iSED® (SN<5000) Automated Erythrocyte Sedimentation Rate Analyzer

PCB and Reading cell Kit replacement Procedure, 112-28-019 Rev. 0

Purpose

The purpose of this procedure is to guide approved service personnel in performing replacement of iSED® (SN<5000) PCB and Reading Cell Replacement Kit on the iSED® (SN<5000) ESR Analyzer.

Scope

This applies to all iSED® (SN<5000) instruments that have operation and/or calibration issues related to Mainboard, Reading Cell or Analog Wire Assembly.

Required

1. All necessary Personal Protective Equipment.
2. Biohazard Disposal
3. PCB and Reading Cell Replacement Kit (112-13-038)

Supporting Documentation

4. 112-07-002 - iSED Correlation Protocol
5. 112-24-050 – Needle alignment and Piercing Depth Calibration
6. 112-27-003 - iSED Main PCB Wiring and Test Point Diagram
7. 112-09-065 - Transfer Card instructions

Necessary Tools

8. 8 mm Wrench (included with kit)
9. Phillips Screwdriver # 2
10. 5.5mm Nut Driver

iSED (SN<5000) PCB and Reading Cell Replacement Kit BOM

Part number	Quantity	Description
		Reading Cell
000032	2	Washer, Lock, M3
000053	2	Screw, M3x25 Pan Head Phillips
000149	4	Nylon Washer, M3 black
000180	2	Nut M3, tooth washer hex
112-08-064	1	Reading Cell Type 1 Sub Assembly
100-10-010	1	Antistatic Bag 4" x 6"
		Mainboard
112-02-009	1	iSED Mainboard
100-10-009	1	8 x 10 inch Reclosable Static Shielding Bags
000079	1	Fuse, 2A, 250V
000090	1	Micro SD Card
		Tubing, Analog Cable, and Tools
112-13-023	1	Tube, Needle to Reading Cell Type 1 Sub Assembly
100-15-054	1	8mm Open-End Wrench
112-13-030	1	Spare Part, Reading Cell to Primary Pump Tube (Type 1)
112-08-054	1	Analog Cable Sub Assembly
100-10-012	1	Ziploc Bag 7" x 9"
112-13-028	1	Pump Tubing Maintenance
112-02-024	1	Printer Wire
		Final Packaging
100-10-011	3	Desiccant Bag 5 gram 58x43mm
112-09-086	1	iSED (SN<5000) PCB and Reading Cell Replacement Kit Serial Number Label
100-10-008	1	Anti-static foam lined box, 12" x 8" x 2 3/4"
112-50505	1	iTest Transfer Card

Procedure

Notes: 1. It's advisable to read the procedure before proceeding with the parts replacement.

2. Make sure that all ESD precautions are taken to avoid damage.

3. For devices/original PCBs that cannot be powered on and settings cannot be retrieved, contact ALCOR Technical Service for configuration settings (Loading, Withdrawal, and Ejector Offsets).

1. **Retrieve data from the Mainboard to be replaced and load transfer card with tests.**

Note: If the device isn't operational, skip step 1 and proceed with Step 2. Step 10.3 will assist in mechanically calibrating the unit.

1.1. Tap service button  and use password 19912.

1.2. Shuffle to page 2 and select the print button  . Store printout for use on step 10.3.

Note: Important settings to be imported to the new mainboard are SN, Rotor Home, Rotor Extract and LIS Settings.

1.3. Hit Home button on bottom of the screen  .

1.4. Insert the Transfer card PN 112-50505 in the Smart card slot, so current available tests on the unit can be transferred to the card. Refer to instructions on 112-09-065 - Transfer Card instructions.

2. Remove Mainboard

2.1. Make sure the instrument is Powered off.

2.2. Disconnect the rapid connect tubing attached to the Waste and Wash containers and remove these containers from the iSED®. Figure 1

Figure 1

2.3. Remove the back enclosure by unscrewing the Phillips screws indicated in Figure 2.

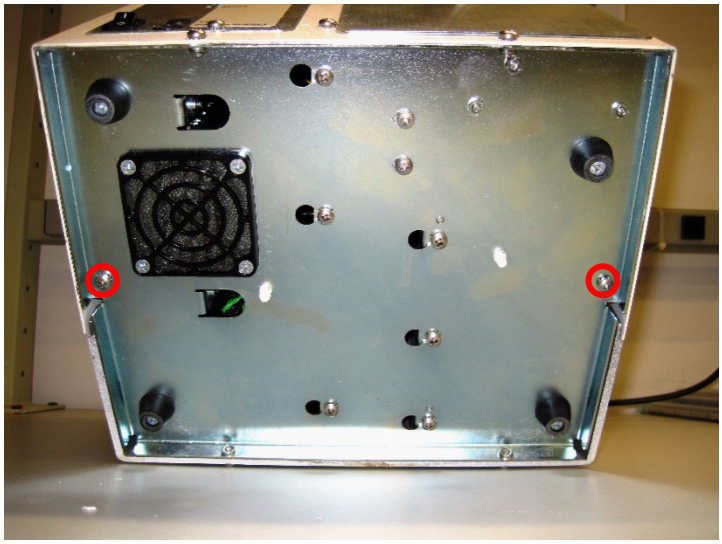

Figure 2

2.4. Once these screws are removed, slowly split the back portion from the front as depicted below in Figure 3 but do NOT fully remove the enclosure yet.

