Positive Position ALP:

1. Insert a Device Action step into the method view.
2. From Device, select the Positive Position ALP performing the required operation.

   OR

   Click on the Positive Position ALP in the Current Deck Display to select it. The configuration for the Positive Position ALP appears (Figure 15-4).

   Note: The deck position has a blue border in the Current Deck Display and is displayed to the right of Device.

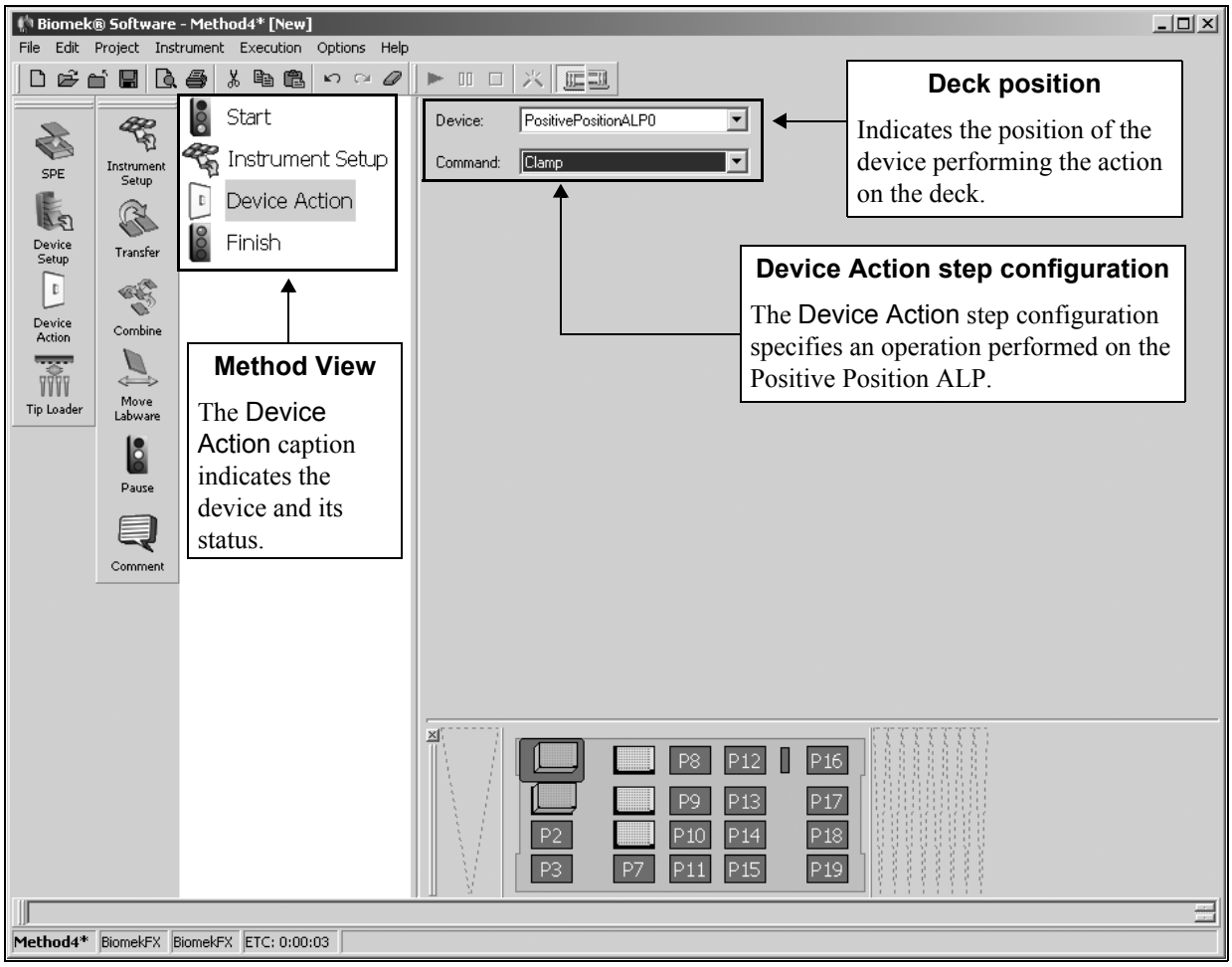

Figure 15-4. Device Action Step for the Positive Position ALP

3. In Command, indicate the desired action for the Positive Position ALP:
   - Clamp — tightens the clamp to hold the labware in place.
   - Unclamp — releases the clamp to allow the labware to be removed from the ALP.
   - VerifyLabware — verifies that labware is currently on the Positive Position ALP; an error displays and the method stops if no labware is found.
   - VerifyNoLabware — verifies that there is currently no labware on the Positive Position ALP; an error displays and the method stops if labware is found.

15.5 Controlling the Positive Position ALP Outside a Method

To control the Positive Position ALP outside a method, use Advanced Manual Control for:

- *Clamping or Unclamping Labware on a Positive Position ALP* (Section 15.5.1)
- *Verifying the Sensor on the Positive Position ALP Operates Properly* (Section 15.5.2)

  Note: Generally, the only time the sensor is verified is during troubleshooting.

- *Verifying the Positive Position ALP Recognizes a Type of Labware* (Section 15.5.3)

15.5.1 Clamping or Unclamping Labware on a Positive Position ALP

To clamp labware on a Positive Position ALP:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**.
3. Select the desired **Positive Position ALP**. Advanced Manual Control for the selected Positive Position ALP appears (Figure 15-5).

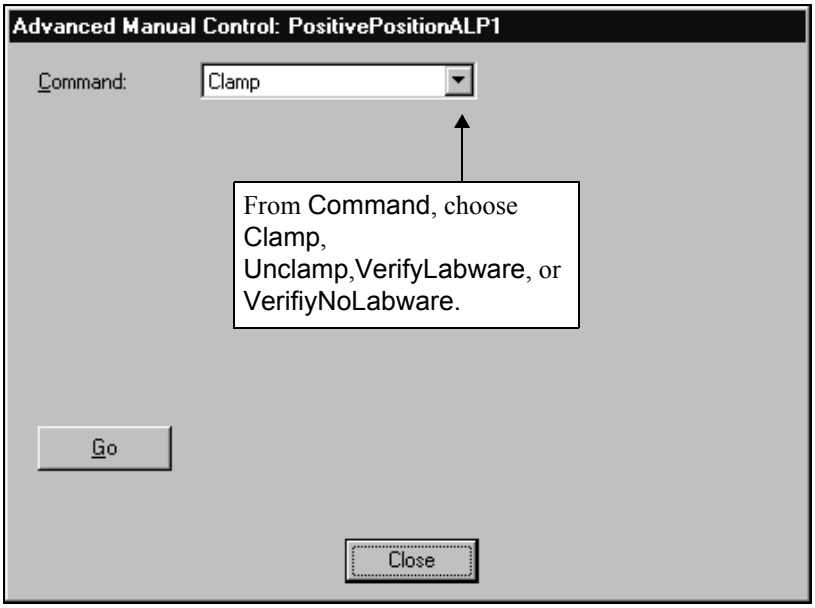

Figure 15-5. Advanced Manual Control for a Positive Position ALP

4. From Command, choose **Clamp**.
5. Choose **Go**. The clamps actuate.
6. Choose **Close** to close Advanced Manual Control.
7. Choose **Exit** to close Manual Control.

To unclamp labware from a Positive Position ALP:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**.
3. Select the desired **Positive Position ALP**. Advanced Manual Control for the selected Positive Position ALP appears (Figure 15-5).
4. From Command, choose **Unclamp**.
5. Choose **Go**. The clamps disengage.
6. Choose **Close** to close Advanced Manual Control.
7. Choose **Exit** to close Manual Control.

15.5.2 Verifying the Sensor on the Positive Position ALP Operates Properly

Manual Control may be used to verify the sensor on the Positive Position ALP operates properly. Generally, the only time the sensor is verified is during troubleshooting.

To verify the sensor operates properly:

1. Place a piece of labware on the Positive Position ALP.
2. Choose **Instrument>Manual Control**. Manual Control appears.
3. Choose **Advanced Controls**.
4. Select the desired **Positive Position ALP**. Advanced Manual Control for the selected Positive Position ALP appears (Figure 15-5).
5. From Command, choose **VerifyLabware**.
6. Choose **Go**. The Positive Position ALP recognizes the piece of labware unless an Error appears (Figure 15-6).

Note: If the following Error (Figure 15-6) appears, the sensor does not recognize the labware present on the Positive Position ALP because the sensor is not operating properly or the ALP does not recognize a specific type of labware.

Note: Contact a Beckman Coulter Service Engineer if several types of labware are not recognized; the sensor on the Positive Position ALP is not operating properly.

Figure 15-6. Labware not found at sensor

7. Choose **Close** to close Advanced Manual Control.
8. Choose **Exit** to close Manual Control.

OR

1. Make sure no labware is placed on the Positive Position ALP.
2. Choose **Instrument>Manual Control**. Manual Control appears.
3. Choose **Advanced Controls**.
4. Select the desired **Positive Position ALP**. Advanced Manual Control for the selected Positive Position ALP appears (Figure 15-5).
5. From Command, choose **VerifyNoLabware**.

6. Choose **Go**. The Positive Position ALP recognizes no labware is placed on the Positive Position ALP unless an Error appears (Figure 15-7).

Note: If the following Error (Figure 15-7) appears, the sensor does not recognize that labware is not present on the Positive Position ALP; the sensor is not operating properly. Contact a Beckman Coulter Service Engineer.

Figure 15-7. Labware found at sensor

7. Choose **Close** to close Advanced Manual Control.
8. Choose **Exit** to close Manual Control.

15.5.3 Verifying the Positive Position ALP Recognizes a Type of Labware

Follow the instructions in Section 15.5.2, *Verifying the Sensor on the Positive Position ALP Operates Properly*, to verify if the Positive Position ALP recognizes a specific type of labware.

15.6 Removing the Positive Position ALP from the Deck

To remove the Positive Position ALP:

1. Turn off power to the Biomek instrument before removing the Positive Position ALP.
2. Unplug the CAN communication cable from the CAN Port on the Positive Position ALP.
3. Loosen the thumbscrews on the base of the ALP.
4. Lift the ALP in an upward motion to clear the locating pins from the deck.

15.7 Storage

Return the Positive Position ALP to the original packing materials and store in a dry, dust-free, environmentally-controlled area.

Note: It is desirable to allow the Positive Position ALP to air dry before returning it to the original packing materials.

15.8 Preventive Maintenance

Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

15.9 Troubleshooting

Do not attempt to repair the Positive Position ALP without first contacting a Beckman Coulter Service Engineer.

Table 15-1. Troubleshooting the Positive Position ALP

IF	THEN
The Positive Position ALP is not powering up	Check CAN cable connection. Contact a Beckman Coulter Service Engineer.
The Positive Position ALP is not functioning correctly	Contact a Beckman Service Engineer. Note: Do not remove the cover(s) for any reason.

16 Solid Phase Extraction (SPE) Vacuum Manifold ALP

16.1 Overview

The Solid Phase Extraction (SPE) Vacuum Manifold ALP (Figure 16-1) is an active ALP used to filter fluid from samples by pulling the fluid from a sample through a filtered microplate, and disposing of the filtered fluid. A user-supplied vacuum supply must be provided.

Note: The SPE ALP requires a minimum vacuum supply of 20 in. Hg @ 4.5 SCFM (67.7 kPa @ 0.127 m^3/min).

The SPE ALP is required to complete the Plasmid DNA Miniprep process, and is configured by using the SPE step from the Devices step palette.

The components of the SPE ALP are stacked on two ALP stands: the SPE ALP Stand and SPE Collar Stand (refer to Section 16.1.1, *Components of the SPE ALP*). The two ALP stands occupy two deck positions on the DNA Preparation Deck Layout and are used simultaneously during a method run.

Note: Since the gripper fingers must open wide enough to grip the SPE Collar on the SPE Collar Stand and would hit an adjacent ALP, use the 1 x 1 Passive ALP with Indented Sides to allow the position adjacent to the SPE Collar Stand to be retained. The 1 x 1 Passive ALP with Indented Sides allows enough clearance for the gripper to extend and move the SPE Collar without hitting it (refer to Section 19.1.2, *1 x 1 Passive ALP with Indented Sides*).

The sections in this chapter include:

- *Installing the SPE ALP and SPE Collar Stand* (Section 16.2)
- *Framing Instructions* (Section 16.3)
- *Using the SPE ALP in a Method* (Section 16.4)
- *Removing the SPE ALP and SPE Collar Stand* (Section 16.5)

- *Storage* (Section 16.6)
- *Preventive Maintenance* (Section 16.7)
- *Troubleshooting* (Section 16.8)

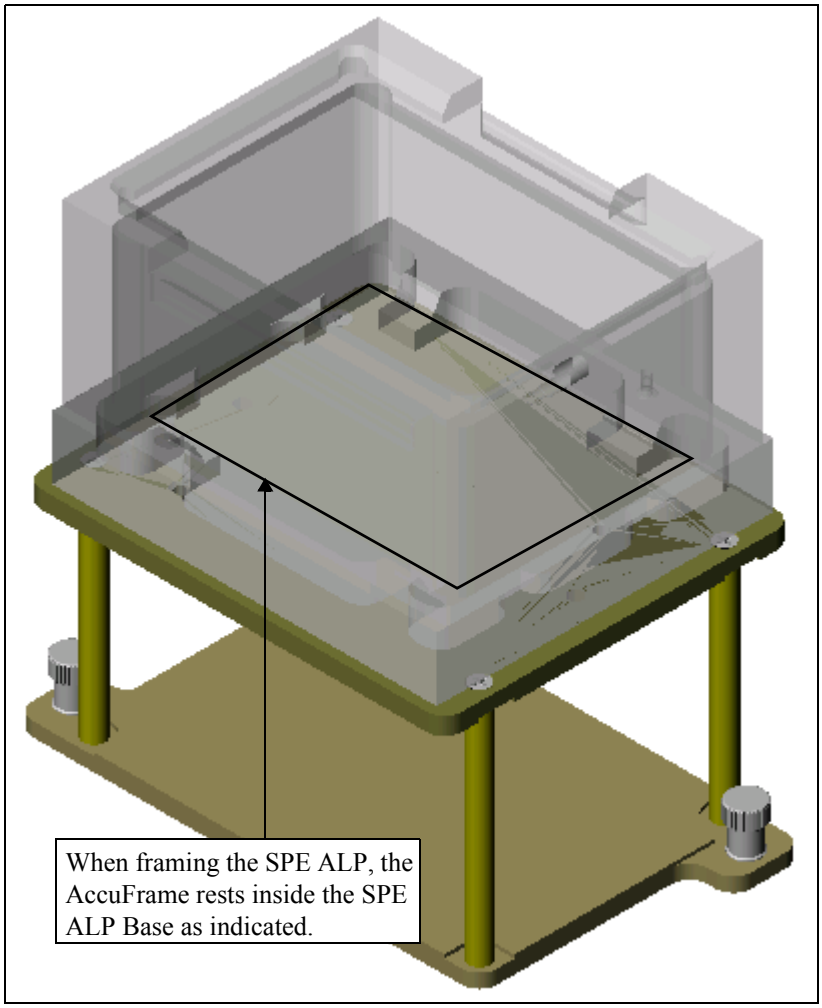

Figure 16-1. SPE ALP with Collar

Note: The interior of the SPE ALP Base is used for framing (refer to Section 16.3, *Framing Instructions*). The SPE Collar must be removed to frame the SPE ALP.

16.1.1 Components of the SPE ALP

The components of the SPE ALP are stacked on two ALP stands which are used simultaneously during a method run.

The components of the SPE ALP are:

- SPE ALP Base — connects to the vacuum used during filtration operations; all filtered fluids are drained through the SPE ALP Base.
- SPE ALP Collar — supports the source microplate and encloses the receiver filter microplate during filtration operations; referred to as the Manifold in the Biomek Software.

  Note: There are multiple SPE Collars available for use on the SPE ALP. The specific collar used during a method run is specified by the wizard.

- Filter Microplate — the labware through which fluids are separated from solids in the SPE ALP; referred to as the Filter Source and Receiver Source in the Biomek Software.
- Filter Holder — a plastic device that holds a filtered microplate to protect it from damage.

Note: The process of stacking the components of the SPE ALP during a method creates the SPE ALP. The SPE ALP can be assembled and/or disassembled during a method.

The two ALP stands are:

- SPE ALP Stand — supports the SPE ALP Base (Figure 16-2) where filtration occurs and occupies a position in the back row of the Biomek FX deck; the SPE ALP Stack is constructed on the SPE ALP Stand.

  Note: The SPE ALP is the combination of the SPE ALP Base and the SPE ALP Stand. The SPE ALP Base and the SPE ALP Stand are treated as a single unit (the SPE ALP) in the Biomek Software.

- SPE Collar Stand — supports the SPE Collar (Manifold in the software) (Figure 16-3) and occupies a deck position adjacent to the SPE ALP Stand, in the same column.

Note: The two ALP stands occupy two deck positions on the DNA Preparation Deck Layout.

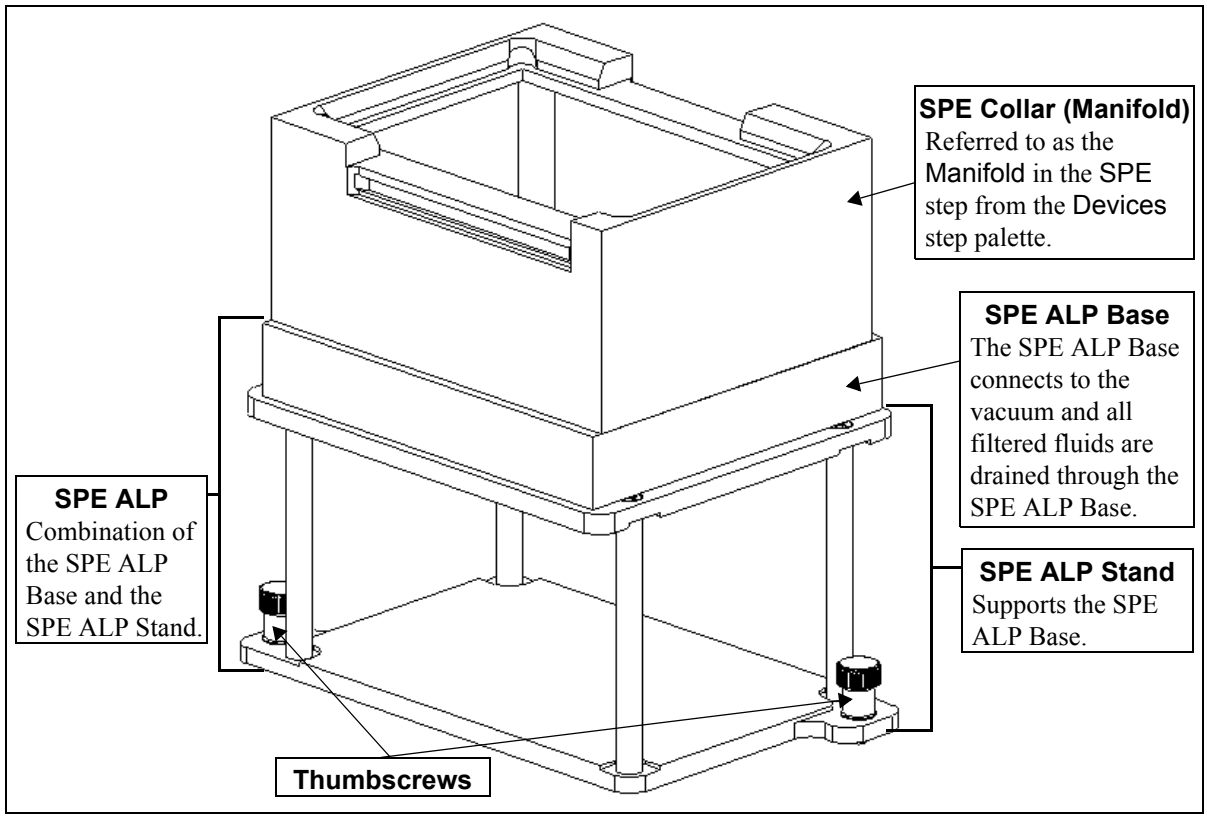

Figure 16-2. SPE Collar (Manifold), SPE ALP Base, and SPE ALP Stand

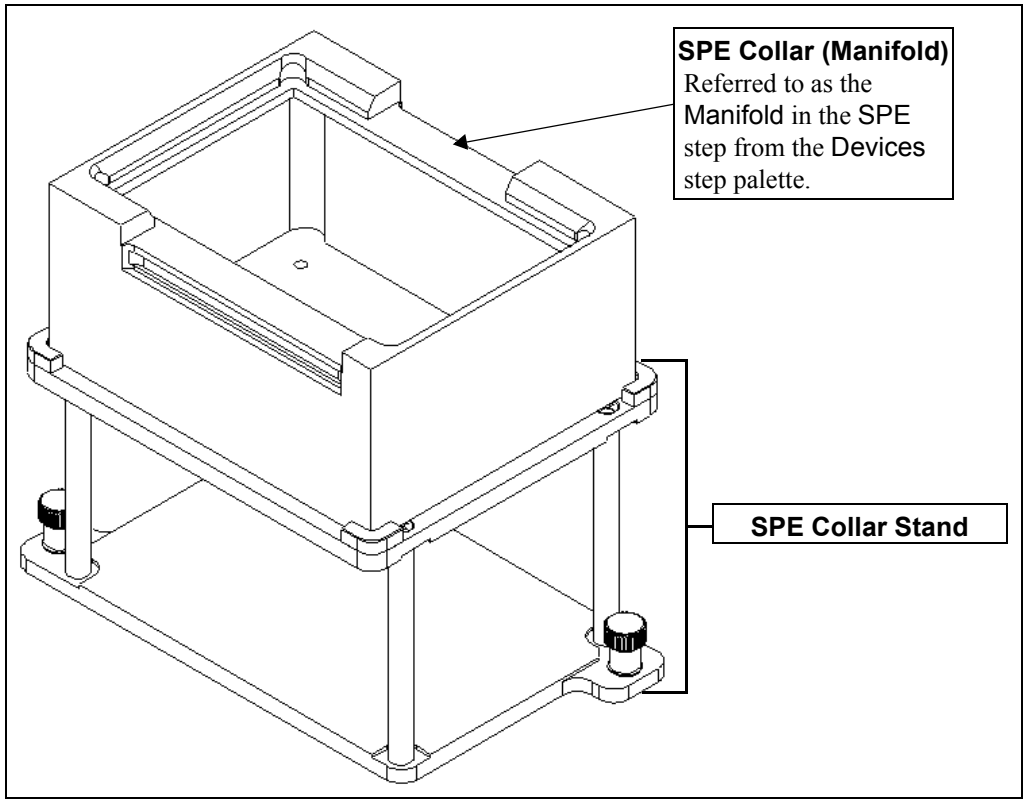

Figure 16-3. SPE Collar placed on the SPE Collar Stand

16.2 Installing the SPE ALP and SPE Collar Stand

Installing the SPE ALP includes choosing adjacent deck positions for the SPE ALP and SPE Collar Stand and mounting them to the deck.

Note: Connect the SPE ALP as recommended by the manufacturer of the vacuum system being used.

16.2.1 Choosing Deck Positions for the SPE ALP and Collar Stand

SPE ALP and the SPE Collar Stand occupy adjacent deck positions. Use the Biomek Software Deck Editor to determine available positions on which to install the SPE ALP and Collar Stand.

Note: After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).

16.2.2 Mounting the SPE ALP

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

To mount the SPE ALP (Figure 16-2):

Note: The SPE ALP is the combination of the SPE ALP Base and the SPE ALP Stand.

1. Position the SPE ALP so the locating pins on the bottom of the ALP stand slip into locating holes on the deck.
2. Attach the SPE ALP to the deck using the thumbscrews on the ALP stand (Figure 16-2).
3. Attach a vacuum hose to the SPE ALP as directed by the manufacturer of the vacuum unit.

   Note: The SPE ALP filtration manifold requires a minimum vacuum supply of 20 in. Hg @ 4.5 SCFM (67.7 kPa @ 0.127 m^3/min).

   Note: The vacuum hose must run toward the back of the Biomek deck; so, make sure the barbed fitting on the SPE ALP is horizontal to the ALP edge.

   Note: Make sure the hose routing does not interfere with the operation of the Biomek instrument.
4. Provide a waste container as specified by the vacuum pump manufacturer.

16.2.3 Mounting the SPE Collar Stand

To mount the SPE Collar Stand (Figure 16-4):

Note: The SPE Collar Stand must be adjacent to the SPE ALP.

1. Position the SPE Collar Stand so the locating pins on the bottom of the stand slip into locating holes on the Biomek deck.

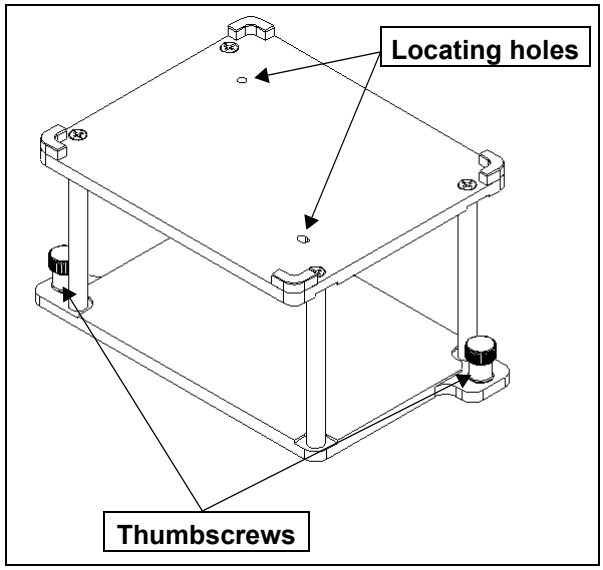

Figure 16-4. SPE Collar Stand locating holes and thumbscrews

2. Attach the SPE Collar Stand to the deck using the thumbscrews on the base of the stand (Figure 16-4).

16.3 Framing Instructions

Special framing instructions are necessary for the SPE ALP and the SPE Collar Stand.

16.3.1 Special Framing for the SPE ALP

The SPE ALP is framed using the AccuFrame, but not the Framing Tool Adaptor.

To frame the SPE ALP:

1. Attach the SPE ALP to the deck using the thumbscrews on the base of the ALP stand (Figure 16-2).
2. Place the AccuFrame inside the SPE ALP.
3. Frame the ALP according to procedures outlined in the specific user's manual for the instrument.

16.3.2 Special Framing for the SPE Collar Stand

The SPE Collar Stand is framed using the AccuFrame and the Framing Tool Adaptor.

To frame the SPE ALP Collar Stand:

1. Place the Framing Tool Adaptor on the SPE Collar Stand so that the locating pins on the bottom of the Framing Tool Adaptor align with the locating holes on the SPE Collar Stand (Figure 16-5).

CAUTION: Turn off power to the Biomek instrument before attaching or removing AccuFrame from the instrument deck.

2. Turn off power to Biomek instrument before connecting the AccuFrame.
3. Plug the AccuFrame into an available CAN port on the Biomek tower.

WARNING: Make sure the light curtain is not violated by the AccuFrame cable. If the light curtain is violated, the framing process halts immediately.

WARNING: Make sure the AccuFrame cable does not interfere with pod movement.

4. Turn on power to Biomek instrument.
5. Manually place the AccuFrame into the Framing Tool Adaptor by placing the front right corner first and pushing the AccuFrame gently down into the Adaptor (Figure 16-5).

6. Frame the SPE Collar Stand according to the instructions outlined in the specific user's manual for the instrument.

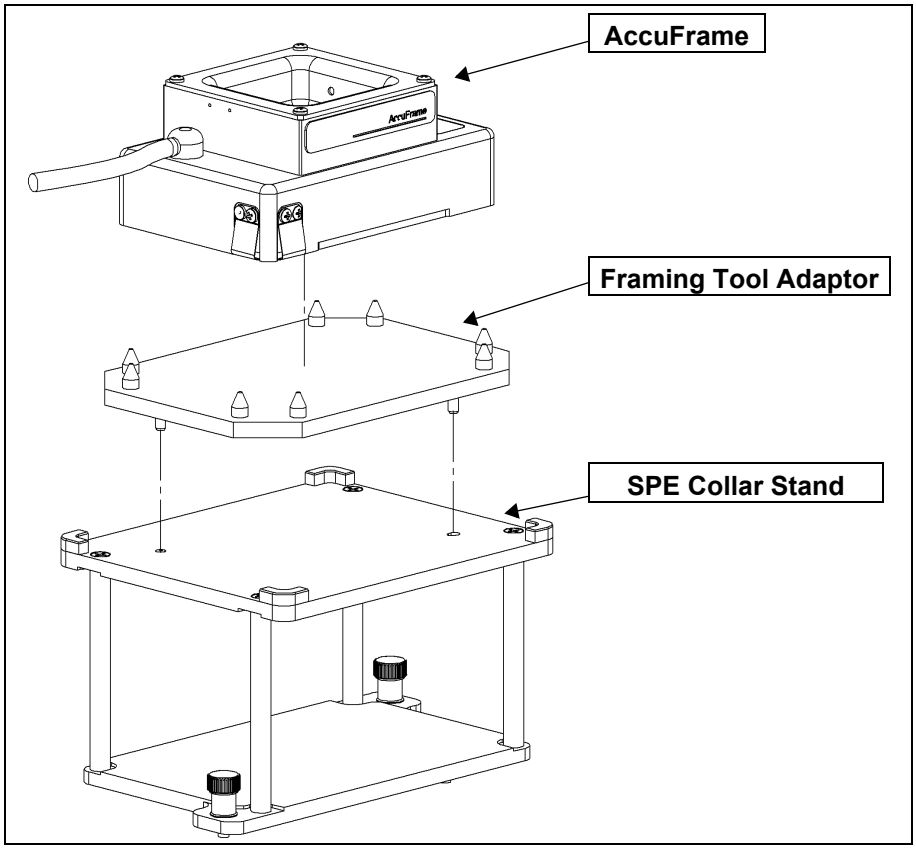

Figure 16-5. Placing the Framing Tool Adaptor and AccuFrame on the SPE Collar Stand

16.4 Using the SPE ALP in a Method

Using the SPE ALP in a method requires the configuration of labware, such as the filter holder, in the Instrument Setup step (refer to the *Biomek Software User's Manual,* Chapter 15.2, *Instrument Setup Step*) and configuration of the SPE step (refer to Section 16.4.1, *Configuring the SPE Step*).

16.4.1 Configuring the SPE Step

The SPE step is a convenient way of executing the assembly and disassembly of the SPE ALP system. An SPE step must be configured when an SPE ALP is required to complete a method. The configuration for the SPE step informs the Biomek Software of the:

- Operation required of the SPE step (Figure 16-6)
- Location of the filtered microplate used by the SPE ALP
- Locations of the SPE vacuum manifold and receiver
- Location of the SPE ALP on the deck
- Pod constructing/destroying the SPE stack

Note: The SPE step is for use with a Multichannel Pod only.

Note: The SPE ALP can only be used on the DNA Preparation Deck Layout and occupies two deck positions.

To configure the SPE step:

1. Insert a SPE step into the Method View (Figure 16-6).

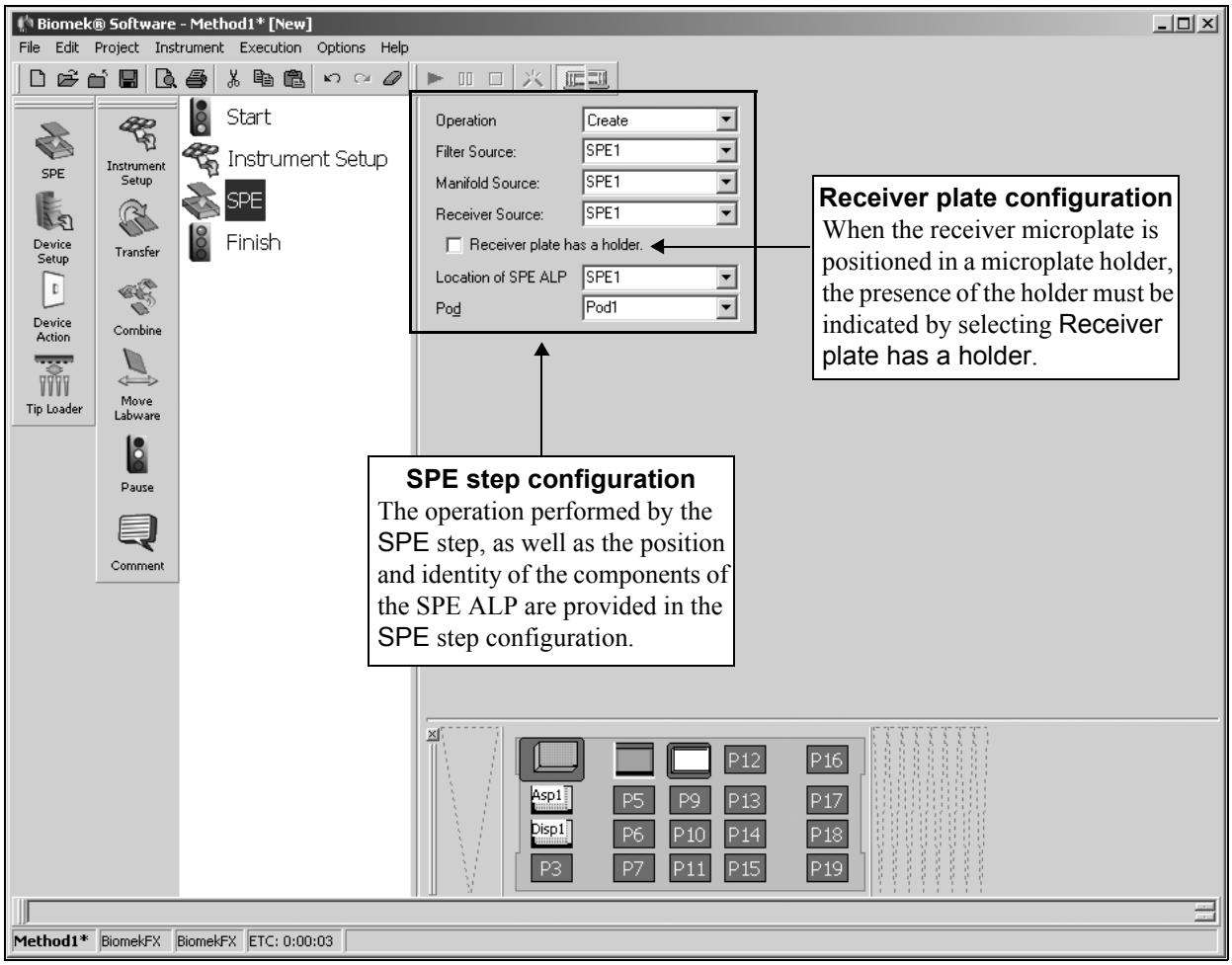

Figure 16-6. SPE step and configuration

2. Select the **Operation** performed by the SPE ALP from the options listed below:
   - Create — assembles the various pieces of an SPE stack
   - Destroy — disassembles an SPE stack
3. Select the location of the **Filter Source** used by the SPE stack.

