

# *Entech Model 7650-L20 Loop System*



7650 L20 Manual  
Ver 2.0  
March 2018

## Contents

SECTION (Note the numbers in parentheses are the page numbers of the pdf.)

### 1. 7650-L20 Introduction

- 1-1 Introduction (4)
- 1-1 Warranty (4)

### 2. 7650-L20 Overview

- 2-1 7650-L20 Overview (6)
- 2-1 Software Overview (6)
- 2-2 Sequence Screen (7)
- 2-5 View Screen (10)
- 2-9 Method Screen (14)
- 2-9 Settings Screen (14)
- 2-10 Settings - Instrument Configuration (15)
- 2-11 Settings - Temperatures (16)
- 2-11 Settings - Calibration (16)
- 2-13 Settings - Fixed Positions (18)
- 2-14 Settings - Override (19)

### 3. 7650-L20 Operations

- 3-1 Loop Sizes (20)
- 3-1 Method Software Overview (20)
- 3-3 Method Development (22)
- 3-3 Sequencing (22)
- 3-4 Analysis Checklist (23)

### TechNotes

- (24) 7650-L20 Loop System Installation
- (30) 7650-L20 Z-Axis Calibration
- (33) 7650-L20 Position Adjustment
- (35) 7650-L20 Thermocouple Calibration
- (38) 7650-L20 Software Loading Version 1.0.0.14
- (44) 7650-L20 Sample Line Cleanup
- (47) 7650-L20 Lubrication
- (49) 7650-L20 Transfer Line Replacement and Depth Check
- (53) 7650-L20 Z-Axis Softpot Adjustment
- (56) 7650 Replacing MQT O-Rings
- (58) 7650 Gripper Replacement
- (64) 7650 Up Detect Switch Positioning
- (66) 7650 Softpot Replacement
- (70) 7650 Gripper Solenoid Replacement

- (72) 7650 Sample Detect Adjustment
- (75) Procedure to replace the 7650 Gripper.
- (79) 7650 Procedure to Replace the small DC Power Supply
- (83) 7650 Transfer Line Heater Connector

Flow Diagrams (84)

## Section 1.

### 7650-L20 Introduction

The 7650-L20 is the only system capable automated loop injection of Tedlar bags and other gas phase samples using a single inlet robotic autosampler. The 7650-L20 can automate the analysis of up to 16 Tedlar Bags, or from 24-80 Bottle-Vac Samplers or Mini-Cans depending on the size of the container. Bottle-Vacs and Mini-Cans can be heated in an optional oven to extend the molecular weight range of recoverable compounds. The dual loop system simultaneously injects an Internal Standard along with a sample or standard. A 100% Silonite coated ceramic pathway ensures recovery of difficult compounds. The 7650-L20 can automate the injection of gas samples to virtually all GCs by using model specific communication cables available from Entech.

The 7650-L20 uses a single inlet that makes only momentary contact with the sample when drawing it through the a calibrated loop immediately before injection into the GC. This inlet line is then immediately flushed to minimize the exposure of the sample to the 7650-L20 tubing and valve. The unique inlet allows a heated Silonite coated 1/16" tube to be inserted into the sample fitting, called a male Micro-QT valve, on the Tedlar Bag tray, Mini-Can, or Bottle-Vac. The inlet is heated right up to the sample fitting with eliminates all dead volume and cold spots. This ensures a clean, contamination free solution well into the semi-volatiles range.

Entech continues to pioneer new developments in robotic canister loop systems. The latest products now include the new 7650 Canister autosamplers, which completely isolate each sample canister from the next, providing at least 1000X less chance of cross-contamination than rotary valve based loop systems. This can be particularly important when running high concentration (Soil Gas) or low volume (HDS Personal Monitor) samplers.

We value any feedback from our users on how we can improve our products and manuals. You can contact us through our website, or through our support e-mail address at [support@entechinst.com](mailto:support@entechinst.com).

### WARRANTY

The seller warrants each standard Product sold by it to be free from defects in material and workmanship for the periods and in accordance with the terms and conditions stated below. The warranty period for any Entech products, parts or accessories sold hereunder is limited to 90 days unless an alternative warranty period is specified by Seller on the face of Seller's quotation or is otherwise agreed upon between buyer and seller in writing.

Unless otherwise provided in a software license agreement between Seller and Buyer, Seller warrants software media and firmware media furnished by Seller for use with a Seller's Products to be free of those defects in materials which cause failure to execute programming instructions. This warranty applies only to unlicensed software media and

firmware properly installed for a period of 90 days and does not apply to interruptions or errors in operation. Title to software or firmware licensed or sub-licensed by Seller shall remain with Seller or Seller's licensors, as the case may be and the terms and conditions of the applicable license agreement, including any warranty provisions, shall prevail over any contrary terms and conditions herein.

The warranty period begins upon completion of installation where installation is paid for by Buyer or included in the purchase price. However, if Buyer schedules or delays installation more than 30 days after delivery, then the warranty period starts on the 31<sup>st</sup> day from date of shipment. In all other cases the warranty period begins on the date of shipment from Seller to the original Buyer.

The sole and exclusive remedy under warranty shall be replacement of defective parts, or at Seller's option, repair of instrument malfunctions which in sole opinion of Seller are due or traceable to defects in original materials or workmanship, provided that, Seller may, as an alternative, elect to refund an equitable portion of the purchase price of the Product. Repair of defective products may be performed at customer's site or upon shipment back to Entech at Entech's sole discretion. Replacement or repair under warranty does not extend the original warranty period.

This warranty does not cover Buyer supplied software and hardware, equipment warranted by another manufacturer, or replacement of expendable items and those of limited life.

## Section 2.

### 7650-L20 Overview.

The 7650-L20 is a robotic loop system based on the 7650 Autosampler.

System Requirements and Installation: Refer to the 7650-L20 installation TechNote.

Software Installation: Refer to the 7650-L20 Software Installation TechNote and the 7650-L20 Installation TechNote.

### 7650-L20 Software Overview.

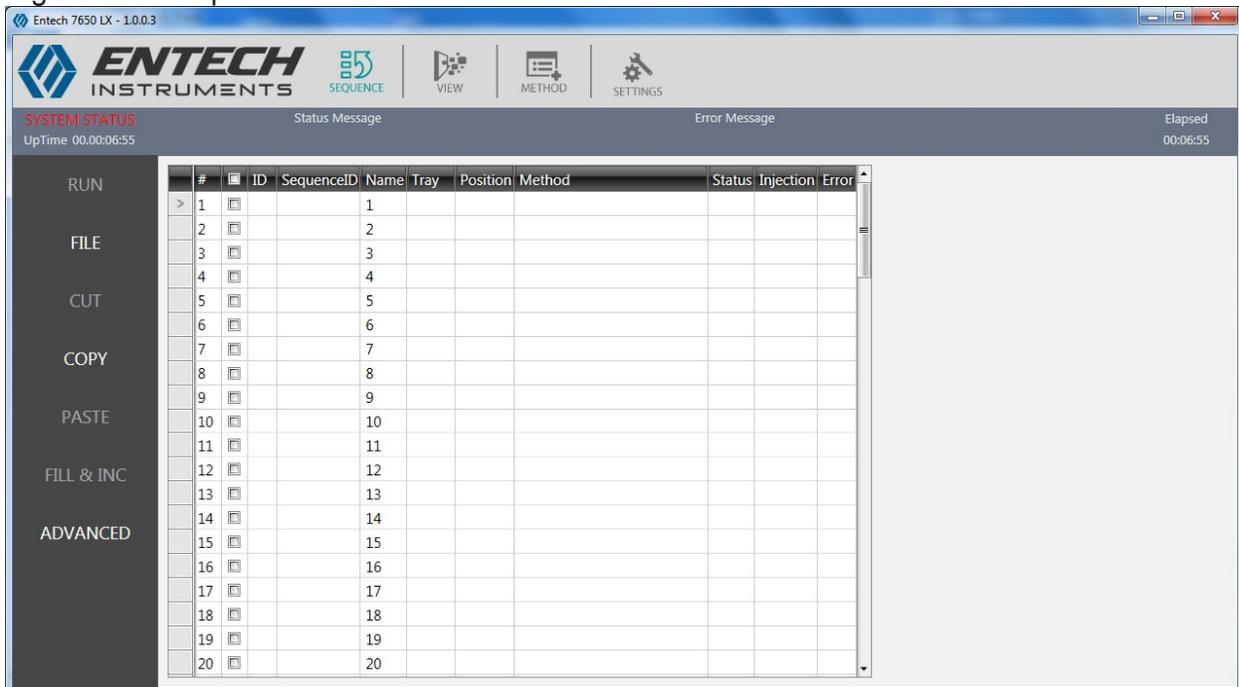
The Entech 7650-L20 software must always be run as administrator. The executable is Entech7650LX.exe and is located in C:\SmartLabs\Applications\7650LX\Entech7650LX 1.0.0.14. If a higher version of software is loaded then the executable will be in that patch directory. Below is a picture (figure 3-1) of the Sequence Screen, which is the first screen to appear when the software is opened.

The first four items are the same on all of the Entech 7650 L20 software screens:

In the upper left “Entech 7650 LX - 1.0.0.3” shows that the software is version 1.0.0.3. (The actual version that is loaded will be V1.0.0.14 or higher.)

In the upper right the red “X” can be used to exit the software.

Figure 2-1. Sequence Screen.



**Buttons:** These are at the top of the screen and are used to switch between software screens.

**Sequence:** Toggles the Sequence screen.

**View:** Toggles the View screen.

**Method:** Toggles the method screen.

**Settings:** Toggles the Configuration Screen.

**System Status Bar:** This shows error messages, the run step or status, and the time elapsed (since a run step started, a run completed, or the software was opened). “System Status” appears in green if the 7650-L20 is communicating with the software (the 7650-L20 is Link Active). “System Status” will be red if the 7650-L20 is not communicating with the software (the 7650-L20 is not Link Active). Underneath “System Status” is the “Uptime”. This is the amount of time that the 7650-L20 has been communicating with the software.

**Control Column:** These are commands and pulldowns that vary with the different screens.

**Main Box:** This varies for the different screens and sometimes with different control column selections.

**The Sequence Screen:** The Sequence screen itself is used to create and run sequences. It is the first screen to open when the software opens.

**Control Column for the Sequence Screen:** Refer to figure 2-2.

**Run:** Button used to start the sequence.

**File:** Use to manage sequences. The default sequence directory is C:\Smartlabs\Data\7650LX\Methods\. The file extension for sequences is .7650LX.Seq.

**New Sequence:** Clears the sequence table of all entries.

**Load Sequence:** Loads a user selected sequence.

**Save Sequence:** Saves the current sequence table to a user selected name and directory.

Figure 2-2. Sequence Control Column.



**Export as PDF:** Saves the current sequence table in C:\Smartlabs\Data\7650LX\Methods\ as a pdf. A sequence name is created automatically but it can be changed by the user. This pdf can be opened and printed as needed.

**Export as XLS:** Saves the current sequence table in C:\Smartlabs\Data\7650LX\Methods\ as an Excel (.XLS) file. A sequence name is created automatically but it can be changed by the user. This Excel file can then be opened and printed as needed.

**Cut:** Cuts the selected line from the Sequence table. The cut line may be pasted elsewhere in the sequence table. Only one line may be cut at a time.

**Copy:** Copies the highlighted sequence line. Only one line may be copied at a time. The copied line may be pasted elsewhere in the sequence table.

**Paste:** Pastes a copied or cut line into the currently highlighted sequence line or lines (Shift and then arrow down the desired number of lines.). This will overwrite whatever was previously in the highlighted line.

**Fill & Inc:** Highlight the line to be copied. Click “Copy” Then use the Shift key and the down arrow to select the empty sequence lines to be filled. Click “Fill & Inc”. The highlighted line should be copied into the empty lines. The sample position should increase by one. If the autosampler position plus one exceeds the number of currently configured autosampler positions it will become one. Fill and increment will overwrite anything previously typed in a sequence line.

#### **Advanced:**

Use the following to change the sequence table:

**Append:** Adds a line to the bottom of the sequence table.

**Insert:** Insert a blank line into the sequence table immediately above the highlighted line. Only one line can be inserted at a time.

**Delete:** Delete the selected line or lines from the sequence table permanently.

Use the following to change the run status of the currently highlighted sequence line. The options are:

**Blank:** The sequence table status for the highlighted line becomes empty. The sequence will run the line if the status is empty.

**Queue:** The sequence table status for the highlighted line will change to “Queue”.

**Main Box for the Sequence Screen:** Each row in the sequence is one run. The columns in the sequence table are explained below. Refer to figure 2-3.

**#:** Shows the number of the line in the sequence table. The # is sequential from the first line of the table.

**Checkbox:** Shows which lines in the sequence are active for editing.

**ID:** A user entered run identifier (ID). The box will expand as the ID is typed in.

**Sequence ID:** A user entered field. It can be used to enter the sequence name or other identifying information.

**Name:** User entered run name.

**Tray:** Specifies the 7650 tray or rack. Options are A (rear tray), B (front tray), C (rear expansion rack), D (front expansion rack), or F (fixed position on the left) (only the F3, F4, and F5 positions may be used).

**Position:** Specifies 7650 tray or rack position number. This must be a whole number.

**Method:** User selected method. Click the method box until “Browse” appears. Then click “Browse”, select the method, and then click “Open”.

**Status:** Shows the run status. The default status is “Queue”. During the run the status will change to “Running” and then to “Complete” when finished. The status can be changed to “Queue” or completely blank by using “Advanced” in the Control Column.

**Injection:** Date and time of the injection (GC start). This should correspond to the GC injection time if the 7650-L20 and GC are run from the same computer. If they are on different computers, the computers’ clocks must be synchronized for the times to agree.

**Error:** If an error occurs during a run a code will appear in this box. This error is a reference to the location in the software code where the error occurred. These errors should be noted in case your local Entech representative must be contacted for troubleshooting.

Figure 2-3. Main box for the Sequence Screen.

#	<input type="checkbox"/>	ID	SequenceID	Name	Tray	Position	Method	Status	Injection	Error
> 1	<input type="checkbox"/>			1						
2	<input type="checkbox"/>			2						
3	<input type="checkbox"/>			3						
4	<input type="checkbox"/>			4						

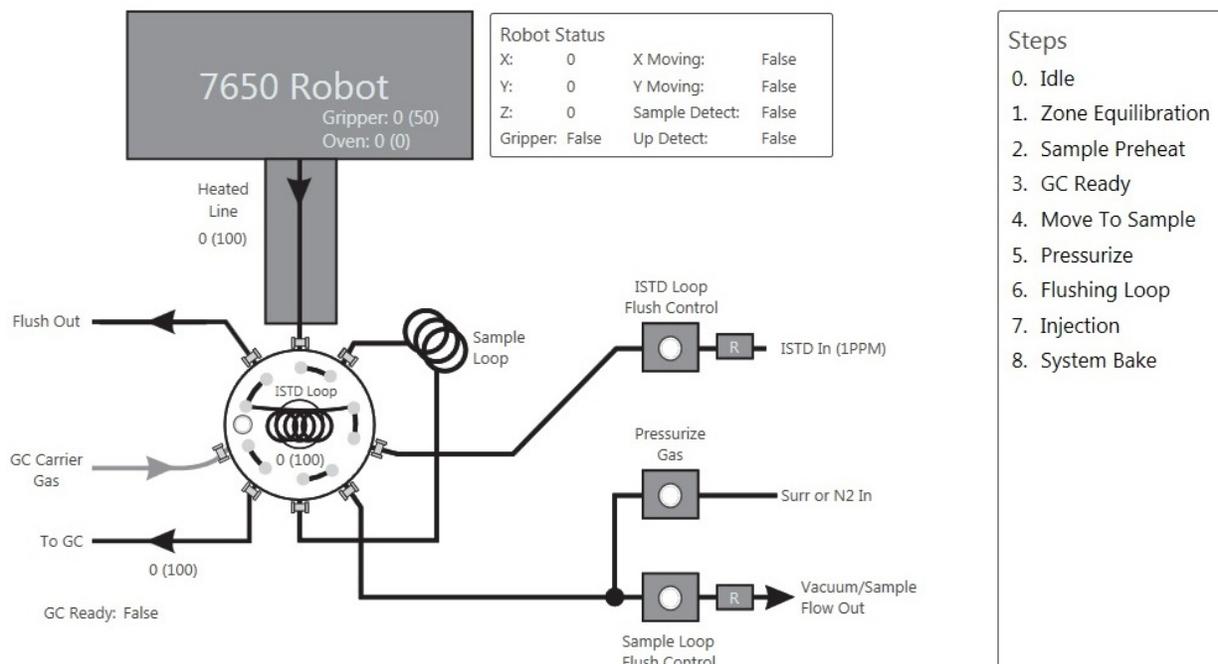


Figure 2-4. The 7650-L20 View Screen Main Box with the Run Steps.

**The View Screen:** Refer to figures 2-4 and 2-5.

**Control Column for the View Screen:**

**Commands:**

**Start Bakeout:** Begins a bakeout. The 7650 will move to F2. The temperatures will go to the bakeout temperatures on the Settings-Temperatures screen for the duration set on the Settings-Temperatures screen.

**Stop Bakeout:** Ends a bakeout early. It closes the valves used during the bakeout and resets the heaters used during the bakeout to their "Idle" temperatures.

**Idle:** Applies the idle temperature setpoints to the 7650-L20.

**Skip:** Aborts the current method step (event) and goes to the next method step.

**Abort:** Aborts the run, or bakeout.

**Diagnostics:** Toggles between the 7650-L20 Run Steps and 7650-L20 controls on the right of the View screen.

**Main Box for the View Screen:** Refer to figures 2-4 to 2-6.

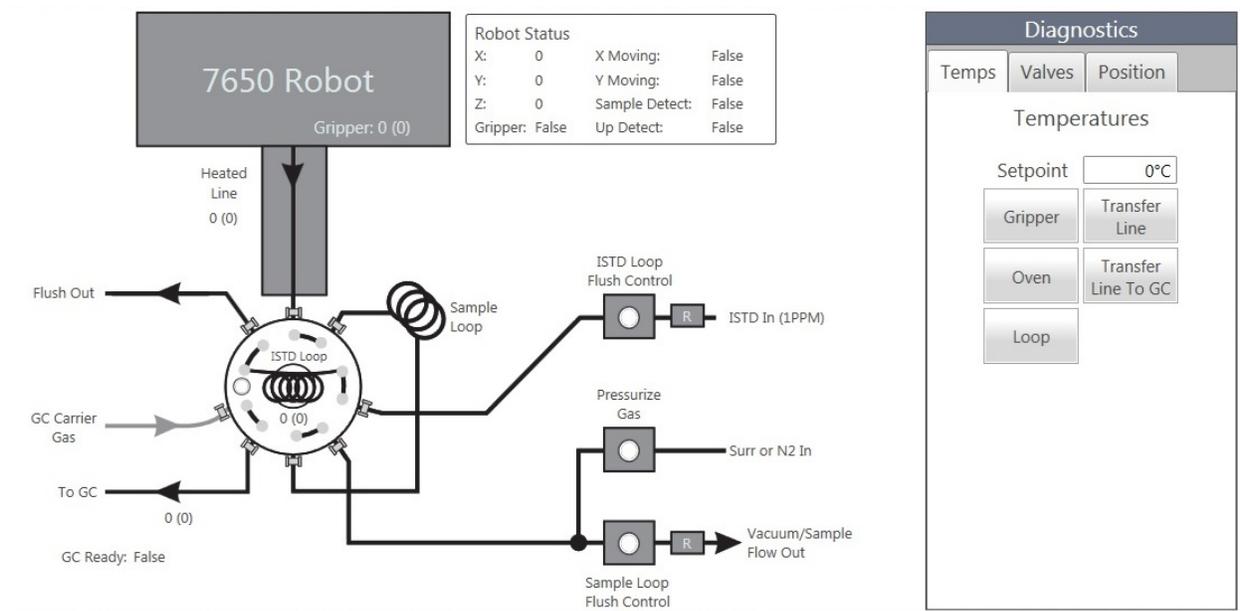


Figure 2-5. The 7650-L20 View Screen Main Box with the Temps Diagnostic Controls.

**Flow Diagram:** Shows the actual and setpoint temperatures of the 7650-L20. It also indicates which solenoid valves are active with a green light on the valve in the diagram. It also shows the rotary valve position, and the GC Ready status along with the basic 7650-L20 flow path.

**Robot Status Box:** Shows the X, and Y encoder reading, the Z softpot reading, the gripper status (true = on, false = off), X moving status, Y moving status, sample detect (true = detected in gripper, false = not detected in gripper), and Up Detect (true = gripper in up position sensor is activated, false = not activated).

**Run steps box:** Shows the run steps and the current status of the 7650-L20.

#### Run Steps for the 7650-L20:

0. Idle
1. Zone Equilibration
2. Sample Preheat
3. GC Ready
4. Move to Sample
5. Pressurize
6. Flushing Loop
7. Injection
8. System Bake

**7650-L20 Diagnostic Controls:** Use the Tabs to move between the Temps, Valves, or Positions screens.

**Temps:** Refer to figure 2-5. Clicking a heater sets the heater to the temperature in the "Setpoint" box to test the heater. Clicking the heater a

second time sets the heater to its idle temperature.

**Setpoint:** The user entered setpoint for any heaters that are activated.

**Gripper:** Heater for the 7650 gripper.

**Transfer Line:** Heater for 7650 transfer line between gripper and the top module.

**Oven:** 7650 Oven Heater.

**Xfer Line To GC:** Heater for the 7650 transfer line between the top module and the GC.

**Loop:** Heater for the 7650-M loop valve.

**Valves:** Refer to figure 2-6. One click activates a valve. A second click deactivates it.

**Valves:**

**Loop:** In the 7650 Million Air is present, this controls the 10 position valve actuator position. When activated the Million Air loop valve puts the 7650 loops inline with module 3 in the 7200.

**Pressurize:** Activates and Deactivates the Pressurize Gas Valve.

**Sample:** Activates and Deactivates the Sample Loop Flush Control Valve.

**Int Std:** Activates and Deactivates the Internal Standard (ISTD) Loop Flush Control Valve.

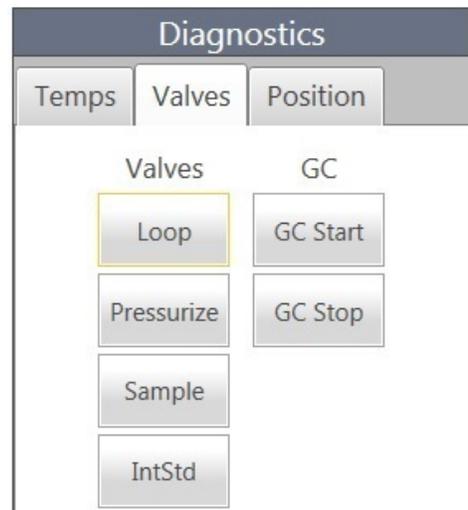
**GC:**

**GC Start:** When clicked it sends a continuous start signal to the GC.

**GC Stop:** Ends the GC Start Signal.

**Position:** Refer to figure 2-7. Use to

Figure 2-6. View Screen Diagnostics Valves Controls.



move the 7650 gripper.

**Position:**

**Position Icons:** The gripper must be in the Up position be using these. Click “Raise Gripper” before clicking F1, F2, F3, F4, and F5 and verify that the gripper goes to the up position. Then click the desired fixed position. The gripper will move to that position.

**Home:** Homes the autosampler. In the Home Position the gripper should be in the up position directly above F1. After “Home” is clicked, the 7650 gripper raises to the top in the Z-axis. The software checks to make sure the Up detect switched has been activated and that the Z-axis softpot value is a minimum of 800. Then the gripper moves in the X and Y axes until both the X and Y home detect sensors are activated. Then the X and Y encoder values are reset to a reading of 0. At this point the 7650 gripper should be directly over F1. (If not the X and Y Home detect sensors would need to be adjusted.)

**Location Pulldown:** Click “Up”, then just click the arrow and scroll down to the position the autosampler should go to. Once selected the autosampler immediately goes to that position. Then select “Down” to send the gripper onto that position.

