

Agilent 7696A Sample Prep WorkBench

**Installation, Operation and
Maintenance**



Agilent Technologies

Notices

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Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

Contents

Part 1: Safety and Regulatory Information

1 Safety and Regulatory Information

Important Safety Warnings	12
Many internal parts of the instrument carry dangerous voltages	12
Electrostatic discharge is a threat to instrument electronics	13
Safety and Regulatory Certifications	14
Information	14
Symbols	15
Technical and environmental specifications	16
Electromagnetic compatibility	16
Sound Emission Certification for Federal Republic of Germany	17
Cleaning	17
Recycling the Product	17

Part 2: Installation

2 Compatibility

The G4513A Tower	22
The G8130A Sample Tray	22
The G8140A Peltier Cooler Heater Module	22

The G4521A Large Volume Syringe Carrier 22

The 7696A WorkBench Software 22

3 Installation

Preparing for Installation 24

Installing the G4529A Main Frame 25

Install the configuration plug 25

Installing the G8130A Sample Tray 30

Prepare the Sample Tray 30

Install the Sample Tray 35

Connect the communication cable 37

Installing the G4513A Towers 38

Prepare the Towers 38

Install the G4521A Large Volume Syringe Carrier 39

Install the Towers 40

Check your work 44

Connecting the Cables 45

Test the connections 45

Installing the Vial Racks 46

Park the WorkBench 46

Install the vial rack labels 46

Install the vial racks 47

Remove the vial rack labels 49

Calibrating the Sample Prep WorkBench 51

Installing the Waste Vials 53

Configuring the WorkBench Network Address 54

Installing the Agilent 7696A WorkBench Software 55

Install the software 55

Configure the software 55

4 Accessories

Installing the G8140A Peltier Cooler and Heater Module	58
Tools needed	58
Install the Peltier Cooling and Heating module	58
The drainage tubing	87
Complete the installation	88
Installing the G4521A Large Volume Syringe Carrier	89

Part 3: Operation

5 Introduction to Operation

About your 7696A Sample Prep WorkBench	98
Components	98
Features	100
Capabilities	101
Sample Preparation	103
About the WorkBench system	103
Using the system	104
The WorkBench Cycle	105

6 Configuration

Using the Keypad	108
Configuring the 7696A Sample Prep WorkBench	110
Configuring the WorkBench Network Address	112
Configuring the Agilent WorkBench Software	113

7 Syringes and Needles

Selecting a Syringe	116
Inspecting a Syringe	117

Installing a Syringe	118
Removing a Syringe	122
Replacing a Syringe Needle	123

8 Vials and Bottles

Preparing a Sample Vial	126
Select a sample vial	126
Select a vial septa	127
Label a sample vial	128
Fill a sample vial	129
Cap a sample vial	130
Preparing Solvent and Waste Bottles	132
Select the bottles	132
Fill the solvent bottles	133
Prepare the waste bottles	133
Placing Vials and Bottles	134
Place vials and bottles in the turret	134
Place vials and bottles in the Sample Tray	136
How Many Sample Vials Can I Run?	137
Solvent bottle equation	138
Waste bottle equation	138
Example	139
Reduced solvent and sample usage	142

9 Running Samples

Creating and Running a Sample Prep Method	144
Interrupting a Sample Prep Method or Sequence	145
WorkBench response to interruptions	145
Restarting an interrupted Sample Prep Method	145

Part 4: Maintenance and Troubleshooting

10 Maintenance

Periodic Maintenance	150
Moving the WorkBench	152
Tray Home and Park Positions	153
Installing a Syringe	154
Removing a Syringe	158
Replacing the Turret	159
Replacing the Needle Support Foot	163
Adapting for Syringes Over 100 μ L	165
Replacing the Syringe carrier Assembly	166
Replacing a Syringe Needle	173
Aligning the Tower	175
Aligning the Sample Tray	177
Calibrating the Sample Prep WorkBench	179
Updating the Firmware	181
View the current firmware version	181
Update the firmware	181
Replacing the Fuse on the AC Board	182

11 Faults and Errors

Faults	186
Tower faults	186
Sample tray faults	188
Error Messages	190

12 Troubleshooting

Correcting Syringe Problems 196

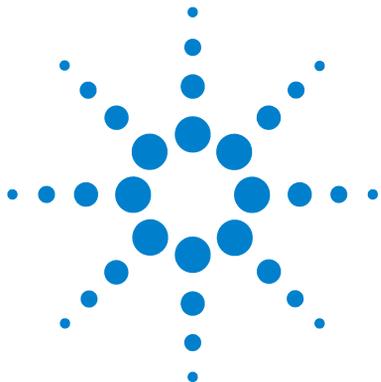
Correcting Sample Vial Delivery Problems 197

13 Replacement Parts

G4513A Tower 200

G8130A Sample Tray 202

Power Configuration Plugs 204



Part 1:

Safety and Regulatory Information

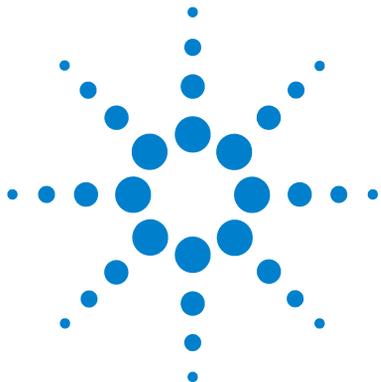
Important Safety Warnings 12

Safety and Regulatory Certifications 14

Cleaning 17

Recycling the Product 17





1 Safety and Regulatory Information

Important Safety Warnings	12
Many internal parts of the instrument carry dangerous voltages	12
Electrostatic discharge is a threat to instrument electronics	13
Safety and Regulatory Certifications	14
Information	14
Symbols	15
Technical and environmental specifications	16
Electromagnetic compatibility	16
Sound Emission Certification for Federal Republic of Germany	17
Cleaning	17
Recycling the Product	17

This chapter provides important safety and regulatory information about the 7696A Sample Prep WorkBench (WorkBench) system.



Important Safety Warnings

There are several important safety notices that you should always keep in mind when using the WorkBench.

WARNING

If this instrument is not used as specified, the protection provided by the equipment could be impaired. This instrument must be used in a normal condition (in which all means of protection are intact only).

Many internal parts of the instrument carry dangerous voltages

With the WorkBench power switch on, potentially dangerous voltages can exist on:

- All electronics boards in the instrument.
- The internal wires and cables connected to these boards.

If the WorkBench is connected to a power source, even if the power switch is off, potentially dangerous voltages exist on:

- The wiring between the WorkBench power cord and the AC power supply.
- The AC power supply itself.
- The wiring from the AC power supply to the power switch.
- The wiring to the Towers and Sample Tray.

NOTE

The power outlet must be installed near your instrument and must be easily accessible at all times.

WARNING

This is a Safety Class 1 Product (provided with a protective earthing ground, incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the instrument is likely to make the instrument dangerous. Intentional interruption is prohibited.

WARNING

All of these parts are shielded by covers. With the covers in place, it should be difficult to accidentally make contact with dangerous voltages. Unless specifically instructed to, never remove a cover.

WARNING

If the power cord or the exposed wiring insulation is frayed or worn, the cord must be replaced. Contact your Agilent service representative.

Electrostatic discharge is a threat to instrument electronics

The printed circuit (PC) boards in the instrument can be damaged by electrostatic discharge. Do not touch any of the boards unless it is absolutely necessary. If you must handle them, wear a grounded wrist strap and take other antistatic precautions. Wear a grounded wrist strap any time you must remove the electronics cover.

Safety and Regulatory Certifications

The instruction documentation contains information and warnings which must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition.

The 7696A Sample Prep WorkBench conforms to the following safety standards:

- International Electrotechnical Commission (IEC): 61010–1
- EuroNorm (EN): 61010–1

In addition to the above Safety and Regulatory Certifications, the 7696A Sample Prep WorkBench conforms to the following safety and regulatory certifications:

- Canadian Standards Association (CAN/CSA): C22.2 No. 61010-1
- Nationally Recognized Test Laboratory (NRTL): ANSI/UL 61010-1

The instrument conforms to the following regulations on Electromagnetic Compatibility (EMC) and Radio Frequency Interference (RFI):

- CISPR 11/EN 55011: Group 1, Class A
- IEC/EN 61326-1
- AUS/NZ  N10149

This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB–001 du Canada.



The instrument is designed and manufactured under a quality system registered to ISO 9001.

Information

The Agilent Technologies Sample Prep WorkBench meets the following IEC (International Electrotechnical Commission) classifications: Safety Class I, Transient Overvoltage Category II, Pollution Degree 2.

This unit has been designed and tested in accordance with recognized safety standards and is designed for use indoors. If the instrument is used in a manner not specified by the manufacturer, the protection provided by

the instrument may be impaired. Whenever the safety protection of the Agilent Sample Prep WorkBench has been compromised, disconnect the unit from all power sources and secure the unit against unintended operation.

Refer servicing to qualified service personnel. Substituting parts or performing any unauthorized modification to the instrument may result in a safety hazard.

Symbols

Warnings in the manual or on the instrument must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions violates safety standards of design and the intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

See accompanying instructions for more information.



Indicates a hot surface.



Indicates hazardous voltages.



Indicates earth (ground) terminal.



Indicates explosion hazard.



Indicates electrostatic discharge hazard.



Technical and environmental specifications

- Indoor use only in ordinary atmospheres
- Altitude up to 4,300 meters
- Ambient operating temperature 15 to 35 degrees centigrade
- Ambient operating humidity 5 to 95 percent
- Pollution degree 2, Installation Cat II

In addition to the above technical and environmental specifications, the 7696A Sample Prep WorkBench conforms to the following technical and environmental specifications:

- Rated for mains connection to 100–120 VAC or 220–240 VAC, 50/60 Hz, 800 VA
- Main supply voltage fluctuations up to $\pm 10\%$ of the nominal voltage

Electromagnetic compatibility

This device complies with the requirements of CISPR 11 and IEC 61326-1. Operation is subject to the following two conditions:

- 1 This device may not cause harmful radio frequency interference.
- 2 This device must accept any radio frequency interference received, including interference that may cause undesired operation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try one or more of the following measures:

- 1 Relocate the radio or antenna.
- 2 Move the device away from the radio or television.
- 3 Plug the device into a different electrical outlet, so that the device and the radio or television are on separate electrical circuits.
- 4 Make sure that all peripheral devices are also certified.
- 5 Make sure that appropriate cables are used to connect the device to peripheral equipment.
- 6 Consult your equipment dealer, Agilent Technologies, or an experienced technician for assistance.
- 7 Changes or modifications not expressly approved by Agilent Technologies could void the user's authority to operate the equipment.

Sound Emission Certification for Federal Republic of Germany

Sound pressure

Sound pressure $L_p < 82$ dB(A) according to DIN-EN 27779 (Type test).

Schalldruckpegel

Schalldruckpegel $LP < 82$ dB(A) nach DIN-EN 27779 (Typprüfung).

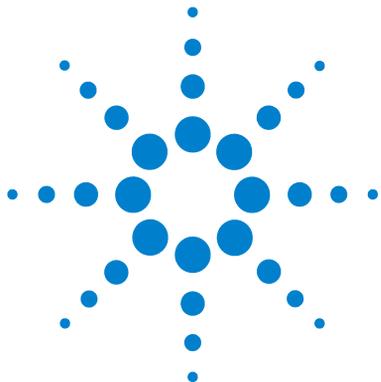
Cleaning

To clean the external surfaces of the Tower and Sample Tray, disconnect the power and wipe down with a damp, lint-free cloth. Refer to [“Periodic Maintenance”](#) on page 150 for more information.

Recycling the Product

For recycling, contact your local Agilent sales office.

Safety and Regulatory Information

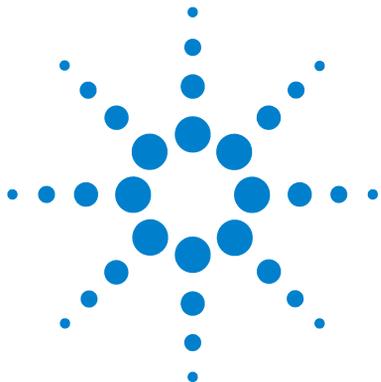


Part 2:

Installation

Compatibility	21
The G4513A Tower	22
The G8130A Sample Tray	22
The G8140A Peltier Cooler Heater Module	22
The G4521A Large Volume Syringe Carrier	22
The 7696A WorkBench Software	22
Installation	23
Preparing for Installation	24
Installing the G4529A Main Frame	25
Installing the G8130A Sample Tray	30
Installing the G4513A Towers	38
Connecting the Cables	45
Installing the Vial Racks	46
Calibrating the Sample Prep WorkBench	51
Installing the Waste Vials	53
Configuring the WorkBench Network Address	54
Installing the Agilent 7696A WorkBench Software	55
Accessories	57
Installing the G8140A Peltier Cooler and Heater Module	58
Installing the G4521A Large Volume Syringe Carrier	89





2 Compatibility

The G4513A Tower	22
The G8130A Sample Tray	22
The G8140A Peltier Cooler Heater Module	22
The G4521A Large Volume Syringe Carrier	22
The 7696A WorkBench Software	22

This chapter aids in identifying compatible equipment and software for the 7696A Sample Prep WorkBench system.



The G4513A Tower

The Agilent G4513A Tower is designed for the Agilent 7696A Sample Prep WorkBench system. No other Tower models are compatible.

The G8130A Sample Tray

The Agilent G8130A Sample Tray (with Bar Code Reader/Mixer/Heater) is designed for the Agilent 7696A Sample Prep WorkBench system. No other Sample Tray models are compatible.

The G8140A Peltier Cooler Heater Module

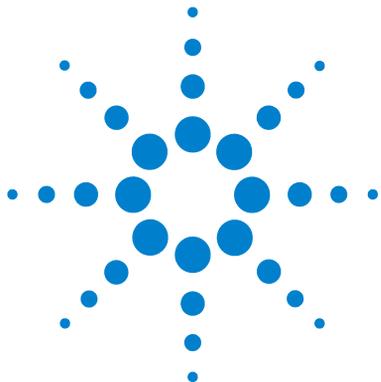
The G8140A Peltier Cooler Heater Module is designed specifically for the 7696A Sample Prep WorkBench system. No other cooling and heating accessories are compatible.

The G4521A Large Volume Syringe Carrier

The Agilent G4521A Large Volume Syringe Carrier is designed specifically for the 7696A Sample Prep WorkBench system. No other large volume syringe carrier models are compatible.

The 7696A WorkBench Software

The Agilent 7696A WorkBench Software is designed specifically for the 7696A Sample Prep WorkBench system. No other software is compatible.



3 Installation

Preparing for Installation	24
Installing the G4529A Main Frame	25
Installing the G8130A Sample Tray	30
Installing the G4513A Towers	38
Connecting the Cables	45
Installing the Vial Racks	46
Calibrating the Sample Prep WorkBench	51
Installing the Waste Vials	53
Configuring the WorkBench Network Address	54
Installing the Agilent 7696A WorkBench Software	55

This chapter contains the procedures for installing the 7696A Sample Prep WorkBench system.



Preparing for Installation

The 7696A WorkBench system ships with the following separately-packaged components:

- One G4529A Main Frame
- One G8130A Sample Tray
- Two G4513A Towers

Some parts included in the component packaging are not used with the 7696A WorkBench system. Set the following parts aside before installation to avoid accidental use:

G8130A Sample Tray

Part No	Description
G4514-20529	Tray Bracket Insulating Washer
0515-0437	Screw-M4*33.3
1390-1024	FSTNR-OPTVE SCR.M4X0.7

G3413A Towers

Part No	Description
G4513-40532	Spot Hi-Density Turret
G4513-20561	Spot Mounting Post
G4513-40529	Needle Support Insert COC
05890-61525	Dual Parking Post

Installing the G4529A Main Frame

This procedure describes how to prepare the G4529A Main Frame for the 7696A Sample Prep WorkBench system.

WARNING

Potential electric shock hazard. Do not plug the power cable into the Main Frame at this time.

Install the configuration plug

WARNING

Due to a potential electric shock hazard, the configuration plug must only be installed by a qualified and trained service professional.

3 Installation

- 1 Loosen the thumbscrews on the Main Frame top-left panel (Figure 1).

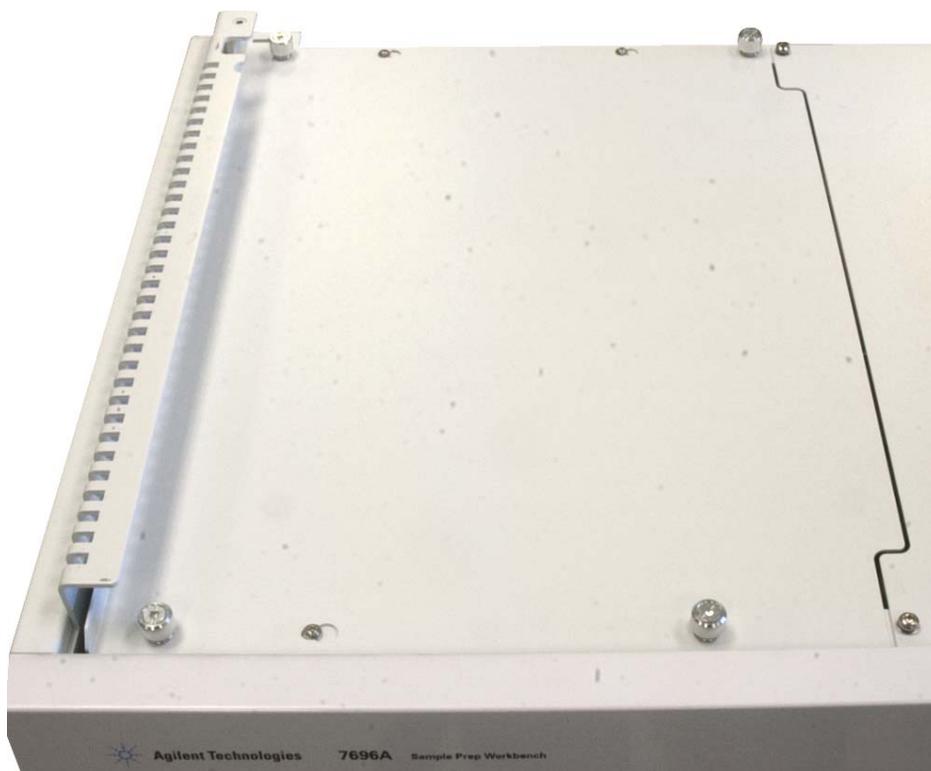


Figure 1 Removing Main Frame top-left panel

- 2 Slide the Main Frame top-left panel to the left, lift the panel off of the Main Frame, and set it aside.

- 3 Install the supplied configuration plug (Figure 2).

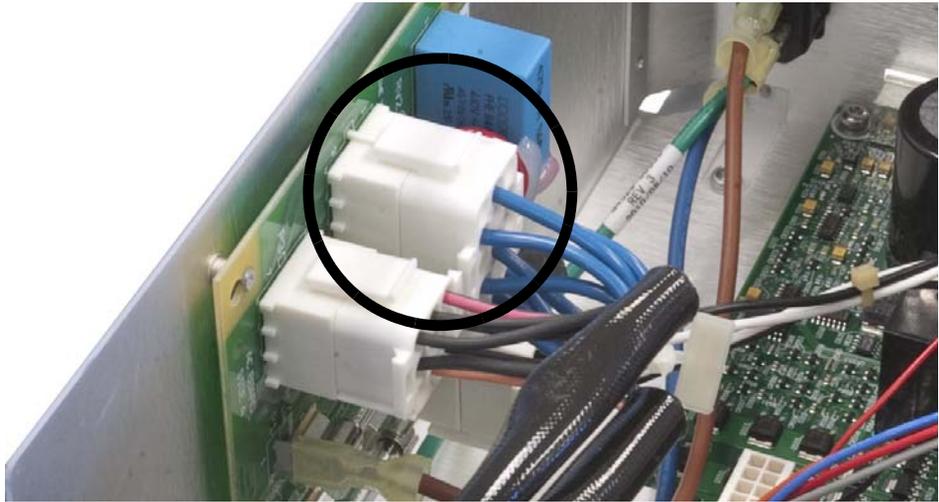


Figure 2 Installing the configuration plug

- 4 Reinstall the top cover and tighten the thumbscrews.
- 5 On the back of the Main Frame, remove the sticker covering the power cord jack.

3 Installation

- 6 Lift the safety bracket and plug the power cord into the back of the Main Frame (Figure 3).

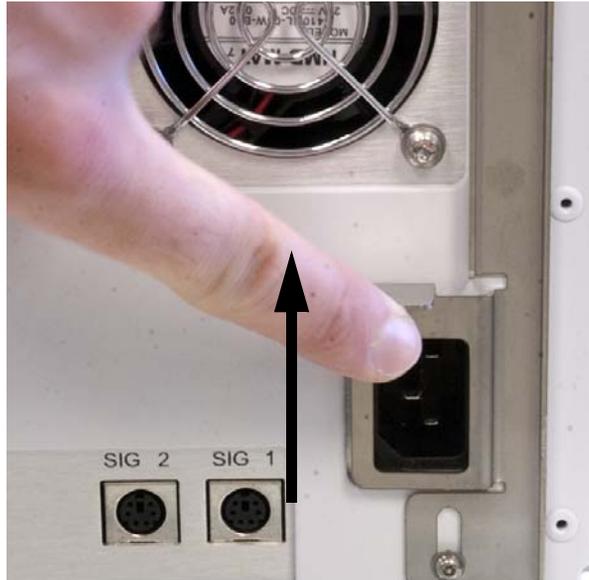


Figure 3 Power cord jack

- 7 Place the supplied voltage label sticker on the back of the Main Frame near the power cord (Figure 4).

- 8 Plug the LAN communication cable into the **LAN** port on the back of the Main Frame (Figure 4).



Figure 4 Voltage sticker and LAN port locations

Installing the G8130A Sample Tray

This procedure describes how to install the G8130A Sample Tray onto the G4529A Main Frame base.

Prepare the Sample Tray

WARNING

Take care when holding the Sample Tray. Because the motors are heavy and located off-center, an improper balance point can cause the tray to tip out of your grasp.

- 1 Remove the Sample Tray from the packaging.
- 2 Using a T-20 Torx driver, remove the T-20 screw from the shipping clamp (Figure 5).

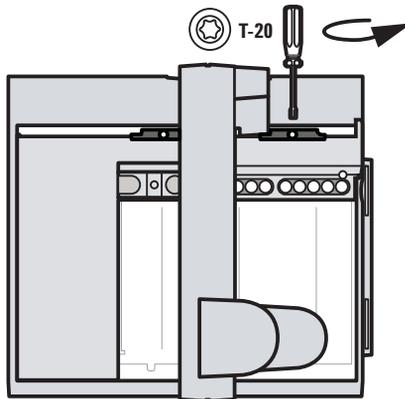


Figure 5 Removing the T-20 screw from the shipping clamp

- 3 Remove the two plastic shipping clamp pieces from the sample tray and discard (Figure 6)

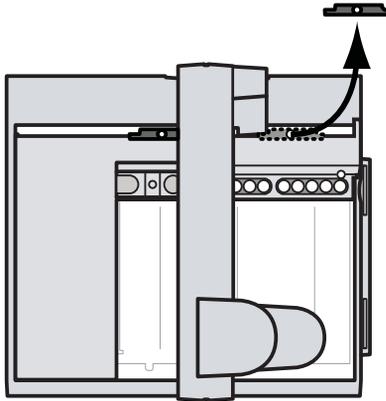


Figure 6 Removing the two plastic shipping clamp pieces

- 4 Place your hand on the gantry as shown in Figure 7 and gently push the gantry towards the sample tray mounting bracket until the remaining shipping clamp is accessible.

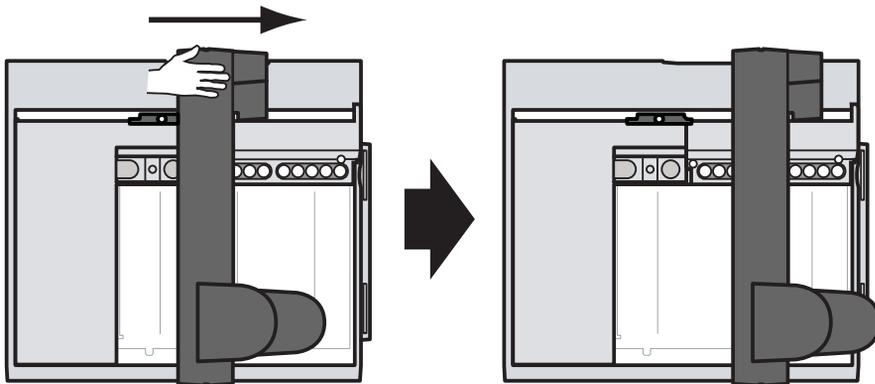


Figure 7 Sliding the gantry towards the sample tray mounting bracket

3 Installation

- 5 Using a T-20 Torx driver, remove the T-20 screw from the shipping clamp (Figure 8).

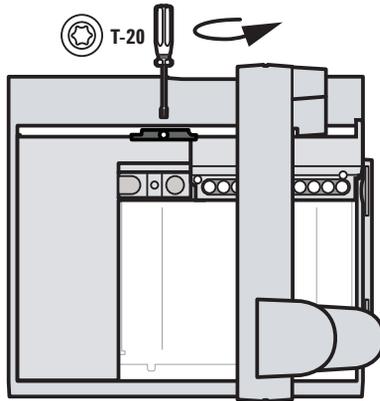


Figure 8 Removing the T-20 screw from the shipping clamp

- 6 Remove the two plastic shipping clamp pieces from the sample tray and discard (Figure 9)

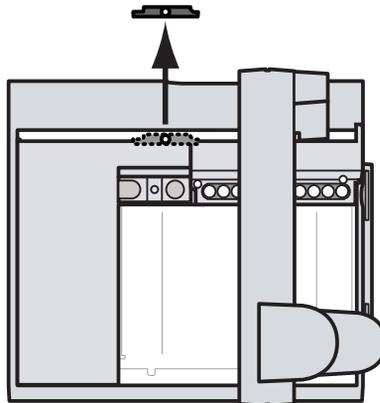


Figure 9 Removing the two plastic shipping clamp pieces

- 7 Set the Sample Tray on a secure, flat surface. Position the instrument on its end so the tray mounting bracket faces up. Let the gantry slide all the way down (Figure 10).

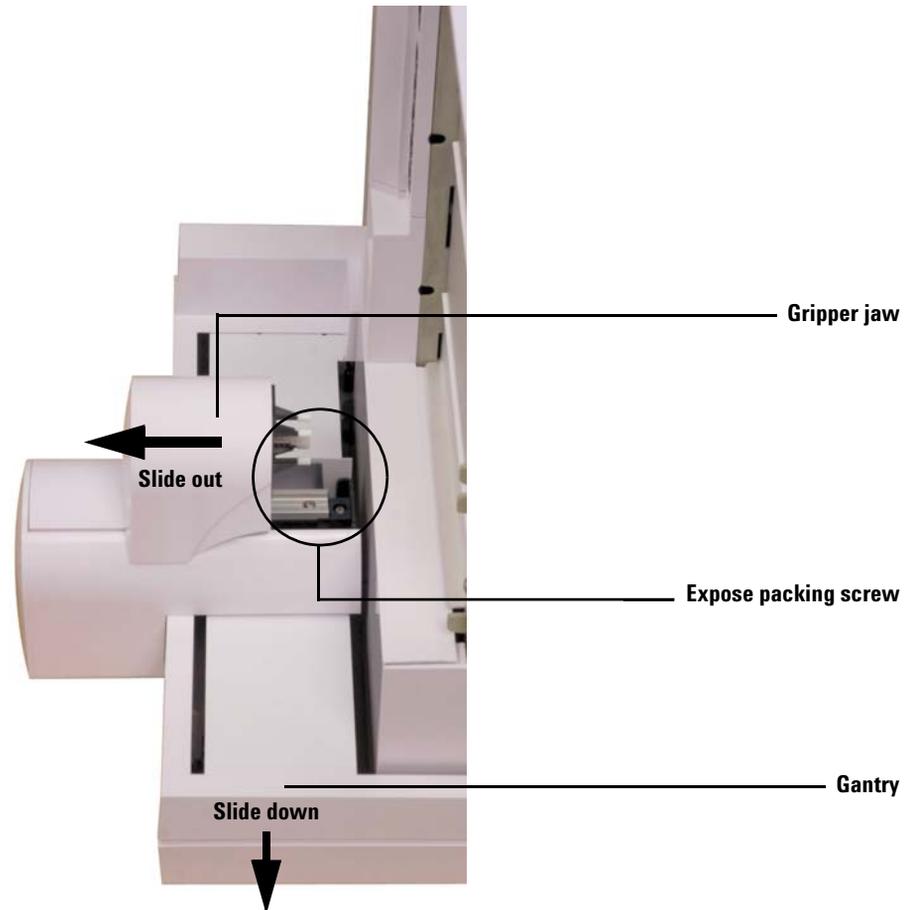


Figure 10 Exposing the packing screw in the gripper assembly area

- 8 Slide the gripper jaw away from the tray base until the packing screw is accessible (Figure 10).

