Hamilton Robotics

Microlab STARline UV Light Kit

Installation and User's Manual

Oct 2020

Part Number: 92207-01 (Rev. E)

HAMILTON

Important Notice

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Chapter 1: General Information

1.1 About this manual

This installation and user manual for the STARline UV Light Kits is a resource to assist in understanding the installation and operation of the UV Light Kit for the Microlab® STARline instruments.

The installation of the ML STARline instrument itself shall be performed by a trained service engineer according to the Microlab STAR Service Manual. The replacement parts and accessories are listed as reference.

1.2 Intended Use of the STARline UV Light Kit

The STARline UV Light Kits include a light box that mounts to the top of STAR and STARlet equipped with either Autoload or Manual Load. The STARline UV Light Kit provides ultraviolet germicidal decontamination to the interior of the instrument while protecting the operator from the UV light. The UV light is software controlled.

Additional UV light kits provide compatibility with STARline CAP systems. UV light systems for instruments with CAP hoods have some different mounting components, but control and operation remain the same.

NOTE: The UV light is intended to be used with and for the STARlet Manual Load and Autoload and STAR Manual Load and Autoload. Stand-alone operation of the UV light is not supported.

Figure 1-1: ML STARline instrument

1.3 Safety and special symbols

All safety precautions and hazards regarding the ML STARline instrument are listed in the MICROLAB STAR Operator, Programmer, and Service Manuals.

Appropriate precautions should be taken to avoid injury from exposure to UV light.

Biohazard: This symbol indicates the possibility of health danger when servicing a contaminated part or area of the Instrument. Laboratory cautions must be taken.

The “UV Light Hazard” symbol indicates the presence of artificial UV light which could result in significant personal exposure.

The “Electrical Shock Electrocution” symbol alerts personnel or observers to situations upon contact of a (human) body part with any source of electricity that causes a sufficient current through the skin, muscles, or hair.

The “Burn Hazard / Hot Surface” symbol indicates the present surface temperature and caution personnel or observers against equipment with hot surfaces (dryers, motors, engines, water heaters, boilers, valves, etc.) to prevent contact with them leading to thermal burns.

The “Electrostatic Discharge” symbol indicates any component (primarily electrical) which can be damaged by common static charges which build up on people, tools, and other non-conductors or semiconductors.

WARNING: The “Warning!” symbol contains information that must be followed to prevent personal injury to those operating the equipment.

IMPORTANT: The “Important” symbol gives instructions that must be followed to prevent damage to equipment or loss of data.

NOTE: The “Note” symbol provides useful information to improve system performance or directs you to supplemental information to improve your understanding of overall operations.

Procedure: The “Procedure” symbol is followed by a set of installation or operational steps.

1.4 UV Light Safety

Avoid exposure to the UV light. Exposure may cause severe eye or skin injury.

Never install UV lamps on a system with a non-enclosed waste cabinet or table. This could lead to unsafe levels of UV exposure.

Ensure that all waste cabinet or table doors are closed whenever UV lamps are in operation.

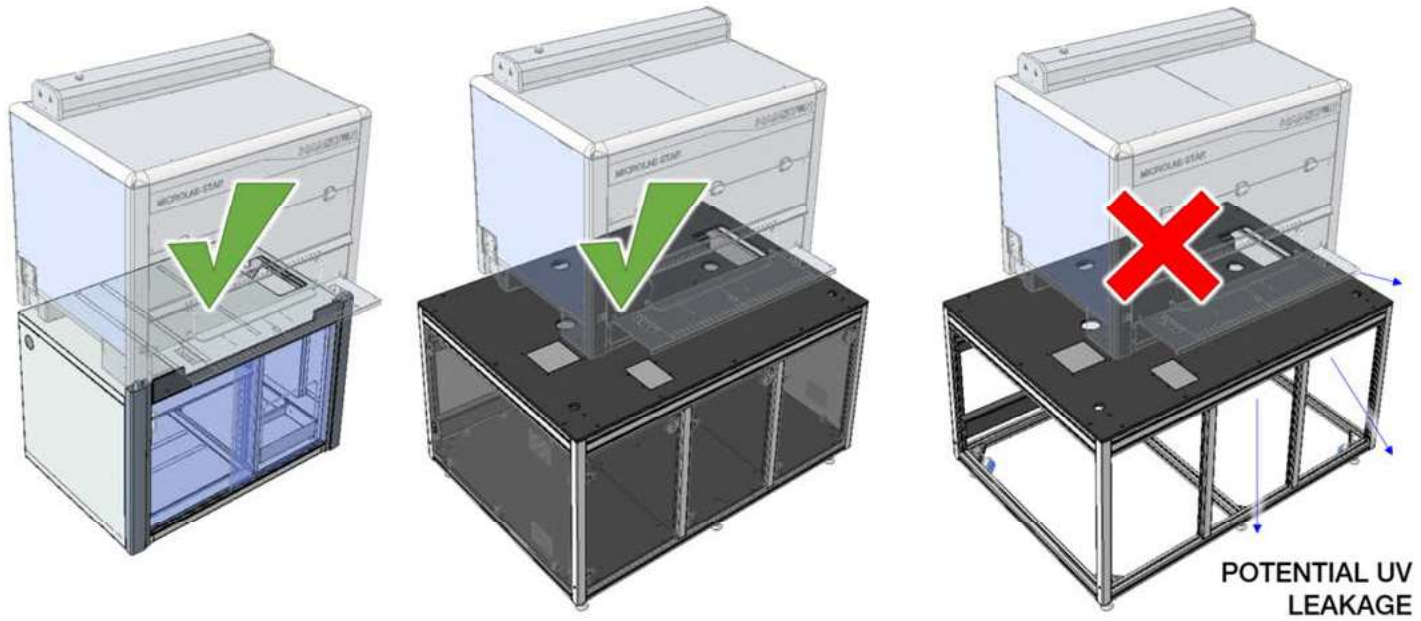

Figure 1-2: Using properly enclosed bench with UV lamps

The instrument’s bench or table must be at least as deep and wide as the instrument. Never install UV lamps on a system that is narrower than the instrument in either direction. This could lead to unsafe levels of UV light exposure.

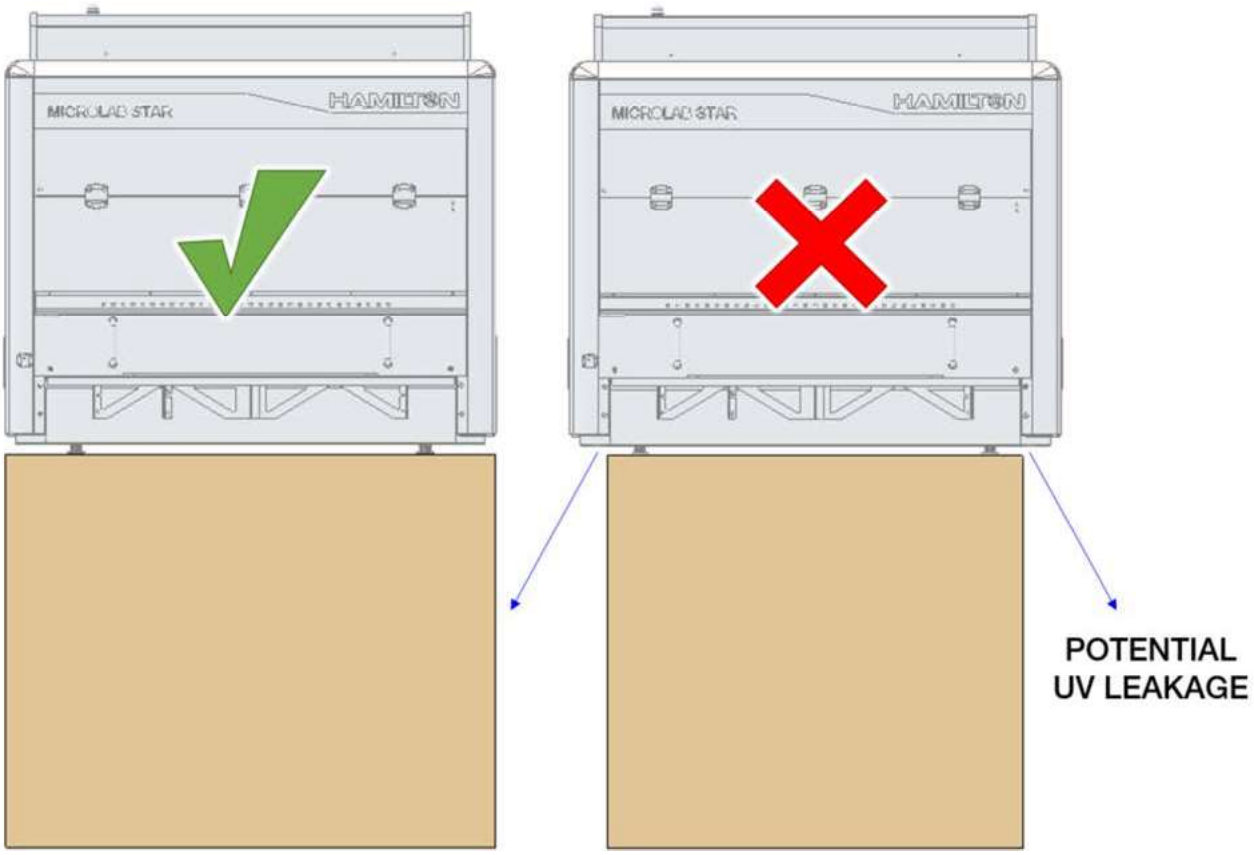

Figure 1-3: Using a bench with proper dimensions

Never disable any safety measure. Always operate the UV light with the door closed and the UV shield in place.

When the UV light is on, remain at least 6 inches (15.2 cm) away from the instrument

Do not remove UV cover while light is in operation.

Be aware that UV decontamination can only be done to surfaces that have direct or reflective exposure to the UV light. Surfaces that are in shadow or are covered will not be decontaminated by the UV light; decontamination of those surfaces should be done by some other means.

The UV lamp contains mercury. Manage the lamp according to local disposal laws.

The UV bulb has a 20% intensity decay over the lifetime (rated for 8000 h). It is the responsibility of the laboratory to verify throughout the bulb lifetime that the intensity meets the laboratory's requirement for decontamination.

When working with the electronic assembly, use ESD (Electrostatic Discharge) control measures.

Use good laboratory practice (GLP) and universal precautions, including the use of personal protective equipment (PPE) when working with and around the ML STARlet instrument and UV light.

Always make sure the instrument power is off before installing or removing any electrical connections.

Installation of the STARline UV Light Kit must only be performed by a trained service engineer.

Operating the light or instrument outside of the stated intended use precludes Hamilton from loss or liability.

Front cover monitoring must be enabled.

1.5 Warning Labels and Safety Precautions

Before removing a mechanical or electrical component, the instrument must be switched off and disconnected from the main electricity supply.

Figure 1-4: Warning labels

Table 1-1: Work Area

	UV light Hazard Avoid looking directly at light.		**Laser beam** Do not stare into beam of class 2 laser.

Table 1-1: Work Area (Continued)

	**Moving parts** Moving arm inside transparent cover. Aborts the run if cover is opened.		**Biohazard warning** Waste may contain bio-hazardous or chemically contaminated materials.
	**USB connection** Having a total cable distance of more than 5 m, signals can be interfered.		**Biohazard warning** Deck may contain bio-hazardous or chemically contaminated materials.
	**Pipetting Arm** Do not move Pipetting Arm by hand.		**Hot Surface** Avoid contact of Hamilton Heater Shaker (HHS). Surfaces are hot and may cause personal injury if touched.
	**Power connection** Connect only to earth-grounded outlet		**Connection to PC** Use only the appropriate shielded cables Biohazard.
	**WARNING** UV Light Hazard Avoid looking directly at light.		**WARNING** Do not remove UV cover while light is in operation.

Chapter 2: Hardware

2.1 Description of the STARline UV Light Kit

The STARline UV Light Kit includes these major components:

- **STAR(let) UV fixture with UV indicator light and power/communication cabling**
- **UV Shield panel for door gap closure**
- **Custom top and right side panels**
- **Other shielding components**
- **Software to control the UV light.**

In addition to these kit components, the UV decontamination application requires that the instrument's front covers be down and lockable. The Service software configuration must be set to monitor the front covers.

Figure 2-1: STARlet shown with the UV light kit installed

2.1.1 STARline UV fixtures

The STARlet UV fixture (Figure 2-1) mounts to the top of the STARlet. The STAR UV fixture mounts to the top of a STAR

instrument. The fixtures provide ultraviolet germicidal decontamination to the interior of the instrument. The lamp contained in the light box is a short wave low pressure, mercury tube that produces ultraviolet waves (254 nanometers) that sterilize microorganisms (virus, bacteria, protozoa, and mold) in the air and on surfaces inside the instrument.

The UV fixture has power and communication cabling that is routed behind the instrument and is connected to the left side port panel of the instrument. The light is controlled through a custom software application.

The top of the UV fixture has a UV indicator light. This UV indicator light automatically turns on when the UV light has power available to it. It is an indicator for the operator that the UV system is active.

2.1.2 STARline UV Shields

The kit includes a UV Shield that is appropriate for the instrument (Figure 2-1) to cover the front opening. The UV Shield is necessary to prevent UV exposure from the front of the instrument. The UV Shield is detectable by either the Autoload unit or additional sensors and sensor board during the decontamination routine.

The UV software application verifies the UV Shield is in place before turning on the UV light. It then monitors for the presence of the UV Shield during the decontamination process, and it will abort the process if the UV Shield is not detected. Because of this functionality, a UV kit for a specific STAR/STARlet configuration cannot be used on any other configuration:

- **STAR UV kits may not be used on STARlets, and vice versa**
- **UV kits for an instrument with Autoload may not be used on a Manual Load instrument, and vice versa**

2.1.3 Instrument front cover configuration setting

The UV light software requires that the instrument front cover (Figure 2-1) be closed prior to turning on the lamp. The application automatically locks the door of the instrument before activating the UV light. This is to protect the user from dangerous ultraviolet exposure.

Service software needs to set the following configuration for the UV light software to work correctly. The cover monitoring needs to be checked to allow the front door to be locked and monitored (Figure 2-2).