**A1-A#:** A tray sample positions. Final number (A#) depends on the number of positions in the tray.

**B1-B#:** B tray sample positions. Final Number (B#) depends on the number of positions in the tray.

**C1-C9:** Fixed positions on optional rack C.

**D1-D9:** Fixed positions on optional rack D.

**Slidebar:** Used with the X (Move X) and Y (Move Y)

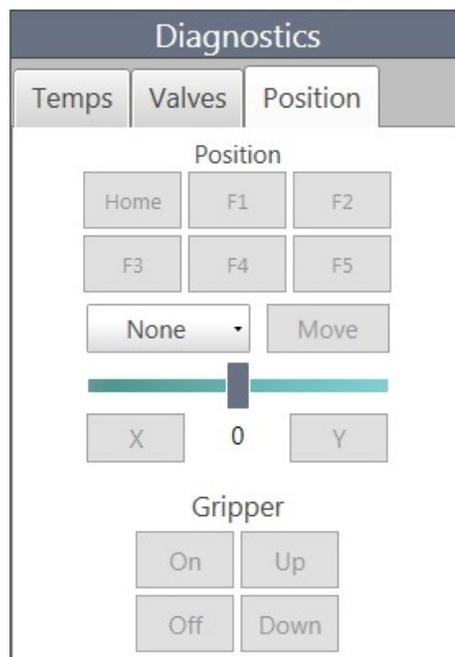


Figure 2-7. View Screen Diagnostics Position Controls.

buttons. Use the sidebar to select the number of steps the gripper should move. Negative step values move the gripper toward the Home position (to the left in the X axis or to the rear in the Y axis) while positive step values move the gripper away from the Home position (to the right in the X axis or to the front in the Y axis) .

**X:** CAUTION: The gripper must be raised to use this. Use the slider on the toolbar just above it to set the amount and direction (negative to left) of the move. The gripper will move in X axis (left or right) when click in the amount of steps and direction set on the sidebar.

**Y:** CAUTION: The gripper must be raised to use this. Use the slider on the toolbar just above it to set the amount and direction (negative to the rear) of the move. The gripper will move in Y axis (to the front or rear) when click in the amount of steps and direction set on the sidebar.

**Gripper:**

**On:** Turns the gripper on.

**Off:** Turns the gripper off.

**Up:** Raises the Gripper.

**Down:** Lowers the Gripper.

**The Method Screen:** The software overview of the method screens is in the Operations Section of this Manual. The Method button brings up the method screens.

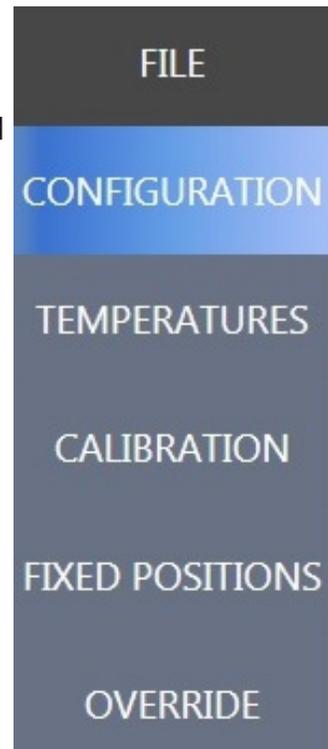
**Settings Screen:** If any changes are made to the configuration they must be saved ("File" - "Save Configuration", "File" - "Save Temperatures", "File" - "Save Calibration", "File" - "Fixed Positions", or "File" - "Save Override" for the changes to be kept after the software is closed.)

**Control Column for the Settings Screen:** Refer to figure 2-8.

**File:** Selection(s) changes depending on which toggle is clicked in the control column.

**Save Configuration:** Saves the instrument configuration.

Figure 2-8. Settings - Control Column.



**Save Temperature:** Saves the Idle Temperatures, the Bakeout Temperatures, and the Bakeout Duration.

**Save Calibration:** Saves the 7650 Duocard Calibration.

**Save Fixed Positions:** Saves any adjustments made to the X and Y positions of the F and C/D positions.

**Save Override:** Saves the Comport Overrides for the 7650-L20.

**Configuration:** Toggles the Instrument Configuration screen.

**Temperatures:** Toggles the Instrument Temperatures screen.

**Calibration:** Toggles the 7650 Calibration screen.

**Fixed Positions:** Toggles the 7650 Fixed Positions screen that is used to make fine adjustments to the X/Y position of the F, C, and D positions.

**Override:** Toggles the Comport Overrides screen.

### Main Box for the Settings Screen:

**Instrument Configuration:** Refer to Figure 2-9. Click “Configuration” in the control column to access.

#### Instrument:

**Instrument ID:** Enter the lab’s instrument ID for the 7650-L20 in the box.

**GC 6890/7890:** Select “Yes” from the pulldown if the GC uses a contact open signal to start the GC like the Agilent 6890 and 7890 GCs. Choose “No” if the GC uses contact closure to start the GC.

Figure 2-9. Settings - Configuration Main Box.

<b>Instrument</b> Instrument ID <input type="text" value="Entech"/> GC 6890/7890 <input type="button" value="Yes"/> ▾ GC Wait Time Out <input type="text" value="60.0 min"/> Fixed C <input type="button" value="No"/> ▾ Fixed D <input type="button" value="No"/> ▾ Oven <input type="button" value="Disabled"/> ▾	<b>Trays</b> Tray A <input type="text" value="HS_LT900_006"/> ▾ Tray B <input type="text" value="None"/> ▾ <b>Default Method</b> File Type <input type="text" value="7650LX.LX"/> ▾	<b>7650LX Z Axis</b> <table border="1"><thead><tr><th>Vials</th><th>Canisters</th><th>Other</th></tr></thead><tbody><tr><td>20ml <input type="text" value="0"/></td><td>50ml <input type="text" value="0"/></td><td>No Sample <input type="text" value="0"/></td></tr><tr><td>40ml <input type="text" value="0"/></td><td>1/1.4L <input type="text" value="246"/></td><td>Home (F1) <input type="text" value="281"/></td></tr><tr><td>60ml <input type="text" value="0"/></td><td>1/1.4L+TOV <input type="text" value="516"/></td><td>Fixed C/D <input type="text" value="0"/></td></tr><tr><th>Bottles</th><th>Ovens</th><th>Header</th></tr><tr><td>125ml <input type="text" value="0"/></td><td>Oven <input type="text" value="0"/></td><td>X RC <input type="text" value="50"/></td></tr><tr><td>250ml <input type="text" value="0"/></td><td>1/1.4L+TOV <input type="text" value="0"/></td><td>Y RC <input type="text" value="50"/></td></tr><tr><td>500ml <input type="text" value="0"/></td><td></td><td></td></tr></tbody></table>	Vials	Canisters	Other	20ml <input type="text" value="0"/>	50ml <input type="text" value="0"/>	No Sample <input type="text" value="0"/>	40ml <input type="text" value="0"/>	1/1.4L <input type="text" value="246"/>	Home (F1) <input type="text" value="281"/>	60ml <input type="text" value="0"/>	1/1.4L+TOV <input type="text" value="516"/>	Fixed C/D <input type="text" value="0"/>	Bottles	Ovens	Header	125ml <input type="text" value="0"/>	Oven <input type="text" value="0"/>	X RC <input type="text" value="50"/>	250ml <input type="text" value="0"/>	1/1.4L+TOV <input type="text" value="0"/>	Y RC <input type="text" value="50"/>	500ml <input type="text" value="0"/>		
Vials	Canisters	Other																								
20ml <input type="text" value="0"/>	50ml <input type="text" value="0"/>	No Sample <input type="text" value="0"/>																								
40ml <input type="text" value="0"/>	1/1.4L <input type="text" value="246"/>	Home (F1) <input type="text" value="281"/>																								
60ml <input type="text" value="0"/>	1/1.4L+TOV <input type="text" value="516"/>	Fixed C/D <input type="text" value="0"/>																								
Bottles	Ovens	Header																								
125ml <input type="text" value="0"/>	Oven <input type="text" value="0"/>	X RC <input type="text" value="50"/>																								
250ml <input type="text" value="0"/>	1/1.4L+TOV <input type="text" value="0"/>	Y RC <input type="text" value="50"/>																								
500ml <input type="text" value="0"/>																										

**GC Wait Time Out:** How long after reaching a “Wait for GC Ready” step before the software will send the 7200 to an idle state.

**Fixed C:** Select “Yes” if the optional C position inlets are present on the 7650 or “No” if not.

**Fixed D:** Select “Yes” if the optional D position inlets are present on the 7650 or “No” if not.

**Oven:** Select “Disabled” if there is no oven, “Mixing” for the mixing oven (part number HS-OVEN-407-1M), and “Standard” (part number HS-OVEN-407-1) for the basic oven.

**Trays:**

**Tray A and Tray B:** Use the pulldowns to select the installed tray for each one. The options are the part numbers of the trays available. Select the part number of the tray from the list. The part numbers are stamped into the top of the trays.

**Default Method:**

**File Type:** Use the pulldown to choose the default method extension. The only choice is 7650LX.LX.

**7650LX Z Axis:** Except for the items under “Header” all of these are the z-axis heights when the gripper is on the position or size container mentioned. These z-axis heights are set during the Z-axis calibration in the installation procedure. The Z-axis calibration is done using instructions in a TechNote at the rear of this manual. The exceptions are X RC and Y RC. X RC and Y RC allow the power to be boosted in the case of instrument stalls in the X and Y axis. The X RC and Y RC are a percentage. RC is run current and it affects the amount of power sent to the motors moving the 7650 in X and Y axes. X RC and Y RC should only be used on the direct advice of Entech personnel.

**Temperatures:** Refer to figure 2-10. Setpoints of the heated zones when idle and during bakeout. The towers (rotary valve autosamplers - 7032A, 7016CA-2, and 7016D) use the same temperatures during bakeout and when idle. This screen is also used to set the manual bakeout time. Use “File” “Save Temperatures” to keep any changes after the software is closed. Click “Temperatures” in the control column to toggle this screen.

**Calibration:** Refer to figure 2-11. Refer to the

Figure 2-10. Settings - Temperatures Main Box.

File Saved. 9:49 AM

Bakeout Duration	<input type="text" value="10.0 min"/>	
	Idle (°C)	Bake (°C)
Gripper	<input type="text" value="50°C"/>	<input type="text" value="50°C"/>
Transfer Line	<input type="text" value="120°C"/>	<input type="text" value="120°C"/>
Loop	<input type="text" value="120°C"/>	<input type="text" value="120°C"/>
Transfer Line to GC	<input type="text" value="120°C"/>	<input type="text" value="120°C"/>

Unicard Calibration					
Gripper	0.00	<input type="text" value="1190 Gain"/>	<input type="text" value="81 Zero"/>	Gain: 1190	Zero: 81
TransferLine	0.00	<input type="text" value="1190 Gain"/>	<input type="text" value="80 Zero"/>	Gain: 1190	Zero: 80
Oven	0.00	<input type="text" value="1190 Gain"/>	<input type="text" value="80 Zero"/>	Gain: 1190	Zero: 80
Loop	0.00	<input type="text" value="1180 Gain"/>	<input type="text" value="70 Zero"/>	Gain: 1180	Zero: 70
TransferLineToGC	0.00	<input type="text" value="1180 Gain"/>	<input type="text" value="70 Zero"/>	Gain: 1180	Zero: 70
<input type="button" value="Apply"/>					

Figure 2-11. Settings - Calibration Main Box.

TechNotes at the rear of this manual for a procedure to calibrate the 7650's thermocouples and to adjust the 7650 positions. Click "Calibration" in the control column to toggle this screen.

**Heater Zones:** The columns are in order from left to right: Name of heater, Current temperature reading, Box to enter a new Gain value, Box to enter a new Zero value, the currently applied Gain value, and the currently applied Zero value.

**Apply:** Click to use the newly entered zero and gain values. The values in the last two columns should change. The temperature reading that is being calibrated should also change. To permanently save the new values use "File" - "Save Calibration" otherwise the new values will be lost when the software is closed.

Figure 2-12. Setting - Fixed Positions Main Box.

Select Position

Tray	Name
Fixed Positions	F2
Fixed Positions	F3
Fixed Positions	F4
Fixed Positions	F5

Selected Position

Tray	Position
X Coordinate	Y Coordinate

Move Robot

Current X: 0 steps  
Current Y: 0 steps

Custom Positions

Tray	Name	X Coordinate	Y Coordinate	Delete

**Fixed Positions:** This screen is used to individually adjust the robot in the X and Y axes for the F, C, and D. It is normally used if the autosampler has trouble going down on or releasing from a specific position. Refer to the TechNotes for more details. Before using this part of the software it is critical that 7650 is properly homed. Refer to figure 2-12.

**Select Position:** Click the fixed position to be tested or adjusted. Only configured positions will be displayed.

**Selected Position:** Shows the tray, position, target X encoder value, and target Y encoder value.

**Move To:** Sends the robot to the position selected under Select Position. The autosampler must be in the up position before clicking "Move To".

**Clear:** Clear adjustments made to the target position and returns to the original target X and Y values.

#### **Move Robot:**

**Current X:** Actual encoder values for the X and Y axes, and the softpot value for the Z axis.

**Current Y:** Actual encoder values for the Y axis.

**Sliderbar:** Use the slider to select the number of steps for the gripper to move in the X or the Y axis relative to its current position. Negative X numbers move the gripper to the left (closer to the Home position). Positive X numbers move the gripper to the right. In the Y axis negative numbers move the gripper closer to the home position (to the back) and positive numbers move the gripper away from the home position (to the front). The gripper will not move until the "X" or "Y" toggle is clicked.

**X:** Move the gripper in the X axis the number of steps and direction indicated in the "Move to" box. The gripper must be in the up position before using this.

**Y:** Move the gripper in the Y axis the number of steps and direction indicated in the "Move to" box. The gripper must be in the up position before using this.

**Apply:** Before clicking make sure the correct position is selected under "Select Position". To permanently save the new values use "File" - "Save Fixed Positions" otherwise the new values will be lost when the software is closed.

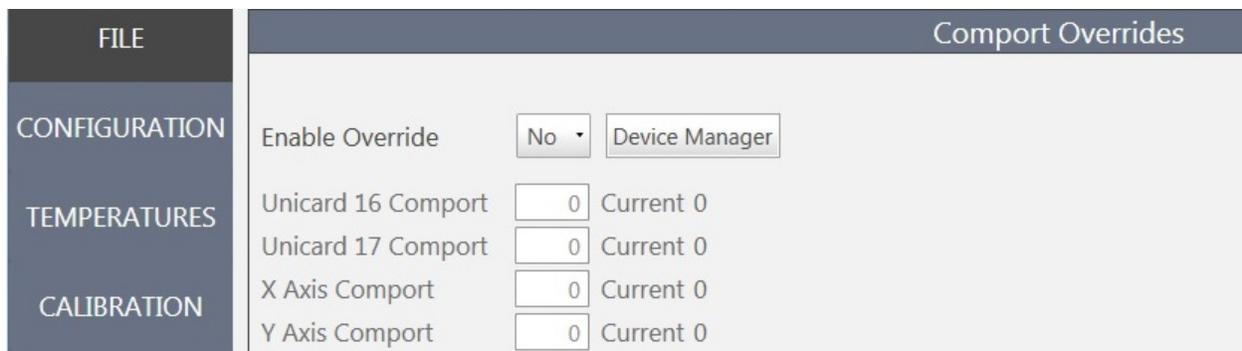


Figure 2-13. Settings - Override Main Box.

**Override:** Refer to figure 2-13. Only use this on the direct advice of Entech personnel. It is used to tell the computer exactly which COM port is associated with which board. Click “Override” in the control column to toggle this screen. Override can speed up the initial loading time of the software and makes it easier to establish USB communications with an instrument.

**File - Device Manager:** When the Override screen is open click file and select “Device Manager” to access “Device Manager” on the computer. Then click “Ports COM and LPT” to view which computer comports are in use.

**Enable Override:** Select “No” to deactivate the override feature. Select “Yes” to activate the override feature. If “No” is selected the 7650 Comports will remain grayed out and uneditable. If Override is enabled Comports must be entered for both Unicards and both Axes.

**Unicard 16 Comport:** Board 16 in the 7650.

**Unicard 17 Comport:** Board 17 in the 7650.

**X-Axis Comport:** The X-axis IMS Controller in the 7650.

**Y-Axis Comport:** The Y-axis IMS Controller in the 7650.

To permanently save the new Override Settings use “File” - “Override” otherwise the new values will be lost when the software is closed. Close the software and then reopen it to use the new Override Settings.

## Section 3

### 7650-L20 Operations

**Loop Sizes:** Both the internal standard loop and the sample loop are 0.25 cc. Users can use different loop sizes as needed. Be aware that if a larger loop is used the earlier compounds may have broader peak shapes.

#### Method Software Overview:

To access the method screen, click “METHOD” at the top of the screen. Refer to figure 3-1 for an example of the method screen.

**Method Control Column:** There is only one item in the column.

**File:** Click to see the selection.

**Load Method:** Use to load the method.

**Save Method:** Use to save the method.

#### Method Main Box:

**File:** Shows the currently loaded method.

**Temperatures:**

Figure 3-1. 7650-L20 Method Screen showing the default starting point method conditions.

FILE	LX Method		
	File: Default.7650LX.LX		
	<b>Temperatures</b>	<b>Durations</b>	<b>Heated</b>
	Gripper <input type="text" value="80°C"/>	Use Surrogate <input type="text" value="No"/>	Is Heated <input type="text" value="No"/>
	Transfer Line <input type="text" value="100°C"/>	Sample Pressurization <input type="text" value="0.00 min"/>	Oven <input type="text" value="0°C"/>
	Loop Valve <input type="text" value="100°C"/>	Use Int. Std. <input type="text" value="Yes"/>	Preheat <input type="text" value="0.0 min"/>
	Transfer Line To GC <input type="text" value="0°C"/>	Int. Std. Flush <input type="text" value="0.20 min"/>	Mixing (%) <input type="text" value="0"/>
		Flush Delay <input type="text" value="0.10 min"/>	
		Flush <input type="text" value="0.20 min"/>	
		Inject <input type="text" value="3.00 min"/>	
		Bake Out <input type="text" value="2.00 min"/>	

**Gripper:** Enter the desired temperature in degrees Celsius in the box.

**Transfer Line:** Enter the desired temperature in degrees Celsius in the box.

**Loop Valve:** Enter the desired temperature in degrees Celsius in the box.

**Transfer Line to the GC:** Enter the desired temperature in degrees Celsius in the box.

### **Durations:**

**Use Surrogate:** Use the pulldown to select “Yes” or “No”. If yes is selected a the sample container will be spiked or pressurized before analysis. If this option is used it will be important to use a good quality double stage regulator to ensure that all runs are spike to the same pressure consistently.

**Sample Pressurization:** How long to pressurize the sample with surrogate. Larger sample containers will require longer times.

**Use Int. Std:** Use the pulldown to select “Yes” or “No”. “Yes” activates the internal standard flush. The internal standard flush can be shorter than the sample flush.

**Int. Std. Flush:** Length of the internal standard flush in minutes.

**Flush Delay:** Length of time in minutes between the loop flush and the injection.

**Flush:** Length of the sample flush in minutes.

**Inject:** Length of the loop injection in minutes.

**Bake Out:** Bake Out time in minutes.

### **Heated:**

**Is Heated:** Use only if an oven is present, configured, and sample heating or mixing is desired. In that case use the pulldown to select “Yes”, otherwise select “No”.

**Oven:** Enter the desired oven temperature in Celsius.

**Preheat:** Enter the preheat time in minutes.

**Mixing:** Enter the mixing speed as a percent. 0% is no mixing. 100% is

full speed.

## Developing Methods

Before a sequence can be run an appropriate method must be created. Figures 3-1 shows the default method at the time of this writing. This method provides a good starting point for method development. It is recommended that no more than one or two parameters be changed at one time while trying to develop or optimize a method. It is also strongly advised that the default method provided with the 7650-L20 not be overwritten, as it can be used as a starting point should performance move in the wrong direction. Customer access to web based methods will also be available soon.

To access the method screen, select “METHOD” at the top of the screen.

To load a method, click “File”, select “Load Method”, choose the method desired, and click “Open”.

To save a method, click “File”, select “Save Method”, type in the desired method name, and click “Save”.

## Sequencing

The Sequence Table must be filled in to show each analysis in the order that they will occur. Synchronize this table with the run sequence on the GC or GC/MS. Refer to the software overview in section one for more information.

**Sequence and run example.** Refer to figure 3-2 for an example sequence.

Open the software.

In the first line of the sequence table type in an **ID**, **Sequence ID**, and a **Name** if desired. These are user enterable. The columns will expand as needed during typing.

**Tray:** Click in the Tray column and use the pulldown to select the tray or optional fixed position rack: A, B, C, D, or F.

Figure 3-2. 7650-L20 Sequence Example.

#	ID	SequenceID	Name	Tray	Position	Method	Status	Injection	Error
1	<input type="checkbox"/> Check Standard	20180129.s 1801290101001.d	250 ppbv	F	4	7650-L20.7650LX.LX	Queue		
2	<input type="checkbox"/> Method Blank	20180129.s 1801290101002.d	Humidified Ultra Zero Air	F	5	7650-L20.7650LX.LX	Queue		
3	<input type="checkbox"/> 9810456-001A	20180129.s 1801290101003.d	Site A	A	3	7650-L20.7650LX.LX	Queue		
4	<input type="checkbox"/> 9810456-002A	20180129.s 1801290101004.d	Site B	A	4	7650-L20.7650LX.LX	Queue		
5	<input type="checkbox"/> 9810456-003A	20180129.s 1801290101005.d	Site C	B	5	7650-L20.7650LX.LX	Queue		
6	<input type="checkbox"/> 9810456-003A	20180129.s 1801290101006.d	Site C Duplicate	B	5	7650-L20.7650LX.LX	Queue		
7	<input type="checkbox"/> 9810456-004A	20180129.s 1801290101007.d	Site D	D	9	7650-L20.7650LX.LX	Queue		
8	<input type="checkbox"/> Blank	20180129.s 1801290101008.d	Humidified Ultra Zero Air	F	5	7650-L20.7650LX.LX	Queue		
9	<input type="checkbox"/> Blank	20180129.s 1801290101009.d	Humidified Ultra Zero Air	F	5	7650-L20.7650LX.LX	Queue		
10	<input checked="" type="checkbox"/>		10	A					
11	<input type="checkbox"/>		11	A					

**Position:** Enter the tray or fixed position number.

Click in the **Method** box, click **Browse**, select the desired method, and then click “Open”.

Repeat the process above to add additional lines to the sequence. The Edit commands on the left (Copy, Paste, Cut, Fill & Inc, Advanced - Append, Advanced - Insert, Advanced - Delete, Advanced - Blank, Advanced - Queue) of the sequence table may be very useful.

Use **File - Save Sequence** to save the sequence.

Click “Run Sequence” to start the preconcentration. “Abort” can be used to stop the sequence.

## **Analysis Checklist**

Here are a few things to remember to check prior to launching a sequence on the 7650-L20:

1. Consider spiking samples with a surrogate compound to validate recovery. This is not optional for HDS Personal Monitor testing based on OSHA and NIOSH methods currently under development.
2. For canister analysis by loop the canisters must be pressurized above 3 psig. This is for standards, blanks, and samples.
3. Verify the vacuum pump is on (Tedlar bag analysis or screening only).

## Technical Notes: 7650-L20 System Installation

<u>DESCRIPTION:</u> 7650-L20 SITE REQUIREMENTS AND INSTALLATION		<u>DOC.#:</u> 7650L20-000-V00-INSTALLATIO N-C.DOCX	<u>REV.:</u> 00	<u>APPROVAL:</u>	<u>ORIGINATOR:</u> TIM RAUB
<u>FILE:</u>		<u>ISSUE DATE:</u>		<u>DEPARTMENT:</u> SERVICE	
<u>REV.:</u> 00	<u>DATE:</u> 05MAR2018	<u>INITIALS:</u> TTR	<u>DESCRIPTION:</u> Document Created.		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		

### Site Requirements:

The 120 VAC Version requires a dedicated 20 Amp circuit. For the 240 VAC version a dedicated 10 Amp circuit is required. Note that the 7650 Loop System must be on a high quality surge protector for the warranty to be valid.

Location: The 7650-L20 Standalone Loop System must be located within 4 ft (120 cm) of its dedicated AC circuit and within 15 ft (5 m) of its computer. It must be situated within 1 ft (30 cm) to the right of the GC. The 7650 Loop System requires a footprint of 35" (90 cm) W X 35" (90 cm) D X 60" (155 cm) H (from the top of the counter) for maintenance and operations. The 7650-L20 must sit on a flat level surface capable of holding 200 lbs., (91 kg), at the same level as the GC. It is best to locate the 7650 Loop System on a counter which allows good access to the rear of the 7650-L20 for installation, troubleshooting, and maintenance.

UHP Nitrogen at 50-60 psig (60 psig is the maximum). The customer must provide a regulator with a 1/4" fitting on the outlet for connection to the tubing provided in the installation kit.

Internal Standard. It is recommended that an internal standard or surrogate be added to each canister to verify recovery and instrument performance. The standard must be regulated to the about 5-7 psig with a clean SS (stainless steel) dual stage regulator and should be at a high enough concentration to respond well on the GC.

Carrier Gas: This will come from the GC injection port. For the best connection a 2 mm or 4 mm straight injection port liner should be installed before starting the installation.