3 Installation

- 9 Remove the packing screw using a Phillips screw driver and tweezers (Figure 11).

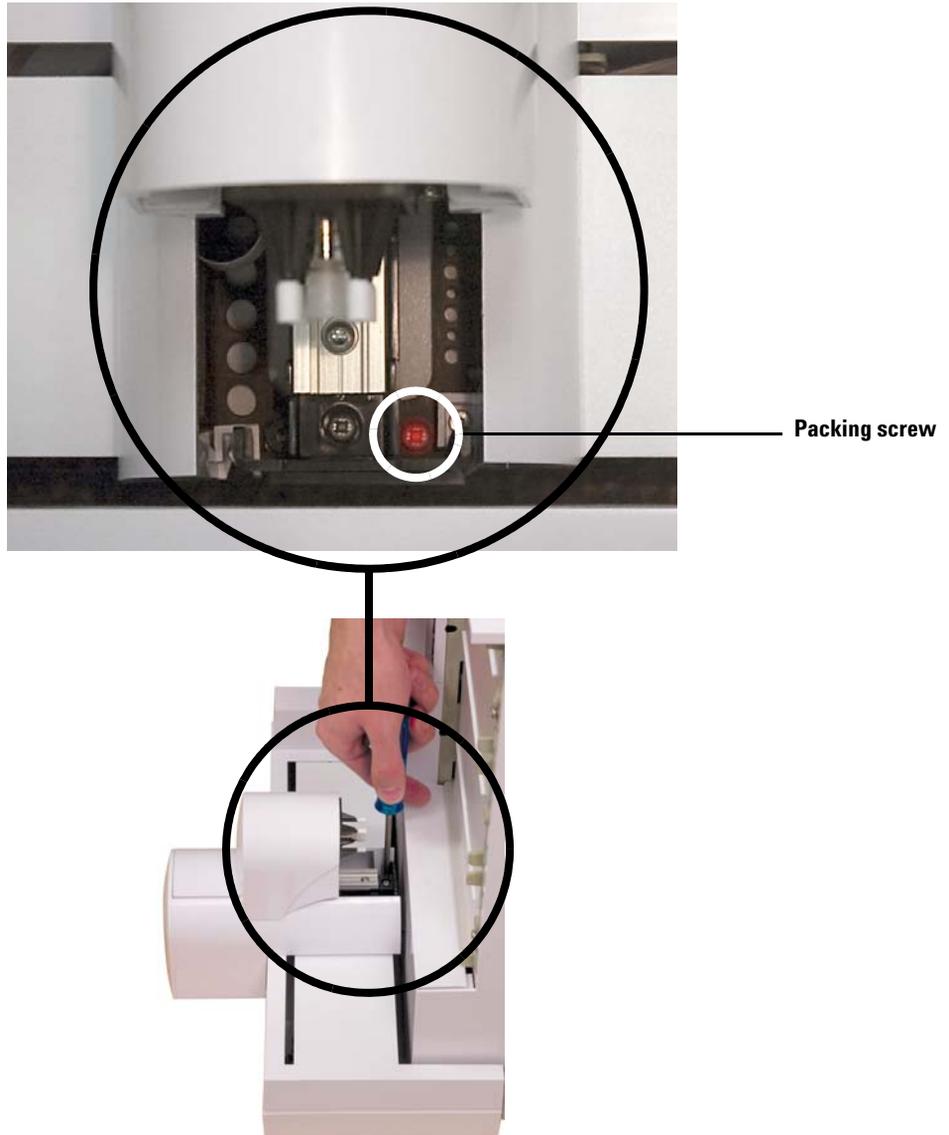


Figure 11 Removing the packing screw from the gantry assembly

Install the Sample Tray

- 1 Using both hands, carefully lower the Sample Tray onto the Main Frame base. Align the Sample Tray mounting bracket tabs with the Main Frame mounting bracket (Figure 12). Lower the Sample Tray at an angle so that the lower tab on the bracket inserts into the fitting on the Main Frame mounting bracket. Make sure the Sample Tray mounting bracket tabs align with the Main Frame mounting bracket.

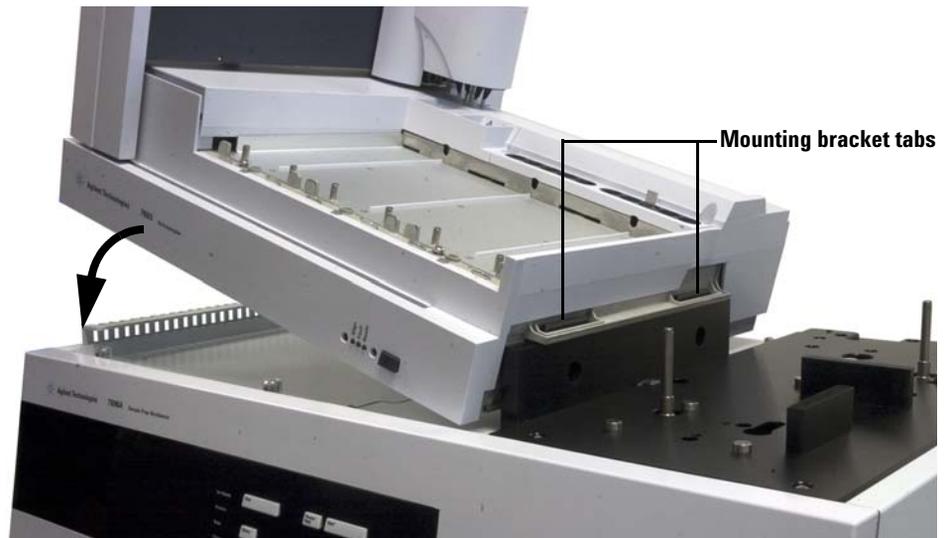


Figure 12 Installing the Sample Tray to the Main Frame

3 Installation

- 2 Make sure the Sample Tray sits flat on the Main Frame base (Figure 13).



Figure 13 Setting the Sample Tray flat on the Main Frame base

- 3 Using a T-30 Torx driver, install the two T-30 screws into the Main Frame mounting bracket, securing the Sample Tray to the Main Frame base (Figure 14).

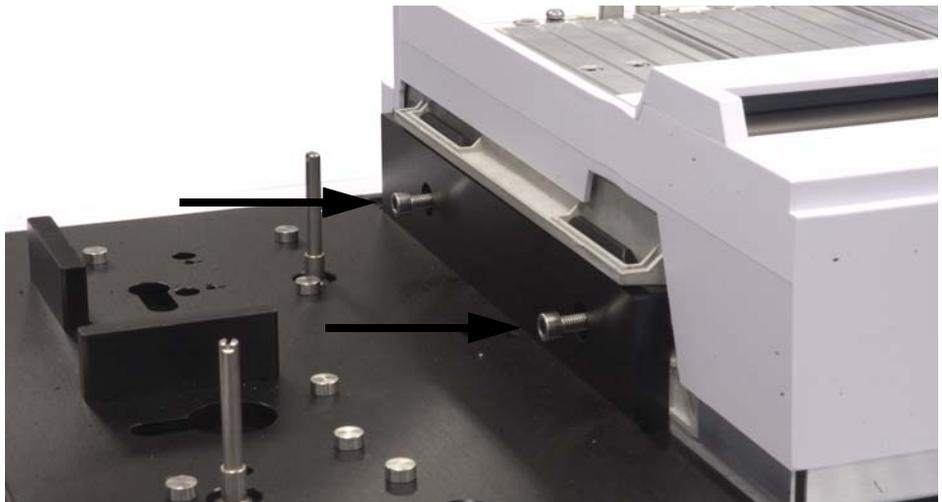


Figure 14 Securing the Sample Tray to the Main Frame mounting bracket

Connect the communication cable

- 1 Connect the communication cable to the back of the Sample Tray and Main Frame base. See “[Connecting the Cables](#)” for more information.



Figure 15 Connecting the Sample Tray communication cable

Installing the G4513A Towers

This procedure describes how to install the G4513A Towers onto the 7696A Sample Prep WorkBench system.

Prepare the Towers

The following procedure applies to both Towers.

- 1 Remove the G4513A Tower from the packaging.
- 2 Remove the shipping tape from the turret and Tower door.
- 3 Open the Tower door.
- 4 Using a T-10 Torx driver, completely loosen the T-10 screw and remove the shipping clamp from the syringe carrier ([Figure 16](#) and [Figure 17](#)).

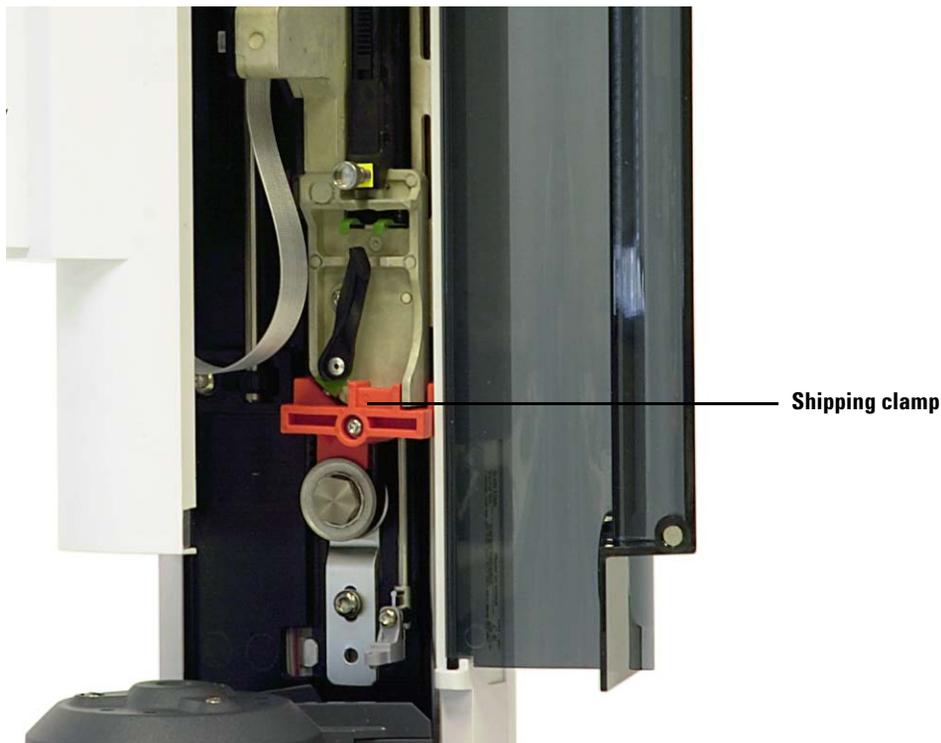


Figure 16 Shipping clamp installed.



Figure 17 Shipping clamp removed.

5 Close the Tower door.

Install the G4521A Large Volume Syringe Carrier

If you intend to use a large volume syringe with your WorkBench system, install the G4521A Large Volume Syringe Carrier onto the G4513A Tower now. See [“Installing the G4521A Large Volume Syringe Carrier”](#) for details.

If you do not plan to use a large volume syringe, skip to the next section.

Install the Towers

This procedure explains how to install the G4513A Towers onto the G4529A Main Frame.

- 1 Install the mounting posts onto the Main Frame (Figure 18).

WARNING

Do not use the mounting posts supplied with the Tower packaging. Only use the mounting posts supplied with the G4529A Main Frame packaging.



Figure 18 Installing the mounting posts.

- 2 Plug the communication cable into the front Tower (Figure 19). If you installed the G4521A Large Volume Syringe Carrier into a Tower, use that Tower as the front Tower.

Note the location of the mounting post insert location in the Tower base (Figure 19).

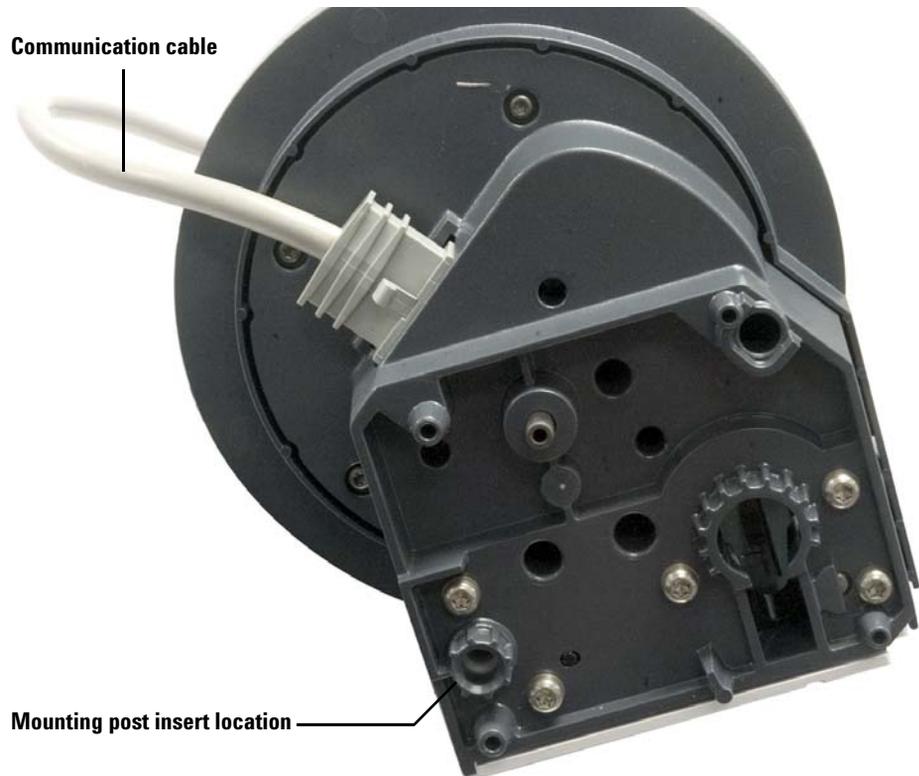


Figure 19 Communication cable and mounting post insert locations

3 Installation

- 3 With the communication cable installed, lower the front Tower onto the front position on the Main Frame and mounting post. Be sure to properly align the Tower so it sits evenly on the Main Frame base (Figure 20).

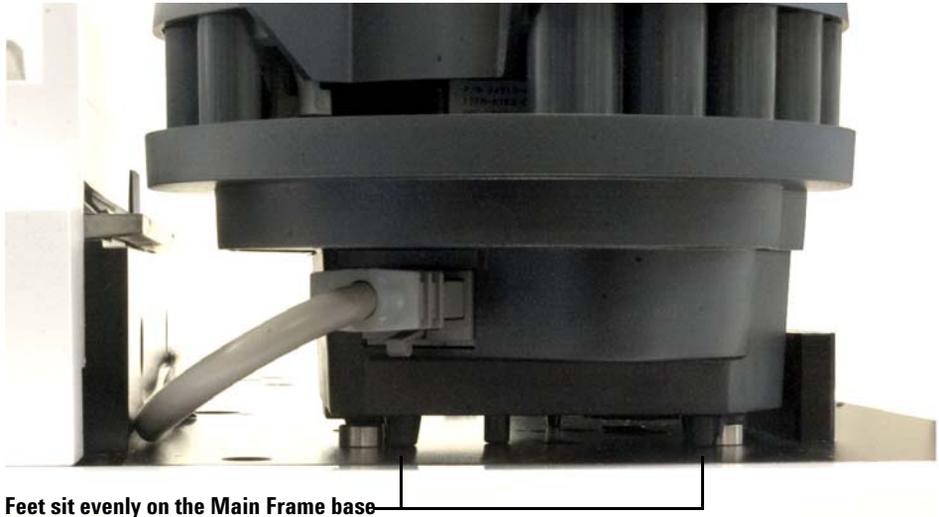


Figure 20 Installing the front Tower on the Main Frame.

- 4 Run the front Tower communication cable along the Sample Tray mounting bracket towards the back of the Main Frame (Figure 21).



Figure 21 Running the front Tower cable along the Sample Tray mounting bracket.

- 5 Plug the front Tower communication cable into the **Sampler 1** cable port on the back of the Main Frame.
- 6 Plug the communication cable into the back Tower.

3 Installation

- 7 With the communication cable installed, lower the back Tower onto the back position on the Main Frame and mounting post. Be sure to properly align the Tower so it sits evenly on the Main Frame base (Figure 20).

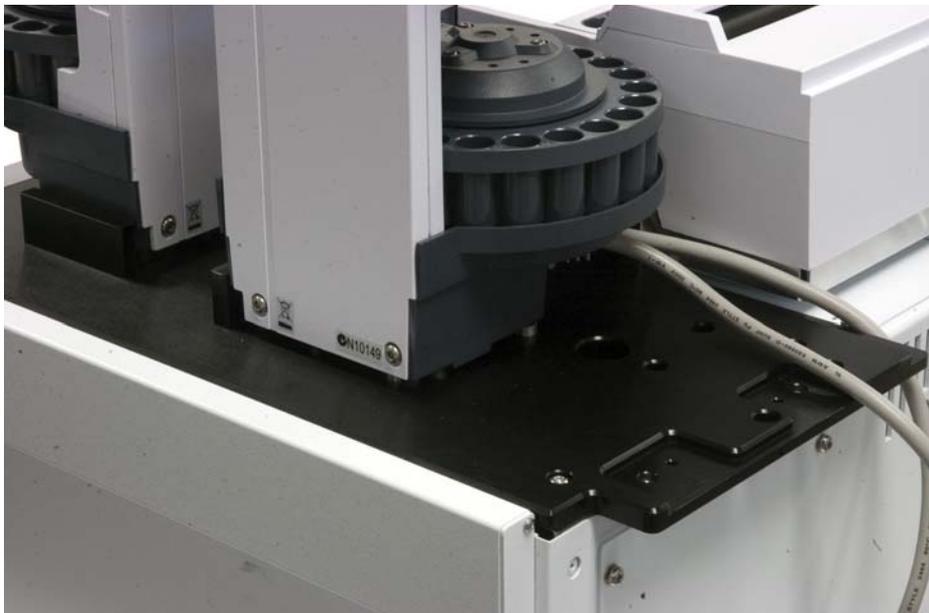


Figure 22 Installing the back Tower to the Main Frame.

- 8 Plug the back Tower communication cable into the **Sampler 2** cable port on the back of the Main Frame.

Check your work

The Towers must be vertical and stable.

If a Tower does not sit upright, verify that the Tower cables are routed correctly along the Sample Tray bracket and are away from the Tower bases.

Connecting the Cables

This section shows the Tower and Sample Tray cable routing for a Sample Prep WorkBench.



Figure 23 Cable connection ports

- 1 Connect the front and back Towers to the WorkBench base with G4514-60610 cables.
- 2 Connect the Sample Tray to the WorkBench base with a G4514-60610 cable.
- 3 Connect the WorkBench power cord to the outlet.

Test the connections

When the cables are connected, turn on the power. After the start-up process ends:

- The Ready light on the Tower should be on.
- If the Align Mode light on the Tower is on, see [Aligning the Tower](#).
- If the Fault light on the Sample Tray is on, see [Faults](#).

Installing the Vial Racks

Follow the procedure below to install the vial racks onto the Sample Tray.

Park the WorkBench

The WorkBench must be Parked to allow for clear access to the Sample Tray base. To park the 7696A Sample Prep WorkBench.

- 1 Power on the WorkBench.
- 2 Pause the WorkBench by pressing **[Pause]** on the front keypad.
- 3 Park the WorkBench by pushing the **[P]** button on the front tray panel.



The gantry moves to the far-left position (away from the Towers), and gripper jaw moves to the far-back position (away from the front panel). This allows for clear access to the Sample Tray base.

NOTE

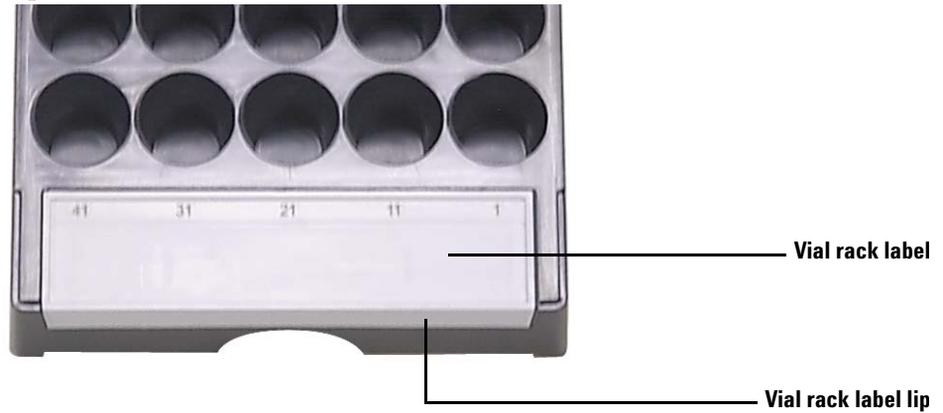
To operate the Sample Prep WorkBench, the system must be out of the Park position. Press **[P]** on the front panel to move the gantry from the Park position to the Home position.

Install the vial rack labels

Before using the vial racks, you must install the vial rack labels:

- 1 Place the vial racks on a flat surface.
- 2 Align the vial rack label with the front of the vial rack so that the lip of the vial rack label fits over the front of the vial rack. The tabs on the underside of the vial rack label will align with the insert holes on the vial rack.

- 3 Press the vial rack label down into the vial rack until it snaps into place.



Install the vial racks

- 1 After the vial rack labels are installed, lower the back end of the vial rack into the tray base.



3 Installation

- 2 Align the tab found on the back side of the vial rack with the hole in the tray's back wall.



- 3 Lower the front of the vial rack so that it fits into place and rests flat on the tray base. The LED light below each vial rack will light if the

vial rack is present. Be sure to install the vial racks so the vial rack label numbers are in sequential order from right to left.



4 Repeat the process for the two remaining vial racks.

Remove the vial rack labels

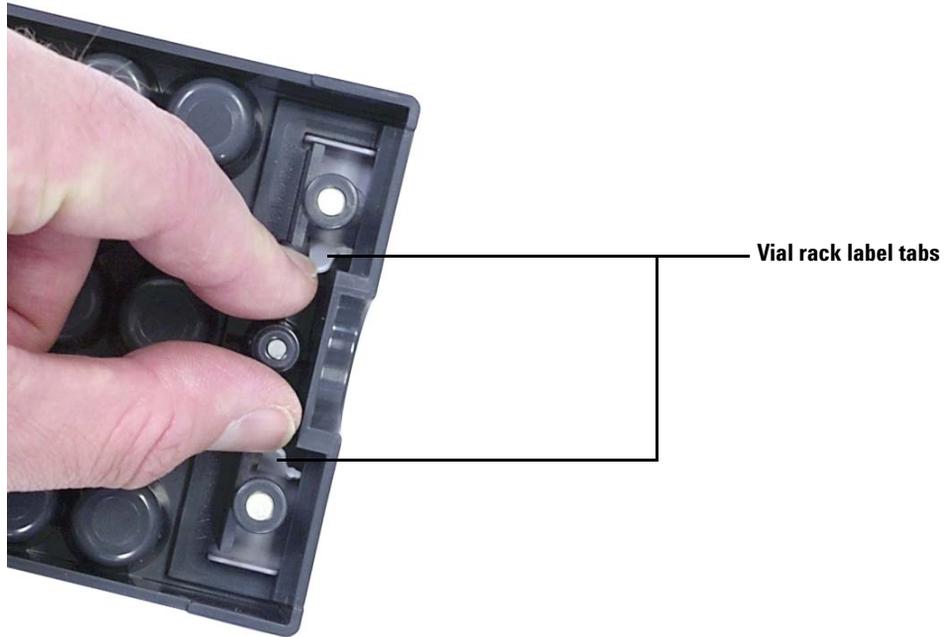
Skip this section if you do not wish to remove the vial rack labels.

To remove the vial rack labels:

1 Hold the vial rack upside-down.

3 Installation

- 2 Using your free hand, pinch the two tabs towards each other until the vial rack label snaps out of the vial rack.



Calibrating the Sample Prep WorkBench

Follow the procedure below to calibrate the Sample Prep WorkBench system.

The Sample Prep Workbench system calibration process aligns the sample tray with the tower turret position so vial transfers occur without incident. Calibration should be performed if a calibration does not exist, and also as a routine maintenance procedure.

Calibrating the Sample Prep Workbench system is recommended if any Sample Prep Workbench components are moved.

To calibrate your Sample Prep Workbench system:

- 1 Place the calibration vial (G4514-40588) in tray position 1 ([Figure 24](#)).



Figure 24 Tray position 1

3 Installation

- 2 Remove any vials from transfer turret positions L1, L2, and L3 in both towers (Figure 25).

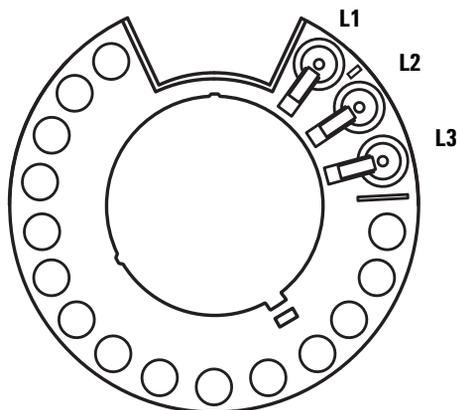


Figure 25 Transfer turret positions L1, L2, L3 (top view)

- 3 To start the Sample Prep Workbench system calibration from the Workbench front keypad, press **[Menu]** > **Sampler calibration** > **[Enter]** > **Start calibration** > **[Enter]**.

The following calibration process occurs:

- a The Workbench assesses the turret alignment by placing the calibration vial into turret position L1 and returning to sample tray position 1.
 - b The Workbench tests the vial height and turret position by using the alignment tab between positions L1 and L2 on the transfer turret.
 - c The Workbench verifies the turret alignment by placing the calibration vial into turret position L1 and returning it to sample tray position 1.
 - d The Workbench repeats the process for the back tower.
- 4 When the calibration process completes, the green Ready status light turns on and the gantry stops in the Home position (Figure 89).

Remember to replace any vials that were moved for the calibration process.

Installing the Waste Vials

Install the supplied 4-mL waste vials into the desired turret locations.

Configuring the WorkBench Network Address

You must configure your instrument's network address before you can connect to the instrument.

Use the WorkBench front keypad to set the network address:

- 1** Press **[Menu]**.
- 2** Navigate to LAN Configuration using the **[Up/Down]** arrow keys, and press **[Enter]**. The IP address (**IP**), Gateway address (**GW**), and Subnet Mask (**SM**) display on the screen.
- 3** Use the **[Up/Down]** arrow keys to scroll to the desired network configuration, and press **[Enter]** to make changes to the network address. An asterisk (*) appears next to the value you are currently editing.
 - To change a value, use the **[Up/Down]** arrow keys.
 - To save the current value and move to the next value, press **[Enter]**.
 - Press **[Clear/Back]** to cancel.

When finished, the WorkBench system must be turned off and on again for the network changes to take effect.

Installing the Agilent 7696A WorkBench Software

Install the software

When hardware installation is complete, install your software onto the designated PC for use with the 7696A Sample Prep WorkBench system.

CAUTION

Be sure that your designated WorkBench PC does not have any other instrument data systems installed.

Insert the Agilent G8129-64010 WorkBench Software DVD into your PC's DVD drive and run **Setup.exe** from the root directory of the DVD. Follow the installation wizard and refer to the software online help for more information.

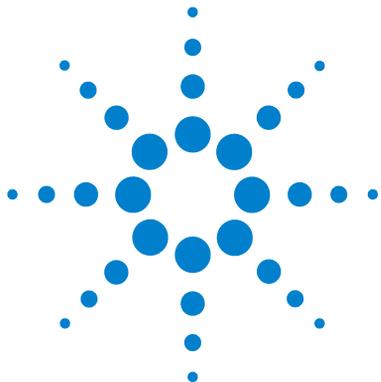
Configure the software

Once you have completed the Agilent WorkBench Software installation, you must configure the software for use with the 7696A Sample Prep WorkBench system.

If the **Setup Wizard - Instruments** screen is not currently open, navigate to **Programs > Agilent WorkBench > Add Instrument** from the Microsoft Windows Start menu. The **Setup Wizard - Instruments** screen opens.

Refer to the software's online help for further instructions.