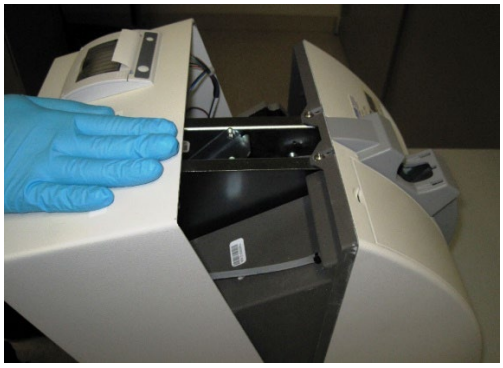

Figure 3

2.5. Once you have the back and front enclosures split as shown above, you will see two sets of wires leading from the printer (Clip 2) and fan (Clip 1) to the mainboard. Disconnect these two wire sets from the top of the mainboard. Figure 4

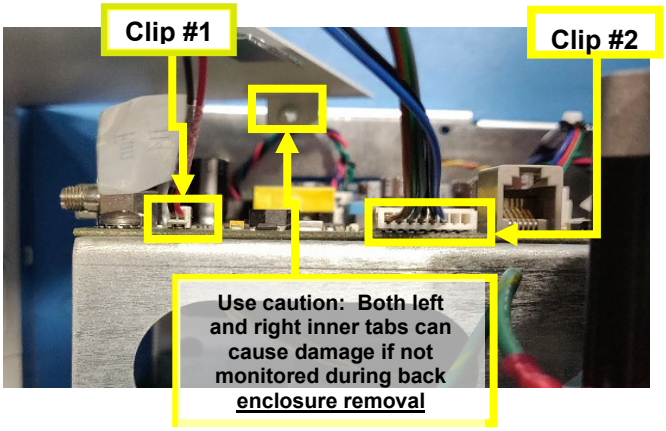

Figure 4

2.6. Before separating the back enclosure, remove the power switch wires from the mainboard. Figure 5

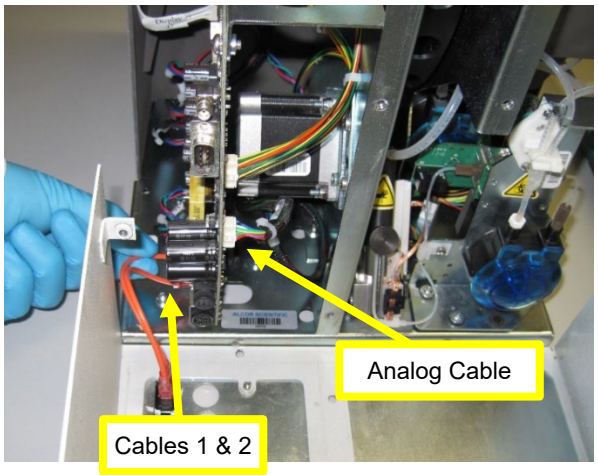

Figure 5

2.7. Carefully separate the back enclosure from the front while watching to ensure both the right and left inner tabs of the back enclosure clear the other mechanics without damage.