   Note: The Filter Source is the location on the deck of the filtered microplate that is placed on top of the SPE ALP stack.

4. Select the location of the **Manifold Source** for the SPE stack. The Manifold Source is the location of the manifold, which is referred to as the collar in the this manual.

5. Select the location of the **Receiver Source** for the SPE stack. The Receiver Source is any filtered microplate that is positioned inside the SPE Collar and the SPE ALP. If no receiver microplate is defined, the fluid flows through the source filtered microplate into the SPE ALP Base. The fluid is removed from the base via the vacuum hose.

   Note: Filter Source, Manifold Source, and Receiver Source all change to Destination when Operation is set to Destroy.

6. Select **Receiver plate has a holder** if the receiving microplate is positioned in a filter holder. The filter holder is used to keep the tips of a filtered microplate from touching the base of an ALP stand.

   Note: A filter microplate without a filter holder can be positioned inside a 1 x 1 ALP without damaging the microplate.

   Note: Labware, including the filter holder, is positioned on the Deck Layout in the Instrument Setup step.

7. Select the **Location of SPE ALP** on the Biomek deck.
8. Specify the **Pod** accessing the SPE stack.
   - ***FX*** — Pod is available only if the Biomek instrument is configured as a dual-pod instrument. Pod1 is the default for a single-pod Biomek FX system. In a dual-pod Biomek FX system, the pod configured as the default pod is displayed in Pod. If the other pod is desired, select the pod from the drop-down list.
9. Select a step that occurs after the SPE step or the **Finish** step to validate the step configuration.

16.5 Removing the SPE ALP and SPE Collar Stand

To remove the SPE ALP:

1. Remove the vacuum attachment as directed by the manufacturer.
2. Loosen the thumbscrews.
3. Lift the ALP in an upward motion to clear the locating pins from the deck.

To remove the SPE Collar Stand:

1. Loosen the thumbscrews.
2. Lift the SPE Collar Stand in an upward motion to clear the locating holes from the deck.

16.6 Storage

Return the SPE ALP to the original packing materials and store in a dry, dust-free, environmentally controlled area.

Note: It is desirable to allow the SPE ALP to air-dry before returning it to the original packing materials.

16.7 Preventive Maintenance

Wash plastic periodically.

16.8 Troubleshooting

Do not attempt to repair the SPE ALP without first contacting a Beckman Coulter Service Engineer.

Table 16-1. Troubleshooting the SPE Vacuum Manifold ALP

IF	THEN
The SPE ALP is not applying appropriate vacuum to the microplate	Verify the vacuum unit has been set up and attached to the ALP as directed by the manufacturer.
The SPE ALP is not functioning correctly	Contact a Beckman Coulter service Engineer. **Note:** Do not remove the cover(s) for any reason.
Gaskets become worn	Replace gaskets using the Gasket Replacement Kit (#719404). Follow instructions in the kit.

17 Span-8 Disposal ALP

17.1 Overview

The Span-8 Disposal ALP is a passive ALP that provides a means to dispose of tips during a method. This ALP is designed to dispose of tips used by the Span-8 Pod in one of two ways:

- Span-8 Disposal ALP without Slide — The disposed tips are placed into a waste receptacle positioned inside the Span-8 Disposal ALP base (used for tip disposal only).

  OR

- Span-8 Disposal ALP with Slide— A slide that extends beyond the edge of the Biomek deck is inserted into the Disposal ALP. Tips placed inside the ALP slide down into a receptacle placed below.

Note: The Span-8 Disposal ALP is shipped so that either of the two options above can be assembled and used.

Earlier versions of the Span-8 Disposal ALP included a slightly different bagging extension; however, when used with Biomek Software 3.2, a new bagging extension must be used. This new bagging extension is included in an upgrade kit (Beckman Coulter Part # A20304). The Span-8 Disposal ALP purchased with Biomek Software 3.2 includes the new bagging extension.

CAUTION: Older versions of the Span-8 Disposal ALP must be modified with the new bagging extension when upgrading to Biomek Software 3.2. Failure to modify the ALP could result in Span-8 Pod crashes.

- ***FX*** — When the Biomek FX instrument is configured with a Span-8 Pod and a Multichannel Pod, the Span-8 Disposal ALP must be positioned on the Span-8 side of the deck in the outside column.
- ***NX-S8*** — The Half-Position Disposal ALP is designed to dispose of tips used by the Biomek NX Span-8 instrument (refer to Chapter 5, *Half-Position Disposal ALP (NX-S8 only)*).

The sections in this chapter include:

17.1.1 Span-8 Disposal ALP without Slide

WARNING: When using the Span-8 Disposal ALP without Slide, do not overfill the disposal bag. Tips may spill over onto the deck, possibly contaminating the deck with hazardous materials.

When the Span-8 Disposal ALP is used as a self-contained waste receptacle, the bagging extension is attached to the ALP base, and a waste bag is mounted inside the Span-8 Disposal ALP (Figure 17-1). The ALP can be used in a standard deck position in the outside columns of the deck and is particularly effective when lab space is at a premium.

Note: The Span-8 Disposal ALP without Slide is used only for collecting shucked tips.

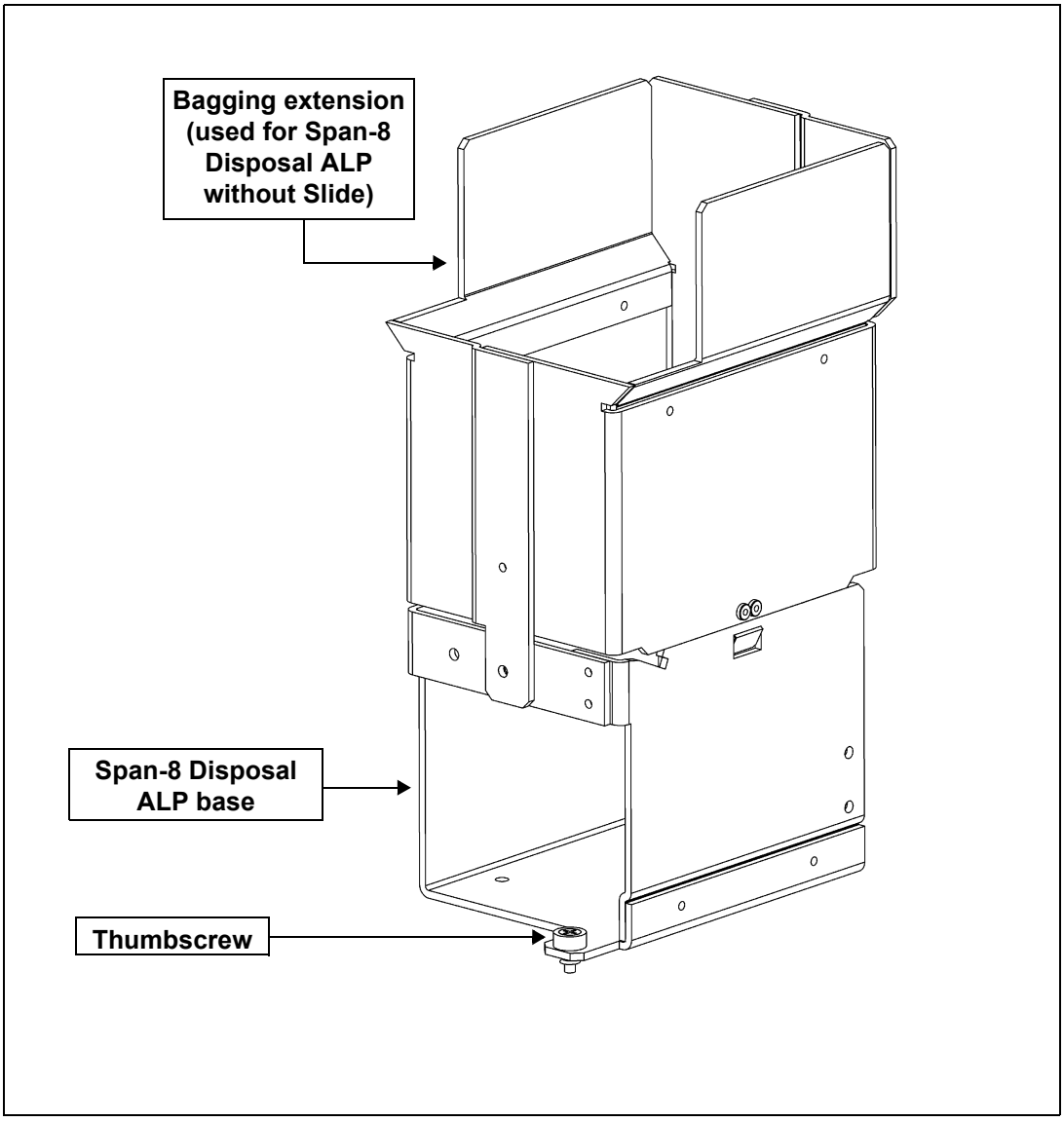

Figure 17-1. Span-8 Disposal ALP without Slide

17.1.2 Span-8 Disposal ALP with Slide

The Span-8 Disposal ALP with Slide (Figure 17-2) is positioned on the deck in the outside columns, and extends off the edge of the deck. The slide is directed through the gap between the deck and light curtain (or side safety shield). A trash receptacle is placed on the floor at the end of the slide to catch the waste. The Span-8 Disposal ALP with Slide allows the disposal of as many used tips as the trash receptacle is capable of holding.

CAUTION: The Span-8 Disposal ALP with Slide must be mounted on the outside columns of the Biomek deck to avoid collisions.

Note: Span-8 Disposal ALPs with Slide cannot be mounted adjacent to one another on the first three rows of the deck.

The Span-8 Pod can drop disposable tips directly into the Span-8 Disposal ALP with Slide.

Note: Tips may stick to the slide, which could cause tips to jam in the chute. Check the slide periodically during the method run to ensure it is clear of tips.

Note: Since the slide of a Span-8 Disposal ALP extends beyond the edge of the Biomek FX deck, the deck must be modified to accommodate the slide. Refer to Section 17.4, *Installing Protective Shield Blanking Plate on the Biomek FX*, for more information on modifying the deck to accommodate a Span-8 Disposal ALP with Slide.

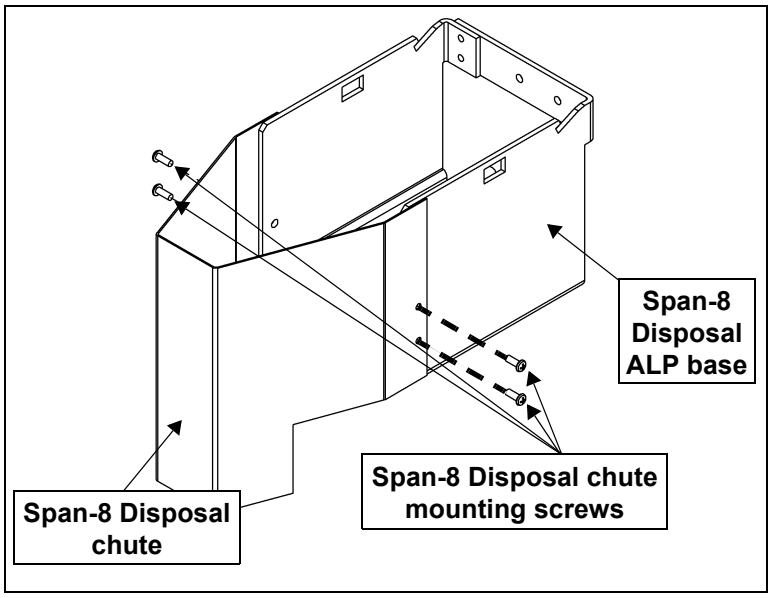

Figure 17-2. Span-8 Disposal ALP with Slide

17.2 Installing the Span-8 Disposal ALP without Slide

Installing the Span-8 Disposal ALP without Slide includes choosing a deck position and mounting the ALP to the deck.

17.2.1 Choosing a Deck Position for the Span-8 Disposal ALP without Slide

CAUTION: The self-contained Span-8 Disposal ALP without Slide must be mounted on the outside columns of the Biomek deck to avoid collisions.

CAUTION: Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

The Span-8 Disposal ALP without Slide can be placed in positions in the outside columns of the Biomek deck.

Note: Span-8 Disposal ALPs cannot be mounted adjacent to one another in the first three rows on the Biomek deck

When adding a Span-8 Disposal ALP without Slide to the Biomek deck, the ALP must be associated with that deck position in the Deck Editor. To associate the Span-8 Disposal ALP without Slide with a deck position in the Deck Editor, drag and drop **Span8TipTrash** to the appropriate position in the deck view. For more information about associating an ALP with a deck position, refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*.

17.2.2 Mounting a Span-8 Disposal ALP without Slide

To mount a Span-8 Disposal ALP without Slide:

1. Remove the slide and chute from the Span-8 Disposal ALP. (Refer to 17.7, *Removing a Span-8 Disposal ALP with Slide*, for specific instructions and diagrams.)

CAUTION: Bagging extensions are not interchangeable between the Multichannel Disposal ALP and the Span-8 Disposal ALP. Each Disposal ALP must use the bagging extension designed for that ALP.

2. Snap the bagging extension onto the Span-8 Disposal ALP base by lining up the springs on the bagging extension with the cutouts on the Disposal ALP base (Figure 17-3).

3. Apply downward force to the top of the bagging extension. The springs slip through to the inside of the Span-8 Disposal ALP base and lock into the cutouts (Figure 17-3).

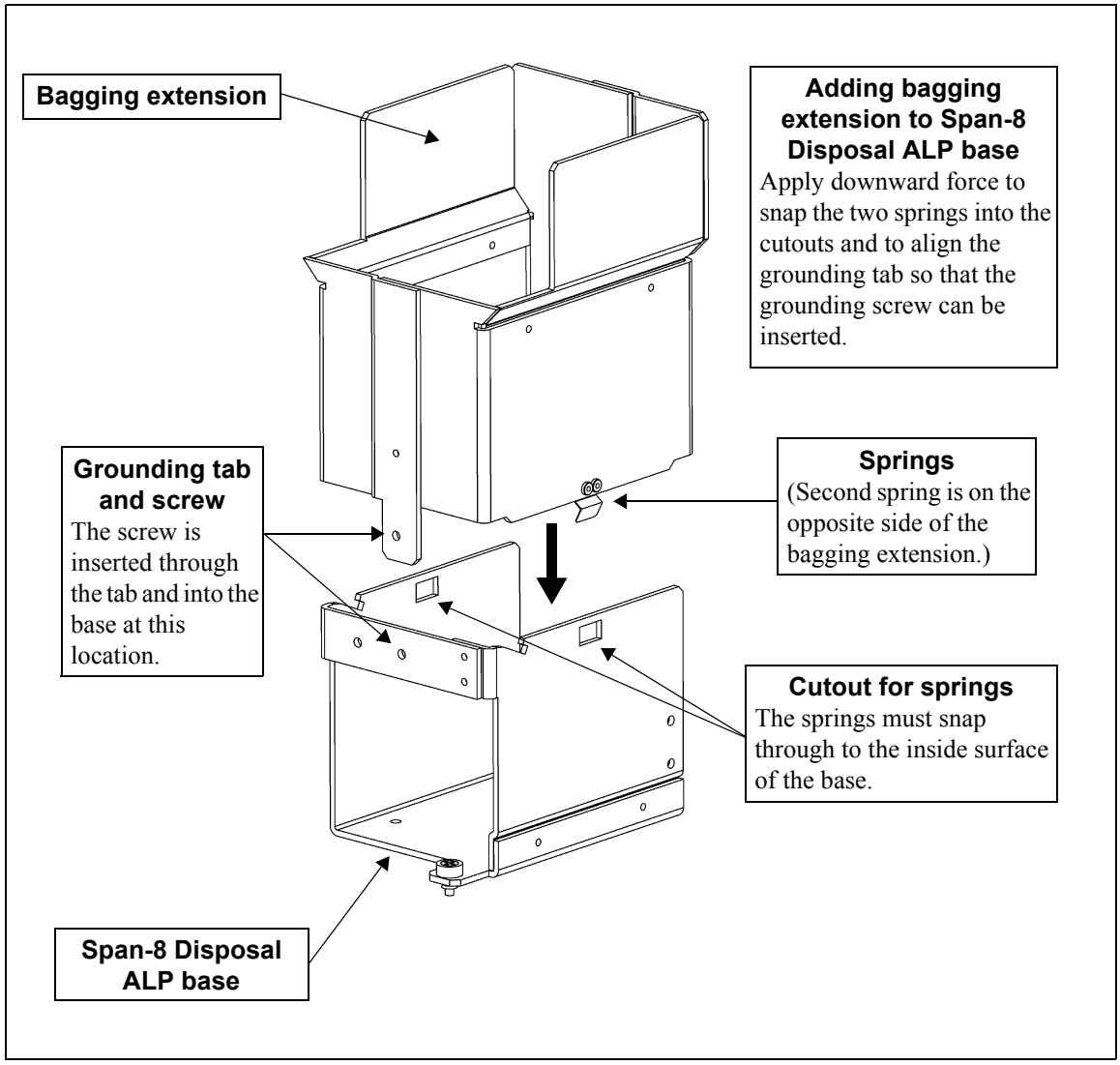

Figure 17-3. Span-8 Disposal ALP without Slide — exploded

4. Insert a screw through the hole in the grounding tab on the bagging extension and into the threaded hole in the Span-8 Disposal ALP base (Figure 17-4).

Note: This screw is necessary for proper ESD grounding of the ALP.

5. Choose a deck position in the outside column of the deck, then slip the locating pins on the bottom of the Span-8 Disposal ALP into the locating holes of the desired deck position.

6. Fasten the Span-8 Disposal ALP to the deck using the thumbscrews on the base of the Span-8 Disposal ALP (Figure 17-4).

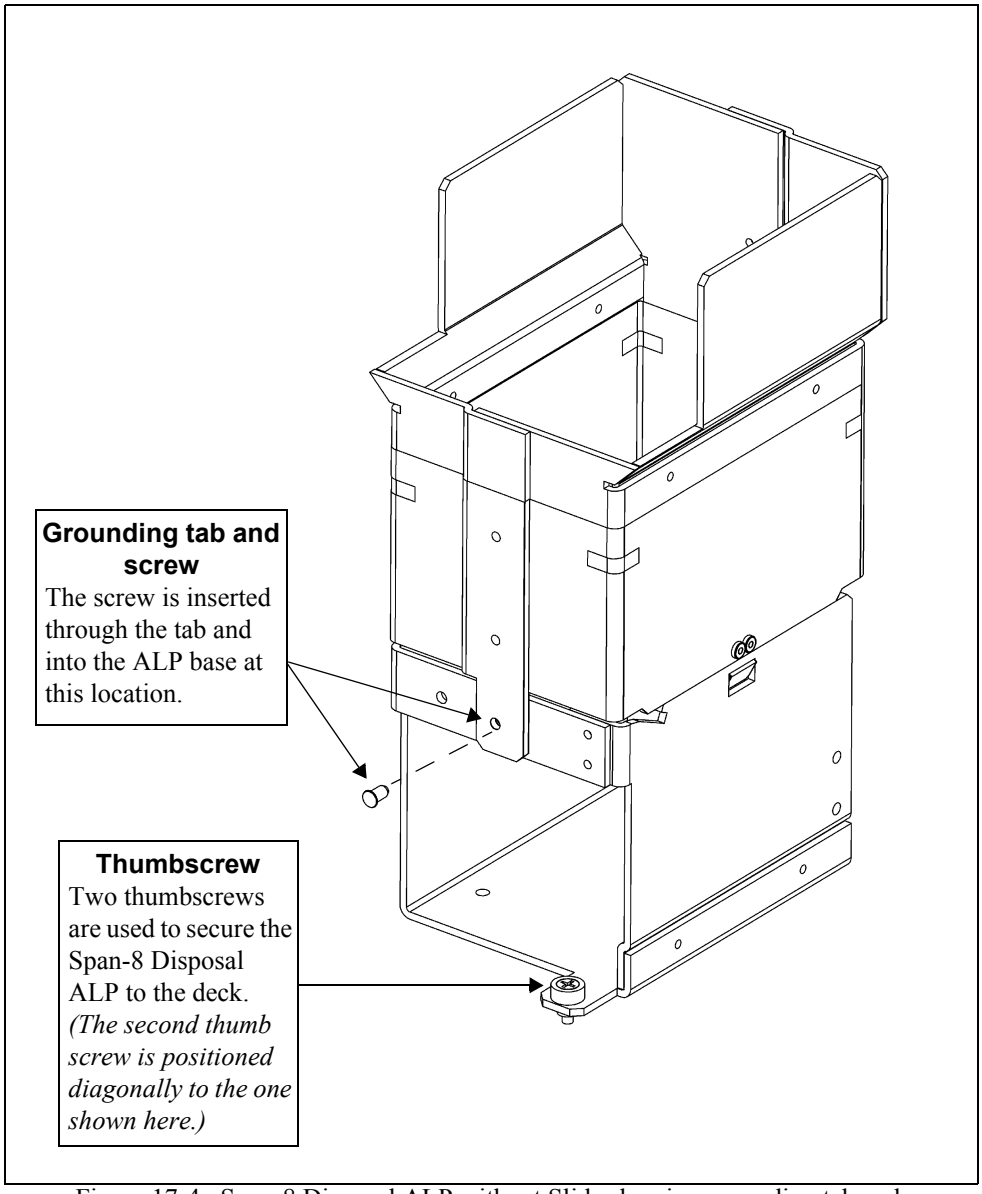

Figure 17-4. Span-8 Disposal ALP without Slide showing grounding tab and screw

WARNING: Appropriately marked autoclavable biohazard bags are recommended for hazardous applications. The waste bags shipped with the Span-8 Disposal ALP are not biohazard bags. Contact the laboratory safety officer for appropriate biohazard bags and procedures.

7. Fold the top of a waste bag over the frame so that the bottom of the bag reaches the bottom of the ALP base.
8. Smooth out the bag to allow items to drop directly to the bottom of the bag.

9. To hold the bag in place, stretch the rubber band over the top of the extension and bag and position it in the location shown (Figure 17-5).

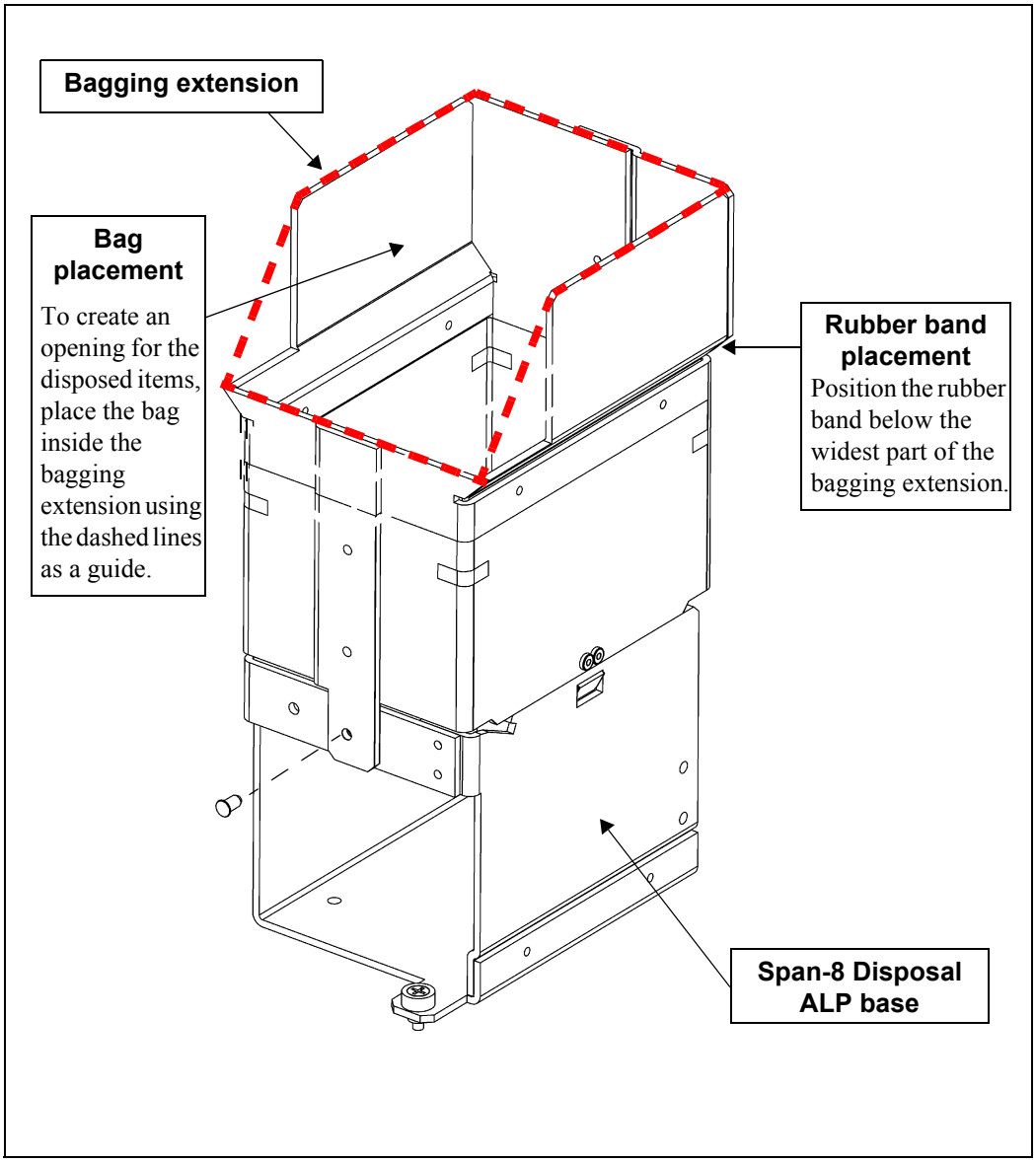

Figure 17-5. Span-8 Disposal ALP without Slide rubber band placement

10. Pull the bag through the Span-8 Disposal ALP so the opening looks like the photo in Figure 17-6.

Figure 17-6. Span-8 Disposal ALP with correct bag placement

17.3 Installing the Span-8 Disposal ALP with Slide

Installing the Span-8 Disposal ALP with Slide includes choosing a deck position and mounting the ALP to the deck.

Note: Since the slide of a Span-8 Disposal ALP extends beyond the edge of the Biomek FX deck, the deck must be modified to accommodate the slide. Refer to Section 17.4, *Installing Protective Shield Blanking Plate on the Biomek FX*, for more information on modifying the deck to accommodate a Span-8 Disposal ALP with Slide.

17.3.1 Deck Positions for the Span-8 Disposal ALP with Slide

CAUTION: The Span-8 Disposal ALP with Slide must be mounted on the outside columns of the Biomek deck to avoid collisions.

CAUTION: Make sure the correct Disposal ALP is chosen when configuring the deck setup in the Deck Editor. Disposal ALPs vary in height and failure to choose each Disposal ALP correctly in the software may result in collisions between pod(s) and Disposal ALPs during operation.

The Span-8 Disposal ALP with Slide can be positioned in the outside columns, and extends off the edge of the Biomek deck.

Note: When adding a Span-8 Disposal ALP with Slide to the Biomek deck, the ALP must be associated with a deck position in the Deck Editor. To associate the Span-8 Disposal ALP with Slide with a deck position in the Deck Editor, drag and drop **Span8TrashLeft** or **Span8TrashRight** to the appropriate position in the deck view. For more information about associating an ALP with a deck position, refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*.

17.3.2 Mounting a Span-8 Disposal ALP with Slide

To mount a Span-8 Disposal ALP with Slide:

1. Position the disposal chute by lining up the holes in the disposal chute with the threaded holes in the Span-8 Disposal ALP base (Figure 17-7).
2. Attach the disposal chute to the Span-8 Disposal ALP base using the four screws supplied (Figure 17-7).
3. Place the Span-8 Disposal ALP in an outside column of the deck. This allows the slide to extend downward beyond the left or right side of the deck.
4. Slip the locating pins on the bottom of the Span-8 Disposal ALP into the locating holes on the deck.
5. Fasten the Span-8 Disposal ALP to the deck using the thumbscrews on the base of the Span-8 Disposal ALP (Figure 17-7).

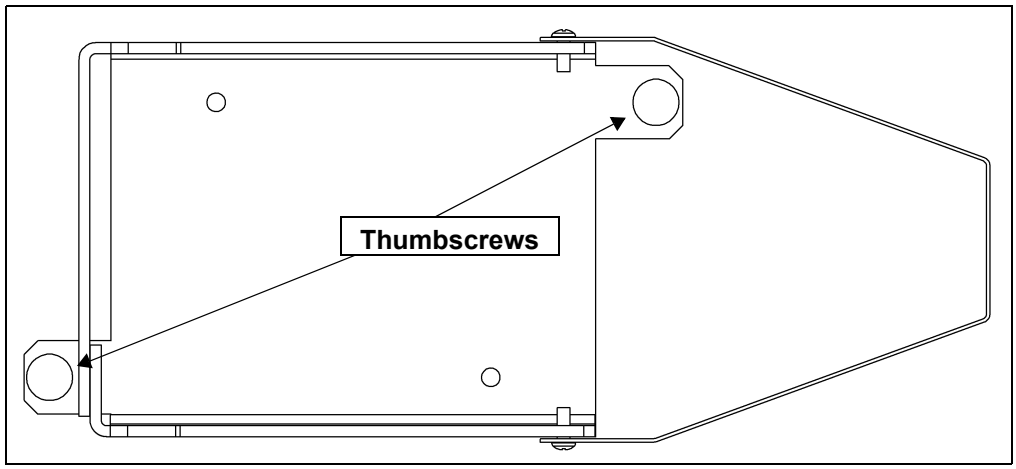

Figure 17-7. Span-8 Disposal ALP with Slide thumbscrews (bottom view)

6. Attach the slide to the ALP by lowering the upper tabs into the grooves in the Span-8 Disposal ALP base (Figure 17-8).

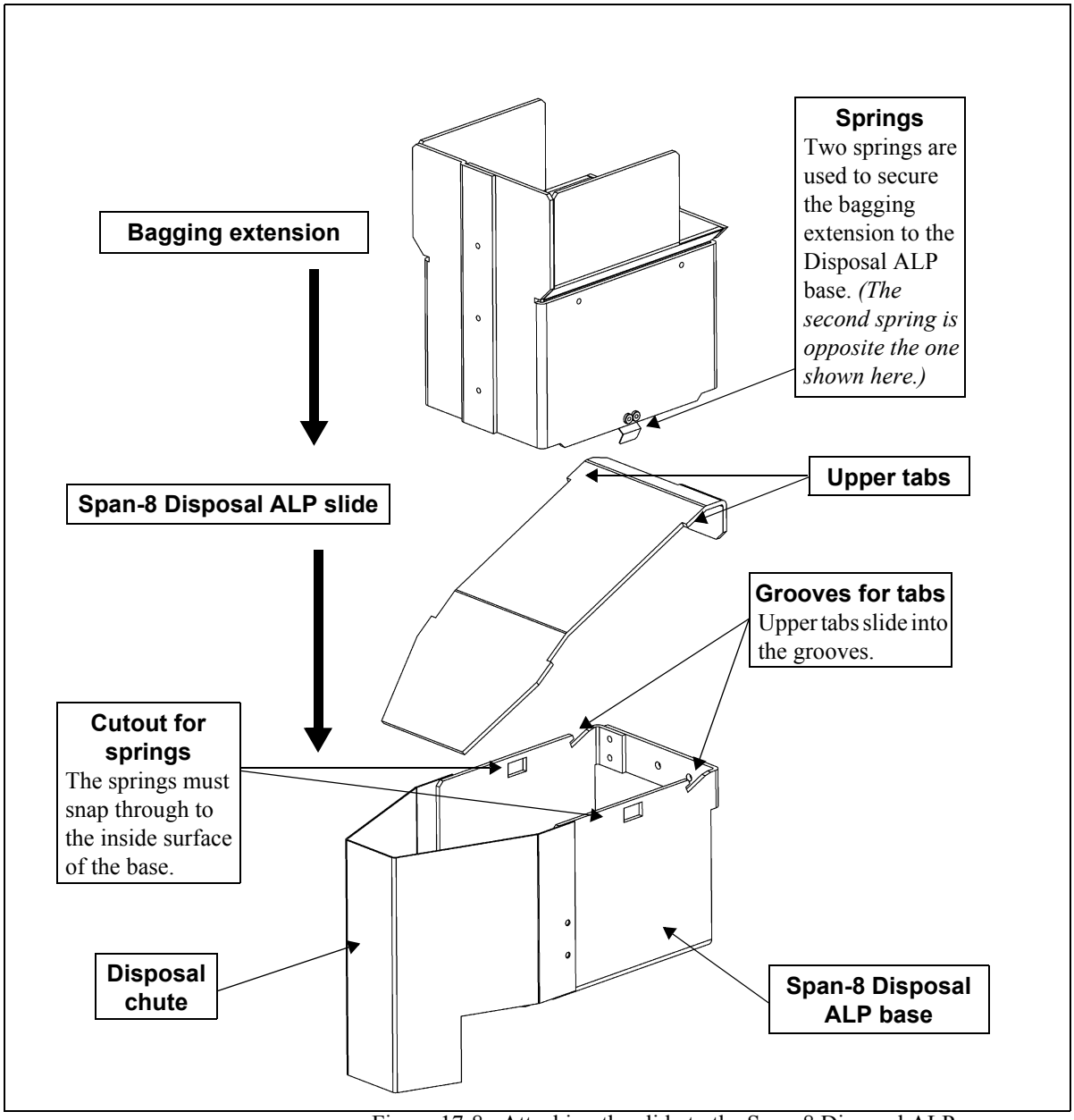

Figure 17-8. Attaching the slide to the Span-8 Disposal ALP

7. Insert the ground screw through the tab on the back of the slide and into the threaded hole in the Span-8 Disposal ALP base (Figure 17-9).

Note: This screw is necessary for proper ESD grounding of the ALP.