3 Installation



4 Accessories

Installing the G8140A Peltier Cooler and Heater Module 58

Installing the G4521A Large Volume Syringe Carrier 89

This chapter provides instructions on how to install accessories onto your Sample Prep WorkBench system. Follow the instructions in this chapter that are relevant to your accessories and your system setup.



Installing the G8140A Peltier Cooler and Heater Module

This section describes how to install the G8140A Peltier Cooler and Heater module on the WorkBench system.

The Peltier module allows for the simultaneous cooling and heating of vials on your sample tray. The Peltier module divides the sample tray into heated and cooled regions. The far-left vial rack area can be heated up to 60 °C, the far-right vial rack area can be cooled down to 5 °C, and the center vial rack remains near room temperature.

CAUTION

Ensure that the drainage tube is installed correctly through the hole in the back panel of the WorkBench main frame.

When controlling for low sample temperature with high ambient temperature or high humidity, water condensation from the heating and cooling plate and WorkBench could damage equipment under or near the WorkBench system.

Tools needed

- Diagonal cutters
- T-10 Torx driver
- T-20 Torx driver

Install the Peltier Cooling and Heating module

- 1 Unplug all cables from the back of the sample tray and main frame.
- 2 Remove the towers from the main frame.

- 3 Remove the sample tray from the main frame.
 - a Remove the two T-30 Torx screws on the main frame mounting bracket (Figure 26).



Figure 26 Removing the screws in the main frame mounting bracket

- b Lift the sample tray up and off of the main frame. Lay it on a secure surface such as a work bench or table.

4 Accessories

- 4 Remove the thumbscrews that secure the top-left cover on the main frame, and remove the cover (Figure 27).



Figure 27 Removing the top-left main frame cover

- 5 Remove the four T-20 Torx screws that secure the top-right cover on the main frame, and remove the cover (Figure 28).

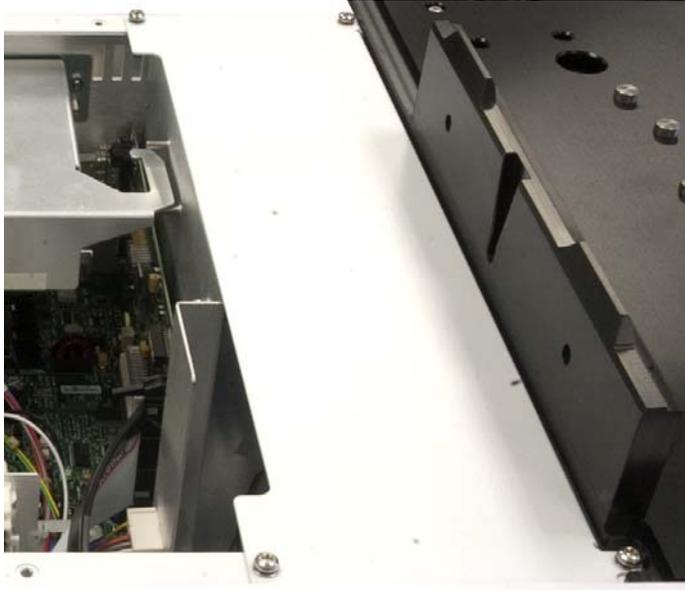


Figure 28 Removing the top-right main frame cover

- 6 Carefully lower the Peltier power control board into the main frame chassis using the alignment pins for guidance (Figure 29 and Figure 30).

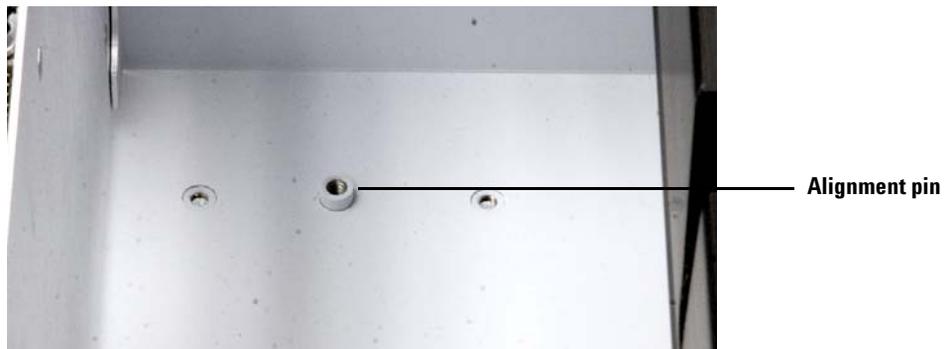


Figure 29 An alignment pin in the main frame chassis

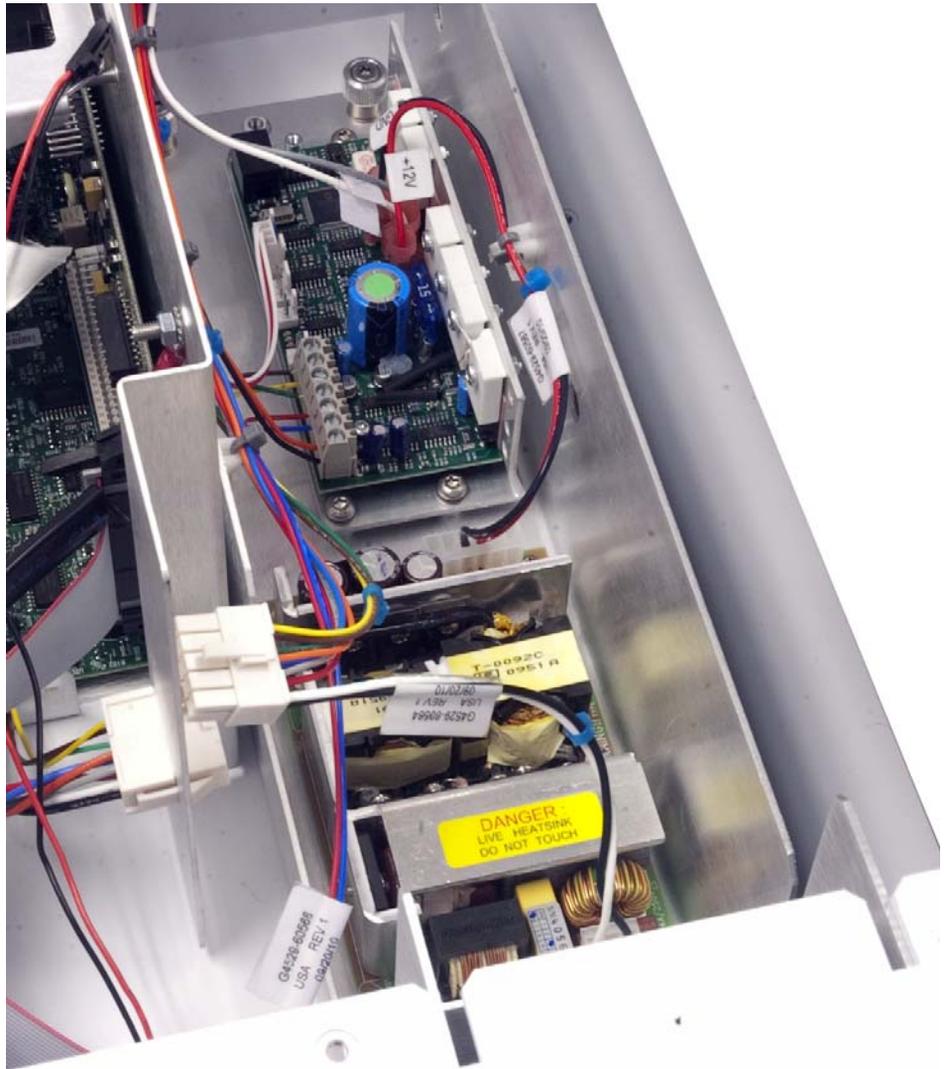


Figure 30 The Peltier power control board installed in the main frame chassis

- 7 Completely tighten four T-20 Torx captive screws to secure the Peltier power control board to the main frame chassis.

- 8 Connect the cables from the Peltier power control board to the main frame cables (Figure 31).

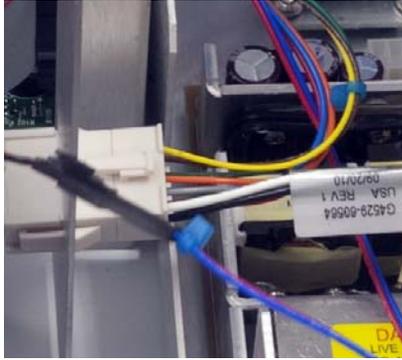


Figure 31 Cable connections

NOTE

Each cable harness is designed with a unique size. Do not force a cable harness connection.

4 Accessories

- 9 Lay the Peltier power control board cables located near the back of the board outside of the main frame chassis, as shown in [Figure 32](#).

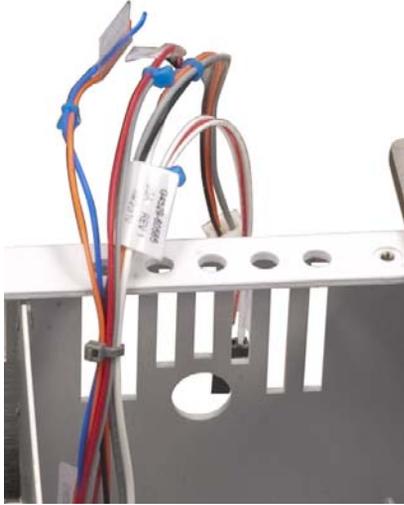


Figure 32 Laying the cables outside of the main frame chassis

10 Install the Peltier power control board bracket.

- a** Run the cables through the opening in the back of the Peltier power control board bracket, as shown in [Figure 33](#).

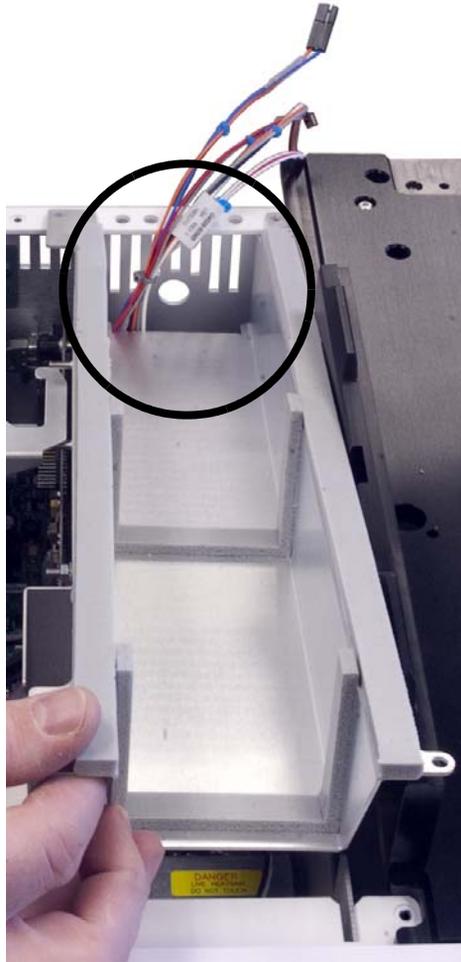


Figure 33 Installing the Peltier power control board bracket

- b** Install four T-20 Torx screws to secure the upper Peltier power

control board bracket to the main frame chassis (Figure 34).

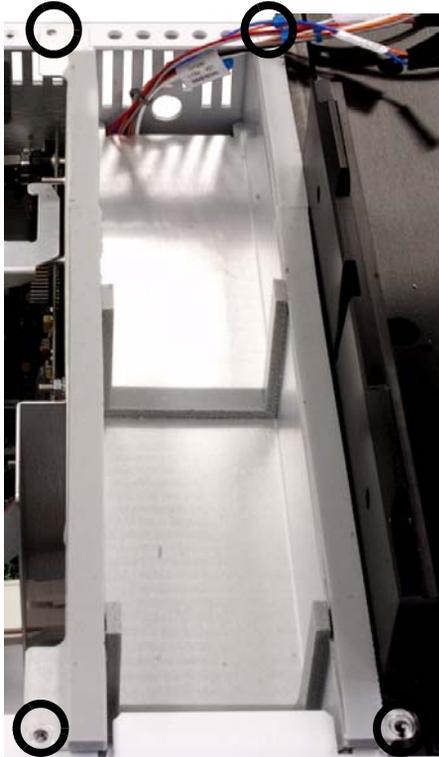


Figure 34 Installing the screws to the Peltier power control board bracket

11 Install the foam adhesive to the main frame chassis as shown in Figure 35.



Figure 35 Installing the foam adhesive to the main frame chassis

12 Replace the top-left main frame cover by tightening the thumbscrews (Figure 36).



Figure 36 Installing the top-left main frame cover

4 Accessories

- 13** On the underside of the sample tray, remove the accessory plate using a diagonal cutter (**Figure 37**).

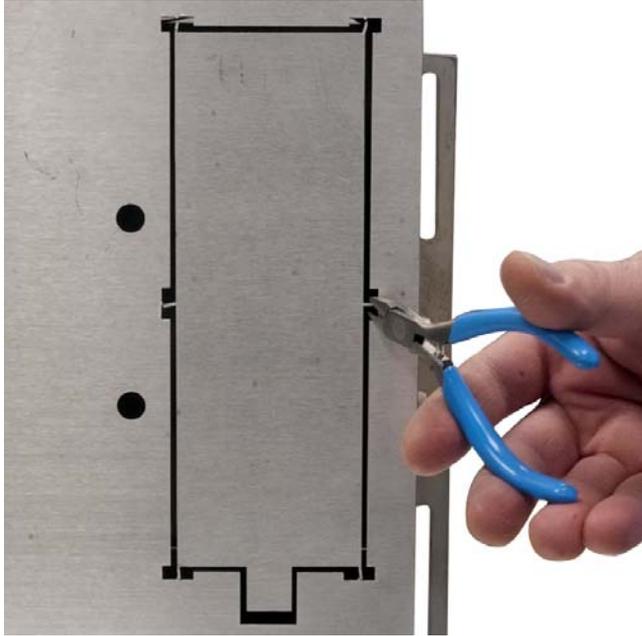


Figure 37 Removing the accessory plate using diagonal cutters

- 14** Sit the sample tray on its base by the edge of a work bench or table. Hang the side of the sample tray with the accessory opening off the

edge of the table so that the entire accessory opening is exposed (Figure 38).



Figure 38 Sitting the sample tray on the edge of a work bench or table

4 Accessories

- 15 On the sample tray, completely loosen the two T-20 screws securing the unknown vial station cover (Figure 39).



Figure 39 Removing screws and unknown vial station cover

- 16 Remove the unknown vial station cover.
- 17 Completely loosen the two T-20 screws securing the unknown vial station.

18 Remove the unknown vial station (Figure 40).



Figure 40 Removing the unknown vial station

19 Slide the gantry towards the home position (far-right, towards the tray bracket).

20 Loosen the T-20 Torx screw securing the tray cover (Figure 41).

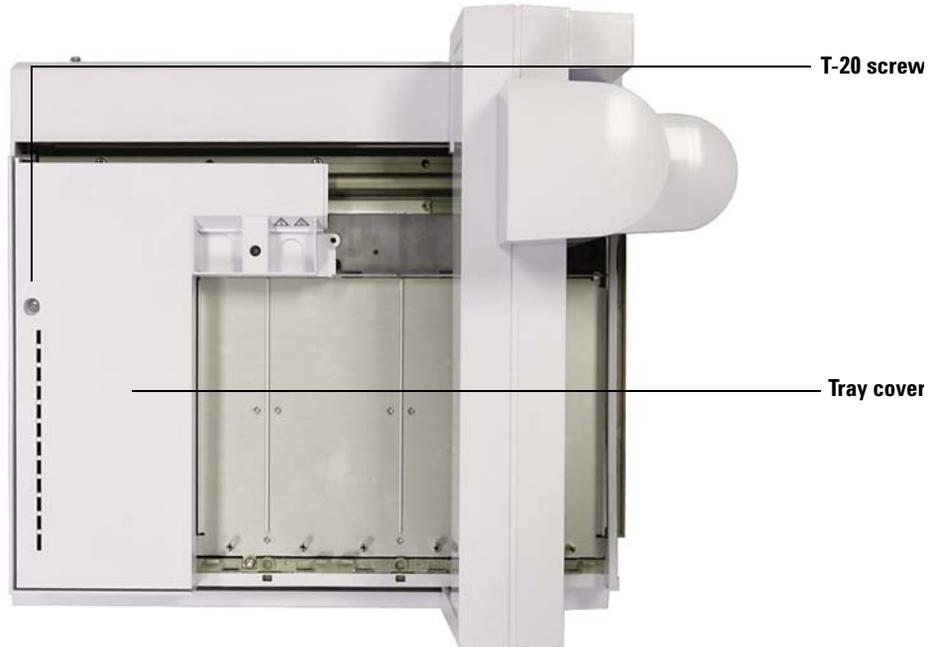


Figure 41 Loosening the top-left tray cover screw

21 Remove the top-left tray cover.

22 Slide the gantry towards the park position (far-left, away from the tray bracket).

- 23** Remove the four T-20 Torx screws securing the vial rack support plate and set them aside. They are not used from this point forward (Figure 42).

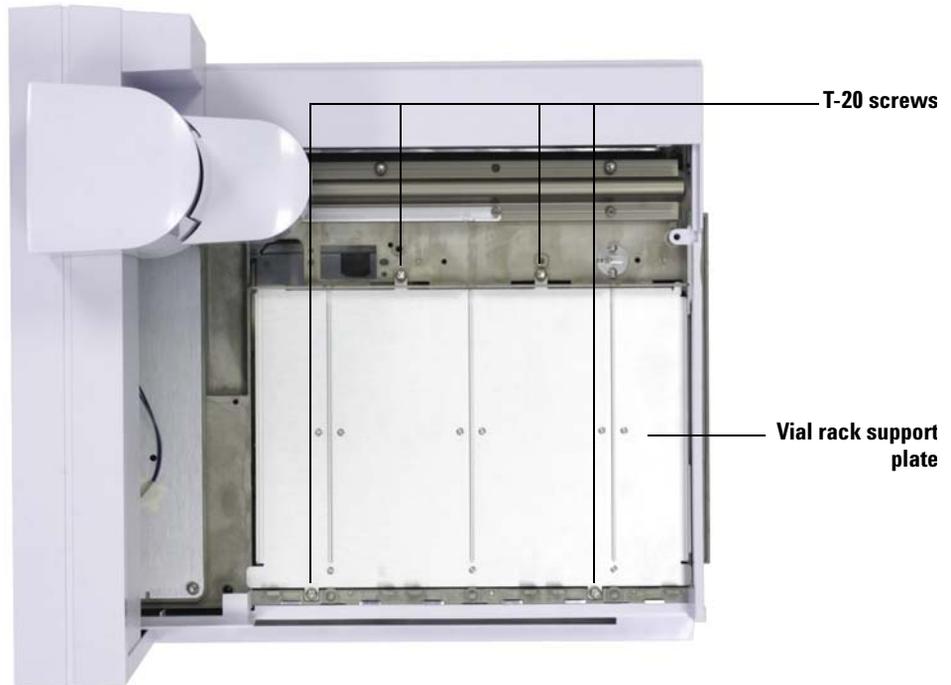


Figure 42 Removing four screws that secure the vial rack support plate to the sample tray chassis

4 Accessories

- 24** Remove the tray support plate by lifting the front of the plate and pulling outward towards the front of the sample tray. The support plate slides out (Figure 43).

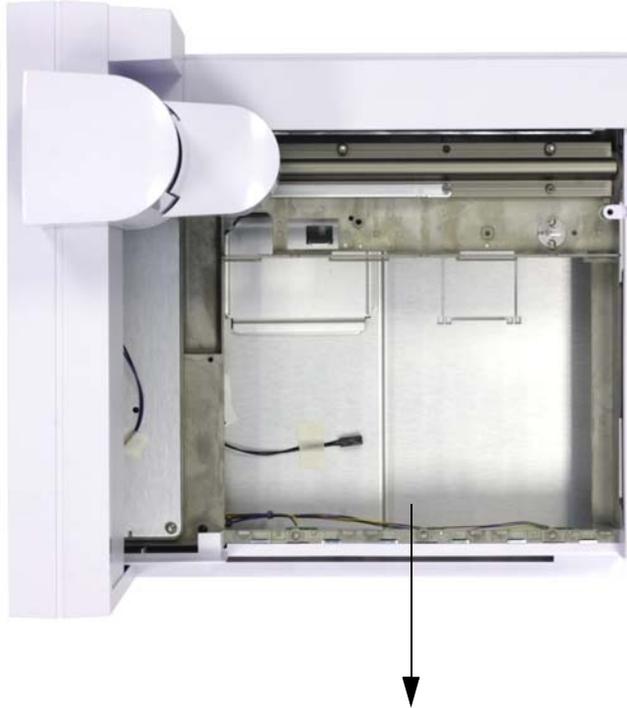


Figure 43 Removing the sample tray support plate

- 25** Place the sample tray in such a way so that it securely sits on a table or work bench edge with the accessory opening exposed on the edge of the table or work bench.

Hold the Peltier module above the sample tray and run the tubing through the accessory hole. Be careful to not catch an edge with the tubing or your hands (Figure 44).



Figure 44 Running the drainage tubing through the accessory opening

CAUTION

The edges of the accessory opening can be sharp

4 Accessories

- 26** Connect the cable found at the bottom of the sample tray to the matching cable harness on the Peltier module, then run the loose cables through the accessory opening ([Figure 45](#)).

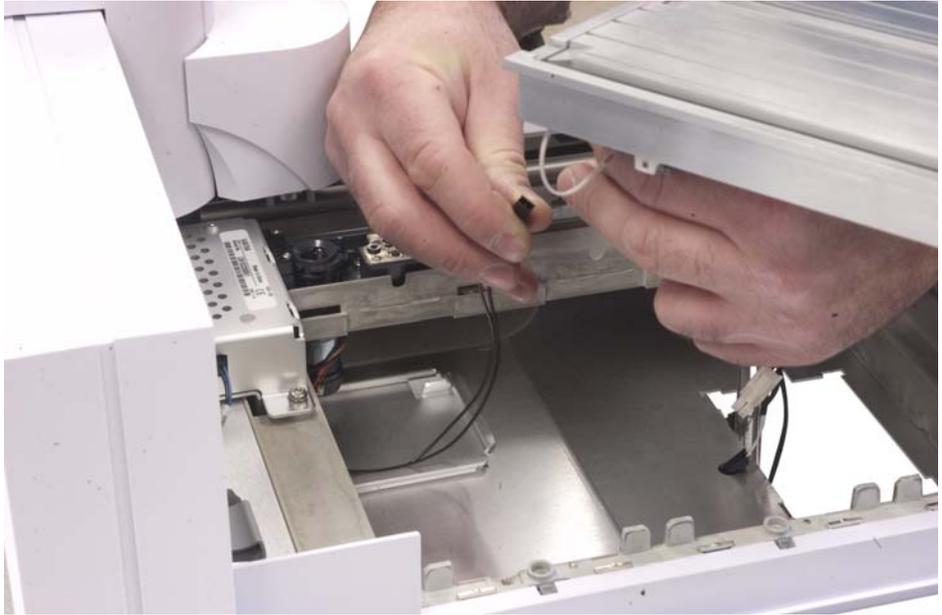


Figure 45 Connecting cables

27 Lower the Peltier module straight down into the sample tray with the bottom part of the Peltier module dropping through the accessory opening (Figure 46).



Figure 46 Installing the Peltier module

4 Accessories

28 Using the supplied T-20 Torx screws (Figure 47), install the two screws in the front of the sample tray area to secure the front of the Peltier module to the sample tray (Figure 48).



Figure 47 Using the four T-20 Torx screws (Part No 1400-3288)



Figure 48 Installing two T-20 Torx screws to secure the front of the Peltier module

- 29 Place the Peltier module support bracket into place and slide it to the left until the screw holes align (Figure 49).

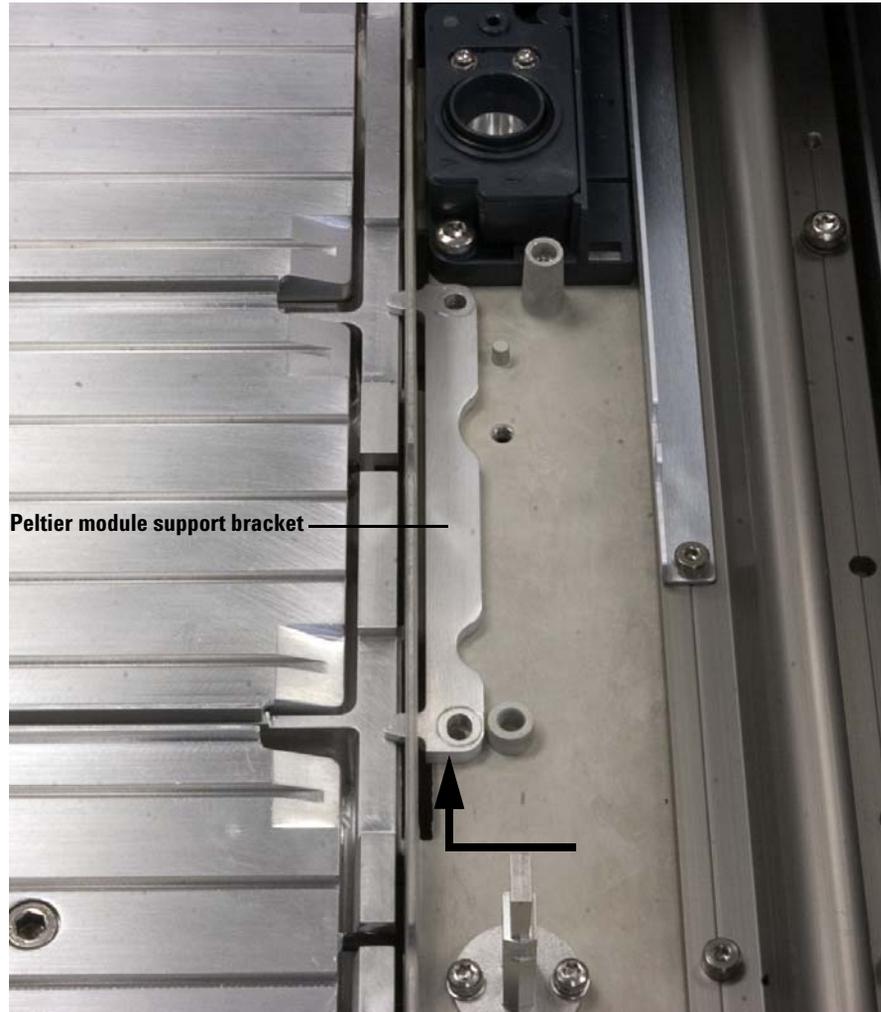


Figure 49 Installing the Peltier module support bracket

- 30** Using the supplied T-20 Torx screws, install the two screws to secure the Peltier module support bracket to secure it to the sample tray (Figure 50).

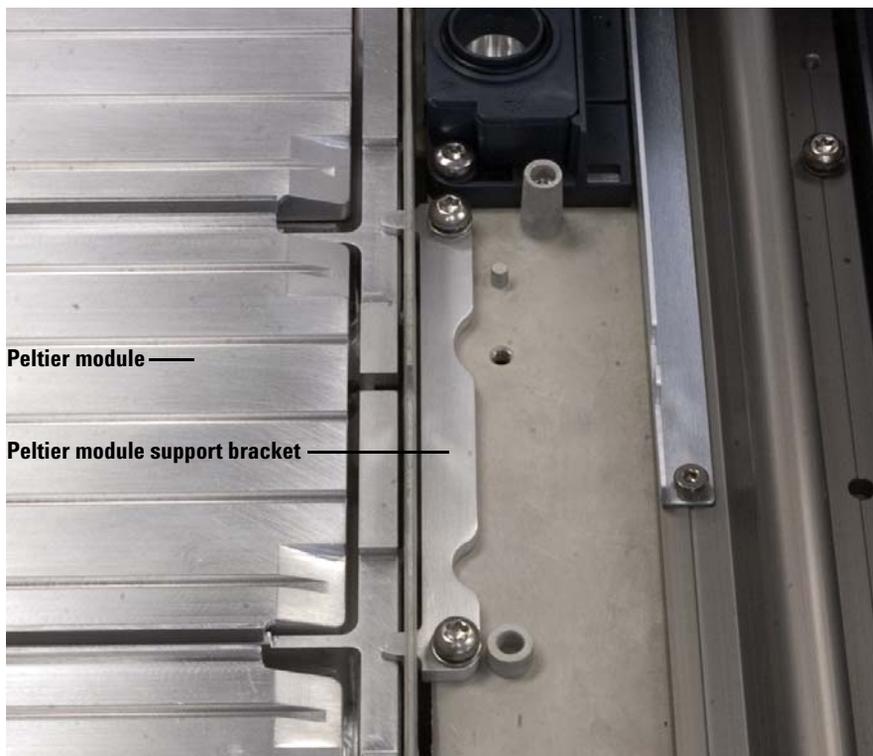


Figure 50 Securing the Peltier module and Peltier module support bracket

- 31** If necessary, slide the gantry to the home position (far-right, towards the tray mount).
- 32** Replace the sample tray cover and secure it with a T-20 Torx screw.
- 33** Slide the gantry to the park position (far-left, away from the tray mount).
- 34** Replace the unknown vial station and secure it with two T-20 Torx screws.
- 35** Replace the unknown vial station cover and secure it with two T-20 Torx screws.