Computer:

The computer must be on an Uninterrupted Power Supply (UPS) for the warranty to be valid.

Requires a Windows 7 or 10 Professional 64-Bit Computer with .Net Framework 4.7.1 (For Windows 7 Computers WIN7 Service Pack 1 is a prerequisite for .Net 4.7.1. Windows 10 computers must have at least the anniversary update (build 1511 or greater) for .Net 4.7.1 to load successfully.), a Pentium I5 (only up to I6 on WIN7 computers) or better processor, and a minimum of 8 GB of RAM. 16 GB of RAM is the minimum if the 7650-L20 software is run on

## Technical Notes: 7650-L20 System Installation

---

the same computer as the GC or GC/MS software (this is not recommended). Computers purchased after March 2016 must be Windows 10 Professional. As Anti-Virus software may interfere with software it must not be used on the computer. The Entech software must be run as administrator. The computer must be registered with Windows and automatic updates must be turned off. The computer must use the United States regional setting.

A separate computer for the 7650 is required if any of the Entech programs or required programs for the Entech software interfere with the GC or GC/MS software. Besides the obvious operating system requirements some GC or GC/MS software may require .NET 2.0 or a different version of SQLCE that may be incompatible. A separate computer is recommended if the GC or GC/MS software uses a lot of computer resources. LECO GC/MS software and Agilent Mass Hunter GC/MS software both fall in this category. If a separate computer is used for the 7650 Loop System a KVM switch may be used to share a monitor, a keyboard, and a mouse between both computers.

Prior to loading the software go to the Microsoft website to download and install all currently available updates.

The 7650-L20 Software must be run as an administrator and it must be loaded as an administrator.

The Monitor: For the best experience the monitor must be 1280 X 720 with a 16:9 aspect ratio. If a KVM is purchased from Entech to share the monitor, keyboard, and mouse then the monitor must either be VGA or have a VGA adapter.

For Windows 7 computers only: If the computer has USB 3.0 or USB SS ports they must not be used. If the Intel Extensible 3.0 Driver Installer is present on the computer, it must be uninstalled.

### **Tools Needed:**

Assorted Open End Wrenches (1/2", 7/16, 9/16", 1/4", etc.)  
Tubing Cutter for 1/8" and 1/4" copper Tubing  
Tubing Cutter for 1/16" SS Tubing  
Hex Keys  
Column Cutter

### **Installation:**

Unpack the 7650-L20 and do a quick inventory to ensure everything needed for the installation is present.

Place the instrument on the Counter to the immediate right of the GC. Due to the transfer line length and the space needed for the transfer line heaters there must be nothing between the right side of the GC and the 7650-L20. That includes detector hardware and auxiliary valve ovens. If any of these

## Technical Notes: 7650-L20 System Installation

must be on the right side of the GC, then arrangements must be made in advance of the installation to find a workaround.

**Make the Nitrogen Connections.** Connect a 1/4" line to the regulator on the UHP Nitrogen Cylinder. Near the 7650-L20 connect a 1/4" brass tee to this line. Connect another leg of the tee to the loop valve actuator on the rear of the 7650 using a section of the 1/4" tubing. Connect the remaining leg of the tee to the regulator for the Z-axis bulkhead on the left side of the 7650 with 1/4" copper tubing. Tee into the short piece of copper tubing on the regulator outlet. Connect one leg to the Z-Axis Bulkhead using one half of the short piece of tubing on the regulator as it was received. Use 1/8" tubing and a reducer to connect the other leg of the tee to the F2 position. If samples will not be pressurized by the 7650-L20 then tee into the 1/8" line to F2 and connect the F2 line to the Sample Pressurize In bulkhead on the top rear of the 7650-L20. Turn on the nitrogen supply (at the UHP Nitrogen cylinder) and regulate it to 50 psig. (50 is the minimum. 60 is the maximum.) Set the Z-axis regulator to 30-35 psig.

**Alternative Nitrogen Connection.** The Z axis and the loop valve actuator do not require UHP Nitrogen. A lower grade of compressed gas from a cylinder may be used instead. If this is done the F2 position and the Sample Pressurize In bulkhead (only if Sample Pressurize In is not used for adding Surrogate) will require UHP Nitrogen or Helium at 10-30 psig (separate regulator required) for loop flushing and sample line cleanup.

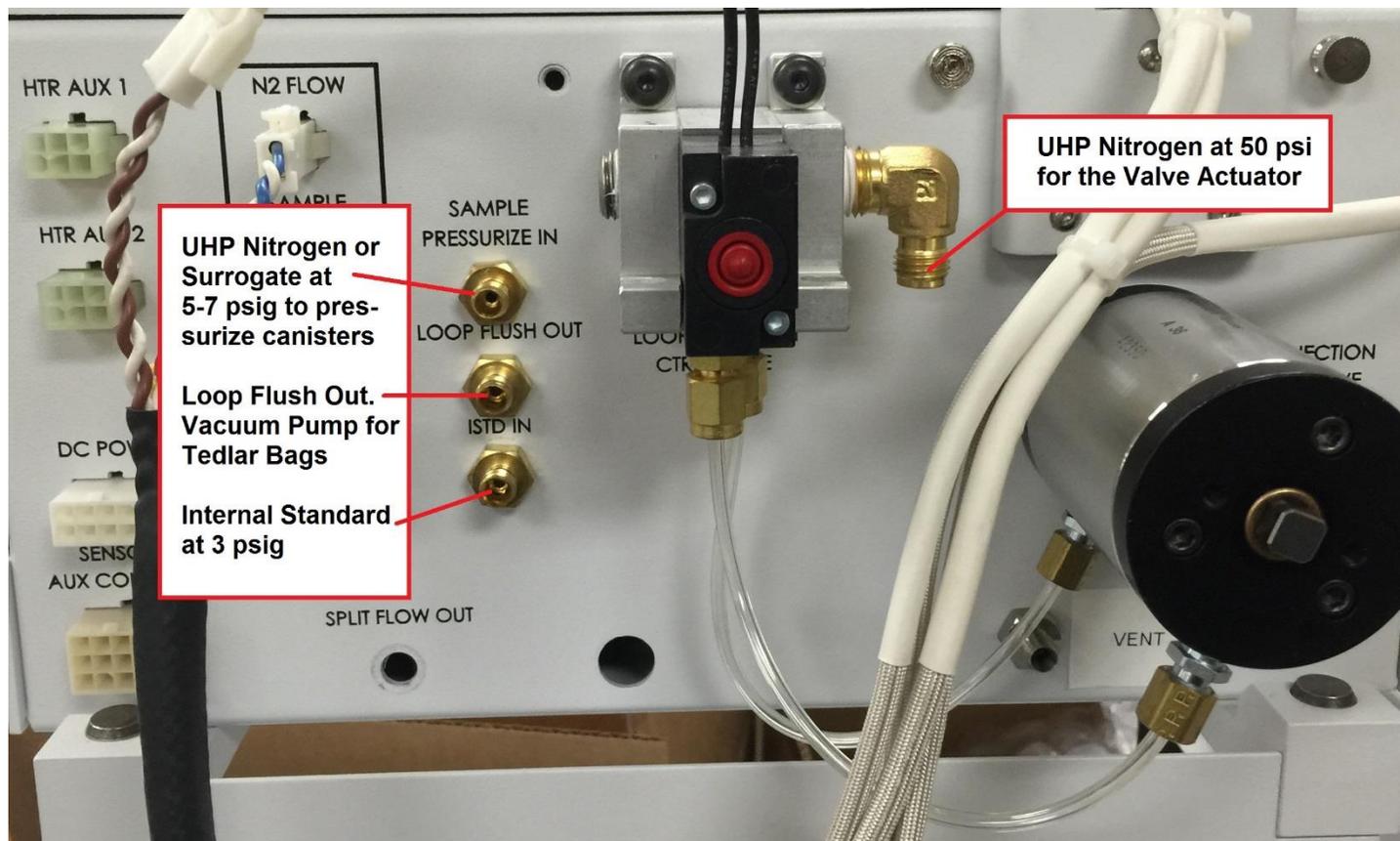


Figure 1. Top Module Pneumatic Connections.

## Technical Notes: 7650-L20 System Installation

### 7650 Loop Valve Ports:

- Port 1. At the 12:00 position. 7650 autosampler transfer line.
- Port 2. At the 1:12 position. Sample Loop connection 1.
- Port 3. At the 2:24 position. Internal Standard Loop connection 1.
- Port 4. At the 3:36 position. Internal Standard In Line.
- Port 5. At the 4:48 position. Sample Loop Flush Line.
- Port 6. At the 6:00 position. Sample Loop connection 2.
- Port 7. At the 7:12 position. To GC Column.
- Port 8. At the 8:24 position. Carrier Gas In.
- Port 9. At the 9:36 position. Internal Standard Loop connection 2.
- Port 10. At the 10:48 position. Internal Standard Loop Flush Out.

Valve and heater cables are usually left connected at the factory. If one is not connected its cable has a small label. The label shows what the cable connects to.

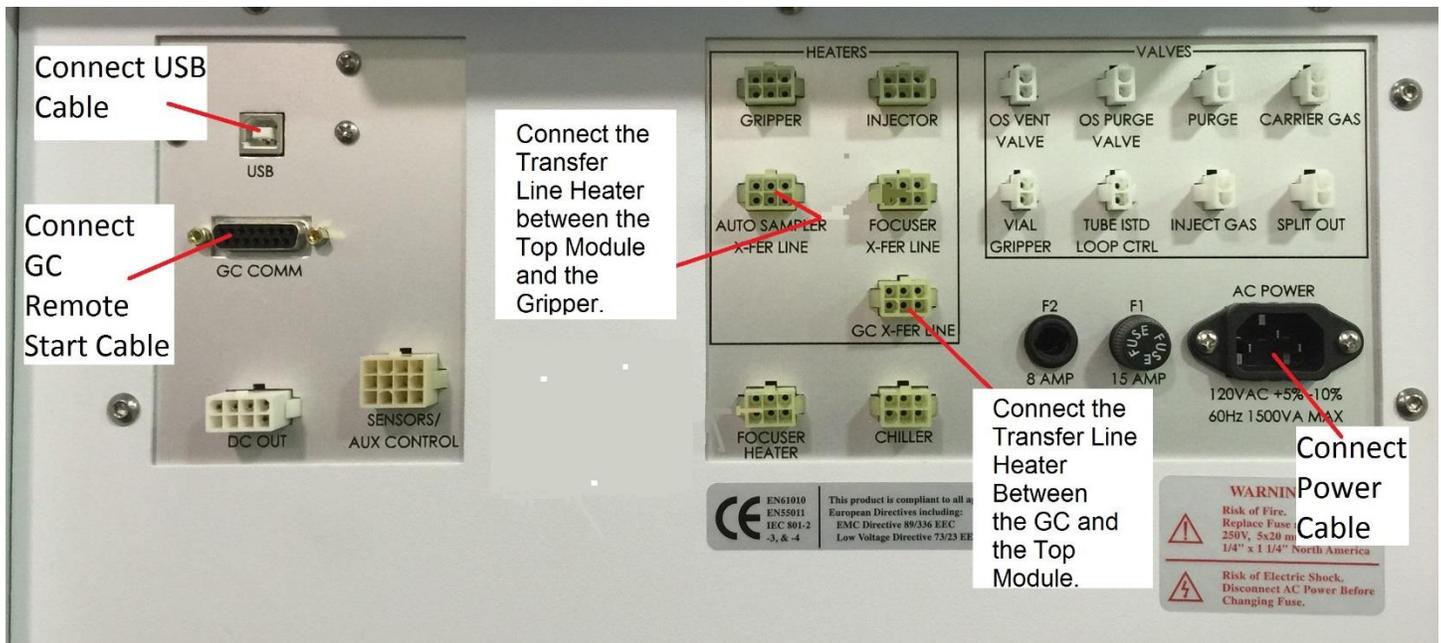


Figure 2. Shows the cable connection made to the bottom rear of the 7650-L20.

## Technical Notes: 7650-L20 System Installation

---

Carrier Gas connection. Use a short piece of 1/32" FSLD tubing and a 1/16" SS Union to connect the 1/16" OD X 0.04" (This may change to 0.02" ID in the future.) ID SS tubing to the GC injection port. The other end of the 1/16" tubing connects to a 1/8" bulkhead on the rear of the 7650-L20 top module.

Column Connection. Use the 1/16" X 0.02" ID SS tubing to connect the column to port 3 on the loop valve with a 1/16" SS Union. The column should extend about 0.5 cm past the end of its ferrule at the union.

Top Module 1/8" Bulkheads.

The top one is UHP N<sub>2</sub> or Surrogate. If the sample will be pressurized with a surrogate connect this to a dual stage regulator at 5-7 psig. Otherwise connect 1/8" baked copper tubing between the bulkhead and a tee on the line between the F2 position and the Z-axis regulator.

The middle bulkhead is loop flush out. It must be connected to a vacuum pump.

The internal standard connects to the bottom bulkhead. Regulate the internal standard to 3 psig with a clean SS (analytical grade) dual stage regulator.

Fixed Positions:

- F1: Plugged
- F2: UHP nitrogen for flushing the loop valve at 10-30 psig.
- F3. Not Used
- F4. Not Used
- F5. Empty

Install the C/D fixed positions, trays, and oven.

Connect the electrical cord to the rear of the 7650, plug it into its surge protector and then plug the surge protector into the dedicated circuit. Refer to figure 1.

Connect the remote start cable between the GC and the 7650-L20. Refer to figure 1.

Load the software. Refer to the TechNote on loading 7650-L20 software. During the software installation the USB cable will be connected between the computer and 7650 (refer to figure 1).

### **Configure the software for the 7650-L20:**

Refer to the figure 3 showing the instrument configuration screen below:

Open the 7650-L20 software using the shortcut created when loading the software and click "Settings" at the top. The "Instrument" configuration screen should appear.

## Technical Notes: 7650-L20 System Installation

The Default Extension must be set to “7650LX.LX”.

If the GC uses contact open like an Agilent 6890/7890 to signal the run start leave “GC 6890/7890” as “Yes”. If the GC uses contact closed use the pulldown to change it to “No”.

For Fixed C use to pulldown to select “Yes” if present or “No” if not present. Do the same for Fixed D.

Tray Configuration: Select the appropriate trays for Tray A and Tray B using the pulldown to select each trays part numbers. The part numbers of all trays are stamped into their tops.

<b>Instrument</b> Instrument ID <input type="text" value="Entech"/> GC 6890/7890 <input type="text" value="Yes"/> GC Wait Time Out <input type="text" value="60.0 min"/> Fixed C <input type="text" value="No"/> Fixed D <input type="text" value="No"/> Oven <input type="text" value="Disabled"/>	<b>Trays</b> Tray A <input type="text" value="HS_LT900_006"/> Tray B <input type="text" value="None"/> <b>Default Method</b> File Type <input type="text" value="7650LX.LX"/>	<b>7650LX Z Axis</b> <table border="1"><thead><tr><th>Vials</th><th>Canisters</th><th>Other</th></tr></thead><tbody><tr><td>20ml <input type="text" value="0"/></td><td>50ml <input type="text" value="0"/></td><td>No Sample <input type="text" value="0"/></td></tr><tr><td>40ml <input type="text" value="0"/></td><td>1/1.4L <input type="text" value="246"/></td><td>Home (F1) <input type="text" value="281"/></td></tr><tr><td>60ml <input type="text" value="0"/></td><td>1/1.4L+TOV <input type="text" value="516"/></td><td>Fixed C/D <input type="text" value="0"/></td></tr><tr><th>Bottles</th><th>Ovens</th><th>Header</th></tr><tr><td>125ml <input type="text" value="0"/></td><td>Oven <input type="text" value="0"/></td><td>X RC <input type="text" value="50"/></td></tr><tr><td>250ml <input type="text" value="0"/></td><td>1/1.4L+TOV <input type="text" value="0"/></td><td>Y RC <input type="text" value="50"/></td></tr><tr><td>500ml <input type="text" value="0"/></td><td></td><td></td></tr></tbody></table>	Vials	Canisters	Other	20ml <input type="text" value="0"/>	50ml <input type="text" value="0"/>	No Sample <input type="text" value="0"/>	40ml <input type="text" value="0"/>	1/1.4L <input type="text" value="246"/>	Home (F1) <input type="text" value="281"/>	60ml <input type="text" value="0"/>	1/1.4L+TOV <input type="text" value="516"/>	Fixed C/D <input type="text" value="0"/>	Bottles	Ovens	Header	125ml <input type="text" value="0"/>	Oven <input type="text" value="0"/>	X RC <input type="text" value="50"/>	250ml <input type="text" value="0"/>	1/1.4L+TOV <input type="text" value="0"/>	Y RC <input type="text" value="50"/>	500ml <input type="text" value="0"/>		
Vials	Canisters	Other																								
20ml <input type="text" value="0"/>	50ml <input type="text" value="0"/>	No Sample <input type="text" value="0"/>																								
40ml <input type="text" value="0"/>	1/1.4L <input type="text" value="246"/>	Home (F1) <input type="text" value="281"/>																								
60ml <input type="text" value="0"/>	1/1.4L+TOV <input type="text" value="516"/>	Fixed C/D <input type="text" value="0"/>																								
Bottles	Ovens	Header																								
125ml <input type="text" value="0"/>	Oven <input type="text" value="0"/>	X RC <input type="text" value="50"/>																								
250ml <input type="text" value="0"/>	1/1.4L+TOV <input type="text" value="0"/>	Y RC <input type="text" value="50"/>																								
500ml <input type="text" value="0"/>																										

Figure 3. 7650-L20 Configuration Screen.

Click “File” - “Save Configuration” when done. Changes are saved immediately but the software must be closed and reopened for the changes to show up on the screens.

After the installation is complete refer to the TechNotes to calibrate the 7650 thermocouples, calibrate the Z-axis, and do the 7650 position adjustment. Then use an electronic leak detector to check for helium leaks.

## Technical Notes: 7650-L20 Z-Axis Calibration Procedure

<u>DESCRIPTION:</u> CALIBRATING THE Z AXIS ON THE 7650-L20		<u>DOC.#:</u> 7650L20- 002-V00-Z- AXIS- CALIBRATION -C.DOCX	<u>REV.:</u> 00	<u>APPROVAL:</u>	<u>ORIGINATOR:</u> TIM RAUB
<u>FILE:</u>		<u>ISSUE DATE:</u>		<u>DEPARTMENT:</u> SERVICE	
<u>REV.:</u> 00	<u>DATE:</u> 01FEB2018	<u>INITIALS:</u> TTR	<u>DESCRIPTION:</u> Document created.		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		

### Introduction:

The purpose of the Z-axis calibration is to improve the movement of the 7650 Z-axis when picking up and dropping off samples that are heated in the oven and to make sure the gripper reaches the fixed positions. Slight differences in the Z-axis calibration are expected from instrument to instrument. This procedure is typically done as part of the installation or if a new size sample container will be used.

### Procedure:

Refer to the pictures at the end of this procedure.

Open the 7650-L20 software. Go to the "Settings" screen. Make sure the correct trays, oven (if present), and fixed position racks are selected.

Go to the View Screen and click "Diagnostics" on the left and then the "Position" tab on the right to access the 7650 controls. The controls will appear on the right of the View screen (refer to the pictures 1 and 2 below).

Click "Home" (in a yellow box in the picture 1). When done the autosampler should be above F1.

Place a sample container in "A1". Click "Up" (in the red box with "Down" in the picture). Use the Location pulldown (in a green box in the picture) to select "A1". Then click "Move". The robot should move above the A1 position. Then click "Down". Record the "Z" value (the red circle in picture 2). Enter this value in the appropriate box for the container on the Instrument Configuration Screen (refer to picture 3) (click "Settings" to access) then click "File" and "Save Configuration". Then go to the autosampler screen and click "Up". This only needs to be done once for each container size. Repeat the procedure above for any additional size containers that may be used. Please note that there are different positions for 1.4 liter cans with just MQT fittings and 1.4 liter cans with a TOV valve (an MQT fitting to 1/4" tube needs to be present on top of the TOV valve). Note that not every sample container size is listed in the table. Simply use one of the unused boxes for sample containers not listed. For example, the 500 ml vial box could be used for 450 ml Mini-Cans or 1/1.4L Canister box could be used for 1 liter headspace jars.

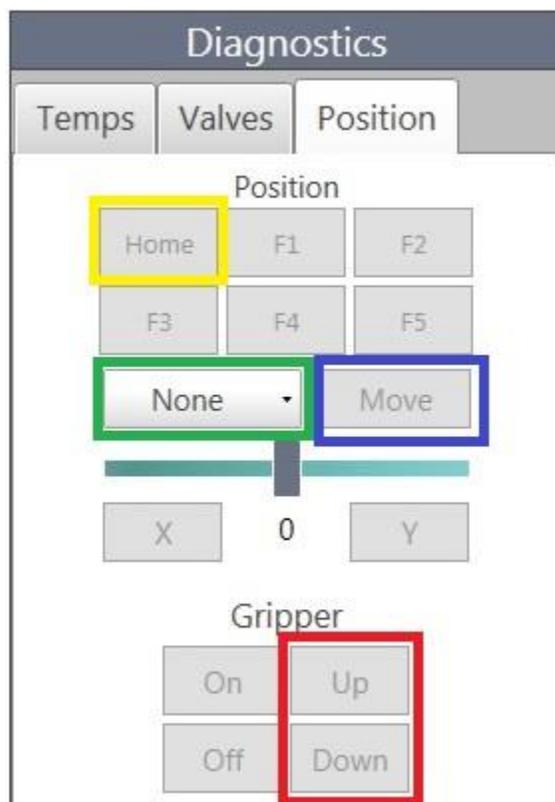
## Technical Notes: 7650-L20 Z-Axis Calibration Procedure

---

Next do the same for the one of fixed C/D positions (if present) by sending the gripper to one of the fixed positions. Then do F1 (Home but the gripper must be down on the MQT fitting not in the “Up” or “Home” position). For the no sample position remove a tray and send the gripper to a position from that tray. Then click “Down”. Record the Z-axis value when the gripper is completely down, enter it in the 7650 Z-Axis Configuration Table and save as above. Then click “Up”.

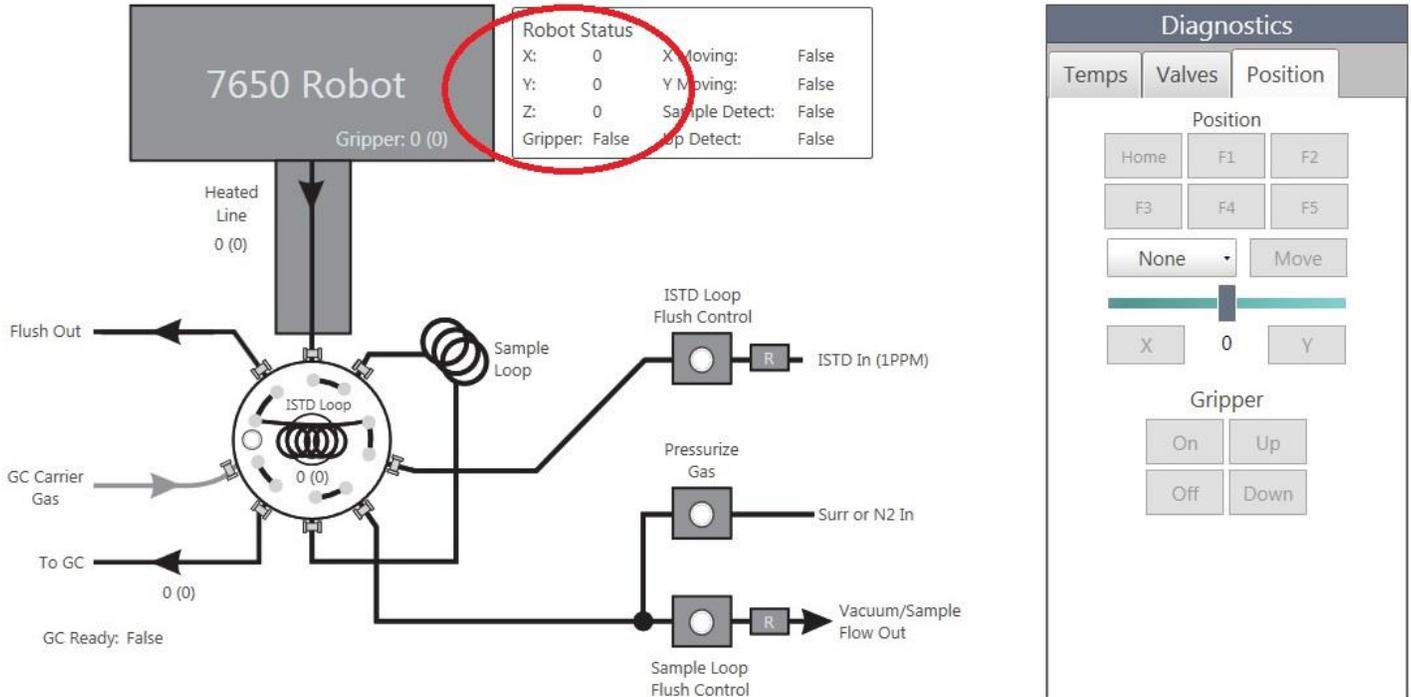
When finished click “File” and then select “Save Configuration”. Home the 7650 and close the 7200 software. Reopen the software. The values entered will not be used by the software until it is closed and reopened.