2.8. Remove the mainboard (112-02-009) by removing all wires and 4 screws from the mainboard. Figure 6

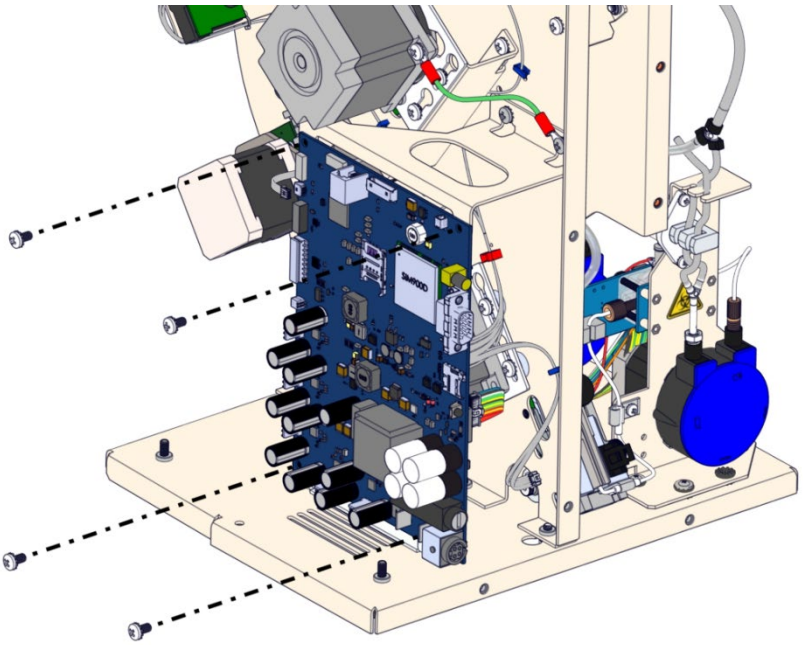

Figure 6

3. Remove Needle to reading cell tubing and Needle tip.

3.1. Remove the Wash Tubing from the top of the Probe Tube. Figure 7

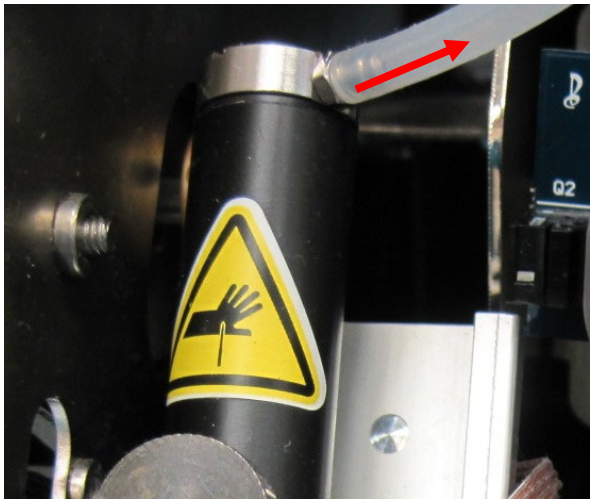

Figure 7

3.2. Unclip the black wire clip and remove the Probe Wire. Be careful not to damage the probe wire. Figure 8

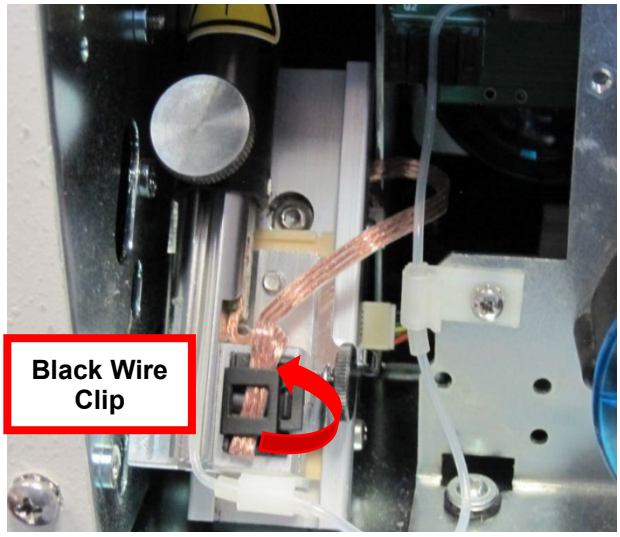

Figure 8

3.3. Loosen the **black** Thumb Screw **on the side** of the piercing system to allow the Probe Tube to be pivot forward. Only loosen the Thumbscrew until the Probe Tube can be pivoted out. Do not remove Thumbscrew from the piercing system. Figure 9

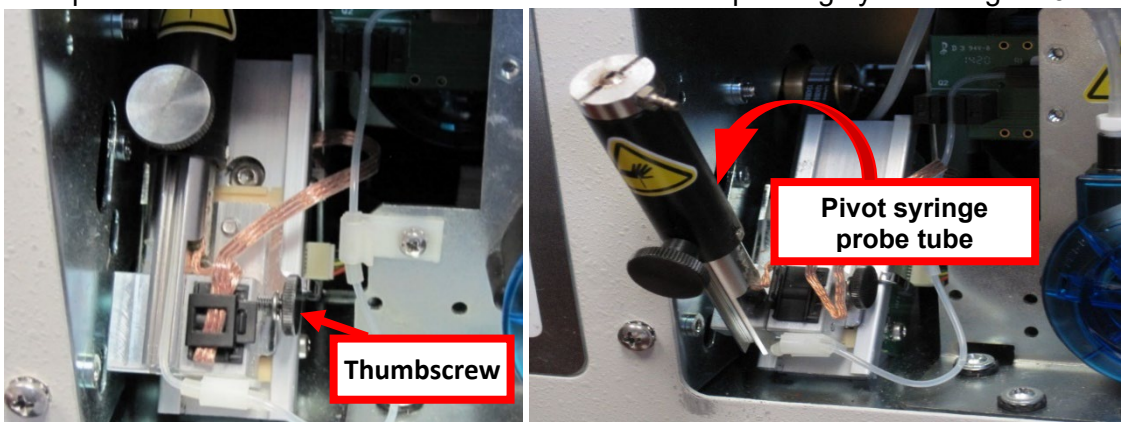

Figure 9

3.4. Remove the large Thumbscrew from the front of the Probe Tube. Figure 10

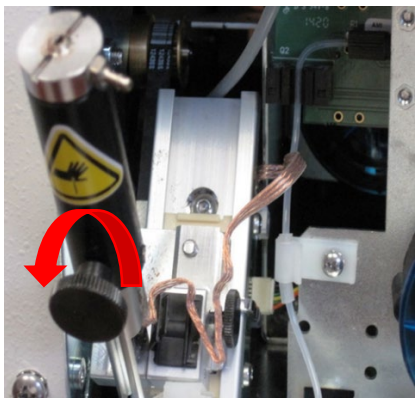

Figure 10

3.5. After removing the Thumb Screw, the Probe Tube assembly and the Needle Spring can be removed from the Needle Tip. Figure 11

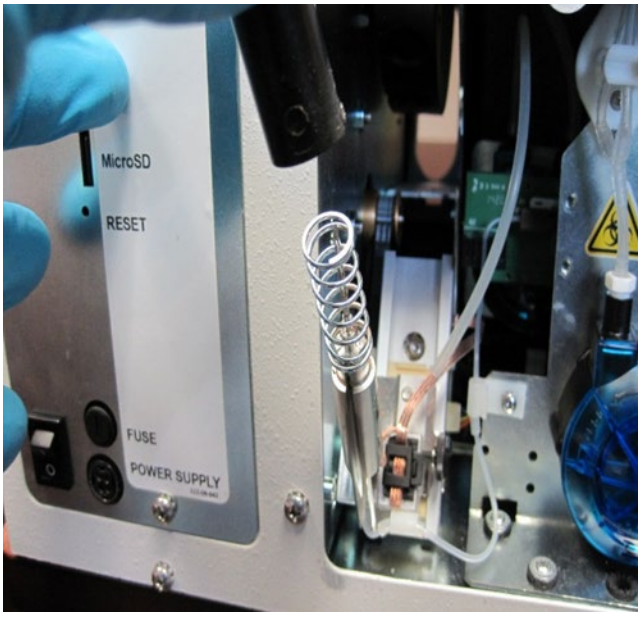

Figure 11

Caution: This will expose the needle and could cause potential injury!