- 36** Hold the sample tray over the main frame partially in place and run the plastic drainage tube through the hole in the back of the main frame chassis (Figure 51).

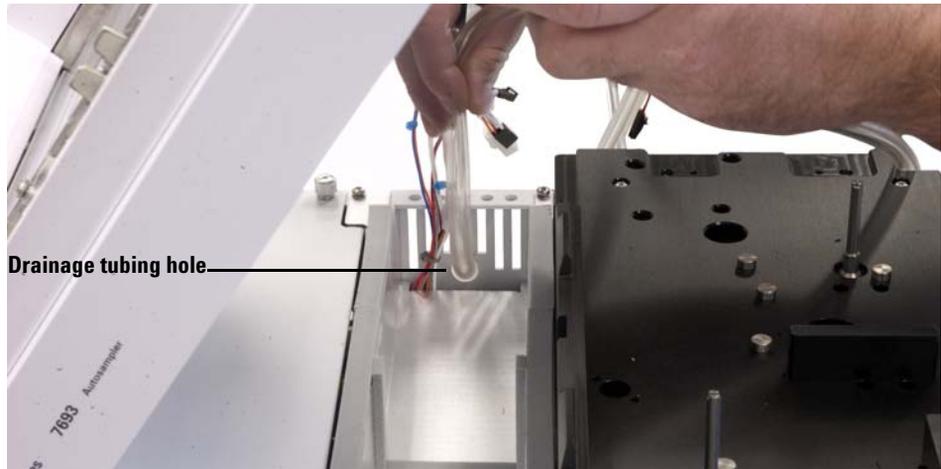


Figure 51 Running the drainage tubing through the hole in the chassis

- 37 Prop the sample tray onto the main frame with the lower part of the Peltier module sitting on the main frame mounting bracket (Figure 52).

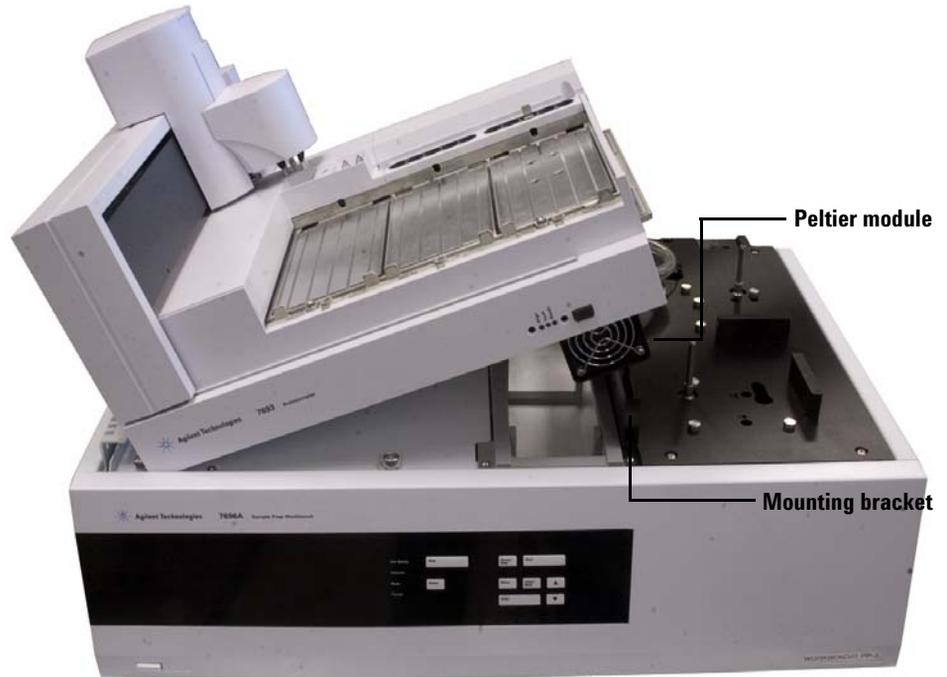


Figure 52 Propping the sample tray on the main frame with the Peltier module sitting on the mounting bracket

38 Connect all cables. Each cable has a unique-sized harness. Do not force a harness to fit into the wrong harness ([Figure 53](#)).



Figure 53 Connecting the cables

39 Tuck the excess tubing into the chassis.

40 While running the drainage tubing through the chassis hole, lower the sample tray onto the main frame chassis (Figure 54) until it sits evenly on the main frame surface (Figure 55).



Figure 54 Lowering the sample tray onto the main frame chassis



Figure 55 Sample tray with Peltier module sitting evenly on the main frame surface

- 41 Check to make sure the cabling and drainage tube on the back of the main frame looks similar to [Figure 56](#) with no protruding cables and a straight, non-kinked tube.

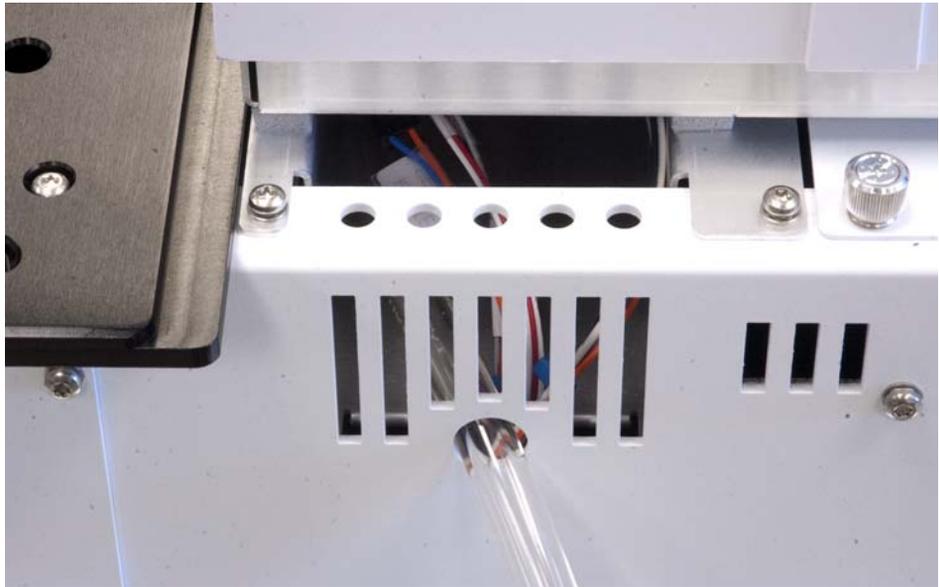


Figure 56 Drainage tubing run correctly through chassis hole, and cabling tucked correctly in opening of main frame chassis

4 Accessories

42 Install the two T-20 Torx screws to secure the sample tray to the main frame mounting bracket (Figure 57).



Figure 57 Securing the sample tray to the main frame mounting bracket

- 43 Install the Peltier module vial racks. See “Installing the Vial Racks” for details (Figure 58).



Figure 58 Installed Peltier module vial racks

The drainage tubing

The tubing must allow for condensate from the Peltier module to drain easily with no back pressure. Make sure that:

- The tubing slopes downward towards the drainage container.
- The tubing is kept straight without kinks that may block the flow.
- The open end of the tubing is not submersed in the drainage container (Figure 59).

- The tubing does not become clogged or dirty. Replace tubing if necessary.

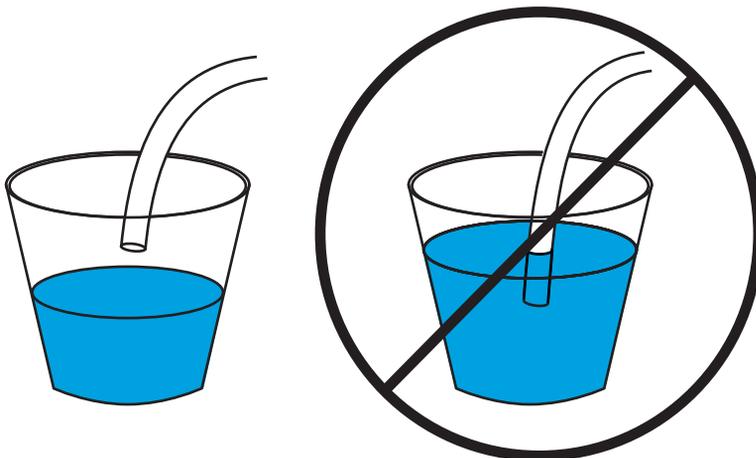


Figure 59 Drainage tube correctly hung (left) and incorrectly submersed (right)

Complete the installation

- 1 Install the towers. See [“Installing the G4513A Tower](#) for details.
- 2 Connect the WorkBench power cable, and power on the WorkBench.
- 3 Calibrate the Sample Prep WorkBench system. See [“Calibrating the Sample Prep WorkBench System](#) for details.

Installing the G4521A Large Volume Syringe Carrier

This section describes how to install the G4521A Large Volume Syringe Carrier accessory onto a G4513A Tower.

To install the large volume syringe carrier:

- 1** Open the Tower door.
- 2** Remove the turret. See [“Replacing the Turret”](#) for details.
- 3** Slide the syringe carrier assembly down until the assembly cable is accessible below the Tower casing, and detach the cable from the assembly.

4 Accessories

- 4 Completely loosen and remove the T-10 Torx screw at the top of the syringe carrier assembly (Figure 60).

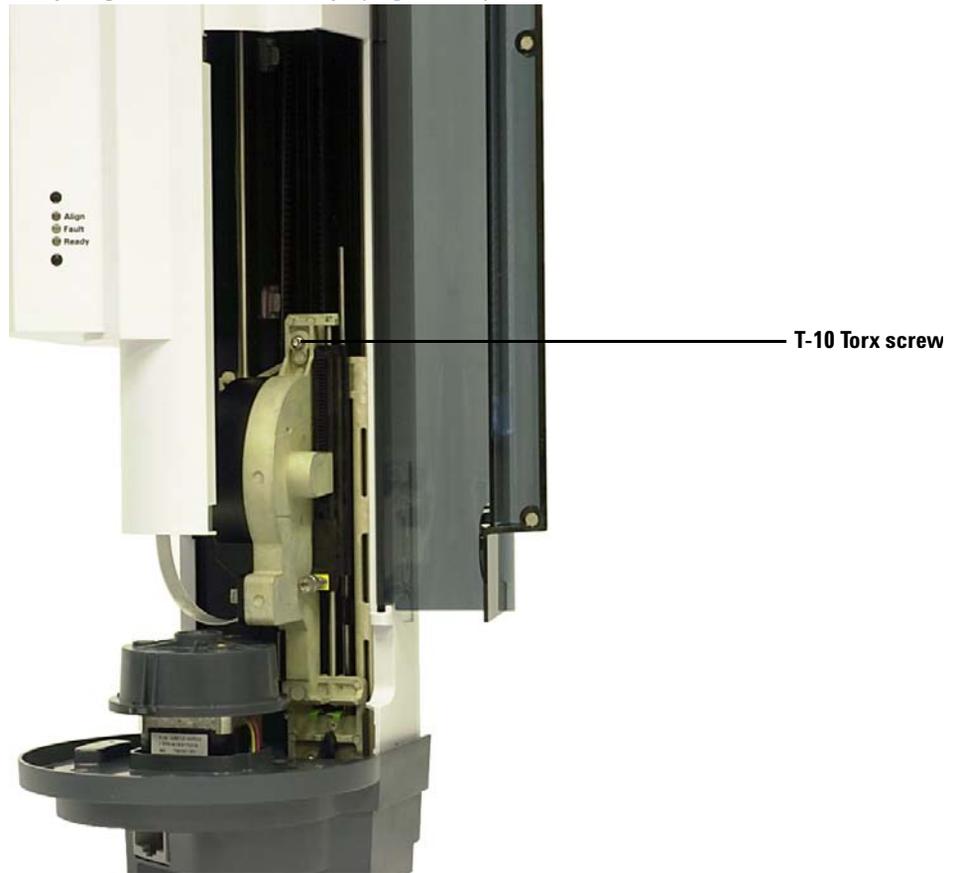


Figure 60 Removing the syringe carrier top T-10 Torx screw

- 5 Slide the syringe carrier assembly completely up until the flange and latch are accessible (Figure 61).

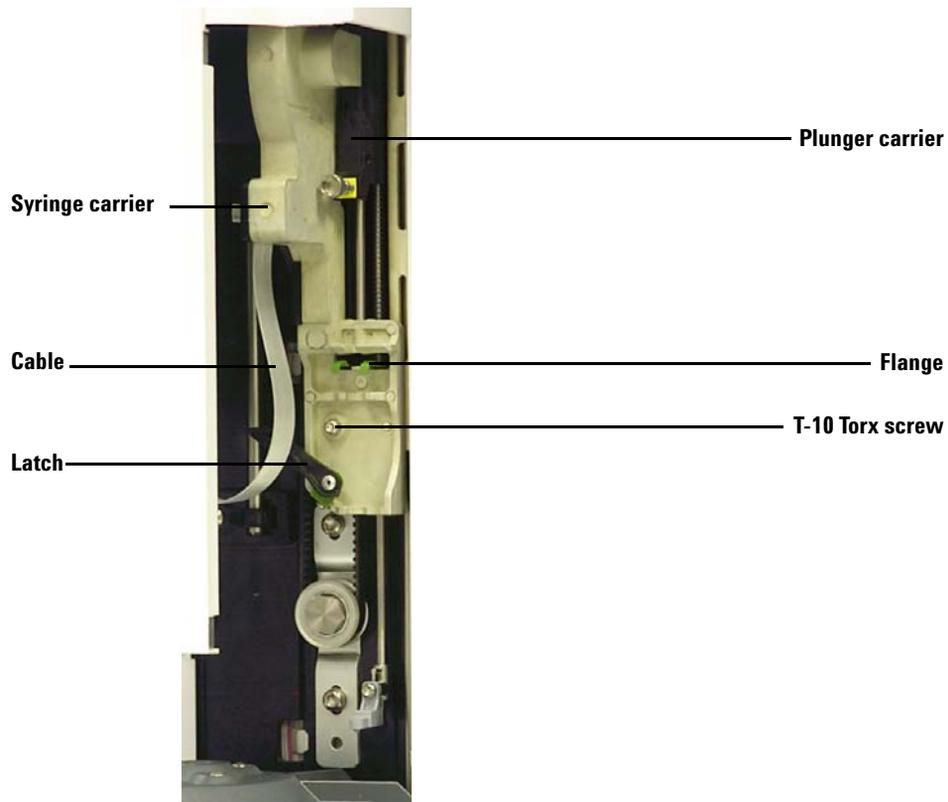


Figure 61 Removing the syringe carrier assembly

4 Accessories

- 6 Completely loosen and remove the T-10 Torx screw above the syringe latch (Figure 62).

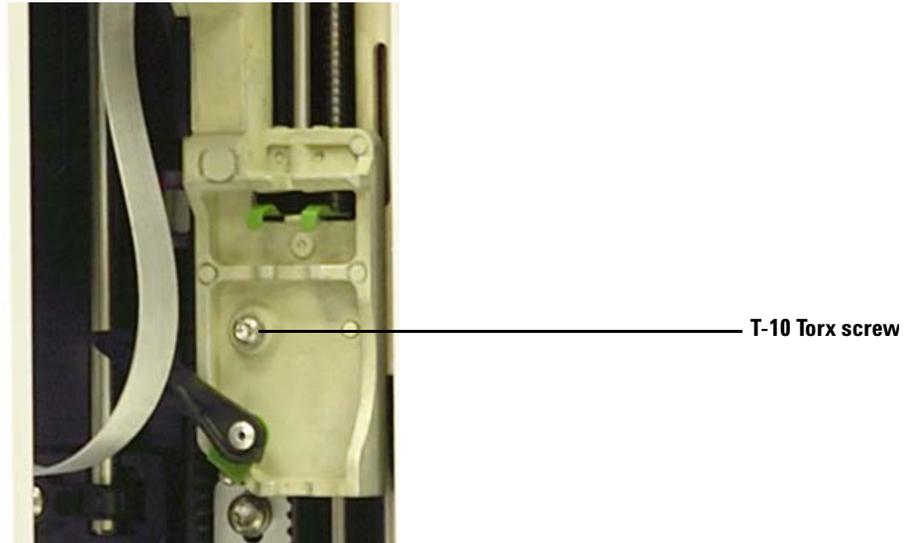


Figure 62 Removing the T-10 Torx screw

- 7 Carefully remove the syringe carrier assembly from the Tower carrier.
- 8 Slowly position the G4521A Large Volume Syringe Carrier on the Tower carrier. The syringe carrier assembly hangs in place when positioned correctly.
- 9 Completely tighten the T-10 Torx screw above the syringe latch.

- 10** Slide the syringe carrier assembly completely down until the cable input jack on the assembly is accessible below the Tower casing ([Figure 63](#)).

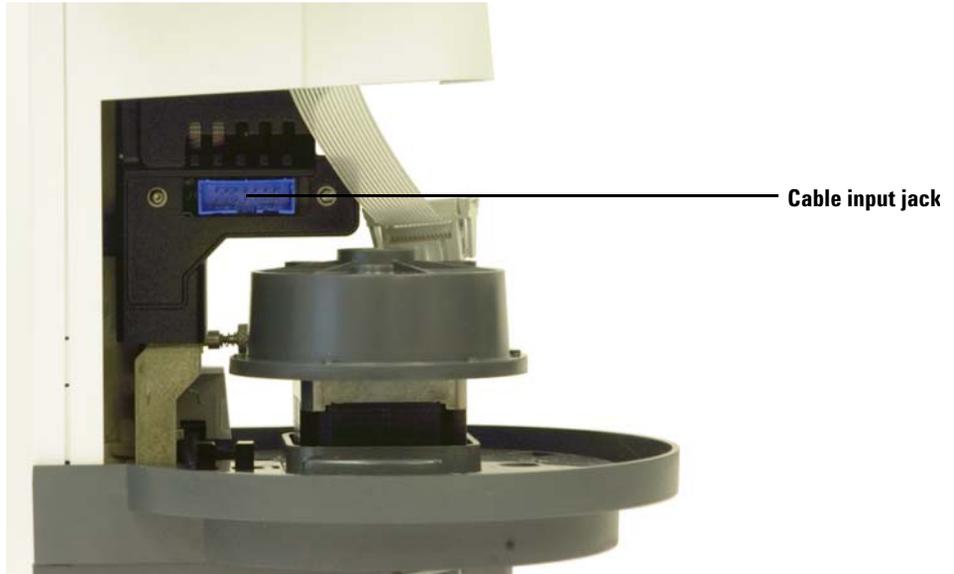


Figure 63 Accessing the cable input jack

- 11** Completely tighten the T-10 Torx screw at the top of the syringe carrier assembly (Figure 64).

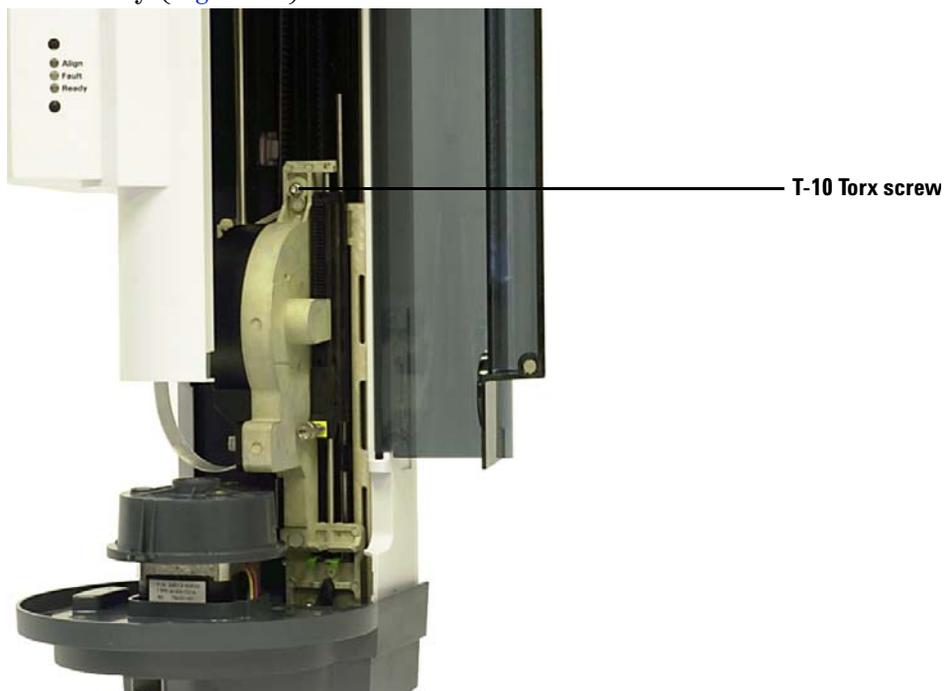
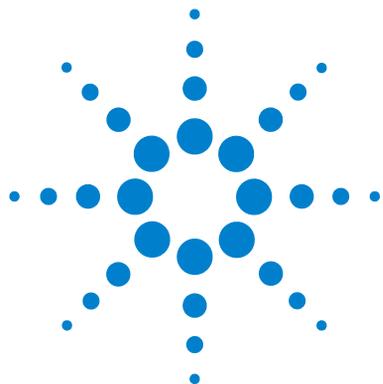


Figure 64 Tightening the screw at the top of the syringe carrier assembly

- 12** Connect the assembly cable to the syringe carrier assembly.
- 13** Slide the syringe carrier assembly completely up.
- 14** Install the large volume syringe needle support foot supplied with the G4521A Large Volume Syringe Carrier. See “[Replacing the Needle Support Foot](#)” for details.
- 15** Reinstall the turret. See “[Replacing the Turret](#)” for details.
- 16** Close the Tower door.

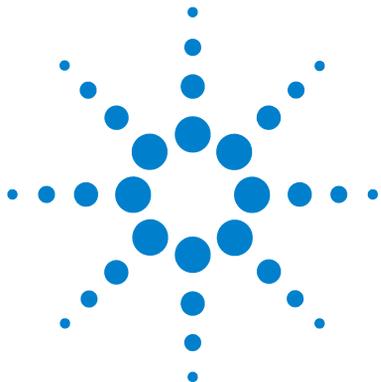


Part 3:

Operation

Introduction to Operation	97
About your 7696A Sample Prep WorkBench	98
Sample Preparation	103
The WorkBench Cycle	105
Configuration	107
Using the Keypad	108
Configuring the 7696A Sample Prep WorkBench	110
Configuring the WorkBench Network Address	112
Configuring the Agilent WorkBench Software	113
Syringes and Needles	115
Selecting a Syringe	116
Inspecting a Syringe	117
Installing a Syringe	118
Removing a Syringe	122
Replacing a Syringe Needle	123
Vials and Bottles	125
Preparing a Sample Vial	126
Preparing Solvent and Waste Bottles	132
Placing Vials and Bottles	134
How Many Sample Vials Can I Run?	137
Running Samples	143
Creating and Running a Sample Prep Method	144
Interrupting a Sample Prep Method or Sequence	145





5 Introduction to Operation

About your 7696A Sample Prep WorkBench 98

Components 98

Features 100

Capabilities 101

Sample Preparation 103

The WorkBench Cycle 105

This chapter describes the components that make up the Agilent 7696A Sample Prep WorkBench, some of the important features of the system, and the software capabilities.



About your 7696A Sample Prep WorkBench

Components

The 7696A Sample Prep WorkBench ([Figure 65](#)) can include the following components:

- Main Frame
- Sample Tray with Bar Code Reader/Mixer/Heater
- Tower (two)
- Large Volume Syringe Carrier
- Peltier Cooler Heater Module
- Agilent WorkBench Software



Figure 65 The 7696A Sample Prep WorkBench

Features

The key features of the Sample Prep WorkBench system include:

- Transfer turrets are provided with the Towers. Each transfer turret has three sample vial transfer locations which are configurable for use in sample preparation. There are six solvent A positions, four solvent B positions, and five waste positions.
- Accessible solvent and waste vial capacity of 20 mL.
- A standard syringe carrier for syringes up to 100 μL .
- An optional large volume syringe carrier with a slow, high-powered motor for syringes over 100 μL .
- A bar code reader/mixer/heater module.
- An optional Peltier Cooler Heater module.

Capabilities

Table 1 summarizes the capabilities of the 7696A Sample Prep WorkBench.

Table 1 7696A Sample Prep WorkBench capabilities

Parameter	Range
Syringe size	1 to 500 μ L
Wash mode	A, B A - A2, B - B2 A - A6, B - B4
Solvent saving	10%, 20%, 30%, 40%, 80% of syringe size (μ L)
Usable volume	1 - 50% of syringe size (μ L)
Sample pumps	0 - 15
Viscosity delay	0 - 7 seconds
Air gap	0 - 10% of syringe size (μ L)
Pre-use washes	0 - 15
Post-use solvent A washes	0 - 15
Post-use solvent B washes	0 - 15
Pre-use solvent A washes	0 - 15
Pre-use solvent B washes	0 - 15
Pre-use dwell	0 - 1 minutes in .01 minute
Post-use dwell	0 - 1 minutes in .01 minute
Sampling offset	On, Off
Variable sampling depth position	2 mm below, 30 mm above

5 Introduction to Operation

Chromatogram C shows the result of washing the syringe with four 80% syringe volume solvent washes. The carryover peaks disappear.

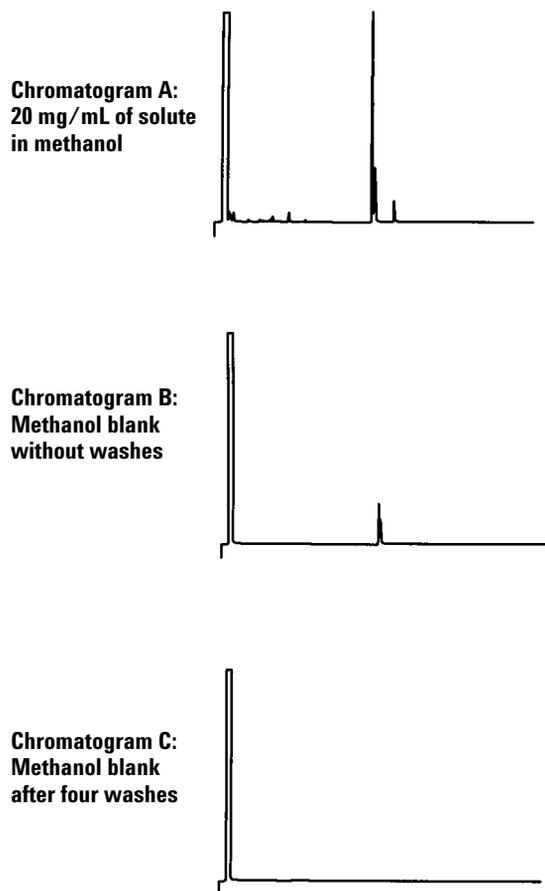


Figure 66 Sample carryover

Sample Preparation

Use the software and WorkBench system to perform tasks such as:

- Sample preparation
- Derivatizations
- Dilutions
- ISTD additions

The integrated hardware and software provide an easy-to-use and robust sample prep system that provides repeatable results, logging, and resource tracking.

About the WorkBench system

The WorkBench system consists of the 7696A WorkBench sample prep hardware and the 7696A WorkBench control software. The system couples the hardware—two automatic liquid samplers, a mixer, a heater, a bar code reader, and a robotic Sample Tray—with the Agilent Easy Sample Prep and Easy Sequence software technology.

The hardware repeatedly and accurately performs physical sample preparation steps, such as dispensing, washing, mixing, heating, agitating, and so on. The software provides an easy-to-use interface for managing these sample preparation steps and preparing series of samples or standards.

In addition, the software also provides resource tracking. Before beginning preparation tasks, you can immediately know whether or not sufficient resources exist to properly complete the work. For example, the software will check whether you have enough empty sample vials or internal standard remaining, then prompt you to replenish these resources before you begin to process any samples.

Using the system

To use the system, follow the workflow shown in [Figure 67](#).