Picture 1: 7650 Position (movement) Controls.



## Technical Notes: 7650-L20 Z-Axis Calibration Procedure

Picture 2: X, Y, Z positions.



Picture 2: 7650 Z-Axis Configuration table.

7650LX Z Axis					
Vials		Canisters		Other	
20ml	<input type="text" value="0"/>	50ml	<input type="text" value="0"/>	No Sample	<input type="text" value="0"/>
40ml	<input type="text" value="0"/>	1/1.4L	<input type="text" value="0"/>	Home (F1)	<input type="text" value="0"/>
60ml	<input type="text" value="0"/>	1/1.4L+TOV	<input type="text" value="0"/>	Fixed C/D	<input type="text" value="0"/>
Bottles		Ovens		Header	
125ml	<input type="text" value="0"/>	Oven	<input type="text" value="0"/>	X RC	<input type="text" value="50"/>
250ml	<input type="text" value="0"/>	1/1.4L+TOV	<input type="text" value="0"/>	Y RC	<input type="text" value="50"/>
500ml	<input type="text" value="0"/>				

## Technical Note: 7650 Position Adjustment

<b><u>DESCRIPTION:</u></b> PROCEDURE TO ADJUST THE GRIPPER POSITION IN THE X AND Y AXES FOR THE 7650-L20		<b><u>DOC.#:</u></b> 7650L20-004-V00-POSITIONADJUSTMENT-C.DOCX	<b><u>REV.:</u></b> 00	<b><u>APPROVAL:</u></b>	<b><u>ORIGINATOR:</u></b> TIM RAUB
<b><u>FILE:</u></b>		<b><u>ISSUE DATE:</u></b>		<b><u>DEPARTMENT:</u></b> SERVICE	
<b><u>REV.:</u></b> 00	<b><u>DATE:</u></b> 02FEB2018	<b><u>INITIALS:</u></b> TTR	<b><u>DESCRIPTION:</u></b> Document created.		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		

### Introduction:

This procedure is used with the 7650-L20 only. It allows the target position of each sample position to be adjusted in the X and Y axes to ensure the 7650 gripper connects smoothly with the canister or optional fixed sample positions.

Note that the procedure below presumes the 7650-L20 has already been properly configured on the settings screen.

This procedure is normally done at the installation. It can be done during troubleshooting or if the gripper is not coming down smoothly on a position. With the optional fixed position racks it is important for the MQT fittings to be straight. Cable ties or a support may be used to facilitate this. It is also important that each tray is flat on the chassis of the 7650 and secure between the tray positioning posts.

### Procedure

Power on the 7650-L20.

Open the software. Click "View" and then "Diagnostics". Click "Position" to access the 7650 motion controls.

Click "Home". The 7650 gripper should raise to the top position and move over the F1 (plugged) position. If the 7650 was already in the Home position, verify that the gripper will move to another position by sending it to position A6. If it moves to A6 then Home again. Then click "Down". The gripper should go down on F1. Click "Up" and the gripper should rise. This is just a check to verify that the 7650 is functioning normally. If it has trouble Homing or reaching A6 please contact your local Entech representative for additional support.

Click "Settings" (top) and then "Fixed Positions" (left). Use the "Select Position" table to select the position to be checked or adjusted. This table will only show the configured fixed positions. F2-F5 are always present but the C/D positions will only be shown if configured. Then click "Move To". The gripper should move to that position. Watch the gripper and click "Down". If the gripper comes down

## Technical Note: 7650 Position Adjustment

smoothly on the position no further action is needed. If the gripper does not come down smoothly on the position note which in which direction it is off and about how much. Click “Up”. Use the Move Robot Sidebar to select a value and direction for the movement. 100 would be a small adjustment away from the home position. (In the X axis the gripper will move slightly to the right for positive numbers. In the Y axis the gripper will move slightly to the front of the instrument for positive values.) -100 would be a small adjustment towards the home position. Larger or smaller adjustments can be used. Click X or Y to move the gripper in the appropriate axis. Repeat until the gripper comes down smoothly. Then click “Apply”. Once done click “File” and then select “Save Fixed Positions”.

Select Position	
Tray	Name
Fixed Positions	F2
Fixed Positions	F3
Fixed Positions	F4
Fixed Positions	F5

Selected Position	
Tray	Position
X Coordinate	Y Coordinate
Move To	Clear

Move Robot		
Current X: 0 steps	Current Y: 0 steps	
X	0	Y
Apply		

Custom Positions				
Tray	Name	X Coordinate	Y Coordinate	Delete

Check the position all fixed positions and adjust as needed. It may be necessary to close and reopen the software after each position is saved depending on the exact software version loaded.

Close and reopen the software. Then “Home” the 7650. Next verify that all the positions were adjusted correctly and that the 7650 goes to all the fixed positions correctly. (With the current software only a small adjustment is allowed but the user still should verify the 7650 goes to the correct position and comes down smoothly. It is fairly common for a user to forget to save a position when using this procedure.)

Tip 1: Keep track of how much each position needs to be adjusted in the X and the Y. For new installations these adjustments are very similar on all positions.

Tip 2: It is critical that the 7650 is properly home before starting this procedure.

## Technical Notes: 7650-L20 Thermocouple Calibration

<u>DESCRIPTION:</u> HOW TO CALIBRATE THE 7650-L20 THERMOCOUPLES		<u>DOC.#:</u> 765L20-005-V00-THERMOCOUPLE-CALIBRATION-C.DOCX	<u>REV.:</u> 00	<u>APPROVAL:</u>	<u>ORIGINATOR:</u> TIM RAUB
<u>FILE:</u>		<u>ISSUE DATE:</u>	<u>DEPARTMENT:</u> SERVICE		
<u>REV.:</u> 00	<u>DATE:</u> 02FEB2018	<u>INITIALS:</u> TTR	<u>DESCRIPTION:</u> Document created.		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		

### Background:

This procedure may be done at the initial installation, as needed, or as part of a PM visit.

This procedure was written for one thermocouple. It can be done more quickly if two are used as it will not take as long for temperatures to equilibrate. If using two thermocouples just switch them back and forth at the heater or thermocouple connection.

This procedure is used for the 7650-L20.

### Safety:

If any kind of cryogenic fluid is used as a physical constant it will be very important to use proper equipment and safety gear to handle it. Contact your cryogen supplier for more information

### Tools and Parts Needed:

01-18-7650-910 24 AWG Thermocouple Tester

Two Physical Constants: Ice water (0° C) is readily available and always used for one. An alternative to ice water is to set the GC to 35° C. The GC oven set to 200° C can be used for the other. Other alternatives can be boiling water, liquid argon, Liquid nitrogen (-196° C), etc.

### Procedure:

Power on the 7650-L20. Open the 7650-L20 software (Run Entech7650LX.exe.) Click "View" then "Diagnostics" then "Status". Verify the system is Link Active by checking the temperature readings. If the temperatures read "0" there is a communications problem that will need to be resolved before continuing. Otherwise click "Settings" (top) and then "Calibration" (left). Record the starting zeroes and gains for the heaters (Tip: Take a screenshot using "Alt"- "Prnt Scr" then "Ctrl"- "V" into Word, Paint, or WordPad and save the screenshot.). This is for record keeping of the starting values and in case the user must return to those values.

## Technical Notes: 7650-L20 Thermocouple Calibration

---

### Calibrating the Board 16 Thermocouples:

1. Disconnect the Gripper heater connector (top left heater connection) from the rear of the 7650. Plug the thermocouple into Gripper position.
2. Put the other end of the thermocouple into ice water, 0° C, (full to the top with ice but only ¾ full of water) or into the GC oven at 35° C. Note the temperature of the Gripper on the 7650 Cal screen (just after “Gripper”).
3. Move the thermocouple to the GC oven set to 200° C. When the temperature is stable note it.
4. If both temperatures were within +/- 2° C of the physical constants or target temperatures go to the step 7.
5. Put the thermocouple into ice water (full to top with ice but only ¾ full of water). Note the temperature when stable. If the temperature is within +/- 2° C of the constant (0° C) go to step 6. Otherwise change the zero value for “Gripper” by typing in a new one in the Gripper Zero box. It is best to make a change of about +/-50 to the zero value in the first attempt so the trend will be very clear. Then click “Apply”. Adjust the zero until the temperature reads within +/- 2° C of the target temperature. Then go to step 6.
6. Move the thermocouple into the GC oven set to 200° C. Wait until the Gripper temperature is stable. If it reads 200° C (+/- 2° C) go to step 7. Otherwise change the “Gripper” gain value by typing in a new one in the Gripper Gain box. It is best to make a change of about +/-50 to the gain value in the first attempt so the trend will be very clear. After that smaller changes can be made. Then click “Apply”. Adjust the Gripper gain until the Gripper temperature reads within +/- 2° C of the target temperature. If you make any adjustments to the gain, go back to step 5.
7. Once both temperatures are within +/- 2° C of their targets record the final zero and gain values for the Gripper. Enter these values as the zero and gain for “Transfer Line”, and “Oven”. Click “File” (left) and select “Save Calibration”. If the values are not saved they will be lost when the software is closed.
8. Unplug the thermocouple from the rear of the 7650 and plug the Gripper cable back in.

### Calibrating the Board 17 Thermocouples:

1. Disconnect the loop heater from the rear of the 7650. Plug the thermocouple into loop position.
2. Put the other end of the thermocouple into ice water, 0° C, (full to the top with ice but only ¾ full of water) or into the GC oven at 35° C. Note the temperature of the Loop on the Calibration screen (just after “Loop”).
3. Move the thermocouple to the GC oven set to 200° C. When the temperature is stable note it.

## Technical Notes: 7650-L20 Thermocouple Calibration

---

4. If both temperatures were within +/- 2° C of the target temperatures go to the step 7.
5. Put the thermocouple into ice water (full to top with ice but only ¾ full of water). Note the temperature when stable. If the temperature is within +/- 2° C of the target (0° C) go to step 6. Otherwise change the zero value for "Loop" by typing in a new one in the Loop Zero box. It is best to make a change of about +/-50 to the zero value in the first attempt so the trend will be very clear. Then click "Apply". Adjust the zero until the temperature reads within +/- 2° C of the target temperature. Then go to step 6.
6. Move the thermocouple into the GC oven set to 200° C. Wait until the Loop temperature is stable. If it reads 200° C (+/- 2° C) go to step 7. Otherwise change the "Loop" gain value by typing in a new one in the Loop Gain box. It is best to make a change of about +/-50 to the gain value in the first attempt so the trend will be very clear. After that smaller changes can be made. Then click "Apply". Adjust the Loop gain until the Loop temperature reads within +/- 2° C of the target temperature. If you make any adjustments to the gain, go back to step 5.
7. Once both temperatures are within +/- 2° C of their targets record the final zero and gain values for the Loop. Enter these values as the zero and gain for "TransferLine to GC". Click "File" (left) and select "Save Calibration". If the values are not saved they will be lost when the software is closed.
8. Unplug the thermocouple from the rear of the 7650 and plug the Loop cable back in.

### When done:

Review all zero and gain values to make sure they were entered correctly. Make sure the calibration thermocouples have been disconnected and the heater cables reconnected.

### Problems during:

If a thermocouple reads room temperature make sure it is **IN** the ice water or GC Oven as appropriate. Tying a nut onto the end of the thermocouple lead will help keep it submerged. Also, make sure the thermocouple is connected to the correct position on the rear of the 7650.

When calibrating, if changes to the zero/gain are not affecting the readings, make sure the correct heater (on the Calibration screen) is being adjusted.

## Technical Notes: 7650-L20 Loading Software V1.0.0.14

<u>DESCRIPTION:</u> LOADING 7650-L20 SOFTWARE VERSION 1.0.0.14		<u>DOC.#:</u> 7650L20-100-V00-V1.0.0.14-SOFTWARELOADING-C.DOCX	<u>REV.:</u> 00	<u>APPROVAL:</u>	<u>ORIGINATOR:</u> TIM RAUB
<u>FILE:</u>		<u>ISSUE DATE:</u>	<u>DEPARTMENT:</u> SERVICE		
<u>REV.:</u> 00	<u>DATE:</u> 05MAR2018	<u>INITIALS:</u> TTR	<u>DESCRIPTION:</u> Created.		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		

This software loading procedure is for the Entech 7650-L20 Loop System.

### Needed:

The Installer for Version 1.0.0.3 of the 7200 Software and the V1.0.0.14 patch file.

You must be logged on as an Administrator to load the software.

A compatible computer:

Requires a Windows 7 or 10 Professional 64-Bit Computer with .Net Framework 4.7.1 (For Windows 7 Computers WIN7 Service Pack 1 is a prerequisite for .Net 4.7.1. Windows 10 computers must have at least the anniversary update (build 1511 or greater) for .Net 4.7.1 to load successfully.), a Pentium I5 (only up to I6 on WIN7 computers) or better processor, and a minimum of 8 GB of RAM. 16 GB of RAM is the minimum if the 7650-L20 software is run on the same computer as the GC or GC/MS software (this is not recommended). Computers purchased after March 2016 must be Windows 10 Professional. As Anti-Virus software may interfere with software it must not be used on the computer. The Entech software must be run as administrator. The computer must be registered with Windows, and automatic updates must be turned off. The computer must use the United States regional setting.

A separate computer for the 7650 is required if any of the Entech programs or required programs for the Entech software interfere with the GC or GC/MS software. Besides the obvious operating system requirements some GC or GC/MS software may require .NET 2.0 or a different version of SQLCE that may be incompatible. A separate computer is recommended if the GC or GC/MS software uses a lot of computer resources. LECO GC/MS software and Agilent Mass Hunter GC/MS software both fall in this category. If a separate computer is used for the 7650 Loop System a KVM switch may be used to share a monitor, a keyboard, and a mouse between both computers.

Prior to loading the software go to the Microsoft website to download and install all currently available updates.

## Technical Notes: 7650-L20 Loading Software V1.0.0.14

---

The 7650-L20 Software must be run as an administrator and it must be loaded as an administrator.

The Monitor: For the best experience the monitor must be 1280 X 720 with a 16:9 aspect ratio. If a KVM is purchased from Entech to share the monitor, keyboard, and mouse then the monitor must either be VGA or have a VGA adapter.

For Windows 7 computers only: If the computer has USB 3.0 or USB SS ports they must not be used. If the Intel Extensible 3.0 Driver Installer is present on the computer, it must be uninstalled.

Any computers that requires USB 3.0 to achieve USB communication must be Windows 10.

The computer must be on an Uninterrupted Power Supply (UPS) for the warranty to be valid.

### **Installation Procedure:**

Put the software CD or flash drive in the computer and open it. Copy the software to the computer (make a directory called EntechSoftware and paste the software in it). Unzip or Extract any zipped software files before continuing. Go to C:\EntechSoftware\Entech7650LX Installer 1.0.0.3\ and run Entech7650LXSetup.msi as an administrator. (On some computer one may need to simply install it.)

Click "Next" when the screen below pops up.

## Technical Notes: 7650-L20 Loading Software V1.0.0.14

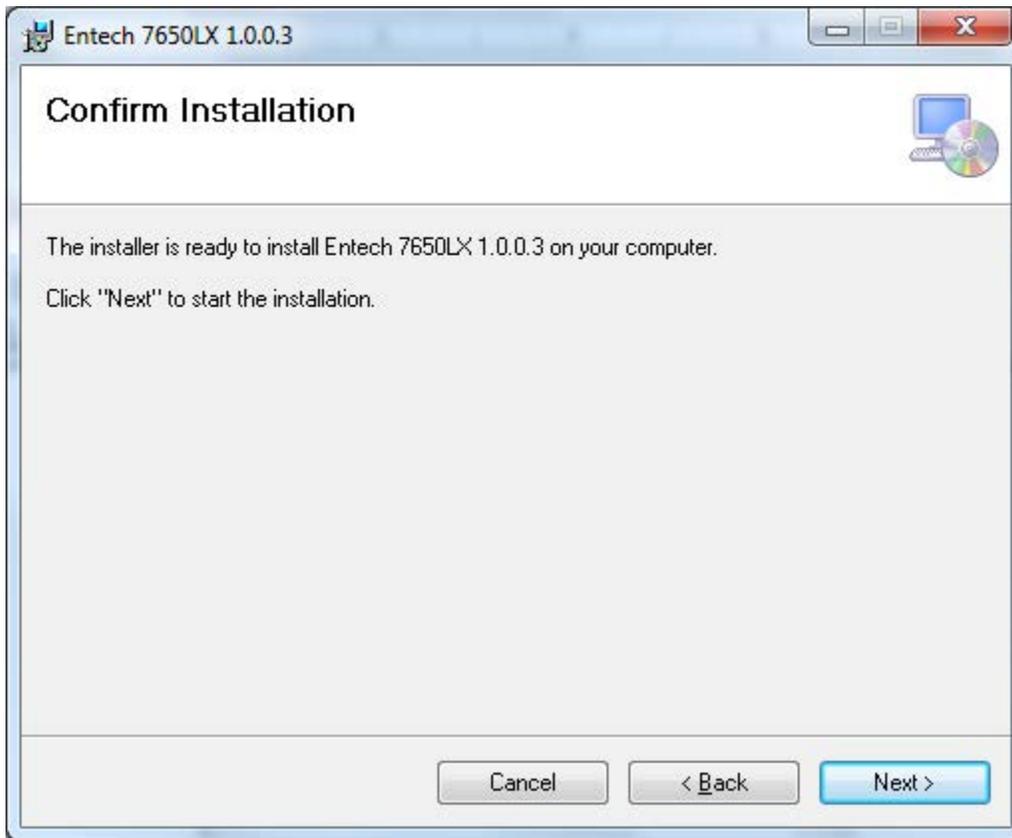
---



Click "Next" when the screen below appears.

## Technical Notes: 7650-L20 Loading Software V1.0.0.14

---

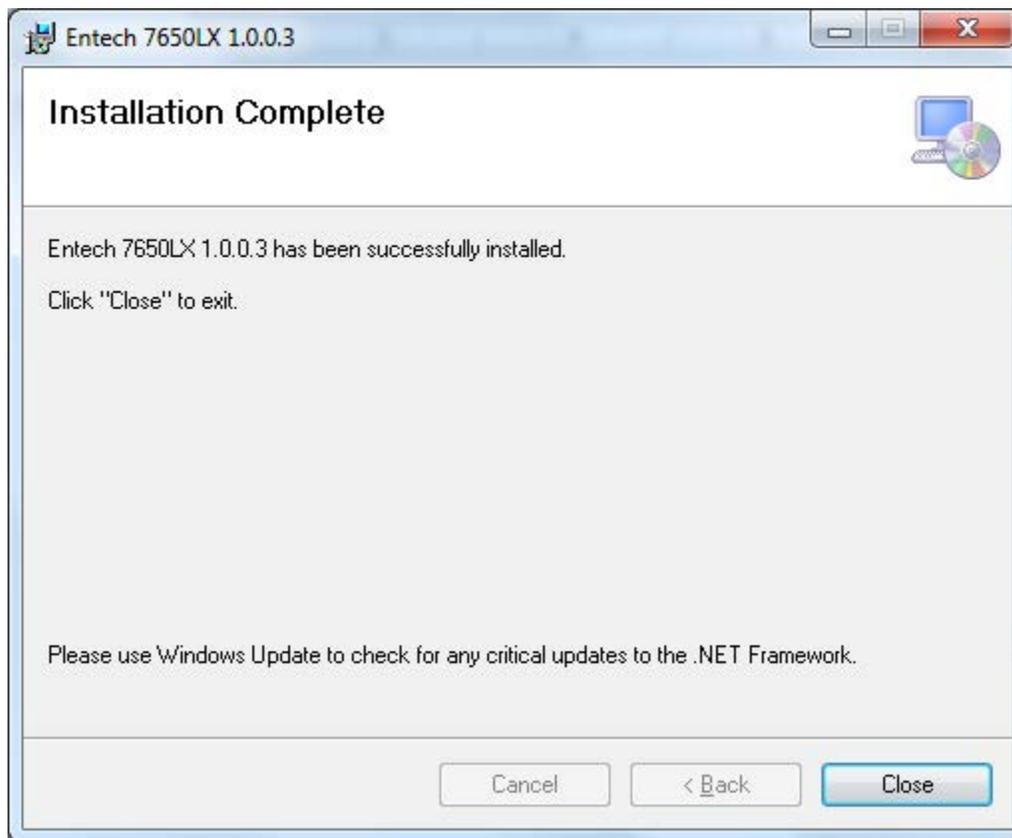


There will be a message asking if you would like to give the software permission to make changes to the computer. Click "Yes".

Click "Close" when the following screen appears.

## Technical Notes: 7650-L20 Loading Software V1.0.0.14

---



At this point the software and driver are installed. There is also a shortcut for Entech7650LX.exe on the desktop. Delete this shortcut as it will not be used.

### Patch Installation:

Copy the Entech7650LX V1.0.0.14 patch file into C:\SmartLabs\Applications\7650LX.

Reboot the computer then plug the USB cables (back) in. Turn on the 7650-L20. Allow a few minutes for the drivers to load. Go to Device Manager and ensure the COM ports are assigned correctly and that all devices are visible. The 7650 uses four COM ports. Reboot the computer again.

Go into C:\SmartLabs\Applications\7650LX\Entech7650LX V1.0.0.14\ and make a shortcut to "Entech7650LX.exe". To do this right click "Entech7650LX.exe, move down to "Send To" on the pop up, and then select "Desktop". Entech7650LX.exe must always be run as administrator. To facilitate this right-click on the "Entech7650LX.exe" shortcut and select properties. Click "Compatibility" on the properties screen. At the bottom check "Run this Program as an Administrator" then "Apply". Then click "Change Settings for All Users". Check "Run this Program as an Administrator" at the bottom. Click "Apply" then "OK". Click "OK" at the bottom of the Properties screen to exit it. (The alternative is to right click on the "Entech7650LX.exe" shortcut and select "Run as Administrator" every time the software is opened.)

## Technical Notes:

### 7650-L20 Loading Software V1.0.0.14

---

**(Newer Patches are installed the same way as the V1.0.0.14 patch except that the patch directory's name changes from Ent....V1.0.0.14 to Ent....V1.0.0.?.)**

Run Entech7650LX.exe. Go to "Settings" (top) and select "Configuration" (left). Configure the 7650-L20: default method extension, GC 6890/7890, trays, oven, and fixed position racks if present. When configuring the tray use the part number stamped on the tray to select the tray. For GC 6890/7890 select "No" if the GC uses contact closure to send a start signal, otherwise choose "Yes". After the settings are entered, click "File" (left) and select "Save Configuration" to permanently save the settings otherwise they will be lost when the software is closed.

Next click "Temperatures" on the left. For the fastest cycle times the 7650-L20 idle temperatures should be set the same as the temperatures in the method. If power savings are more important these idle temperatures can be set to ambient values. The bake out temperatures are the same as those used in the method. Ten minutes is a reasonable bake out duration. After the settings are entered, click "File" (left) and select "Save Temperatures" to permanently save the settings otherwise they will be lost when the software is closed

Close the software and then reopen it.

Next use the TechNotes at the rear of the 7650-L20 manual to calibrate the 7650-L20 thermocouples, to calibrate the Z-axis heights, and to adjust the 7650 positions.

Close the software and then reopen it.

For software upgrades the 7650-L20 should now be ready to run. For new instrument installations continue to the next step in the installation.

## Technical Notes: 7650-L20 Sample Line Cleanup Procedures

<b><u>DESCRIPTION:</u></b> HOW TO CLEAN UP THE FIXED POSITION SAMPLE LINES ON A 7650-L20		<b><u>DOC.#:</u></b> 7650-200-V00-SAMPLELINE CLEANUP-C.DOCX	<b><u>REV.:</u></b> 00	<b><u>APPROVAL:</u></b>	<b><u>ORIGINATOR:</u></b> TIM RAUB
<b><u>FILE:</u></b>		<b><u>ISSUE DATE:</u></b>		<b><u>DEPARTMENT:</u></b> SERVICE	
<b><u>REV.:</u></b> 00	<b><u>DATE:</u></b> 08FEB2018	<b><u>INITIALS:</u></b> TTR	<b><u>DESCRIPTION:</u></b> Created.		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		

### **Introduction:**

This documents how to manually backflush the fixed lines on the 7650. It is not used for the tray positions. Back flushing is recommended after sample analyses to clean the sample lines before the next samples are analyzed on those positions. A couple other techniques will be explained as well.