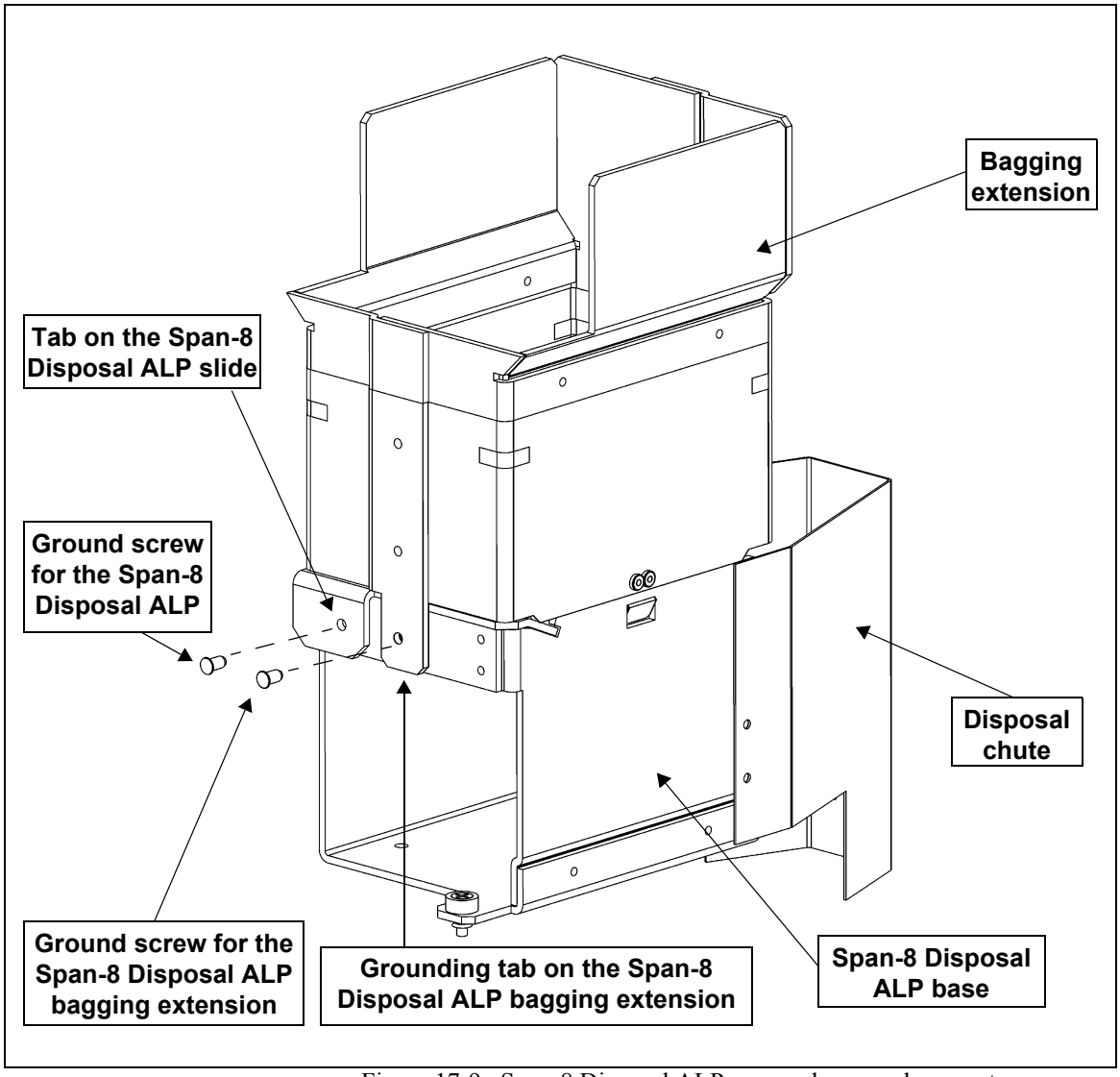

Figure 17-9. Span-8 Disposal ALP - ground screw placement

CAUTION: Bagging extensions are not interchangeable between the Multichannel Disposal ALP and the Span-8 Disposal ALP. Each Disposal ALP must use the bagging extension designed for that ALP.

8. Snap the bagging extension onto the Span-8 Disposal ALP base by lining up the springs on the bagging extension with the cutouts on the Disposal ALP base (Figure 17-9).
9. Apply downward force to the top of the bagging extension. The springs slip through to the inside of the Disposal ALP base and lock into the cutouts (Figure 17-9).
10. Insert the grounding screw through the hole in the grounding tab on the bagging extension and into the threaded hole in the Span-8 Disposal ALP base (Figure 17-9).

Note: This screw is necessary for proper ESD grounding of the ALP.

11. Place a trash receptacle at the end of the disposal chute to catch disposed items.
12. Look down through the disposal chute, or drop a test item into the ALP, to make sure the trash lands in the receptacle. Adjust the placement of the trash receptacle as required.

17.4 Installing Protective Shield Blanking Plate on the Biomek FX

WARNING: To reduce risk of personal injury, operate only with all protective shields in place.

When components of the Biomek FX instrument are installed so that they extend beyond the edge of the work table, a protective bottom shield must be installed by the Beckman Coulter Service Engineer to ensure operator protection on the side overhanging the table. This protective bottom shield contains a solid blanking plate and a cutout blanking plate (Figure 17-11).

When the Biomek FX instrument does not extend beyond the edge of the work table, the solid blanking plate is installed. To accommodate the slide on a Span-8 Disposal ALP, the solid blanking plate is replaced with the cutout blanking plate. To accommodate the slides of two Disposal ALPs (Multichannel or Span-8), the solid blanking plate and cutout blanking plate are removed, leaving an opening for two slides.

Note: When the Span-8 Disposal ALP is in deck positions R1, R4, L1, and L4, no modifications to the deck blanking plates are required.

There are eight deck positions available for a Span-8 Disposal ALP with Slide (Figure 17-10):

- L1•R1
- L2•R2
- L3•R3
- L4•R4

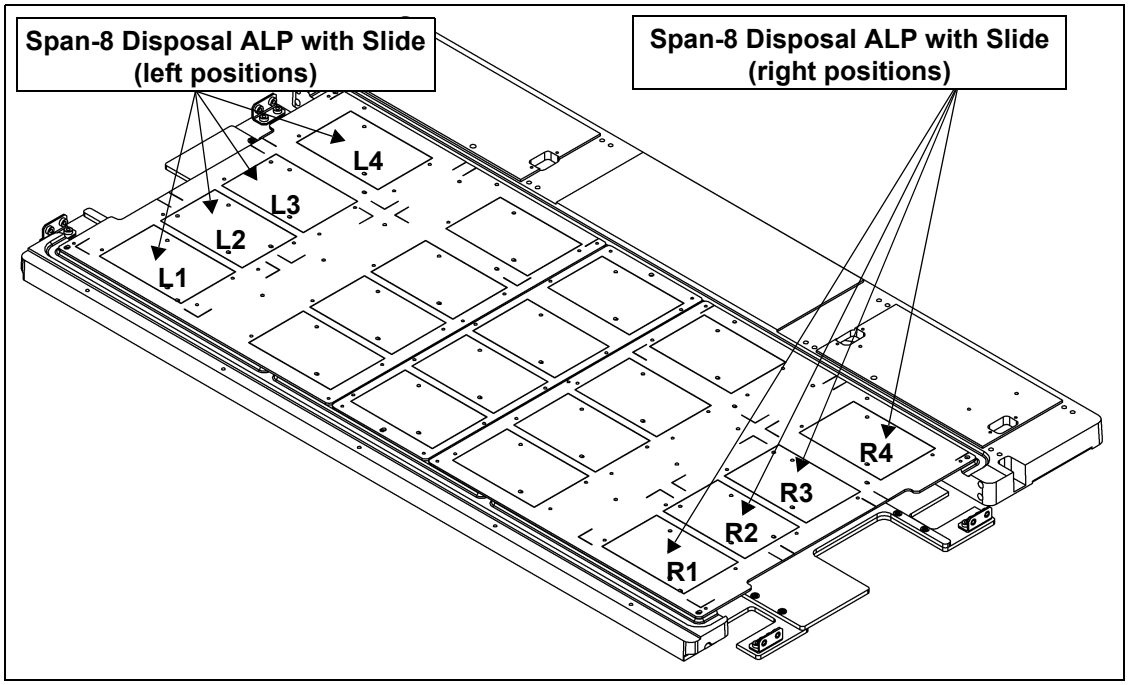

Figure 17-10. Span-8 Disposal ALP with Slide deck positions for a Biomek FX

17.4.1 Span-8 Disposal ALP with Slide in L2

When a Span-8 Disposal ALP with Slide is installed in L2 on the Biomek FX deck (Figure 17-10), install the blanking plate with the cutout as follows:

1. Remove the four fasteners holding the solid blanking plate.
2. Remove the solid blanking plate.
3. Orient the blanking plate cutout as shown in (Figure 17-11).
4. Attach the blanking plate to the bottom shield. This creates an opening next to L2 for a slide.

Note: Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

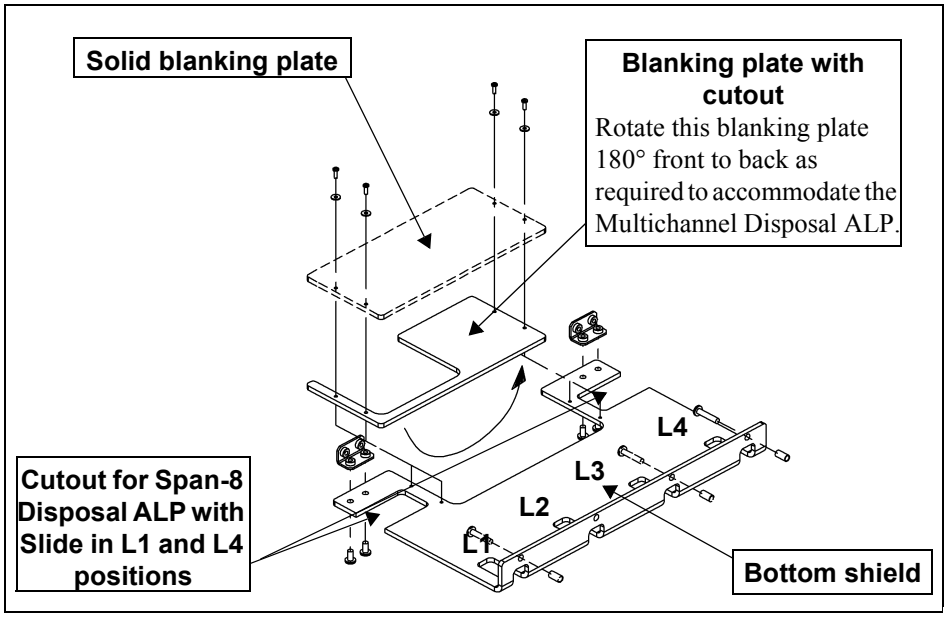

Figure 17-11. Left side bottom shield with solid and cutout blanking plates

17.4.2 Span-8 Disposal ALP with Slide in L3

When a Span-8 Disposal ALP with Slide is installed in L3 on the Biomek FX deck (Figure 17-10), orient and install the blanking plate with the cutout as follows:

1. Remove the four fasteners holding the solid blanking plate.
2. Remove the solid blanking plate.
3. Rotate the blanking plate with the cutout 180° from the one shown in Figure 17-11.
4. Attach the blanking plate to the bottom shield. This creates an opening next to L3 for a slide.

Note: Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

17.4.3 Span-8 Disposal ALPs with Slide in Both L2 and L3

When Span-8 Disposal ALPs with Slide are installed in both L2 and L3:

1. Remove the four fasteners holding the solid blanking plate.
2. Remove the solid blanking plate. This creates an opening large enough for two slides.

17.4.4 Span-8 Disposal ALP with Slide in R2

When a Span-8 Disposal ALP with slide is installed in R2 on the Biomek FX deck (Figure 17-10), orient and install the blanking plate with the cutout as follows:

1. Remove the four fasteners holding the solid blanking plate.
2. Remove the solid blanking plate.
3. Rotate the blanking plate with the cutout 180° from the one shown in Figure 17-12.
4. Attach the blanking plate with the cutout to the bottom shield. This creates an opening next to R2 for the slide.

Note: Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

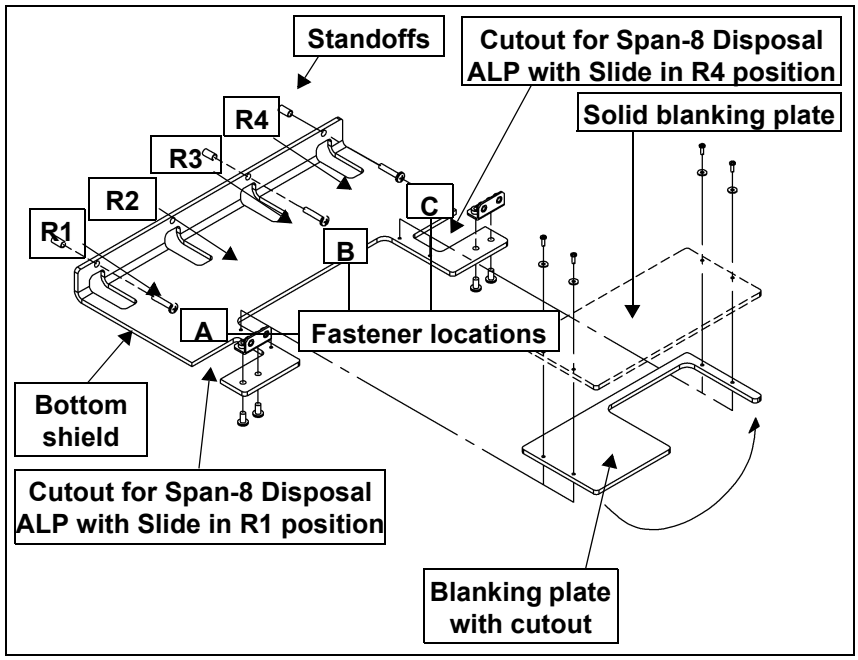

Figure 17-12. Right side bottom shield with solid and cutout blanking plates

17.4.5 Span-8 Disposal ALP with Slide in R3

When a Span-8 Disposal ALP with Slide is installed in R3 on the Biomek FX deck (Figure 17-10), orient and install the blanking plate with the cutout as follows:

1. Remove the four fasteners holding the solid blanking plate.
2. Remove the solid blanking plate.
3. Orient the blanking plate cutout as shown in Figure 17-12.
4. Attach the blanking plate with the cutout to the bottom shield. This creates an opening next to R3 for a slide.

Note: Do not attach both blanking plates. Store the unused blanking plate in an environmentally-controlled area.

17.4.6 Span-8 Disposal ALPs with Slide in Both R2 and R3

When Span-8 Disposal ALPs with Slide are installed in both R2 and R3:

1. Remove the four fasteners holding the solid blanking plate.
2. Remove the solid blanking plate. This creates an opening large enough for two slides.

17.5 Framing Instructions

No special framing is necessary for the Span-8 Disposal ALP (with or without Slide). Framing the ALP occurred when the deck was framed with the Shift Deck command. For more infromation refer to the specific user's manual for the instrument.

17.6 Removing the Span-8 Disposal ALP without Slide

WARNING: The waste bag may be contaminated. Follow the appropriate decontamination and disposal procedures outlined by the laboratory safety officer.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory 'safety officer when using toxic, pathologic, or radioactive materials.

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: SPILL HAZARD.

To remove the Span-8 Disposal ALP without Slide:

1. Remove the rubber band and waste receptacle from the ALP.
2. Dispose of the bag and contents as specified by the safety officer.
3. Loosen the Span-8 Disposal ALP thumbscrews on the base of the Span-8 Disposal ALP.
4. Lift the Span-8 Disposal ALP from the deck so that the locating pins on the bottom of the ALP base clear the locating holes on the deck.

17.6.1 Removing the Bagging Extension

To remove the bagging extension from the Span-8 Disposal ALP:

1. Remove the grounding screw.
2. Grasp the extension firmly with one hand and the base firmly with the other.
3. Pull the bagging extension forcefully from the ALP base to separate the extension from the base.
4. Store the extension in a clean, dry, dust-free area.
5. Insert the screw back into the threaded hole on the Span-8 Disposal ALP base.

17.7 Removing a Span-8 Disposal ALP with Slide

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

To remove the Span-8 Disposal ALP with Slide:

1. Verify that no labware remains on the slide. If labware remains on the slide, remove the labware as specified by the laboratory safety officer.
2. Remove the trash receptacle and dispose of the contents as specified by the laboratory safety officer.
3. Remove the grounding screw from the bagging extension (Figure 17-9).
4. Grasp the bagging extension firmly with one hand and the base firmly with the other.
5. Pull the bagging extension forcefully from the ALP base to separate the extension from the base.
6. Insert the grounding screw back into the threaded hole on the disposal base.
7. Remove the grounding screw from the slide.
8. Lift the slide from the base.
9. Insert the grounding screw back into the threaded hole on the disposal base.
10. Loosen the Span-8 Disposal ALP thumbscrews on the base of the Span-8 Disposal ALP (Figure 17-7).
11. Lift the Span-8 Disposal ALP from the deck so that the locating pins on the bottom of the ALP base clear the locating holes on the deck.
12. To detach the chute, remove the four screws attaching the chute to the disposal base and remove the chute.
13. Insert the four screws back into the threaded holes in the disposal base.

17.8 Storage

Return the Span-8 Disposal ALPs (with or without Slide) to their original packing materials and store in a dry, dust-free, environmentally-controlled area.

Note: It is desirable to allow the Span-8 Disposal ALPs to air-dry before returning them to their original packing materials.

17.9 Preventive Maintenance

WARNING: The Span-8 Disposal ALP may be contaminated. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the Span-8 Disposal ALP with a soft cloth.

18 Span-8 Tip Wash ALP

18.1 Overview

The Span-8 Tip Wash ALP is a passive ALP. The eight cleaning wells of the Span-8 Tip Wash ALP (Figure 18-1) are used to wash fixed tips on the probes of a Span-8 Pod during a step in a method while the reservoir side of the Span-8 Tip Wash ALP is used to dispose of system fluid used when priming the system and purging the tubing and syringes of air. The Span-8 Tip Wash ALP can be placed in half of any deck position and it can be oriented with its eight cleaning wells on the left or right side of the ALP.

The Span-8 Tip Wash ALP utilizes a flow of system fluid from the off-deck supply container as the wash fluid. The system fluid is pumped through the Biomek instrument and into the Span-8 Tip Wash ALP in one of two ways:

- The pumps of the Biomek FX instrument syphon fluid from the off-deck supply container (refer to the *Biomek® FX Laboratory Automation Workstation User's Manual,* Chapter 3.5.3, *Supply Container*) to the probes of the Span-8 Pod. The pumps actuate to dispense the system fluid through the tips and into the wash station.

  OR

- The Speed Pump, (refer to the *Biomek® FX Laboratory Automation Workstation User's Manual,* Chapter 3.6, *Speed Pump*), with the pump valves bypassed, accelerates the speed of the system fluid as it passes through the tubing and is dispensed from the tips into the Span-8 Tip Wash ALP. The volume of fluid passing through the tips cleans the inside surfaces of the tips, while the increased speed of the wash fluid raises the fluid level in the eight cleaning wells of the ALP to a height sufficient to clean the outside of the tips positioned in the Span-8 Tip Wash ALP.

Used wash fluid drains from the ALP via a tube connected to the waste port and terminating in an off-deck waste container (refer to the *Biomek® FX Laboratory Automation Workstation User's Manual,* Chapter 3.5.4, *Waste Container*) via a gravity-fed drainage tube.

The sections in this chapter include:

- *Installing the Span-8 Tip Wash ALP* (Section 18.2)
- *Framing Instructions* (Section 18.3)
- *Removing the Span-8 Tip Wash ALP* (Section 18.4)
- *Storage* (Section 18.5)
- *Preventive Maintenance* (Section 18.6)
- *Troubleshooting* (Section 18.7)

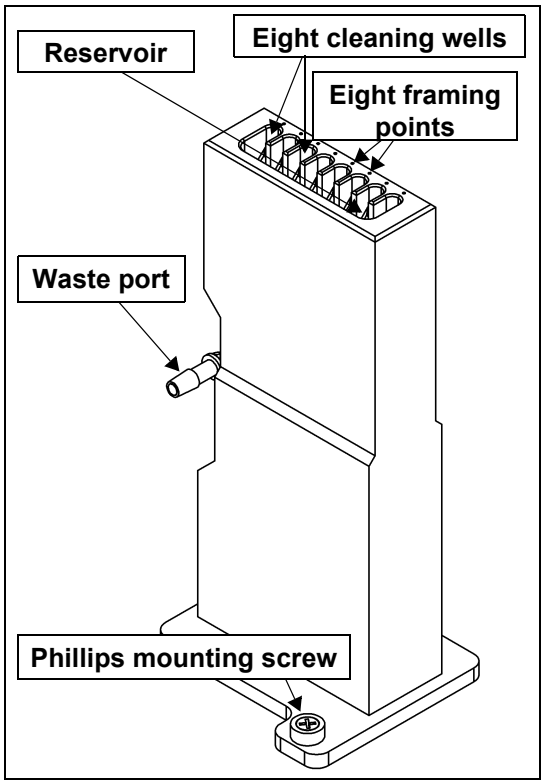

Figure 18-1. Span-8 Tip Wash ALP

18.2 Installing the Span-8 Tip Wash ALP

Installing a Span-8 Tip Wash ALP includes choosing the deck position and mounting the ALP to the deck.

18.2.1 Deck Positions for the Span-8 Tip Wash ALP

The Span-8 Tip Wash ALP occupies 1/2 of any deck position, including the 1/2 ALP positions located between the two outside columns of the Biomek deck. The Span-8 Tip Wash ALP can also occupy the remaining 1/2 ALP position that occurs when a Test Tube Rack ALP is installed on the Biomek deck (refer to Chapter 22, *Test Tube Rack ALPs*).

If a Span-8 Tip Wash ALP is required for a single-pod Biomek FX Instrument, the ALP can be installed on either half of an unoccupied deck position. The eight cleaning wells can be oriented to the left or right side of the ALP (Figure 18-1).

When the dual-pod Biomek FX instrument has one Multichannel Pod and one Span-8 Pod, it must be installed so the ALP is accessible to the Span-8 Pod without interfering with the other pod. More specifically, if the Span-8 Pod is Pod1 (left arm), the Span-8 Tip Wash ALP must be mounted on the left half of a deck position, with the eight cleaning wells on the left side of the ALP.

Note: The Span-8 Tip Wash ALP must be positioned on the Span-8 side of the deck.

Note: If different types of waste materials must be disposed of separately, two Span-8 Tip Wash ALPs may be installed on the deck.

Note: When the Span-8 Tip Wash ALP is placed on the left side of a Biomek deck position, the ALP is referred to as the Span-8WashLeft. When the Span-8 Tip Wash ALP is placed on the right side of a Biomek FX deck position, it is referred to as the Span-8WashRight.

After a deck position on which to physically mount the ALP has been chosen, configure the ALP in the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).

18.2.2 Mounting the Span-8 Tip Wash ALP to the Deck

WARNING: Do not kink the drainage hose.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: SPILL HAZARD.

To install the Span-8 Tip Wash ALP:

1. Position the Span-8 Tip Wash ALP so the locating pin on the bottom of the ALP slips into a locating hole on the deck.
2. Fasten the Span-8 Tip Wash ALP to the deck using the Phillips mounting screw located on the base of the Span-8 Tip Wash ALP (Figure 18-1).
3. Place the waste container under the lab bench or in an accessible space lower than the Biomek instrument height.
4. Attach the drainage tube to the waste port on the Span-8 Tip Wash ALP (Figure 18-1).
5. Run the opposite end of the drainage tube to the waste container by passing the tube through either the access holes between the towers at the back of the instrument, or between the light curtain and the deck on the side of the Biomek instrument.

   Note: Make sure the tube routing does not interfere with the operation of the Biomek instrument or the light curtain.

6. Cut the drainage tube to the appropriate length to ensure there is no excess that could cause a ‘rise’ or ‘bump’ in the drainage tubes route from the Span-8 Tip Wash ALP to the waste container.

   Note: Since the Span-8 Tip Wash ALP is gravity fed, it is crucial that the drainage tube run down-hill without any rises between the ALP and the waste container.

7. Ensure that the supply container contains the desired system (cleaning) fluid.

18.3 Framing Instructions

Special framing instructions using Manual Teach are necessary for the Span-8 Tip Wash ALP to ensure that the tips and probes on the Span-8 Pod access the eight cleaning wells of the ALP without causing any damage to the tips, probes, pod, or ALP. Since the eight cleaning wells of the ALP are relatively small, it is crucial that the tips on the probes be framed as accurately as possible. Manual Teach is accessed through Position Properties in the Deck Editor.

To frame the Span-8 Tip Wash ALP:

1. Open the Biomek FX Software by selecting **Start>Programs>Beckman Coulter>Biomek**.
2. Choose **Instrument>Deck Editor**. The Deck Editor appears.
3. Add a Span-8 Tip Wash ALP to the deck by selecting either **Span8WashRight** or **Span8WashLeft** from the list of available devices and dragging it to the appropriate deck position.
4. Open **Position Properties** for the Span-8 Tip Wash ALP by double-clicking in the area outlined in the center of the Span-8 Tip Wash ALP. Position Properties appear (Figure 18-2).

Note: Two different sets of properties can appear when double-clicking on the Span-8 Tip Wash ALP: Position Properties and ALP Properties. Position Properties is used to manually frame the Span-8 Tip Wash ALP. To open Position Properties, double-click in the area outlined in the center of the Span-8 Tip Wash ALP. A pink outline appears around the 'W' in the center of the ALP when Position Properties are being configured. (When configuring ALP Properties, a yellow outline appears around the 'W', a pink outline appears around the entire ALP position, and ALP Properties appears.)

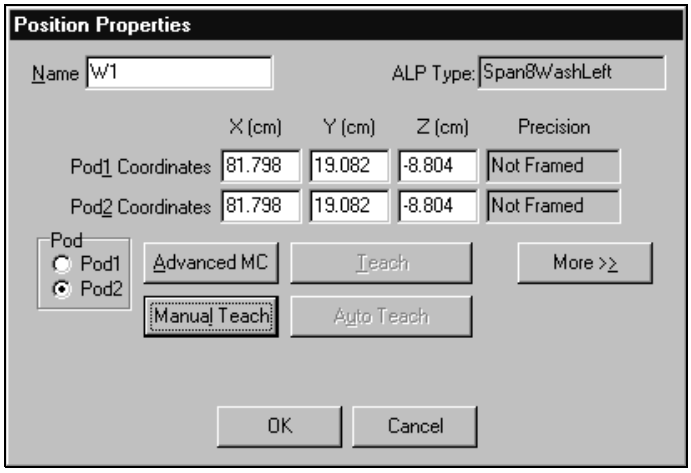

Figure 18-2. Position Properties for the Span-8 Tip Wash ALP

5. In **Name**, verify that the Span-8 Tip Wash ALP is assigned a unique name.

Note: The software automatically assigns a name beginning with a 'W' and followed by a number; for example, 'W1' and 'W2'.

6. In **Pod**, select the Span-8 Pod used to frame the Span-8 Tip Wash ALP.

7. Choose **Manual Teach**. Manual Teaching opens with a Warning (Figure 18-3).

Note: On the left side of Manual Teaching, a list of steps required to complete the teaching process are displayed. As the steps of Manual Teaching are accessed, they are highlighted on the left.

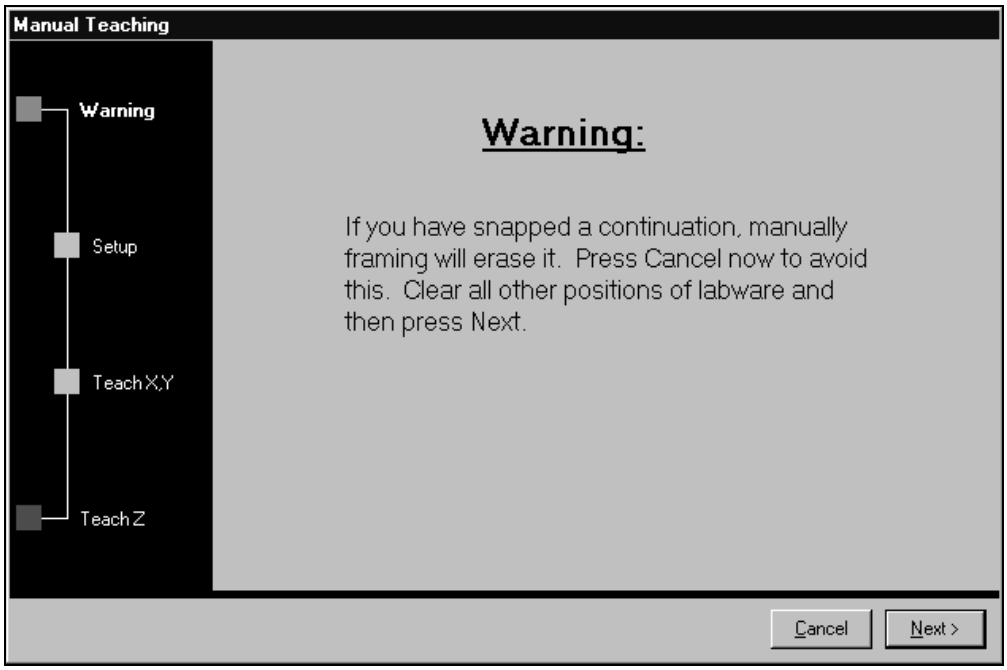

Figure 18-3. Manual Teaching (Warning)

8. Choose **Next**. Manual Teaching appears (Figure 18-4)

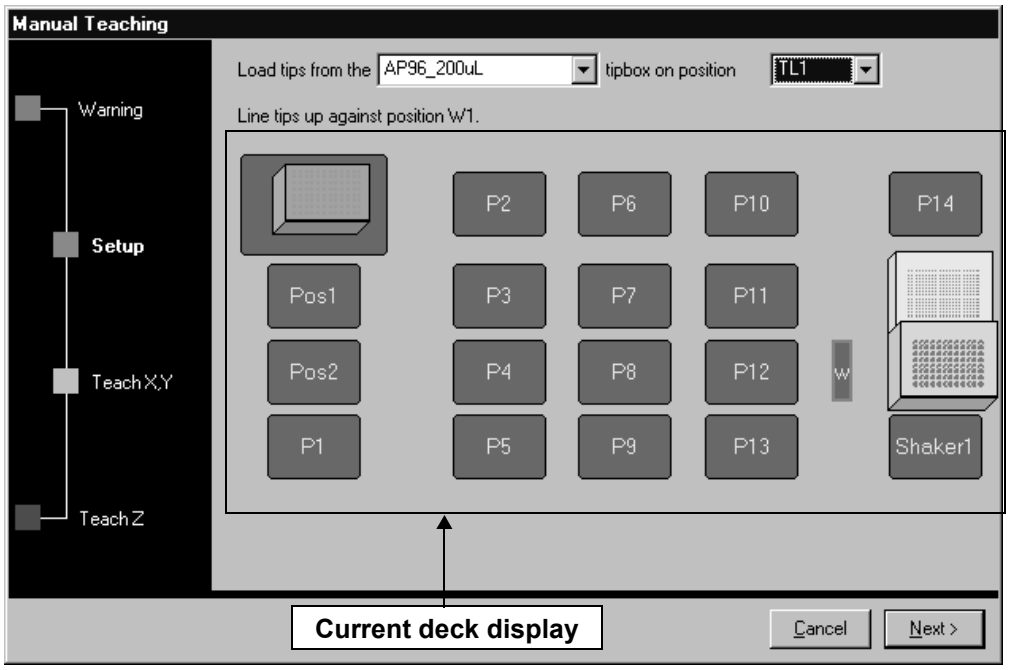

Figure 18-4. Manual Teaching (Setup)

9. If disposable tip mandrels are installed, in **Load tips from the**, verify that the appropriate tips are selected.
10. In tipbox on position, select the deck position containing the tipbox by selecting that position in the Current Deck Display.

11. Choose **Next**. Manual Teaching appears (Figure 18-5).

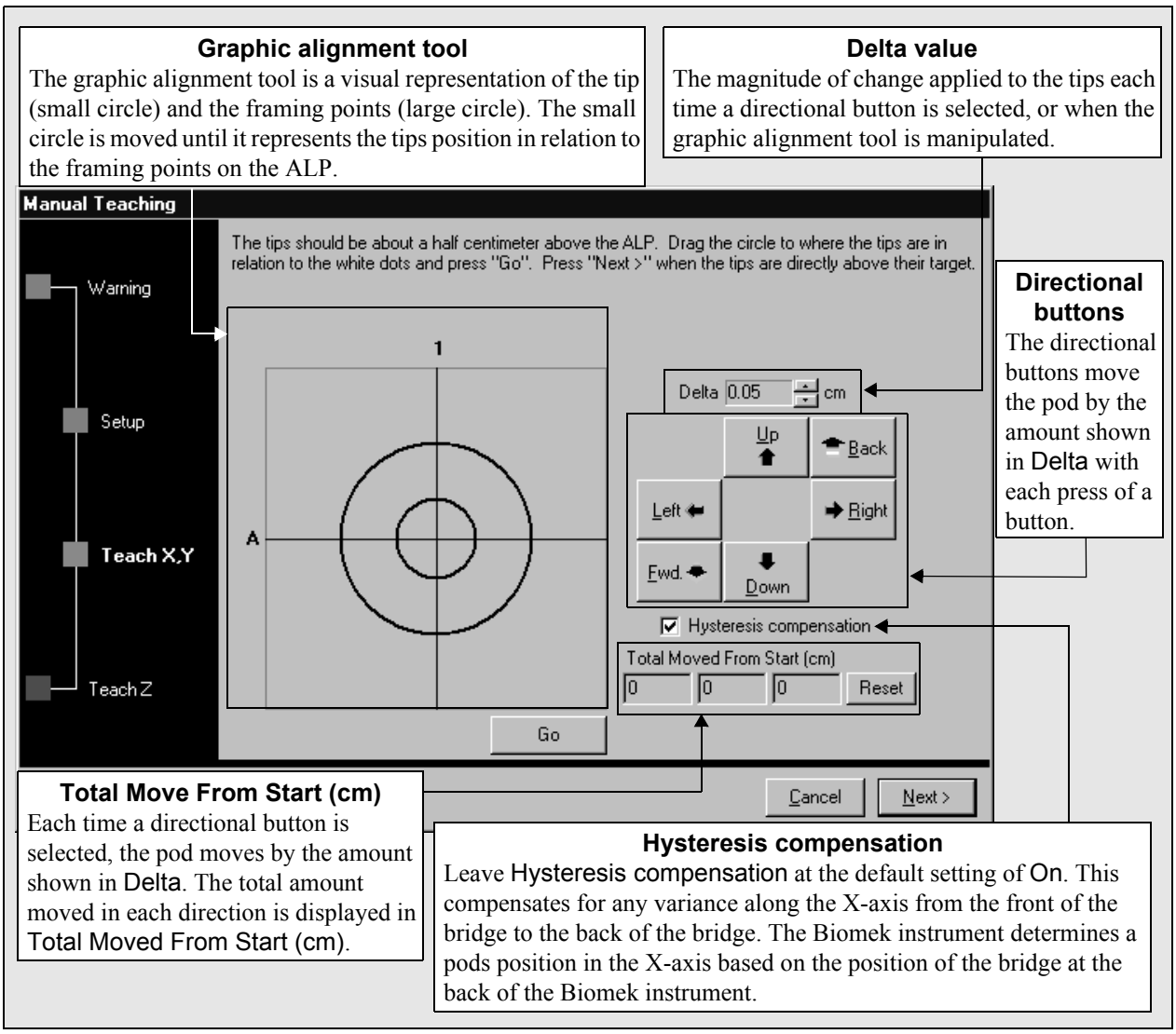

Figure 18-5. Manual Teaching (Teach X,Y)

12. To align the tips in the X- and Y-axes with the white framing points on top of the Span-8 Tip Wash ALP (Figure 18-1), lower the tips in the Z-axis until they are approximately 1 cm above the top of the Span-8 Tip Wash ALP.