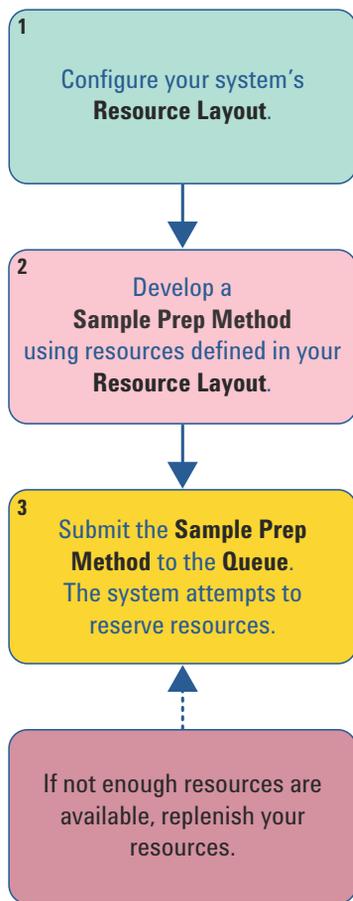


Figure 67 The WorkBench system workflow

Once you have defined your resources, the system will prompt you whenever you need to replenish them.

The WorkBench Cycle

All versions of the Sample Prep WorkBench perform the same basic operations (Table 2).

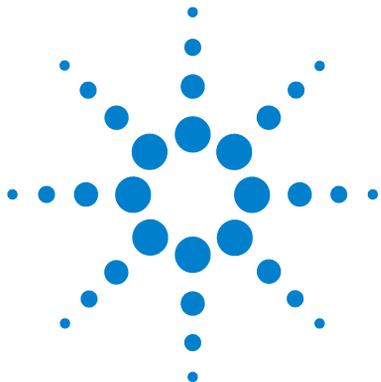
Table 2 The WorkBench cycle

Step	Action	Notes
1	Transport the vial.	<ul style="list-style-type: none"> Move the vial from the tray to the turret.
2	Wash the syringe with solvent.	<ul style="list-style-type: none"> <ul style="list-style-type: none"> a Rotate a solvent bottle under the syringe. b Lower the syringe needle into the solvent. c Draw in solvent. d Raise the syringe needle out of the solvent bottle. e Rotate a waste bottle under the syringe. f Lower the syringe. Depress the plunger to discard solvent. g Raise the syringe needle out of the waste vial. <ul style="list-style-type: none"> The syringe can be washed several times and with more than one solvent. This is controlled by the solvent pre-wash parameters.
3	Wash the syringe with sample.	<ul style="list-style-type: none"> <ul style="list-style-type: none"> a Rotate the sample vial under the syringe. b Lower the syringe needle so that the needle pierces the vial septum and enters the sample. c Draw in sample. d Raise the syringe and needle out of the solvent bottle. e Rotate a waste bottle under the syringe. f Lower the syringe needle. Depress the plunger to discard sample. g Raise the syringe needle out of the waste vial. <ul style="list-style-type: none"> The syringe can be rinsed with sample several times.

5 Introduction to Operation

Table 2 The WorkBench cycle (continued)

Step	Action	Notes
4 Load the syringe with sample.	<p>a Rotate the sample vial under the syringe.</p> <p>b Lower the syringe needle so that it pierces the vial septum.</p> <p>c Draw in sample.</p> <p>d With the needle still in the sample, depress the syringe plunger quickly.</p> <p>e After the final pump, draw in sample.</p> <p>f Raise the syringe needle out of the sample vial.</p>	<ul style="list-style-type: none">• Actions c and d can be repeated several times. The purpose is to expel air bubbles from the syringe.
5 Dispense the contents of the syringe.	<p>a Rotate the turret to position the intended vial with the syringe.</p> <p>b Lower the syringe needle so that it pierces the vial septum.</p> <p>c Depress the syringe plunger to dispense the contents into the vial.</p> <p>d Raise the syringe needle out of the vial.</p>	
6 Wash the syringe with solvent.	<ul style="list-style-type: none">• Same as step 2, but according to the post-use parameters.	
7 Transport the sample vial.	<ul style="list-style-type: none">• Return the sample vial to its intended tray location.	
8 Perform repeat sample preparation.	<ul style="list-style-type: none">• If so programmed, the WorkBench repeats the cycle from step 1.	



6 Configuration

Using the Keypad	108
Configuring the 7696A Sample Prep WorkBench	110
Configuring the WorkBench Network Address	112
Configuring the Agilent WorkBench Software	113

This chapter describes how to configure the 7696A Sample Prep WorkBench hardware and software.



Using the Keypad

The 7696A Sample Prep WorkBench keypad (Figure 68) is used to start, pause, and abort a sample prep method, to configure and calibrate the instrument, and to view the current instrument status.

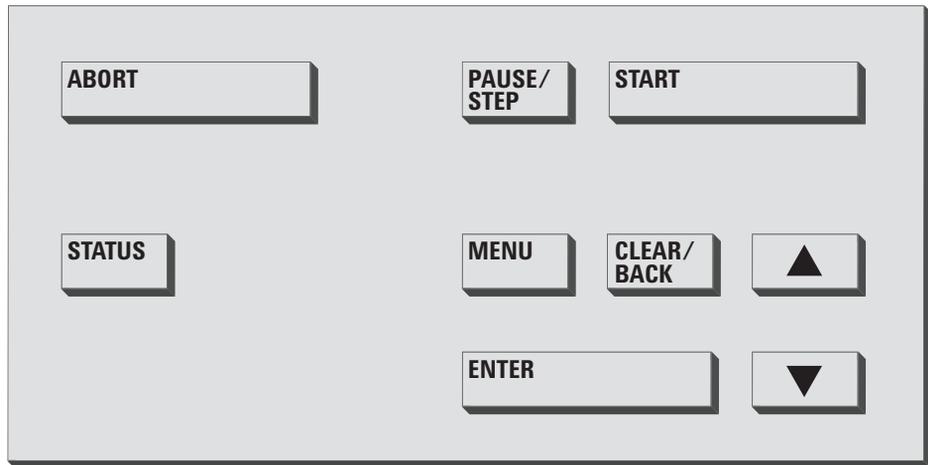


Figure 68 The 7696A Sample Prep WorkBench keypad

The following control keys are available:

Abort – The **[Abort]** key immediately halts all WorkBench operations and aborts the current sample prep method.

Pause/Step – The **[Pause/Step]** key pauses the WorkBench at the completion of the currently running step. The WorkBench system remains in the paused state until the **[Start]** key is pressed.

NOTE

The Towers may pause in a state that does not allow access to the syringe or certain vials in the turret.

Start – The **[Start]** key starts a sample prep method. If the WorkBench system is in a paused state, the **[Start]** key clears the paused state and resumes any pending operations.

Status – The **[Status]** key toggles between the operational status and the hardware status.

The operational status displays the readiness state (Ready, Not Ready), the current operational state (Idle, Sample prep in progress, Pause pending, or Paused), the current command execution state (Moving Vials, Mixing Sample, Heating Sample, and so forth), and any fault information.

The hardware status displays the vial heater temperature, the tray heater temperature (if installed), the tray chiller temperature (if installed), and the center vial rack temperature.

Menu – The **[Menu]** key navigates to the configuration parameters menu.

Clear/Back – The **[Clear/Back]** key clears the currently-selected parameter or navigates to the previous menu.

Enter – The **[Enter]** key selects the current menu item or confirms new parameter values.

Up/Down Arrows – The **[Up/Down]** arrow keys navigate menu items and scroll incrementally through parameter values.

Configuring the 7696A Sample Prep WorkBench

Configure the following parameters by using the keypad (Figure 68) and display screen (Figure 69) located on the front of the WorkBench.

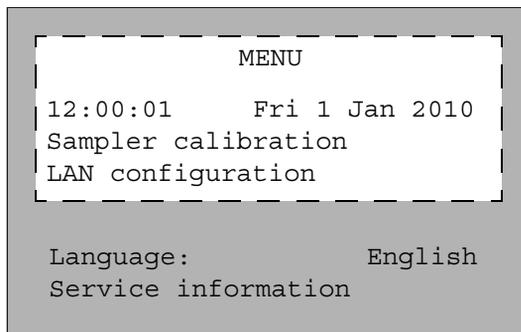


Figure 69 The 7696A Sample Prep WorkBench front display

Date and Time – Configure the date and time for the WorkBench. To set the date and time, scroll to the date and time, press **[Enter]** on the keypad, and use the up and down arrows to scroll to the correct values. Press **[Enter]** when finished setting each value.

Sampler calibration – The **Sampler calibration** option calibrates the Sample Prep WorkBench system. When started, the WorkBench performs a series of tests that align the Sample Tray with the turret positions. Calibration should be done if a calibration does not exist and as a routine maintenance procedure. Calibrating the Sample Prep WorkBench system is recommended if any Sample Prep WorkBench components are moved. See [Calibrating the Sample Prep WorkBench](#) for more information.

LAN configuration – The LAN configuration allows you to view or configure the WorkBench’s IP address, gateway, subnet mask, and MAC address, and to enable or disable DHCP for the instrument.

Language – Set the user interface language for the WorkBench display screen. You can choose English, Chinese, or Japanese. To change the language, scroll to **Language** with the up and down arrow keys, press **[Enter]** on the keypad, and use the arrow keys to select your desired language. Press **[Enter]** to select the language.

Service information – The **Service information** section displays information such as the device’s serial number, date of manufacture, firmware version, firmware date, and calibration data (Sample Tray only) for each WorkBench component.

Configuring the WorkBench Network Address

You must configure your instrument's network address before you can connect to the instrument.

Use the WorkBench front keypad to set the network address:

- 1** Press **[Menu]**.
- 2** Navigate to LAN Configuration using the **[Up/Down]** arrow keys, and press **[Enter]**. The IP address (**IP**), Gateway address (**GW**), and Subnet Mask (**SM**) display on the screen.
- 3** Use the **[Up/Down]** arrow keys to scroll to the desired network configuration, and press **[Enter]** to make changes to the network address. An asterisk (*) appears next to the value you are currently editing.
 - To change a value, use the **[Up/Down]** arrow keys.
 - To save the current value and move to the next value, press **[Enter]**.
 - Press **[Clear/Back]** to cancel.

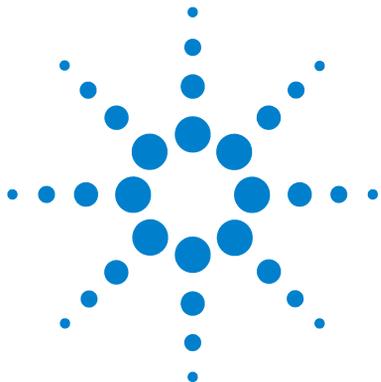
When finished, the WorkBench system must be turned off and on again for the network changes to take effect.

Configuring the Agilent WorkBench Software

Once you have completed the Agilent WorkBench Software installation, you must configure the software for use with the 7696A Sample Prep WorkBench system.

If the **Setup Wizard - Instruments** screen is not currently open, navigate to **Programs > Agilent WorkBench > Add Instrument** from the Microsoft Windows Start menu. The **Setup Wizard - Instruments** screen opens.

Refer to the software's online help for further instructions.



7 Syringes and Needles

Selecting a Syringe	116
Inspecting a Syringe	117
Installing a Syringe	118
Removing a Syringe	122
Replacing a Syringe Needle	123

The Tower uses syringes as the sample-handling device. This chapter describes their properties and uses.



Selecting a Syringe

Select the syringe type based on the largest volume of liquid you want to make. To select a syringe, refer to the Agilent catalog for consumables and supplies for part numbers and ordering information.

Use syringe needles with a conical tip. Do not use sharp-tipped needles. They tear the inlet septum and cause leaks (Figure 70 and Figure 71).

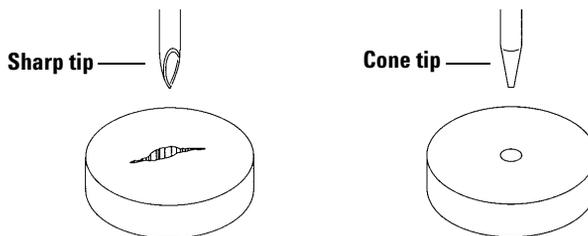


Figure 70 Needle tips

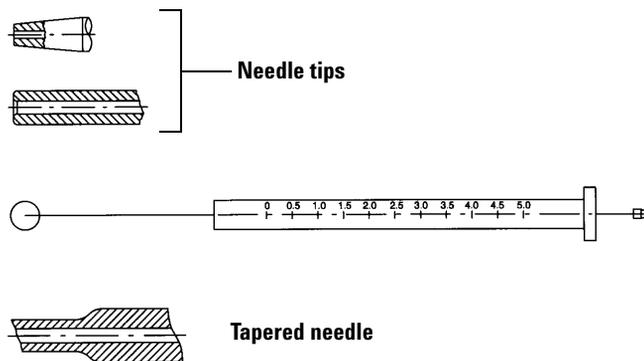


Figure 71 Needle shapes

Inspecting a Syringe

WARNING

The syringe needle is sharp and can cause injury. Handle the syringe needle with care.

Before installing a syringe:

- 1 Roll the syringe on the edge of a clean flat surface. If the tip of the needle moves in a circle, straighten the shaft by bending it slightly near where it connects to the syringe barrel and check it again (Figure 72).

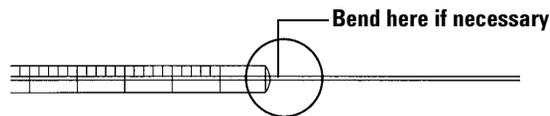


Figure 72 Inspecting the syringe

- 2 Check for a rough needle. The needle surface may have closely spaced concentric ridges that act like a miniature file and abrade pieces of the septum into the inlet or vial. The ridges are easy to see under 10X magnification.

If there are ridges, polish the needle by pulling it through a folded piece of fine emery paper between your finger and thumb until the ridges are gone. Be careful not to modify the tip of the syringe.

- 3 Check for a sticky plunger. Slide the plunger of the syringe up and down a few times. It should move smoothly without sticking or binding. If it is sticky, remove the plunger and clean it with solvent.

Installing a Syringe

WARNING

The syringe needle is sharp and can cause injury. Handle the syringe needle with care.

To install a syringe (Figure 73):

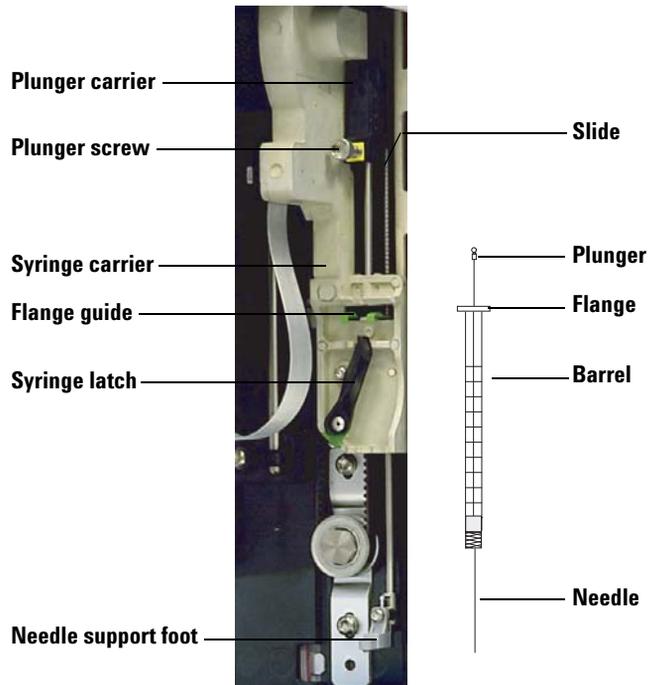


Figure 73 Installing a syringe

- 1 If desired, unplug the tower cable and lay the tower on a flat surface such as a work bench.
- 2 Open the tower door.
- 3 Slide the syringe carriage to the top position.
- 4 Open the syringe latch by swinging it in a counterclockwise direction.

- 5 Lift the plunger carrier to the top position.
- 6 Carefully pass the syringe needle through the guide hole in the needle support foot.

7 Syringes and Needles

- Align the syringe flange with the flange guide and press the syringe into place, keeping the needle end in the guide hole of the needle support foot. Make sure that the flat edge of the syringe flange faces out (Figure 74).

NOTE

Failure to correctly install the syringe flange into the flange guide will result in damage to the syringe plunger.

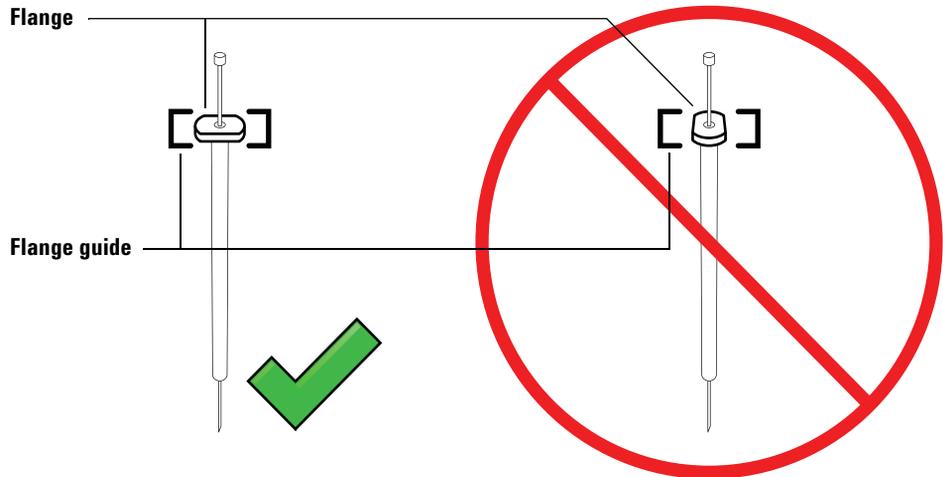


Figure 74 Syringe flange orientation

- Close the syringe latch by swinging it clockwise until it snaps in place.
- Loosen the plunger screw entirely by turning it counterclockwise until the stop is reached.
- Slide the plunger carrier down until it is completely over the syringe plunger, and tighten the plunger thumb screw until finger-tight.
- Manually move the plunger carrier up and down. If the syringe plunger does not move along with the carrier, repeat the previous steps until installed correctly. Be sure the plunger thumb screw is secure and tight. If the carrier is not completely attached to the syringe plunger it may become detached after a few injections.

CAUTION

Repeating this movement can damage the syringe.

- 12 Verify that the needle is inside the guide hole of the needle support foot. The needle should be straight and pass freely through the needle guide hole.

If the needle is bent or is outside the guide hole, remove the syringe and reinstall. See [Figure 75](#) for a properly installed syringe.

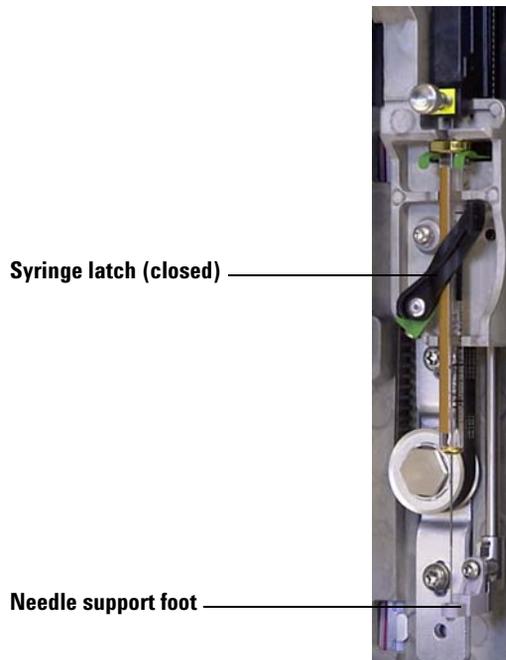


Figure 75 Syringe carriage and needle support with syringe installed

- 13 Close the tower door.
- 14 Calibrate the Sample Prep Workbench system. See [“Calibrating the Sample Prep WorkBench”](#) for details.

Removing a Syringe

CAUTION

The syringe needle is sharp and can cause injury. Handle the syringe needle with care.

To remove a syringe:

- 1 If desired, unplug the tower cable and lay the tower on a flat surface such as a work bench.
- 2 Open the tower door.
- 3 Slide the syringe carriage to the top position.
- 4 Completely loosen the plunger thumb screw until it reaches the stop, and lift the plunger carrier off of the syringe plunger.
- 5 Open the syringe latch by swinging it in a counterclockwise direction.

CAUTION

Be careful not to bend the syringe needle. Only pull the syringe out of the carriage until clear. The needle bends easily when still seated in the needle support guide.

- 6 Carefully pull the top of the syringe out of the flange guide, then lift the needle out of the needle support foot.

To install a syringe, see [“Installing a Syringe”](#) for details.

Replacing a Syringe Needle

CAUTION

The syringe needle is sharp and can cause injury. Handle the syringe needle with care.

The stainless steel needles used for 250- μm and 320- μm injections must be inserted into a glass syringe barrel.

Needles for 250- μm injections have silver-colored stops. Needles for 320- μm injections have gold-colored stops. See your Agilent consumables and supplies catalog or the Agilent web site (www.agilent.com/chem) for a list of syringes and needles.

To insert a needle into a syringe barrel (Figure 76):

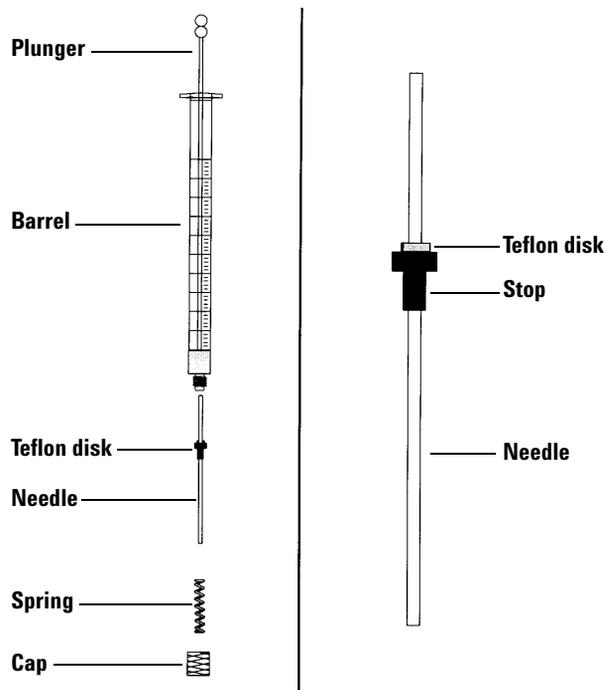
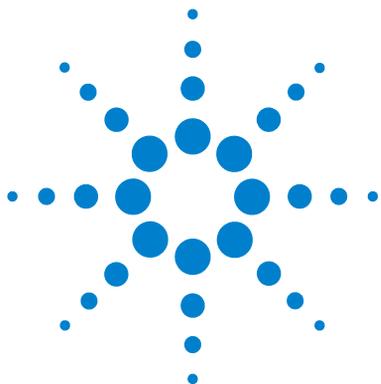


Figure 76 Syringe parts

7 Syringes and Needles

- 1 Unscrew the syringe barrel cap and remove the spring.
- 2 Make sure the needle has a Teflon disk ([Figure 76](#)). If the syringe barrel does not have the Teflon disk, use the instructions in the syringe box to wrap the needle yourself.
- 3 Slide the spring and the cap down over the needle.
- 4 Insert the needle into the syringe barrel.
- 5 Screw the cap back on the syringe barrel.



8 Vials and Bottles

Preparing a Sample Vial	126
Select a sample vial	126
Select a vial septa	127
Fill a sample vial	129
Label a sample vial	128
Cap a sample vial	130
Preparing Solvent and Waste Bottles	132
Select the bottles	132
Fill the solvent bottles	133
Prepare the waste bottles	133
Placing Vials and Bottles	134
Place vials and bottles in the turret	134
Place vials and bottles in the Sample Tray	136
How Many Sample Vials Can I Run?	137
Solvent bottle equation	138
Waste bottle equation	138
Example	139

This chapter describes sample vials, solvent bottles, and waste bottles, including how to place them in the Sample Tray or turret. It also discusses how to estimate the maximum number of samples that can be run before solvent bottles must be refilled or waste bottles must be emptied.



Preparing a Sample Vial

Select a sample vial

The Tower and Sample Tray use clear or amber glass sample vials with crimp caps, or screw-cap vials. Use amber glass vials for light-sensitive samples. Refer to your Agilent catalog for consumables and supplies for acceptable vial types. Incompatible sample vials cause tray and turret errors.

Figure 77 shows the critical dimensions for sample vials used with the 7696A Sample Prep WorkBench. These dimensions do not make up a complete set of specifications.

Body Diameter (BD) = 11.7 ± 0.2
 Cap Diameter (CD) = $BD \times 1.03$ maximum
 All dimensions in millimeters

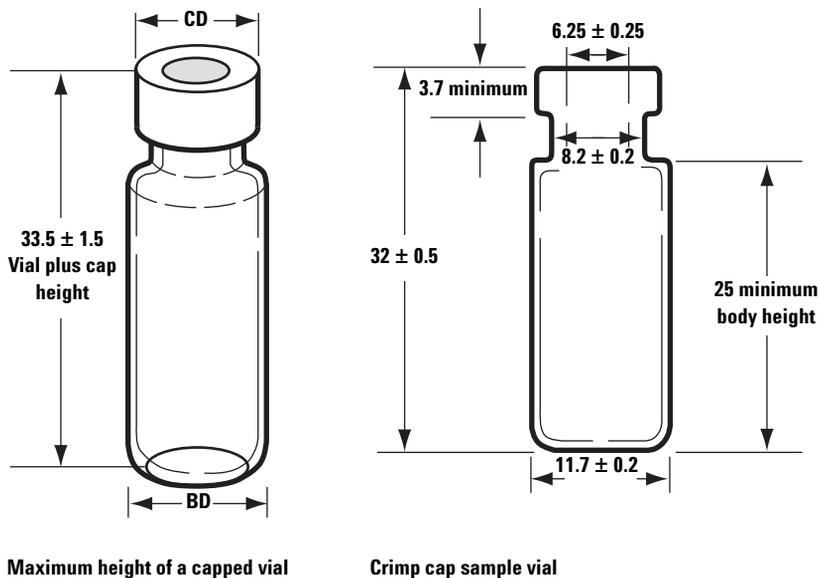


Figure 77 Sample vial dimensions

Select a vial septa

There are two types of septa used with crimp caps and screw-on caps, each with different resealing characteristics and different resistance to solvents.

- One type is natural rubber formulation coated with Teflon on the sample side. This septum is suitable for samples with a pH range of 4.0 to 7.5. They are less resistant to solvents after puncture and are more easily cored than silicone rubber septa. Coring may deposit septum pieces in the vial and affect your chromatograms.
- Another is high-quality, low-extractable silicone rubber septa, coated with Teflon on one or both sides. They are more resistant to solvents after puncture and to coring by the needle.

Refer to your Agilent catalog for consumables and supplies for more information.

Figure 78 shows the diameter for vial cap apertures.

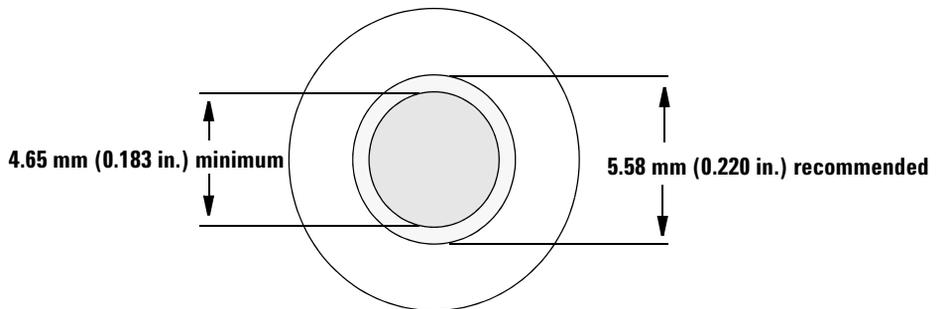


Figure 78 Vial cap aperture specifications

Label a sample vial

Some vials are available with a write-on spot for easy marking. If you choose to make and apply your own labels, Agilent Technologies recommends the positioning and maximum label thickness shown in Figure 79.