### **Manual Back Flushing the 7650-L20:**

This procedure cannot be done while the system is actively running samples.

Connect UHP Nitrogen regulated to 5-7 psi to the “Sample Pressurize In” bulkhead on the rear of the 7650-L20.

Open the lines to be flushed to the atmosphere.

Open the software. Click “View” (top), click “Diagnostics” (left), and then “Position” (right).

Use the 7650 controls to move the arm to the position to be back flushed (“Up”, Select the Position with the Position pulldown (F3-F5, C1-C9, or D1-D9), then “Move”, and then “Down.”). Click “Valves” (right) and then click “Pressurize”. (The color of the Pressurize button should change.) After 60-180 seconds click “Pressurize” again to turn off the backflush gas (button color should change). Repeat this for any additional positions to be back flushed.

When done, close and reopen the software, home the 7650, and then bakeout out the 7650 for ten minutes.

### **Manual Flushing the 7650-L20:**

This procedure cannot be done while the system is actively running samples.

Connect UHP Nitrogen regulated to 5-7 psi to the “Sample Pressurize In” bulkhead on the rear of the 7650-L20.

## Technical Notes: **7650-L20 Sample Line Cleanup Procedures**

---

Connect a vacuum pump to the “Loop Flush Out” bulkhead on the rear of the 7650-L20 if not present already.

Cap all the lines to be flushed using a ¼” cap or a female MQT fitting.

Open the software. Click “View” (top), click “Diagnostics” (left), and then “Position” (right).

Use the 7650 controls to move the arm to the position to be back flushed (“Up”, Select the Position with the Position pulldown (F3-F5, C1-C9, or D1-D9), then “Move”, and then “Down.”). Click “Valves” (right). Click “Sample” (The color of the Sample button should change. This applies vacuum to the sample line.), after 15 seconds click “Sample” again to turn off the Sample Valve, click “Pressurize”, after 5 seconds click “Pressurize” again to turn off the flush gas. Repeat the 3-5 times for each position. Repeat this procedure for any additional positions to be back flushed.

When done, close and reopen the software, home the 7650, and then bake out out the 7650 for ten minutes.

### **Back flushing using a nitrogen line:**

Supplies required: UHP Nitrogen regulated to 5 psig. A nitrogen line to reach the 7650 Fixed Positions. Female MQT fitting.

Procedure: Open the lines to be flushed to the atmosphere. Connect the nitrogen line to the position to be flushed for 60-180 seconds then remove the nitrogen line from the position. Repeat for any additional lines that require back flushing.

This can be done while the 7650 is running but the operator must ensure that they and the back flushing apparatus do not interfere with 7650 operations.

### **Flushing using a nitrogen/vacuum line:**

Supplies required: Connect UHP Nitrogen regulated to 5 psig to one leg of a 3-way valve. Connect another leg to a Vacuum Pump. Connect a short 2-4’ line to the outlet of the 3-way valve to reach 7650 Fixed Positions. This line must have a female MQT fitting on its end.

Procedure: The lines to be flushed must be capped with a ¼” cap or a Female QT fitting. Connect the flush line to the position. Apply vacuum for 15 seconds. Then apply nitrogen for 5 seconds. Cycle the vacuum and nitrogen three to five times to flush the line thoroughly. Repeat for any additional lines that require flushing.

This can be done while the 7650 is running but the operator ensure they and the flushing apparatus do not interfere with 7650 Operations.

### **Flushing with the Entech 3100A or 3100D:**

## Technical Notes:

### **7650-L20 Sample Line Cleanup Procedures**

---

The C/D expansion rack sample lines are easy to remove from the sample rack. Just push the line up from the bottom and slide them out. Cap the lines removed with a ¼" Cap or Female MQT fitting. Connect them to ports in a 3100A or 3100D cleaning oven and clean them just like cans.

This can be done while the instrument is running but the operator must be careful not to interfere with the 7650 movement while removing or replacing the sample lines. The operator must not put these positions into a sequence while its line and fitting is in the cleaner. This procedure would normally only be used if the sample line had run an extremely high concentration sample.

## Technical Notes: 7650-L20 Lubrication Procedure

<b><u>DESCRIPTION:</u></b> PROCEDURE FOR LUBRICATING THE X, Y, AND Z AXES ON THE 7650-L20		<b><u>DOC.#:</u></b> 7650-300-V00-LUBRICATION-C.DOCX	<b><u>REV.:</u></b> 00	<b><u>APPROVAL:</u></b>	<b><u>ORIGINATOR:</u></b> TIM RAUB
<b><u>FILE:</u></b>		<b><u>ISSUE DATE:</u></b>		<b><u>DEPARTMENT:</u></b> SERVICE	
<b><u>REV.:</u></b> 00	<b><u>DATE:</u></b> 29JAN2018	<b><u>INITIALS:</u></b> TTR	<b><u>DESCRIPTION:</u></b> Document created.		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		

### **Parts and Tools Needed:**

01-50-00205 Tri-Gel 300S Lubricant (10 cc)

KimWipes

Cotton Swaps

Gloves

9/64" Hex Key

3/32" Hex Key

### **Z-Axis Procedure:**

The Z-Axis does not have any parts that require lubrication.

### **Lubricating the X-/Y-axes:**

Raise the gripper on the 7650. ("View" > "Diagnostics" > "Position" > "Up".) Close the software.

Power off the 7650.

Remove the two screws that secure the X-Axis cover using a 9/64" hex key. These screws are under the arm on the far right of the X-Axis. (The X-Axis is the left/right axis.) Pull the cover to the right to remove it.

Remove the three 9/64" hex screws that secure the Y-Axis cover using a hex key. All three screws are under the Y-Axis. (The Y-Axis is the Front/Rear axis). Two screws are under the Y-Axis at the rear of the axis. One screw is under the Y-Axis near front of the Axis. There are also 3/32" hex screws located near the center of the uppermost white powder coated guardrail that must be removed. Pull the cover forward to remove it.

## Technical Notes: 7650-L20 Lubrication Procedure

---

Put on gloves and then use cotton swabs and KimWipes to remove the old drive screw lubricant completely. The gripper arm can be pulled to the side or forward and back to move the red pieces on the drive screws so the old lubricant under the red pieces can be removed.

Once the old lubricant is removed place three thin beads of Tri-Gel about 120° apart down the entire length of each drive screw. Pull the gripper to the side or pull it back and forth to move the red pieces on the drive screws and lubricate way under where the red piece had been. Turn on the 7650. Open the software. Use the 7650 controls to move the gripper to distribute the Tri-Gel evenly. (“View” > “Diagnostics” > “Move” > “Home” and use the position pulldown to select “D9”. Alternate between Home and D9 three or four times.)

Power off. Replace the covers.

## Technical Notes:

### 7650-L20 Transfer Line Replacement and Depth Check

<u>DESCRIPTION:</u> HOW TO CHANGE THE 7650 TRANSFER LINE AND CHECK ITS DEPTH		<u>DOC.#:</u> 7650L20-301-V00-TRANSFERLINECHANGE-DEPTHCHK-C.DOCX	<u>REV.:</u> 00	<u>APPROVAL:</u>	<u>ORIGINATOR:</u> TIM RAUB
<u>FILE:</u>		<u>ISSUE DATE:</u>	<u>DEPARTMENT:</u> SERVICE		
<u>REV.:</u> 00	<u>DATE:</u> 08FEB2019	<u>INITIALS:</u> TTR	<u>DESCRIPTION:</u> Document created.		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		

### Tools and Parts Needed:

- 01-19-7600-301      7650 Transfer Line Depth Tool
- 01-19-7600-302      Transfer Line Depth Verification Tool
- 01-15-87195        7500 FSLUD Transfer Line 9'
- 01-31-01001        1/16" Valco ZDV Nut (1 comes with 01-15-87195)
- 01-31-01002        1/16" ZDV SS Ferrule (1 comes with 01-15-87195)
- 1/16" Terry Tool or other cutter for the 1/16" SS Transfer line
- 5/16" X 1/4" Open End Wrench
- 7/16" X 3/8" Open End Wrench
- Phillips Head Screwdriver
- Teflon Tape

### Transfer Line Change Procedure:

Open the software and raise the gripper. (Click "View" > "Diagnostics" > "Position" > "Up".) Turn off the 7650 and wait about 15 minutes for the heated zones to cool. Move the gripper to the front of the 7650 for easier access.

Remove the top 7650 cover, the loop cover and insulation, and the gripper cover. Use one hand to hold the gripper cover (the cover may fall when the last screw is loosened) and the other to loosen the four screws that secure the gripper cover with a small Phillips screwdriver, and remove the gripper cover. Do not remove the screws completely as the cover is slotted

## Technical Notes:

### **7650-L20 Transfer Line Replacement and Depth Check**

---

In the top module disconnect the transfer line from the loop valve (position 1).

Refer to picture one. Loosen the two setscrews securing the transfer line tip. Pull the gripper end of the transfer line out of the transfer line heater by pulling from the loop ent.

Inspect both ends of the new transfer line. One end should have just a straight cut. The other end should be slightly beveled (rounded) and smooth. This end must go into the gripper.

Wrap some Teflon tape around the square cut end of the transfer line push it through the gripper end transfer line heater until it comes out of the loop end of the transfer line heater. Remove the Teflon tape once the transfer line starts to come out of its heater. At this point start to pull the line from the top module of the 7650. Pulling makes it much less likely to accidentally bend the transfer line.

Pull the line out of the transfer line heater until only a little more than one quarter inch (0.8 cm) extends out of the gripper. Use the indented end of the transfer line depth tool to push the transfer line back up and tighten the 2 setscrews (refer to figure 1) to secure it in position. (Push the end of the tool in but not hard enough to push the gripper up. If the gripper body is pushed up while setting the transfer line depth push the line back into the gripper. Then use the tool to set the depth again without pushing up quite so hard.)

Use the transfer line depth verification tool to verify the depth is set correctly. Insert the Calibration Verification Tool into the Gripper. Push it firmly up. Then insert the black rod into the aluminum cylinder. The rod should go into cylinder until the mark (a small indentation scored at the halfway point of the rod) is flush with the bottom of the cylinder. If the mark is flush no adjustment is needed. If the mark is not flush loosen the transfer line set screw, push the transfer line out of the gripper slightly, and then readjust the depth.

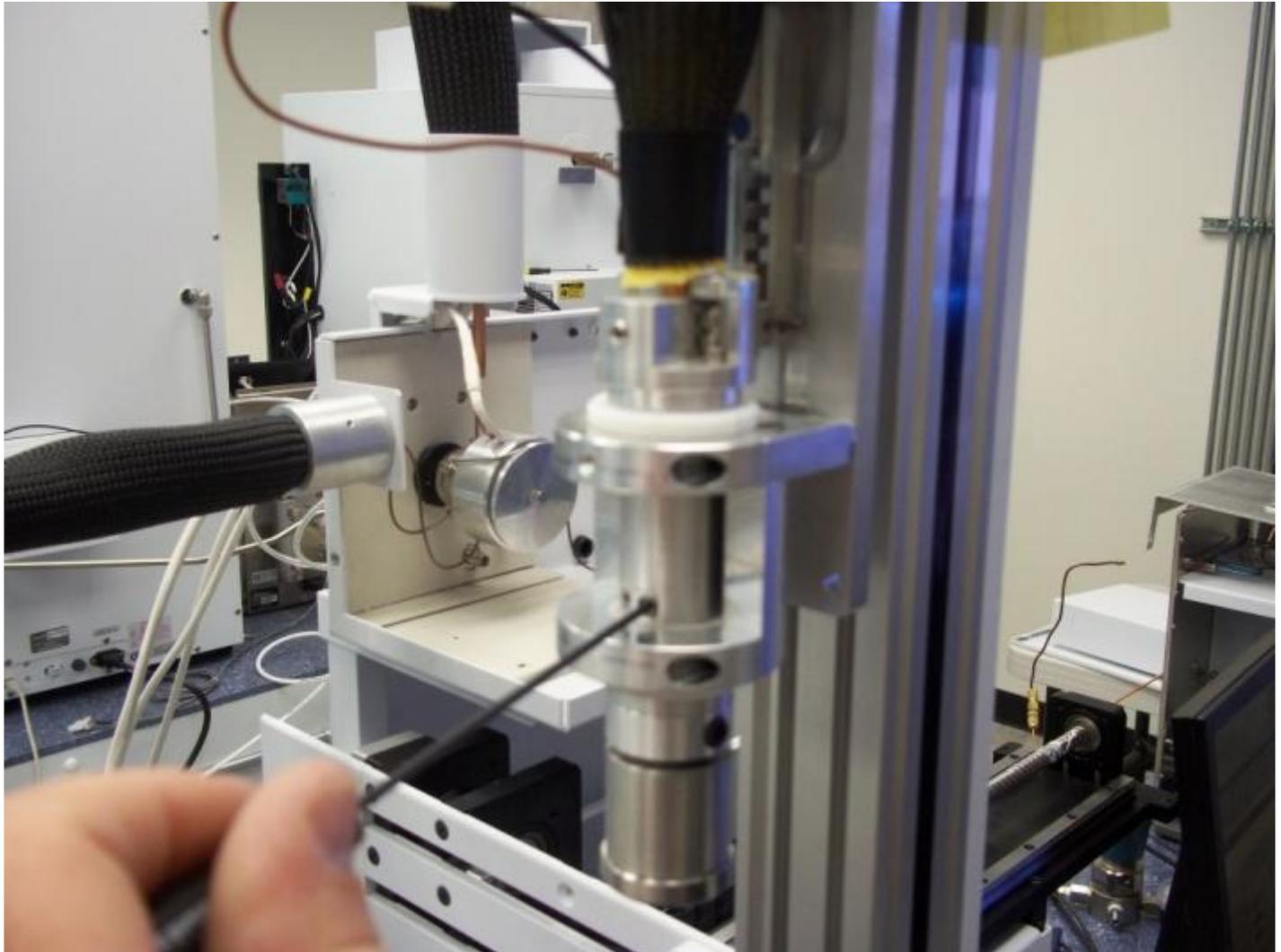
Cut the transfer line carefully and connect it to the loop valve.

Replace the covers and insulation.

## Technical Notes:

### 7650-L20 Transfer Line Replacement and Depth Check

Picture 1. Shows the transfer lines set screws being loosened.



#### Transfer Line Depth Check Procedure:

Open the software and raise the 7650 gripper. (Click “View” > “Diagnostics” > “Position” > “Up”.)

Insert the Calibration Verification Tool into the Gripper. Push it firmly up. Then insert the black rod into the aluminum cylinder. The rod should go into cylinder until the mark (a small indentation scored at the halfway point of the rod) is flush with the bottom of the cylinder. If the mark is flush no adjustment is needed. If the mark is not flush use the procedure below to adjust the transfer line depth.

#### Adjusting the Transfer Line Depth:

Open the software and raise the 7650 gripper. (Click “View” > “Diagnostics” > “Position” > “Up”.)

## Technical Notes:

### **7650-L20 Transfer Line Replacement and Depth Check**

---

Remove the top cover and the gripper cover of the 7650. Use one hand to hold the gripper cover (the cover may fall as the last screw is loosened) and the other to loosen the four screws that secure the gripper cover with a small Phillips screwdriver, and remove the gripper cover. Do not remove the screws completely as the cover is slotted

Remove the cover from the top module of the 7650. Loosen the nut securing the gripper transfer line from the fitting or valve inside the top cover and disconnect the transfer line.

Refer to picture one. Loosen the two setscrews securing the transfer line tip.

Make sure the black insulated transfer line is not too hot to the touch, or use a glove for the following. Grab the black insulated transfer line just above where it connects to the loop injection box on top of the 7650, 7650-M, or 7650HS-CTS. Please refer to the photo (Picture 2) below.



Pushing down on this will push more of the 1/16" transfer tubing into the gripper inlet, so push it down as far as it will go. Using the side of the depth calibration tool with a hole in it, push up from the bottom of the gripper until the tube stops. You should see the black insulation move up where it was pushed down on top of the box. That proves that the tubing has been pushed back up to the correct height. Repeat the process if movement wasn't noticed. Tighten the 2 setscrews to secure the transfer line into position.

Replace the covers.

## Technical Notes: 7650-L20 Z-Axis Soft Pot Adjustment

<u>DESCRIPTION:</u> 7650-L20 Z-AXIS SOFT POT ADJUSTMENT		<u>DOC.#:</u> 7650-302- V00- ZAXISSOFTP OTADJUSTME NT-C.DOCX	<u>REV.:</u> 00	<u>APPROVAL:</u>	<u>ORIGINATOR:</u> TIM RAUB
<u>FILE:</u>		<u>ISSUE DATE:</u>		<u>DEPARTMENT:</u> SERVICE	
<u>REV.:</u> 00	<u>DATE:</u> 08FEB2018	<u>INITIALS:</u> TTR	<u>DESCRIPTION:</u> Document created.		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		

### Introduction:

On the 7650 the Z-axis softpot is used to monitor the gripper position. When the gripper is in up position the softpot will read about 995-1000. At its lowest position it will read zero. On a 1.4 liter can in the tray it will read about 245.

If the softpot does not read correctly the softpot adjustment screw should be adjusted. Symptoms indicating the screw may need adjustment would be a Z-axis softpot value that does not change, a softpot value that changes but then increases, or a message that the arm could not reach the down position.

### Procedure:

The newer 7650 softpot adjustment screw is secured in place by a setscrew (older systems may not have the setscrew although a 440 X 3/8" one could be added). Refer to three pictures below to locate the setscrew. And verify the setscrew is present.

If present open the 7200 software and raise the 7200 gripper ("View" > "Instrument" > "Position" > "Up"). Power off the 7650. The gripper must be raised for a 0.050" hex key to reach the setscrew. Manually move the 7650 arm into a good position to access the setscrew. Use caution while using a stepladder or stepstool to access the top of the instrument to prevent falls. Loosen the setscrew.

Once the setscrew is loose or if it was not present use a regular screwdriver (older systems) or a hex key (newer systems) to screw in the softpot adjustment screw until a little resistance is felt. Then back off the screw one full turn. Turn on the 7200 and open the software. Home the 7650. Then move the gripper up and down to verify the softpot is reading correctly.

Once the 7650 is reading correctly tighten the setscrew back in place.

## Technical Notes: 7650-L20 Z-Axis Soft Pot Adjustment

---

Figure 1 General Location of the Softpot Adjustment Screw

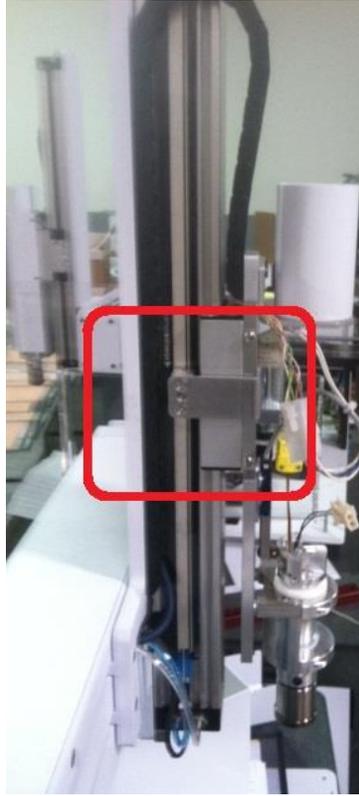
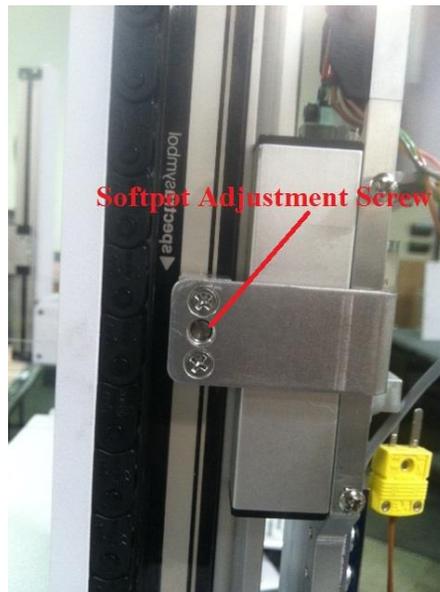


Figure 2 The Softpot Adjustment Screw



## Technical Notes: 7650-L20 Z-Axis Soft Pot Adjustment

---

Figure 3. The setscrew for the softpot adjustment screw.



## Technical Notes:

### Changing the O-Rings in the MQT Bulkheads on the 7650

<b><u>DESCRIPTION:</u></b> HOW TO REPLACE THE O-RINGS IN THE MQT BULKHEADS OF THE 7650		<b><u>DOC.#:</u></b> 7650-301-V00-CHANGING MQTo-RINGS-C.DOCX	<b><u>REV.:</u></b> 00	<b><u>APPROVAL:</u></b>	<b><u>ORIGINATOR:</u></b> TIM RAUB
<b><u>FILE:</u></b>		<b><u>ISSUE DATE:</u></b>		<b><u>DEPARTMENT:</u></b> SERVICE	
<b><u>REV.:</u></b> 00	<b><u>DATE:</u></b> 22SEP2016	<b><u>INITIALS:</u></b> TTR	<b><u>DESCRIPTION:</u></b> Document renamed 7650-301-V00-Changing MQTo-Rings-C.docx. Minor edits.		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		

### Introduction:

Replacement of the O-rings in the MQT bulkheads in the C and D fixed position racks is done as needed. Heavy users may find it beneficial to replace O-rings in the F1 and Helium fittings about once a month and the sample position O-rings once every 3-6 months. This procedure may also be used to replace O-ring on sample containers.

### Parts and Tools Needed:

01-39-26020          Dash 003 Viton O-rings, 100 pack

Ice Pick or bent paper clip for removing the old o-ring

6 mm Hex Nut Driver

Assorted Open End Wrenches (7/16", 9/16", ...)

Optional Supplies:

01-16-09960S          MQT spring                  For inside of MQT valve.

01-30-22020S          MQT plunger                For inside of MQT valve.

01-30-22010          Micro QT Valve Cap    The top piece on the MQT valve. The O-ring, spring, and plunger are held in place by the cap. Do not confuse with part number 01-30-22060 MQT CAP Assembly. The cap assembly is for shipping cans to the field. It goes over the end of the MQT valve to protect it.

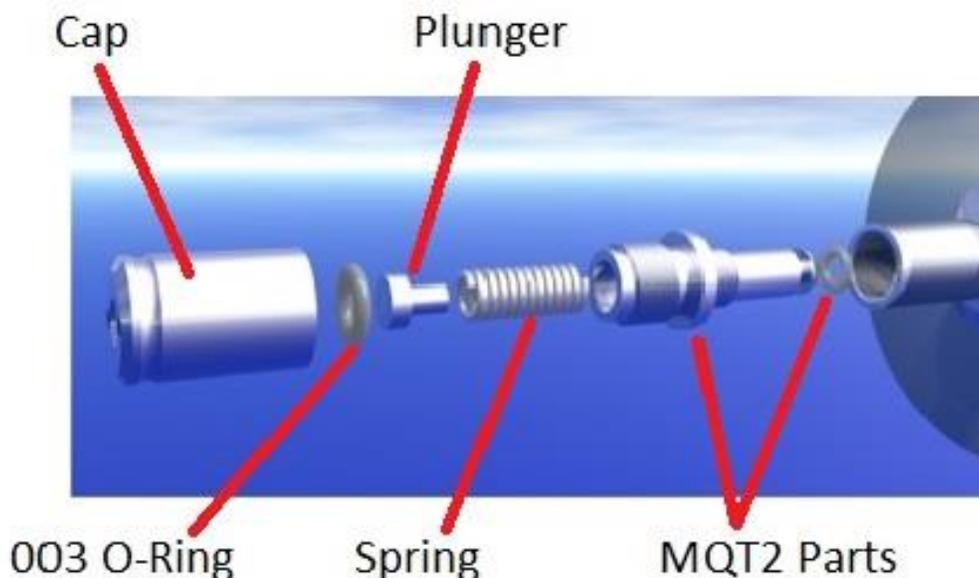
## Technical Notes:

### Changing the O-Rings in the MQT Bulkheads on the 7650

---

Small headspace jar. This can be used to vacuum clean the O-rings before use and to store them under nitrogen.

Figure 1 showing the parts in a Male MQT valve.



### Procedure:

Remove the bulkhead from its rack and disconnect any samples attached to its line.

Use the 6 mm Hex nut driver to remove the MQT valve cap. It is best to put your fingernail into the indent on the MQT cap to prevent the hex nut driver from going too far onto the MQT cap. This could make it more difficult to remove the MQT cap from the hex nut driver. Be careful not to cross-thread the cap while removing it. Typically, the hex nut driver will twist to one side while removing the cap. Do not force the hex nut driver straight as this will cross-thread the MQT valve and the entire valve will need to be replaced. Simply make a wide arc with the hex nut driver while unscrewing the cap. Once the cap is loose carefully lift it off the valve while making sure the MQT valve plunger and spring do not become lost and then remove the MQT cap from the hex nut driver.