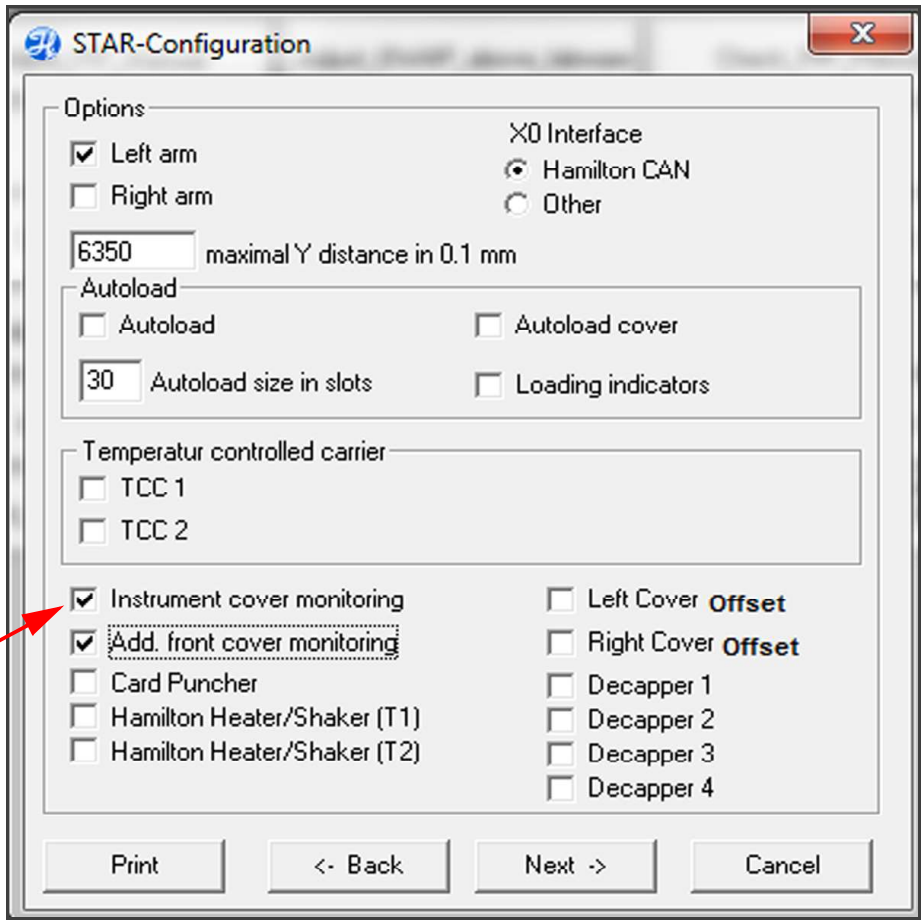

Figure 2-2: STAR configuration checking cover monitoring

2.2 Integration Kits

The STARline UV Light Kits are intended to be installed by a service engineer. The UV Integration kit (Table 2-1) can be installed during the installation of the instrument, or it can be installed onto an existing instruments. Table 2-2 lists the UV Light replacement parts.

Table 2-1: UV Integration Kits

Part Number		Description
No CAP hood	With CAP hood	
97310-21	97310-11	KIT, UV LIGHT, AUTOLOAD, MPH, STAR
97310-22	97310-12	KIT, UV LIGHT, AUTOLOAD, STAR
97310-23	97310-13	KIT, UV LIGHT, AUTOLOAD, MPH, STARlet
97310-28	97310-18	KIT, UV LIGHT, AUTOLOAD, STARlet
97310-27	97310-17	KIT, UV LIGHT, MLOAD, MPH, STAR
97310-26	97310-16	KIT, UV LIGHT, MANUAL LOAD, STAR
97310-24	97310-14	KIT, UV LIGHT, MLOAD, MPH, STARlet
97310-25	97310-15	KIT, UV LIGHT, MANUAL LOAD, STARlet

Table 2-2: UV Light Replacement Parts

Part Number	Description	Quantity															
		97310-21	97310-22	97310-23	97310-24	97310-25	97310-26	97310-27	97310-28	97310-11	97310-12	97310-13	97310-14	97310-15	97310-16	97310-17	97310-18
68140-01	FIXTURE, UV, STARlet			1	1	1			1			1	1	1			1
68140-02	FIXTURE, UV, STAR	1	1				1	1		1	1				1	1	
68176-02	UV SHIELD, AUTOLOAD, STAR	1	1							1	1						
68176-03	UV SHIELD, MANUAL, STARlet				1	1							1	1			
68176-04	UV SHIELD, MANUAL, STAR						1	1							1	1	
68176-05	UV SHIELD, A-LOAD, STARlet, CAP			1					1			1					1
51476-04	LAMP, UVC, 32W, G30T5L, 27.20"	2	2	1	1	1	2	2	1	2	2	1	1	1	2	2	1
97343-01	UV SHIELD, LOWER RIGHT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
97342-01	UV SHIELD, LOWER LEFT, MPH	1		1	1			1		1		1	1			1	
68108-02	COVER, VENT, CAP, UV, STARLINE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
68109-01	STANDOFF, VENT COVER, UV	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
68110-02	COVER, TUBE ROUTING, CAP, UV	1	2	1	1	2	2	1	2	1	2	1	1	2	2	1	2
6604267-01	BLOCK, TUBE ROUTING, CAP, UV	2	4	2	2	4	4	2	4	2	4	2	2	4	4	2	4
420322	SCREW, BUHX, M4X8, ISO7380, A2SS	2	4	2	2	4	4	2	4	2	4	2	2	4	4	2	4
68308-01	HANDLE, DOOR, STARLINE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
68350-01	BLOCK, CATCH, FRONT DOOR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
51552-01	LABEL, UV SAFETY, STARLINE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
92003-01	LABEL, WARNING, UV LIGHT	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
51565-01	SCREW, BUHX, M5X10 MM, SST	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
420560	SCREW, BUHX, M4X10, A2SS	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
66621-01	CLAMP, CABLE, Ø.25, NYLON	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
99088-08	USB, MANUAL/SW, UV LIGHT, STARLINE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
68369-01	SOFTWARE, STAR UV LIGHT CD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6603712-02	PANEL, TOP, UV CAP, STARlet											1	1	1			1
6603712-03	PANEL TOP, UV, NO CAP, STARlet			1	1	1			1								
97340-01	PANEL, ROOF, UV LIGHT, STAR																
6603845-02	PANEL, TOP, UV, CAP, STAR									2	2				2	2	
6603845-03	PANEL, TOP, UV, NO CAP, STAR	2	2				2	2									
68106-01	PANEL, RIGHT, UV LIGHT, STARline	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

2.3 Installation Procedure

The following is the installation procedure for the UV Light Kit during the installation of the STARline instrument.

For UV Light Kits installed as a retrofit onto an existing, pre-installed instrument, please reference the 'Retrofit Notes' of this procedure.

2.3.1 Manual Load UV Shield Sensor Assembly

1. Remove the left and front deck sections. Make sure to keep track of all removed screws and parts.

   To remove the left deck, the stop blocks need to be disconnected and removed starting from the left and including the block behind the waste block on the right.

2. Unpack the small box with the custom sensor wiring and circuit board and Inspect all parts to ensure nothing is damaged.

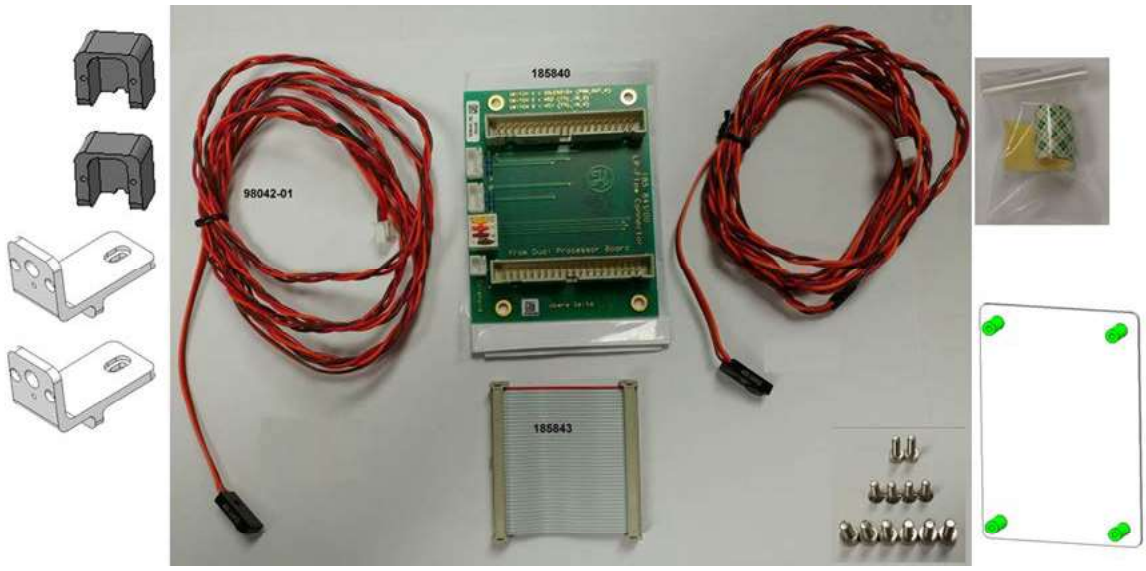

Figure 2-3: Inspecting components for the Manual Load UV Shield Sensor kit

3. Set the DIP switches on the flow connector board as shown in Figure 2-4. Note that switch B is not used.

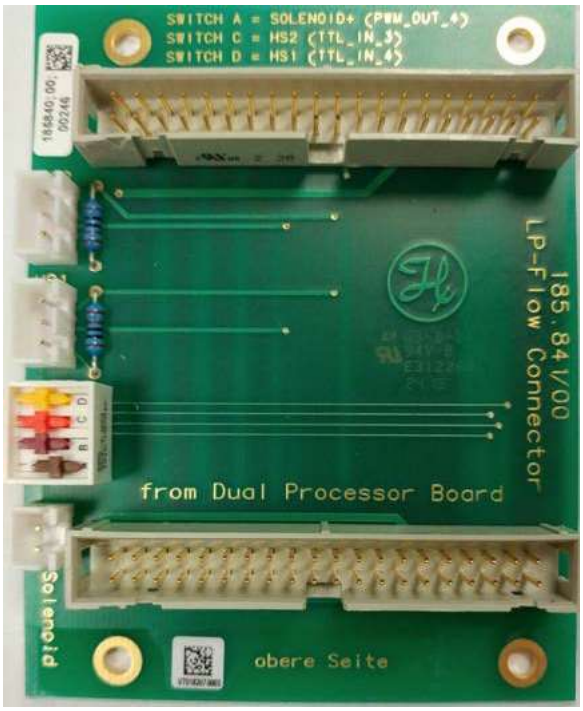

Figure 2-4: Setting the PCB DIP switches

4. Put double-sided tape on the back of the PCB mount bracket.

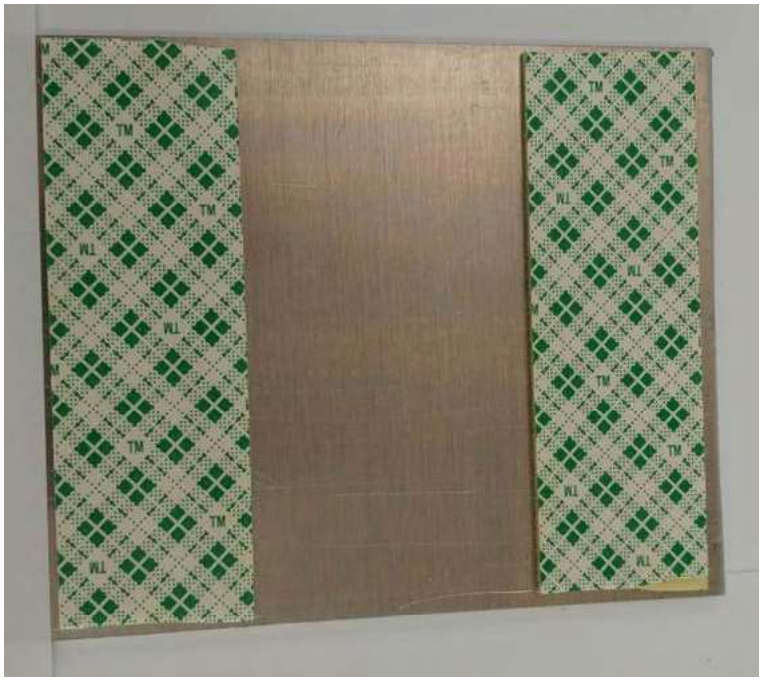

Figure 2-5: Applying double-sided tape to the back of the PCB mount

5. Attach the flow connector board to the PCB mount and connect the periphery flow cable. Make sure the red edge of the ribbon cable is on the

same size as the DIP switches.

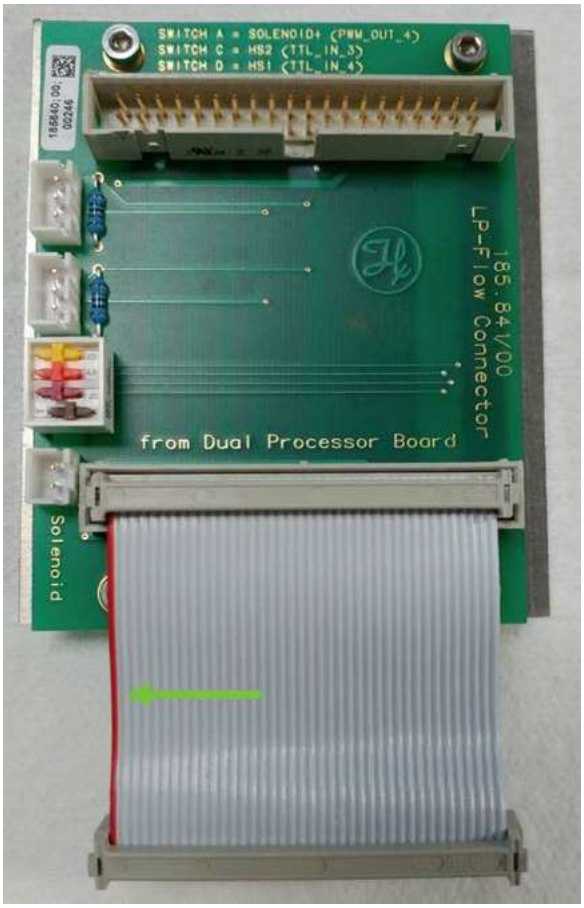

Figure 2-6: Attaching the flow control board and periphery flow cable

6. Disconnect the two ribbon cables from the dual processor board. Note the orientation of the ribbon cables using their red edges before disconnecting them.

Figure 2-7: Disconnecting the ribbon cables from the dual processor board

7. Route the sensor cable connectors through the instrument frame from the front left end of the channel to where the other cables enter the board bay.

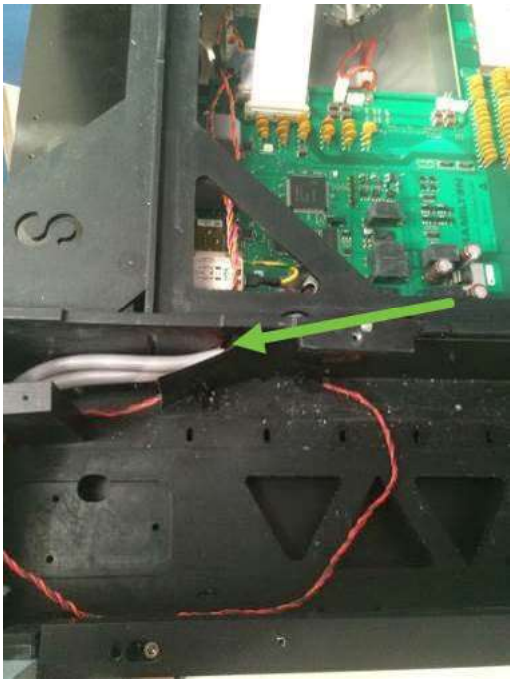

Figure 2-8: Routine the sensor cable connectors

8. Remove the backing from the double-sided tape on the PCB board mount.

9. Connect the instrument ribbon cable to the empty ribbon cable port on the flow connector board, then connect the sensor cable connectors to the board. Note the orientation of the ribbon cable's red edge.