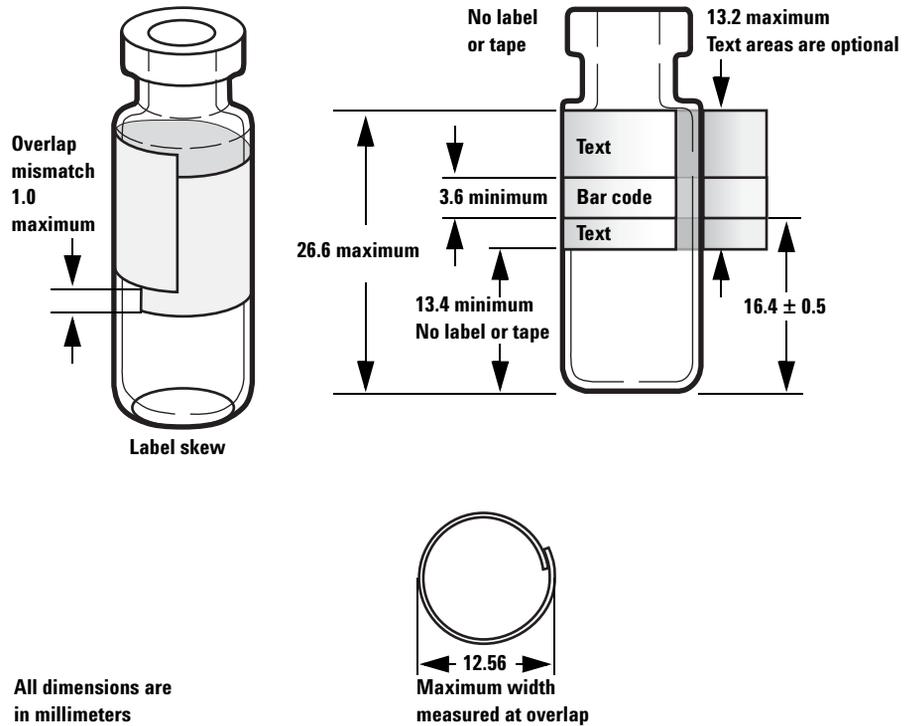


Figure 79 Sample vial label dimensions

CAUTION

Correct sample vial dimensions are critical for proper gripper operation. Vials and labels that do not meet these specifications may cause sampler errors. Service calls and repairs found to be due to vials and microvials that do not meet these specifications are not covered under warranty or the service contract.

Fill a sample vial

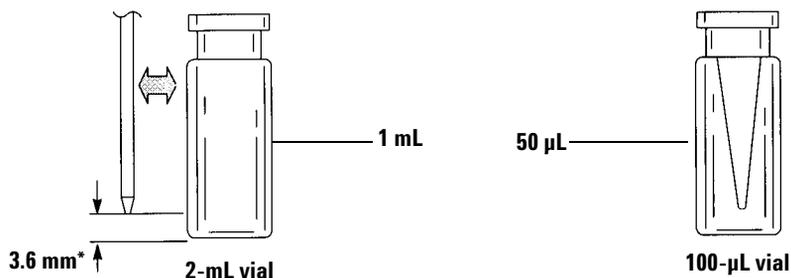
Figure 80 shows the recommended fill volumes for sample vials of:

- 1 mL for the 2-mL vial
- 50 μL for the 100- μL vial

The air space in the vial is necessary to avoid forming a vacuum when sample is withdrawn. This could affect reproducibility.

CAUTION

Do not dispense air into the vials to prevent this vacuum. This often damages the cap seal and may damage syringe needles.



* Needle position based on default sampling depth.

Figure 80 Recommended fill volumes for sample vials

When developing your method, keep the following in mind:

- If you need to test a large amount of sample over repeated uses, divide the sample among several vials to obtain reliable results.
- When sample volume in the vial is low, contaminants from the previous sample or solvent washes may have a greater impact on the sample.

If you change suppliers, you may need to redevelop your method. Differing manufacturing practices for vial hardware sometimes cause variances in your results.

Cap a sample vial

CAUTION

If using a sample vial with a screw cap top, be sure to completely tighten the screw cap before use.

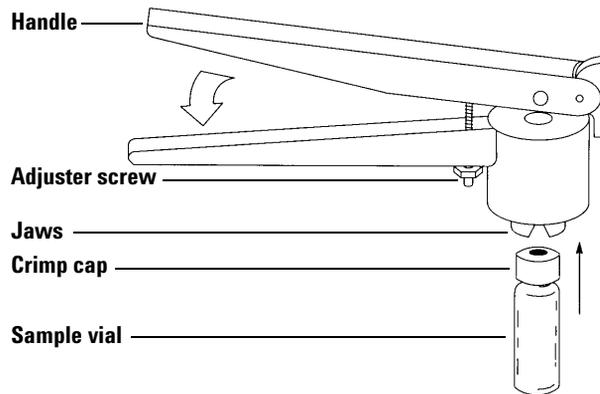


Figure 81 Crimping caps

To install the airtight crimp caps:

- 1 Clean the inside surfaces of the crimper jaws.
- 2 Place the crimp cap over the top of the vial.
- 3 Lift the vial into the crimper. Squeeze the handle until it reaches the adjuster screw.

Figure 82 shows acceptable and unacceptable vial caps.

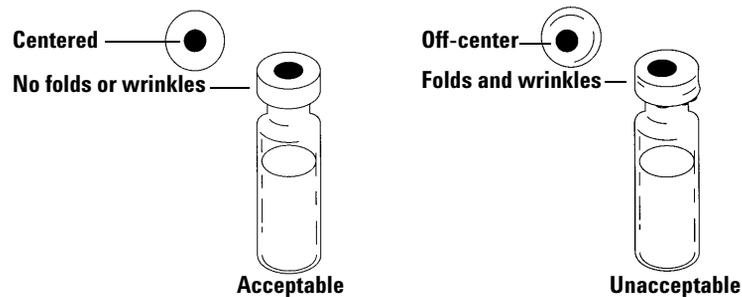


Figure 82 Acceptable and unacceptable caps

Check each vial for proper crimping:

- 1** Be sure there are no folds or wrinkles on the part of the cap that wraps under the neck of the vial. To remove folds or wrinkles, turn the vial about 10° and crimp it again. Adjust the crimper for a looser crimp by turning the adjusting screw clockwise.
- 2** The cap should be finger-tight. If the cap is loose, adjust the crimper for a tighter crimp by turning the adjusting screw counterclockwise. Crimp the cap again. If the cap is too tight, the septum will distort and the vial may leak.
- 3** Be sure that each cap has a flat septum centered over the top of the vial.
 - If the septum is not flat, remove the cap, turn the crimper adjusting screw clockwise, and try again.
 - If the cap is not centered, remove the cap and make sure the new cap is flat on the top of the vial before you squeeze the crimper.

Preparing Solvent and Waste Bottles

The solvent bottles hold solvent for rinsing the syringe between uses. The Tower dispenses the solvent washes and sample washes into waste bottles. The number of samples that can be analyzed may be limited by the wash or waste bottle capacity.

Select the bottles

Solvent and waste bottles can be closed with either diffusion caps (a plastic cap with a hole; it retards evaporation while letting the needle enter freely) or septa. Agilent Technologies recommends diffusion caps (Figure 83) over septa for two reasons:

- The diffusion cap allows multiple entrances into a bottle without contaminating the liquid inside the bottle with small pieces of septum material.
- For common solvents, the rate of diffusion out of the bottle is less with a diffusion cap than with a septum that has been punctured multiple times with a standard syringe needle.

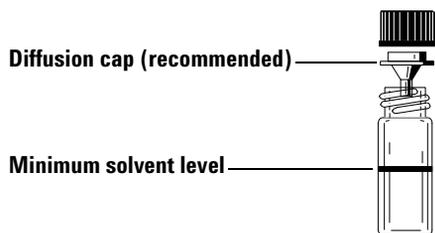


Figure 83 Four milliliter bottle used for solvent or waste

Fill the solvent bottles

Rinse and fill each solvent bottle with 4 mL of fresh solvent. The liquid level will be near the shoulder of the bottle. Good laboratory practice dictates using no more than 2.0 mL of the 4 mL solvent for syringe washes. The needle tip draws solvent 18.5 mm from the bottom of the vial (Figure 84).

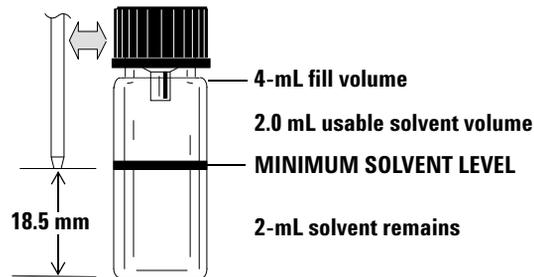


Figure 84 Needle tip position when withdrawing solvent

Prepare the waste bottles

Empty and rinse each waste bottle after each multiple vial run. The syringe can discard about 4 mL of waste into the waste bottle (Figure 85).

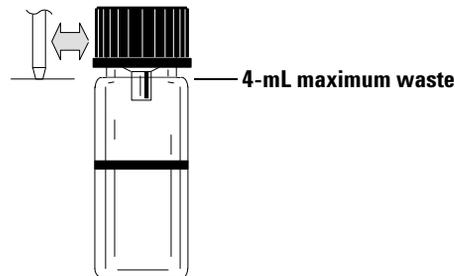


Figure 85 Needle tip position when discharging waste

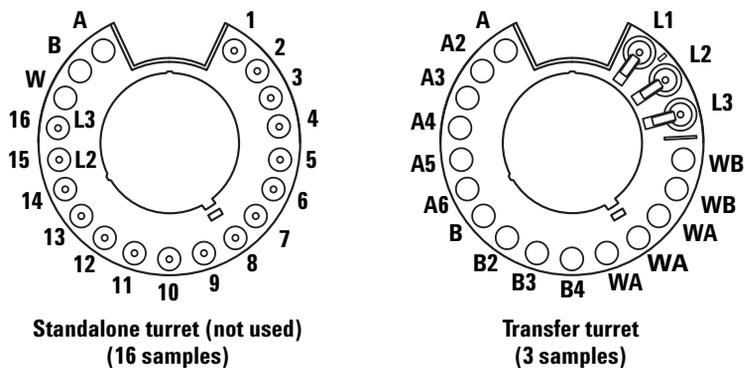
Placing Vials and Bottles

Place vials and bottles in the turret

Two turrets are provided with the G4513A Tower (Figure 86). The 16-sample standalone turret (not used), and the 3-sample transfer turret.

NOTE

The WorkBench system only uses the 3-sample transfer turret.



Top views.

Figure 86 Turrets

The labeled positions are defined in Table 3 and Table 4.

Table 3 Standalone turret labels (not used)

Position	Label	Bottle/Vial
1 through 14	1 through 14	Sample vials
15	15 L2	Sample vial Layer 2 bottle

Table 3 Standalone turret labels (not used) (continued)

Position	Label	Bottle/Vial
16	16 L3	Sample vial Layer 3 bottle
17	W	Waste bottle
18	B	Solvent B bottle
19	A	Solvent A bottle

Table 4 Transfer turret labels

Position	Label	Bottle/Vial
1	L1	Dedicated vial transfer position A Layer 1 bottle
2	L2	Configurable vial transfer position B Layer 2 bottle
3	L3	Configurable vial transfer position C Layer 3 bottle
4 and 5	WB	Waste B1 - B2 bottles
6 through 8	WA	Waste A1 - A3 bottles
9 through 12	B - B4	Solvent B1 - B4 bottles
13 through 18	A - A6	Solvent A1 - A6 bottles

Place vials and bottles in the Sample Tray

Place up to 150 vials in the three vial racks according to your sample prep method. [Figure 87](#) shows a top view of your Sample Tray using tray positions 6 through 21.

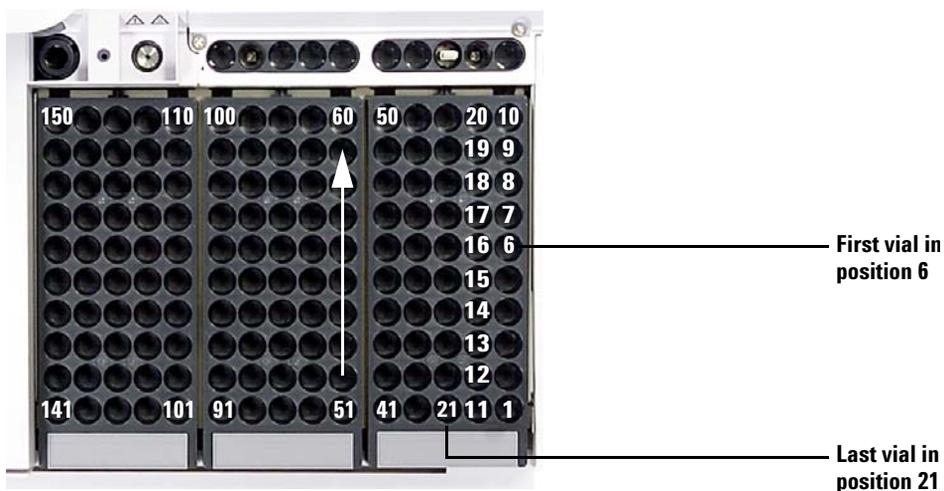


Figure 87 Loading Sample Tray positions

How Many Sample Vials Can I Run?

The number of sample vials that you can run at one time is determined by the following parameters for your application:

- The number of sample uses intended per prepared sample vial.
- The syringe size used: 1 μL to 500 μL .
- The syringe wash volume (Table 5)
- The number of solvent washes (both pre- and post-use) required from each solvent bottle.
- The number of sample washes and solvent washes per prepared sample that the syringe discards into each waste bottle.
- Number of waste bottles.

Table 5 Syringe wash volumes

Syringe Size (μL)	80% syringe volume μL	40% syringe volume μL	30% syringe volume μL	20% syringe volume μL	10% syringe volume μL
1	0.8	0.4	0.3	0.2	0.1
2	1.6	0.8	0.6	0.4	0.2
5	4	2	1.5	1	0.5
10	8	4	3	2	1
25	20	10	7.5	5	2.5
50	40	20	15	10	5
100	80	40	30	20	10
250	200	100	75	50	25
500	400	200	150	100	50

Solvent bottle equation

CAUTION

The number of sample vials given by these equations are estimates. Solvent characteristics such as evaporation rate and surface tension may affect the capacity of the bottles.

This equation estimates the maximum number of sample vials you can run from **one** solvent bottle.

Maximum number of sample vials **per solvent bottle**

$$= \frac{2000}{V_W \times N_{SI} \times N_{SW}}$$

where:

V_W = Volume of Wash in μL taken from [Table 5](#)

N_{SI} = Number of sample injections intended to be taken from each sample vial

N_{SW} = Number of Solvent washes (pre and post) per sample injected

Waste bottle equation

This equation estimates the maximum number of sample vials you can run per one waste vial type (A or B).

Maximum number of sample vials per waste bottles used (WA or WB)

$$= \frac{V_{Waste}}{W_{Wash} \times N_{SI} \times N_{SS}} \times W$$

where:

V_{Waste} = Volume of waste bottles used in μL . Use 4000.

V_{Wash} = Volume of wash in μL taken from [Table 5](#)

N_{SI} = Number of sample injections intended to be taken from each sample vial

N_{SS} = Total number of pre- and post-solvent A or solvent B washes and sample washes per sample injected. When using both solvent A and B, the sample wash is divided evenly between all four waste bottles in the 1-sample turret

W = Waste vial usage.

Standalone, W = 1

Transfer, W = 3 for waste A, W = 2 for waste B

Example

Your application parameters are:

- Two intended sample injections per prepared sample vial
- Three washes from solvent bottle A
- Two washes from solvent bottle B
- Two sample washes
- 10- μL syringe
- 80% wash volume (default)

1 Substitute the parameters of your application into the solvent bottle equation:

For Solvent A

V_{W} = 8 from [Table 5](#)

N_{SI} = 2

N_{SW} = 3

Maximum number of sample vials per solvent bottle

$$= \frac{2000}{8 \times 2 \times 3} = 41$$

For Solvent B

$V_W = 8$ from Table 5

$N_{SI} = 2$

$N_{SW} = 2$

Maximum number of sample vials per solvent bottle

$$= \frac{2000}{8 \times 2 \times 2} = 62$$

- 2 Substitute the parameters of your application into the waste bottle equation:

For Waste A

$V_{Waste} =$ Use 12000 for the 3-sample transfer turret

$V_{Wash} = 8$ from Table 5

$N_{SI} = 2$

$N_{SS} = 3$ (solvent A washes) + 1 (Sample wash) = 4

Maximum number of sample vials per waste bottles used (WA)

$$= \frac{12000}{8 \times 2 \times 4} = 187.5$$

For Waste B

$V_{\text{Waste}} = \text{Use } 8000 \text{ for the 3-sample transfer turret}$

$V_{\text{Wash}} = 8 \text{ from Table 5}$

$N_{\text{SI}} = 2$

$N_{\text{SS}} = 2 \text{ (solvent B washes)} + 1 \text{ (sample wash)} = 3$

Maximum number of sample vials per waste bottles used (WB)

$$= \frac{8000}{8 \times 2 \times 3} = 166$$

3 Analyze the results keeping the following in mind:

- The 3-sample transfer turret has 3 waste A bottles and 2 waste B bottles. If solvent A is used, all waste A bottles must be used. If solvent B is used, all waste B bottles must be used.
- Sample washes are evenly distributed to all waste bottles used.
- The Tower can be configured to use 1 A, 1 B; 2 A's, 2 B's; or all 6 A's and 4 B's.

Using a single solvent bottle of each type, all five waste bottles must be used; 41 vials can be run. Using two solvent A bottles and two solvent B bottles, 84 vials can be run. If you use three solvent A bottles and three solvent B bottles, you can run 150 vials which is the tray capacity limit.

CAUTION

We strongly recommend that *all* waste positions in *all* turrets contain bottles at *all* times, regardless of which ones are actually used in the current configuration. This protects against accidental discharge of solvent into the turret body, which could damage it.

Reduced solvent and sample usage

Solvent and sample washes by default use 80% of the syringe capacity. Solvent and sample can be conserved by reducing this volume. This is done by configuring each Tower's solvent saving setting.

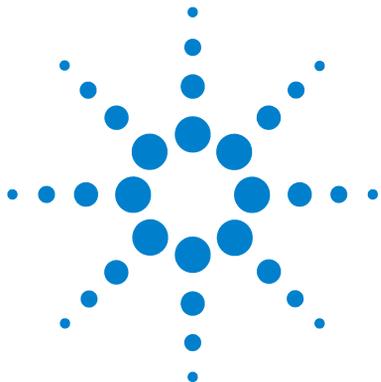
CAUTION

Teflon-tipped syringes must be used to lubricate the barrel wall. Standard syringes, will fail quickly with limited lubrication.

The solvent wash can be set to use less than the usual 80%. This modifies the solvent wash process as follows:

- 1 The syringe draws in solvent to the percent specified, which can be as little as 10% of the syringe size.
- 2 The syringe and needle rise out of the solvent bottle.
- 3 The plunger rises to the 80% mark, rinsing the syringe barrel with solvent, followed by air.
- 4 The solvent and air are discharged into a waste bottle.

Confirm that sample carryover is not a problem with the reduced solvent washes.



9 Running Samples

Creating and Running a Sample Prep Method	144
Interrupting a Sample Prep Method or Sequence	145
WorkBench response to interruptions	145
Restarting an interrupted Sample Prep Method	145

This chapter describes the process for running one or more samples.



Creating and Running a Sample Prep Method

WARNING

When running a Sample Prep Method, keep your hands away from the syringe needle. The needle is sharp and may contain hazardous chemicals.

To create and run a sample prep method:

- 1 Load your Sample Tray resources:
 - a Install a clean syringe. See [Installing a Syringe](#).
 - b Fill your solvent bottles and empty your waste bottles. See [Preparing Solvent and Waste Bottles](#).
 - c Place the solvent and waste bottles in the turret or tray. See [Placing Vials and Bottles](#).
 - d Load your resources into the Sample Tray. See [Preparing a Sample Vial](#).
- 2 Using the Agilent WorkBench Software:
 - a Define your resources with the Sample Prep Resource Layout Editor.
 - b Create a Sample preparation method using the Easy Sample Prep Editor.
 - c Define your samples and create a sequence using the Easy Sequence Editor.
 - d Send your sequences to the Sequence Queue.
 - e Monitor progress by viewing the Instrument Status panel.

Refer to the software's Help and documentation for more information.

Interrupting a Sample Prep Method or Sequence

The following events interrupt a Sample Prep Method or sequence:

- **Power failures**—The power to the WorkBench fails.
- **Abort and Pause Step commands**—The [**Abort**] or [**Pause Step**] keys on the WorkBench keypad are pressed.
- **Safety or operator faults**—The sampler recognizes the following fault(s):
 - Tower door open
 - Turret error
 - Plunger error
 - Tray arm axis error
 - The Tower moved during sample prep
 - The Sample Tray failed to deliver a vial

WorkBench response to interruptions

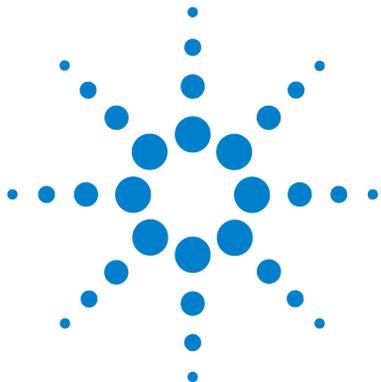
If the interruption was caused by a problem that the WorkBench recognizes, a message appears on the WorkBench display screen. For more information, see [Error Messages](#).

- **Power failure**—Aborts the current method. Restart the sample prep method (see below).
- **Stop commands**—Interrupts the run. Restart the sample prep method (see below).
- **Safety or operator faults**—Aborts the run. Restart the sample prep method (see below).

Restarting an interrupted Sample Prep Method

To restart an aborted sample prep method from the point of interruption:

- 1 Resolve the problem that caused the interruption.
- 2 The Sample Tray automatically moves any unknown vials found in the gripper arms or in an unexpected location to the unknown vials station.
- 3 Replenish your resources and sample vials and restart the sample prep method.

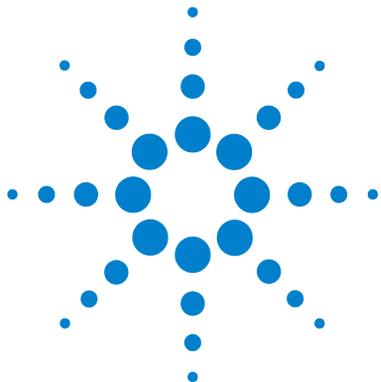


Part 4:

Maintenance and Troubleshooting

Maintenance	149
Periodic Maintenance	150
Moving the WorkBench	152
Tray Home and Park Positions	153
Installing a Syringe	154
Removing a Syringe	158
Replacing the Turret	159
Replacing the Needle Support Foot	163
Adapting for Syringes Over 100 μ L	165
Replacing the Syringe carrier Assembly	166
Replacing a Syringe Needle	173
Aligning the Tower	175
Aligning the Sample Tray	177
Calibrating the Sample Prep WorkBench	179
Updating the Firmware	181
Replacing the Fuse on the AC Board	182
Faults and Errors	185
Faults	186
Error Messages	190
Troubleshooting	195
Correcting Syringe Problems	196
Correcting Sample Vial Delivery Problems	197
Replacement Parts	199
G4513A Tower	200
G8130A Sample Tray	202





10 Maintenance

Periodic Maintenance	150
Moving the WorkBench	152
Tray Home and Park Positions	153
Installing a Syringe	154
Removing a Syringe	158
Replacing the Turret	159
Replacing the Needle Support Foot	163
Adapting for Syringes Over 100 μ L	165
Replacing the Syringe carrier Assembly	166
Replacing a Syringe Needle	173
Aligning the Tower	175
Aligning the Sample Tray	177
Calibrating the Sample Prep WorkBench	179
Updating the Firmware	181
Replacing the Fuse on the AC Board	182

The information in this chapter will assist you in keeping the Sample Prep WorkBench running smoothly.



Periodic Maintenance

This section contains some suggestions for ensuring good performance of your Sample Prep WorkBench system. The maintenance interval varies with the use of the instrument.

CAUTION

Do not use any lubricants on the Sample Prep WorkBench. They may damage the instrument.

CAUTION

When cleaning the instrument, as described below, use a damp (not wet!), lint-free cloth. Do not use chemical cleaners.

On an occasional basis:

- ✓ Calibrate the Sample Prep WorkBench system. See [Calibrating the Sample Prep WorkBench](#) for details.
- ✓ Clean the gantry, tray base, vial racks, turrets, keypad, and other surfaces.
- ✓ Wipe away any excess spill remains from the spill tray found underneath the turret. See [Removing the turret](#) for details.
- ✓ Clean the needle support foot and nearby surfaces on the Tower. Dust and dirt accumulate in these areas and can be picked up by the syringe needle and carried into the inlet.
- ✓ Inspect the needle support foot for signs of wear, and replace if necessary. See [Replacing the Needle Support Foot](#) for details.
- ✓ Clean all surfaces.
- ✓ Vacuum any dust found on or around the vents.
- ✓ Be sure all cables are securely connected.
- ✓ If using a liquid heating or cooling plate, the drainage tubing must allow any condensate to drain easily with no back pressure. Make sure that:
 - The tubing slopes downward towards the drainage container.

- The tubing is kept straight without kinks that may block the flow.
- The open end of the tubing is not submersed in the drainage container.
- The tubing does not become clogged or dirty. Replace tubing if necessary.

Moving the WorkBench

Before moving the WorkBench, be sure to disconnect all cables from the Sample Tray, Towers, computer, and Main Frame including communication cables and the power cord.

We recommend a two-person lift due to the size and weight of the WorkBench.

Tray Home and Park Positions



Figure 88 Tray in Park position



Figure 89 Tray in Home position

Installing a Syringe

WARNING

The syringe needle is sharp and can cause injury. Handle the syringe needle with care.

To install a syringe (Figure 90):

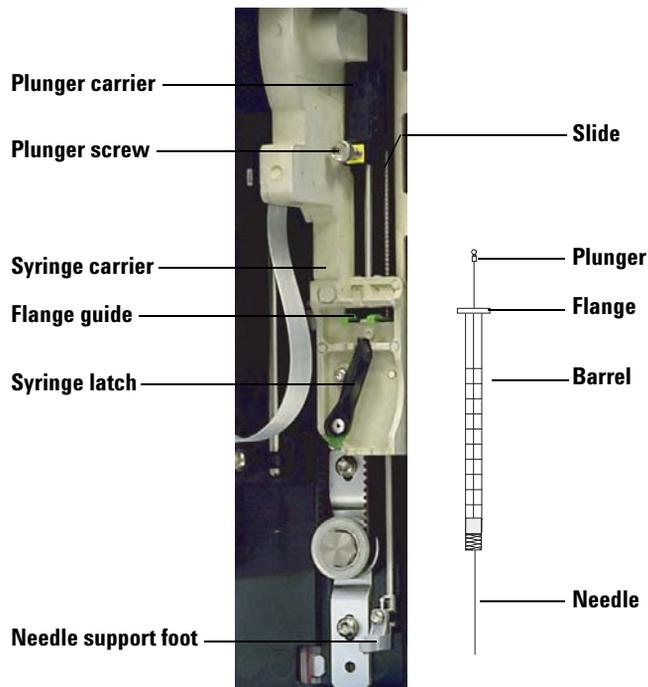


Figure 90 Installing a syringe

- 1 If desired, unplug the tower cable and lay the tower on a flat surface such as a work bench.
- 2 Open the tower door.
- 3 Slide the syringe carriage to the top position.
- 4 Open the syringe latch by swinging it in a counterclockwise direction.

- 5 Lift the plunger carrier to the top position.
- 6 Carefully pass the syringe needle through the guide hole in the needle support foot.

- 7 Align the syringe flange with the flange guide and press the syringe into place, keeping the needle end in the guide hole of the needle support foot. Make sure that the flat edge of the syringe flange faces out (Figure 91).

NOTE

Failure to correctly install the syringe flange into the flange guide will result in damage to the syringe plunger.