Note: Tip height of the pod is set in the next step in the Manual Teaching process; therefore, move the pod to any height while manipulating tip alignment with the white framing points.

13. Visually verify the physical position of the tips in relation to the physical position of the white framing points on top of the Span-8 Tip Wash ALP.

14. In **Delta**, select the magnitude of change applied to the tips each time a directional button is selected (Figure 18-5).

    Note: The default Delta value is 0.05 cm. If the tips are a considerable distance from the desired location, increase the distance traveled by increasing the Delta value (maximum setting is 1.0 cm). If the tips are almost to the desired location, reduce the Delta value to fine-tune the position (minimum setting is 0.005 cm).

15. Select the **directional button** representing the motion required to physically move the tip into position over the white framing points on the Span-8 Tip Wash ALP (Figure 18-5).

    Note: The directional keys on the numeric keypad can also be used to physically position the tips over the wells of the microplate. The directional buttons displayed in the software parallel the keys on the numeric keypad. More specifically, the Fwd. directional button correlates to the '1' on the numeric keypad, while Down is found on the '2', Left is found on the '4', Right on '6', Up on '8', and Back on '9'.

    Note: Each time a directional button is selected, the pod and tips move the distance specified in Delta in the indicated direction.

    OR

    Using the graphic alignment tool, **Drag the center (small) circle** until it represents the tips physical position in relation to the white framing points on the ALP.

    Note: The large circle represents the position of the white framing points on the top of the Span-8 Tip Wash ALP, while the small circle represents the position of the tips on the Span-8 Pod. The objective is to provide the software with a representation of the tips position in relation to the white framing points on the ALP. The software uses this graphical representation and the Delta value to know approximately how far in any direction the tips must move.

16. Select **Go**. The Span-8 Pod moves in accordance to the Delta value and the position of the small circle in relation to the large circle.

    Note: When the move is completed, the small circle resets itself to the center of the large circle. The values displayed in Total Moved from Start (cm) changes each time steps 11 thru 16 are completed. If desired, the values in Total Moved from Start (cm) can be reset to zero by selecting Reset.

17. Visually verify the position of the tips on the Biomek instrument in relation to the white framing points on the top of the Span-8 Tip Wash ALP. If the tips are still not physically positioned above the white framing points, repeat steps 13 through 16 until they are positioned above the white framing points.

18. Choose **Next**. Manual Teaching (Teach Z) appears (Figure 18-6).

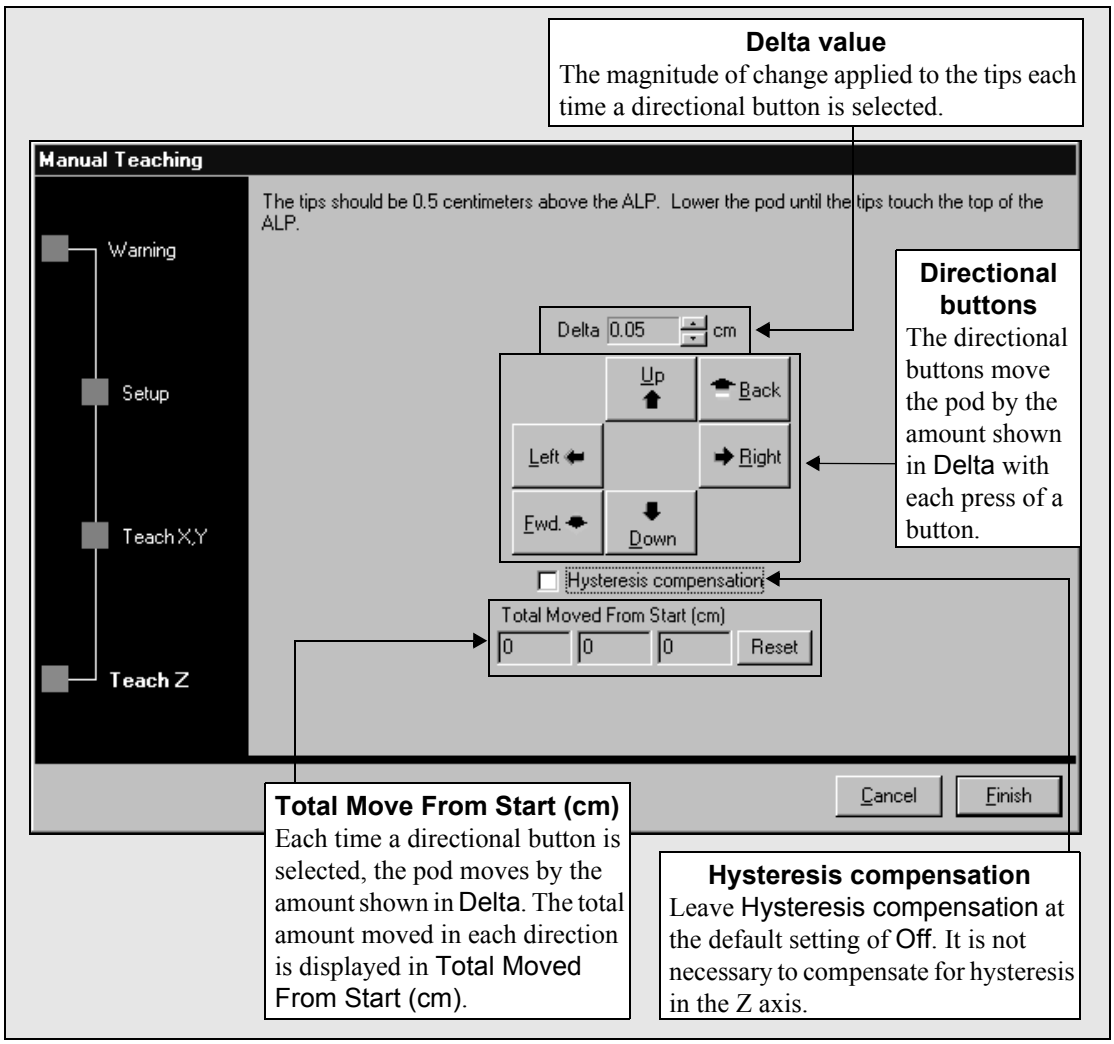

Figure 18-6. Manual Teaching (Teach Z)

19. In **Delta**, select the magnitude of change applied to the tips each time a directional button is selected (Figure 18-6).

Note: The default Delta value is 0.05 cm. If the tips are a considerable distance above the ALP, increase the distance traveled by increasing the Delta value (maximum setting is 1.0 cm). If the tips are almost to the desired location, reduce the Delta value (minimum setting is 0.005 cm).

---

20. Select the directional button representing the motion required to physically move the tip into position over the white framing points on the Span-8 Tip Wash ALP.

Note: Each time a directional button is selected, the pod and tips move the distance specified in Delta in the indicated direction.

---

21. Select **Finish**. The Span-8 Pod moves in accordance to the Delta value, Manual Teaching closes, and Position Properties (Figure 18-2) appears.
22. Choose **OK** to close Position Properties.
23. Choose **Save** to close the Deck Editor. The Span-8 Tip Wash ALP is framed.

18.4 Removing the Span-8 Tip Wash ALP

WARNING: Always wear protective gloves when draining the Span-8 Tip Wash ALP of fluid.

WARNING: The waste fluid may be contaminated. Follow the appropriate disposal procedures outlined by the laboratory safety officer.

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by your safety officer when using toxic, pathologic, or radioactive materials.

CAUTION: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

CAUTION: SPILL HAZARD.

To remove the Span-8 Tip Wash ALP:

1. Turn the waste port on the Span-8 Tip Wash ALP up so that no fluid from the ALP leaks onto the deck.
2. Detach the drainage tube from the waste port.
3. Raise the drainage tube until the fluid in the tube drains into the waste container.
4. Remove the tubing from the Biomek instrument deck and the waste container.
5. Loosen the Phillips screws on the Span-8 Tip Wash ALP base from the deck.
6. Remove the Span-8 Tip Wash ALP from the deck by lifting until the locating pin clears the locating hole on the deck.

WARNING: Follow the appropriate disposal procedures outlined by the laboratory safety officer to dispose of the fluid. The cleaning wells and reservoir of the Span-8 Tip Wash ALP may contain hazardous chemicals and fluids.

7. Carefully empty the Span-8 Tip Wash ALP of fluids by turning the ALP over and pouring the waste into an approved waste container.

18.5 Storage

Return the Span-8 Tip Wash ALP to the original packing materials and store in a dry, dust-free, environmentally-controlled area.

Note: Allow the Span-8 Tip Wash ALP to air-dry before returning it to the original packing materials.

18.6 Preventive Maintenance

Follow the appropriate decontamination procedures outlined by the laboratory safety officer. Also, periodically clean the Span-8 Tip Wash ALP by filling the supply container with a bleach solution and running it through the ALP.

18.7 Troubleshooting

Do not attempt to repair the unit without first contacting a Beckman Coulter Service Engineer.

Table 18-1. Troubleshooting the Tip Wash ALP

IF	THEN
The Span-8 Tip Wash ALP is not functioning correctly	Make sure that the hoses and cables are properly attached and routed to the Tip Wash ALP.
The Span-8 Tip Wash ALP is not draining waste fluid	Look into the wells and reservoir and verify they are not clogged.

19 Standard Passive ALPs

19.1 Overview

Standard Passive ALPs are open structures that hold labware on the deck during liquid-handling procedures. These ALPs can be mounted on any deck position, and ensure that labware is accessible by the pod at a predetermined height.

Standard Passive ALPs are also used as a base for many active ALPs, such as the Stirring ALP. Certain active ALPs are secured to the Standard Passive ALP stand, mounted on the appropriate deck position, and configured in the Deck Editor.

Standard Passive ALPs include:

- 1 x 1 Passive ALP (refer to Section 19.1.1, *1 x 1 Passive ALP*)

  Note: A 1 x 1 Passive ALP with LLS Plate Option is also available (refer to Section 19.1.1.1, *1 x 1 Passive ALP with LLS Plate Option*).

- 1 x 1 Passive ALP with Indented Sides (refer to Section 19.1.2, *1 x 1 Passive ALP with Indented Sides*)

  Note: The 1 x 1 Passive ALP with Indented Sides is placed on the deck next to an SPE Collar Stand with an SPE Collar to preserve a deck position. The indented sides allow enough clearance for the gripper to extend and move the SPE Collar without hitting the ALP.

- 1 x 3 Passive ALP (refer to Section 19.1.3, *1 x 3 Passive ALP*)
- 1 x 5 Passive ALP (refer to Section 19.1.4, *1 x 5 Passive ALP*)

The sections in this chapter include:

- *Installing Standard Passive ALPs* (Section 19.2)
- *Framing Instructions* (Section 19.3)
- *Removing Standard Passive ALPs from the Deck* (Section 19.4)
- *Storage* (Section 19.5)
- *Preventive Maintenance* (Section 19.6)

19.1.1 1 x 1 Passive ALP

A 1 x 1 Passive ALP occupies one position on the deck and holds one piece of labware (Figure 19-1).

Note: Labware positioned on a 1 x 1 Passive ALP is gripper accessible and stackable.

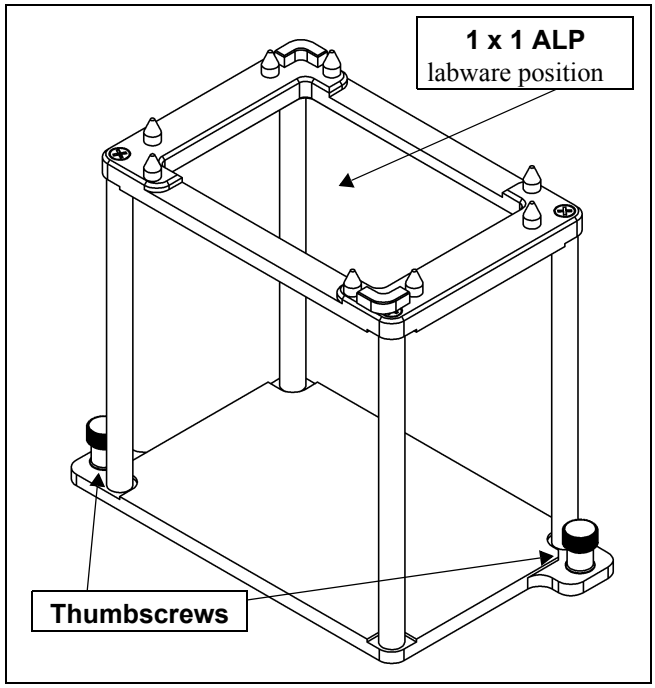

Figure 19-1. 1 x 1 Passive ALP

Note: The 1 x 1 Passive ALP supports an LLS plate option which improves liquid level sensing and clot detection capabilities in labware positioned on the ALP (refer to Section 19.1.1.1, *1 x 1 Passive ALP with LLS Plate Option*).

19.1.1.1 1 x 1 Passive ALP with LLS Plate Option

The 1 x 1 Passive ALP stand supports a Liquid Level Sensing (LLS) plate option (Figure 19-2) which when installed improves liquid level sensing capabilities in labware positioned on the 1 x 1 Passive ALP.

- ***NX-S8*** — The LLS plate option also improves clot dectection capabilities.

Note: Labware positioned on a 1 x 1 Passive ALP with the LLS plate option installed is gripper accessible and stackable.

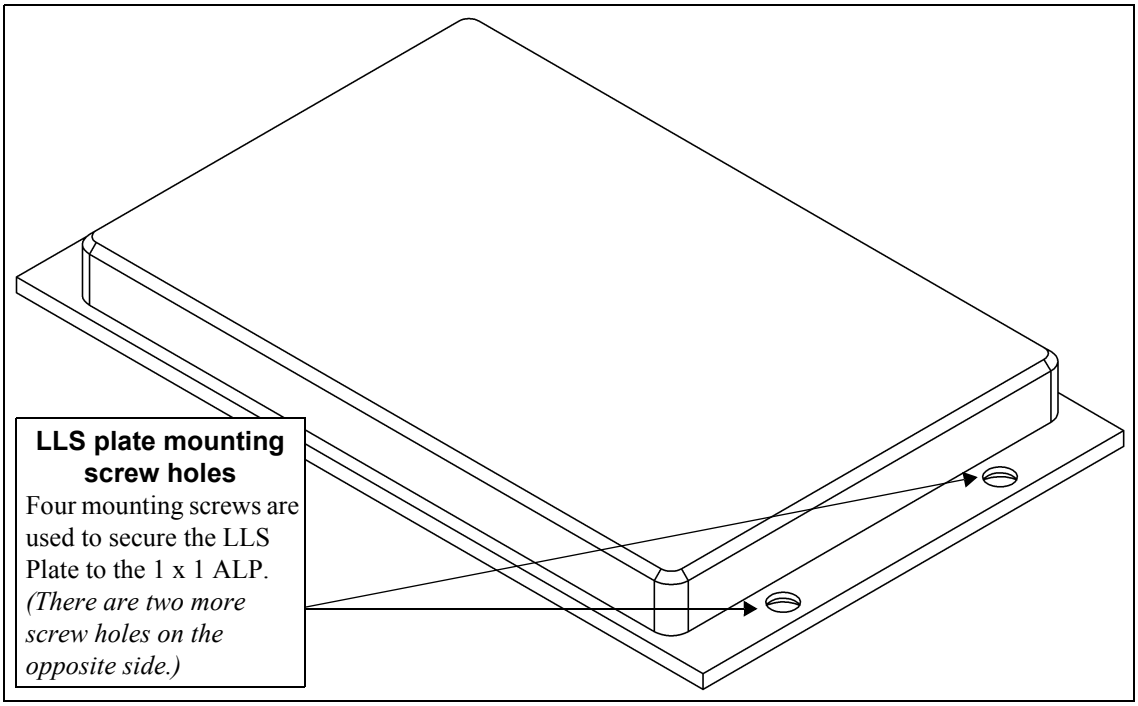

Figure 19-2. LLS Plate (Top View)

19.1.1.1.1 Installing the LLS Plate Option on a 1 x 1 Passive ALP

To install the LLS plate, complete the following:

1. Turn a 1 x 1 Passive ALP upside down.
2. Position the LLS plate upside down in the center of the 1 x 1 Passive ALP stand (Figure 19-3).

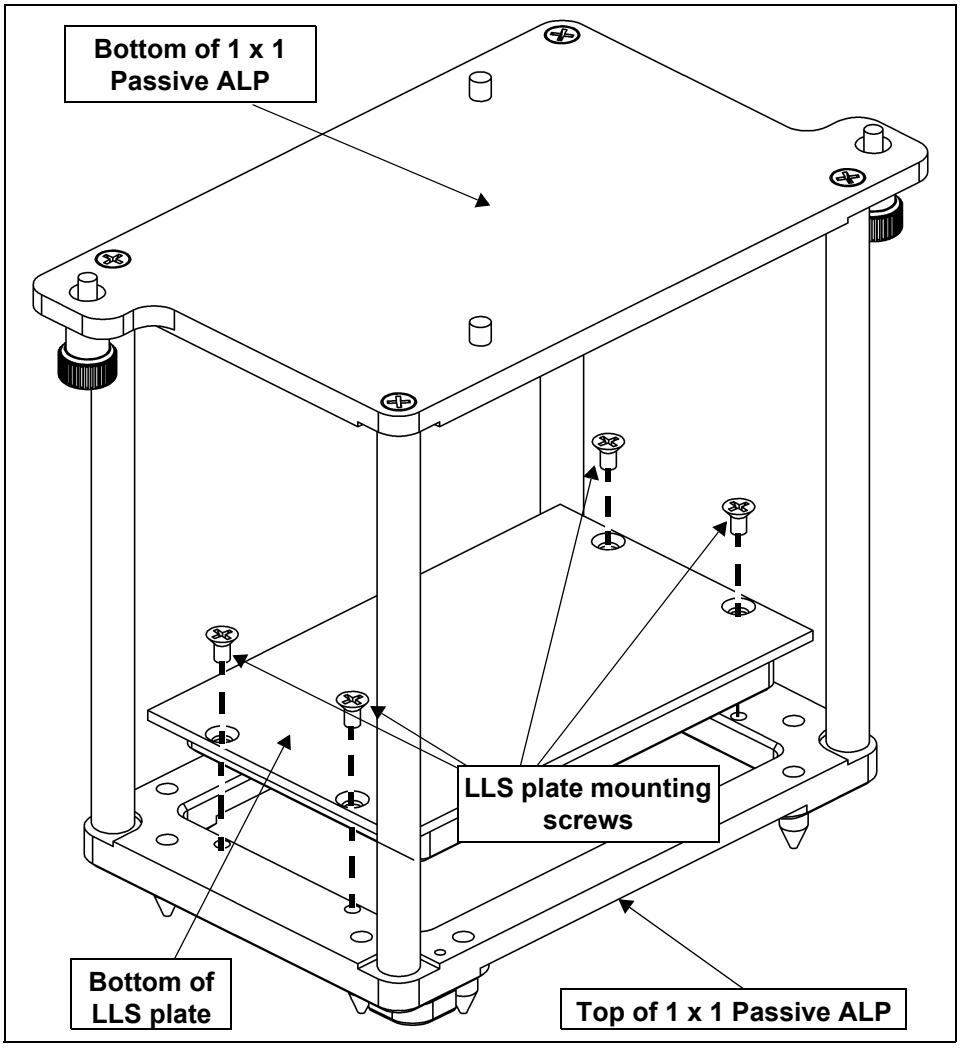

Figure 19-3. Installing an LLS Plate on a 1 x 1 Passive ALP

3. Attach the LLS plate to the 1 x 1 Passive ALP with the four mounting screws provided by turning the screws clockwise. The LLS plate is now installed (Figure 19-4).

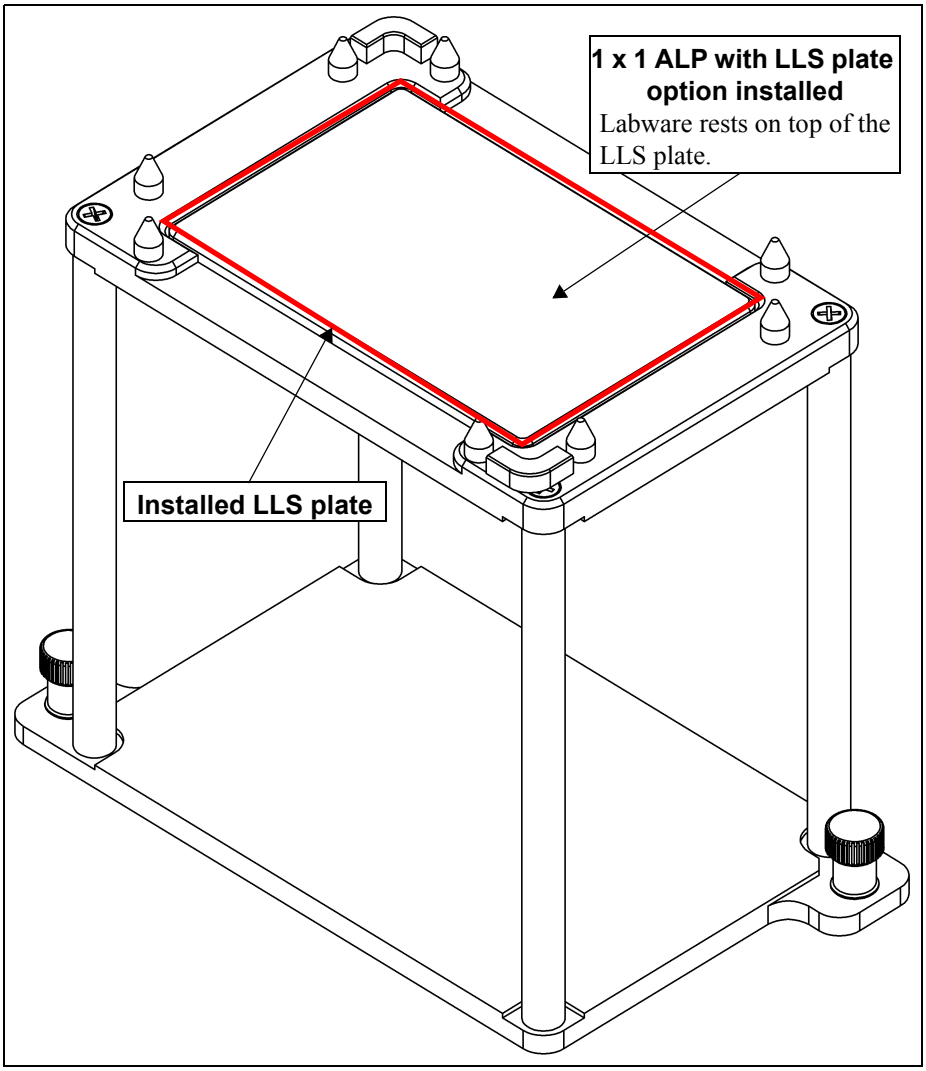

Figure 19-4. 1 x 1 Passive ALP with the LLS plate option installed

19.1.2 1 x 1 Passive ALP with Indented Sides

The 1 x 1 Passive ALP with Indented Sides occupies one deck position and is placed on the deck next to an SPE Collar Stand with an SPE Collar. Since the gripper fingers must open wide enough to grip the SPE Collar and would hit the adjacent ALP, the position would be lost without using the 1 x 1 Passive ALP with Indented Sides. This ALP allows enough clearance for the gripper to extend and move the SPE Collar without hitting it.

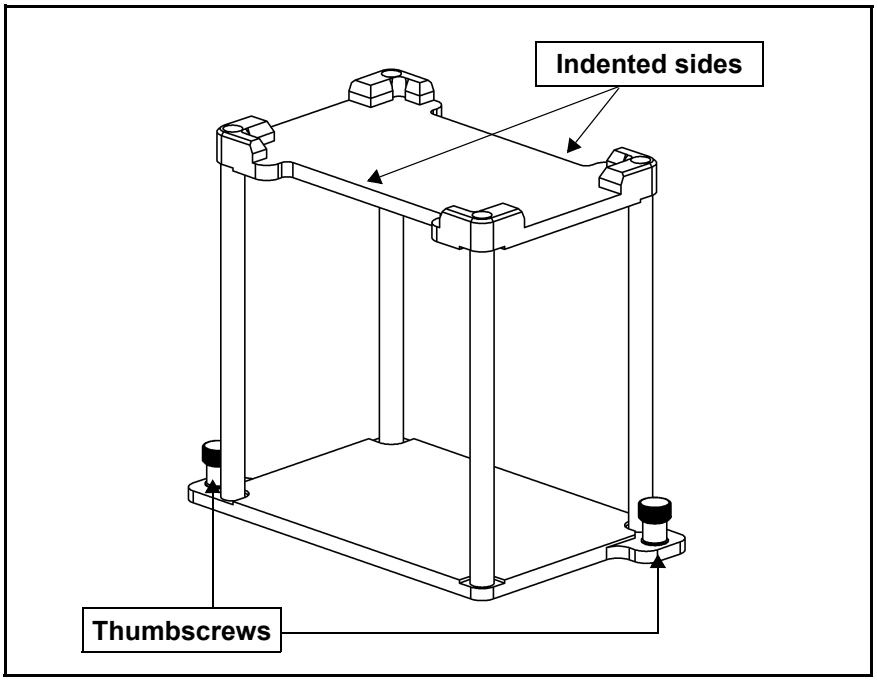

Figure 19-5. 1 x 1 Passive ALP with Indented Sides

19.1.3 1 x 3 Passive ALP

A 1 x 3 Passive ALP occupies three positions on the deck and holds up to three pieces of labware in one column (Figure 19-6).

Note: Labware positioned on the 1 x 3 Passive ALP is gripper accessible and stackable.

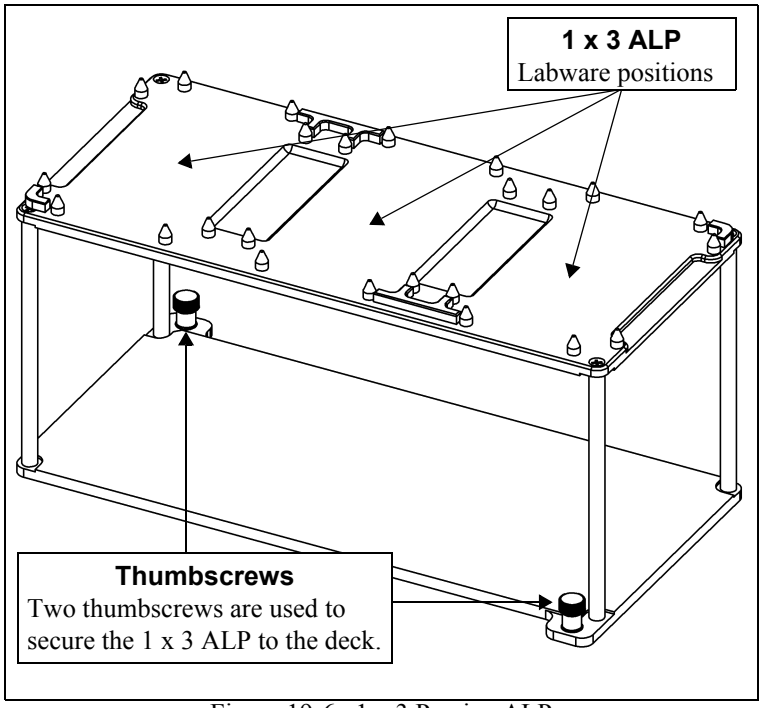

Figure 19-6. 1 x 3 Passive ALP

19.1.4 1 x 5 Passive ALP

A 1 x 5 Passive ALP occupies one column on the Biomek FX deck and holds up to five pieces of labware (Figure 19-7).

Note: Labware positioned on the 1 x 5 Passive ALP is not gripper accessible or stackable.

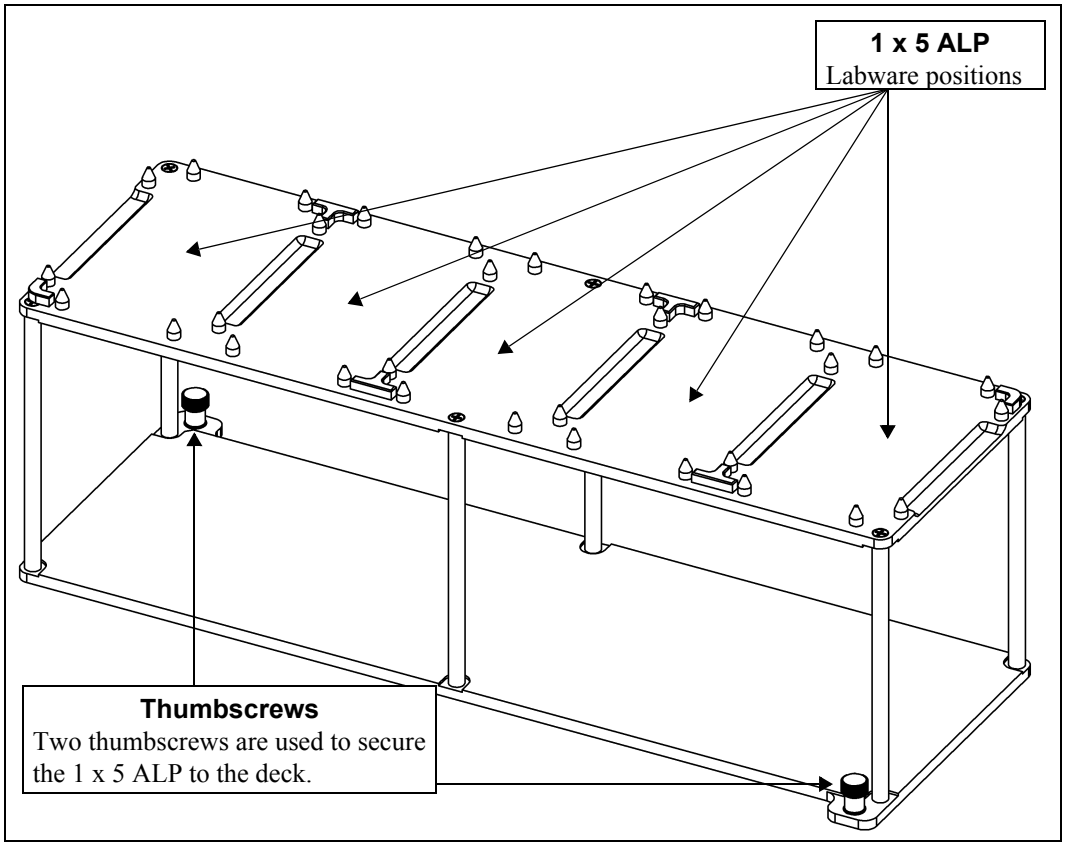

Figure 19-7. 1 x 5 Passive ALP

19.2 Installing Standard Passive ALPs

Installing Standard Passive ALPs to the deck includes choosing the deck position and mounting the ALP to the deck.

19.2.1 Choosing a Deck Position

Use the Deck Editor to determine where the ALP may be mounted on the deck. Positions capable of supporting the ALP are indicated by dashed lines.

Note: After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).

19.2.2 Mounting Standard Passive ALPs to the Deck

To mount Standard Passive ALPs to the deck:

1. Choose an appropriate deck location to mount the ALP to the deck (refer to Section 19.2.1, *Choosing a Deck Position*).
2. Position the ALP on the appropriate deck location so the locating pins on the bottom of the ALP slip into the locating holes on the deck.

   Note: Use the deck laser etchings as a guide when positioning Standard Passive ALPs on the deck.
3. Fasten the ALP to the deck using the thumbscrews on the base of the Standard Passive ALP.

19.3 Framing Instructions

Frame the Standard Passive ALPs according to the instructions in the specific user's manual for the instrument.

19.4 Removing Standard Passive ALPs from the Deck

To remove Standard Passive ALPs from the deck:

1. Remove labware from the ALP manually or through a Biomek method.
2. Loosen the thumbscrews on the base of the Standard Passive ALP.
3. Lift the ALP straight up from the deck until the locating pins are clear of the locating holes.

19.5 Storage

Return Standard Passive ALPs to their original packing materials and store in a dry, dust-free, environmentally-controlled area.

Note: It is desirable to allow the Standard Passive ALPs to air-dry before returning them to the original packing materials.

19.6 Preventive Maintenance

WARNING: Standard Passive ALPs may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the Standard Passive ALPs with a soft cloth.

20 Stirring ALP

20.1 Overview

The Stirring ALP is an active ALP that stirs liquids in a reservoir at an adjustable speed (Figure 20-1). To create the stirring and mixing motion, a caplet-shaped Teflon-coated stir bar (Figure 20-2) is placed in the reservoir. The stir bar follows the movements of a motor-powered magnet located in the base of the ALP. The stirring motion occurs as the stir bar ramps up from a resting (still) state to the configured speed, then ramps back down to a resting state when stirring is completed.

CAUTION: The Stirring ALP continues to stir during a light curtain violation even though the method stops.

The Device Action step is used to configure the Stirring ALP (refer to the *Biomek Software User's Manual,* Chapter 22.6, *Device Action Step*).

It is possible to pipette from a reservoir on the Stirring ALP. The pipetting operation can occur while the stir bar continues stirring or when the stirring motion has stopped. The pipetting option is also configured with the Device Action step.

Note: When setting the height for pipetting operations, the presence of the stir bar must be taken into consideration. Pipetting operations that do not account for the height of the stir bar could damage the tips.

The sections in this chapter include:

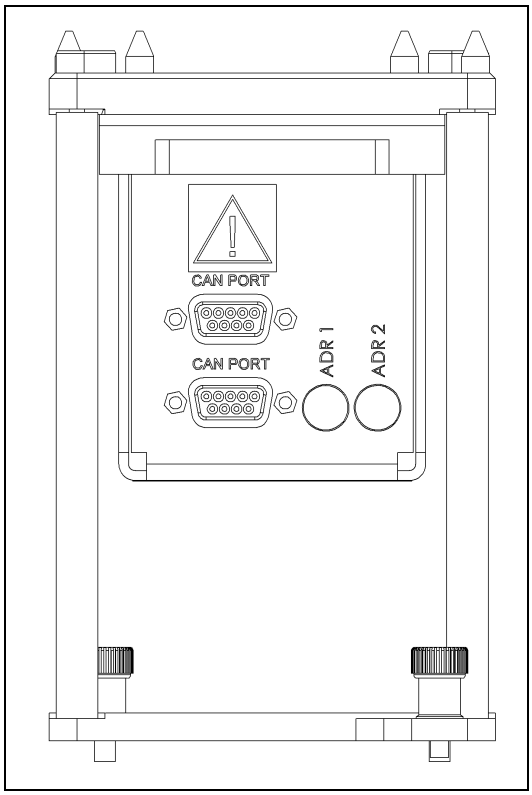

Figure 20-1. Stirring ALP (side view)

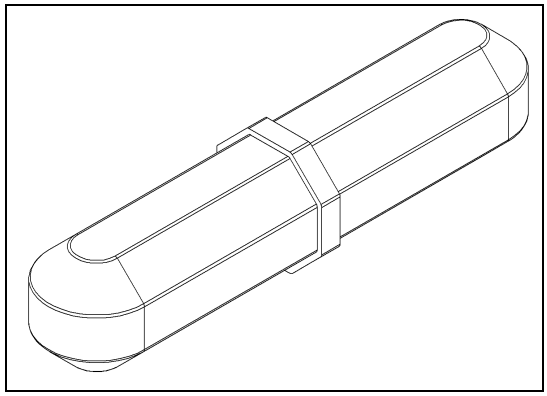

Figure 20-2. Stir bar

20.2 Installing the Stirring ALP

Installing the Stirring ALP includes choosing any standard deck position on the deck and mounting the ALP to the deck.