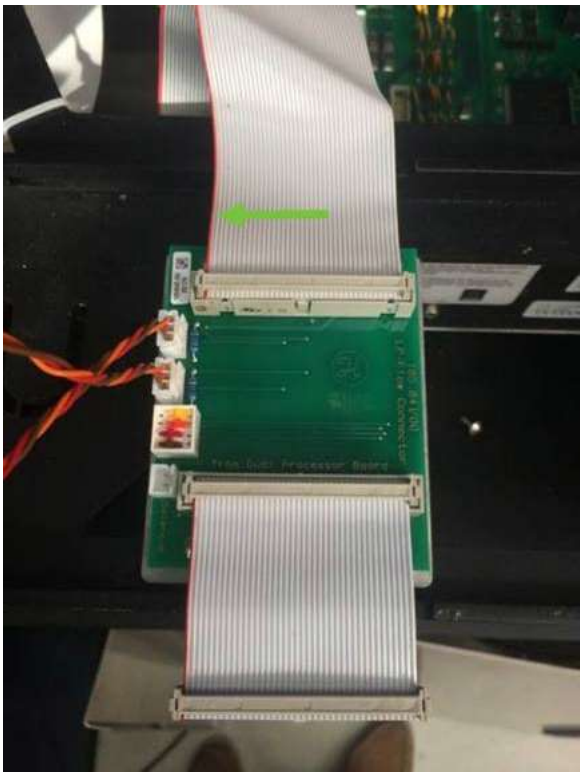

Figure 2-9: Connecting sensor and instrument ribbon cables

10. Connect the short ribbon cable on the flow connector board to the larger port on the dual processor board, and attach the flow connector board to the board bay tray as shown using the double-sided tape. Note the orientation of the red edge of the short ribbon cable.

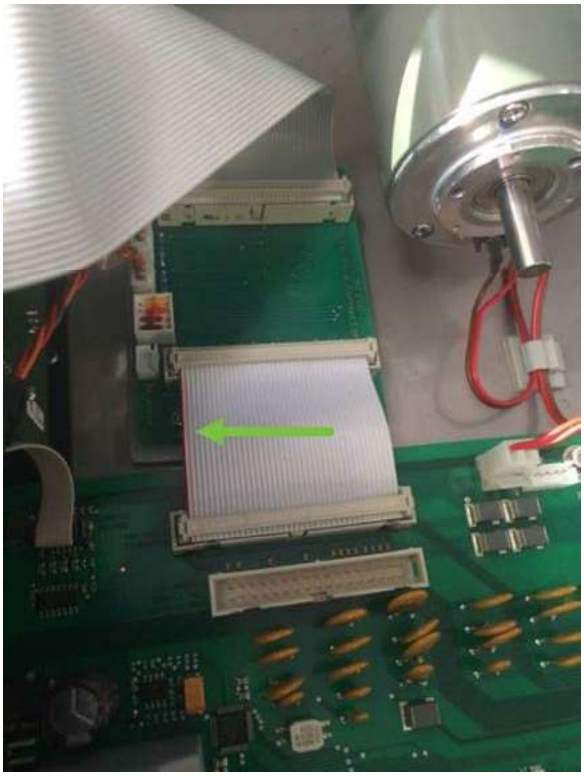

Figure 2-10: Attaching the flow connector board

11. Reconnect the periphery ribbon cable to the dual processor board. Make sure its orientation is the same as it was before it was disconnected.

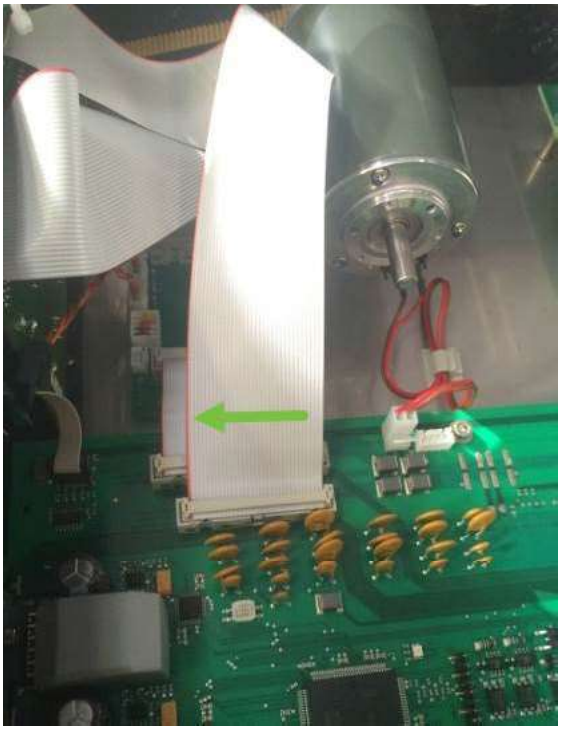

Figure 2-11: Reconnecting the periphery ribbon cable

12. Route one of the sensor cables near the left edge of the channel, and one toward the right edge. Coil any excess cable and store in the channel.

Figure 2-12: Routing sensor cables

13. Bring the modified front deck (either 97350-02 or left and right pair, 660352-02 and 6600380-02) to the instrument and route the cables through the oblong holes on either end.

14. Bring the sensors up through the deck so they can be mounted.

15. Mount the sensors on the inner corner of the sensor mount brackets, using screws with the plus-shaped boss positioned in the large hole of the bracket and the sensor wire routed below the screw. Install the sensor covers over the sensors using the flat head screws provided.

Figure 2-13: Mounting sensors on their brackets

16. Install the deck pieces on the instrument.

Figure 2-14: Installing the front deck sections

17. Attach the sensor mount brackets to the deck near the cutouts for the sensor cables. Use the screws provided to secure the deck between the brackets and the frame.

Figure 2-15: Attaching the sensor

18. Re-install the stop blocks, starting with the right-hand one behind the waste block and connecting them to each other, working right to left. Connect the flat cable to the end stop block before covering with the end block.

2.3.2 UV Light Kit Installation

To install the STARline UV Light Kit:

1. Remove the protective sheeting from the instrument top and UV Light Right Panels (6603712-02/-03, 6603845-02/-03, and 68106-01).

Retrofit Note: Remove the right and left rear corner covers from the back panel. Remove the existing STARline top, left, and right side panels, saving screws.

2. Install the top panel using the screws that are used to install the standard top panels. (Figure 2-16). Use panel 6603712-02/-03 or 6603845-02/-03.

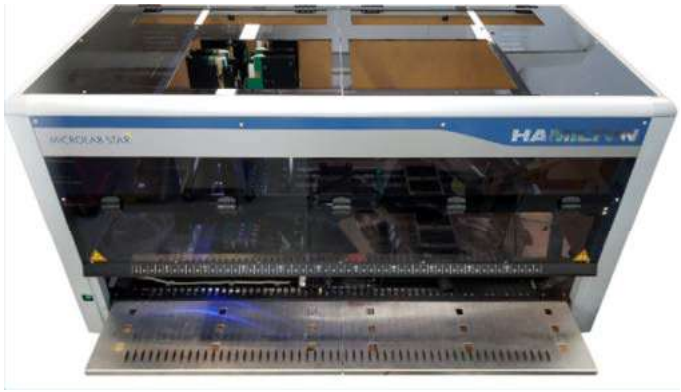

Figure 2-16: UV Light Kit top panel

3. Install the UV lamps (51476-04) into UV fixture (68140-01 or 68140-02) by placing one end into the UV spring socket followed by connecting the other lamp end into the UV light socket, before installing UV fixture to instrument.

4. Place the UV fixture on the top of the instrument, with the electrical connection on the left hand side (Figure 2-17).

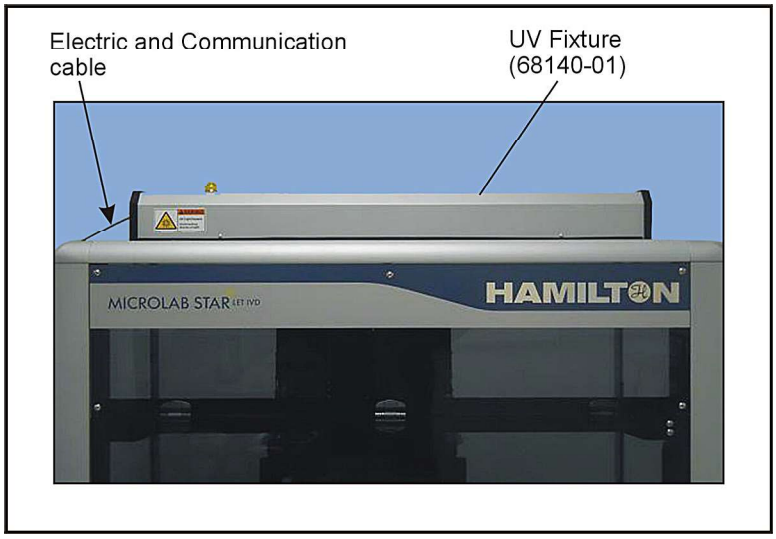

Figure 2-17: UV Fixture in place on top of STARline

Power and communication cables are routed from the left side of the housing.

5. Adjust rubber gasket to minimize light leakage between UV fixture and top panel.

6. Attach the UV fixture to the top panel from the inside of the instrument with four BUHX screws (51565-01). See Figure 2-18.

7. Install the standard left side panel.

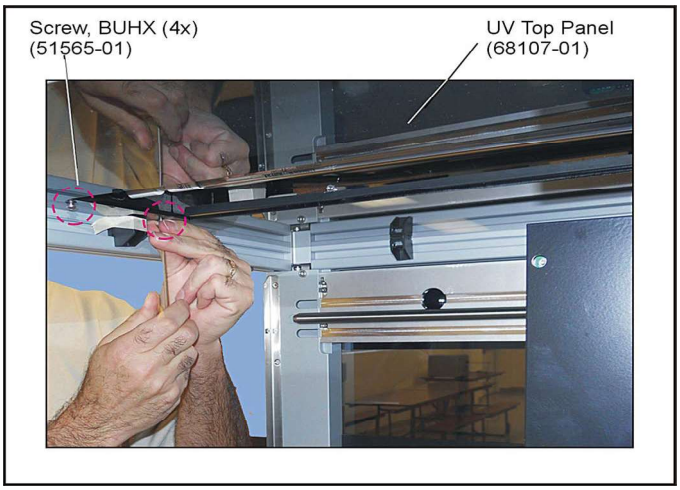

Figure 2-18: Securing the UV fixture to the top panel

8. Install the standard back panel along with right rear corner cover (using three screws for each cover).

9. Install the two cable clamps (66621-01) along with the left side corner bracket (Figure 2-19 and Figure 2-29).

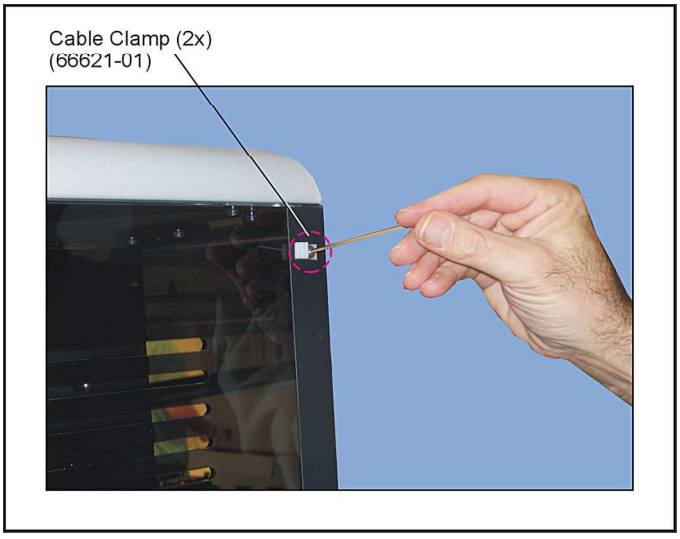

Figure 2-19: Installing two cable clamps (View is from the rear of the instrument)

10. Install two slot cover standoffs (68109-01) on the bottom slot of each of the two ventilation areas of the back panel (Figure 2-20).

Slot cover standoffs are secured onto the ventilation slots by turning each a quarter turn after insertion.

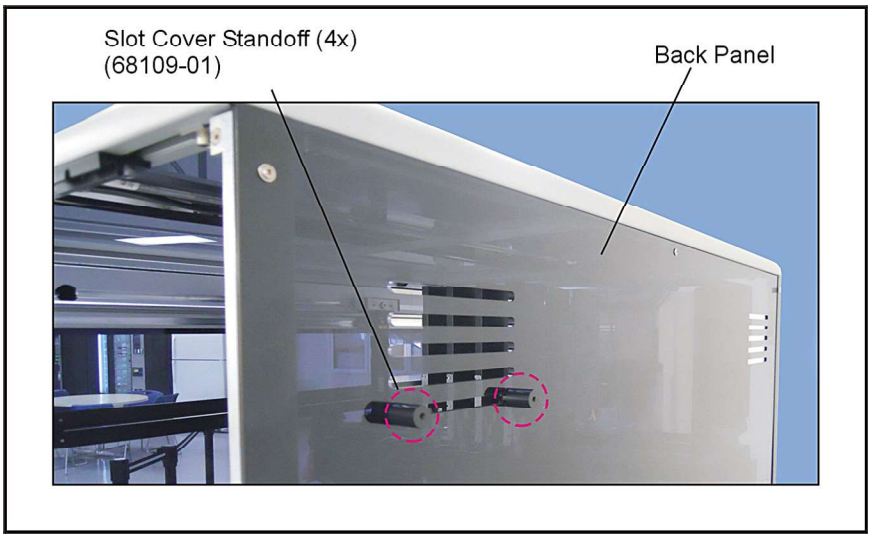

Figure 2-20: Slot cover standoffs

11. Using four BUHX screws (420560), install two slot covers (68108-02) by attaching to the standoff sets installed in the previous step (Figure 2-21).

Figure 2-21: Securing slot covers to prevent UV exposure out the rear of the instrument

12. On the inside of the UV Light Right Panel (68106-01), install the Lower Right UV Shield (97343-01) using four BUHX screws (420560). See Figure 2-22 and Figure 2-23.

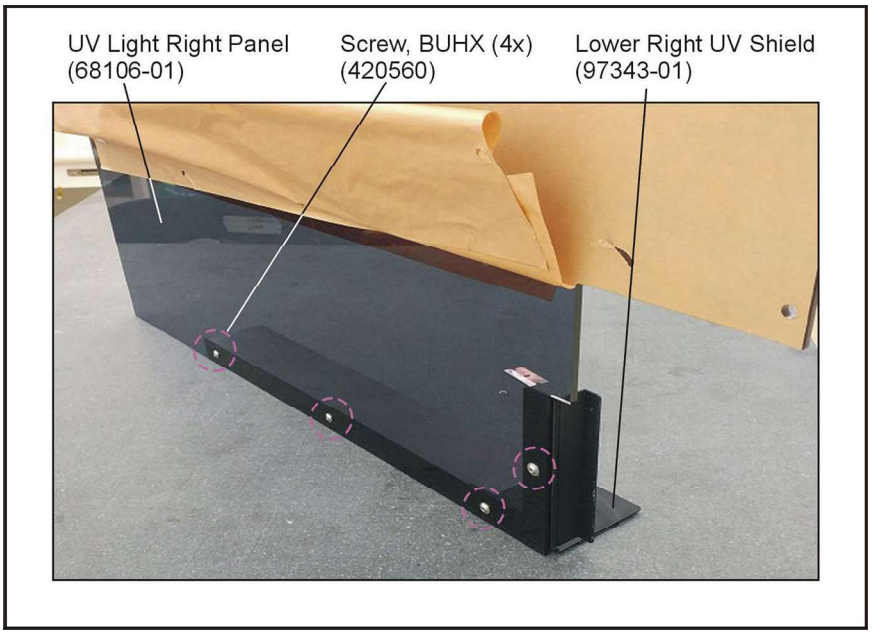

Figure 2-22: UV Light Right Panel and Lower Right UV Shield installation

13. The Lower Right UV Shield (97343-01) is flush with the bottom of the UV Light Right panel (68106-01) when installed (Figure 2-23).