Tap out the O-ring. If necessary, use an ice pick or a bent paper clip to carefully remove it.

Put a new O-ring either on top of the plunger or in the cap depending which works better for you. Use your fingers to screw the cap onto the MQT valve. Do the final tightening with the Hex nut drive.

Inspect the end of the MQT valve to ensure it looks OK. The O-ring should not be over the top of the center of the plunger and you should see the O-ring all the way around the sides of the plunger.

Leak check the fitting when done.

## Technical Notes: 7650 Gripper Replacement Procedure

<b><u>DESCRIPTION:</u></b> HOW TO REPLACE A 7650 OR OS+ GRIPPER		<b><u>DOC.#:</u></b> 7650-303-V00-GRIPPERCHANGE-C.DOCX	<b><u>REV.:</u></b> 00	<b><u>APPROVAL:</u></b>	<b><u>ORIGINATOR:</u></b> TIM RAUB
<b><u>FILE:</u></b>		<b><u>ISSUE DATE:</u></b>		<b><u>DEPARTMENT:</u></b> SERVICE	
<b><u>REV.:</u></b> 00	<b><u>DATE:</u></b> 17SEP2016	<b><u>INITIALS:</u></b> PD/TTR	<b><u>DESCRIPTION:</u></b> Document renamed 7650-303-V00-GripperChange-C.docx. Minor edits.		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		

### Introduction:

This procedure is for the 7650, 7650 Loop System, 7650M, 7650HS, Omni Sampler, and Omnisampler Plus.

### Tools and Parts Needed:

Small Phillips Screwdriver

3/32" Allen Wrench

9/64" Allen Wrench

0.050" Allen Wrench

1/4" Wrench

01-19-7650-301 7650/OS+ Transfer Line Calib Tool

Black Sharpie (marker or tracer)

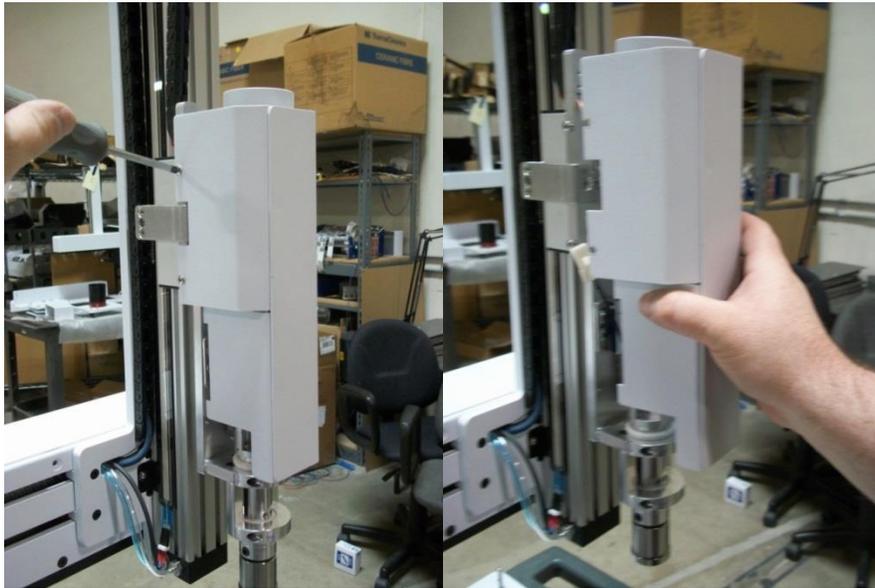
01-20-7650-300 7650/OS+ Gripper Assy

### Procedure:

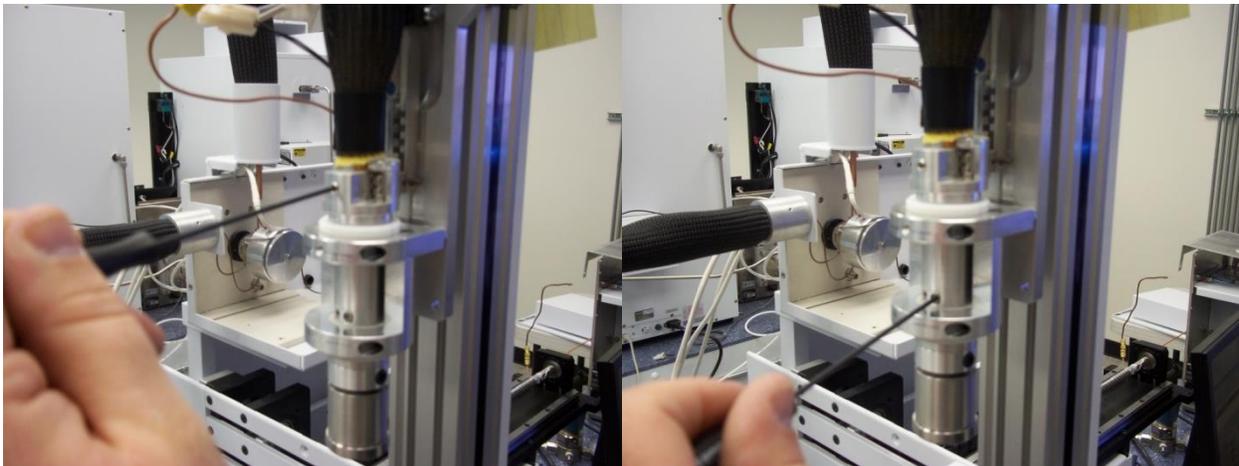
**Step One:** Use one hand to hold the gripper cover (the cover may fall when the last screw is loosened) and the other to loosen the four screws that secure the gripper cover with a small Phillips screwdriver, and remove the gripper cover. Do not remove the screws completely as the cover is slotted

## Technical Notes: 7650 Gripper Replacement Procedure

---



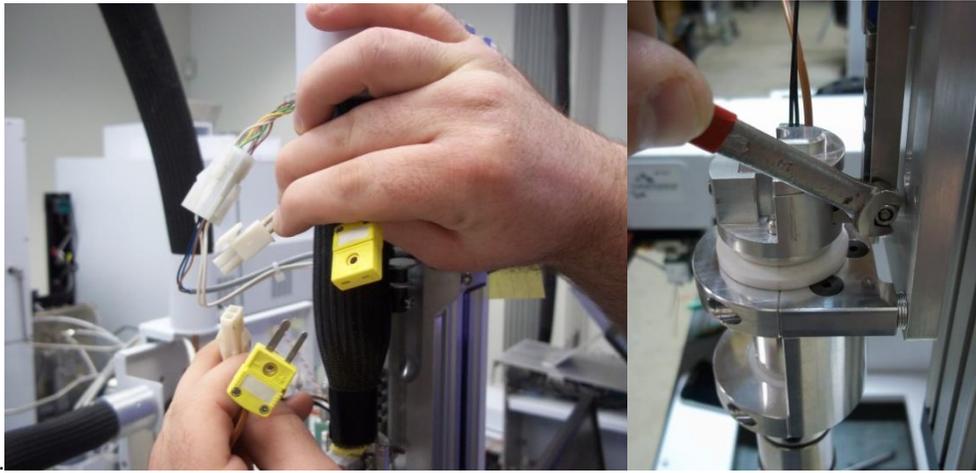
**Step Two:** Loosen the set screw clamping down the copper end of the transfer line heater using a 3/32" Allen wrench and then loosen the two screws that hold down the transfer line tubing inside the gripper as shown. Do not remove the screws completely.



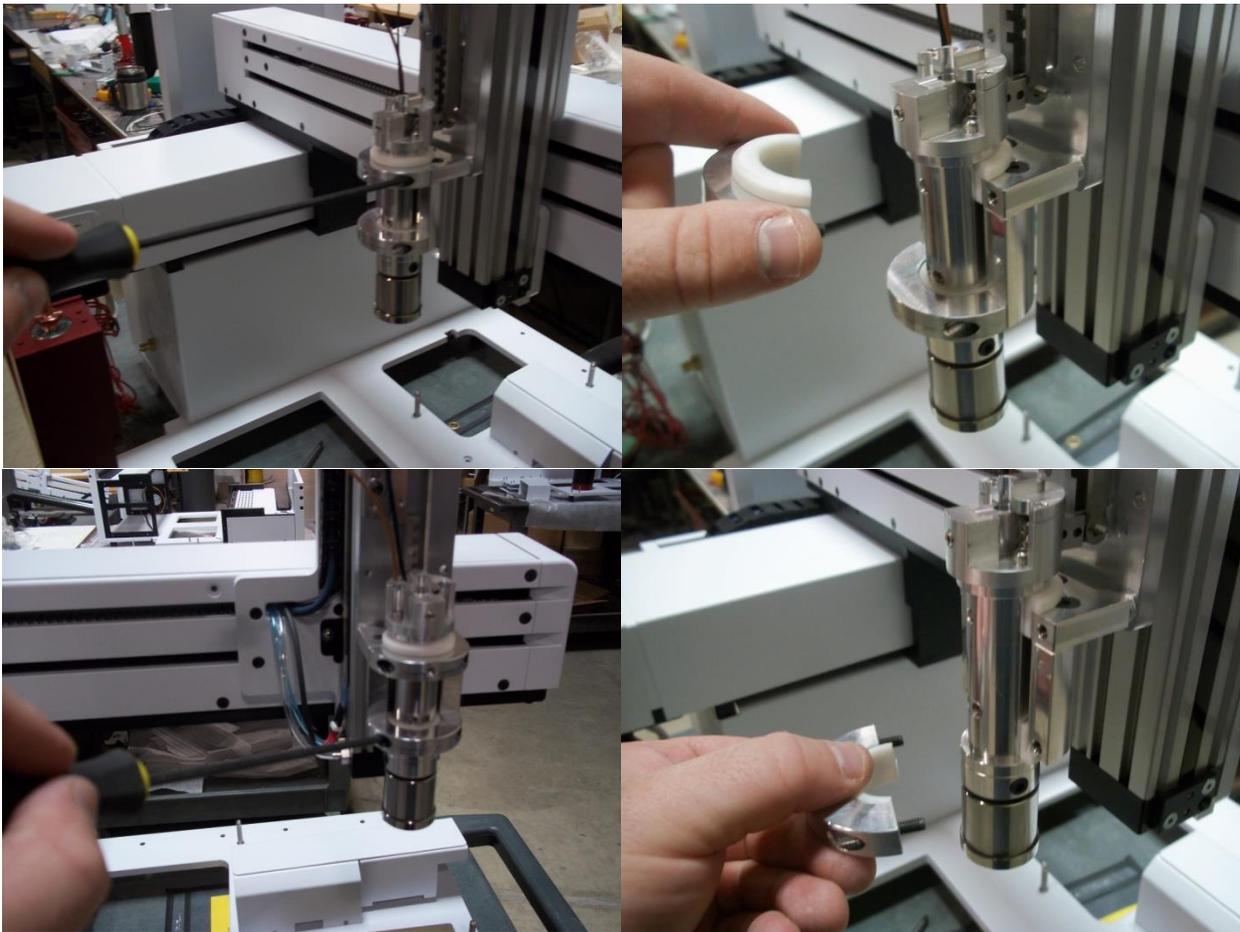
**Step Three:** Unplug the yellow thermocouple connection and the two position connector to the gripper heater. (Note that these only go back together one way. Be sure to note how they connect together.) Use a 1/4" wrench to remove the lock nut attaching the gripper actuator bar to the gripper.

## Technical Notes: 7650 Gripper Replacement Procedure

---



**Step Four:** Remove the four socket cap screws using a 9/64" Allen wrench, and remove the "C" shaped clamp and outer white Teflon half rings.

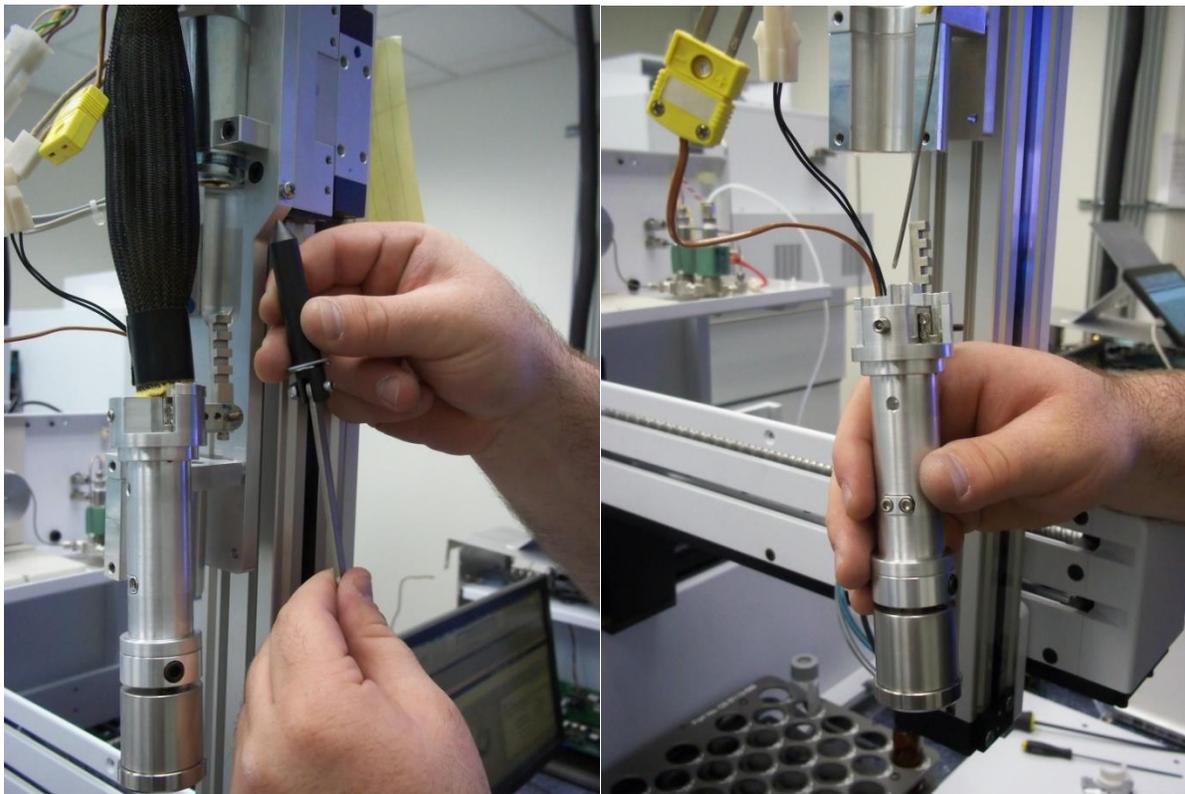


**Step Five:** Remove the gripper actuator bar with the attached section of the gripper solenoid and set aside. The white plastic washer sits on top of the snap ring and can be easily lost. Then remove the

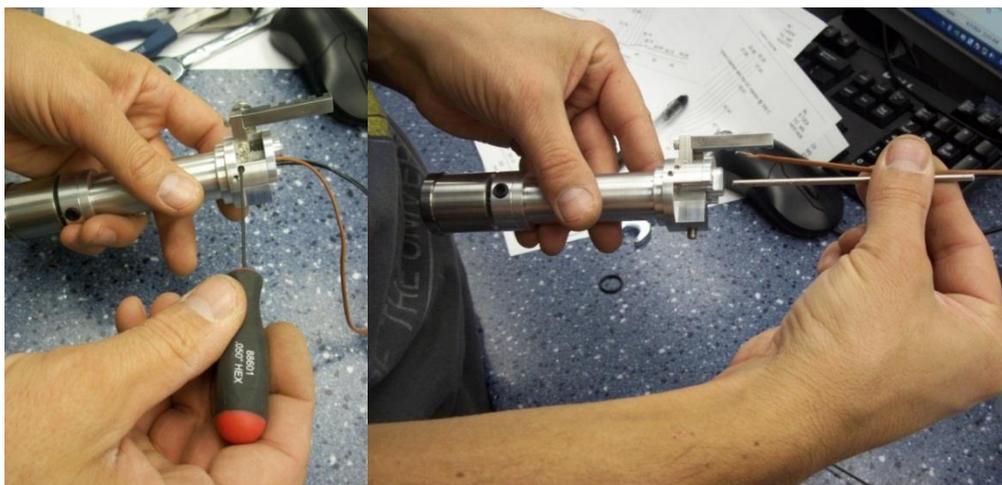
## Technical Notes: 7650 Gripper Replacement Procedure

---

transfer line heater and tubing from the gripper by pulling the gripper down gently. The rear Teflon half rings will be loose at this point, so be careful not to lose them.



**Step Six:** Note the depth of the heater rod in the old gripper and make a mark on the thermocouple lead with the sharpie in the old gripper to ease their positioning in the new gripper. Remove the gripper heater rod (this can be difficult) and thermocouple from the gripper by loosening the two 0.050" set screws on the side of the gripper, and insert them into the holes on the new gripper. Tighten the set screws on the new gripper. Gently pull on the thermocouple and heater lead to verify they are secure.

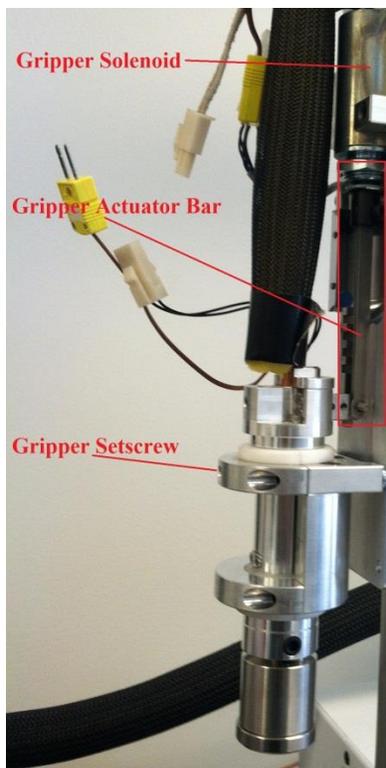


## Technical Notes: 7650 Gripper Replacement Procedure

---

Gripper reinstallation is the reverse of removal. But some additional steps will need to be taken to reinstall the transfer line to the 7200.

First when replacing the C clamps from Step 4, be sure to position the slotted sensor bar with 1 mm clearance. It is also important to make sure the gripper actuator bar is aligned perfectly with the bar it connects to on the gripper (the gripper bar). When reconnecting the gripper actuator bar to the gripper bar the gripper actuator bar (push up the bar not the rings on the gripper) may need to be pushed up slightly before securing it. Tighten the C clamps. Make sure the gripper setscrew is secure. If the gripper setscrew is not secure the gripper may rotate slightly during use. If this happens the gripper may not be able to grip cans when moving them to and from the oven. Then test the clearance of the coupling (sensor bar that looks a little like a comb) by inserting the transfer line depth tool into the gripper and push up the sample detect switch using the transfer line depth tool. The coupling may move closer to the sensor when it is in the up position. If there is not enough clearance in the down position the coupling may bind in the up position.

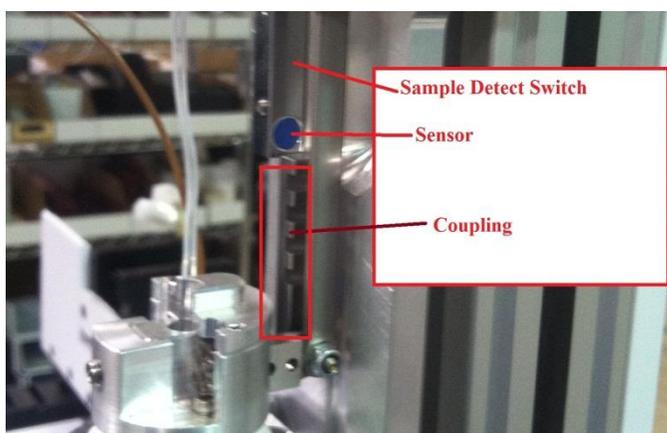


Next, disconnect the other end of transfer line from the valve, junction, or tee (depending on the exact configuration of the 7650, 7650M, 7650-L10, OS, or OS+). Push the transfer line through the bottom of the gripper so it extends more than 1/4" into the top of the gripper. Use the transfer line depth tool to set the depth. (Push the end of the tool in but not so hard as to push the gripper up. If the gripper is pushed up while setting the depth start over. Push the transfer line back into the gripper. Then use the tool to set the depth again without pushing up quite so hard.) Then tighten the setscrews to secure the transfer line (again hold the depth tool securely in the gripper during this step) in place.

## Technical Notes: 7650 Gripper Replacement Procedure

---

Sample Detect Sensor adjustment. (Refer to the picture below) Once the gripper and transfer line are in place verify the sample detect switch is positioned correctly. Watch the sample detect switch while inserting the transfer line depth tool into the gripper. Note the position of the tool relative to the sample detect switch arm in the gripper when the tool activates the sensor. If the sensor activates when the tool is barely touching it loosen the screws on the switch and position the sensor slightly upward before securing it in place. If the sensor activates a little after the tool touches the arm the sensor is positioned correctly. If the sensor activates more than a millimeter after first contact you must loosen the sensor screws and position the switch slightly downward. If the sensor needs to be adjusted verify it was repositioned correctly and make further adjustments as needed.



Once the gripper is in place leak check a plugged position to verify the transfer line is correctly and securely in position. Then do a couple test runs to verify everything is working properly.

## Technical Notes: Adjusting the 7650 Up Detect Switch

<u>DESCRIPTION</u> HOW TO ADJUST THE 7650 UP DETECT SWITCH		<u>DOC.#:</u> 7650-306-V00-ADJUSTUPD EETECT-C.DOCX	<u>REV.:</u> 00	<u>APPROVAL:</u>	<u>ORIGINATOR:</u> TIM RAUB
<u>FILE:</u>		<u>ISSUE DATE:</u>	<u>DEPARTMENT:</u> SERVICE		
<u>REV.:</u> 00	<u>DATE:</u> 17SEP2016	<u>INITIALS:</u> TTR	<u>DESCRIPTION:</u> Document renamed 7650-306-V00-AdjustUpDeetect-C.docx. Minor edits.		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		

### Introduction:

This is normally only adjusted if changing the sensor or if the sensor is not detecting at all.

Before adjusting the up detect sensor check its cable seating. This cable connects under the y-axis cover.

### Needed:

2 People (one will hold the 7650 Z Axis while the other makes the adjustment.)

Hex Keys.

Regular Screwdriver

Ruler

### Procedure:

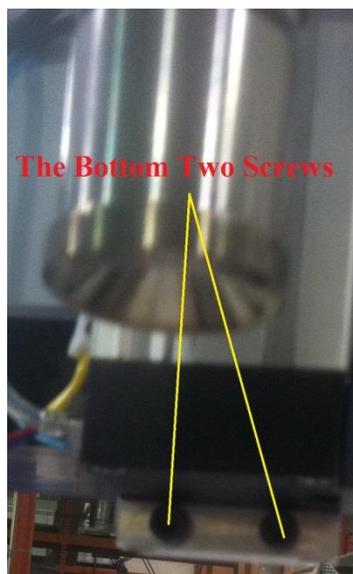
Have one person remove the top two and bottom two screws that secure the 7650 Z-axis while the other person holds the 7650 Z-axis. The Z-axis will detach from the 7650, except for the track and Softpot.

## Technical Notes: Adjusting the 7650 Up Detect Switch

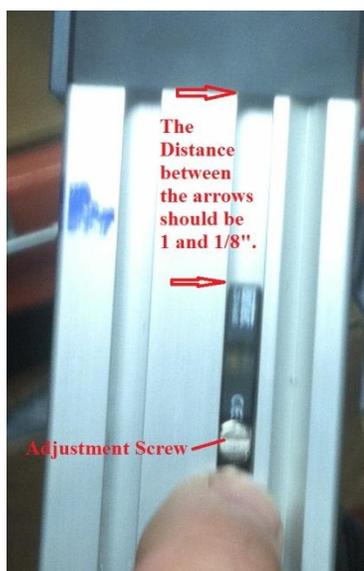
---

Picture 1. Top Screws.

Picture 2. Bottom Screws.



See picture 3 for the adjustment. There should be 1 and 1/8 inches from the top of the sensor channel to the top of the sensor.



While making the adjustment have the 7650 powered on but with the software closed so the up sensor light will turn on if it is activated.