20.2.1 Mounting the Stirring ALP to the Deck

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

To mount the Stirring ALP:

1. Turn off power to main unit before mounting any ALP.
2. Position the Stirring ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck.
3. Fasten the Stirring ALP to the deck using the thumbscrews on the ALP.

CAUTION: A maximum of one long CAN cable can be used in each chain of ALPs. If more than one long CAN cable is used in a chain, CAN communication errors may occur.

4. Plug the female end of the CAN communication cable into the male CAN Port on the Stirring ALP.

   Note: When possible, short CAN cables should be used when connecting devices to each other or to the Biomek instrument.

5. Plug the other end of the CAN cable into one of the following connectors:

   Note: Make sure the cable routing does not interfere with the operation of the Biomek FX.

   - Any female connector labeled “CAN Port” on the main Biomek unit
   - Any available female connector labeled “CAN Port” on another Active ALP, creating a ‘chain’ of connected cables

     Note: A ‘chain’ allows multiple devices to be linked together. The maximum number of devices that can be chained together is three. The chain must plug into the main Biomek unit at some point.

6. Verify the address switch ADR1 is set to ‘2.’

7. If multiple Stirring ALPs are on the deck, change ADR2 to a unique address between zero (0) and F.

   Note: ADR2 is set to a default address of zero (0). If only one Stirring ALP is on the deck, ADR2 should be left at the default setting.

8. Place a reservoir on the ALP.
9. Carefully load the liquid into the reservoir.
10. Carefully place the stir bar in the center of the reservoir.

    Note: When placed into the center of the reservoir correctly, the stir bar self-aligns.

11. Set the stirring speed and ramp time in the software (refer to Section 20.4, *Using the Stirring ALP in a Method*). The stir bar ramps up from a resting (still) state to the set speed, and ramps back down when stirring is completed.

20.3 Framing Instructions

Frame the Stirring ALP according to the instructions in the specific user's manual for the instrument.

20.4 Using the Stirring ALP in a Method

CAUTION: Adjust the stirring speed using the software. Set the stirring speed only as high as absolutely necessary to avoid splashing.

WARNING: Setting the stirring speed too high, or setting the speed too high with an inadequate amount of liquid in the reservoir, or ramping the stirring speed up too fast in a high viscosity liquid may force the stir bar off center. The stir bar would then have to be reset to the center position.

To use the Stirring ALP in a method, it must be installed in Hardware Setup For more information, refer to the specific user's manual for the instrument.

Note: Configuration in Hardware Setup is not necessary for the Stirring ALP.

The Stirring ALP is controlled and operated through the Device Action step in Biomek Software (refer to the *Biomek Software User's Manual,* Chapter 22.6.1.10, *Configuring the Device Action Step for the Stirring ALP (FX, NX only)*). The speed, stirring time, and ramp time are all configured through the Device Action step for use in a method.

20.5 Controlling the Stirring ALP Outside a Method

To control the Stirring ALP outside a method, use Advanced Manual Control to:

- Turn on the Stirring ALP at a particular speed.
- Turn off the Stirring ALP.

To turn on or adjust the speed of a Stirring ALP:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**.
3. Select the desired **Stirrer ALP**. Advanced Manual Control for the selected Stirring ALP appears (Figure 20-3).

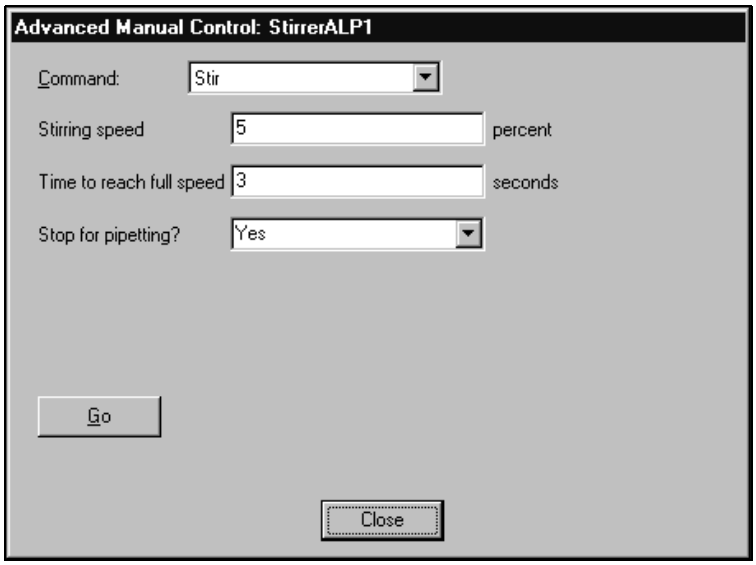

Figure 20-3. Advanced Manual Control for a selected Stirring ALP

4. From Command, choose **Stir**.
5. Enter a percentage in **Stirring speed**.

Note: The allowed minimum percentage is 1 and the allowed maximum percentage is 100.

6. Enter a time in seconds in **Time to reach full speed**.
7. Choose **Yes** or **No** in **Stop for pipetting?**
8. Choose **Go**.
9. Choose **Close** to close Advanced Manual Control.
10. Choose **Exit** to close Manual Control.

To turn off a Stirring ALP:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**.
3. Select the desired **Stirrer ALP**. Advanced Manual Control for the selected Stirring ALP appears (Figure 20-3).
4. From Command, choose **Off**.
5. Choose **Go**.
6. Choose **Close** to close Advanced Manual Control.
7. Choose **Exit** to close Manual Control.

20.6 Removing the Stirring ALP

CAUTION: The reservoir and stir bar may be contaminated following use. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To remove the ALP:

1. Turn off power to main unit before removing the Stirring ALP.
2. Carefully remove the reservoir from the Stirring ALP, being careful not to spill any residual liquid.
3. Unplug the CAN communication cable from the CAN Port on the Stirring ALP.
4. Loosen the mounting screws.
5. Lift the Stirring ALP in an upward motion to clear the locating pins from the locating holes on the deck.

20.7 Storage

CAUTION: Clean the reservoir before storing or filling with another substance.

Return the Stirring ALP to the original packing materials and store in a dry, dust-free, environmentally controlled area.

Note: It is desirable to allow the Stirring ALP to air-dry before returning it to the original packing materials.

20.8 Preventive Maintenance

Follow the appropriate decontamination and cleaning procedures outlined by the laboratory safety officer.

20.9 Troubleshooting

Do not attempt to repair the unit without first contacting a Beckman Coulter Service Engineer.

Table 20-1. Troubleshooting the Stirring ALP

IF	THEN
The Stirring ALP does not stir	Turn off power to main unit. Check the electrical connection at the Biomek instrument and the Stirring ALP. If the ALP is connected in a chain, check all connections in the chain. Retry functionality. Check rotary address dial. Contact a Beckman Coulter Service Engineer.
The Stirring ALP is not powering up	Contact a Beckman Coulter Service Engineer.
The Stirring ALP is not functioning correctly	Contact a Beckman Service Engineer. **Note:** Do not remove the cover(s) for any reason.

21 Storage ALPs (FX-only)

21.1 Overview

Storage ALPs allow three extra storage positions on the Biomek FX deck.

Storage ALPs are Standard 1 x 1 or 1 x 3 Passive ALPs that are positioned partially off the left side of a Biomek FX deck using deck positions available through the Storage ALP installation. Once the Standard Passive ALPs are installed on these deck positions, they are considered Storage ALPs and can be used only for storing labware; they are not available for pipetting. However, the extra space available on the deck using Storage ALPs allows other ALPs to be added.

To move labware to and from a Storage ALP, a Storage ALP Move step must be used (refer to Section 21.4, *Configuring the Storage ALP Move Step*).

Note: When the Storage ALP installation is run, the Storage ALP deck positions in the Deck Editor and Storage ALP Move step are available.

Storage ALPs are installed, removed, stored, and preventively maintained like Standard Passive ALPs. Use the following information from the *Standard Passive ALPs* chapter:

- *Installing Standard Passive ALPs* (Section 19.2)

  Note: Ensure the correct deck plate holes on the deck are used to allow the Storage ALP to be partially positioned off the left side.

- *Removing Standard Passive ALPs from the Deck* (Section 19.4)
- *Storage* (Section 19.5)
- *Preventive Maintenance* (Section 19.6)

The sections in this chapter include:

- *Configuring Storage ALPs in the Deck Editor* (Section 21.2)
- *Framing Storage ALPs* (Section 21.3)
- *Configuring the Storage ALP Move Step* (Section 21.4)

21.2 Configuring Storage ALPs in the Deck Editor

Before Storage ALPs can be used in a method, Biomek Software must know the location of the ALPs on the deck. The software representation of the instrument deck is configured in the Deck Editor.

Configuring the Deck Editor to use a Storage ALP includes:

- *Adding a Storage ALP to the Deck* (Section 21.2.1)
- *Setting Storage ALP Position Properties* (Section 21.2.2)
- *Adding Other ALPs to the Deck* (Section 21.2.3)

21.2.1 Adding a Storage ALP to the Deck

A new Storage ALP is added to the deck using the Deck Editor. The new deck position is named automatically when a Storage ALP is added to the deck.

To add an Storage ALP to the deck:

1. From the Instrument menu, select **Deck Editor**. Deck Editor appears.
2. Click and hold the mouse button on **OneByOneStorage** in the ALP Types List. The Deck Editor interface moves slightly to the right to indicate the positions on the left of the deck capable of supporting the 1 x 1 Storage ALP (Figure 21-1).

   OR

   Click and hold the mouse button on **OneByThreeStorage** in the ALP Types List. The Deck Editor interface moves slightly to the right to indicate the positions on the left of the deck capable of supporting the 1 x 3 Storage ALP (Figure 21-2).

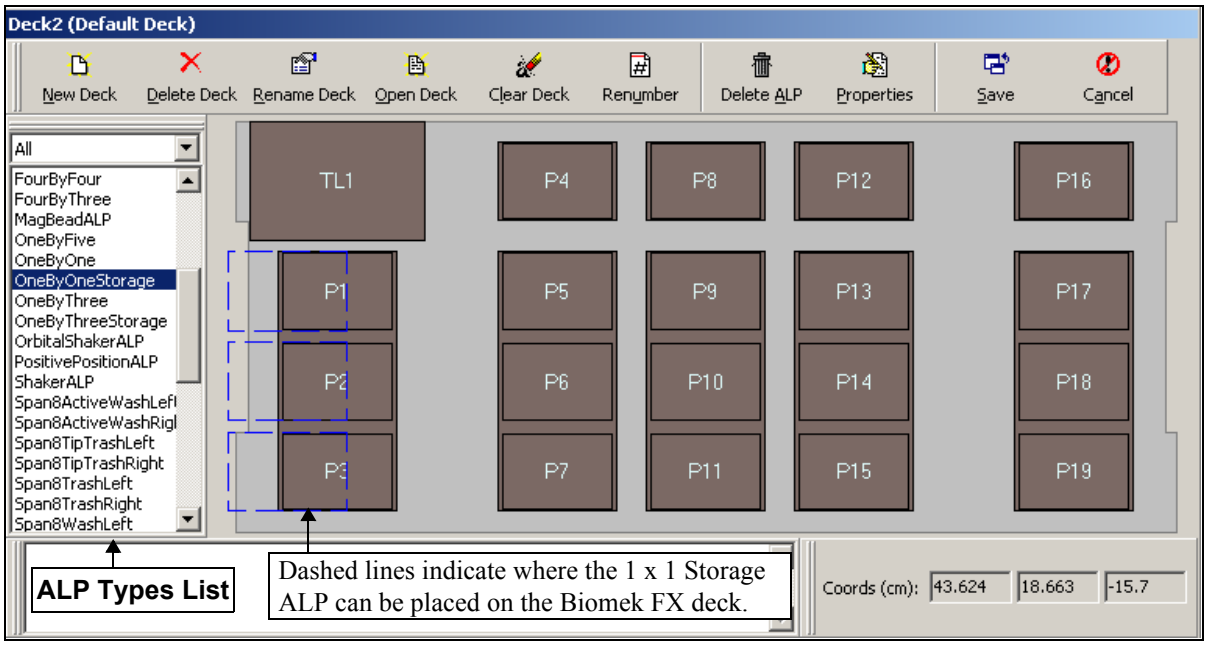

Figure 21-1. 1x1 Storage ALP deck positions on a Biomek FX deck

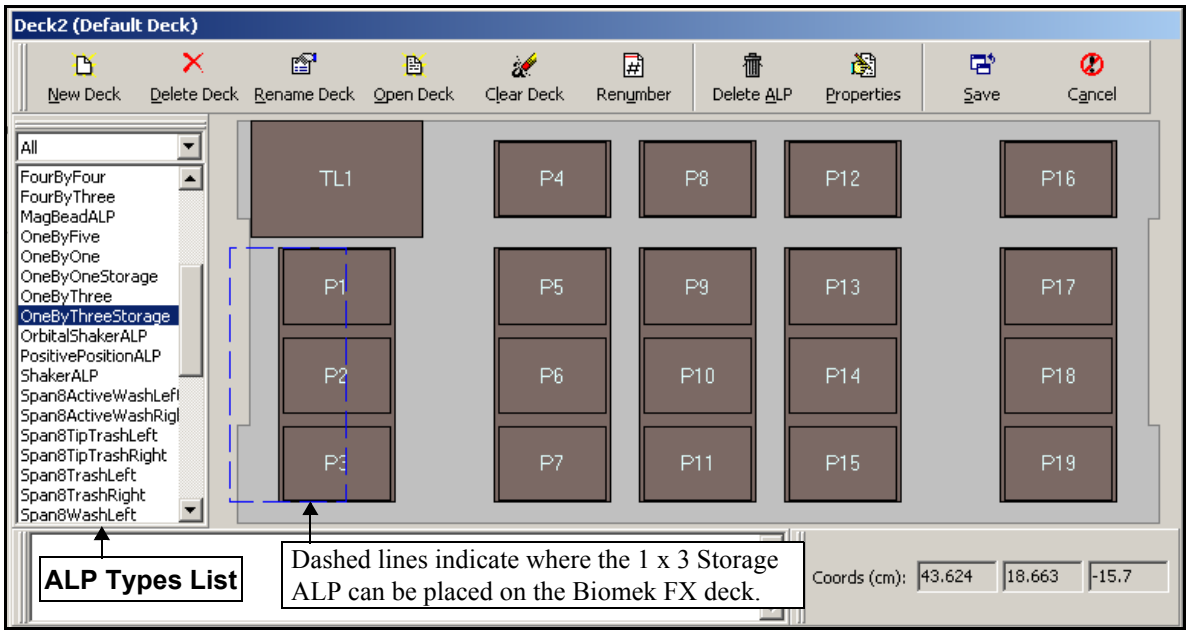

Figure 21-2. 1 x 3 Storage ALP deck position on a Biomek FX

3. Drag and drop **OneByOneStorage** or **OnebyThreeStorage** from the ALP Types List to one or more of the dashed locations on the deck. The Storage ALP appears and the deck position is named automatically.

Note: Attempting to place a Storage ALP in a location where another ALP resides results in a Warning (Figure 21-3). Choose **No** and delete the currently placed ALP(s) before placing the Storage ALP on the deck. For more information, refer to the *Biomek Software User's Manual,* Section 5.4.1, *Deleting ALPs and Deck Positions from a Deck*.

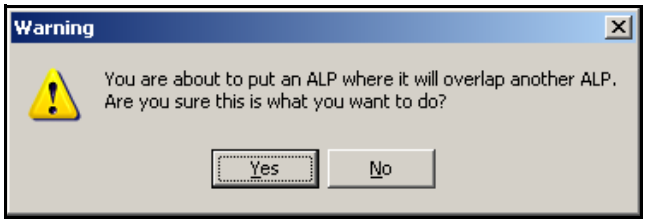

Figure 21-3. Warning indicating that an ALP is about to be placed in a position overlapping another ALP

21.2.2 Setting Storage ALP Position Properties

After an Storage ALP is placed on the deck, the deck position properties must be set. Position Properties include position Name and Per-labware Offsets, which customize the offsets for specific types of labware.

To set deck position properties:

1. Select the desired Storage ALP deck position on the Deck View of the Deck Editor. The selected position is highlighted with a pink border.

2. Select **Properties** from the Deck Editor toolbar.

   OR

   Double-click on the Storage ALP deck position.

   OR

   Right-click on the Storage ALP deck position and select **Properties** from the menu**.** Position Properties appears (Figure 21-4).

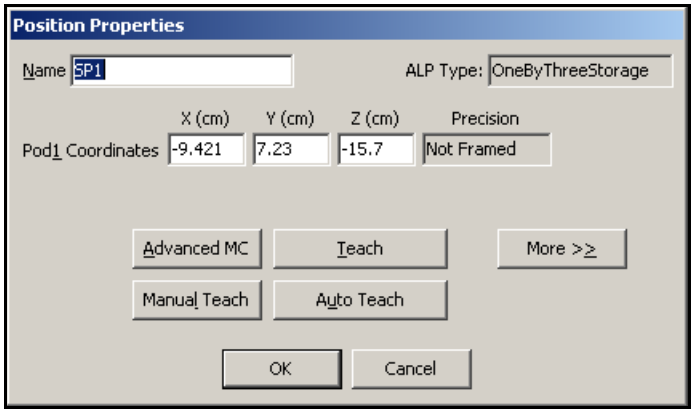

Figure 21-4. Position Properties for a 1 x 3 Storage ALP

3. In **Name**, rename the deck position, if desired.
4. Specify the **X**, **Y**, and **Z Coordinates** of the position in relation to the pod's home position by teaching the ALP (refer to Section 21.3, *Framing Storage ALPs*).
5. Select **More>>** to display device association and labware offset options (Figure 21-5).

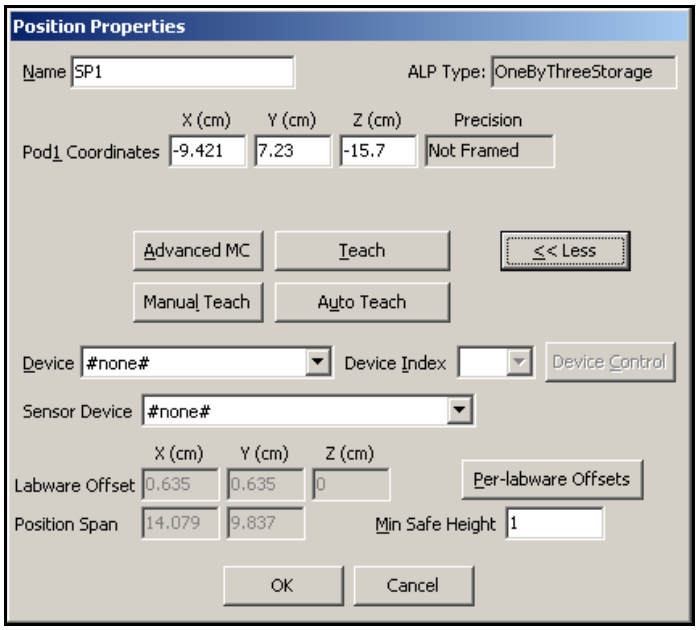

Figure 21-5. Position Properties after More is chosen

6. If desired, choose **Per-labware Offsets** to customize the offsets for specific types of labware (refer to the *Biomek Software User's Manual,* Section 5.4.3.3, *Changing Per-Labware Offsets*).
7. If necessary, adjust the **Min Safe Height** (refer to the *Biomek Software User's Manual,* Section 5.4.3, *Setting ALP Properties and Deck Positions*).
8. Choose **OK** to save the position properties and return to the Deck Editor.
9. Choose **Save** to save changes to save the new deck configuration and close the editor.

21.2.3 Adding Other ALPs to the Deck

Since the Storage ALPs are positioned partially off the left side of the deck, space becomes available for three additional ALPs. Once the deck has been configured for the Storage ALPs, drag and drop other ALPs from the ALP list to the available positions.

Figure 21-6 displays a deck with three Storage ALPs and three Standard 1 x 1 ALPs positioned in the available deck space.

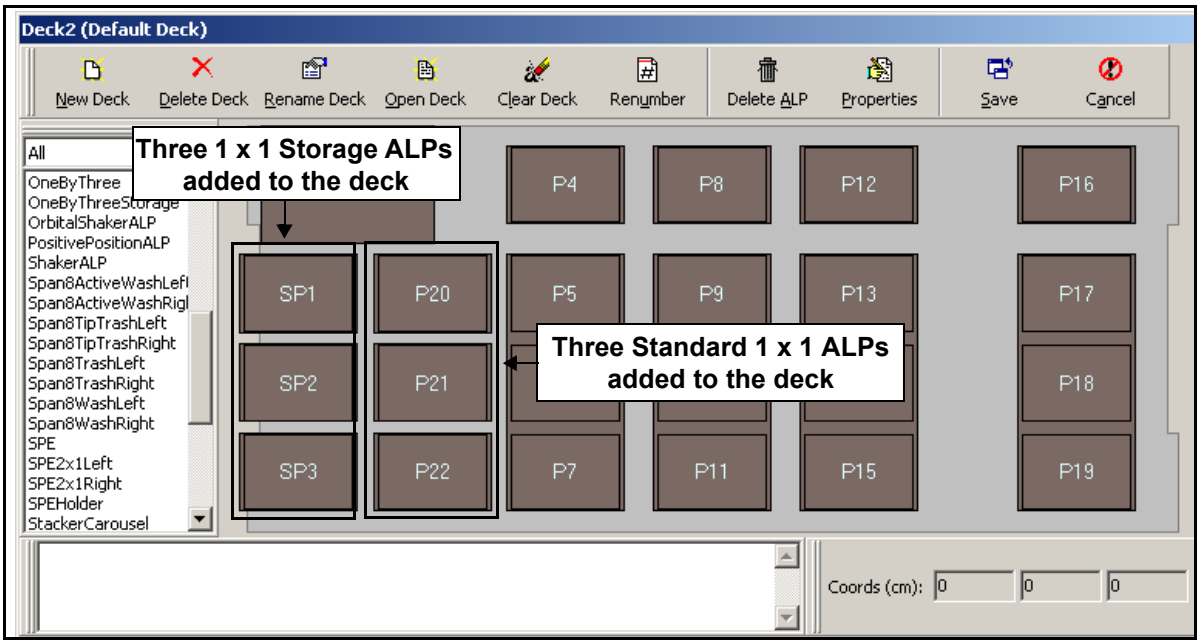

Figure 21-6. Three 1 x 1 Storage ALPs and three Standard 1 x 1 ALPs added to a Biomek FX deck

21.3 Framing Storage ALPs

Storage ALPs are framed using the AccuFrame and the red Framing Adaptor (Figure 21-7).

To frame a Storage ALP:

1. Gently mount the Accuframe on the red Framing Adaptor provided with the integration (refer to the *Biomek® FX Laboratory Automation Workstation User's Manual,* Section 5.2.3, *Installing AccuFrame*).

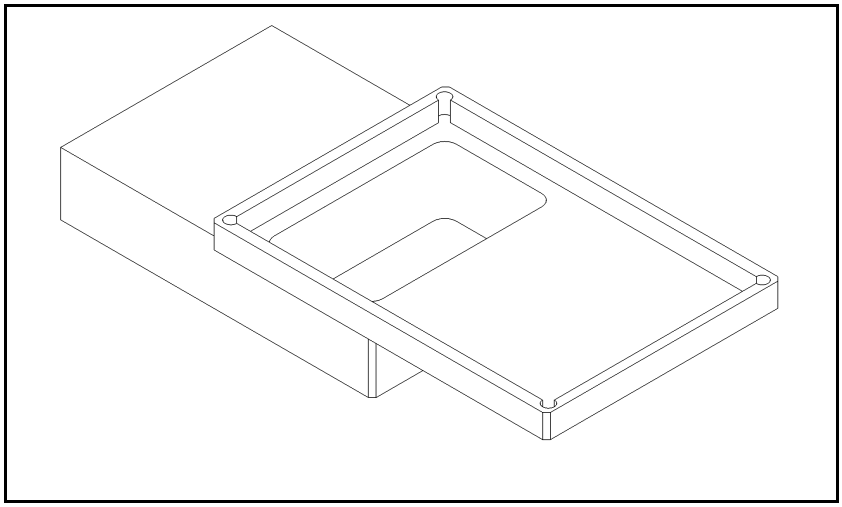

Figure 21-7. Framing Adaptor

2. Frame the Storage ALP Position with the Multichannel Pod according to the instructions in the hardware manual (refer to the *Biomek® FX Laboratory Automation Workstation User's Manual,* Section 5.2.4, *Framing the Position*). Adaptor Warning appears (Figure 21-8).

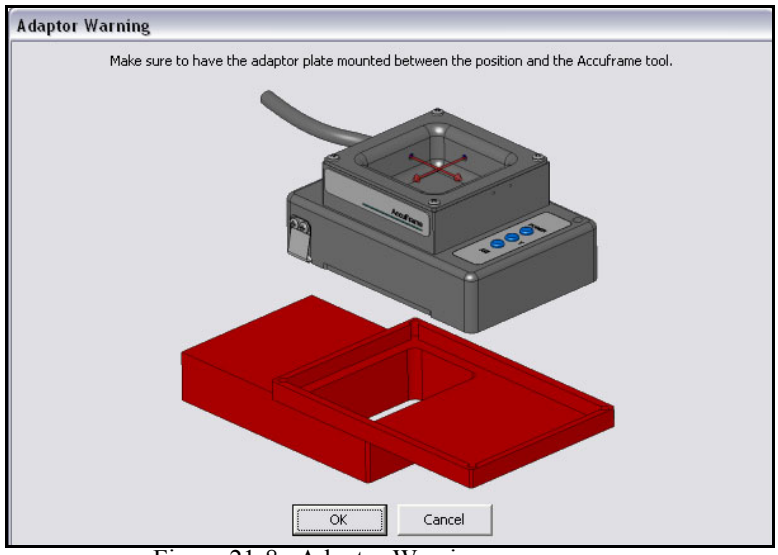

Figure 21-8. Adaptor Warning

3. Ensure the instructions are followed on the Adaptor Warning and choose **OK**. Teaching Instructions appears (Figure 21-9).

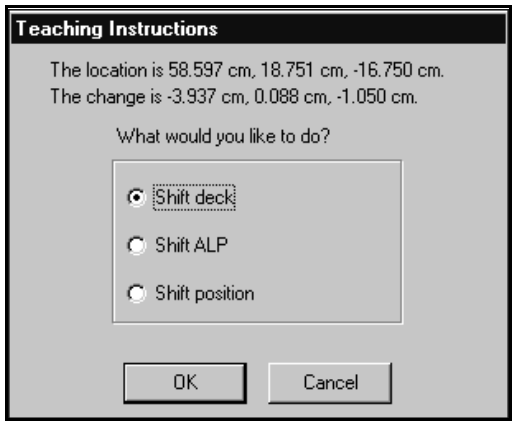

Figure 21-9. Teaching Instructions

4. Choose **Shift ALP**.
5. Choose **OK**. Position Properties appears again, and the Storage ALP is framed with the Multichannel Pod.
6. Choose **OK** to close Position Properties.
7. Choose **Save** to close the Deck Editor.

21.4 Configuring the Storage ALP Move Step

The Storage ALP Move step is used to move labware to and from the Storage ALPs. This step is available on the Integrated Devices step palette when the Storage ALPs are installed (Figure 21-10).

Note: If the Storage ALP Move step is accidentally deleted from the Integrated Devices step palette, the Storage ALP installation must be reinstalled.

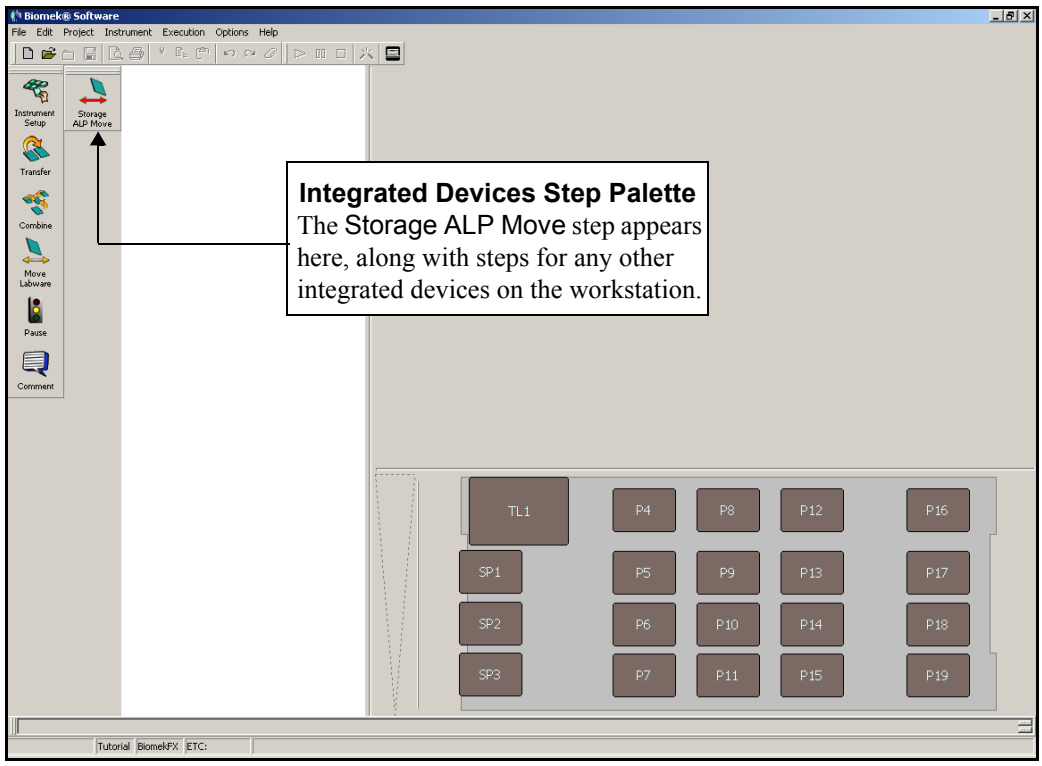

Figure 21-10. Integrated Devices step palette

To configure the Storage ALP Move step:

1. To insert a Storage ALP Move step into a method, drag and drop **Storage ALP Move** from the Integrated Devices step palette to the Method View (Figure 21-11).

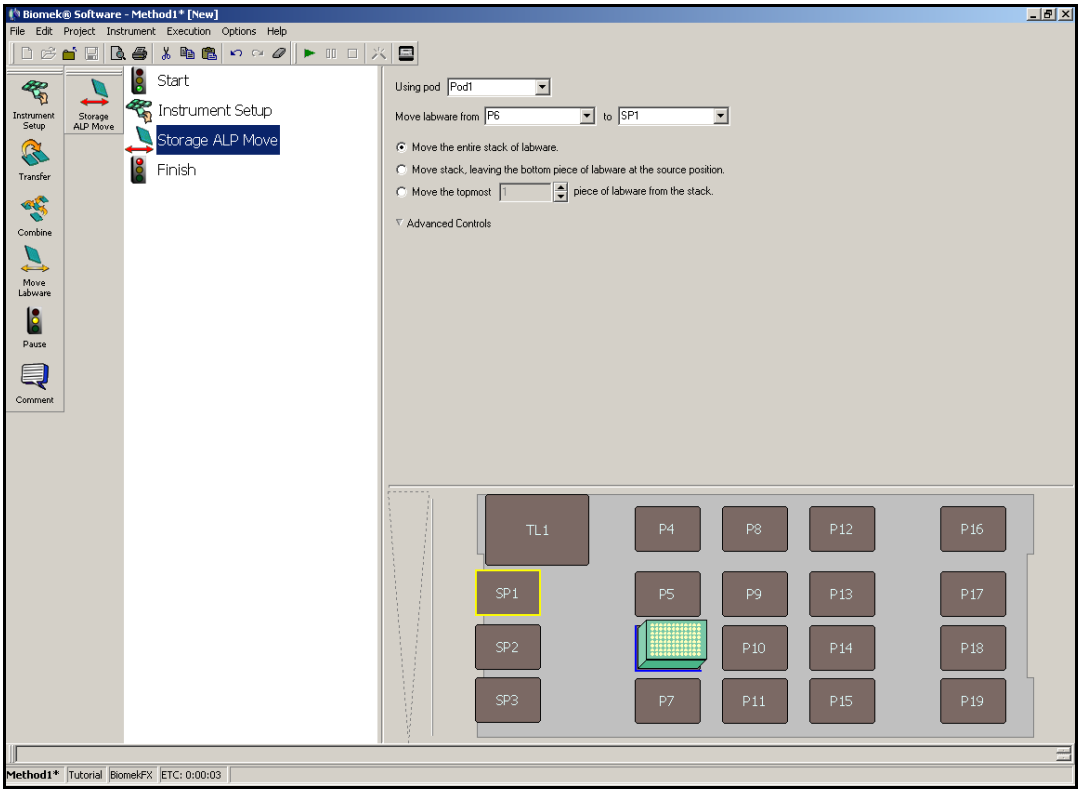

Figure 21-11. Storage ALP Move step inserted into the Method View

2. In Using Pod, select the pod to move the labware.

   Note: In Using Pod, Pod1 is the default on a single-pod Biomek FX instrument and the only pod capable of moving labware on or off the Storage ALPs.

3. In Move labware from, select the position where labware desired to move is located.
4. In to, select the desired position where the selected labware will be moved.
5. The In Move labware from, select the position where labware desired to move is located.
6. In to, select the desired position where the selected labware will be moved.

   Note: Storage ALP position must be chosen in either Move labware from or to; this step is used only to move labware to or from the Storage ALP.

7. Select the desired option for moving stacked labware:

   - **Move the entire stack of labware** — moves all labware in the stack; this option should be selected when moving a single unstacked piece of labware.
   - **Move stack, leaving the bottom piece of labware at the source position** — moves all labware in the stack except for the bottom piece.

     Note: Selecting Move stack, leaving the bottom piece of labware at the source position when the source deck position contains only one piece of labware results in an error.

   - **Move the topmost. . .piece(s) of labware from the stack** — moves only the specified number of labware from the top of the stack.

Advanced Controls (Figure 21-12) may be selected to change the offset values for the Storage ALP Move step; however, consult with Beckman Coulter Customer Support before changing the values in Advanced Controls.