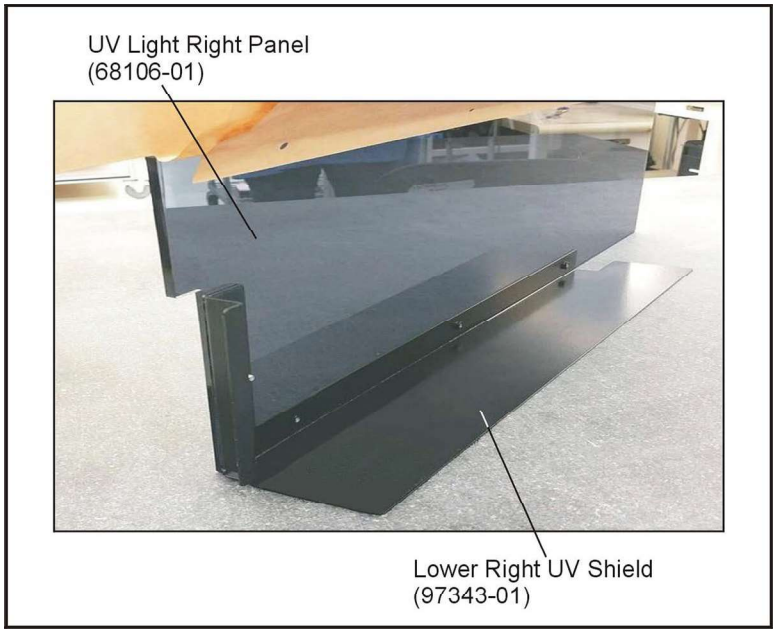

Figure 2-23: UV Light Right Panel with Lower Right UV Shield attached

14. Install the UV Light Right Panel (68106-01) using the two BUHX screws (420560) that are used to install the standard right panel (Figure 2-24).

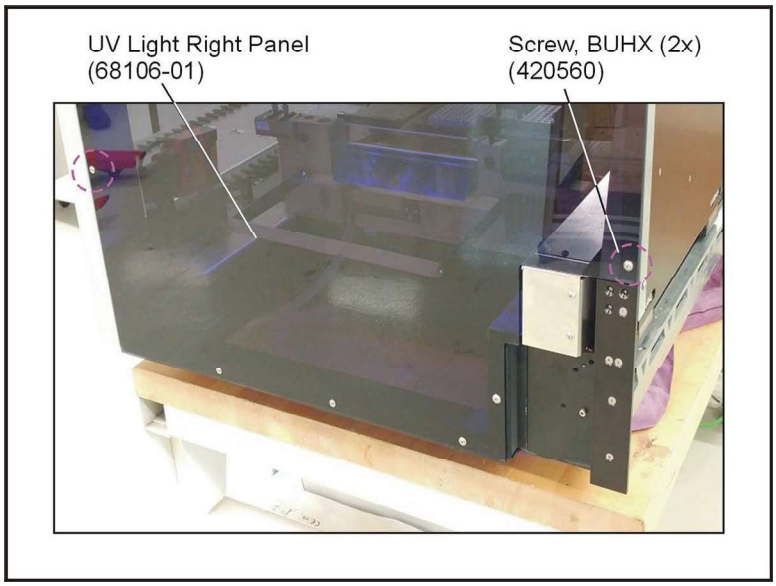

Figure 2-24: UV Light Right Panel installed on instrument

15. The UV Light Right Panel (68106-01) hangs down below the instrument upright when installed (Figure 2-25).

The bottom front corner of the UV Light Right Panel will not be flush with the rest of the instrument.

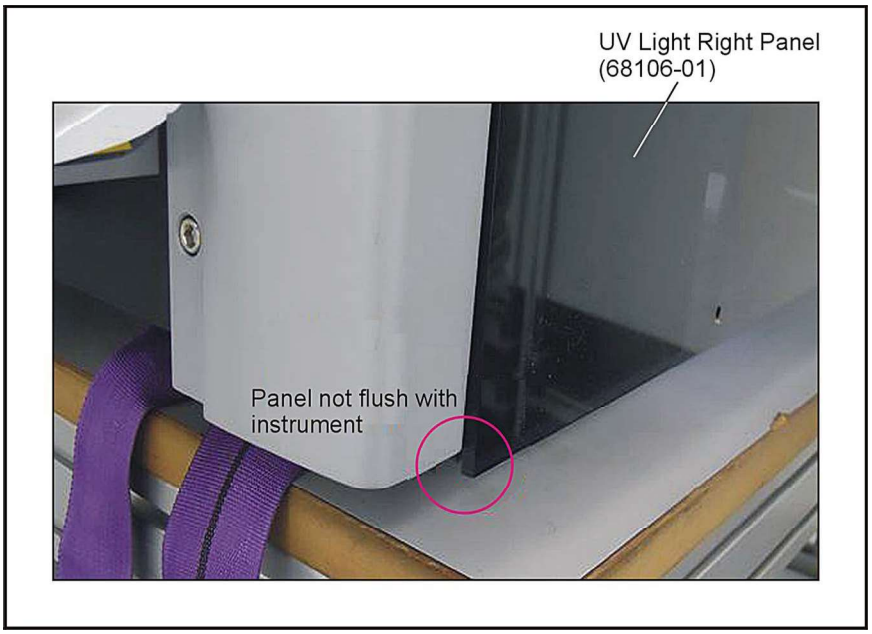

Figure 2-25: Bottom front corner of right panel relative to the instrument corner upright

16. The Lower Right UV Shield helps prevent UV exposure in the area of the tip waste.

17. Remove the screws from the docking station end cap located on rear right side of the instrument.

18. Install one of the tube routing covers—68110-02 with two tube routing blocks (6604267-01)—over the end cap, using the previously removed screws and the two additional screws included in the kit. This tube routing cover helps prevent UV light exposure in that area.

    Make sure the orientation of the tube routing blocks matches that shown in Figure 2-27. The blocks should be flush with the cover when installed, without gaps.

Figure 2-26: Securing the right side tube routing cover

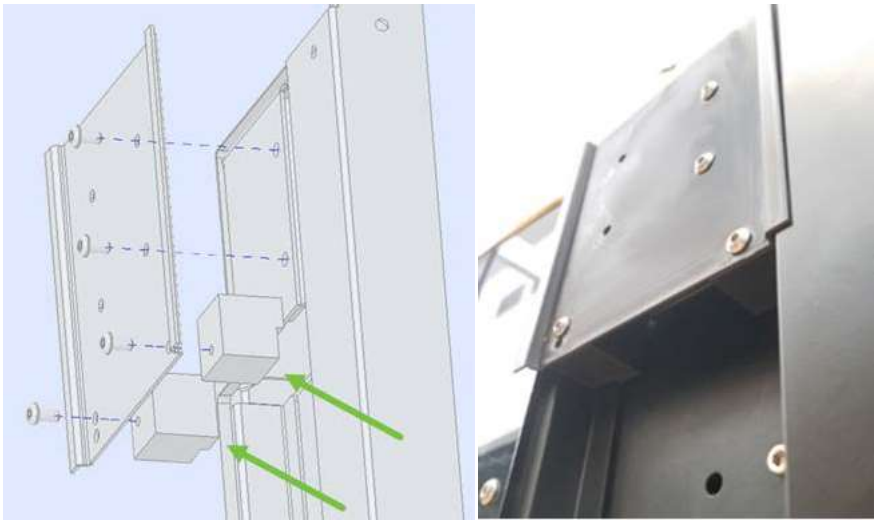

Figure 2-27: Installing tube routing covers and blocks (right side)

19. Remove the screws from the docking station end cap located on the left side of instrument.

20. Install the second tube routing cover—68110-02 with two tube routing blocks (6604267-01)—over the end cap, using the previously removed screws and the two additional screws included in the kit with the flange toward the interior of the instrument.

    Make sure the orientation of the tube routing blocks matches that shown in Figure 2-28. The blocks should be flush with the cover when installed, without gaps.

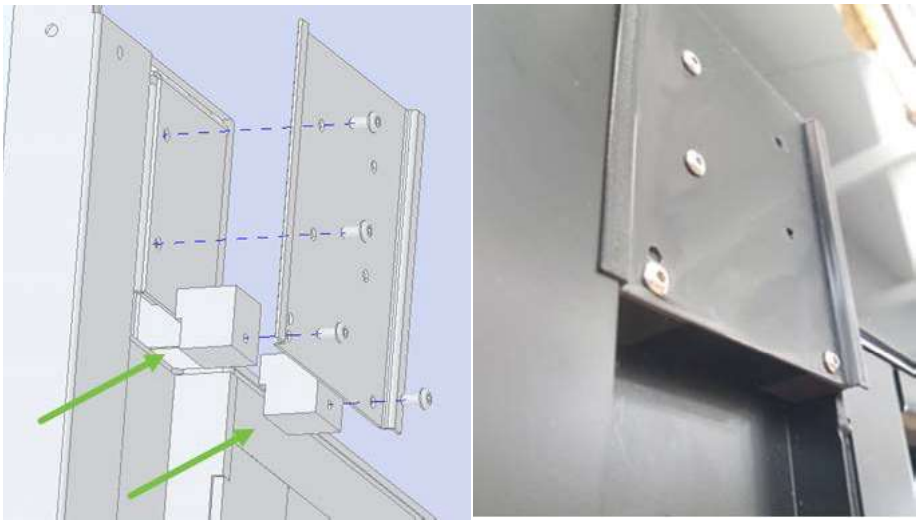

Figure 2-28: Installing tube routing covers and blocks (left side)

21. Route the UV light cable down the back left side of the instrument securing it with two cable clamps (66621-01). See Figure 2-29.

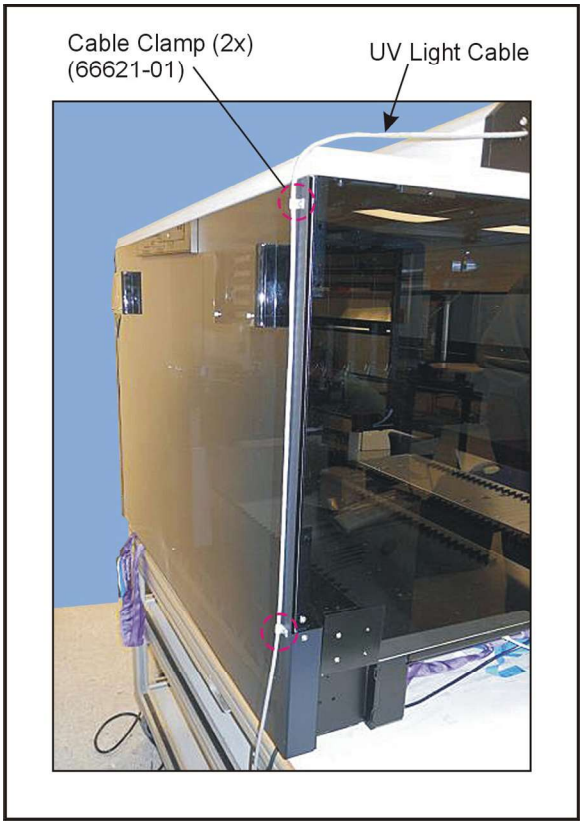

Figure 2-29: Routing the UV light cable down the rear left edge of the instrument

Make sure instrument power is OFF.

22. Plug the UV power connectors into the Power 1 and Power 2 ports and the UV communication connector into the DIV 3 port of the STARline (Figure 2-30).

Note the labels on cables.

Figure 2-30: Power (POWER 1 and 2) and communication (DIV3) ports

23. Remove left hand side door lock catch.

24. Fit the modified front door catch block (68350-01) from the STARline UV Light Kit to the door handle (68308-01) with screws removed in step 23 to create the door catch and handle lock assembly (Figure 2-31).

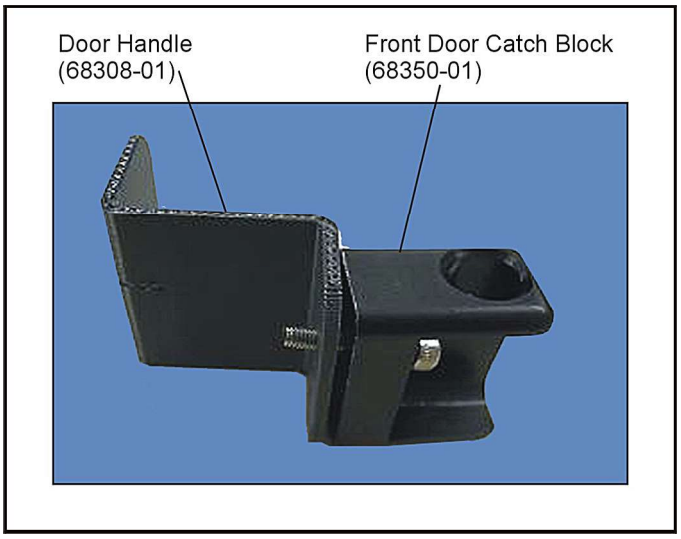

Figure 2-31: Door catch and handle lock assembly

25. Install door catch and handle lock assembly onto left hand side of the door (Figure 2-32).

26. Verify the functionality of the system. See Chapter 4 “Operation” section on page 49.

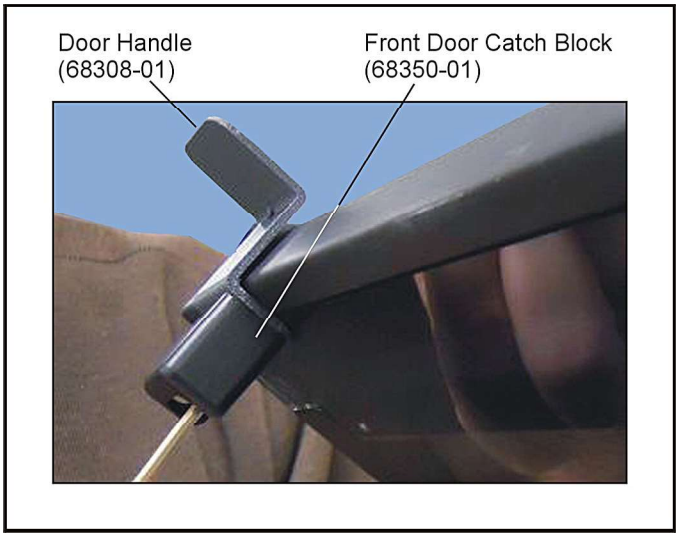

Figure 2-32: Door catch and handle lock assembly installation onto front cover

2.3.3 Installing Warning Labels

To install the Warning labels (Figure 2-33):