## Technical Notes: 7650 Softpot Replacement

<u>DESCRIPTION:</u> 7650 SOFTPOT REPLACEMENT		<u>DOC.#:</u> 7650-307-V00-SOFTPOTREPLACEMENT-C.DOCX	<u>REV.:</u> 00	<u>APPROVAL:</u>	<u>ORIGINATOR:</u> TIM RAUB
<u>FILE:</u>		<u>ISSUE DATE:</u>		<u>DEPARTMENT:</u> SERVICE	
<u>REV.:</u> 00	<u>DATE:</u> 23SEP2016	<u>INITIALS:</u> TTR	<u>DESCRIPTION:</u> Document renamed. Pictures added and minor edits.		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		
<u>REV.:</u>	<u>DATE:</u>	<u>INITIALS:</u>	<u>DESCRIPTION:</u>		

### Parts Needed:

01-19-7600-970 Z Axis Softpot Bracket.

01-25-7600-000 400 mm L Softpot Sensor

Misc See Pat Downey. (Pat will verify it is assembled correctly and appropriate for your version of the 7650.)

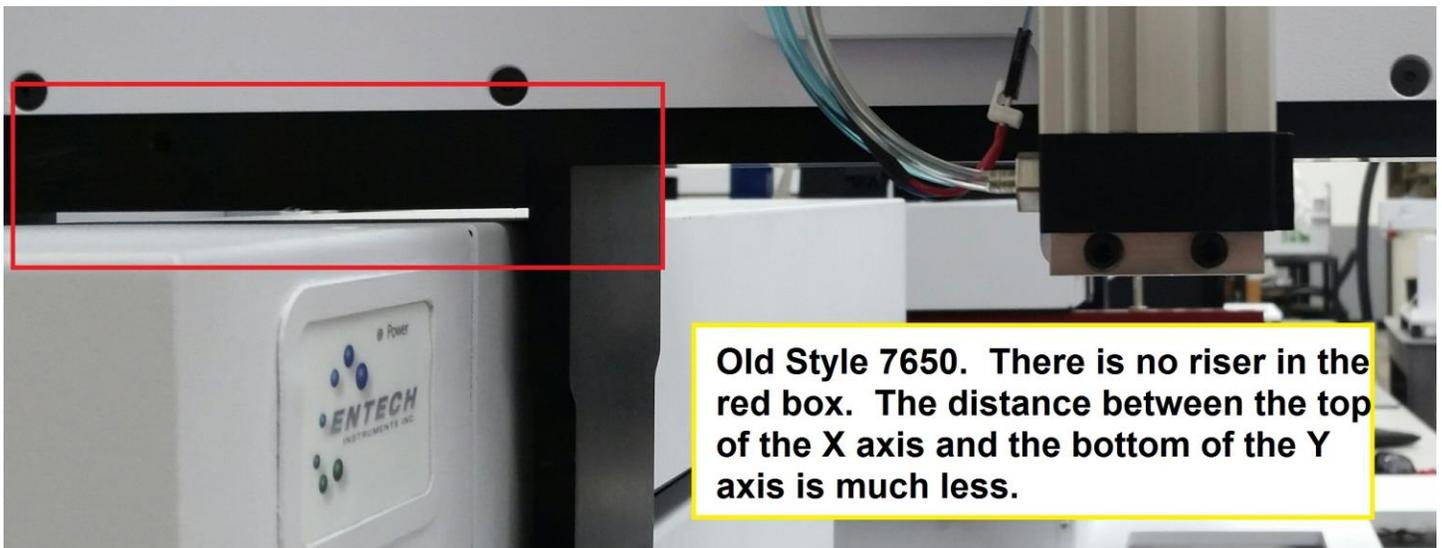
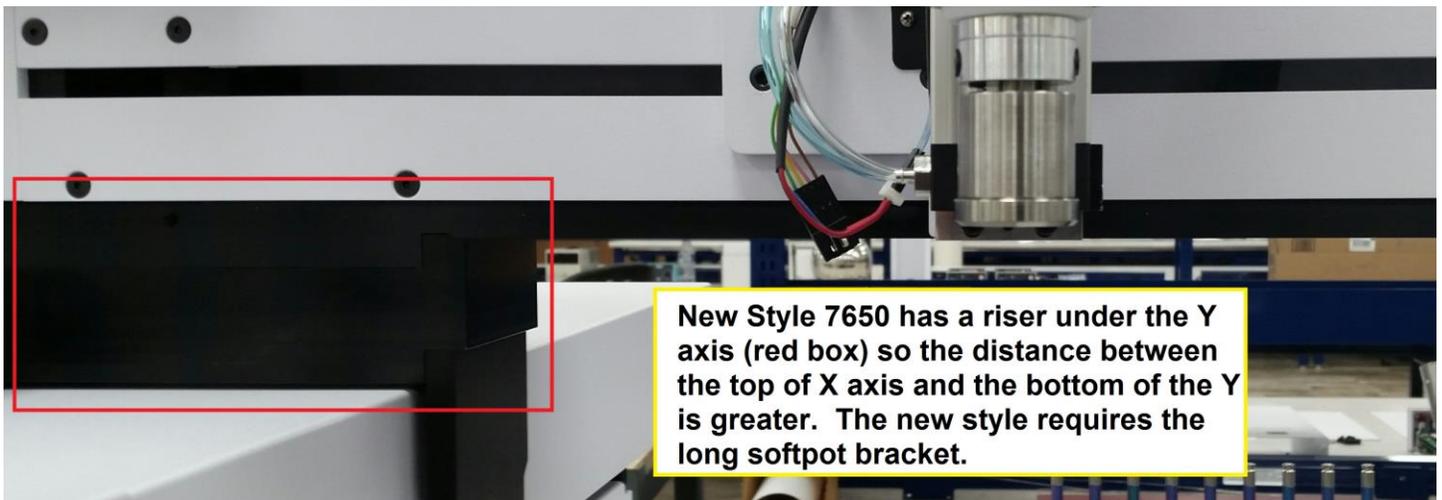
Note: When ordering request that these parts are assembled together at the Entech. Please include the length of the metal Softpot Bracket. The 19" one is the older style and the 20" one is the new styles. They are not interchangeable. In the future there may be separate part numbers for each one. You may be asked to email pictures in (refer to the pictures below for the view needed).

Refer to the four pictures below. Have the user take a picture of the bottom of the Z axis (in red boxes in the pictures) and send it to you. The difference is easy to see in the pictures.



## Technical Notes: 7650 Softpot Replacement

---



### Tools Needed:

Phillips Head Screwdriver

3 mm Hex Key

### Procedure:

Disconnect the softpot from the connection at the bottom. See picture 1.

Picture 1

## Technical Notes: 7650 Softpot Replacement

---



Remove the screw Circled in picture 2. (Note that only the screw hole is pictured.)

Picture 2

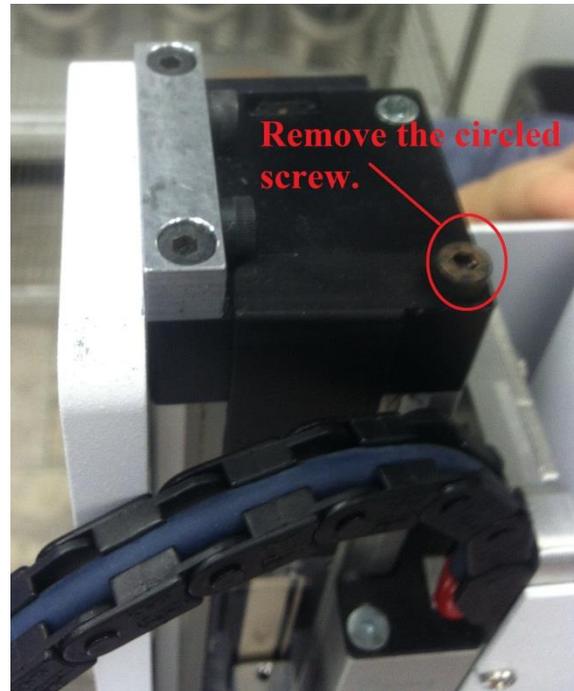


Remove the screw circled in picture 3. (Only that one screw.)

## Technical Notes: 7650 Softpot Replacement

---

Picture 3.



Lift the softpot up and out from the top. It may be necessary to loosen the softpot adjustment screw to remove the softpot. Note that on the first few 7650 systems the softpot was secured to the chassis with double sided tape. In later units this tape was not used. If the tape is present pull the softpot away from the chassis to remove the softpot. Also, in these earlier systems the two screws at the bottom of the chain may need to be removed so the screw tab will clear the wires at the bottom of the arm.

Reverse the procedure to install the new softpot. Note that it is possible to connect the connection at the bottom backwards. If that occurs the z value in the up position will be approximately 0 when it should be about 1000. If this happens reverse the connector.

Screws: One is a Phillips head screw 4-40 thread X 1/4" long and the other is a metric 10mm socket cap that requires a 3 mm Allen wrench.

## Technical Notes: 7650 Gripper Solenoid Change

<b><u>DESCRIPTION:</u></b> HOW TO REPLACE THE GRIPPER SOLENOID ON THE 7650 GRIPPER		<b><u>DOC.#:</u></b> 7650-304-V00-GRIPPERSOLENOIDCHANGE-C.DOCX	<b><u>REV.:</u></b> 00	<b><u>APPROVAL:</u></b>	<b><u>ORIGINATOR:</u></b> TIM RAUB
<b><u>FILE:</u></b>		<b><u>ISSUE DATE:</u></b>		<b><u>DEPARTMENT:</u></b> SERVICE	
<b><u>REV.:</u></b> 00	<b><u>DATE:</u></b> 17SEP2016	<b><u>INITIALS:</u></b> PD/TTR	<b><u>DESCRIPTION:</u></b> Document created. 7650-304-V00-GripperSolenoidChange-C.docx. Minor edits.		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		

### Tools/Parts Needed:

01-50-10007          Extraction Tool; Mini-Fit Jr. Mini-fit Pin Remover

01-01-75140          24 V Solenoid (7500) (When placing the order let customer care know that this is for a 7650 and that they are to see Pat Downey.)

### Test for a bad gripper solenoid:

Unplug the electrical connector for the 7650 Gripper Solenoid. Measure the resistance between the two leads to the gripper solenoid. The resistance should measure 15-18 ohms. If it is less than that the gripper solenoid is bad.

The gripper solenoid may also be bad if it does not move as it should.

### Replacement Procedure:

Remove the cover from the Z axis.

Remove the two wires to the gripper solenoid from the 6 position connector using the mini-fit pin removal tool.

Remove the two clamp pieces that hold the gripper solenoid down. You can reuse the ferrite piece that goes in the middle of the gripper solenoid so there is no reason to remove it completely. Do not lose the white plastic washer.

Slide the new gripper solenoid in place and clamp it down with enough of a gap to allow the gripper to actuate fully. Due to a little slop in the linkage push up on the solenoid ferrite, with the solenoid installed loosely until the gripper actuates fully. Then tighten gripper solenoid down. Push the gripper solenoid wires into the electrical connector. The wires should mate with the yellow and brown wires. There is no polarity to the solenoid so it does not matter which solenoid wire goes to yellow or brown.

## Technical Notes: 7650 Gripper Solenoid Change

---

Test the gripper with the software.

Put the Z-Axis cover back on.

## Technical Notes: 7650 Sample Detect Switch Adjustment Procedure

<b><u>DESCRIPTION:</u></b> HOW TO ADJUST THE 7650 SAMPLE DETECT SWITCH		<b><u>DOC.#:</u></b> 7650-311-V00-SAMPLEDETECTADJUSTMENT-C.DOCX	<b><u>REV.:</u></b> 00	<b><u>APPROVAL:</u></b>	<b><u>ORIGINATOR:</u></b> TIM RAUB/PAT DOWNEY
<b><u>FILE:</u></b>		<b><u>ISSUE DATE:</u></b>		<b><u>DEPARTMENT:</u></b> SERVICE	
<b><u>REV.:</u></b> 00	<b><u>DATE:</u></b> 24SEP2016	<b><u>INITIALS:</u></b> PD/TTR	<b><u>DESCRIPTION:</u></b> Document created.		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		
<b><u>REV.:</u></b>	<b><u>DATE:</u></b>	<b><u>INITIALS:</u></b>	<b><u>DESCRIPTION:</u></b>		

### Introduction:

This procedure is for the 7650, 7650 Loop System, 7650M, Omni Sampler, and Omnisampler Plus.

This procedure is typically only used when replacing the gripper or if the sample detect switch is not activating when the gripper is in the down position. If the sample detect is not activating, there will usually be a message to the effect of "Error 1006. Attempted to lower gripper. Lower gripper timed out. Aborting." Make sure the arm is lowering all the way and has adequate nitrogen pressure before beginning this procedure.

### Tools and Parts Needed:

Small Phillips Screwdriver

3/32" Allen Wrench

9/64" Allen Wrench

0.050" Allen Wrench

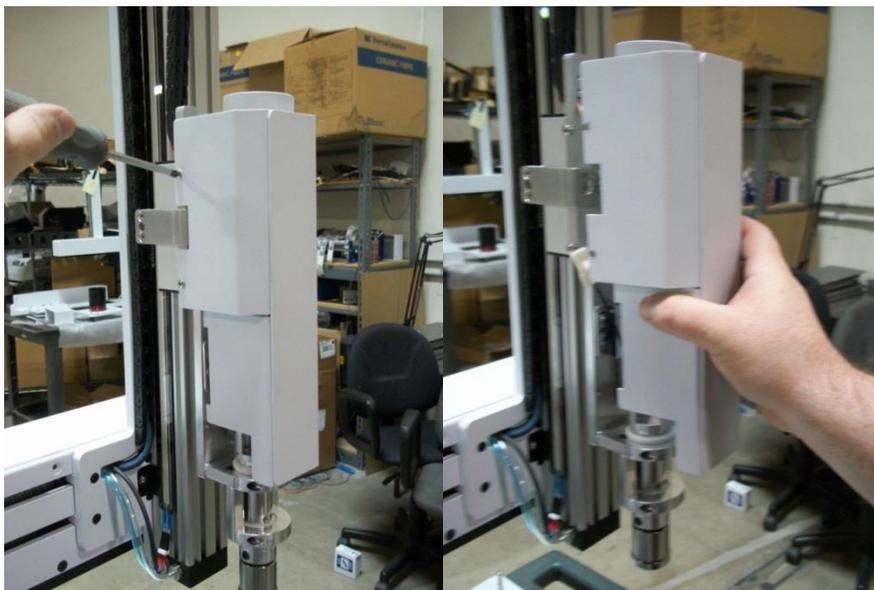
01-19-7650-301 7650/OS+ Transfer Line Calib Tool

### Procedure:

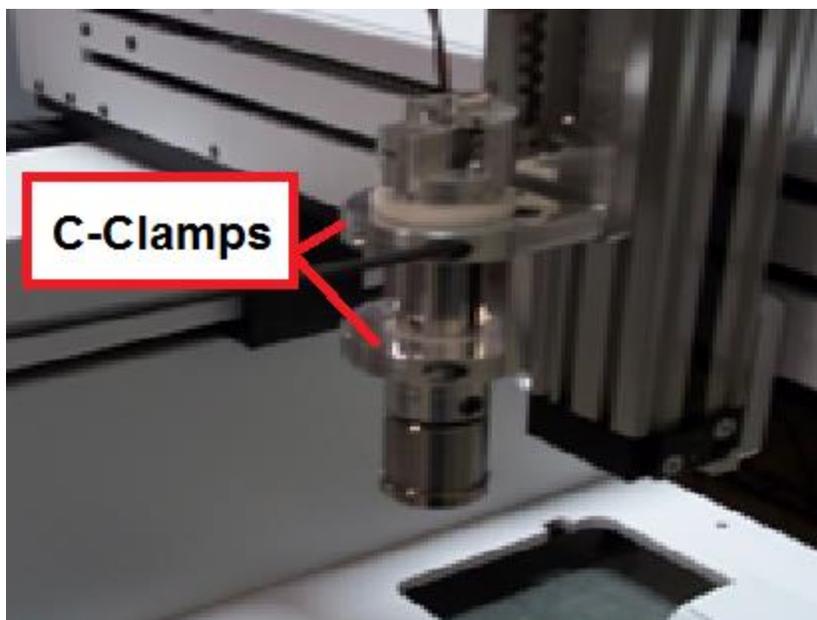
Use one hand to hold the gripper cover (the cover may fall when the last screw is loosened) and the other to loosen the four screws that secure the gripper cover with a small Phillips screwdriver, and remove the gripper cover. Do not remove the screws completely as the cover is slotted

## Technical Notes: 7650 Sample Detect Switch Adjustment Procedure

---



Tip: The gripper is held in place by two C-shaped clamps. In older units the top one has a setscrew. Switching these so the set screw is in the bottom position will allow the setscrew to make contact with metal and be more secure.



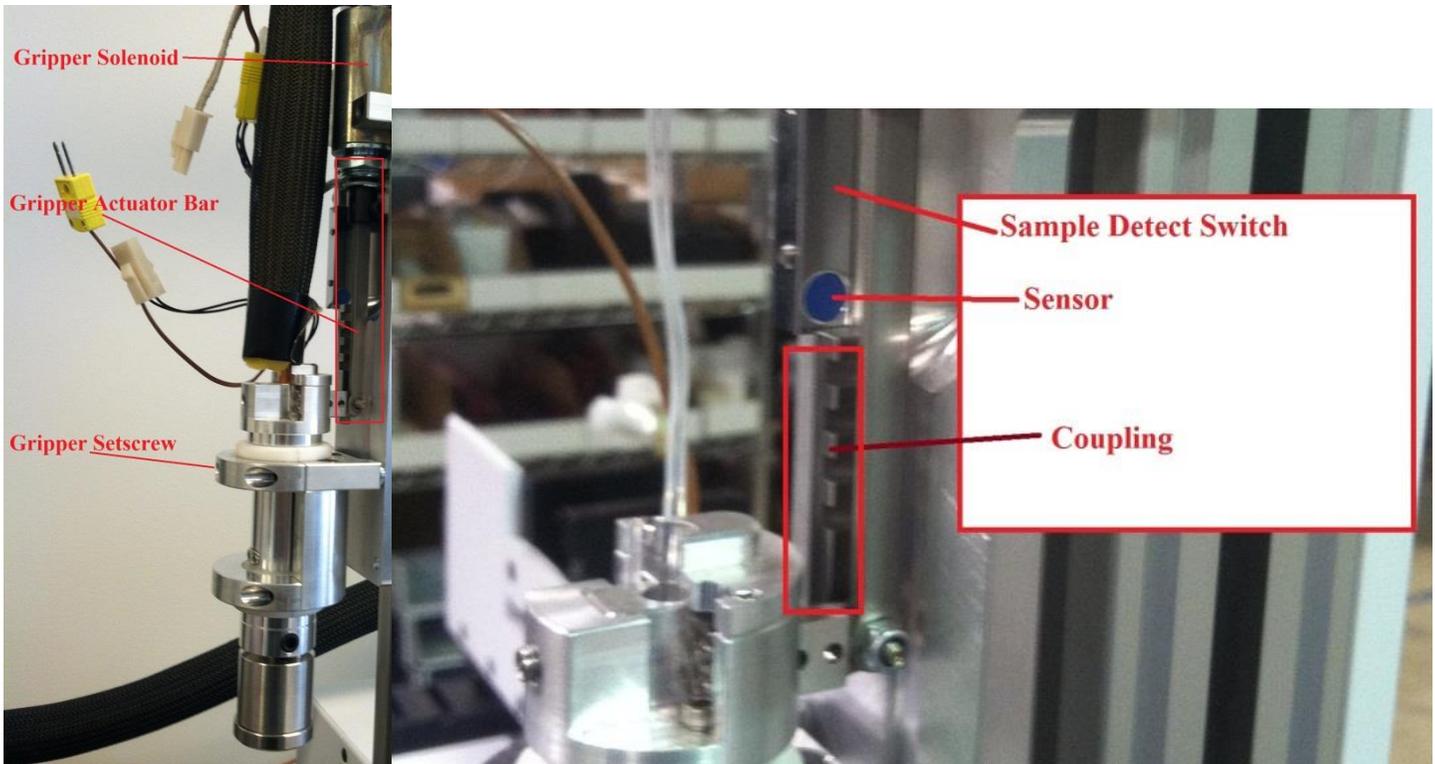
Loosen the setscrew on the C clamp. You should be able to turn the gripper if you turn it firmly.

Position the slotted sensor bar with 1 mm clearance between it and the sensor (refer to the picture below). It is also important to make sure the gripper actuator bar is aligned perfectly with the bar it connects to on the gripper (the gripper bar). Tighten the C clamps. Make sure the gripper setscrew is secure. If the gripper setscrew is not secure the gripper may rotate slightly during use. If this happens the gripper may not be able to grip cans when moving them to and from the oven. (An

## Technical Notes: 7650 Sample Detect Switch Adjustment Procedure

---

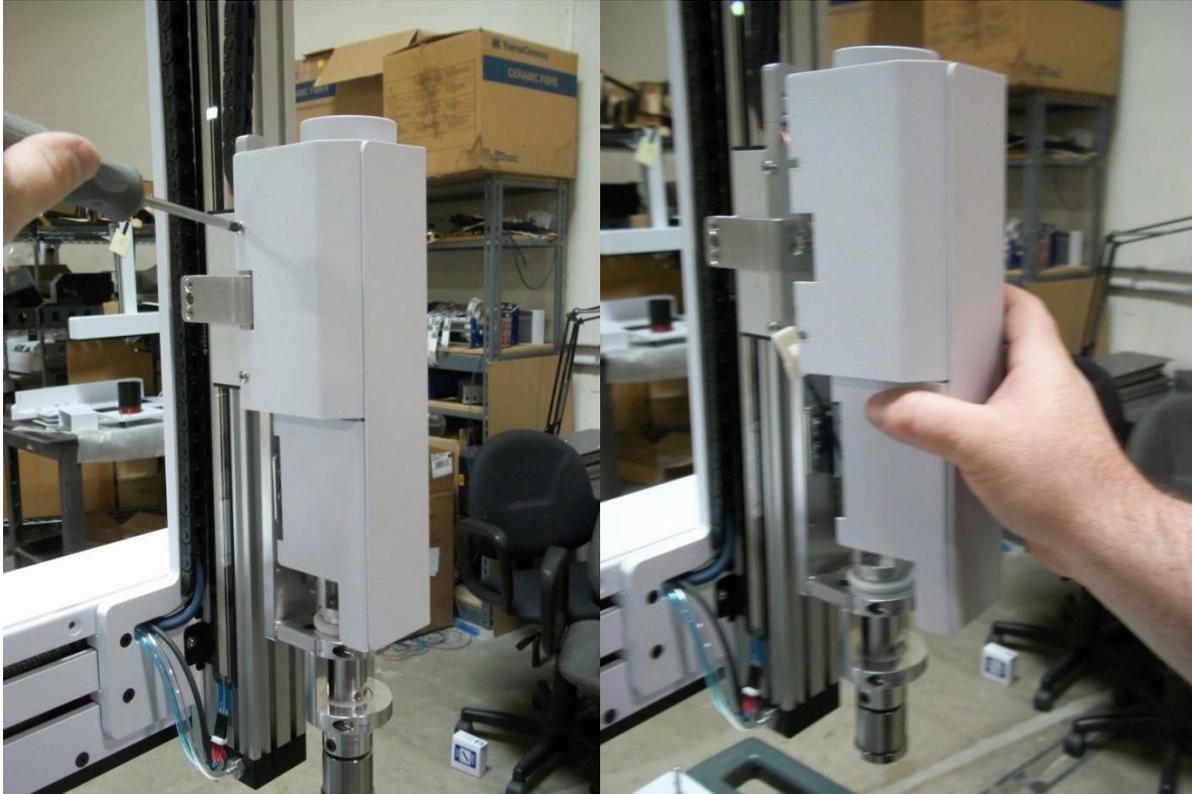
optional oven is supported with the 7650HS and OS Plus). Then test the clearance of the coupling (sensor bar that looks a little like a comb) by inserting the transfer line depth tool into the gripper and push up the sample detect switch using the transfer line depth tool. The coupling may move closer to the sensor when it is in the up position. If there is not enough clearance in the down position the coupling may bind in the up position. Readjust if necessary.