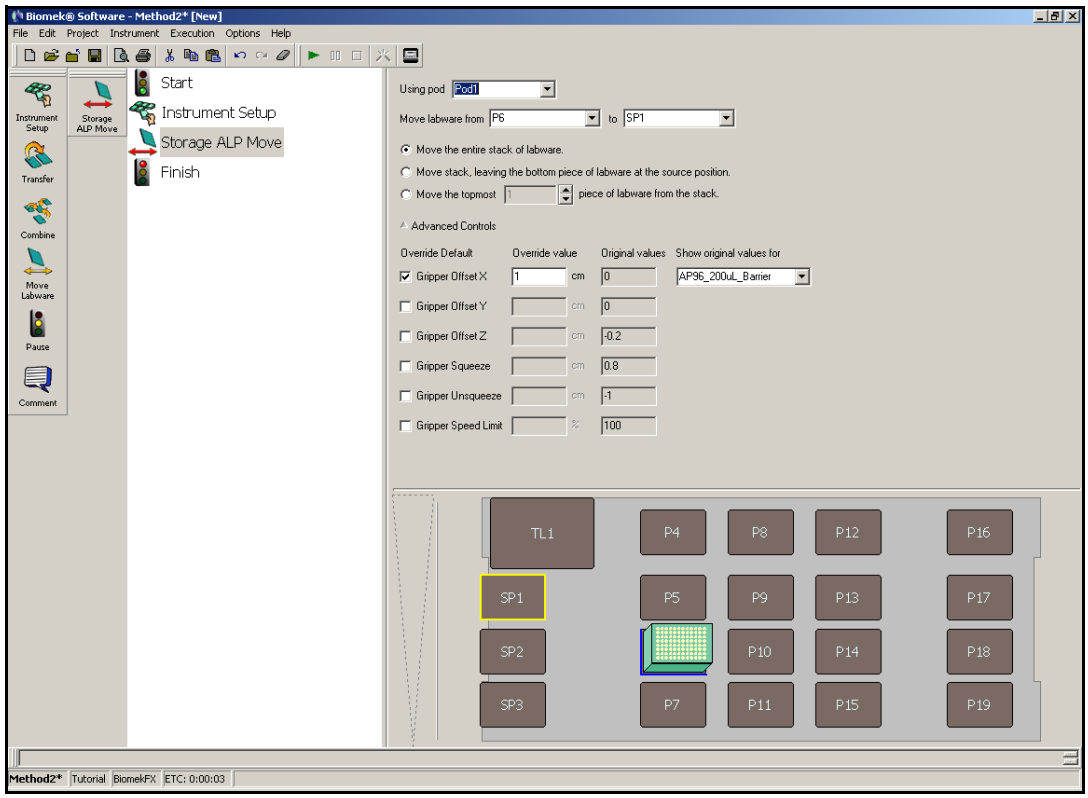

Figure 21-12. Storage ALP Move with Advanced Controls selected

22 Test Tube Rack ALPs

22.1 Overview

Test Tube Rack ALPs are open-structured passive ALPs that hold test tube racks or septum piercing tube racks on the Biomek deck during liquid-handling procedures. Test Tube Rack ALPs ensure that test tubes are accessible by a Span-8 Pod at a predetermined height.

Test Tube Rack ALPs come in two sizes:

- 1 x 2 — holds up to two racks of test tubes
- 1 x 3 — holds up to three racks of test tubes

Both the 1 x 2 and 1 x 3 Test Tube Rack ALPs can be positioned with the overhang on the left or right of the ALP. When the overhang is to the left of the ALP, the ALP is left facing (Figure 22-1). Conversely, when the overhang is to the right, the ALP is right facing (Figure 22-2).

Test Tube Rack ALPs are mounted in specific deck positions based on the overhangs left or right orientation (refer to 22.2.1, *Selecting the Deck Positions for a Test Tube Rack ALP*.

CAUTION: Different sizes of test tubes must not be mixed in one test tube rack. To avoid a collision between the pod and Test Tube Rack ALP, all of the test tubes in the Test Tube Rack must be a uniform height.

Note: Biomek Software assumes a Test Tube Rack contains one size and type of test tube, not a combination of test tube sizes and types.

Test Tube Rack ALPs support four sizes of Beckman Coulter test tube racks:

- 10 mm (x75 mm)
- 12 mm (x75 mm)
- 13 mm (x100 mm)
- 15.5 mm (x100 mm)

The ***NX-S8*** also supports two sizes of Beckman Coulter septum piercing tube racks:

- 13 mm (x100 mm)
- 15.5 mm (x100 mm)

The sections in this chapter include:

22.1.1 1 x 2 Test Tube Rack ALP

A 1 x 2 Test Tube Rack ALP (Figure 22-1) can hold up to two racks of test tubes. Test tubes and test tube racks are not gripper accessible or stackable.

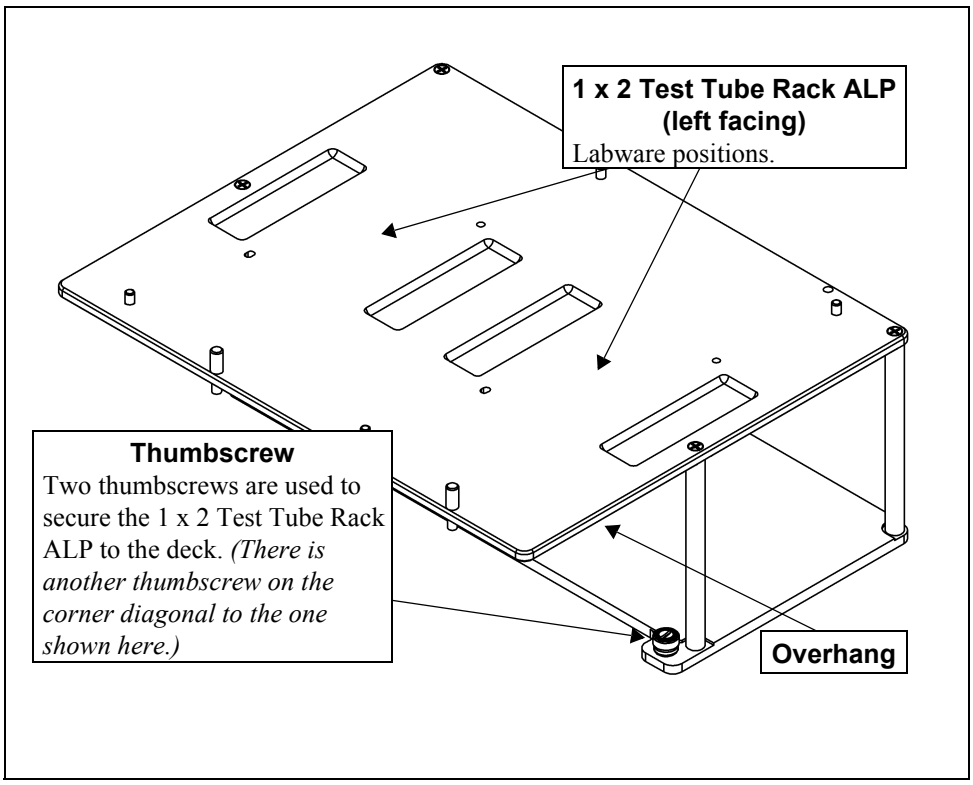

Figure 22-1. 1 x 2 Test Tube Rack ALP (left facing)

22.1.2 1 x 3 Test Tube Rack ALP

A 1 x 3 Test Tube Rack ALP (Figure 22-2) holds up to three racks of test tubes. Test tubes and test tube racks are not gripper accessible or stackable.

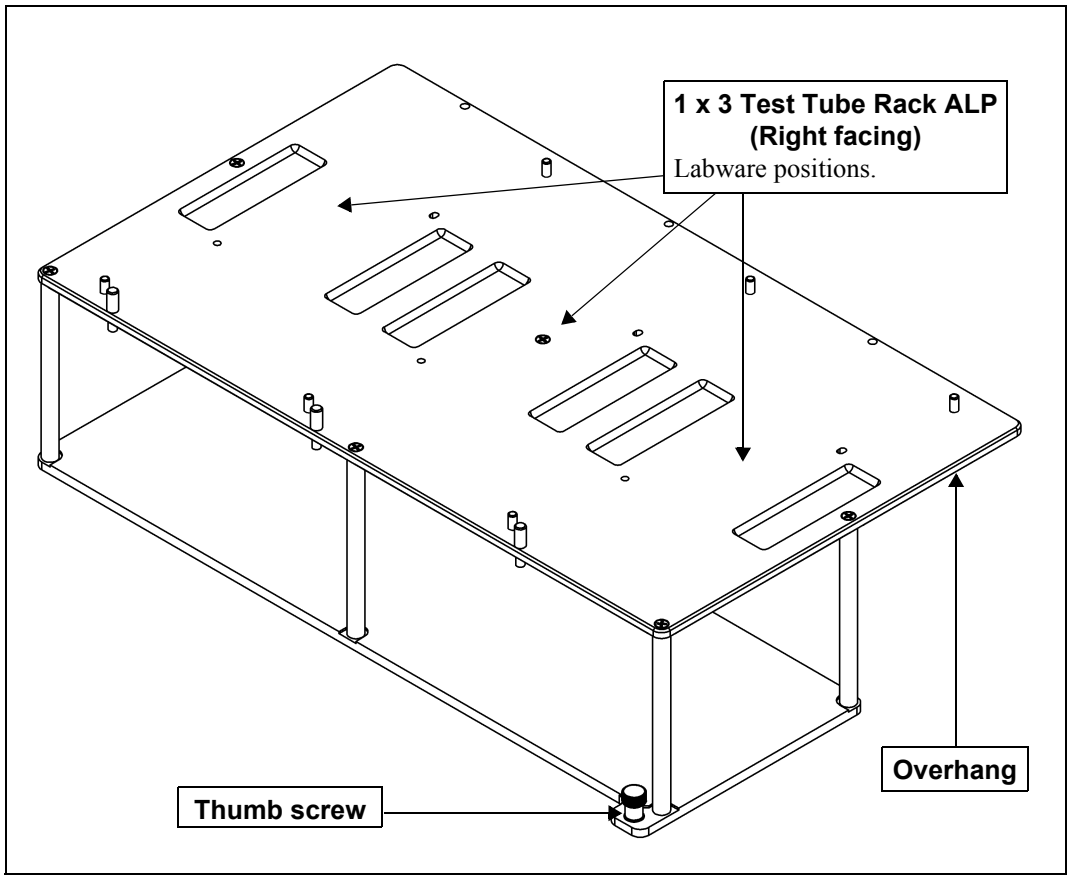

Figure 22-2. 1 x 3 Test Tube Rack ALP (right facing)

22.2 Installing Test Tube Rack ALPs

Installing Test Tube Rack ALPs includes:

- *Selecting the Deck Positions for a Test Tube Rack ALP* (Section 22.2.1).
- *Mounting Test Tube Rack ALPs to the Deck* (Section 22.2.2).

After installing the Test Tube Rack ALP, test tube racks must be added properly to the Test Tube Rack ALP to use them in a method (refer to Section 22.4, *Adding Test Tube Racks to Test Tube Rack ALPs*).

- ***NX-S8*** — Septum piercing test tube racks may also be used with Test Tube Rack ALPs (refer to Section 22.5, *Adding and Removing Septum Piercing Tube Racks to Tube Rack ALPs (NX-S8 only)*).

22.2.1 Selecting the Deck Positions for a Test Tube Rack ALP

Each Test Tube Rack ALP occupies 1½ columns on the deck, although the size of the ALP dictates whether it uses three or four rows on the deck. The deck positions available for a Test Tube Rack ALP are determined by the number of rows occupied by the ALP:

- The 1 x 2 Test Tube Rack ALP uses 3 rows and 1½ columns on the deck.
- The 1 x 3 Test Tube Rack ALP uses 4 rows and 1½ columns on the deck.

Although a Test Tube Rack ALP leaves 1/2 of a column empty, two Test Tube Rack ALPs cannot be placed beside each other so that each one uses 1/2 of the same column. However, a Span-8 Tip Wash ALP can be placed in the 1/2 column remaining next to a Test Tube Rack ALP.

Use the Biomek Software Deck Editor to determine where the 1 x 2 Test Tube Rack ALP and 1 x 3 Test Tube Rack ALP can be placed on the Biomek instrument deck. After a deck position on which to physically mount the ALP has been chosen, configure the ALP in the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).

22.2.2 Mounting Test Tube Rack ALPs to the Deck

While 1 x 2 and 1 x 3 Test Tube Rack ALPs occupy different positions on the deck they are mounted to the deck using the same instructions (refer to Section 22.2.2, *Mounting Test Tube Rack ALPs to the Deck*).

To mount a Test Tube Rack ALP to the deck:

1. Position the ALP so the locating pins on the bottom of the ALP slip into the locating holes on the deck.

   Note: Use the laser etchings as a guide when positioning ALPs on the deck.

2. Fasten the ALP to the deck using the thumbscrews on the base of the Test Tube Rack ALP (Figure 22-1 and Figure 22-2).

22.3 Framing Instructions

Special framing instructions are necessary for Test Tube Rack ALPs which are framed using the AccuFrame and the Framing Tool Adaptor. Each deck position occupied by a Test Tube Rack ALP can be framed for increased pipetting accuracy; however, framing only one of the positions is generally sufficient.

Both the 1 x 2 Test Tube Rack ALP and the 1 x 3 Test Tube Rack ALP are framed using the following instructions.

To frame a Test Tube Rack ALP:

1. Place the Framing Tool Adaptor on the 1 x 2 Test Tube Rack ALP (Figure 22-3) or the 1 x 3 Test Tube Rack ALP (Figure 22-4) so that the locating pins on the bottom of the Framing Tool Adaptor align with the locating holes on the Test Tube Rack ALP.

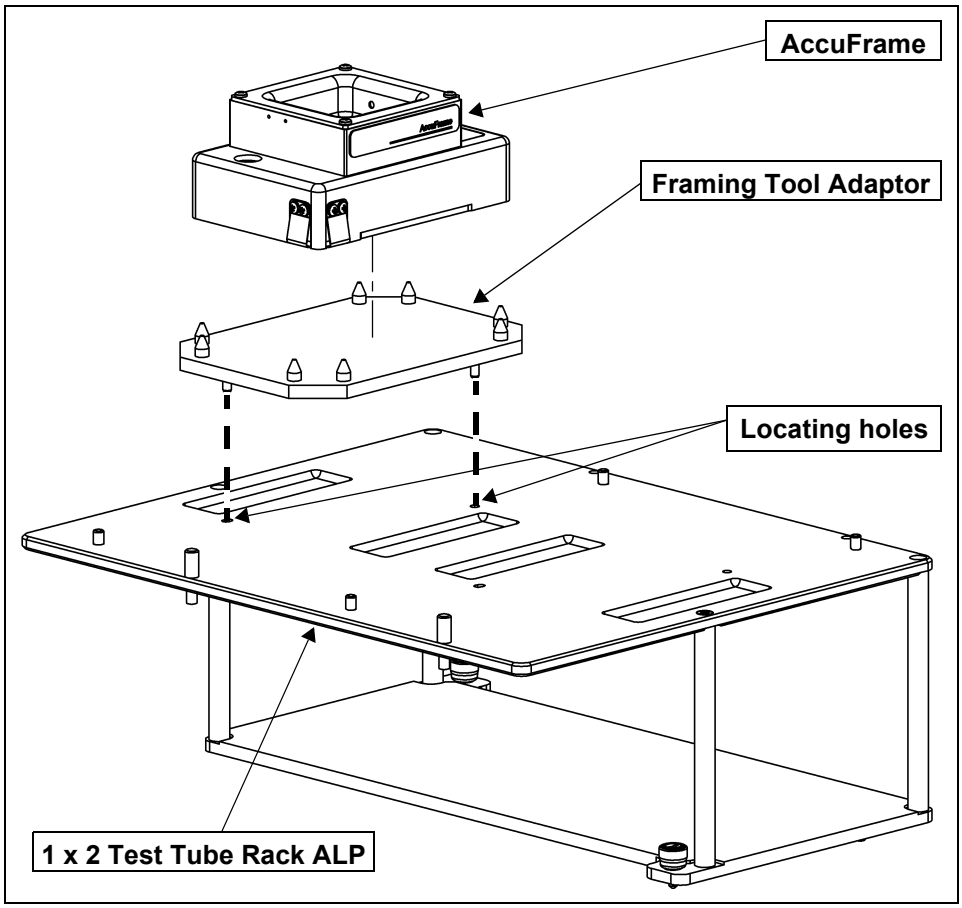

Figure 22-3. Framing for the 1 x 2 Test Tube Rack ALP (left facing)

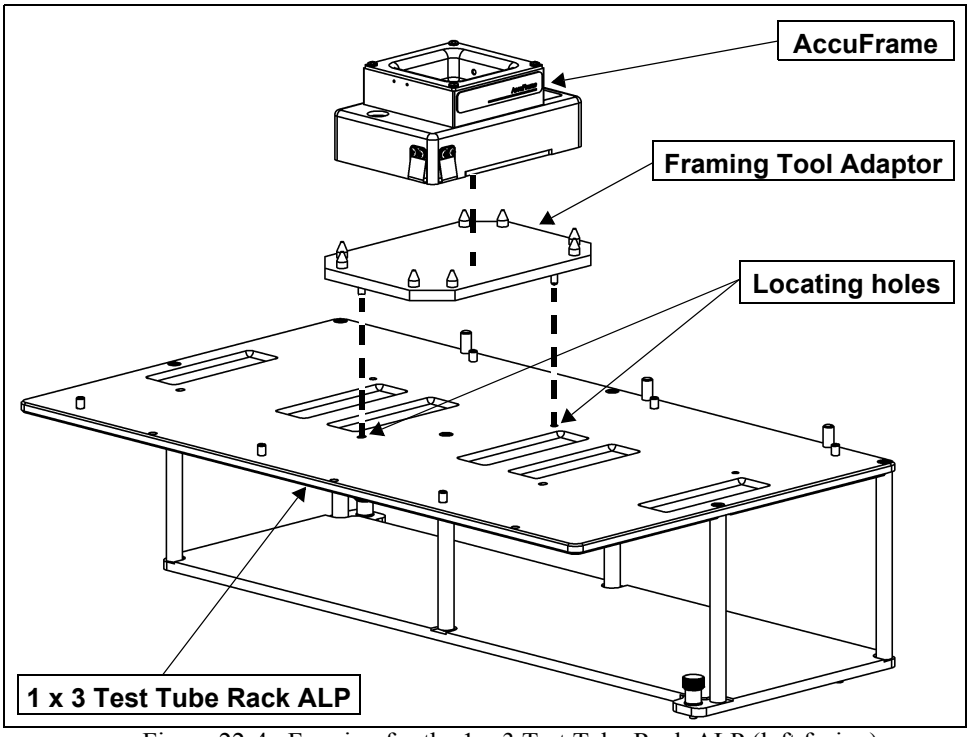

Figure 22-4. Framing for the 1 x 3 Test Tube Rack ALP (left facing)

CAUTION: Turn off power to the Biomek instrument before attaching or removing AccuFrame from the instrument deck.

2. Turn off power to main unit before connecting the AccuFrame.
3. Plug the AccuFrame into any available CAN port on the Biomek FX tower.

WARNING: Make sure the light curtain is not violated by the AccuFrame cable. If the light curtain is violated, the framing process halts immediately.

WARNING: Make sure the AccuFrame cable does not interfere with pod movement.

4. Manually place the AccuFrame into the Framing Tool Adaptor by placing the front right corner first and pushing the AccuFrame gently down into the Adaptor (Figure 22-3 and Figure 22-4).
5. Turn on power to main unit.
6. Frame the Test Tube Rack ALP according to the procedures outlined in the appropriate instrument user's manual.

22.4 Adding Test Tube Racks to Test Tube Rack ALPs

Test tube racks must be properly added to the Test Tube Rack ALPs so position A1 on the test tube rack is in the front-left corner of a labware position on the Test Tube Rack ALP.

- ***NX-S8*** — Septum piercing tube racks may also be placed on Test Tube Rack ALPs (refer to Section 22.5, *Adding and Removing Septum Piercing Tube Racks to Tube Rack ALPs (NX-S8 only)*).

Proper placement of test tube racks on the Test Tube Rack ALPs is ensured by inserting the labware positioning screws in the labware positioning screw holes on the left side of the ALP after the ALP is added to the deck. The labware positioning screws are always on the left side of the ALP, regardless of whether the ALP is left or right facing (Figure 22-5 and Figure 22-6).

Note: Labware positioning screws must be next to the test tube in position A1 on the test tube rack. Position A1 on a test tube rack must be in the front-left corner of a labware position on the ALP.

To add test tube racks to the Test Tube Rack ALPs:

1. Insert the labware positioning screws by screwing them clockwise into the labware positioning screw holes on the left side of the Test Tube Rack ALP (Figure 22-5 and Figure 22-6).

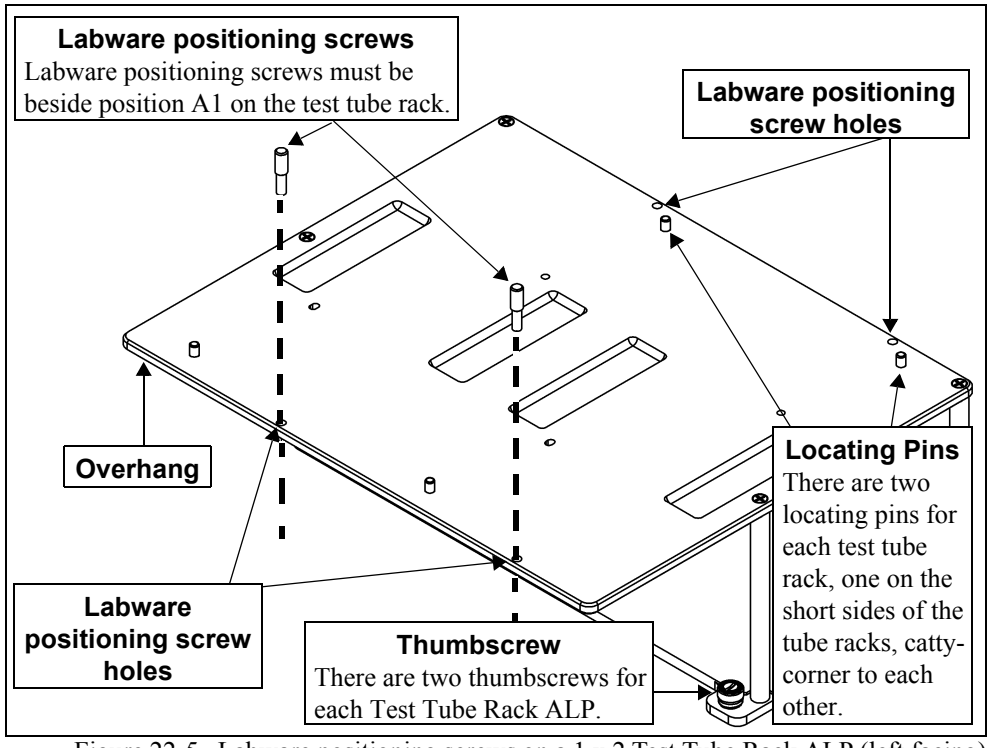

Figure 22-5. Labware positioning screws on a 1 x 2 Test Tube Rack ALP (left facing)

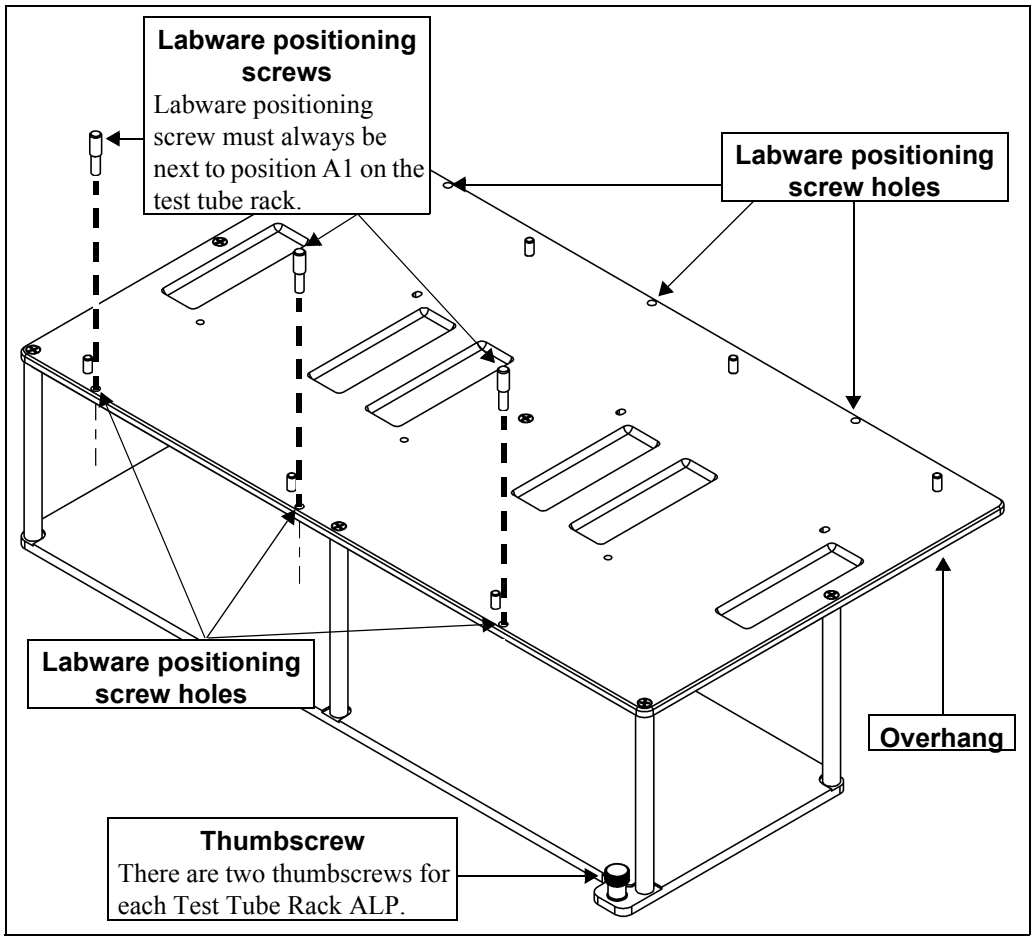

Figure 22-6. Labware positioning screws on a 1 x 3 Test Tube Rack ALP (right facing)

2. Orient the test tube rack so position labeled A1 on the test tue rack is on the front, left side of the ALP (Figure 22-7 and Figure 22-8).

3. Lower the test tube rack so the locating holes in the bottom of the rack slip over the locating pins on the Test Tube Rack ALP (Figure 22-7 and Figure 22-8).

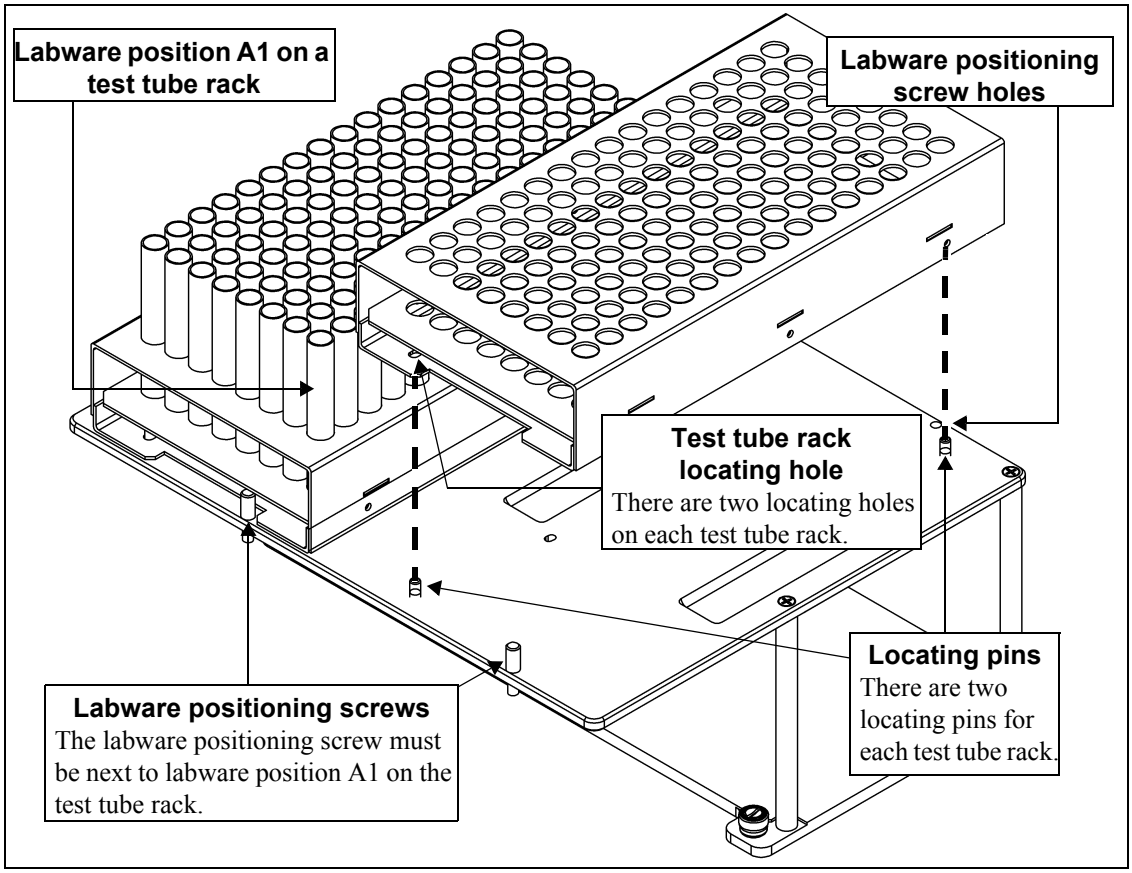

Figure 22-7. Mounting tube racks to a 1 x 2 Test Tube Rack ALP (left facing)

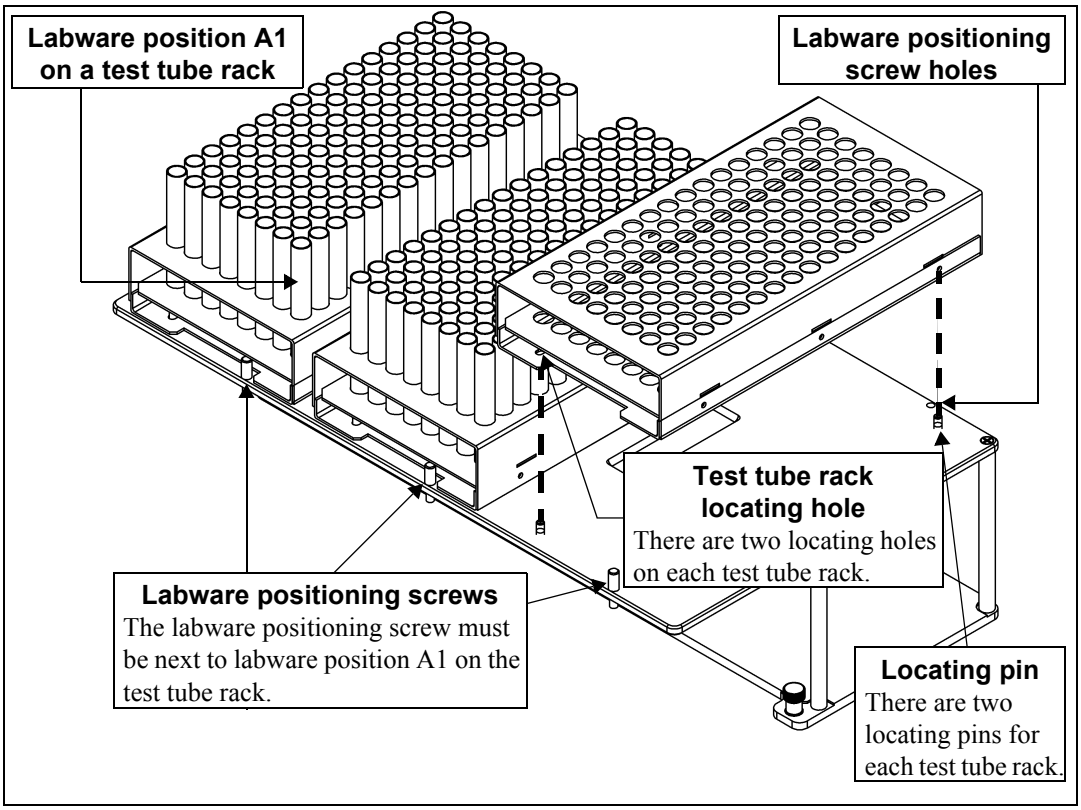

Figure 22-8. Mounting tube racks to a 1 x 3 Test Tube Rack ALP (Left facing)

22.5 Adding and Removing Septum Piercing Tube Racks to Tube Rack ALPs (NX-S8 only)

Septum piercing test tube racks must be properly added to the Test Tube Rack ALPs so position A1 on the septum piercing test tube rack is in the front-left corner of a labware position on the Test Tube Rack ALP. A septum piercing adaptor, consisting of two side plates and a top adaptor plate, is attached to the ALP to securely hold and position test tubes for piercing by septum piercing tips.

22.5.1 Adding Septum Piercing Tube Racks

To add septum piercing test tube racks to the Test Tube Rack ALP:

1. If labware positioning screws are installed on the Test Tube Rack ALP, remove them by turning them counterclockwise.
2. Orient the test tube rack so the position labeled A1 on the test tube rack is on the front, left side of the ALP.
3. Lower the test tube rack so the locating holes on the bottom of the rack slip over the locating pins on the Test Tube Rack ALP.

Note: If using a partially full tube rack, place an equal number of test tubes on each side of the test tube rack, or add blank test tubes to the opposite side to balance it. This helps to provide a level surface for the septum piercing tips and equalizes the force distribution when the tips press down on the septa-covered tubes.

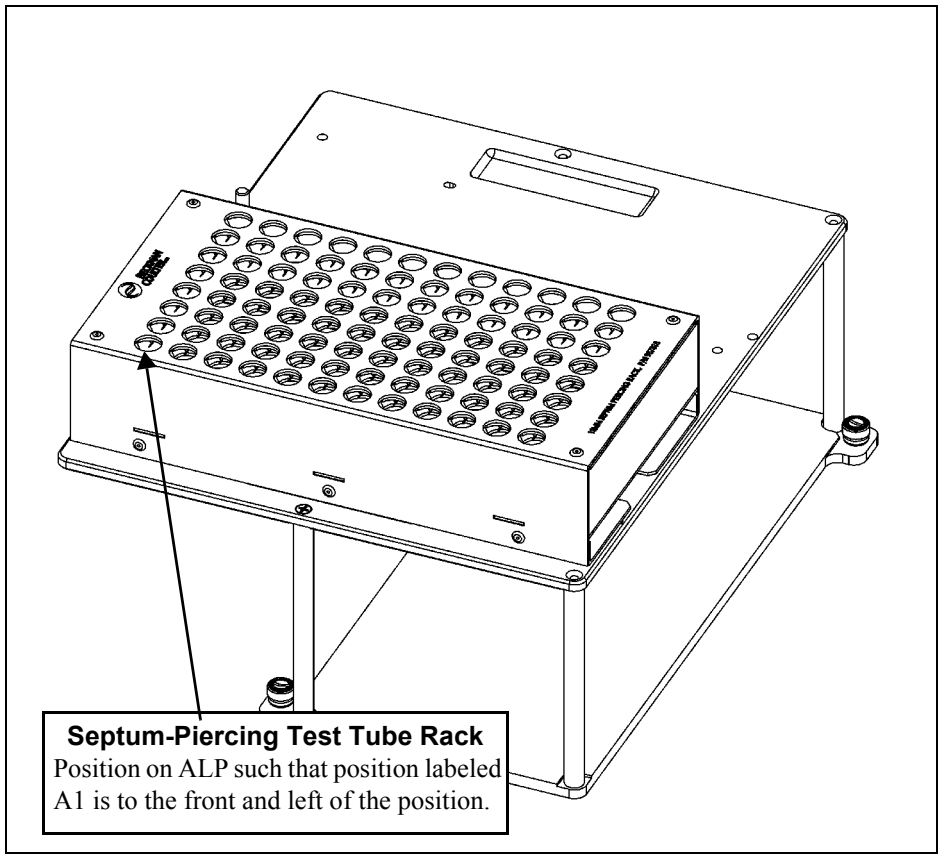

Figure 22-9. Septum Piercing Tube Rack positioned on ALP (left facing)

4. Position one of the side plates so that back slotted thumbscrew is aligned with the the bottom of the screw hole on the left side of the ALP position.
5. Push up on the slotted thumbscrew to engage the threads with the screw hole and turn the thumbscrew counterclockwise to fasten the side plate to the ALP.
6. Position the other side plate so that the front slotted thumbscrew is aligned with the bottom of the screw hole on the right side of the ALP position.