1. Place the UV Light Hazard label (51552-01) to the top right corner on the left side as shown in Figure 2-34.

2. Place the second UV Light Hazard label to the top left corner on the right side as shown in Figure 2-35.

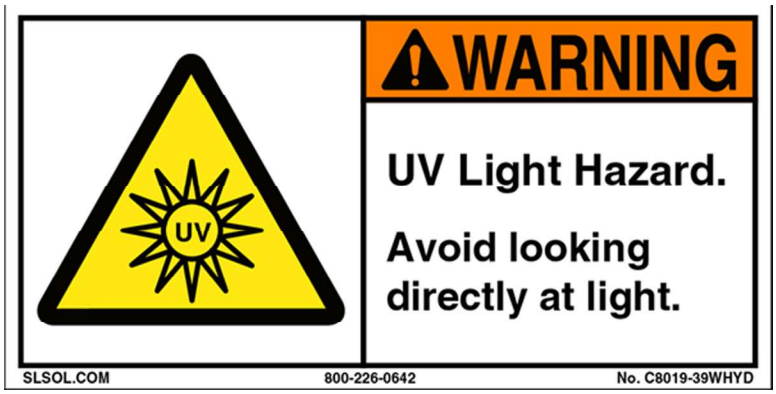

Figure 2-33: UV Light Hazard label

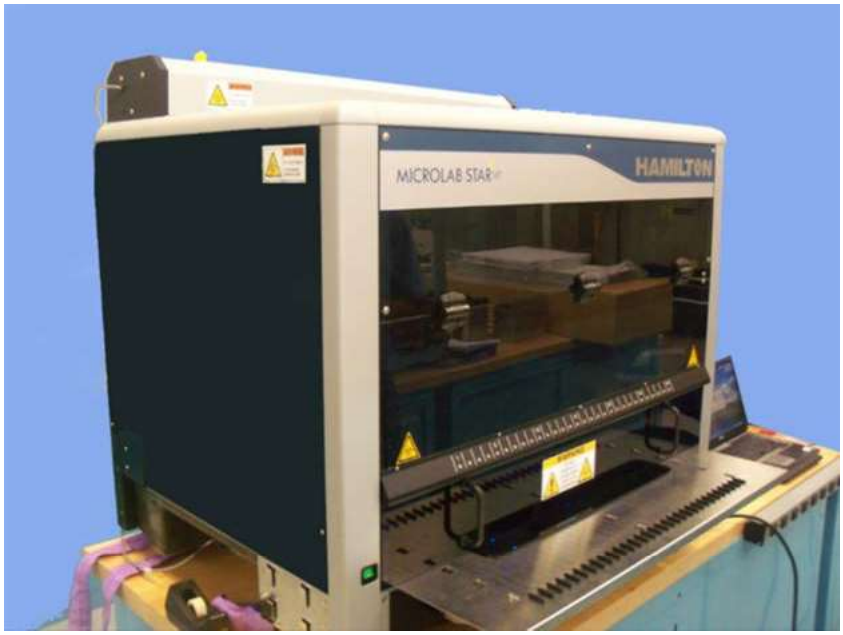

Figure 2-34: UV Light Label - Left side of instrument

Figure 2-35: UV Light Label - Right side of instrument

When applicable, apply the UV light covers label (92003-01, shown in Figure 2-36) to the front door, left and right side panels, and rear panel of the waste table/cabinet beneath the instrument. Place labels centered at the top of each panel or door.

Figure 2-36: UV light covers label

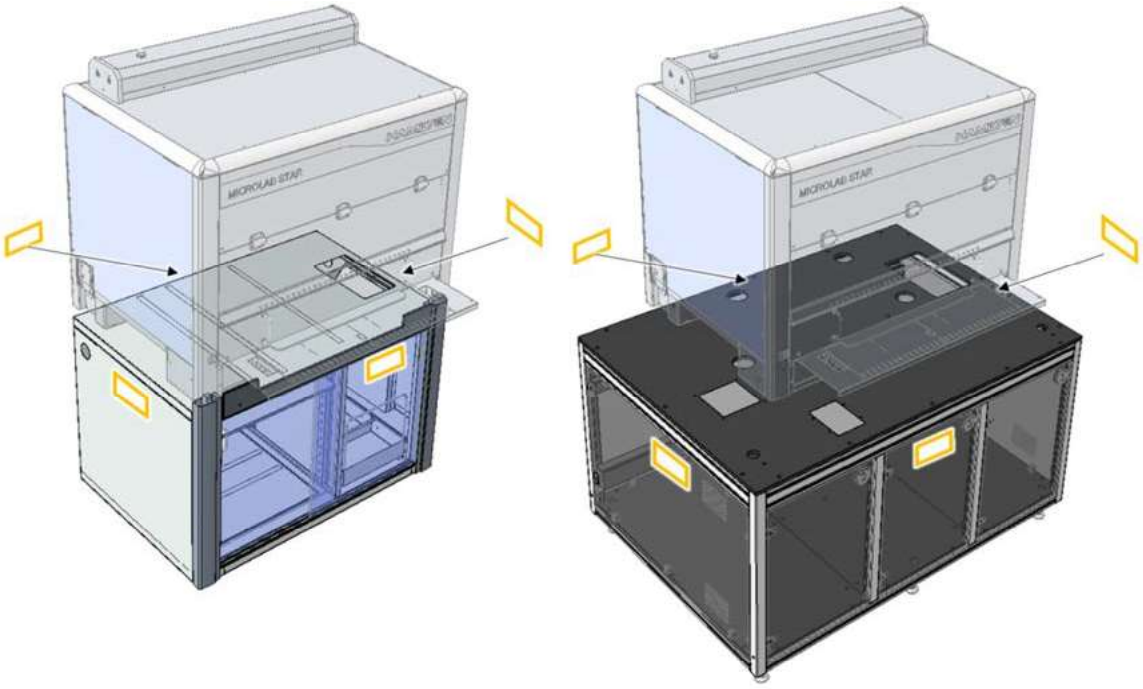

Figure 2-37: Applying UV light covers labels

2.4 Replacing the UV Lamp

Replacement of the UV lamp is intended to be done by a service technician.

To replace the UV lamp (51476-04):

Do not handle the UV lamp without gloves.

Make sure the UV lamp is cold and the instrument is powered off.

1. Open the front cover of the instrument.
2. Reach into the instrument and through the opening in the top panel(s) with gloved hand to grip the lamp near the right end.
3. Push the lamp to your left, into the spring socket on the left (Figure 2-38).to release the single pin from the right socket.
4. Before pulling the right end of the lamp out, feed it right beside the right hand socket to release the left end of the lamp from the spring socket.

5. Feed the left end of the lamp down through the opening in the top panel.

6. For a STAR instrument, repeat these steps for the second lamp.

7. Dispose of the used UV lamp according to the local regulations.

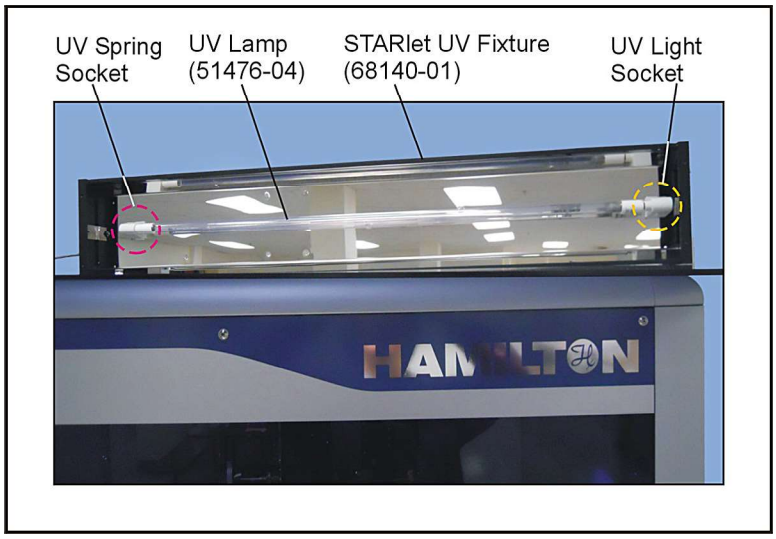

Figure 2-38: STARline UV fixture tipped onto its side

The UV lamp carton should be opened fully so lamp can be lifted out of packaging with no twisting or pulling. Unpacking should take place in an area large enough to eliminate the possibility of inadvertently striking lamp against walls, pillars, pipes, beams or machinery.

Lamp must be wiped with alcohol before placing in service. Bare skin contact with the quartz envelope must be avoided. Compounds from the skin when heated on lamps operating at 600 to 850C will form permanent etching (devitrification) on the quartz surface decreasing UV energy transmission. A contaminated lamp eventually will overheat causing premature failure.

The UV lamp contains mercury. Manage the lamp according to local disposal laws.

8. Wipe the new replacement lamp(s) with alcohol to ensure no residue is on them.

9. Using gloved hands, reverse the above procedure to install the replacement lamp(s).

10. Install the new lamp(s) by placing one end into the spring socket and collapse the spring enough to position the other end in the other socket.

11. Verify the functionality of the new UV lamp.

See Chapter 4 “Operation” section on page 49.It is the responsibility of the laboratory to verify the UV system meets the

laboratory's requirements for decontamination.

Chapter 3: Software

3.1 Installation

The software shall be installed and run on the computer that has Venus Three STAR software already installed.

To install the UV Light Application:

1. Turn on the computer.
2. Insert the DVD (P/N 68369-01) into the computer. The installation should launch automatically.
3. If the installer does not automatically launch, navigate to the DVD directory and double click the setup executable.
4. Once the InstallShield Wizard begins, click the 'Next >' button (Figure 3-1).

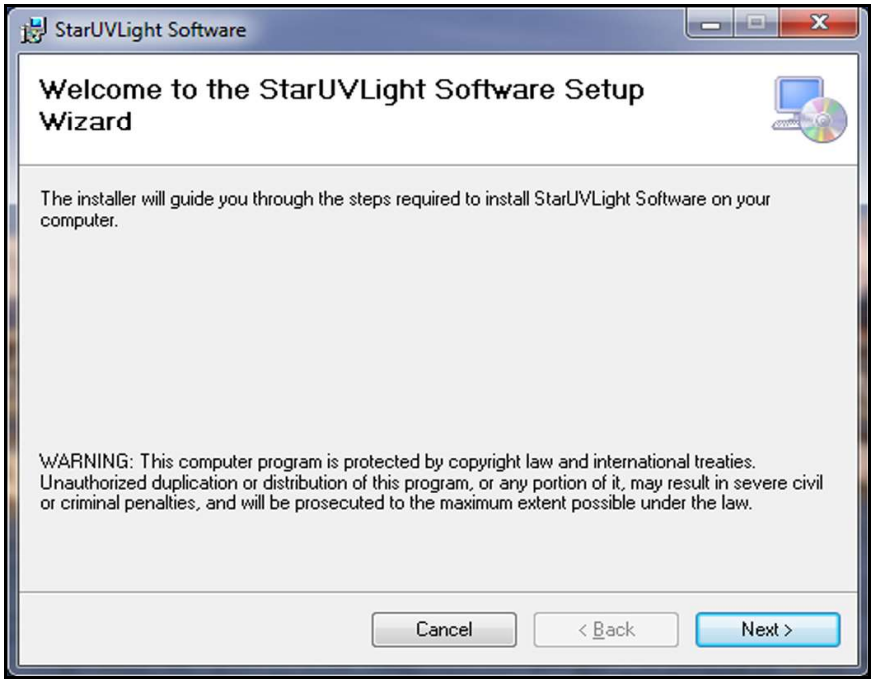

Figure 3-1: First screen of the UV Light software installation

5. A screen allowing the service engineer to select an installation folder. Click the “Next >” button (Figure 3-2).

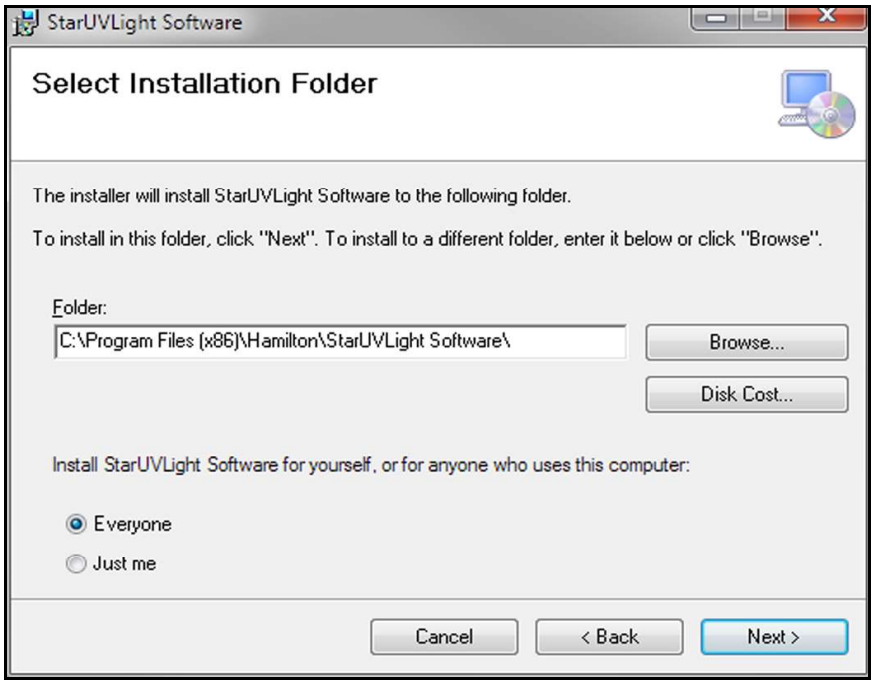

Figure 3-2: Screen 2 of the UV Light software installation

6. The installation will progress and a “Confirm Installation” window will pop-up (Figure 3-3). Click the “Next >” button.

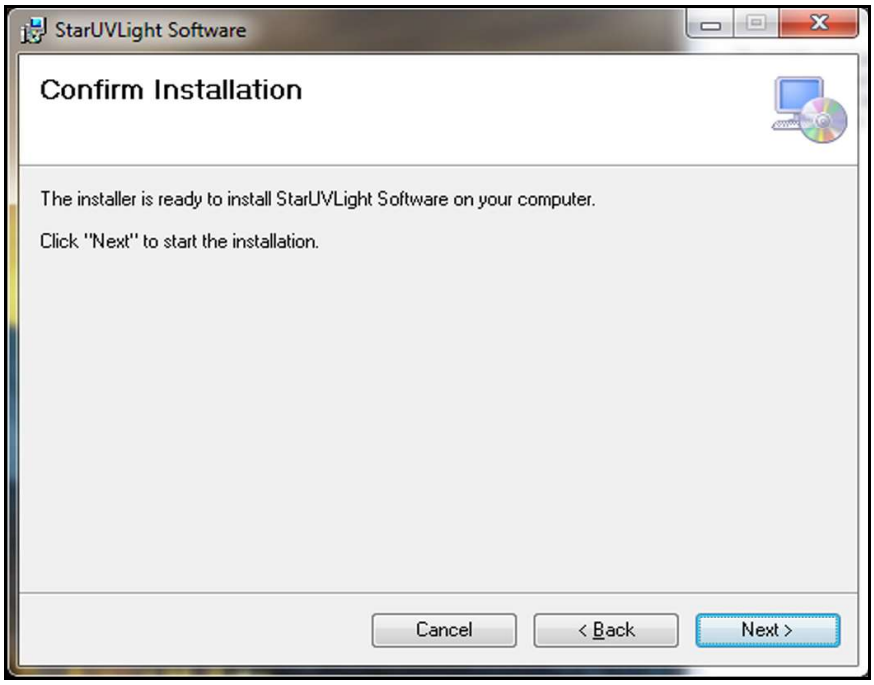

Figure 3-3: Confirm Installation

7. The installation will commence and a progress bar will be shown and then an “Installation Complete” window will pop-up (Figure 3-4. Click the “Close” button.