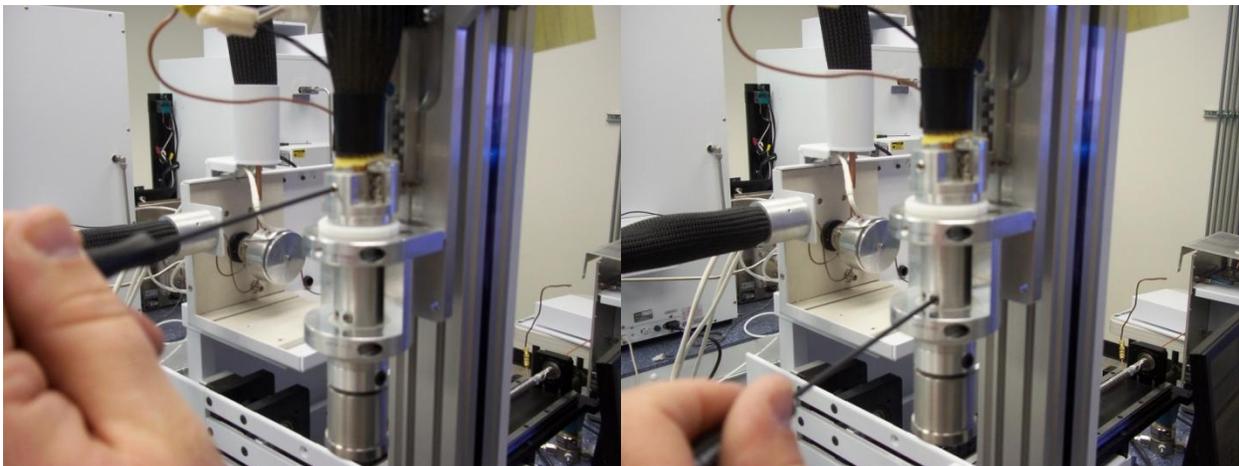
Check the sensitivity of the sensor. Watch the sample detect switch while inserting the transfer line calibration tool (a male MQT fitting can be used instead) into the gripper. Note the position of the tool relative to the sample detect switch arm on the gripper when the tool activates the sensor. If the sensor activates when the tool is barely touching the sample detect switch arm, loosen the screws on the switch and position the sensor slightly upward before securing it in place. If the sensor activates a little after the tool touches the arm the sensor is positioned correctly. If the sensor activates more than a millimeter after first contact, you must loosen the sensor screws and position the switch slightly downward. If the sensor needs to be adjusted verify it was repositioned correctly and make further adjustments as needed.

## Procedure to replace 7650/OS/OS+ Gripper Assembly

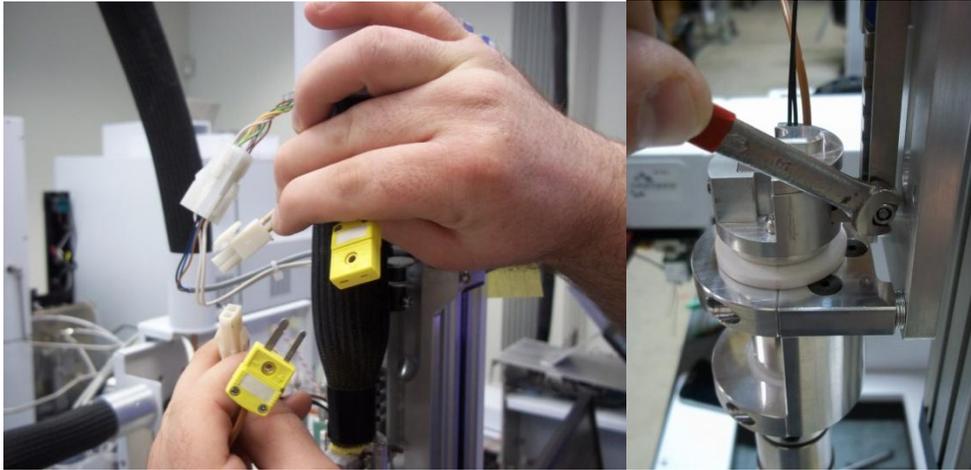
**Step One:** Loosen the four screws hold on the gripper cover with a phillips screwdriver, and remove the gripper cover. You don't need to remove the screws completely, the cover is slotted.



**Step Two:** Loosen the set screw clamping down the copper end of the transfer line heater using a 5/32" allen wrench and then loosen the two screws that hold down the transfer line tubing inside the gripper as shown. You don't need to remove them completely.



**Step Three:** Unplug the yellow thermocouple connection and the two position connector to the gripper heater. Then, using a  $\frac{1}{4}$ " wrench remove the lock nut attaching the gripper actuator bar the gripper.

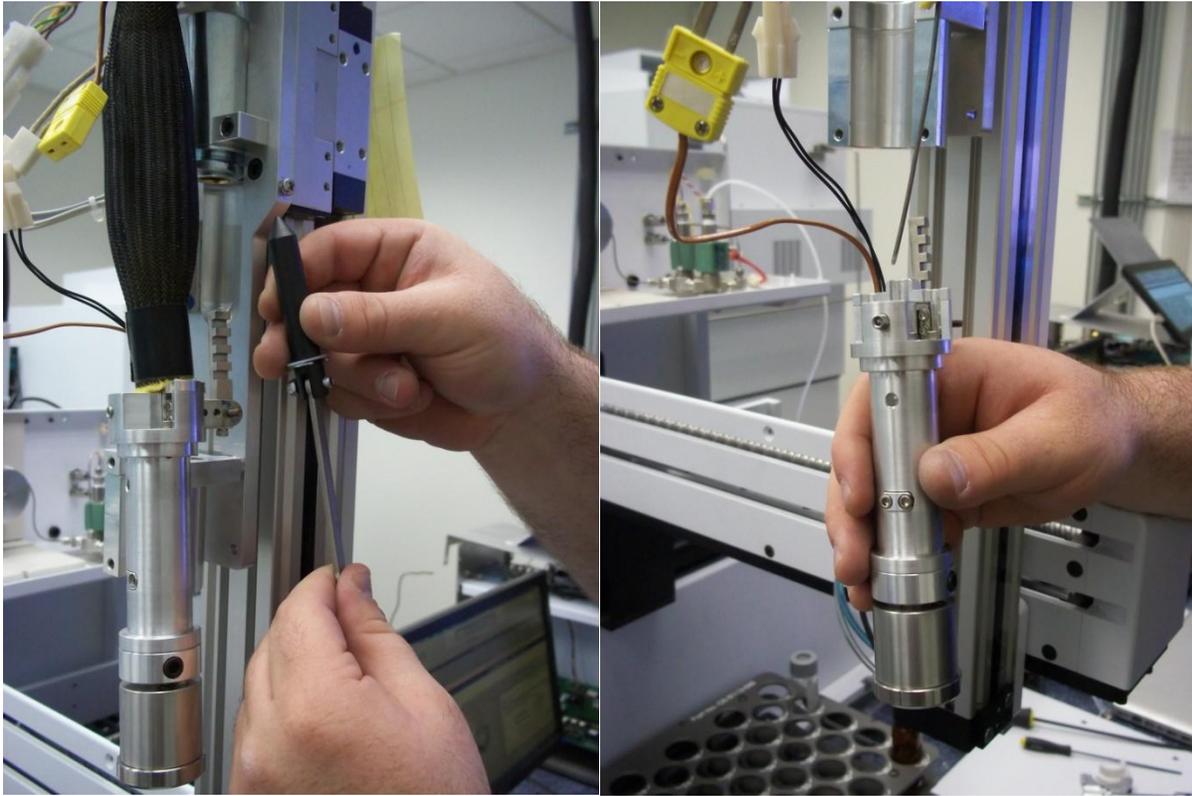


**Step Four:** Remove the four socket cap screws using a  $\frac{9}{64}$ " allen wrench, and remove the "C" shaped clamp and outer white Teflon half rings.

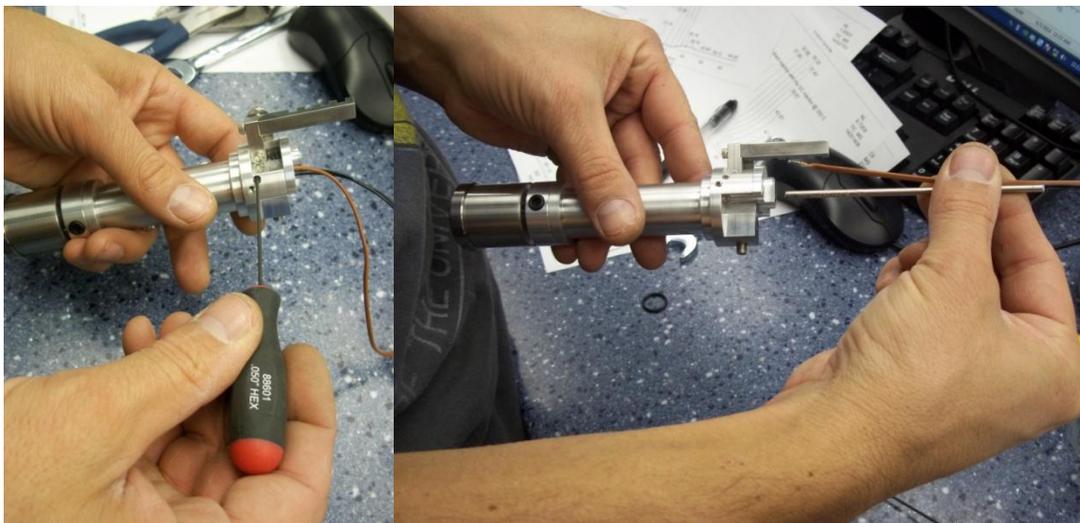


**Step Five:** Remove the gripper actuator bar with the attached section of the gripper solenoid and set aside. The white plastic washer sits on top of the snap ring and can be easily lost. Then remove the

transfer line heater and tubing from the gripper by pulling the gripper down gently. The rear Teflon half rings will be loose at this point, so be careful not to lose them.



**Step Six:** Remove the gripper heater rod and thermocouple from the gripper by loosening the two set screws on the side of the gripper, and insert them into the holes on the new gripper. Re-tighten the set screws.



Gripper reinstallation is the reverse of removal. When reinstalling the transfer line tubing into the gripper, push it through the bottom of the gripper farther than a ¼" and as the last step use the transferline depth tool to set the depth.

## Procedure to Replace DC Power Supply in 7650 Motion Control Module

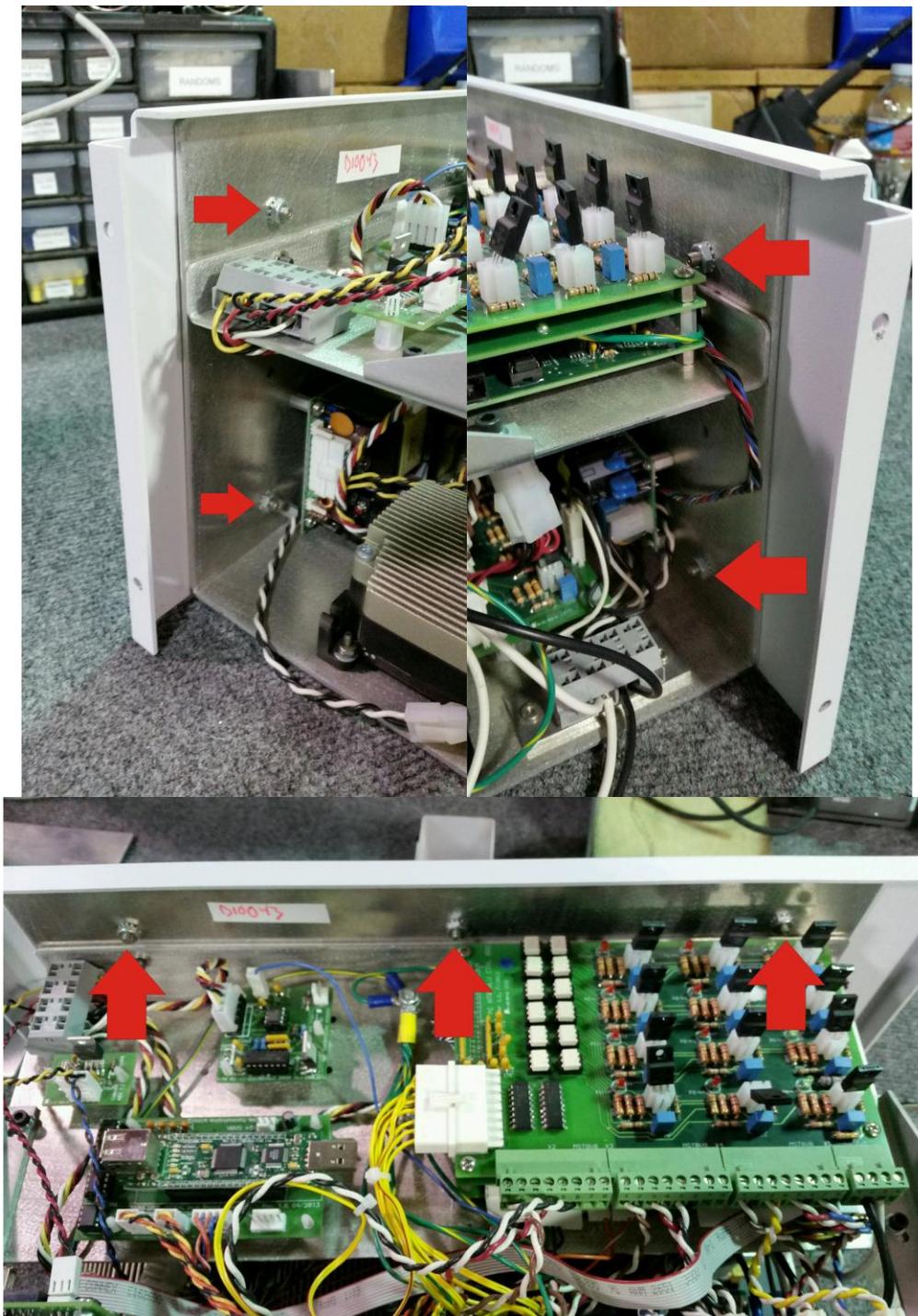
Step 1: Turn off the instrument, and remove the power cord from the back panel.

Warning: DO NOT ATTEMPT TO WORK ON THE INSTRUMENT WITH THE POWER ATTACHED.

Remove the 4 Screws in the faceplate as shown using a 3/32" allen wrench and set them aside. Then, remove the thumbscrew from the back panel as shown. This will allow you to slide the control module forward. If you have an expander installed in the C position, you will need to remove it as well as any trays being used with the instrument.



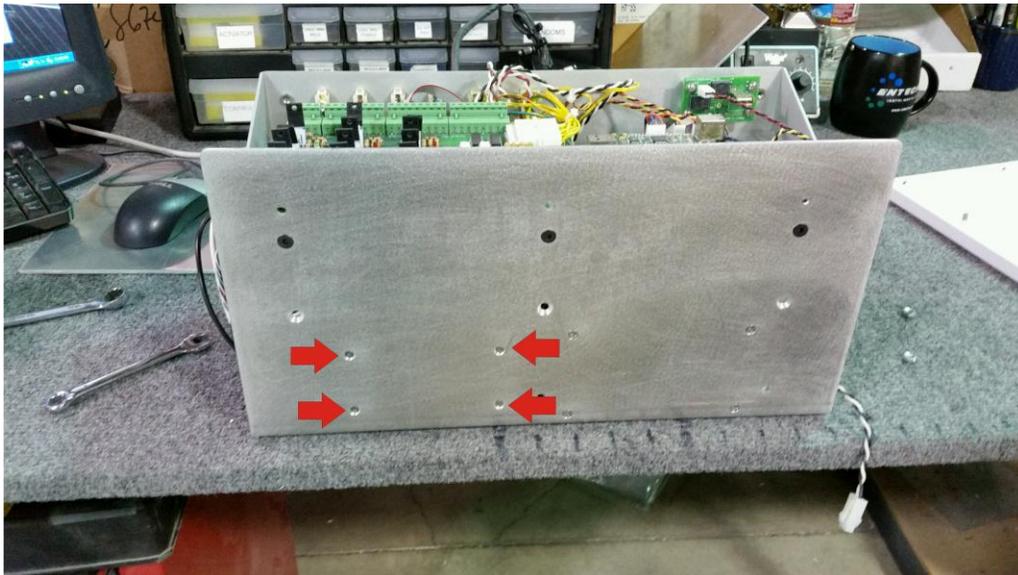
Step 2: Using a 3/8" wrench, remove the 5 nuts that hold the faceplate to the control module as shown, and set them aside. Take care to not allow them to fall under the circuit boards. Remove the faceplate and set it aside.



Step 3: Unplug the connections to the power supply by simply pulling them off. As you do so, note the orientation of the power supply. It is important to note that it can be installed upside down, and the leads will no longer reach. See attached picture to the placement of connections. For clarity, the power supply is pictured uninstalled.



Step 4: Using a phillips head screwdriver, remove the four screws pictured. You will now be able to remove the power supply from the instrument. There will be (4) aluminum standoffs attached to the power supply to attach it to the control module, and you should transfer them to the new power supply at this time. A ¼" wrench can be useful to ensure the standoffs are installed snugly to the new power supply.



Step 5: Install the new power supply into the control module, and plug in the wire leads to it. Reinstall the faceplate to the control module. (See Step 2 for reference.) Make sure all tools are removed from the instrument, as well as any loose hardware removed. You may choose to power up the instrument to check the function of the power supply at this time before pushing the control module back into place. Be aware that there are high voltages present in the control module, and for safety reasons it should not be left unattended in this state.

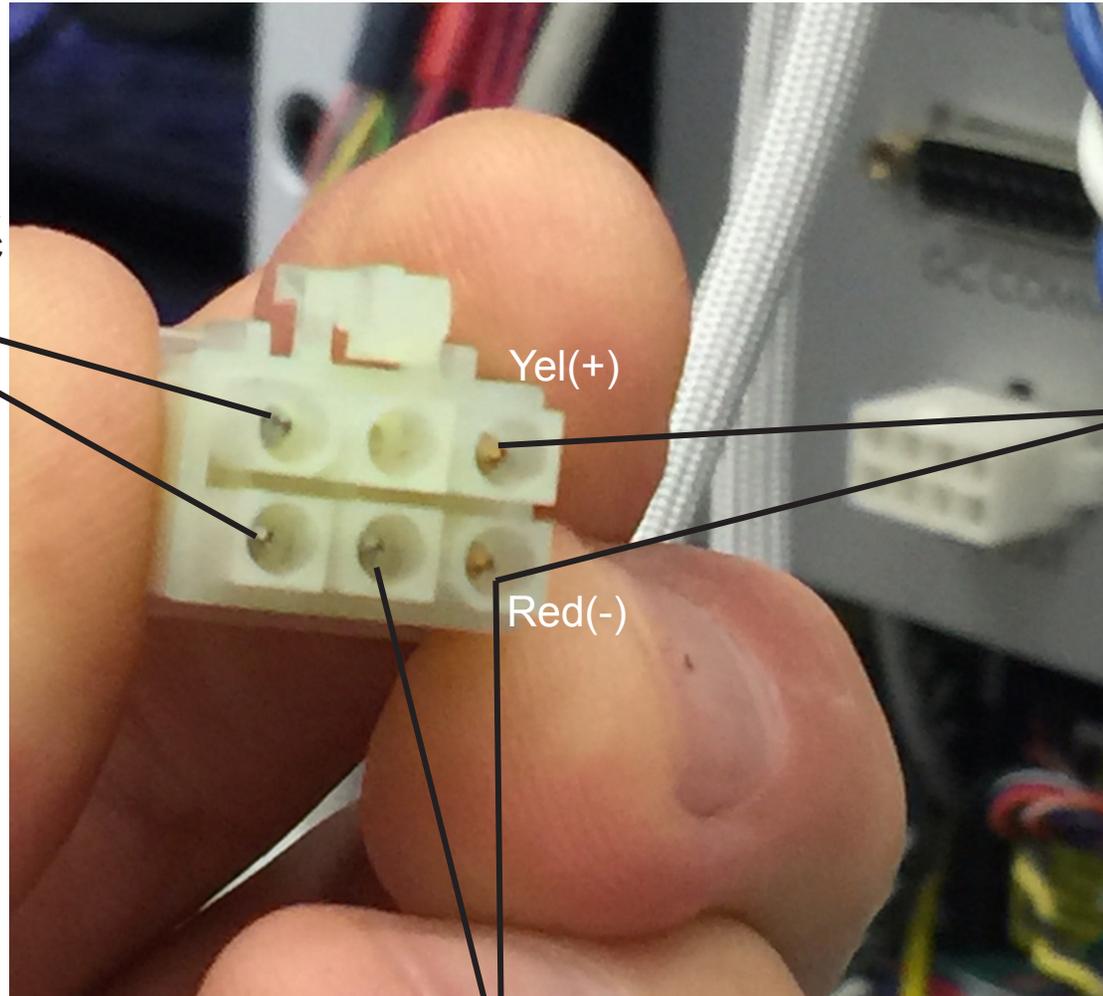
Warning: DO NOT INSTRUCT THE INSTRUMENT TO MOVE WITH THE CONTROL MODULE EXPOSED. It is possible to lower the gripper into the AC control circuits on the top of the module.

Step 6: If the power supply is functioning normally, turn off the instrument and remove the power cord. Then push the control module back into place and reinstall the screws that attach it to the chassis. (See step one.) In some cases it may be useful to remove the back panel (Last picture in step one) to prevent tubing or wires tangling.

# 7650 Autosampler Line Heater (Gripper/Inlet to Top Box)

June 14, 2016

Heater  
110-130 ohms for 120VAC  
400-550 ohms for 240VAC

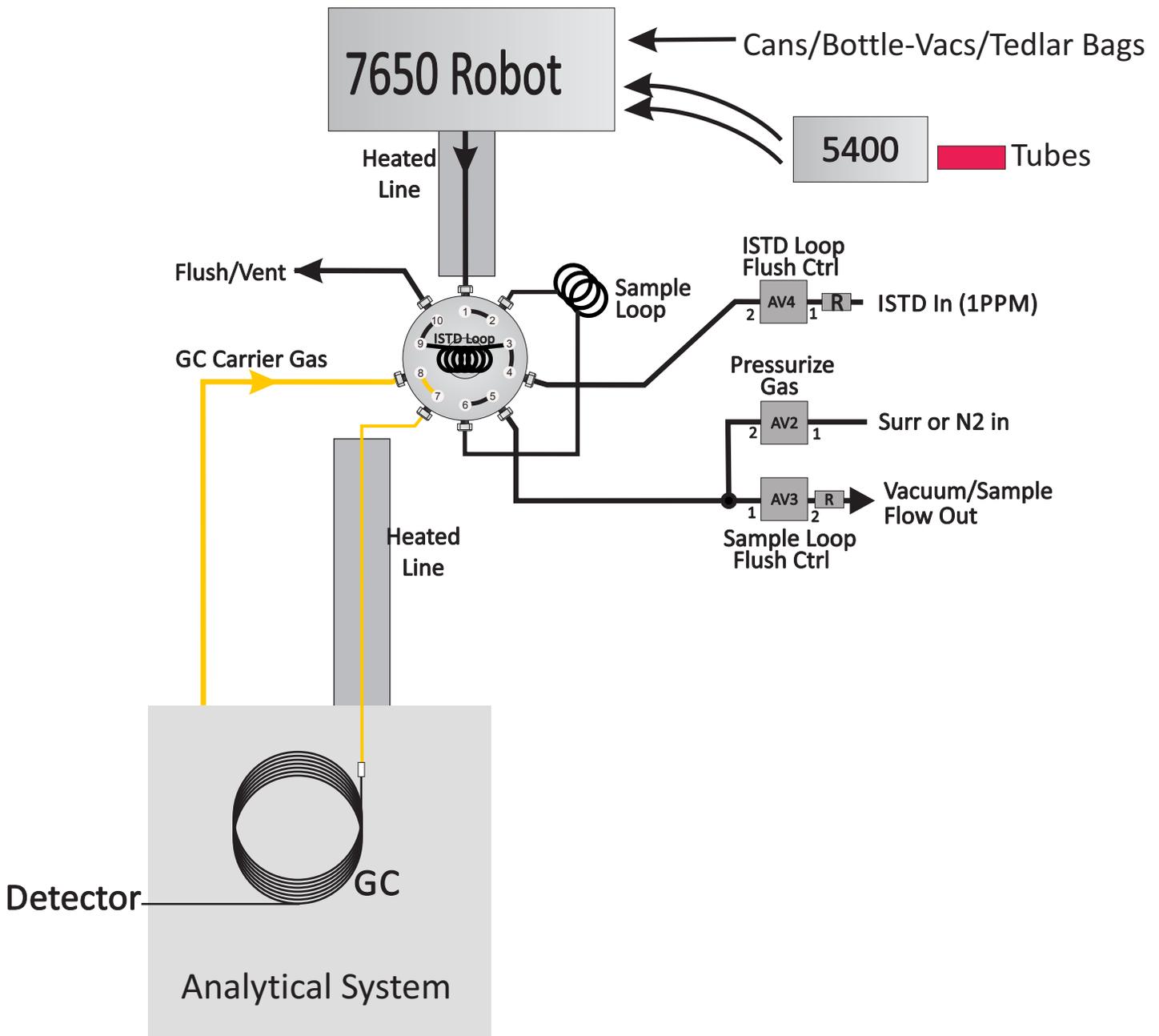


Thermocouples  
3-8 Ohms

Earth Ground to Thermocouple  
0.5-8 Ohms

# 7650-L20 Gas Autosampler (Loop Flush)

March 7, 2018



# 7650-L20 Gas Autosampler (Loop Inject)

March 7, 2018