7. Push up on the slotted thumbscrew to engage the threads with the screw hole and turn the thumbscrew counterclockwise to fasten the side plate to the ALP.

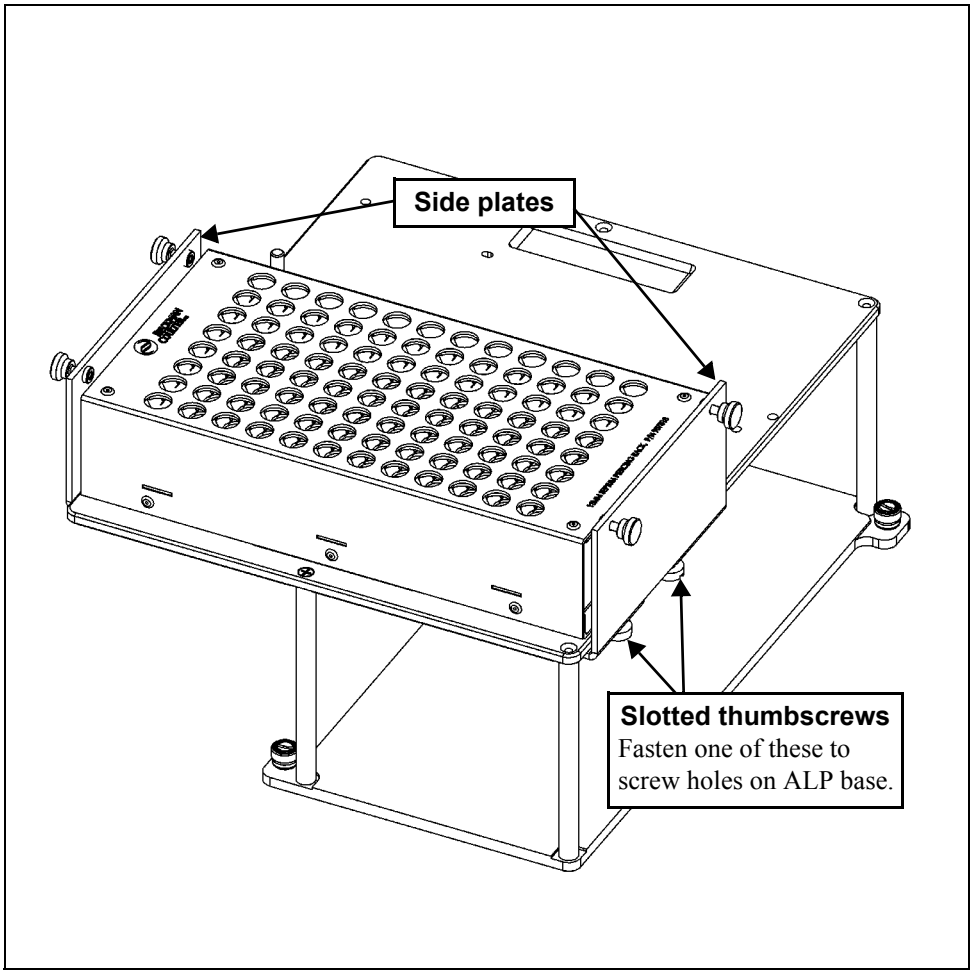

Figure 22-10. Septum Piercing Tube Rack with side plates (left facing)

8. Add test tubes to the test tube rack, if necessary. Once the top adaptor plate is installed, it must be removed to add test tubes to the rack.

Note: If using a partially full tube rack, place an equal number of test tubes on each side of the test tube rack, or add blank test tubes to the opposite side to balance it. This helps to provide a level surface for the septum piercing tips and equalizes the force distribution when the tips press down on the septa-covered tubes.

9. Place the top adaptor plate above the ALP position so that the four grooves on the adaptor slide over the four thumbscrews on the side plates. It may be necessary to loosen one or more of the thumbscrews to allow the grooves of the top adaptor plate to slide over them.

Note: If the septum piercing tube rack has not already been placed on the Test Tube Rack ALP position, do so before placing the top adaptor.

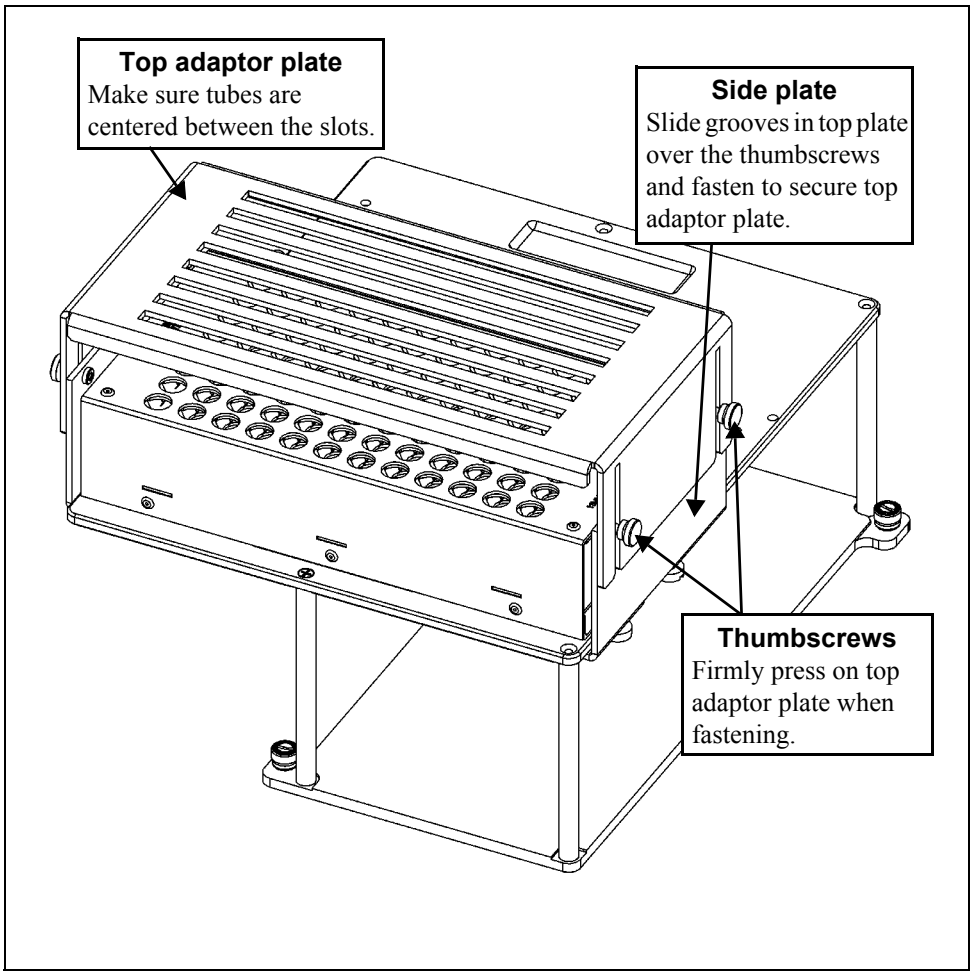

Figure 22-11. Septum Piercing Tube Rack with top adapter plate (left facing)

10. Push the top adaptor plate down until stopped by the top of the test tubes.
11. Make sure the test tubes are centered between the slots of the top adaptor plate. If not, remove the top adaptor plate and repeat steps 7 and 8.
12. When the test tubes are centered in the slots, press firmly down on the top adaptor plate and fasten the four thumbscrews (two on each side plate) to secure it in place.
13. Repeat steps 1 to 10 to place another septum piercing tube rack on the Test Tube Rack ALP.

22.5.2 Removing Septum Piercing Tube Racks

To remove a septum piercing tube rack from a Test Tube Rack ALP:

1. Loosen, but do not remove, the four thumbscrews on the side plates.
2. Lift the top adaptor plate straight up so that the grooves slide completely over the thumbscrews and remove it from the ALP.
3. Carefully lift the test tube rack up off the locating pins and slide it out between the side plates.

22.6 Removing Test Tube Rack ALPs from the Deck

To remove a Test Tube Rack ALP from the Biomek deck:

1. Remove test tube racks from the Test Tube Rack ALP.
   - ***NX-S8*** — If using a septum piercing test tube rack, the septum piercing adaptor must be removed before removing the test tube rack from the ALP (refer to Section 22.6.1, *Removing the Septum Piercing Adaptor from Test Tube Rack ALPs (NX-S8 only)*).
2. Loosen the thumbscrews on the base of the Test Tube Rack ALP.
3. Lift the Test Tube Rack ALP straight up from the deck until the locating pins are clear of the locating holes.

22.6.1 Removing the Septum Piercing Adaptor from Test Tube Rack ALPs (NX-S8 only)

If using septum piercing on the Test Tube Rack ALP, the septum piercing adaptor must be removed prior to removing test tube racks from the ALP.

To remove the septum piercing adaptor from the Test Tube Rack ALP:

1. Loosen, but do not remove, the four thumbscrews on the side plates.
2. Lift the top adaptor plate straight up so that the grooves slide completely over the thumbscrews and remove it from the ALP.
3. Remove the left and right side plates by turning the slotted thumbscrews clockwise until they disengage from the screw holes on the ALP.

22.7 Storage

Return Test Tube Rack ALPs, test tube racks, and septum piercing racks to their original packing materials and store in a dry, dust-free, environmentally-controlled area.

- ***NX-S8*** — Return the septum piercing adaptor to its original packing materials and store in a dry, dust-free, environmentally-controlled area when not in use.

Note: It is desirable to allow Test Tube Rack ALPs to air-dry before returning them to their original packing materials.

22.8 Preventive Maintenance

WARNING: Test Tube Rack ALPs may be contaminated from method solutions. Follow the appropriate decontamination procedures outlined by the laboratory safety officer.

To clean, wipe all surfaces on the Test Tube Rack ALPs with a soft cloth.

23 Tip Loader ALP

23.1 Overview

The Tip Loader ALP (Figure 23-1) is an active ALP that loads disposable tips onto a 96-well head or a 384-well head mounted on a Multichannel Pod. The Biomek system supports up to four tip loaders on the deck at one time; however, only one Tip Loader ALP can function at a time. The Tip Loader is controlled through a Controller Area Network (CAN).

Note: The Tip Loader ALP supports only Beckman Coulter tip boxes.

Note: The Tip Loader ALP is only intended to load and unload tips; therefore, no labware other than tip boxes should be placed on the Tip Loader ALP. No pipetting operations are allowed on the Tip Loader ALP.

The sections in this chapter include:

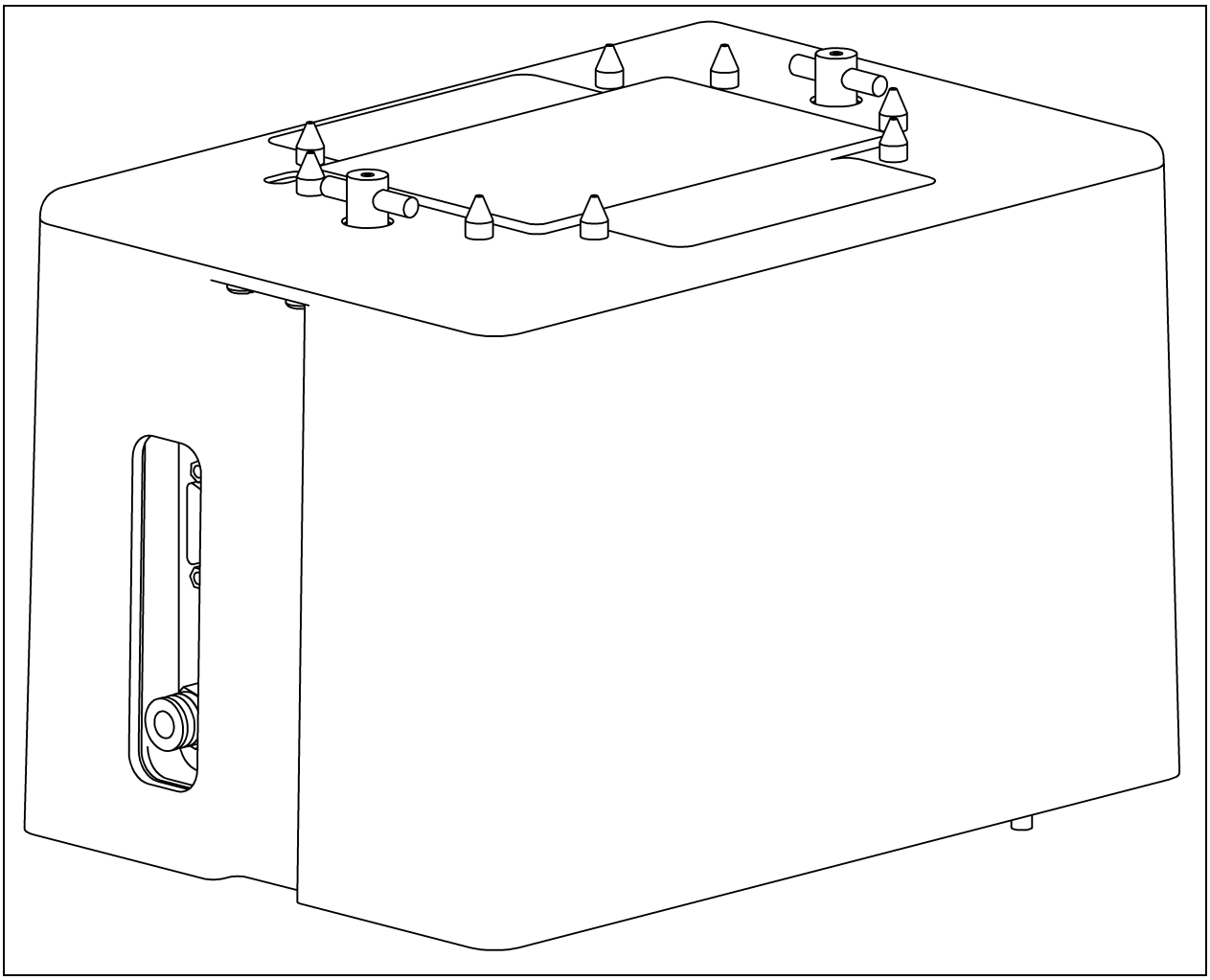

Figure 23-1. Tip Loader ALP

23.1.1 Tip Loader Air Requirements

CAUTION: Clean, dry air must be provided for proper operation of the Tip Loader ALP.

The Biomek instrument requires clean air input of 40 psi. The air is regulated to the air output ports on both towers and increased to meet the 110-115 psi requirement for tip loading. The Tip Loader ALP must be attached to one of the 110-115 psi ports on the inner sides of the Biomek towers to seat tips properly.

23.2 Installing the Tip Loader ALP

Installing the Tip Loader ALP on the deck includes choosing the deck position and mounting the ALP to the deck

23.2.1 Choosing a Deck Position

The size of the Tip Loader limits where it can be positioned on the deck. Since the Tip Loader ALP covers more than one standard deck position, placement is restricted to the outside columns and back row of the Biomek deck. These positions are used in order to leave as many other deck positions available as possible.

Note: Use the laser etchings as guides when placing the Tip Loader ALP. Because of the size of the ALP, the laser etchings are larger for the Tip Loader ALP than all other ALPs.

Note: After a deck position has been chosen on which to physically mount the ALP, configure the ALP in the Deck Editor (refer to the *Biomek Software User's Manual,* Chapter 5, *Preparing and Managing the Deck*).

23.2.2 Mounting the Tip Loader ALP to the Deck

WARNING: Use an appropriately contained environment when using hazardous materials.

WARNING: Observe cautionary procedures as defined by the laboratory safety officer when using toxic, pathologic, or radioactive materials.

WARNING: Do not spill liquids on or around the instrument. Wipe up any spills immediately according to the procedures outlined by the laboratory safety officer.

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

To mount the Tip Loader ALP:

1. Turn off power to main unit before installing any active ALP.
2. Position the Tip Loader ALP so the locating pins on the bottom of the ALP slip into locating holes on the deck, and the air input/output aligns horizontally with the ALP edge.

3. Attach the CAN communications cable (Figure 23-2) to the CAN communications Port.

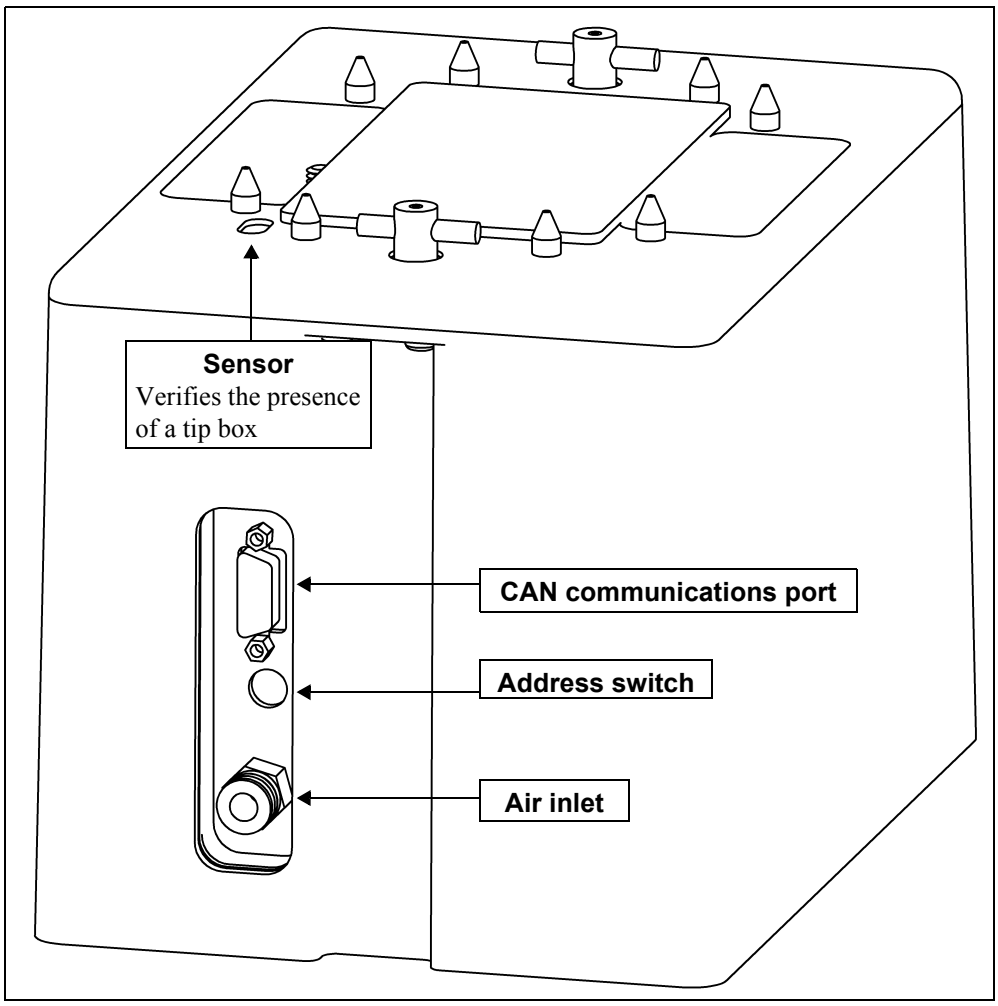

Figure 23-2. Tip Loader ALP Connections

4. Attach the opposite end of the CAN communications cable to an available CAN Port on the instrument tower or Device Controller.

Note: Make sure the cable routing does not interfere with the operation of the Biomek FX.

5. Verify that the address switch on the outside back of the Tip Loader is preset to zero (0) (Figure 23-2).

Note: The default setting for the address switch is zero (0). If only one Tip Loader ALP is on the deck, the address switch should be left at the default setting. If multiple Tip Loader ALPs are on the deck, set (or reset) the address switch to a unique address between one (1) and F.

6. Attach the Tip Loader ALP air tubing to a 110-115 psi air port on the inside left or right tower (Figure 23-3).

Note: Make sure the tube routing does not interfere with the operation of the Biomek instrument.

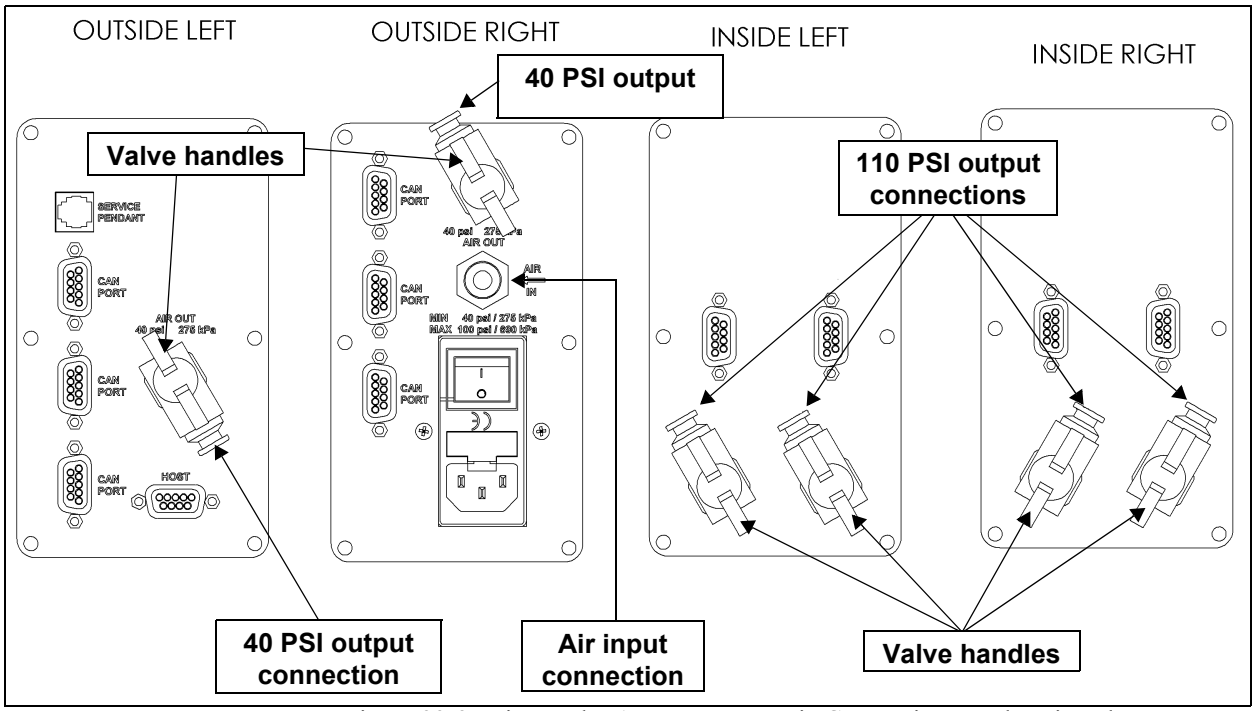

Figure 23-3. Tip Loader ALP — Pneumatic Connections on the Biomek FX Towers

7. Turn on the corresponding air valve.

23.3 Framing Instructions

Frame the Tip Loader ALP according to the instructions in the specific user's manual for the instrument.

23.4 Using the Tip Loader ALP in a Method

To use the Tip Loader ALP in a method, it must be installed in Hardware Setup (refer to Chapter 1.3, *Installing and Configuring ALPs*).

Note: Configuration in Hardware Setup is not necessary for the Tip Loader ALP.

An understanding of how tips are loaded in a method using the Tip Loader ALP is necessary to ensure tips are properly seated for pipetting operations (refer to Section 23.4.1, *Loading Tips*).

To provide more precise control over tip loading and unloading than other steps using a Tip Loader ALP, such as a Transfer or Load Tips step, use a Tip Loader step. A Tip Loader step may be used when performing multiple aspirate and dispense operations with each operation requiring a specific set of tips. Refer to the *Biomek Software User's Manual,* Chapter 22.7, *Tip Loader Step (FX, NX-MC only)*, for information on configuring a Tip Loader step.

23.4.1 Loading Tips

WARNING: Stay clear of the pinch point when locking rods are moving up into the head/pod.

The force used to apply tips to the head comes from the Tip Loader, not the pod or head.

Note: Loading tips by hand or using Manual Control is not recommended due to inadequate and unequal pressure application.

Tips load onto the pod from a software-issued command, such as in a Transfer or Load Tips steps, and the Biomek instrument performs the following:

- Places a tip box on the Tip Loader ALP.
- Raises the locking rods and rotates them to lock into the pod.
- Raises the tip box to seat the tips on the mandrels.

  Note: This process takes a few seconds to seat the tips properly.

- Unlocks and lowers the locking rods.
- Locks the locking rods to hold the empty tip box on the Tip Loader ALP.
- Moves the pod in the Z axis with the tips attached to the head.

23.5 Controlling the Tip Loader ALP Locking Rods Outside a Method

Note: Using Manual Control to load tips for a method is not recommended due to inadequate and unequal pressure application.

Locking rods are the rods that extend from the Tip Loader ALP (Figure 23-4) and lock onto the pod to assist in tip loading. Advanced Manual Control controls the locking rods for a selected Tip Loader ALP in the following manner:

- Extend or retract the locking rods.
- Lock or unlock the locking rods.

To control the locking rods on Tip Loader ALP outside a method, use Advanced Manual Control to:

- Troubleshoot the Tip Loader ALP.
- Recover from a failed tip load.

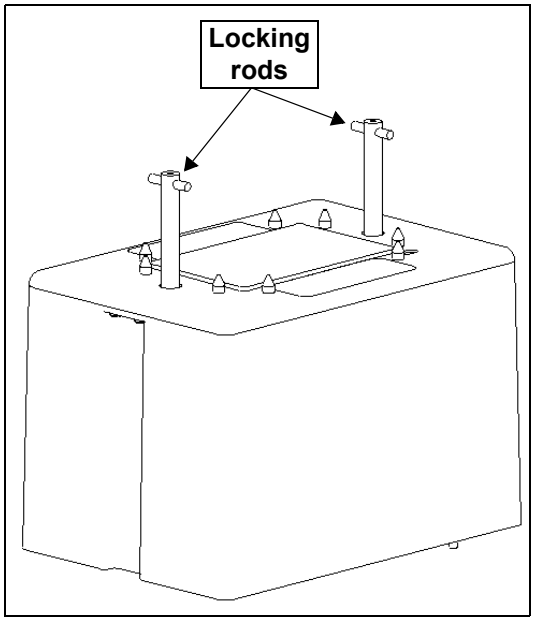

Figure 23-4. Tip Loader ALP with locking rods extended

To manually control the locking rods:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**.
3. Select the desired **Tiploader**. Advanced Manual Control for the selected ALP appears (Figure 23-5).

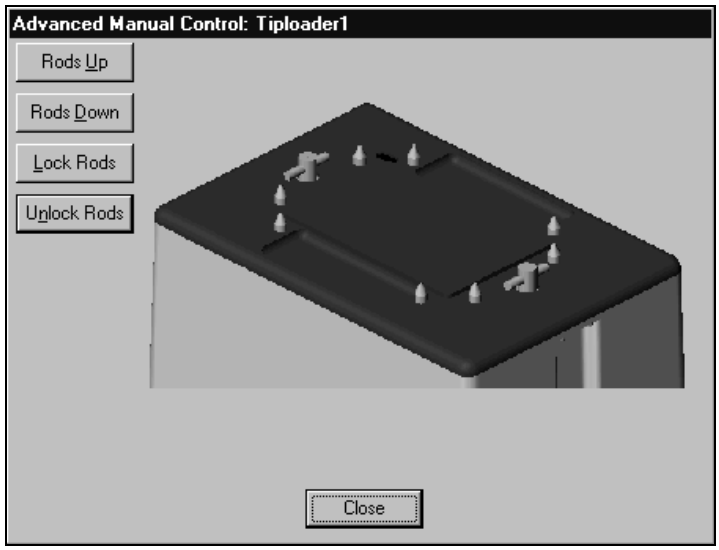

Figure 23-5. Advanced Manual Control for a selected Tip Loader ALP

4. To move the locking rods up, choose **Rods Up.**

   OR

   To move the locking rods down, choose **Rods Down**.

   OR

   To move the rods to their locked position, choose **Lock Rods**.

   OR

   To move the rods to their unlocked position, choose **Unlock Rods**.
5. Choose **Close** to close Advanced Manual Control.
6. Choose **Exit** to close Manual Control.

23.6 Removing the Tip Loader ALP from the Deck

To remove the Tip Loader ALP:

1. Turn off power to main unit before removing any active ALP.
2. Close the air valve where the Tip Loader ALP is attached to the Biomek tower.
3. Detach the air tubing at the unit.
4. Detach the communications cable.
5. Lift the Tip Loader ALP straight up and off of the deck so the locating pins on the bottom of the ALP clear the locating holes on the deck.

23.7 Storage

Return the Tip Loader ALP to the original packing materials, and store in a dry, dust-free, environmentally controlled area.

Note: It is desirable to allow the Tip Loader ALP to air-dry before returning it to the original packing materials.

23.8 Preventive Maintenance

Clean-up all spills immediately with a soft cloth that has been dampened with appropriate cleaning compound. Keep liquids off the sensor (Figure 23-2).

23.9 Troubleshooting

Do not attempt to repair the Tip Loader ALP. Contact a Beckman Coulter Service Engineer for all required repairs.

Note: The following troubleshooting does not require any removal of covers or repair.

Table 23-1. Troubleshooting the Tip Loader ALP

IF	THEN
The tips are not seating properly	Check the air supply line for leaks. Check that the device has been framed correctly. Check that the pod is level.
No motion is occurring when a tip load has been requested	Check the air pressure. Check the communications cable.
Locating pins do not lock into position on the pod	Re-teach the Tip Loader position to orient the pod to the ALP's location on the deck.

Appendix A: Device Controller

A.1 Overview

The Device Controller provides a means to control a number of high voltage and low voltage digital outputs, as well as a means to monitor low voltage digital inputs. A Controller Area Network (CAN) interface with a small microcontroller provides control over the output ports.

High voltage devices requiring 110VAC to 220VAC are attached to a Device Controller via a high voltage power outlet, which is supplied through the AC Power Input. Low voltage devices (which use 24V at 100 mA) are supplied via the CAN connection from the Biomek instrument.

Note: Several ALPs and devices, such as a wash pump or fan, associated with ALPs require an Device Controller to operate.

The sections in this appendix include:

- *Installing a Device Controller* (Section A.2)
- *Setting Address Switches* (Section A.3)
- *Connecting Devices to the Device Controller* (Section A.4)
- *Using Advanced Manual Control to Manually Control Device Controllers* (Section A.5)
- *Preventive Maintenance* (Section A.6)
- *Troubleshooting* (Section A.7)

Located on the front of the Device Controller are (Figure A-1):

- Four (4) high voltage channel power switches allowing for Automatic, Manual On, or Manual Off states
- Channel indicator lights
- System indicator light

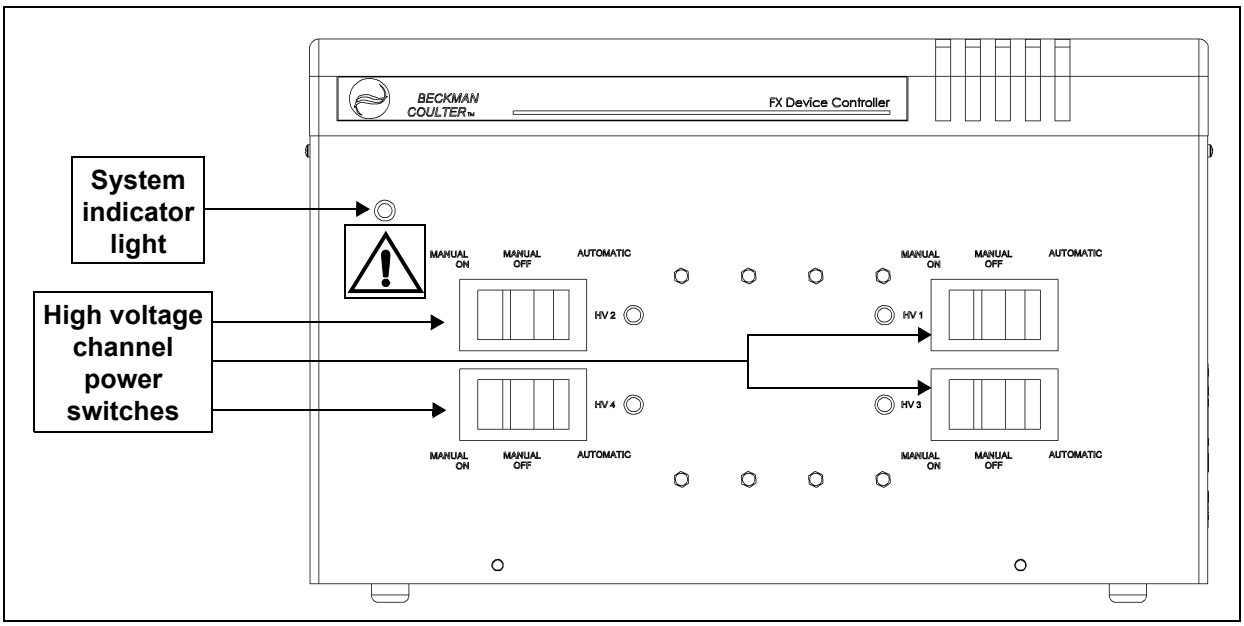

Figure A-1. Front of Device Controller

Located on the back of the Device Controller are (Figure A-2):

- On-off switch for AC power input
- Device indicators for digital inputs/outputs
- Power input module
- Two CAN communication ports
- Four high voltage power outputs
- Four accessible fuses, one for each high voltage power outlet
- Four low voltage digital input channels
- Four low voltage digital output channels
- Two address switches

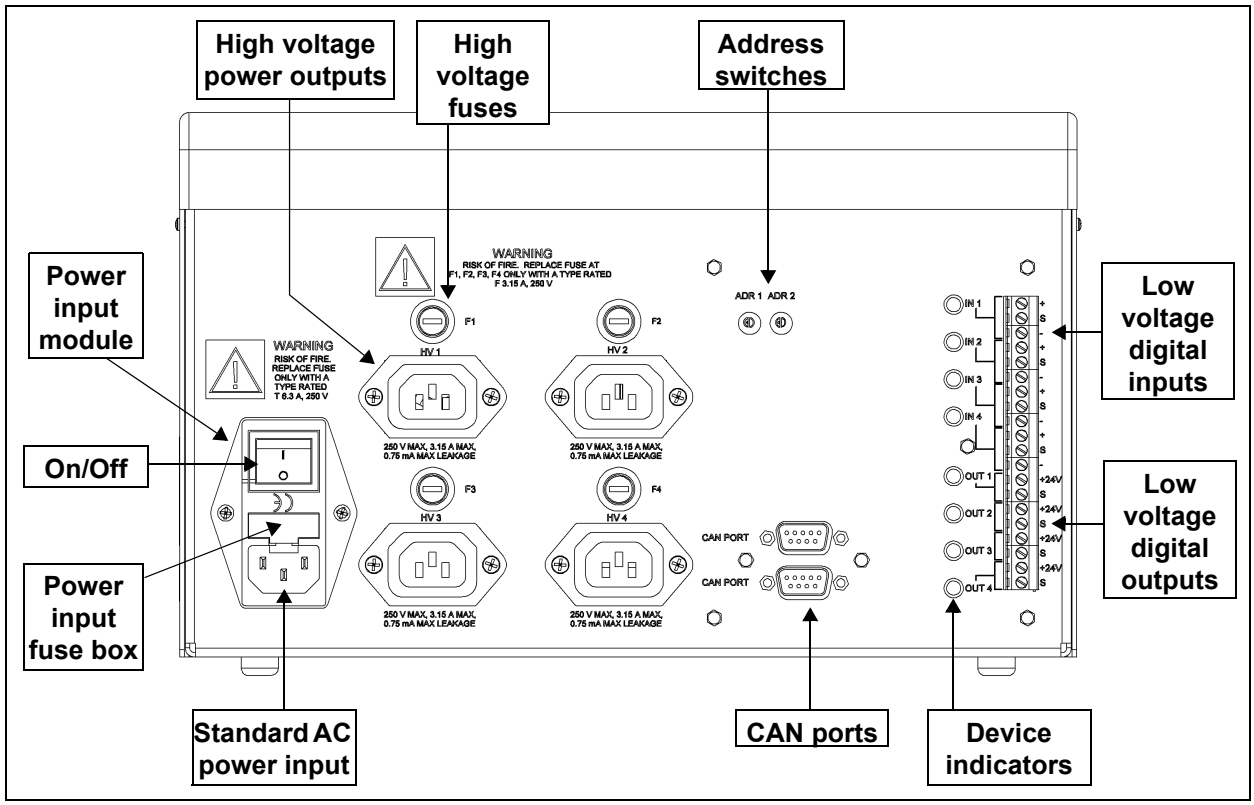

Figure A-2. Back of Device Controller

A.1.1 Device Controller Specifications

Specifications for the Device Controller are found in Table A-1.