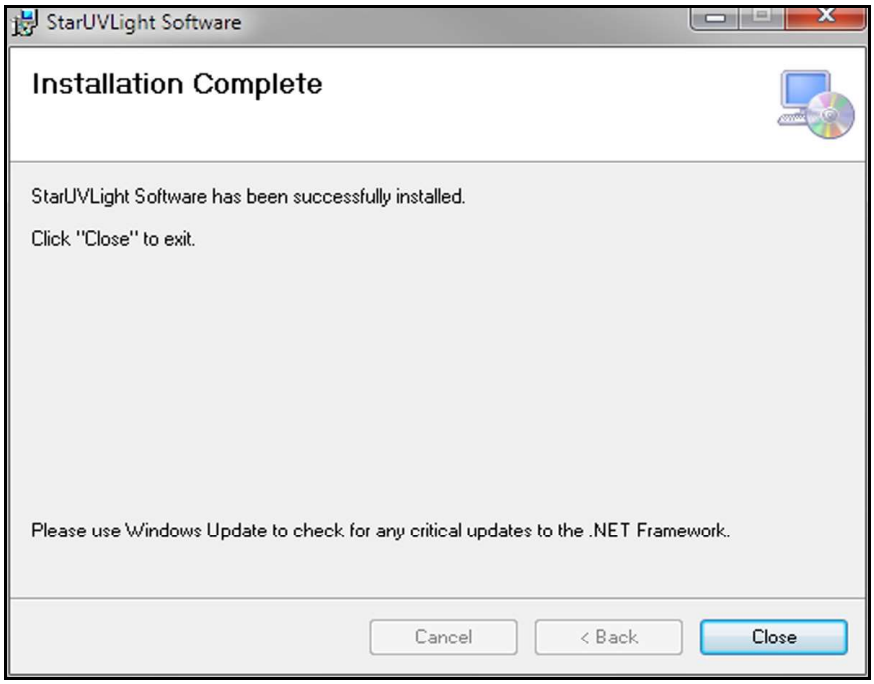

Figure 3-4: Last screen of the UV Light software installation

8. After installation successfully completes there will be a UV light application shortcut on the desktop (Figure 3-5).

Figure 3-5: Desktop icon for the UV Light application

3.2 UV Light Application

At the start of the UV decontamination procedure, the software checks that the instrument front cover is down and that the UV Shield is in place, it locks the front cover, and then turns on the UV lamp.

During the decontamination, the X-arm moves left and right, to provide maximum exposure of UV light to the deck and to minimize shadows.

Throughout the procedure, the Autoload unit verifies the UV Shield is still in place, if equipped. If it is a Manual Load Instrument, added sensors monitor UV Shield presence.

After the decontamination period is done, the UV light will automatically turn off, the arm and Autoload units will stop moving, and the front cover will be unlocked.

There are several options for the operator when using the UV light application (Figure 3-6). These are explained below.

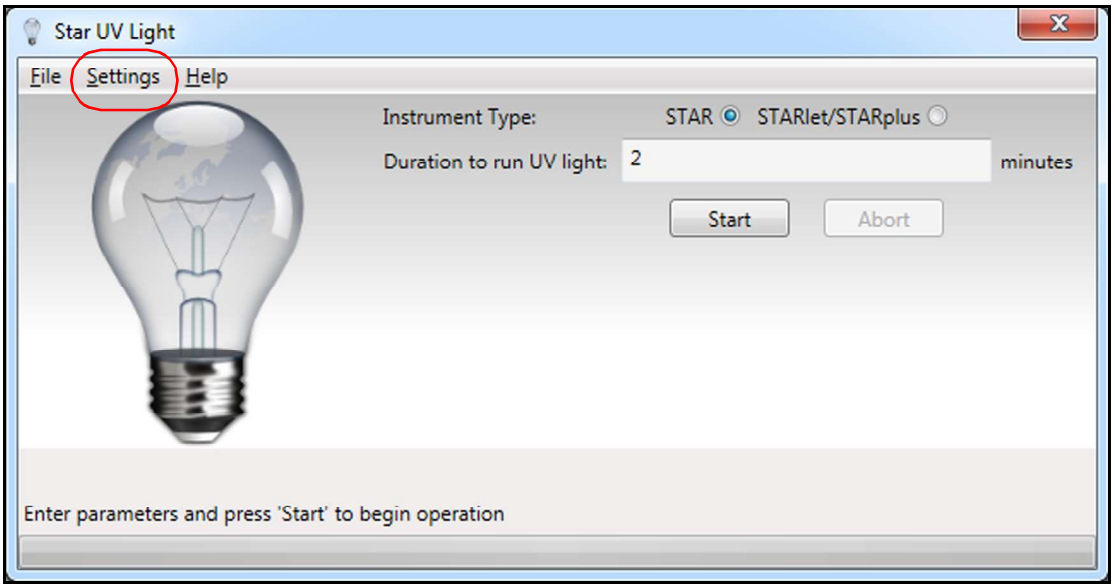

Figure 3-6: UV Light application window

Select the Start button once all your parameter settings are set how you need them.

Instrument Type:

Select whether the instrument is a STAR, STARlet or STARplus instrument. This setting is for autoload only.

Duration to run UV light:

The total number of minutes the UV lamp will be turned on. The timer begins when the 'Start' button is clicked.

Range: 1-60 minutes.

Set desired X-Arm movements:

Select the “Settings” menu (refer to Figure 3-6) to set custom X-Arm movement parameters. Right Arm will be greyed out in single arm instruments.

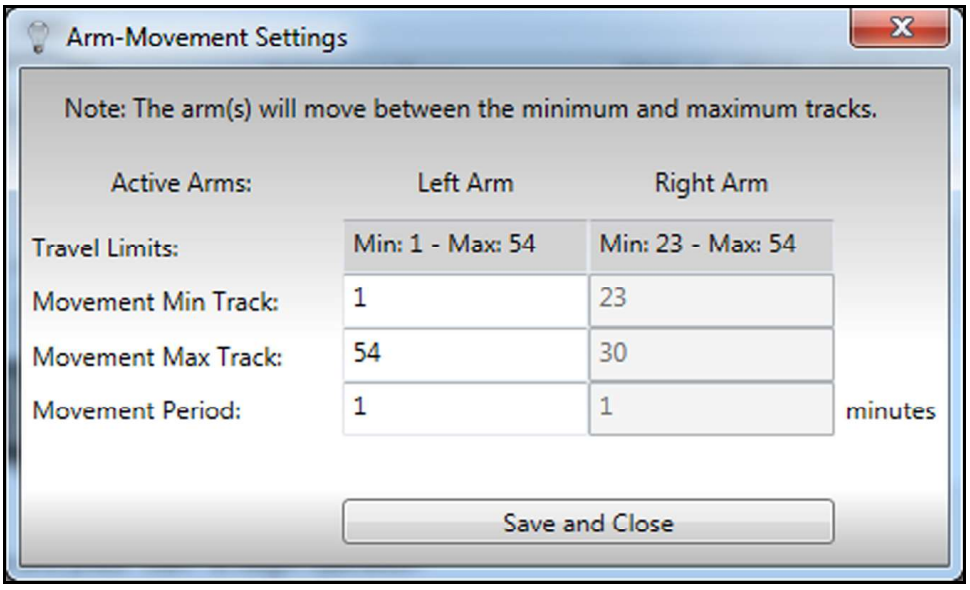

Figure 3-7: Arm-Movement Settings window (1 of 3)

Movement Min Track:

The left-most track the x-arm will move to during decontamination.

Movement Max Track:

The right-most track the x-arm will move to during decontamination. The software will determine allowable 'Travel Limits' for each arm and display them in the row with this title. They may overlap, but you can not assign the arms to overlap their movements.

Movement period:

This is the approximate time in minutes between X-Arm movements. If this is set to either 0, or the same number as the Duration to run UV light, the X-Arm will not move during the decontamination and there will be a shadowing of the arm on the deck that prevents full deck sterilization.

Range: 1-60 minutes.

For best performance of the UV light decontamination, limit the X-Arm movement period to a maximum of 1/3rd the Duration to run the UV light set in the prior instructions.

Example: If you set the 'X-Arm movement period' to 1 minute, the 'Duration to run UV light' needs to be set to at least 3 minutes, otherwise, the result could be a shadow on the deck surface that is not sterilized.

Any setting that allows the X-Arm to not move during decontamination will result in a shadow on the deck surface that is not sterilized.

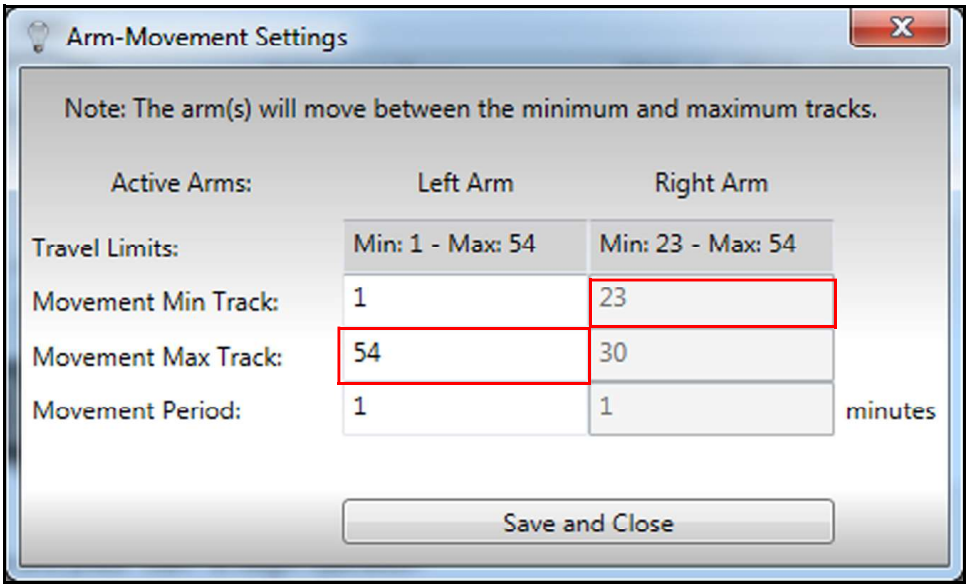

Figure 3-8: Arm-Movement Settings window (2 of 3)

When a track is input that is not allowed, the field where the disallowed track number was entered, as well as the incompatible field are highlighted with a red outline (see Figure 3-8).

NOTE: Travel Limits may overlap, but arm track minimum and maximum track movements for two arms may not overlap.

For periods set to zero:

You can set the movement period to “0” (see Figure 3-9) for a special need where you control decontamination in a different way. This can be saved and closed, but the following warning will display on Start (Figure 3-10).

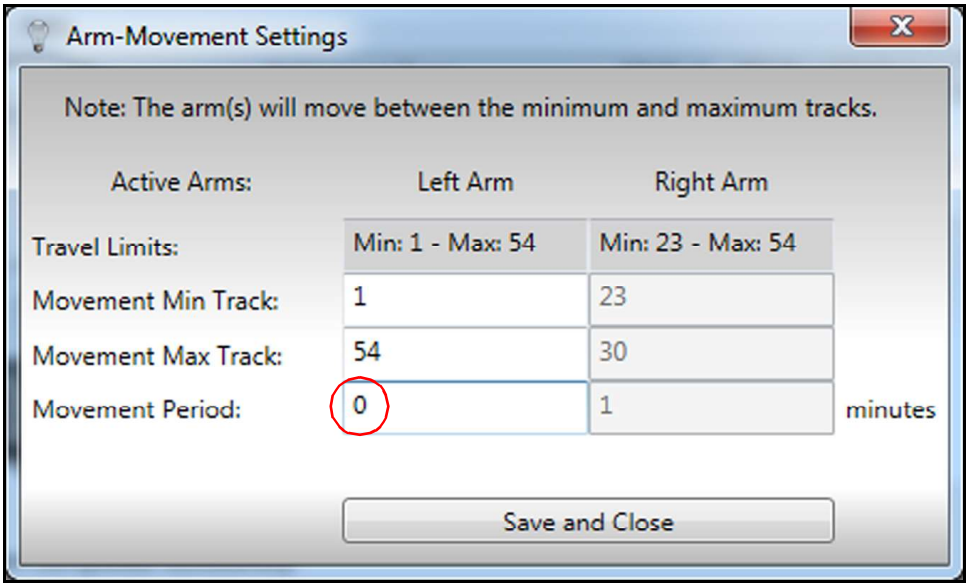

Figure 3-9: Arm-Movement Settings window (3 of 3)

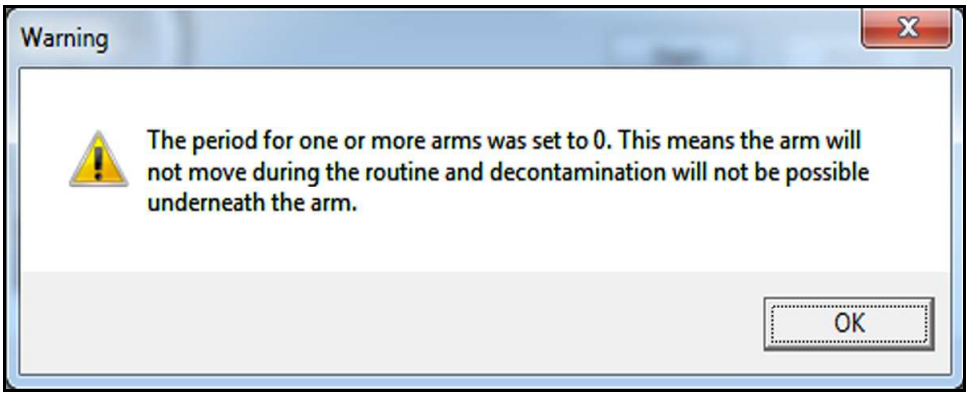

Figure 3-10: Warning window

The method then starts with the arm parked at the minimum track parameter. The arm will cast a UV light shadow on the deck.

The deck in the shadow of the arm is not sterilized. You will not actually see this shadow due to ambient light, because you cannot see the ultraviolet light wavelengths used for sterilization. There is a visible blue light wavelength emitted to allow you to determine that the UV lamp is active.

For tracks set to the same value:

You can set the movement minimum and maximum tracks to the same value (see Figure 3-11). This can be saved and closed, but the following warning will display on Start (see Figure 3-12).