3.6. Use the Open-End Wrench included in the kit to unscrew the old Needle Tip Assembly (counter- clockwise) from Needle Piston Assembly. Figure 12

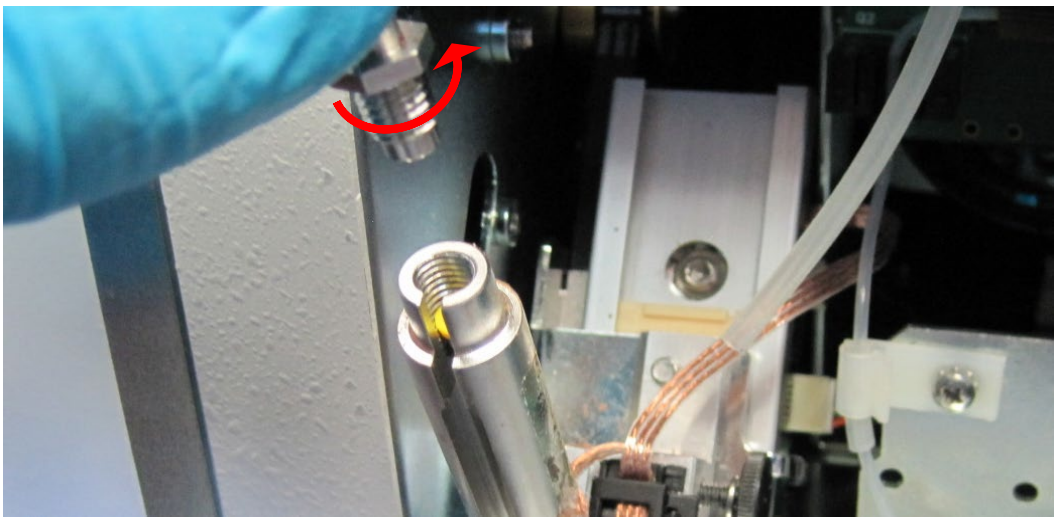

Figure 12

3.7. Remove the old Needle-to-Reading Cell Tubing by removing the tubing from the Retention Clips. Figure 13

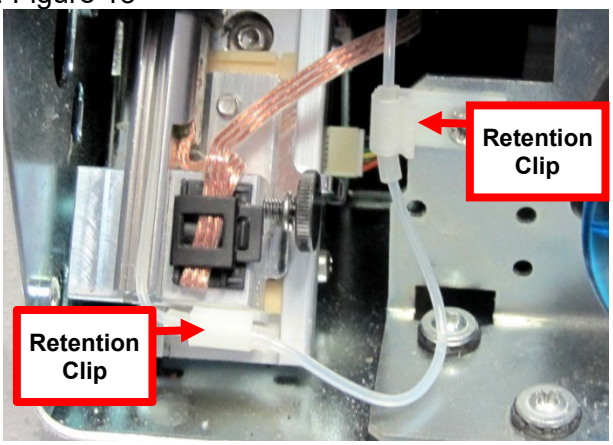

Figure 13

4. Remove the Wash and Waste Pump Tubing

4.1. Remove the tubing from the white connector on the left side of the peristaltic pump and unscrew the brown thumbscrew on the right. Figure 14

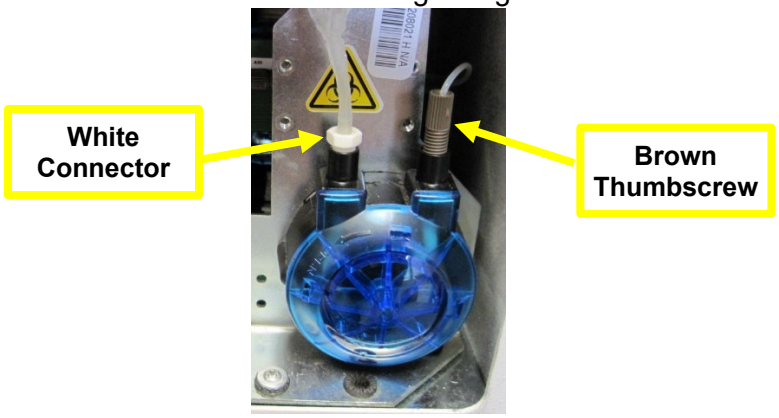

Figure 14

4.2. Loosen and remove the blue cap on the peristaltic pump (turn it counterclockwise).

4.3. Remove the old tubing from the peristaltic pump by gently pulling on the tubing through the alignment tabs within the pump housing. Rotate rotor to assist in removal. Dispose of tubing in proper biohazard disposal container. Figure 15