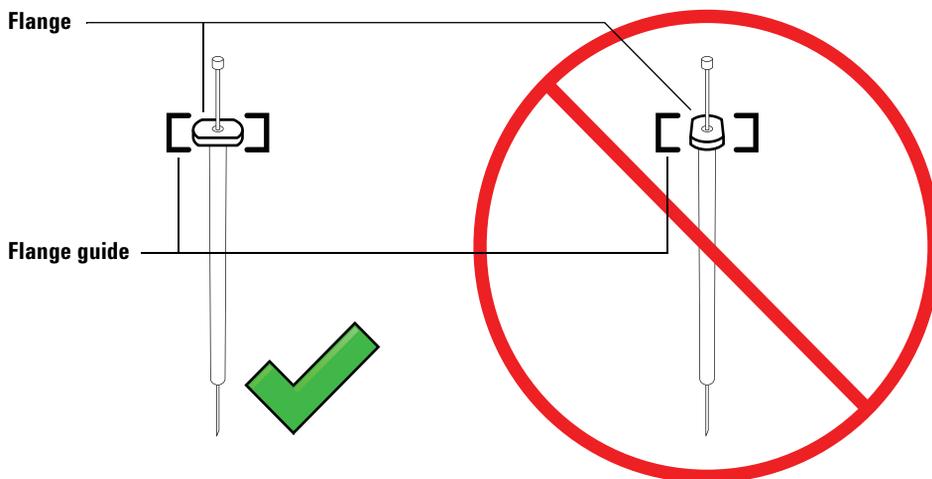


Figure 91 Syringe flange orientation

- 8 Close the syringe latch by swinging it clockwise until it snaps in place.
- 9 Loosen the plunger screw entirely by turning it counterclockwise until the stop is reached.
- 10 Slide the plunger carrier down until it is completely over the syringe plunger, and tighten the plunger thumb screw until finger-tight.
- 11 Manually move the plunger carrier up and down. If the syringe plunger does not move along with the carrier, repeat the previous steps until installed correctly. Be sure the plunger thumb screw is secure and tight. If the carrier is not completely attached to the syringe plunger it may become detached after a few injections.

CAUTION

Repeating this movement can damage the syringe.

- 12 Verify that the needle is inside the guide hole of the needle support foot. The needle should be straight and pass freely through the needle guide hole.

If the needle is bent or is outside the guide hole, remove the syringe and reinstall. See [Figure 92](#) for a properly installed syringe.

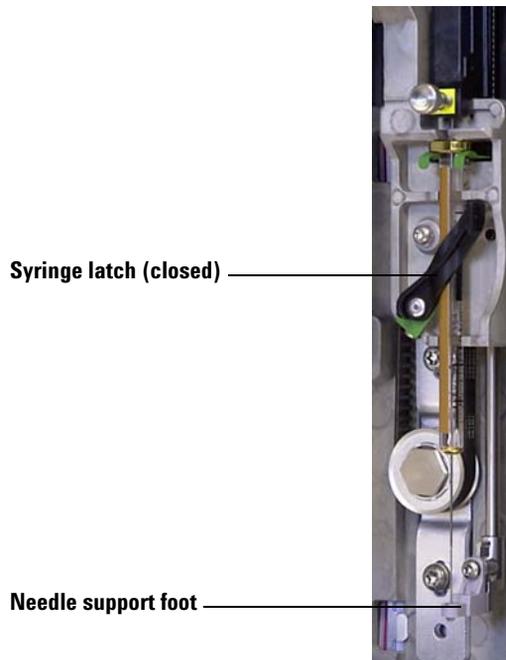


Figure 92 Syringe carriage and needle support with syringe installed

- 13 Close the tower door.
- 14 Calibrate the Sample Prep Workbench system. See [Calibrating the Sample Prep WorkBench](#) for details.

Removing a Syringe

CAUTION

The syringe needle is sharp and can cause injury. Handle the syringe needle with care.

To remove a syringe:

- 1 If desired, unplug the tower cable and lay the tower on a flat surface such as a work bench.
- 2 Open the tower door.
- 3 Slide the syringe carriage to the top position.
- 4 Completely loosen the plunger thumb screw until it reaches the stop, and lift the plunger carrier off of the syringe plunger.
- 5 Open the syringe latch by swinging it in a counterclockwise direction.

CAUTION

Be careful not to bend the syringe needle. Only pull the syringe out of the carriage until clear. The needle bends easily when still seated in the needle support guide.

- 6 Carefully pull the top of the syringe out of the flange guide, then lift the needle out of the needle support foot.

To install a syringe, see [Installing a Syringe](#) for details.

Replacing the Turret

To replace your turret, use the following instructions for proper replacement.

- 1 Remove all vials from the turret.
- 2 If desired, unplug the Tower communication cable and lay the Tower on a flat surface such as a work bench.
- 3 Open the Tower door.
- 4 Remove the syringe. See [Removing a Syringe](#).
- 5 While holding the turret in place with your hand, completely loosen the three T-10 Torx screws that fasten the turret cap to the motor hub.
- 6 Remove the turret cap.
- 7 Rotate the turret to the home position (with the turret opening facing the syringe carrier).
- 8 Lift the turret off of the motor hub, then slide out. Avoid contact with the syringe carrier when removing the turret.

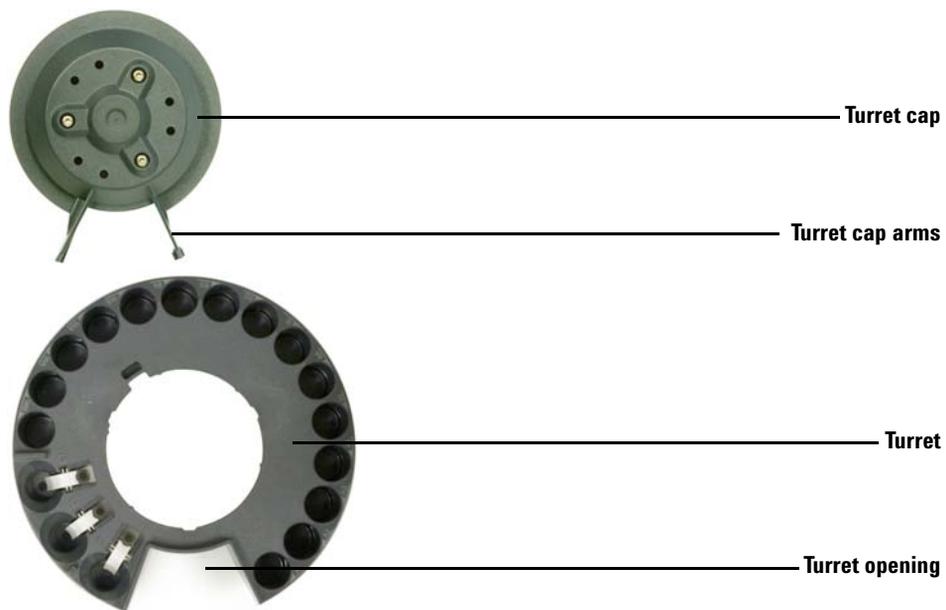


Figure 93 Removing the turret

- 9 Rotate the motor hub so the tabs on the motor hub face outward (Figure 94).

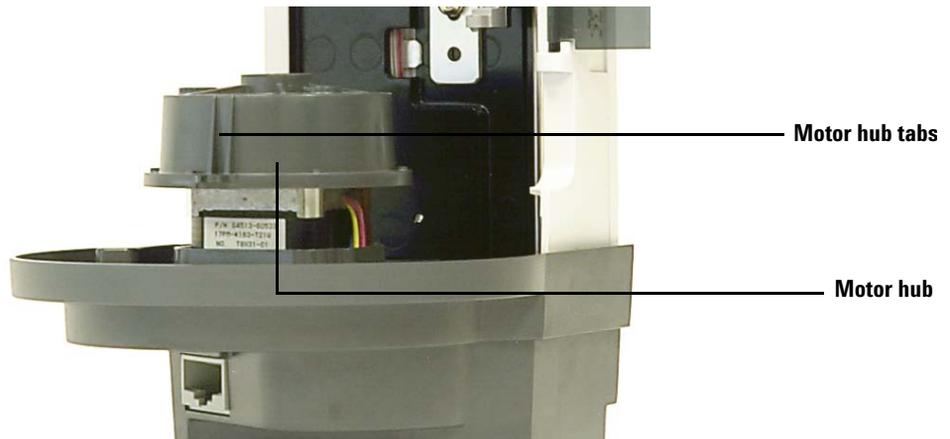


Figure 94 Motor hub tabs facing outward

- 10 Reinstall the turret. Align the inner groove on the turret with the motor hub tabs, then slide the turret onto the motor hub. The turret should sit flat on the hub.
- 11 Reinstall the turret cap. Align the turret cap arms with the turret opening and lay the turret cap in place (Figure 95).

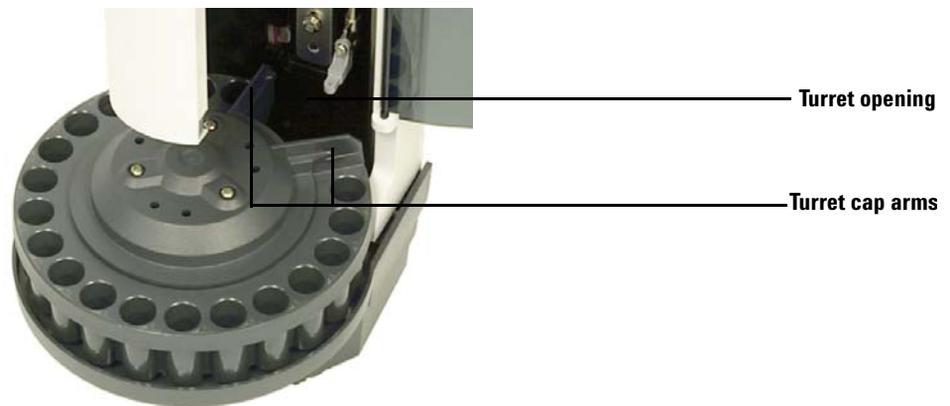


Figure 95 Aligning the turret cap arms with the turret opening

10 Maintenance

- 12** Tighten the three T-10 Torx screws.
- 13** Install the syringe. See [Installing a Syringe](#) for more information.
- 14** Close the Tower door.
- 15** Place the Tower onto the WorkBench base. See [Installing the G4513A Tower](#) for details.
- 16** Plug in the Tower cable.
- 17** When powered on, the Tower verifies the turret type. A fault light will show if the turret is not installed correctly.
- 18** Calibrate the Sample Prep WorkBench system. See [Calibrating the Sample Prep WorkBench](#) for details.

Replacing the Needle Support Foot

Replace the needle support foot ([Figure 96](#)) when it shows signs of wear:

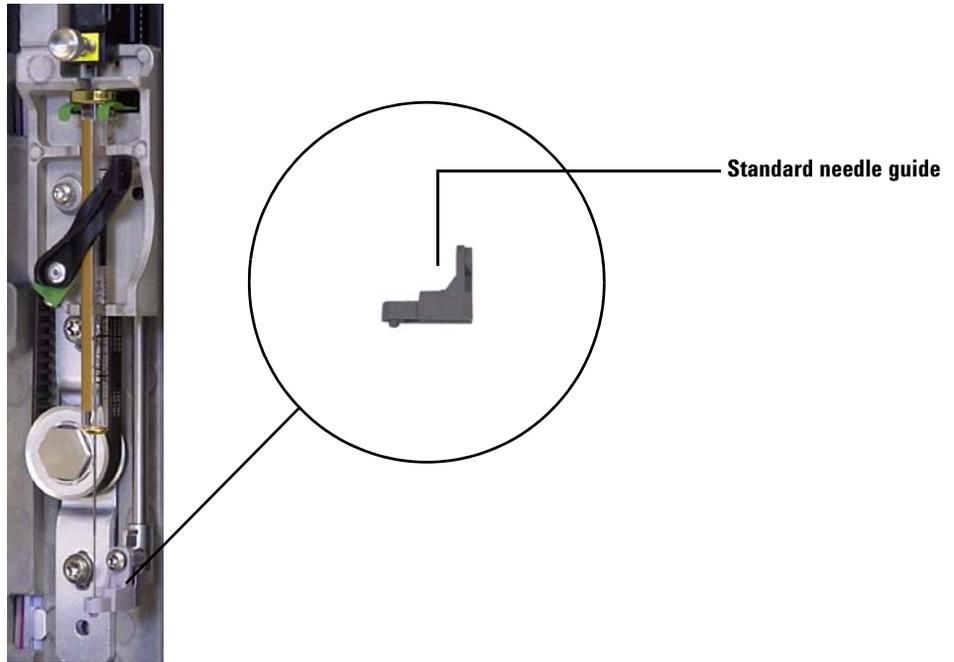


Figure 96 Replacing the needle support foot

- 1 Open the Tower door.
- 2 Remove the syringe. See [Removing a Syringe](#) for details.
- 3 Slide the syringe carrier up to the top position.
- 4 Completely remove the T-10 Torx screw from the support foot. Be careful to not let the screw fall into the turret assembly.
- 5 Slide the support foot off of the Tower assembly.
- 6 Slide the new support foot onto the Tower assembly.
- 7 Replace the T-10 Torx screw and tighten.
- 8 Install the appropriate syringe. See [Installing a Syringe](#) for details.
- 9 Close the Tower door.

10 Maintenance

- 10 Calibrate the Sample Prep WorkBench system. See [Calibrating the Sample Prep WorkBench](#) for details.

Adapting for Syringes Over 100 μ L

The Towers support the use of syringes over 100 μ L. To adapt the Tower carrier for the large volume syringe carrier, follow these steps:

- 1 If necessary, remove the current syringe from the Tower. See [Removing a Syringe](#) for details.
- 2 Replace the standard syringe carrier assembly with the G4521A Large Volume Syringe Carrier. See [Replacing the Syringe carrier Assembly](#) for details.
- 3 Replace the standard needle support foot with the large volume syringe carrier needle support foot. See [Replacing the Needle Support Foot](#) for details.
- 4 Install the appropriate syringe. See [Installing a Syringe](#) for details.
- 5 If necessary, reinstall the Towers onto the WorkBench. See [Installing the G4513A Tower](#) for details.
- 6 Calibrate the Sample Prep WorkBench system. See [Calibrating the Sample Prep WorkBench](#) for details.

Replacing the Syringe carrier Assembly

Use the standard syringe carrier assembly (Figure 97) for syringes that handle up to 100 μL , and the G4521A Large Volume Syringe Carrier (Figure 98) for syringes capable of handling over 100 μL .



Figure 97 Standard syringe carrier assembly



Figure 98 Large Volume Syringe Carrier assembly

To replace the syringe carrier assembly:

- 1** Remove all vials and bottles from the turret.
- 2** If desired, unplug the Tower cable and lay the Tower on a flat surface such as a work bench.
- 3** Open the Tower door.
- 4** Remove the syringe. See [Removing a Syringe](#) for details.
- 5** Remove the turret. See [Replacing the Turret](#) for details.
- 6** Slide the syringe carrier assembly down until the assembly cable is accessible below the Tower casing, and detach the cable from the assembly.

- 7 Completely loosen and remove the T-10 Torx screw at the top of the syringe carrier assembly (Figure 99).

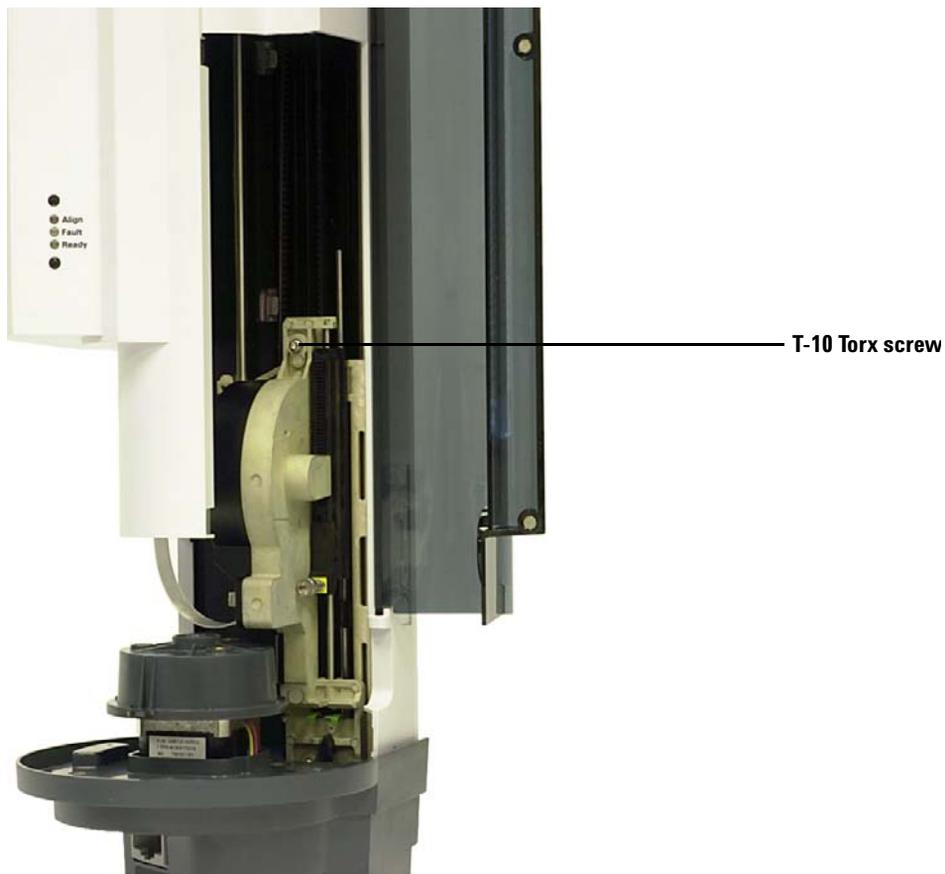


Figure 99 Removing the top T-10 Torx screw on the syringe carrier assembly

- Slide the syringe carrier assembly completely up until the flange and latch are accessible.

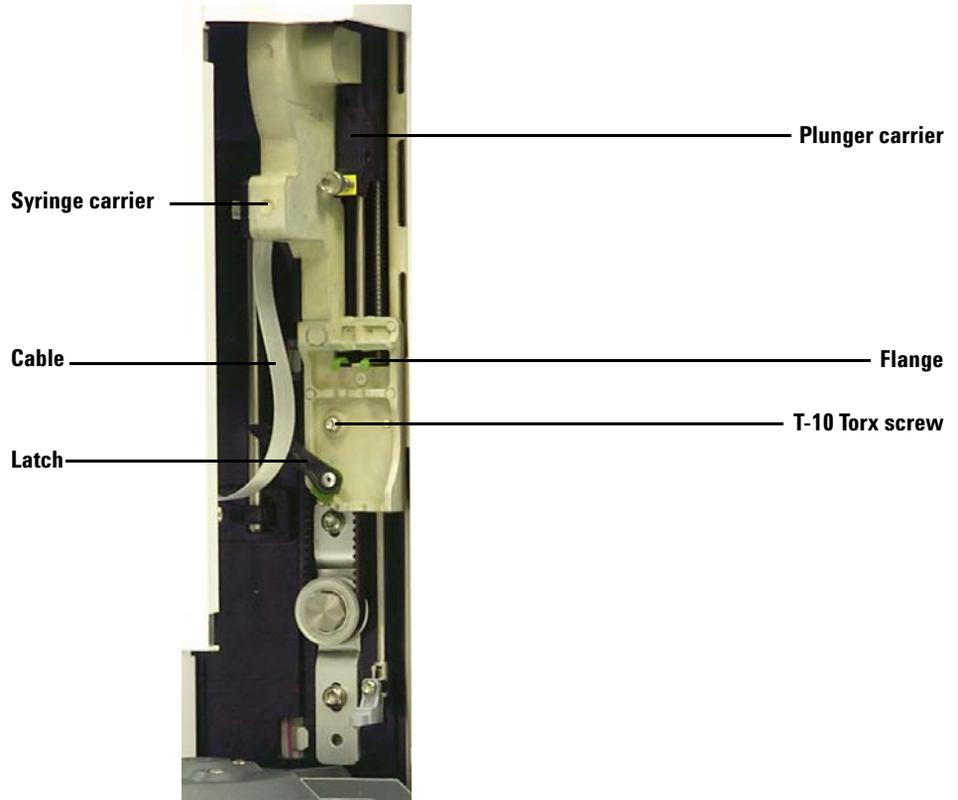


Figure 100 Removing the syringe carrier assembly

10 Maintenance

- 9 Completely loosen and remove the T-10 Torx screw above the syringe latch (Figure 101).

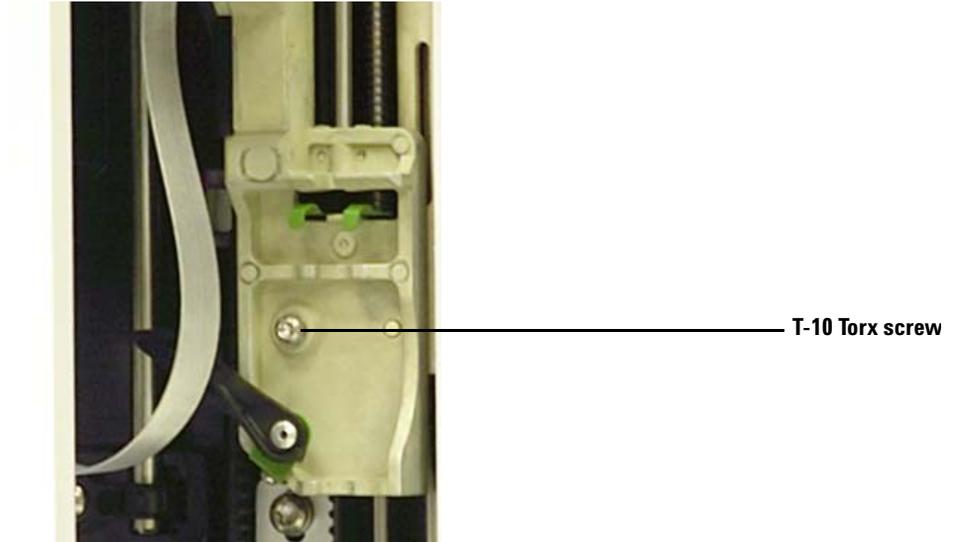


Figure 101 Removing the T-10 Torx screw above the syringe latch

- 10 Carefully remove the syringe carrier assembly from the Tower carrier.
- 11 Slowly position the replacement syringe carrier assembly on the Tower carrier. The syringe carrier assembly will hang in place when positioned correctly.
- 12 Completely tighten the T-10 Torx screw above the syringe latch.

- 13** Slide the syringe carrier assembly completely down until the cable input jack on the assembly is accessible below the Tower casing ([Figure 102](#)).

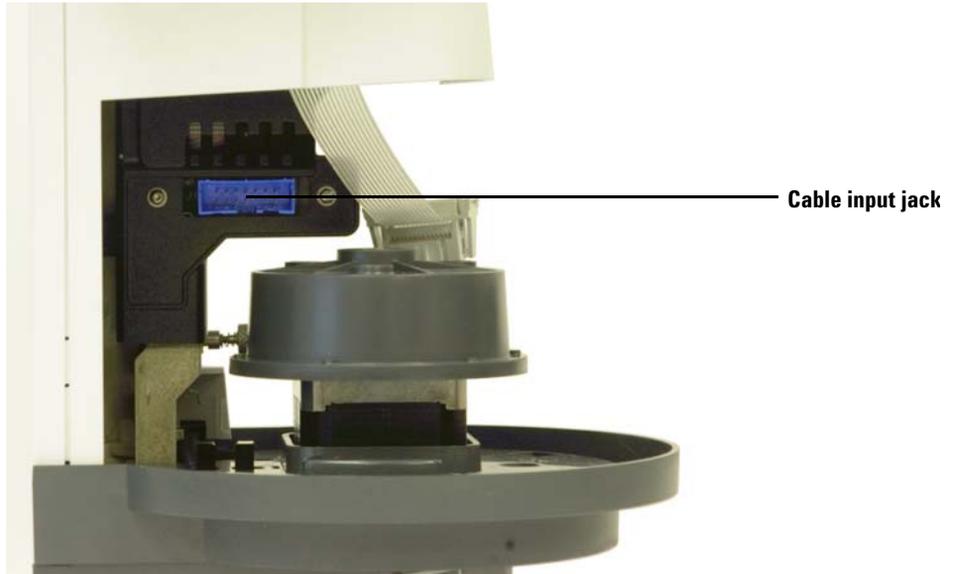


Figure 102 Accessing the cable input jack

- 14** Completely tighten the T-10 Torx screw at the top of the syringe carrier assembly ([Figure 103](#)).

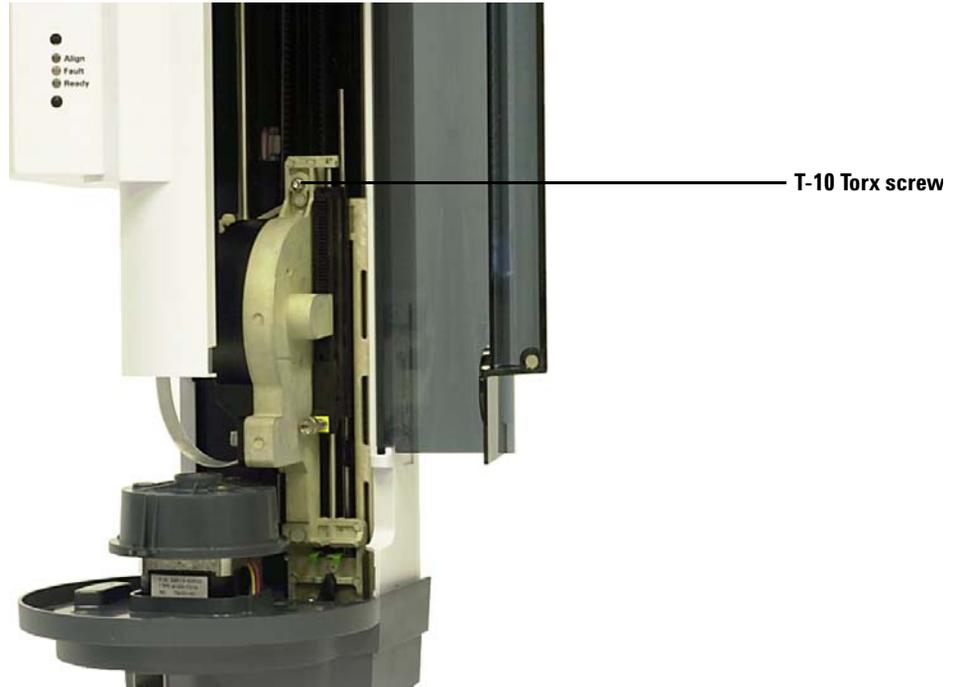


Figure 103 Installing the T-10 Torx screw at the top of the syringe carrier assembly

- 15** Connect the assembly cable to the syringe carrier assembly.
- 16** Slide the syringe carrier assembly completely up.
- 17** Make sure you have the appropriate needle support foot installed. See [Replacing the Needle Support Foot](#) for details.
- 18** Install the turret. See [Replacing the Turret](#) for details.
- 19** Install the syringe. See [Installing a Syringe](#) for details.
- 20** Close the Tower door.
- 21** If necessary, plug in the Tower cable and install the Tower on the WorkBench base. See [Installing the G4513A Tower](#) for details.
- 22** Calibrate the Sample Prep WorkBench system. See [Calibrating the Sample Prep WorkBench](#) for details.

Replacing a Syringe Needle

CAUTION

The syringe needle is sharp and can cause injury. Handle the syringe needle with care.

The stainless steel needles used for 250- μm and 320- μm injections must be inserted into a glass syringe barrel.

Needles for 250- μm injections have silver-colored stops. Needles for 320- μm injections have gold-colored stops. See your Agilent consumables and supplies catalog or the Agilent web site (www.agilent.com/chem) for a list of syringes and needles.

To insert a needle into a syringe barrel (Figure 104):

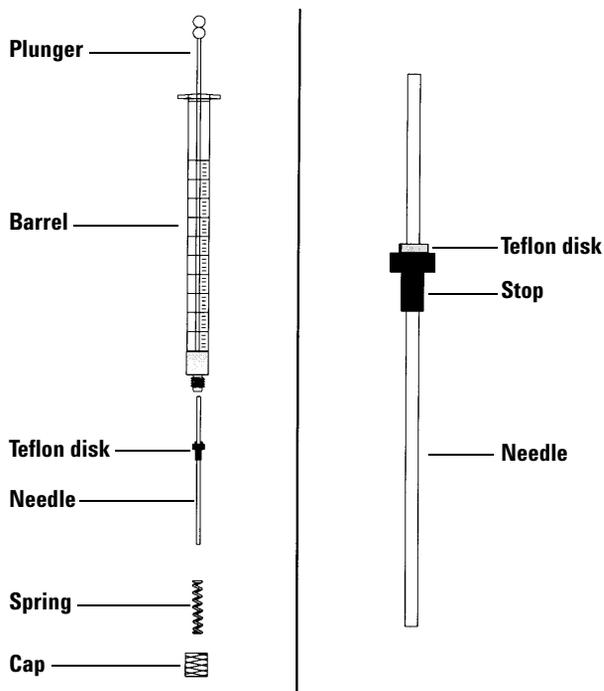


Figure 104 Syringe parts

10 Maintenance

- 1 Unscrew the syringe barrel cap and remove the spring.
- 2 Make sure the needle has a Teflon disk (Figure 104). If the syringe barrel does not have the Teflon disk, use the instructions in the syringe box to wrap the needle yourself.
- 3 Slide the spring and the cap down over the needle.
- 4 Insert the needle into the syringe barrel.
- 5 Screw the cap back on the syringe barrel.