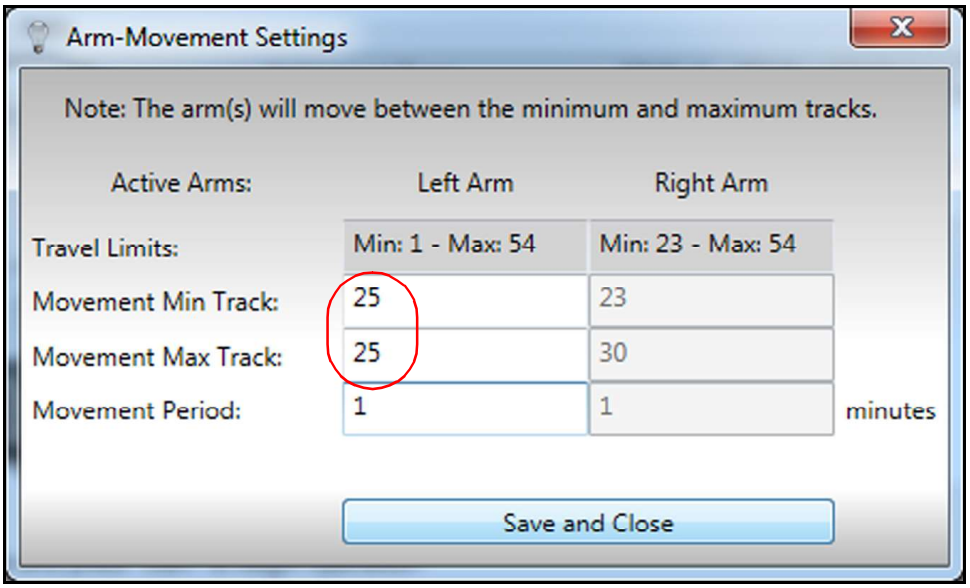

Figure 3-11: Movement minimum and maximum tracks location

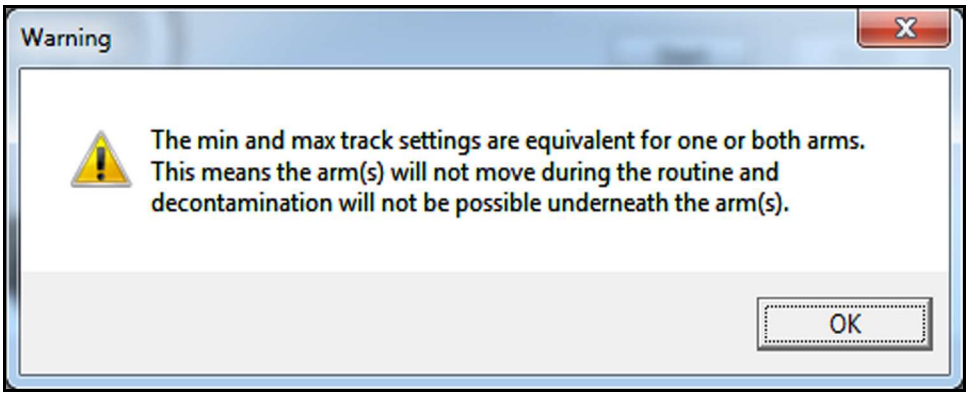

Figure 3-12: Warning window

The method then starts with the arm parked at the min./max track parameter. The arm will cast a UV light shadow on the deck. The deck in the shadow of the arm is not sterilized.

NOTE: Movement settings cannot be changed during decontamination run.

For aborted runs:

When a run is aborted, the software attempts to reveal what caused the abort as well as the time remaining in your duration (Figure 3-13).

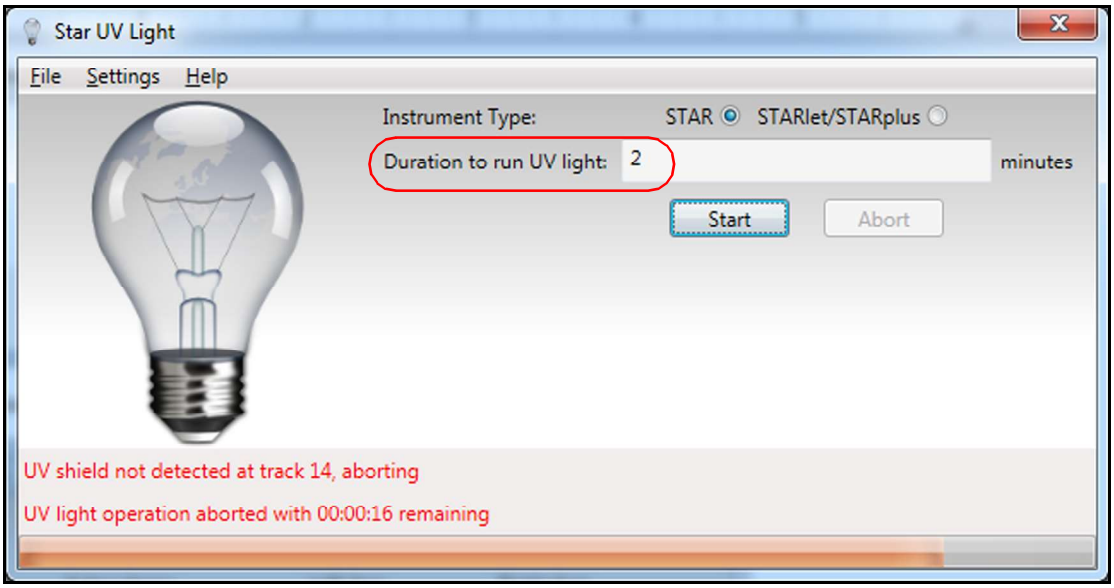

Figure 3-13: Star UV Light window

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Chapter 4: Operation

4.1 Operation of the UV Light

Ultraviolet germicidal decontamination should be completed after successfully running the Daily or Weekly Maintenance for the instrument.

Decontamination by UV can only be done where the surface is directly exposed to the UV light. Dirty surfaces, shadowed surfaces, or unexposed surfaces are not decontaminated by UV exposure.

To operate the UV Light:

1. Remove all carriers from instrument deck and loading table.

2. Open the instrument front cover and install the UV Shield (68176-xx, see Table 4-1).

Table 4-1: UV Shield

UV Shield 68176-xx					
Instrument	-01	-02	-03	-04	**Tracks**
STARlet Autoload	x				2 & 30
STAR Autoload		x			14 & 42
STARlet Manual Load			x		2 & 30
STAR Manual Load				x	14 & 42

3. Install the UV Shield (Figure 4-1) by sliding its two carrier tracks into track positions from Table 4-1until the ends of the shield are against the stop of the instrument's uprights.(Figure 4-2).

Figure 4-1: Putting the UV Shield in place on a STARlet Autoload

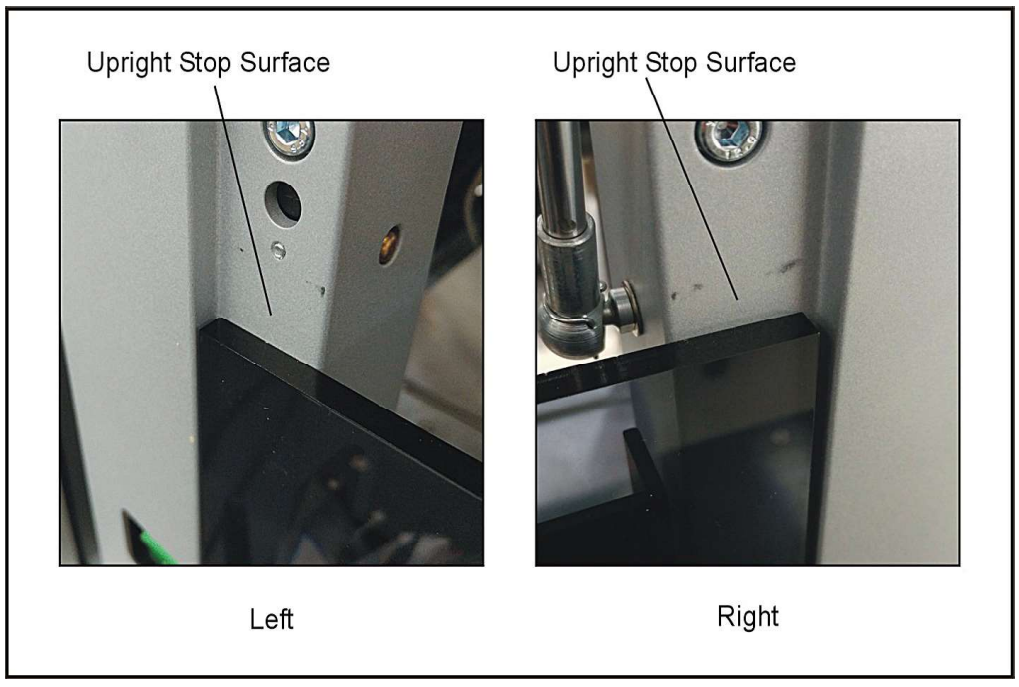

Figure 4-2: UV Shield against upright stops

4. Close the front cover. The door must remain closed during the decontamination process.

5. Use the desktop shortcut to open the UV Light software.

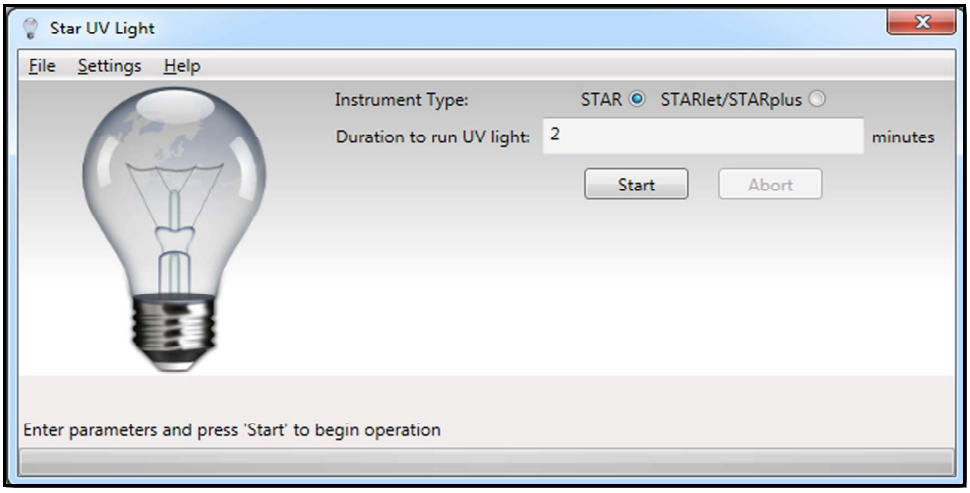

Figure 4-3: UV light application window

6. Enter the decontamination parameters and click the ‘Start’ button. (For a detailed description of the parameters, see Section 3.2 “UV Light Application” on page 42).

7. After the door lock engages, the instrument will initialize, the Autoload unit, if installed, will check for the presence of the UV Shield, and the UV light will turn on.

8. During the UV light decontamination:

   a. The yellow indicator light on the top of the UV fixture will remain on.

   b. The remaining duration time will be displayed on the computer monitor.

   c. The instrument will periodically monitor for the presence of the UV Shield.

   d. The X-arm will sweep across the instrument according to the parameters entered by the user.

9. After the operation is complete, the UV light and the yellow indicator light will turn off, the Autoload, if installed, will park and the door will unlock. A trace file will be generated in the C:\Program Files\Hamilton Company\Logfiles directory.

To stop the decontamination process at any time, click the ‘Abort’ button on the UV light window. This will complete a controlled shut down of the decontamination process, the same as described in step 9.

During the decontamination process, keep at least 6 inches (15.2 cm) away from the instrument.

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Chapter 5: Troubleshooting

Table 5-1: UV Light Application Troubleshooting

Possible causes	Corrective Action
The door sticks when opening or closing when placing/ removing the UV Shield.	Loosen the door lock assembly and adjust right and left as necessary. Retighten.
UV Light Application will not begin or is interrupted because of a 'Door not able to lock' error	Check that the door is closed. Check that the UV Shield is installed correctly and not preventing the door from fully closing.
UV Light Application will not begin or is interrupted because of a 'UV shield not installed' error	Check that the UV Shield carrier tracks are in the proper track positions per Table 5-2 and that the ends of the UV Shield are resting neatly against the door stop notches in the instrument uprights.

Table 5-2: UV Shield

UV Shield 68176-xx					
Instrument	-01	-02	-03	-04	**Tracks**
STARlet Autoload	x				2 & 30
STAR Autoload		x			14 & 42
STARlet Manual Load			x		2 & 30
STAR Manual Load				x	14 & 42

In the event of an error during run time, select the 'Help' button (if available). The message should provide some clues to the cause of the error and a possible remedy.

If not, try to reproduce the error, record the error code and message, and notify Hamilton Company Technical Service. See Appendix C "Getting Technical Assistance" on page 67.

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Chapter 6: Specifications

Table 6-1: UV Lamp specifications

Parameter	Specification
Light Wavelength: UV Intensity: Bulb Life:	254 nm emitting UV-C for germicidal decontamination A minimum of 40 uW/cm2 of intensity at the deck surface Rated for 8000 hours, which includes a 20% intensity decay over the life of the bulb
Operating Temperature: Altitude:	 15° to 30°C (59° to 86°F) 2000 m (1.2 miles) above sea level
Storage Temperature:	 -25°C (-13.0°F) @ 10% humidity to 70°C (158°F) @ 90% humidity non-condensing

Main supply voltage fluctuations are not to exceed 10% of the nominal supply voltage.

Indoor Operation and Use Only

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Appendix A: UV Waste Door Installation

1. If performing a field installation, remove the deck to install the under-deck cable.

   If installing on a new instrument, skip to step 3.
2. Remove the screws securing the dual processor board for ease of cable routing.
3. Route the cable as shown in Figure A-1, securing it with cable ties where it passes over the edge of the deck. Make sure the cable is behind the standoff near the holes shown.

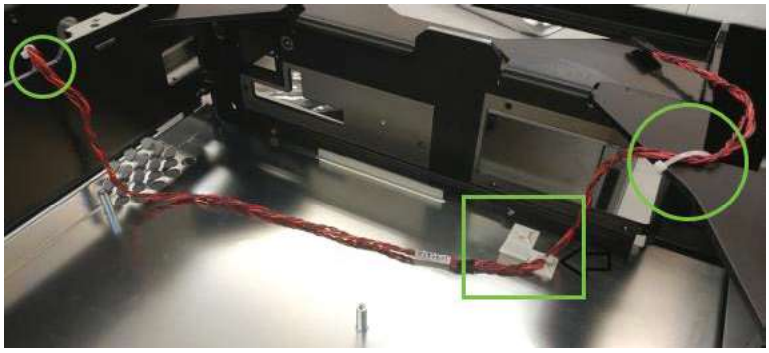

Figure A-1: Routing the under-deck cable on a new instrument

4. Place an unpeeled cable mount against the round protrusion shown in Figure A-2 as a guide for the cable mount.
5. Align a second mount to the unpeeled mount and stick it to the instrument. Use a cable tie to secure the under-deck cable. Remove the unpeeled mount when finished.

Figure A-2: Locating the protrusion for cable mount alignment

If performing a field installation, make sure the cable is routed under the dual processor board and between its ribbon cables.

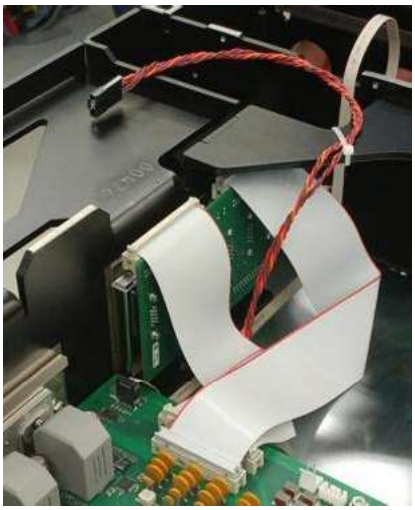

Figure A-3: Routing the under-deck cable for a field installation

6. Connect the cable to the circuit board shown in Figure A-4. The three-wire connector goes to the COVER 2 SENSOR port, and the two-wire connector goes to the COVER 2 SOLENOID port.