Figure 15

4.4. Remove the front screw on the peristaltic pump bracket and set the entire sub-assembly aside. Figure 16

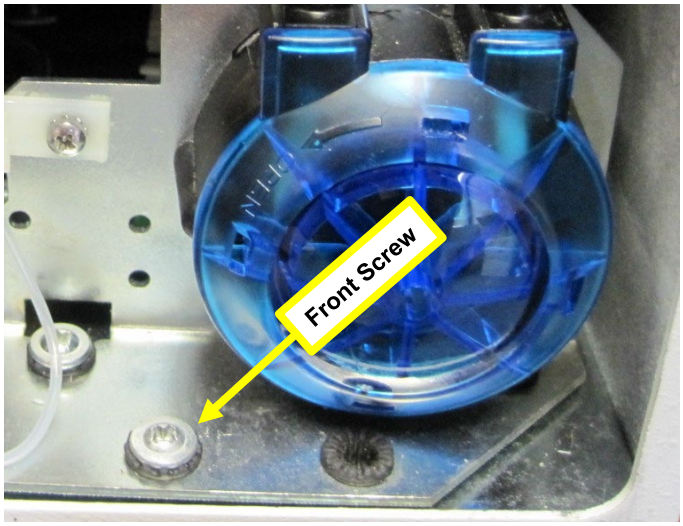

Figure 16

4.5. Remove the 4 screws on the Reading cell Assembly and remove the Analog wire from the clip. You will be able to completely remove the reading cell and analog wire. Figure 17.

Note: Keep the screws and washers aside. They will be used in future steps.

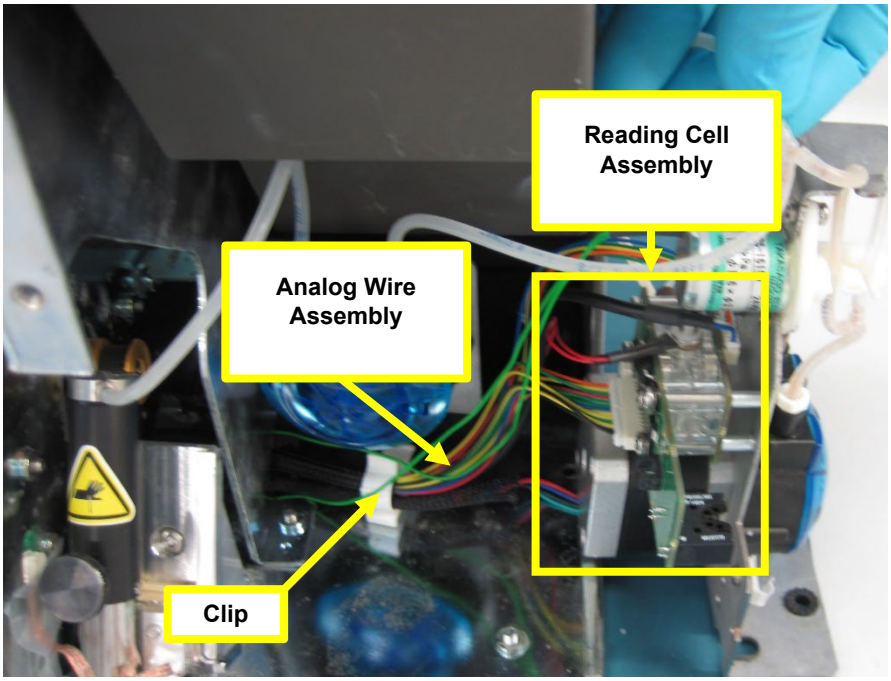

Figure 17

4.6. Disconnect the right side of wash pump tubing by disconnecting it from the “Y” connector. Figure 18

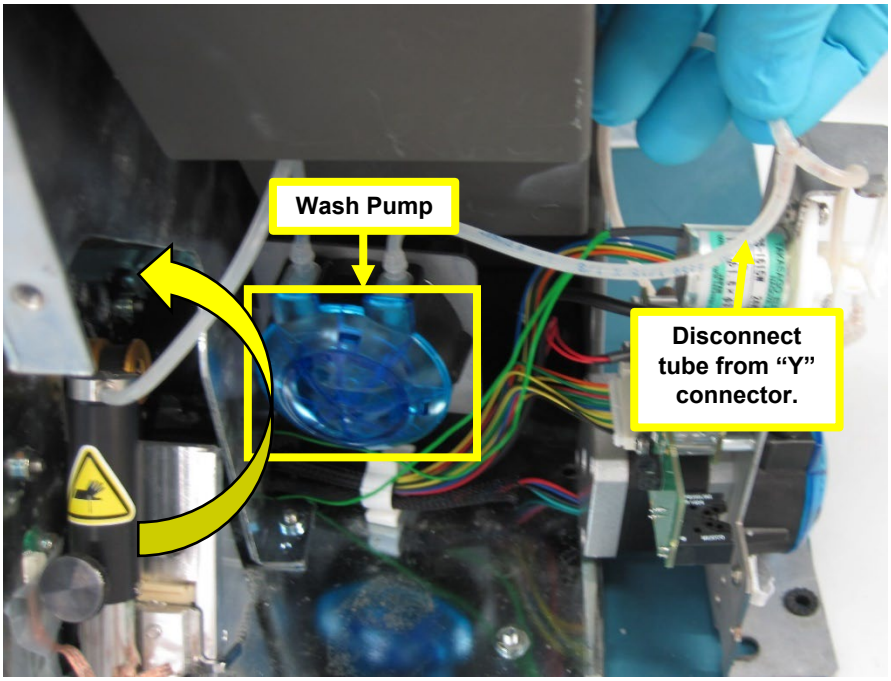

Figure 18

4.7. Remove the blue cover from the wash pump by turning counterclockwise and gently pulling it towards you. Figure 19

4.8. Remove the old wash pump tubing sub-assembly. Be careful not to damage the roller as the old tubing is removed. Clean inside of pump head (if necessary). Dispose of old tubing in Biohazard Waste containers.