Aligning the Tower

This section explains how to perform the Tower alignment procedure. The Tower has been factory-aligned prior to shipment. Only run the alignment procedure if the Tower hardware configuration changes or if the Align Mode light comes on.

NOTE

Agilent does not recommend performing this procedure unless the Align Mode light turns on. It is not necessary to align the Tower after replacing turrets.

If the top, orange Align Mode light is on, the Tower will not operate again until the alignment procedure has successfully completed.

To align the Tower:

- 1 Remove all vials from the turret.
- 2 Open the Tower door and remove the syringe. See [Removing a Syringe](#) for details.
- 3 Close the Tower door.
- 4 Use a long, narrow object to press the recessed **Alignment** button above the indicator lights. Avoid contact with anything behind or around the button inside the recessed hole ([Figure 105](#)).

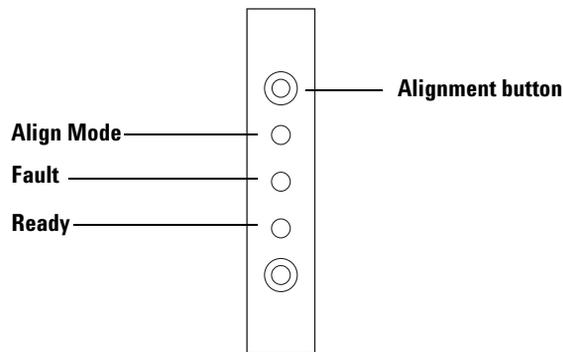


Figure 105 Aligning the Tower

The orange Align mode light is on during the alignment procedure:

- a** The turret rotates to verify that the syringe was removed, then rotates to determine what type of turret is installed.
- b** The syringe carrier moves all the way down, homes, then moves back up again.
- c** The syringe carrier steps down until it touches the turret. This sets its position relative to the turret.
- d** The plunger moves to calibrate stops.
- e** The syringe carrier moves down and the turret rotates to set its position relative to the syringe carrier position.

NOTE

If any of these steps fail, the process will halt and the fault light will shine. If it halts at step **b**, confirm that the turret is installed correctly and press the Alignment button again. If it fails again, unplug the Tower, reconnect it, and try one more time before obtaining Agilent service.

- 5** When Tower movement stops and the green Ready light is on, the alignment is finished.

If this alignment was user-initiated (orange Align Mode light was off before pressing the Alignment button) and alignment fails, unplug the Tower and reconnect it. This restores the previous alignment values.

- 6** Open the Tower door and install the syringe. See [Installing a Syringe](#) for details.
- 7** Close the Tower door.

Aligning the Sample Tray

This section explains how to perform the Sample Tray alignment procedure. The Sample Tray has been factory-aligned prior to shipment. The alignment procedure should only be run if the Align Mode light comes on.

NOTE

Agilent does not recommend performing this procedure unless the Align Mode light turns on or if Agilent support requests it to be performed.

If the left, orange Align Mode light is on, the Sample Tray will not operate again until the alignment procedure has successfully completed.

To align the Sample Tray:

- 1 Use a long, narrow object (such as a pen tip) to press the recessed Alignment button to the left of the indicator lights. Avoid contact with anything behind or around the button inside the recessed hole (Figure 106).

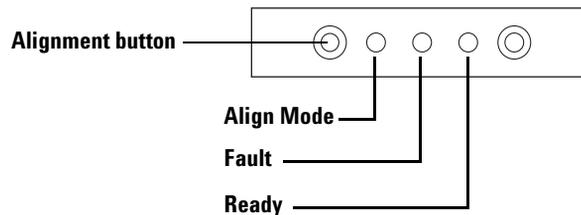


Figure 106 Align the Sample Tray

The orange Align mode light blinks during the following steps:

- a The gripper power calibrates.
- b The gantry calibrates the X, Y, and Z home and span settings.
- c The gantry is zeroed to calibration position (X, Y, Z).

NOTE

If any of these steps fail, the process will halt. Press the Alignment button again. If it fails again, unplug the Sample Tray, reconnect it, and try one more time before obtaining Agilent service.

- 2 When the Sample Tray stops in the Home position and the green Ready light is on, the calibration is finished.

If this alignment was user-initiated (orange Align Mode light was off before pressing the Alignment button) and alignment fails, unplug the Sample Tray and reconnect it. This restores the previous alignment values.

Calibrating the Sample Prep WorkBench

The Sample Prep Workbench system calibration process aligns the sample tray with the tower turret position so vial transfers occur without incident. Calibration should be performed if a calibration does not exist, and also as a routine maintenance procedure.

Calibrating the Sample Prep Workbench system is recommended if any Sample Prep Workbench components are moved.

To calibrate your Sample Prep Workbench system:

- 1 Place the calibration vial (G4514-40588) in tray position 1 ([Figure 107](#)).



Figure 107 Tray position 1

- 2 Remove any vials from transfer turret positions L1, L2, and L3 in both towers (Figure 108).

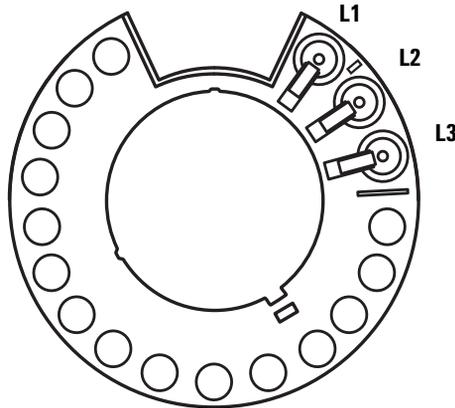


Figure 108 Transfer turret positions L1, L2, L3 (top view)

- 3 To start the Sample Prep Workbench system calibration from the Workbench front keypad, press **[Menu]** > **Sampler calibration** > **[Enter]** > **Start calibration** > **[Enter]**.

The following calibration process occurs:

- a The Workbench assesses the turret alignment by placing the calibration vial into turret position L1 and returning to sample tray position 1.
 - b The Workbench tests the vial height and turret position by using the alignment tab between positions L1 and L2 on the transfer turret.
 - c The Workbench verifies the turret alignment by placing the calibration vial into turret position L1 and returning it to sample tray position 1.
 - d The Workbench repeats the process for the back tower.
- 4 When the calibration process completes, the green Ready status light turns on and the gantry stops in the Home position (Figure 89).

Remember to replace any vials that were moved for the calibration process.

Updating the Firmware

The 7696A Sample Prep WorkBench ships with the latest version of the firmware. However, future versions of the firmware may become available. Visit the Agilent website at www.agilent.com/chem, or contact your local Agilent sales representative to determine if you have the latest firmware version.

View the current firmware version

To view the current firmware version on your Sample Prep WorkBench, do one of the following from the WorkBench front panel keypad:

- Press [**Status**] > [**Clear**]. The firmware version displays at the bottom of the screen.
- Press [**Menu**], scroll to **Service information** and press [**Enter**]. Then scroll to **Instrument Status** and press [**Enter**]. Scroll to **Version** and **Version date** to view your WorkBench firmware information.

You can also use the **Firmware Update** tool in Agilent Instrument Utilities software that is provided on the Agilent GC and GC/MS Hardware User Information and Instrument Utilities DVD (Instrument Utilities) to view your current firmware version. Refer to the Instrument Utilities software help and user documentation for more information.

Update the firmware

To update your WorkBench to the latest firmware version, use the Agilent Instrument Utilities software. Refer to the Instrument Utilities software help and user documentation for firmware update information.

Once you connect to the WorkBench in the software's **Firmware Update** screen, no other tasks can be performed on the WorkBench until you disconnect.

Replacing the Fuse on the AC Board

A small fuse on the AC board protects it from over-currents originating in the WorkBench components (Towers or Sample Tray, for example), or shorts in their cables.

WARNING

For continued protection against fire hazard, replace line fuses only with the same type and ratings. The use of other fuses or materials is prohibited.

Part No	Description
2110-0036	8A Fuse for AC Board

- 1 Turn off the WorkBench main power switch and disconnect its power cord.

WARNING

Hazardous voltages are present in the mainframe when the WorkBench power cord is connected. Avoid a potentially dangerous shock hazard by disconnecting the power cord before removing any WorkBench panels.

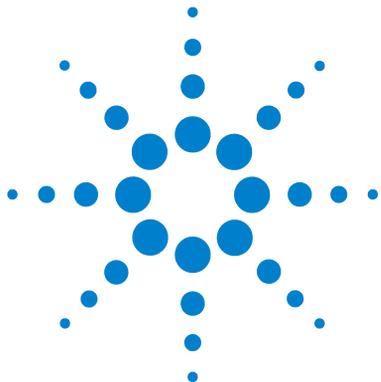
CAUTION

Components can be damaged by static electricity: be sure to wear an ESD strap grounded to the WorkBench chassis while performing this procedure.

- 2 Remove the Sample Tray and Towers from the Main Frame base.
- 3 Access the AC board in the WorkBench Main Frame. See [Install the configuration plug](#).
- 4 Gather ESD protection, T-10 driver, and tweezers.
- 5 Remove the AC board.
- 6 Unscrew the T-10 screw and remove the fuse cover.
- 7 Using the tweezers, carefully replace the fuse.
- 8 Reinstall the fuse cover. Insure that the connectors are visible.

9 Reinstall the AC board.

10 Connect the power cord to the WorkBench and turn on the main power switch.



11 Faults and Errors

Faults	186
Tower faults	186
Sample tray faults	188
Error Messages	190

Sometimes things do not work as expected. In most cases, the nature of the problem is signalled either by status lights or error messages on the Sample Prep WorkBench system. If a fault or error occurs, use this chapter to discover the probable cause and take the corrective action.



Faults

Tower faults

The Tower status is indicated by the three lights on the Tower panels (Figure 109).

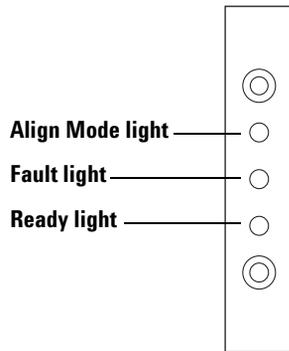


Figure 109 Tower status lights

During normal operation, the green Ready light is on. If the Tower is busy, the green Ready light is flashing.

If another combination of lights is on, an error has occurred.

Use the information in this chapter to try to solve or identify the problem before obtaining Agilent service.

Table 6 Tower status lights

Lights	Possible cause	Action
All lights are off.	<ul style="list-style-type: none"> The line voltage to the Main Frame is off. The Tower cable or connection to the Main Frame is bad. Your WorkBench requires service. 	<ol style="list-style-type: none"> 1 Verify the Tower is properly connected to the Main Frame. 2 Check the power source for your WorkBench. 3 Obtain Agilent service.

Table 6 Tower status lights (continued)

Lights	Possible cause	Action
Fault light is on.	<ul style="list-style-type: none"> The Tower door is open. Tower is not properly mounted on the Main Frame. 	<ol style="list-style-type: none"> 1 Ensure that the Tower door is closed. 2 If the fault light stays on, obtain Agilent service. 3 Ensure that the Tower is mounted properly. For more information, see Installing the G4513A Towers. 4 If the Fault light stays on, obtain Agilent service.
Fault light is flashing two times.	<ul style="list-style-type: none"> Syringe error. 	<ul style="list-style-type: none"> Re-install or replace the syringe. For more information, see Installing a Syringe.
Fault light is flashing three times.	<ul style="list-style-type: none"> Turret error. 	<ul style="list-style-type: none"> Re-install the turret. For more information, see Replacing the Turret.
Fault light is flashing four times.	<ul style="list-style-type: none"> Plunger error. 	<ul style="list-style-type: none"> See Correcting Syringe Problems.
Align Mode light is on.	<ul style="list-style-type: none"> The system was not initialized. There is a Tower memory error. 	<ol style="list-style-type: none"> 1 Verify the turret is properly installed. See Replacing the Turret. 2 Perform the alignment procedure to initialize the system. See Aligning the Tower. 3 If alignment fails, obtain Agilent service.
Align Mode light is flashing.	<ul style="list-style-type: none"> Customer pushed the align mode button. 	<ol style="list-style-type: none"> 1 The alignment and calibration process is currently underway. Let the process finish.
All lights are on.	<ul style="list-style-type: none"> There is a board failure. There is a firmware revision conflict. 	<ol style="list-style-type: none"> 1 Check all cable connections. 2 Turn the instrument off, then on again. 3 If the lights remain on, obtain Agilent service.

Sample tray faults

The Sample Tray status is indicated by the three lights on the front panel (Figure 110).

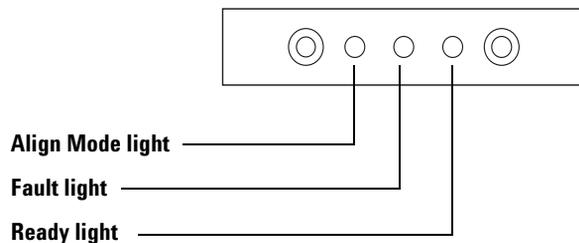


Figure 110 G8130A Sample Tray status lights

During normal operation, the green Ready light is on. If the Sample Tray is busy, the green Ready light is flashing.

If another combination of lights is on, an error has occurred.

Use the information in this chapter to try to solve the problem before obtaining Agilent service.

Table 7 Sample tray status lights

Lights	Possible cause	Action
All lights are off.	<ul style="list-style-type: none"> The device is unplugged. 	
Fault light is on.	<ul style="list-style-type: none"> System fault. 	
Fault light is flashing one time.	<ul style="list-style-type: none"> A vial is lost or missing. 	
Fault light is flashing two times.	<ul style="list-style-type: none"> X-axis error. 	
Fault light is flashing three times.	<ul style="list-style-type: none"> Y-axis error. 	
Fault light is flashing four times.	<ul style="list-style-type: none"> Z-axis error. 	
Fault light is flashing five times.	<ul style="list-style-type: none"> Gripper error. 	
Align Mode light is on.	<ul style="list-style-type: none"> The system was not initialized. There is a tray memory error. 	<ol style="list-style-type: none"> 1 Perform the alignment procedure to initialize the system. See Aligning the Tower. 2 If alignment fails, obtain Agilent service.
Align Mode light is flashing.	<ul style="list-style-type: none"> Customer pushed the align mode button. 	<ol style="list-style-type: none"> 1 The alignment and calibration process is currently underway. Let the process finish.
All lights are on.	<ul style="list-style-type: none"> There is a board failure. There is a firmware revision conflict. 	<ol style="list-style-type: none"> 1 Check all cable connections. 2 Turn the instrument off, then on again. 3 If the lights remain on, obtain Agilent service.

Error Messages

Table 8 lists the sampler error messages as reported on the WorkBench display screen. If you receive an error message that is not shown below, record it. Make sure that your WorkBench is properly configured. If the problem continues, report your error message to Agilent service.

Table 8 Error messages

Message	Probable cause	Suggested action
Bottle in gripper	<ul style="list-style-type: none"> The sample vial was not delivered properly and stayed in the Sample Tray gripper. 	<ol style="list-style-type: none"> Remove the vial and return it to its position in the tray. Ensure that the vial racks are snapped into place. Ensure that the Tower cable is properly connected to the Main Frame. See Connecting the Cables. Check the deliver to location for the vial and verify that the location is empty and free from obstructions. Make sure that the Tower is upright/vertical on the WorkBench. Restart the sample prep method. If the error occurs again, obtain Agilent service.
Front (or Back) door open or Tower not mounted		<ul style="list-style-type: none"> See Faults.
Front (or Back) Tower com error	<ul style="list-style-type: none"> There is a communications error between the Tower and the Main Frame. 	<ul style="list-style-type: none"> Obtain Agilent service.
Front (or Back) Tower incomplete injection	<ul style="list-style-type: none"> The syringe needle is bent. The plunger or syringe carrier is operating incorrectly during injection. 	<ol style="list-style-type: none"> See Correcting Syringe Problems. Remove the syringe from the Tower and check the plunger for stickiness or binding. Replace the syringe if necessary. Restart the sequence. If the error occurs again, obtain Agilent service.

Table 8 Error messages (continued)

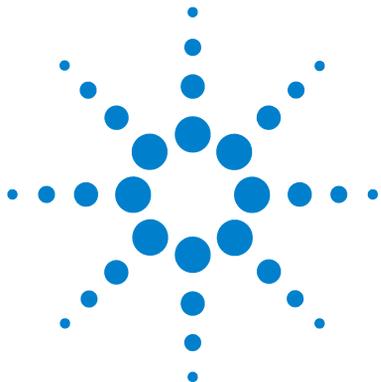
Message	Probable cause	Suggested action
Front (or Back) Tower reset	<ul style="list-style-type: none"> There is an interruption in the power supply from the Main Frame. 	<ul style="list-style-type: none"> Obtain Agilent service.
Front (or Back) plunger error	<ul style="list-style-type: none"> The syringe plunger is sticking or not securely connected to the plunger carrier. The plunger solenoid is binding. The plunger carrier encoder is inoperable. 	<ol style="list-style-type: none"> Remove the syringe and check it for plunger stickiness or binding. Replace the syringe if necessary. For more information, see Inspecting a Syringe. Check the viscosity of the sample against the viscosity parameter. Reset the viscosity parameter if necessary. Restart the sequence. If the error occurs again, obtain Agilent service.
Front (or Back) syringe error	<ul style="list-style-type: none"> The syringe carrier motor is defective. The syringe is not currently installed or is an incorrect type. The syringe carrier sensor is inoperable. 	<ol style="list-style-type: none"> Ensure the syringe is installed correctly. For more information, see Installing a Syringe. Ensure the syringe meets specifications. If the syringe needle is bent, see Correcting Syringe Problems. Restart the sequence. If the error occurs again, obtain Agilent service.
Front (or Back) turret error	<ul style="list-style-type: none"> Something has interfered with the turret rotation. The turret motor/encoder assembly is inoperable. The turret type was changed while the power was on and the turret alignment procedure was not performed. Turret is loose. 	<ol style="list-style-type: none"> Clear any obstructions. Check the Align Mode light. If it is on, perform the alignment procedure. See Aligning the Tower. Tighten the top of the turret. If the error occurs again, obtain Agilent service.

Table 8 Error messages (continued)

Message	Probable cause	Suggested action
Tower not present	<ul style="list-style-type: none"> • There is a board failure in the Tower or Main Frame. • The Tower cable is bad or not securely connected to the Main Frame. • There is a cable failure in the Main Frame. • Your sample prep method specifies an incorrect Tower location (sample prep method mismatch). 	<ol style="list-style-type: none"> 1 Make sure that the Tower-to-Main Frame cable connection is secure. 2 Check your sample prep method to make sure it uses the appropriate Tower location. 3 If the error remains, obtain Agilent service.
Tower offline	<ul style="list-style-type: none"> • There is a board failure in the Tower or Main Frame. • The Tower cable is bad or not connected. • There is a cable failure in the Main Frame. 	<ol style="list-style-type: none"> 1 Make sure that the Tower-to-Main Frame cable connection is secure. 2 If the error remains, obtain Agilent service.
No Bar Code Reader	<ul style="list-style-type: none"> • Bar Code Reader cable not securely connected. • Bar Code Reader is defective. • Sample tray is defective. 	<ol style="list-style-type: none"> 1 Ensure the Bar Code Reader cable connection is secure. 2 If the problem continues, obtain Agilent service.
No bottle in gripper	<ul style="list-style-type: none"> • The sample vial was not found by the gripper. • The gripper could not grasp the vial. • The vial was dropped during transfer to or from the turret. • The sensor in the gripper is defective. • The vial does not meet specifications. 	<ol style="list-style-type: none"> 1 Make sure that the sample vials are in the locations specified by the sequence. 2 Make sure that the sample vials meet recommended specification. 3 If you are using adhesive labels, verify that the labels are properly installed. See Label a sample vial. 4 If the error recurs frequently, obtain Agilent service.
Tray not present	<ul style="list-style-type: none"> • There is a board failure in the Sample Tray or Main Frame. • The Sample Tray cable is bad or not connected between the Main Frame and Sample Tray. • There is a cable failure in the Main Frame. 	<ol style="list-style-type: none"> 1 Make sure that the Sample Tray cable connection is secure. 2 Replace the Sample Tray cable. 3 If the error remains, obtain Agilent service.

Table 8 Error messages (continued)

Message	Probable cause	Suggested action
Tray offline	<ul style="list-style-type: none"> • There is a board failure in the Sample Tray or Main Frame. • The Sample Tray cable is bad or not connected. • There is a cable failure in the Main Frame. 	<ol style="list-style-type: none"> 1 Make sure that the Sample Tray-to-Main Frame cable connection is secure. 2 Replace the Sample Tray cable. 3 If the error remains, obtain Agilent service.
No Tower	<ul style="list-style-type: none"> • The cabling connection to the Main Frame became loose. • A Tower board or Main Frame board failed. 	<ol style="list-style-type: none"> 1 Make sure that the Tower-to-Main Frame cable connection is secure. 2 If the error remains, obtain Agilent service.
Prerun >10 min	<ul style="list-style-type: none"> • The Main Frame is Not Ready. 	<ul style="list-style-type: none"> • Check for Not Ready and other Main Frame messages to determine the cause.



12 Troubleshooting

Correcting Syringe Problems [196](#)

Correcting Sample Vial Delivery Problems [197](#)

The information in this chapter will assist you in keeping the sampler running smoothly.

If you cannot correct the problem, obtain Agilent service.



Correcting Syringe Problems

WARNING

When troubleshooting the Tower, keep your hands away from the syringe needle. The needle is sharp and may contain hazardous chemicals.

Several things can cause syringe needles to bend. When you find one, check for the following conditions before installing a replacement:

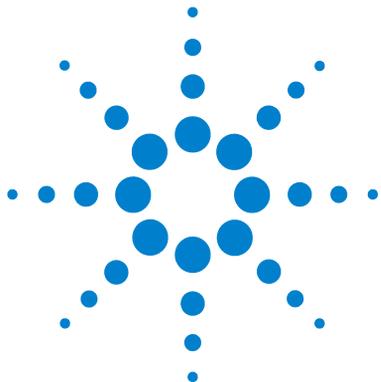
- ✓ Was the syringe installed properly in the syringe carrier?
- ✓ Are you using the correct syringe type? Is the combined length of the syringe barrel and needle 126.5 mm? For more information, see [Selecting a Syringe](#).
- ✓ Is the needle support foot clean? Remove any residue or septum deposits. For more information, see [Periodic Maintenance](#).
- ✓ Is the septum of the crimp cap centered over the sample vial? For more information, see [Cap a sample vial](#).
- ✓ Are the inside diameters of the sample vial, microvial insert, and vial cap septum at least 5 mm? For more information, see [Preparing a Sample Vial](#).

Correcting Sample Vial Delivery Problems

When you find a mishandled sample vial, check:

- ✓ Are the vial caps installed correctly?
- ✓ Are there folds or wrinkles in the crimp cap, especially near the neck of the sample vial? For more information, see [Preparing a Sample Vial](#).
- ✓ If you use labels on the sample vials, are they the correct size? For more information, see [Label a sample vial](#).
- ✓ If you use labels on the sample vials, are they interfering with the gripper? For more information, see [Label a sample vial](#).
- ✓ Are there any obstacles to the Sample Tray arm or turret motions? Remove any obstacles.
- ✓ Are the vial racks and turret in good condition? Clean any residue from the sample positions.
- ✓ Does the bottom of a sample vial touch the top of the turret? To calibrate the Sample Prep WorkBench system, see [Calibrating the Sample Prep WorkBench](#).
- ✓ Does the side of a sample vial touch the side of the turret hole as the vial is raised or lowered? To calibrate the Sample Prep WorkBench system, see [Calibrating the Sample Prep WorkBench](#).

12 Troubleshooting



13 Replacement Parts

G4513A Tower	200
G8130A Sample Tray	202
Power Configuration Plugs	204

The following pages list the replacement parts for the 7696A Sample Prep WorkBench. Also refer to the Agilent web site at www.agilent.com/chem for the mos7696At up-to-date replacement part and firmware listings.



G4513A Tower

Table 9 and Figure 111 list and show the replacement parts for the G4513A Tower module.

Table 9 G4513A Tower replacement parts

Item	Description	Part no.	Qty/Assy
1	Tower module (new/exchange)	G4513A	1
2	Communication cable	G4514-60610	1
3	Transfer turret	G4513-67730	1
4	Needle support insert - standard	G4513-40525	1

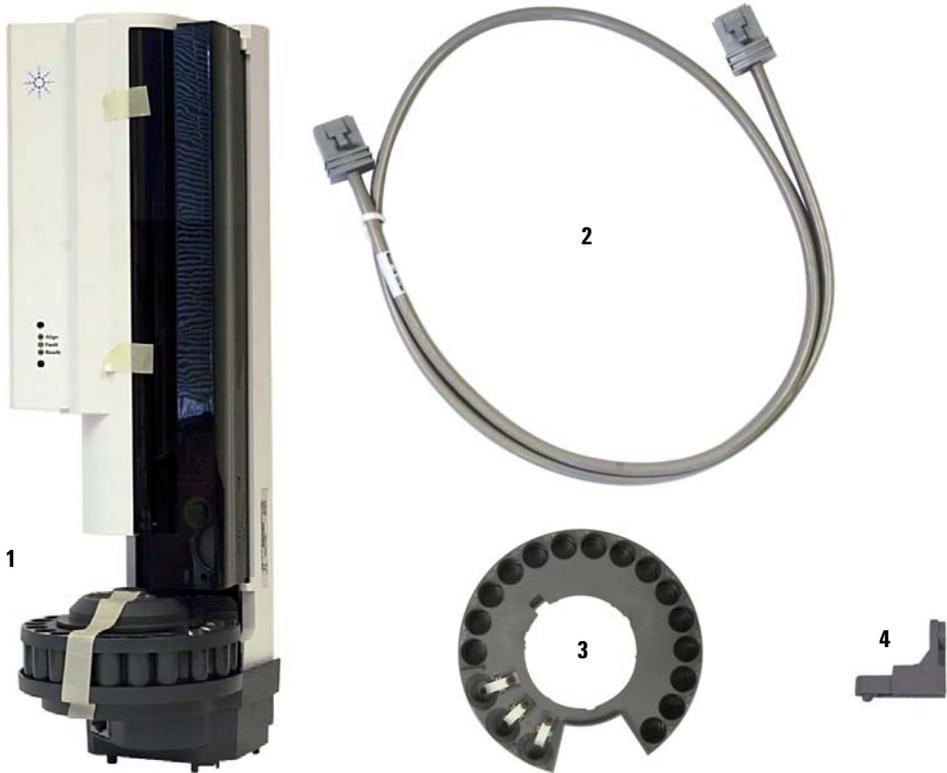


Figure 111 G4513A Tower replacement parts

G8130A Sample Tray

Table 10 and Figure 112 list and show the replacement parts for the G8130A Sample Tray.

Table 10 G8130A Sample Tray replacement parts

Item	Description	Part no.	Qty/Assy
1	Vial rack kit	G4514-67505	3
2	L Key Torx T-20	8710-2430	1
3	L Key Torx T-30	G4514-80524	1
6	M6 × 25 screw	0515-0192	3
7	Gripper finger caps	G4514-60710	16
9	Calibration vial	G4514-40588	1
11	Bar code reader/mixer/heater	G4515A	1
12	Communication cable	G4514-60610	1
13	Vial rack label kit	G4525-60701	3
NS	Metal vial rack kit	G4522-60500	
NS	Vial rack set of 3, with 12 label tags (4 colors)	G4525-63020	
NS	4 mL wash/waste vial 25/pk	5182-0551	
NS	Diffusion caps for 4 mL vials	07673-40180	
NS	Screw cap vial, clear, 100/pk	5182-0714	
NS	Blue screw caps, 100/pk	5182-0717	
NS	Peltier Cooler Heater Module	G8140A	

Power Configuration Plugs

Table 10 lists the replacement part numbers for the WorkBench Main Frame power configuration plug.

Table 11 Power configuration plug

Description	Part no.
120V Configuration Plug	G1530-60690
WorkBench 120V Configuration Sticker	G4529-90921
220V Configuration Plug	G1530-60710
WorkBench 220V Configuration Sticker	G4529-90922
230V Configuration Plug	G1530-60720
WorkBench 230V Configuration Sticker	G4529-90923
240V Configuration Plug	G1530-60730
WorkBench 240V Configuration Sticker	G4529-90924
100V Configuration Plug	G4529-60691
WorkBench 100V Configuration Sticker	G4529-90925