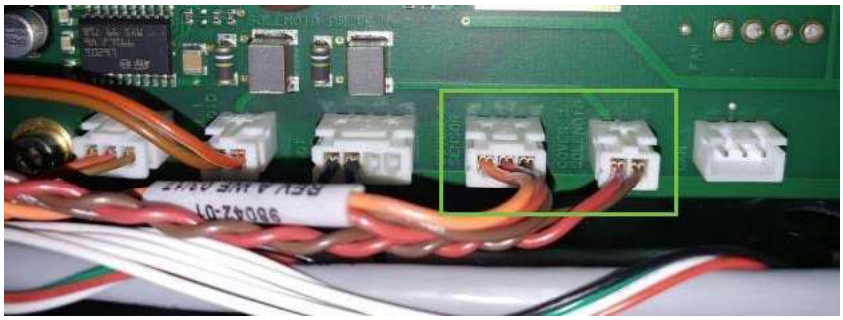

Figure A-4: Connecting the under-deck cable

7. If there is a PCB attached to the end cap being replaced, detach it by removing the three screws indicated in Figure A-5 using a 2.5 mm hex wrench.

Figure A-5: Detaching the PCB from the old cap

8. Attach the PCB to the new end cap by mounting it to the new PCB mount attached to the new end cap reusing the screws from step 7. Loosely install two screws in the holes shown and apply Loctite.

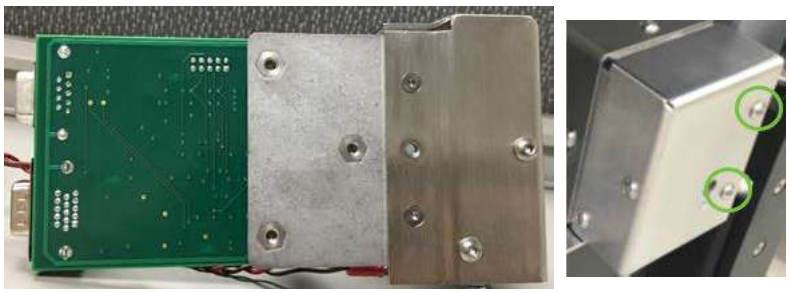

Figure A-6: Attaching the PCB to the new end cap

9. Connect the end cap cable to the under-deck cable.

Figure A-7: Connecting the end cap cable

10. Route the cable along the back of the instrument using evenly-spaced clamps. Use six clamps on a STAR and three on a STARlet. Keep it separate from the other cables routed along the back, and secure the excess with a cable tie.

Figure A-8: Routing and clamping the cable

Figure A-9: Tying down the excess cable

11. Place the end cap in its install location, making sure all cables are behind the backstop.

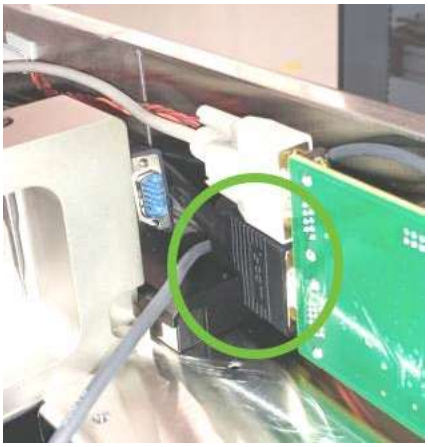

Figure A-10: Checking end cap PCB cables

12. Install the appropriate back cover for the instrument. Use a 2.5 mm hex wrench and apply Loctite.

Figure A-11: Installing the back cover

13. Insert the end cap cover and attach it using a 2.5 mm hex wrench and Loctite. To avoid damage to the main board, verify screws no longer than 6 mm are used to secure the solenoid inside the end cap in the positions indicated in Figure A-12.

Figure A-12: Attaching the end cap cover

14. For field installations, remove the right enclosure panel (or panel with waste door). Remove the two screws indicated in Figure A-13 and detach the side panel from the clamps at the top of the instrument.

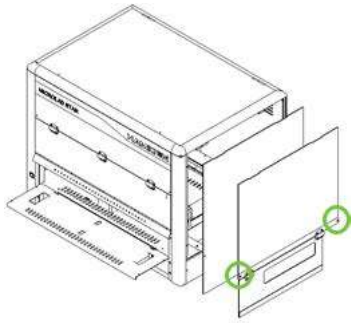

Figure A-13: Removing the right side panel

15. Attach the new UV waste door assembly. Loosen the set screws on the clamps at the top of the instrument, then place the panel on the instrument so the notches in the top fit in the clamps. Attach the panel using the screws on either side of the stiffener bar above the waste door.

    Re-tighten the set screws on the clamps after the panel and waste door are secured.

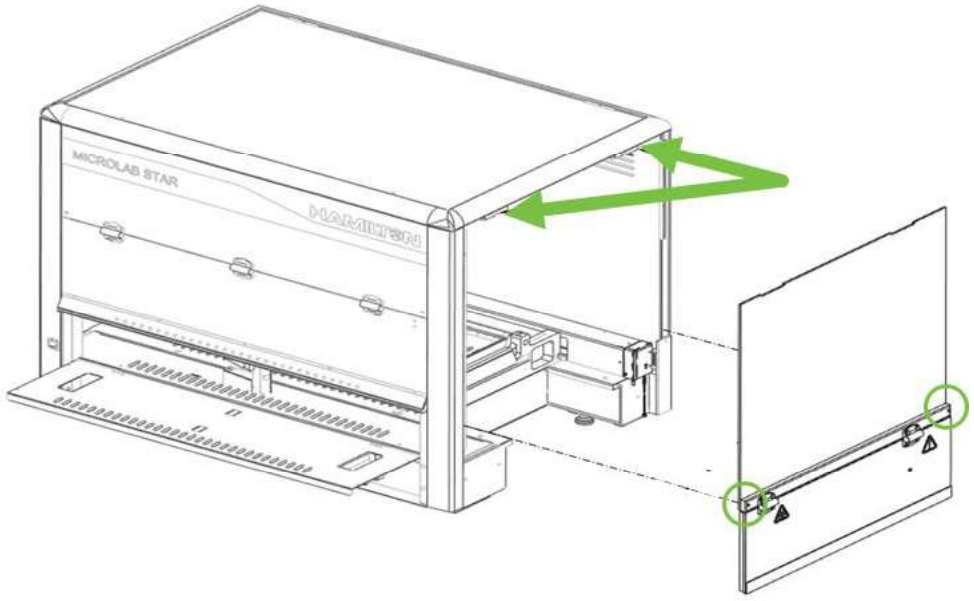

Figure A-14: Attaching the UV waste door assembly

16. Apply a 3/4" adhesive strip to the inside of the strut shown on the instrument in Figure A-15.

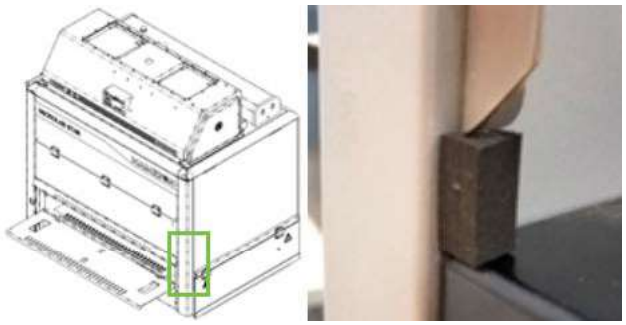

Figure A-15: Applying adhesive strip

17. Adjust the rubber gasket on the bottom of the door so there is no gap between the gasket and the benchtop.

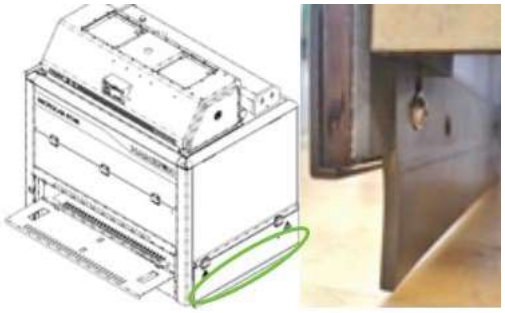

Figure A-16: Adjusting the rubber gasket

18. Connect and power on the instrument, then start the service software using the desktop shortcut in Figure A-17.

Figure A-17: STAR service software shortcut

19. In the service software, click the Settings drop-down menu and select Inst. configuration > Set configuration. The STAR-Configuration window opens.

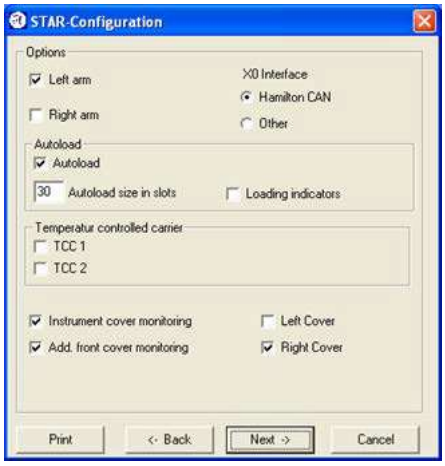

Figure A-18: Setting the instrument configuration

20. Enable the following settings, then click Next:

    "Add. front cover monitoring"
    "Right cover"

21. Keep clicking Next until the Finish button appears, then click Finish.

22. In the main window of the service software, click the Control drop-down menu and select Movements/Sensors > Master module. The Master module window appears.

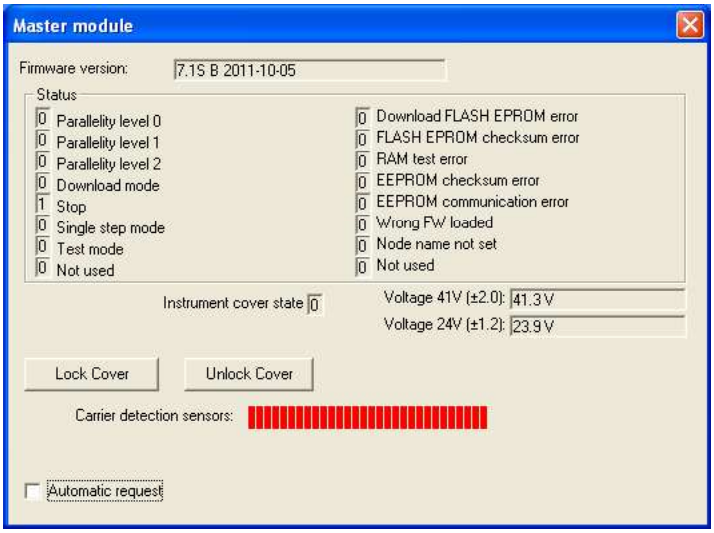

Figure A-19: Checking the waste door sensor and door lock

23. Check the "Automatic request" box. If the UV waste door is open, the "Instrument cover state" should be zero.

24. Close the waste door. The value for the "Instrument cover state" should change to 1.

25. Click Lock Cover and try opening the door. The solenoid should be holding the waste door closed.

26. If both the sensor and lock are working, close the service software and power down the instrument. If there are problems with either part, check the cable routing and connections and retry.

Appendix B: Replacement Parts

Table B-2: UV Light Replacement Parts

Part Number	Description	Quantity															
		97310-21	97310-22	97310-23	97310-24	97310-25	97310-26	97310-27	97310-28	97310-11	97310-12	97310-13	97310-14	97310-15	97310-16	97310-17	97310-18
68140-01	FIXTURE, UV, STARlet			1	1	1			1			1	1	1			1
68140-02	FIXTURE, UV, STAR	1	1				1	1		1	1				1	1	
68176-02	UV SHIELD, AUTOLOAD, STAR	1	1							1	1						
68176-03	UV SHIELD, MANUAL, STARlet				1	1							1	1			
68176-04	UV SHIELD, MANUAL, STAR						1	1							1	1	
68176-05	UV SHIELD, A-LOAD, STARlet, CAP			1					1			1					1
51476-04	LAMP, UVC, 32W, G30T5L, 27.20"	2	2	1	1	1	2	2	1	2	2	1	1	1	2	2	1
97343-01	UV SHIELD, LOWER RIGHT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
97342-01	UV SHIELD, LOWER LEFT, MPH	1		1	1			1		1		1	1			1	
68108-02	COVER, VENT, CAP, UV, STARLINE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
68109-01	STANDOFF, VENT COVER, UV	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
68110-02	COVER, TUBE ROUTING, CAP, UV	1	2	1	1	2	2	1	2	1	2	1	1	2	2	1	2
6604267-01	BLOCK, TUBE ROUTING, CAP, UV	2	4	2	2	4	4	2	4	2	4	2	2	4	4	2	4
420322	SCREW, BUHX, M4X8, ISO7380, A2SS	2	4	2	2	4	4	2	4	2	4	2	2	4	4	2	4
68308-01	HANDLE, DOOR, STARLINE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
68350-01	BLOCK, CATCH, FRONT DOOR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
51552-01	LABEL, UV SAFETY, STARLINE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
92003-01	LABEL, WARNING, UV LIGHT	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
51565-01	SCREW, BUHX, M5X10 MM, SST	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
420560	SCREW, BUHX, M4X10, A2SS	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
66621-01	CLAMP, CABLE, Ø.25, NYLON	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
99088-08	USB, MANUAL/SW, UV LIGHT, STARLINE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
68369-01	SOFTWARE, STAR UV LIGHT CD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6603712-02	PANEL, TOP, UV CAP, STARlet											1	1	1			1
6603712-03	PANEL TOP, UV, NO CAP, STARlet			1	1	1			1								
97340-01	PANEL, ROOF, UV LIGHT, STAR																
6603845-02	PANEL, TOP, UV, CAP, STAR									2	2				2	2	
6603845-03	PANEL, TOP, UV, NO CAP, STAR	2	2				2	2									
68106-01	PANEL, RIGHT, UV LIGHT, STARline	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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Appendix C: Getting Technical Assistance

C.1 Contacting Hamilton Company

C.1.1 Technical Support in the Americas and Pacific Rim

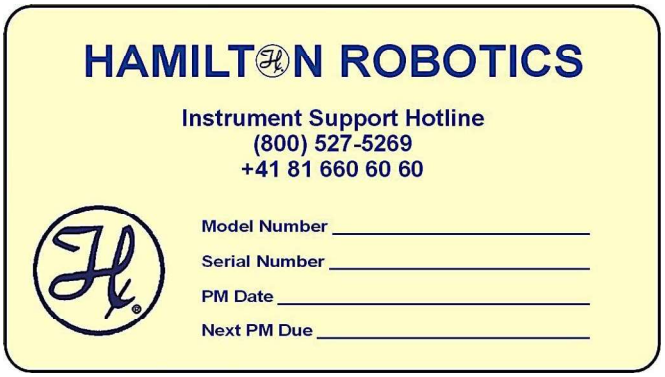
Hamilton Company
4970 Energy Way, Reno, Nevada 89502, USA
Toll Free (USA and Canada), General: 800-648-5950
Toll Free (USA and Canada), Service Hotline: 800-527-5269
Telephone: + 1- 775-858-3000
Fax: +1-775-856-7259
E-Mail: tech@hamiltoncompany.com

C.1.2 Technical Support in Europe, Asia, and Africa

Hamilton Bonaduz AG

CH-7402, P.O. Box 26, Bonaduz, Switzerland
Telephone: + 41 81 660 60 60
Fax: +41 81 660 60 70
E-Mail: itechsupport@hamiltoncompany.com

C.2 Instrument Support Hotline



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Index