Figure 19

5. Install Wash Tubing

5.1. Starting on the left side of the wash pump, insert the grooves of the collar on the new tubing into the slot on the wash pump. Slowly work the tubing into the wash pump in a counterclockwise direction. Spin rotor by hand if needed to help install tubing. Once the tubing is in place, insert the grooves of the collar on the new tubing into the slot on the right side of the wash pump. Figure 20 shows correct placement for tubing.

Note: The longer portion of tubing should be on the left side of the wash pump. A blunt object can be used to help insert the new wash pump tubing into the wash pump. Be careful not to puncture the tubing.

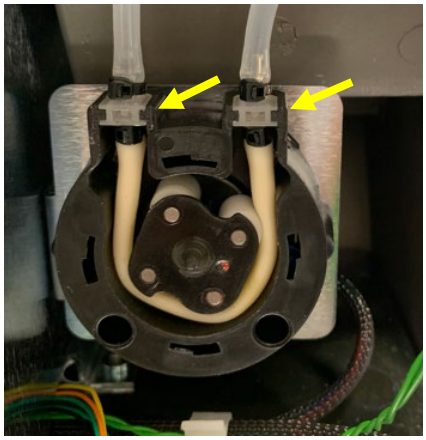

Figure 20

5.2. Once completed, return the blue cap, turning clockwise to lock in place.

Attach the right side of the new wash pump tubing to the “Y” connector and secure with zip tie. Attach the left side of wash pump tubing to the barb on the right side of the syringe probe tube.

6. Install Reading Cell Assembly, Reading Cell Tubing, and Analog Wire

6.1. Feed the mainboard connector of the analog wire through the opening in the walls, so that the connector can be connected to the mainboard in future steps. Figure 21

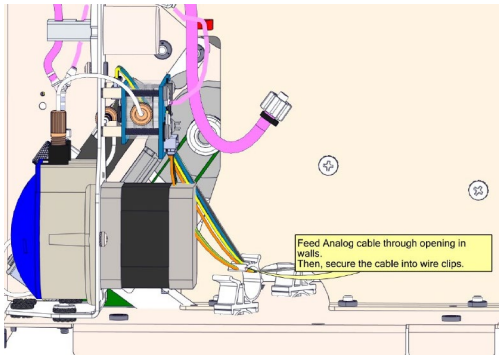

Figure 21

6.2. Install analog wire connectors into Reading Cell. Figure 22

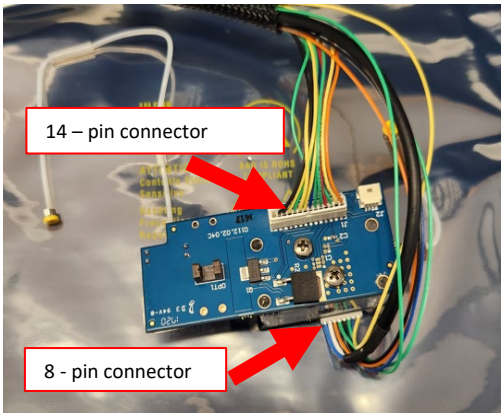

Figure 22

6.3. Secure analog wire in clip on base. Figure 21 above.

6.4. Install the Reading cell assembly on primary pump bracket by using the parts noted in Figure 23.

Note: Depending on the assembly version you have, you'll notice that the new analog wire assembly does not have the 2 extra red wires connected to the top of the reading cell. That's ok.

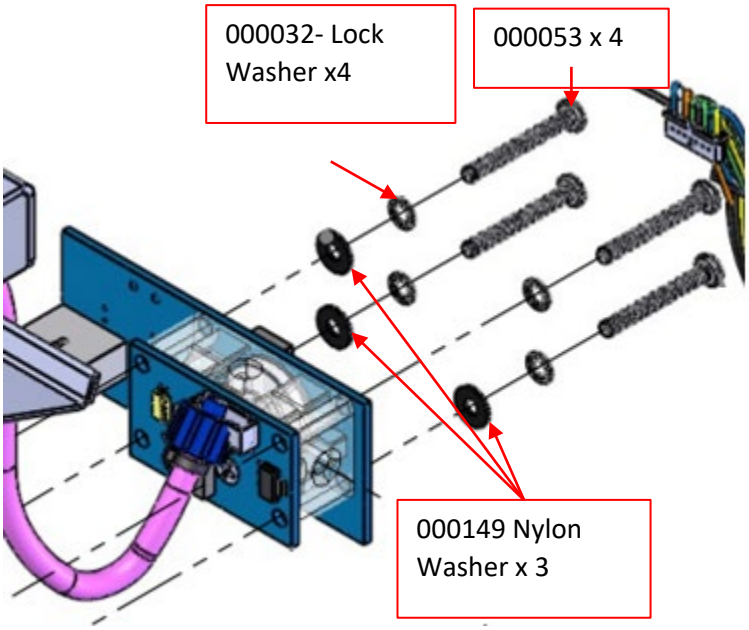

Figure 23

7. Install Primary Pump Tubing and Reading Cell to Primary Pump Tubing

7.1. Replace the Primary pump tubing by first inserting the left side of the primary pump, then inserting the grooves of the new tubing into the slot on the pump. Slowly work the tubing in the pump (rotate rotor by hand if needed). Once the tubing is in place, insert the grooves of the new tubing into the slot on the right side of the pump. See Figure 24 for correct placement.

7.2. Install Reading Cell to Primary Pump tubing into Reading Cell and tighten by hand.

7.3. Tighten the Reading cell to Pump tubing brown connector by hand and reconnect the silicon tube to the white connector.