Table A-1. Device Controller Specifications

Item	Description
Environment	Indoor use only
Input Power Requirements *For high voltage output channels HV1-HV4	US/Europe: 110-240VAC, 6.3A, 50/60Hz *US/Europe: 110-240VAC, 3A, 50/60Hz
Dimensions	12 wide x 8 deep x 7.5 high
Weight	5 lbs.
Ambient Operating Temperature	5-30°C (59-86°F)
Humidity Restrictions	<85% @ 30°C (86°F)
Altitude Restrictions	Up to 2000m (6562ft)
Installation Category	Category II
Pollution Degree	2
Input Fuses	US: 250VAC, 6.3 amp, 5x20mm, SLO-BLO, UL approved Europe: 250VAC, 6.3 amp, 5x20mm, SLO-BLO, UL/IEC approved
Output Fuses	US: 250VAC, 3.15 amp, 5x20mm, Fast Acting, UL approved Europe: 250VAC, 3.15 amp, 5x20mm, Fast Acting, UL/IEC approved
Communication to Biomek instrument	CAN

Device Controller manufactured by:

Beckman Coulter, Inc.
4300 N. Harbor Boulevard
Fullerton, CA 92843-3100

A.2 Installing a Device Controller

A Device Controller can be installed anywhere that is convenient for normal operation of the instrument.

WARNING: To prevent electrical shock, use standard electrical precautions when plugging the Device Controller into the power supply.

WARNING: Do not remove the cover of the Device Controller.

WARNING: Turn off power to the Biomek instrument before connecting CAN communication cables.

WARNING: Turn off power to the Biomek instrument and the Device Controller before attaching or removing any active ALP.

To install a Device Controller:

1. Turn off power to the Biomek instrument before attaching the Device Controller.
2. Using an AC power cord, connect the AC Power Input on the Device Controller to power source.
3. Using the CAN communication cable, connect the Device Controller to the CAN communications port on a tower.

   Note: Three CAN communications ports are located on each side of the Biomek instrument. When making the decision on which CAN communications port to use, consider the number of CAN communication ports in use and try to even the load.

4. Connect the appropriate devices to the Device Controller.

   Note: Making the power connection to an ALP varys depending on the ALP. Each ALP has specific input/output power requirements, so each connecting wire is labeled to ensure appropriate connections. Refer to the individual ALP chapters for information on the appropriate connections.

A.3 Setting Address Switches

When more than one Device Controller is attached to the system, a separate address must be set for each one to enable the software to identify the Device Controller being used for specific operations. Each address is set using the address switches (Figure A-2).

To set Device Controller addresses:

1. Make sure the power to the Biomek instrument is off.
2. Make sure the power switch on the Device Controller is off (Figure A-2).
3. For the first Device Controller, check to make sure address switch 2 is set to 0.
4. On the first Device Controller, using a flathead screwdriver, turn address switch 1 to 0.
5. On the second Device Controller, turn address switch 1 to 1.
6. Continue setting address switch 1 in increments of 1 for the first 16 Device Controllers on the system.
7. To set addresses for the second 16 Device Controllers used on the system, move address switch 2 to 1. This makes the next 16 addresses available on address switch 1.
8. After setting address switch 2 to 1, set address switch 1 to 0 again to set the address for the next Device Controller on the system.
9. Continue setting address switch 1 in increments of 1 for the next 15 Device Controllers on the system.

   Note: For each 16 addresses set on address switch 1, address switch 2 is moved up an increment of 1 to open the next available set of 16 addresses on switch 1 for use. Continue this incremental process of coordinating both switches for setting addresses for up to 128 Device Controllers; at that point, the settings for the 128th Device Controller would be switch 1 set to F and switch 2 set to 7.

10. After setting the necessary addresses, turn on power to the Biomek instrument.
11. Turn on the Device Controller power switch.

A.4 Connecting Devices to the Device Controller

WARNING: To prevent electrical shock, use standard electrical precautions when plugging the Device Controller into the power supply.

WARNING: Turn off power to the Biomek before connecting CAN communication cables.

CAUTION: Turn off power to the Biomek instrument and the Device Controller before attaching or removing any active ALP.

The main power ON/OFF switch is on the rear of Device Controller. The four ON/OFF switches on the front panel of the Device Controller are for high voltage channels only.

Note: The Device Controller must be turned on to provide power to attached high voltage devices. The green light on the Device Controller indicates that the Device Controller is on.

A.4.1 Connecting High-Voltage Devices

To use a high voltage device through the Device Controller:

1. Connect power cable of high voltage device into the appropriate plug.
2. Switch channel power switch for the chosen channel to Manual On. This applies power to the device.
3. Switch channel power switch to Automatic.

Note: The maximum current allowable per high voltage port is 3.15 amps. The Device Controller can handle a maximum of 6.3 amps, so two ports at 3.15 amps each can be used at any one time.

A.4.2 Connecting Digital Device Outputs

Any device that uses 24V and less than 100 milliAmps of current may be connected to the Device Controller via the digital connections (Figure A-3)).

To connect Digital Devices:

1. Turn off system power.
2. Connect the positive wire (+) to the 24V connector on the digital output.

3. Connect the negative wire (-) to the control connector on the digital output.

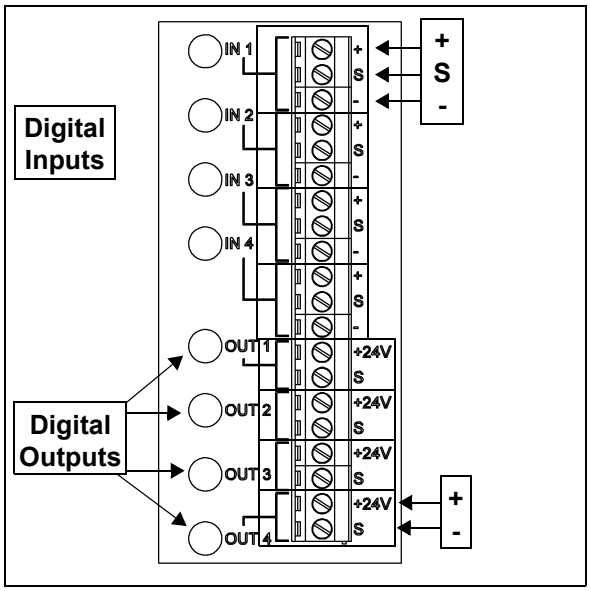

Figure A-3. Digital connections - attach devices here

4. Turn power to the system on and test the device.

A.4.3 Connecting Digital Device Inputs

Each Device Controller digital input channel has three connectors (Figure 38-3):

- Positive (+) — 5V to supply a sensor
- S — Signal from the sensor
- Negative (-) — Ground from the sensor

There are two types of input devices:

- Optical switch — uses three connections (+, -, and signal)
- Contact switch — uses two connections (+, -)

A.4.3.1 Connecting an Optical Switch

To connect an optical switch:

1. Connect the positive (+) wire from the optical switch to the positive (+) connector on the digital input.
2. Connect the ground wire from the optical switch to the negative (-) connector on the digital input.
3. Connect the signal wire from the optical switch to the S connector on the digital input.

A.4.3.2 Connecting a Contact Switch

To connect a contact switch:

1. Connect one lead from the contact switch to the S connector on the digital input.
2. Connect the other lead from the contact switch to the negative (-) connector on the digital input.

A.5 Using Advanced Manual Control to Manually Control Device Controllers

Use Advanced Manual Control for a selected Device Controller to:

- Turn the output channels on or off manually.
- Monitor input channels.

When opened, Advanced Manual Control for a selected Device Controller displays which channels are on and which channels are off.

To manually control Device Controller channels:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**.
3. Select the desired **Device Controller**. Advanced Manual Control for the selected Device Controller appears (Figure A-4).
4. To toggle a channel off or on, click the button.

Note: Channels that are on are highlighted with a bright green color.

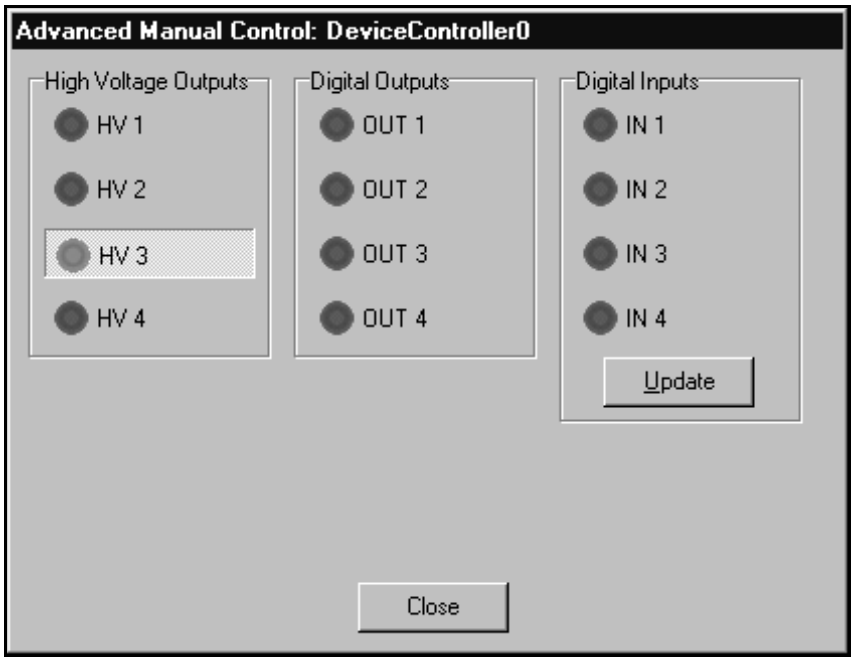

Figure A-4. Advanced Manual Control for a selected Device Controller with channel HV3 on

5. When adjustment of channels has been completed as desired, choose **Close**.

Note: Choose Update to view which digital outputs or inputs are on or off.

6. Choose **Close** to close Advanced Manual Control.
7. Choose **Exit** to close Manual Control.

A.6 Preventive Maintenance

Occasional replacement of the fuses may be required. Use the following instructions to replace power input fuse (refer to Section A.6.1, *Replacing the Power Input Fuse*) and the high-voltage output fuse (refer to Section A.6.2, *Replacing the High-Voltage Output Fuse*).

A.6.1 Replacing the Power Input Fuse

If the Device Controller is connected properly but does not function, check the fuses for possible replacement. The power input contains two fuses, and each high voltage output contains a fuse (Figure 38-2).

To replace the power input fuse:

1. Turn off the power switch on the Device Controller and unplug the unit.
2. Remove the cover from the fuse box.
3. Using only your fingers, pry the old fuses gently from the fuse box.
4. Insert a new 5X20mm 6.3 Amp Slo-Blow fuse into the fuse box.
5. Plug in the unit.
6. Turn on the power switch.

A.6.2 Replacing the High-Voltage Output Fuse

To replace a high-voltage output fuse:

1. Using a flat-head screwdriver, turn the cover over the fuse 1/2 turn to the left.
2. Take pressure off the cover. The fuse cover and fuse will pop out.
3. Replace the fuse with a 5X20mm 3.15 Amp Fast Acting fuse.
4. Place the cover back over the fuse and press in the cover.
5. Turn the cover back 1/2 turn.

A.7 Troubleshooting

Troubleshooting techniques for a Device Controller are found in Table A-2.

Table A-2. Troubleshooting a Device Controller

IF	THEN
Power is not transmitted	Check connections to make sure they are correct and secure.
Power is not transmitted, but connections are correct and secure	Replace the fuse (refer to Section A.6.1, *Replacing the Power Input Fuse*).
The host computer does not recognize the Device Controller	Make sure the address switch is set to the correct device address (refer to Section A.3, *Setting Address Switches*).

Appendix B: Source/Waste Sensor

B.1 Overview

When properly installed and configured in Biomek Software, the Source/Waste Sensor indicates whether a source container is running below a specified level or a waste container is running above a specified level.

The chapter includes the following sections:

B.2 Installing a Source/Waste Sensor

Installing the Source/Waste Sensor includes attaching the sensor with the supplied velcro strap to the source or waste container and inserting the sensor cables to the correct Source/Waste Sensor Controller connection. Using CAN communication cables, the controller is connected to the Biomek instrument.

WARNING: Do not place the controller or the source or waste containers on the Biomek instrument deck.

To install the Source/Waste Sensor:

1. Place the source and waste containers at an off-deck location.
2. Place the controller at an off-deck location near the source and waste containers and the Biomek instrument.
3. Plug the source sensor cable into the SOURCE connection (Figure B-1).
4. Plug the waste sensor cable into the WASTE connection (Figure B-1).

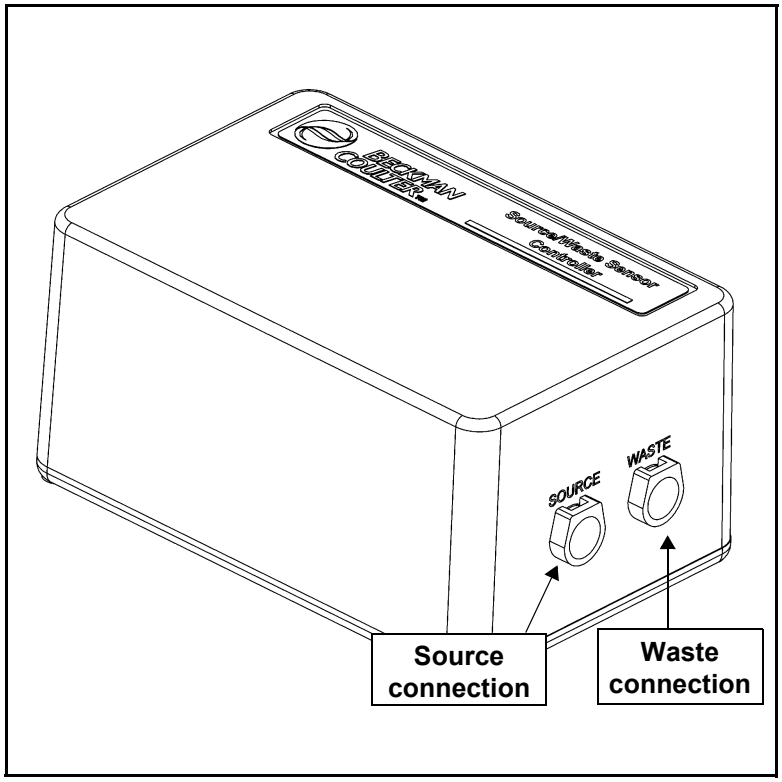

Figure B-1. Source/Waste Sensor Controller

5. Using the supplied velcro strap, secure the sensor to the source container at the desired level. Make sure the face of the sensor is flush to the container and the velcro is pressed against the velcro strap (Figure B-2).

Note: The sensor should be placed at a low level on the source container in order to indicate when the container is running low.

6. If desired, secure the sensor to the waste container at the desired level. Make sure the face of the sensor is flush to the container and the velcro is pressed against the velcro strap (Figure B-2).

Note: The sensor should be placed at a high level on the waste container in order to indicate when the container is becoming full.

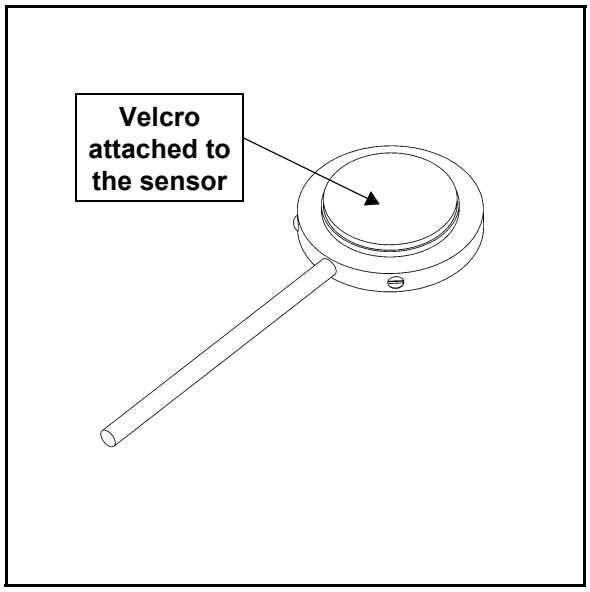

Figure B-2. Source/Waste Sensor

WARNING: Disconnect main power before connecting or disconnecting CAN cables.

7. Plug the male end of the CAN communication cable into the female connector labeled “CAN PORT” on the controller or the female end of the CAN communication cable into the male connector (Figure B-3).

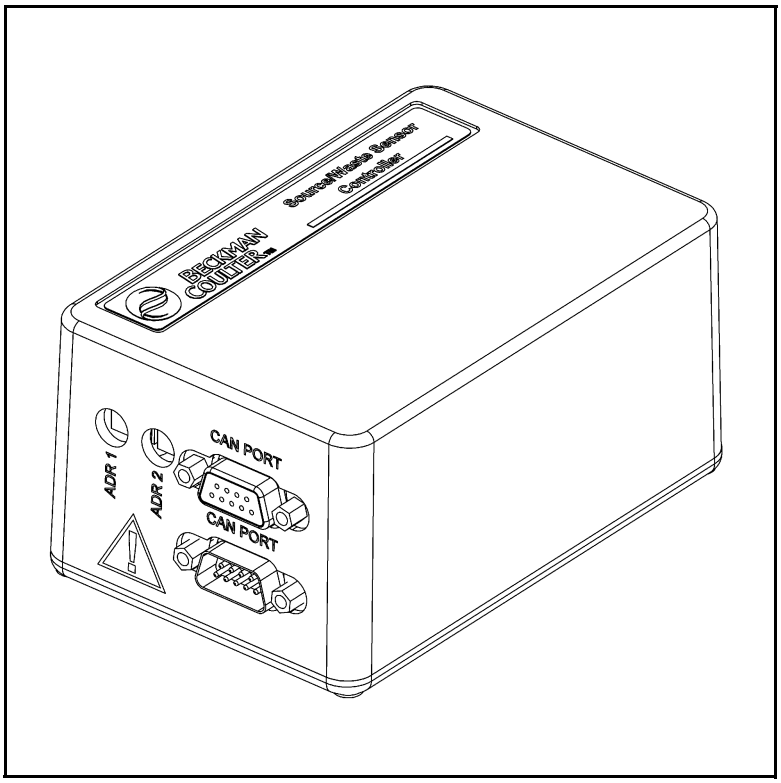

Figure B-3. Source/Waste Sensor Controller

8. Plug the other end of the CAN communication cable into connector labeled CAN Port on the Biomek instrument.
9. Verify the ADR1 address switch is set to 1 for the first connection.
10. Set the ADR2 to a unique address between zero (0) and F, for the second connection if a another Source/Waste Sensor is used.
11. Calibrate the sensor (refer to Section B.2.1, *Calibrating the Sensor*).

B.2.1 Calibrating the Sensor

Every time a new container or liquid is used, the sensor must be calibrated using the following procedure to ensure it operates properly. This process uses a small supplied screwdriver to turn the adjustment screw on the sensor to determine the sensitivity of the sensor. Turning the screw clockwise increases sensitivity while moving it counterclockwise decreases sensitivity.

To calibrate the sensor:

1. Ensure the face or active surface (Figure B-4) of the sensor is attached to the container.
2. Fill the container with liquid until approximately 75% of the active surface of the sensor is covered.
3. Using the small supplied screwdriver, turn the adjustment screw (Figure B-4) on the sensor counterclockwise until the LED extinguishes.
4. Turn the adjustment screw clockwise until the LED turns on again.
5. Slowly move the sensor down the container so that the entire sensor face is below the water level. The LED should remain on.
6. Move the sensor back up the container until approximately 75% of the active surface is covered.
7. Using the supplied screwdriver, turn the adjustment screw clockwise one full rotation.

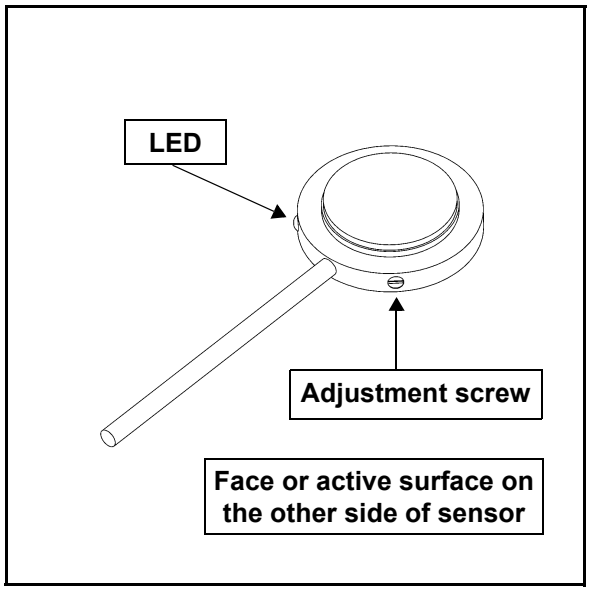

Figure B-4. Sensor

B.3 Using the Source/Waste Sensor in a Method

To use the Source/Waste Sensor in a method, it must first be installed in Hardware Setup (refer to Section 1.3.1, *Installing an ALP in Hardware Setup*).

There are two ways in which the Source/Waste Sensor may be used with Biomek Software:

- Using the Device Setup step — to allow the sensor to check the levels of liquids of source or waste containers at specific times in a method (refer to Section B.3.1, *Using the Device Setup Step*).
- Associating the sensor with a wash ALP — to allow the sensor to check the levels of source or waste containers going into or out of a wash ALP (refer to Section B.3.2, *Associating the Source/Waste Sensor with a Wash ALP*).

B.3.1 Using the Device Setup Step

Use the Device Setup step to use the Source/Waste Sensor in a method to check the level of liquids at a specific time in the method (refer to the *Biomek Software User's Manual,* Chapter 22.6.1.8, *Configuring the Device Action Step for a Source/Waste Sensor (FX and NX only)*).

If during the execution of the Device Setup step, the sensor indicates the supply container is too low or the waste container is too high, an error message appears (refer to Section B.3.3, *Error Messages for the Source/Waste Sensor*).

B.3.2 Associating the Source/Waste Sensor with a Wash ALP

The Source/Waste Sensor also may be associated with a wash ALP or any ALP that uses a pump to allow the sensor to monitor the liquid level of the source and waste containers going into and out of the wash ALP. This association is made in the Deck Editor usually when the wash ALP is framed.

The association allows the sensor to monitor the liquid levels of the containers used with the wash ALP whenever the ALP is used in a method, such as through a Transfer or Wash Tips step.

If while associated with a wash ALP, the sensor indicates the supply container is too low or the waste container is too high, an error message appears (refer to Section B.3.3, *Error Messages for the Source/Waste Sensor*).

To associate the sensor with a wash ALP:

1. In the Deck Editor, double-click the selected wash ALP (Figure B-5). Position Properties for the ALP appears (Figure B-6).

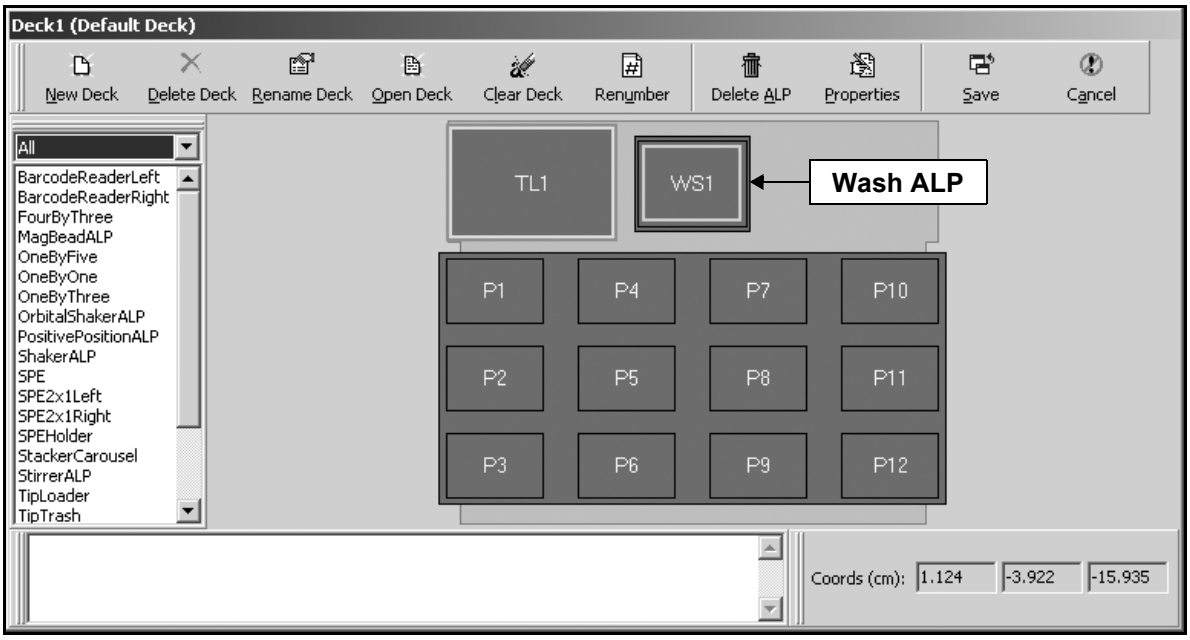

Figure B-5. Deck Editor with wash ALP

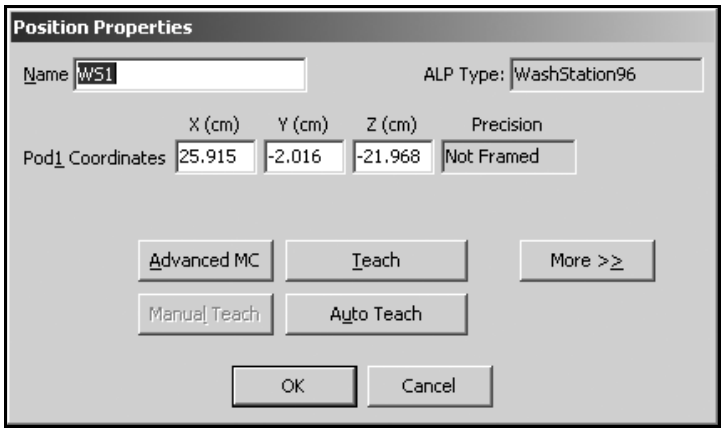

Figure B-6. Position Properties for selected wash ALP

2. Choose More (Figure B-6). An expanded Position Properties appears.

3. In Sensor Device, choose the specific Source/Waste Sensor to associate with the wash ALP (Figure B-7).

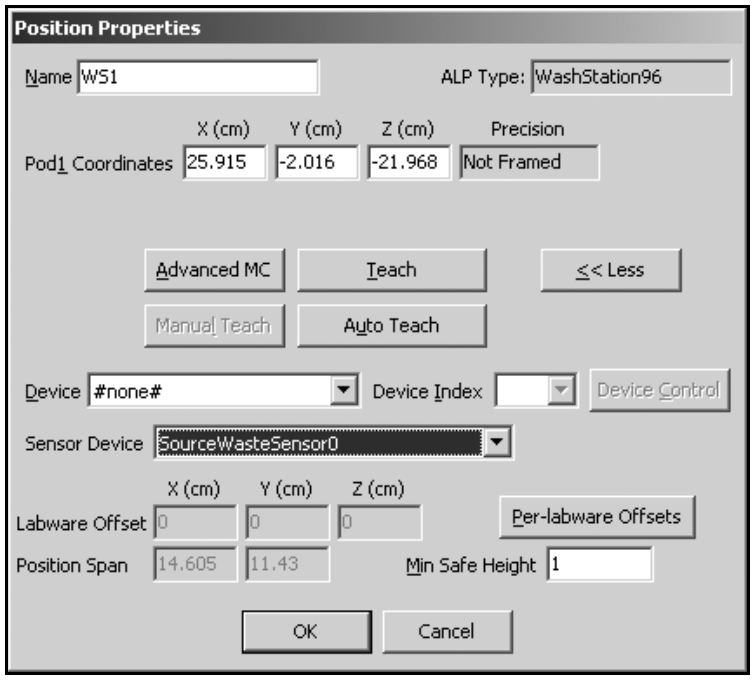

Figure B-7. SourceWasteSensor selected in Sensor Device

4. Choose **OK**. The sensor is associated with that wash ALP and monitors the liquid levels of the supply or waste containers of the ALP.

B.3.3 Error Messages for the Source/Waste Sensor

If the Source/Waste Sensor is properly installed, associated, and configured in a method when the source container is running low or the waste container is running high, an error message similar to the following appears (Figure B-8).

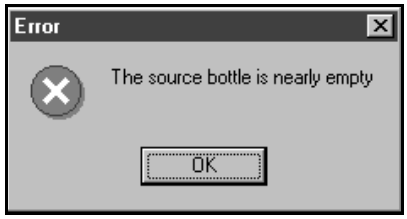

Figure B-8. Source/Waste Sensor error

B.4 Controlling the Source/Waste Sensor Outside a Method

To control a selected Source/Waste Sensor outside a method, use Advanced Manual Control to:

- Check the Source Sensor.
- Check the Waste Sensor.

To manually control the Source/Waste Sensors:

1. Choose **Instrument>Manual Control**. Manual Control appears.
2. Choose **Advanced Controls**.
3. Select the desired **Source/Waste Sensor**. Advanced Manual Control for the selected Source/Waste Sensor appears (Figure B-9).

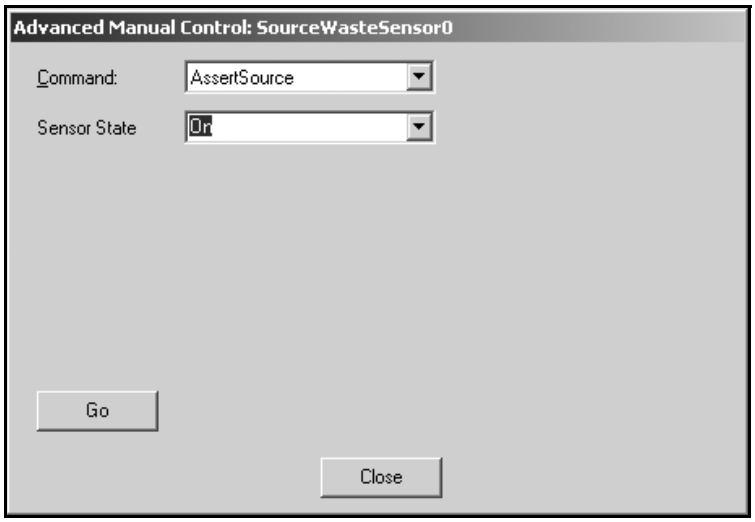

Figure B-9. Advanced Manual Control for a selected Source/Waste Sensor

4. In Command, choose one of the following:
   - **AssertSource** — checks the source container sensor for the presence of liquid.
   - **AssertWaste** — checks the waste container sensor for the presence of liquid.
5. In Sensor State, set the desired sensor action:
   - **On** — generates an error when liquid is not detected.
   - **Off** — generates an error when liquid is detected.
6. Choose **Go**. The command is executed.
7. Choose **Close** to close Advanced Manual Control.
8. Choose **Exit** to close Manual Control.

B.5 Preventive Maintenance

The Source/Waste Sensor requires minimal maintenance. Observe the following guidelines:

- Periodically inspect the velcro strap for wear.
- Wipe any spills on the sensor immediately.
- Calibrate the sensor every time a new container or liquid is used to ensure it is operating properly (refer to Section B.2.1, *Calibrating the Sensor*).

B.6 Troubleshooting

Troubleshooting techniques for a Source/Waste Sensor are found in Table B-1.

Table B-1. Troubleshooting a Source/Waste Sensor

IF	THEN
Sensor is not sensing	Check connections to make sure they are correct and secure.
Sensor is not sensing, but connections are correct and secure	Calibrate the sensor (refer to Section B.2.1, *Calibrating the Sensor*).
No errors are generated even though waste container is full or source container is empty.	Associate the sensor with the appropriate deck position.

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