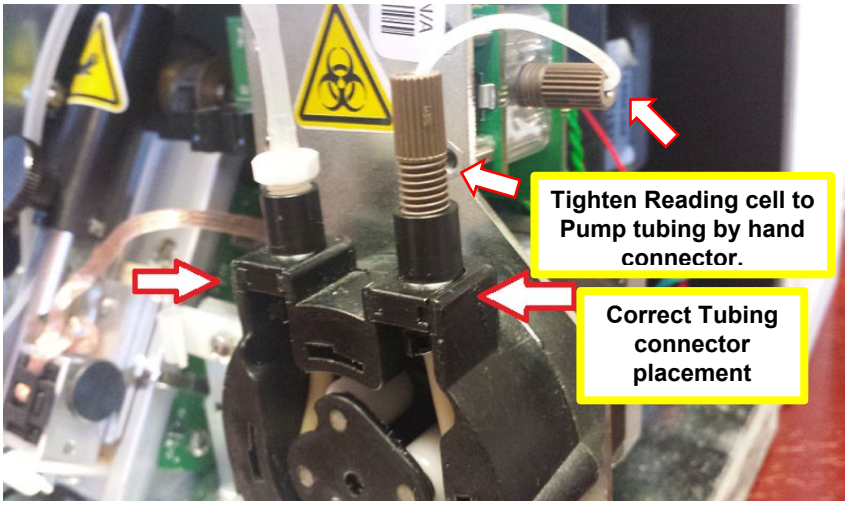

Figure 24

7.4. Once completed, return the blue cap by turning clockwise to lock it in place. See Figure 25.

7.5. Slide the Primary pump assembly back and tighten the vibration screw. See detail in Figure 25.

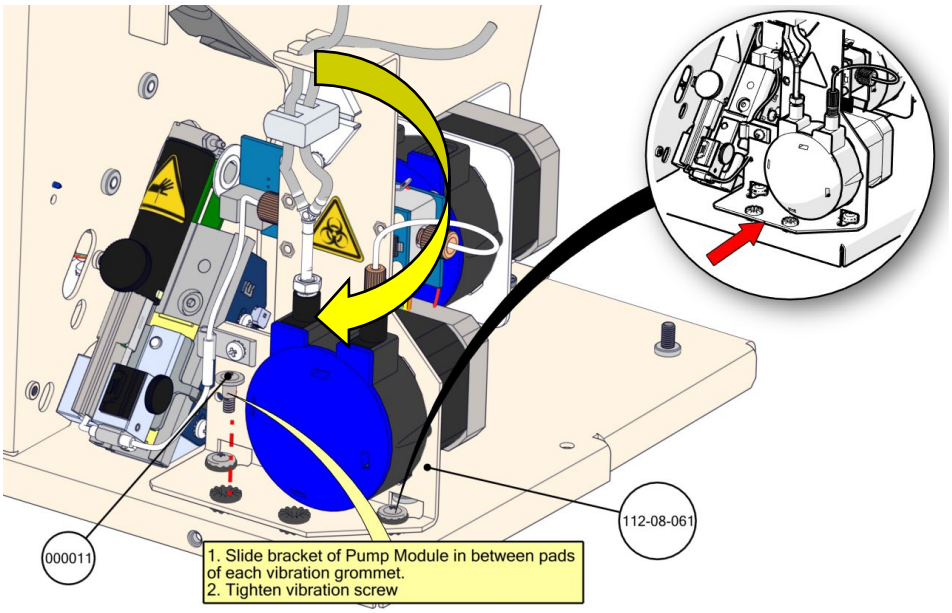

Figure 25

8. Install Needle to Reading Cell Tubing and Needle Tip

8.1. Install new Needle to Reading Cell Tubing into Reading Cell and tighten by hand.

8.2. Install the new Needle to Reading Cell Tubing in the tail sensor's slot and make sure that the tube is pushed in the slot and tube makes nearly 90° angle from the reading cell through the tail sensor. Figure 26

Note: Tubing must be seated in this way to ensure the correct amount of sample is withdrawn.

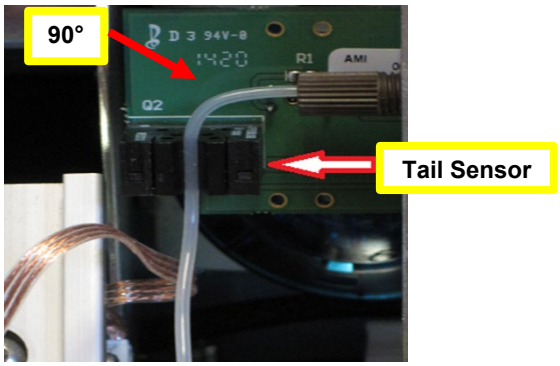

Figure 26

8.3. Insert the new Needle-to-Reading Cell Tubing into the Needle Piston Assembly by ensuring that the tubing is resting on the lowest possible "ledge" of the interior of the Needle Piston. Figure 27

Figure 27

8.4. Screw the replacement Needle Tip into the Needle Piston Assembly. Tighten as much as possible by hand then tighten another ½ turn with the Open-End Wrench. Figure 28

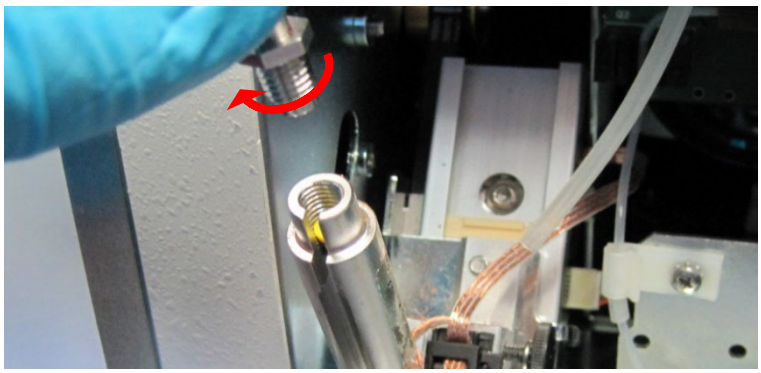

Figure 28

8.5. Re-Insert Needle-to-Reading Cell Tubing back into retention clips. Figure 29

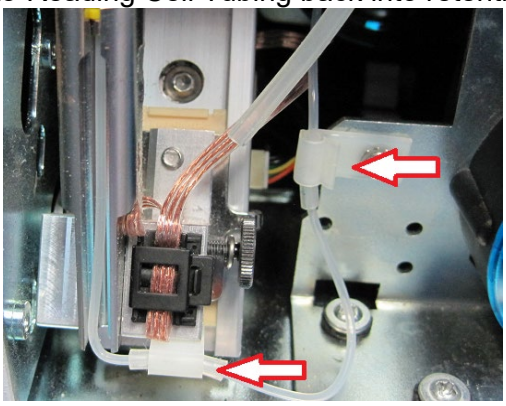

Figure 29

8.6. Replace the Needle Spring and Probe Tube with new parts provided. The Probe Tube should be placed onto the Needle Spring with the yellow warning label and the Thumbscrew hole directly facing you as it was when it was removed. Figure 30

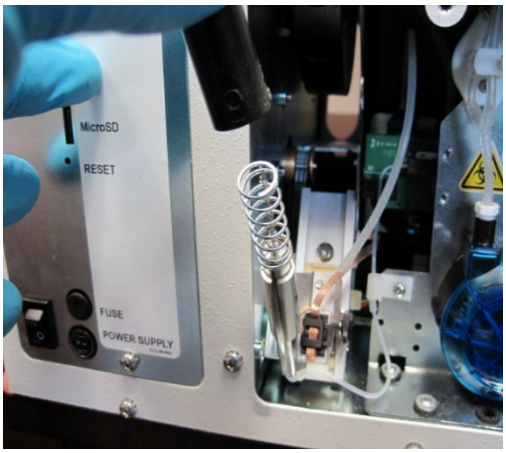

Figure 30

8.7. Place the large Probe Tube Thumbscrew onto the Probe Tube immediately under the yellow warning label. **Reminder**, **the Probe Tube is placed on the Piercing System with the yellow warning label and the Thumbscrew facing outward. (NOT to the side. This will damage the iSED and result in damaging the Needle Probe Sensor board.)**

CAUTION for next step!

Compressing the assembly will expose the needle and could cause potential injury!

8.8. Compress the Needle Spring and Probe Tube housing (pressing down) until the Needle Tip is slightly exposed through the silver portion on top of the Probe Tube. Turn the large Thumbscrew in a clockwise direction until the Thumbscrew is secured by hand. Do not overly tighten the Thumbscrew. Release the tension on the Probe Tube and allow the Needle Tip to return to a safe position within the Probe Tube. Figure 31

Figure 31

8.9. Pivot the Needle Piston Assembly back into the operational position. Replace the Washing Tube back onto the Barb Connector of the Probe Tube. Figure 32.

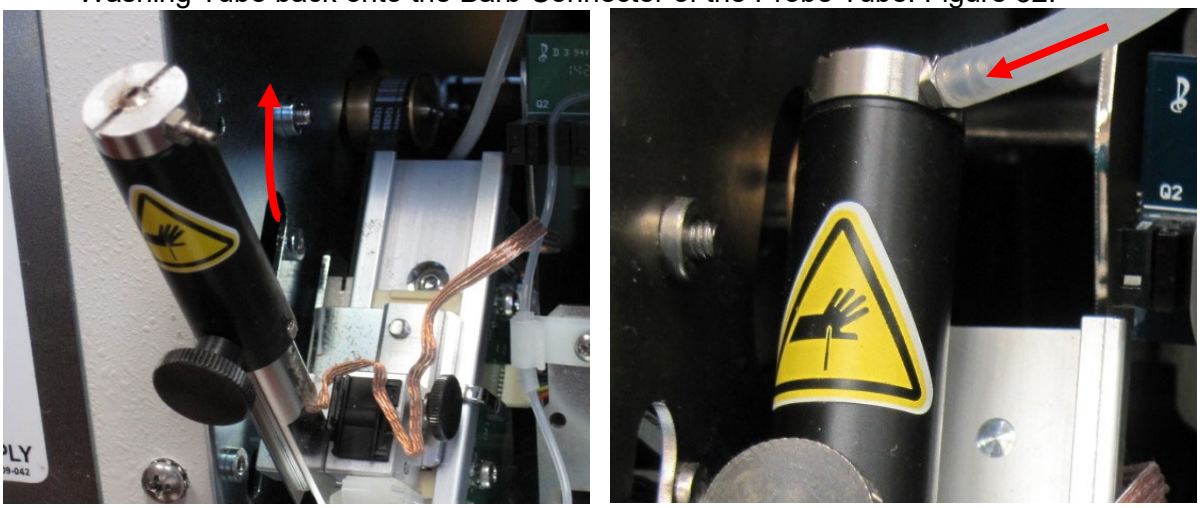

Figure 32

8.10. Retighten the long **black** Thumbscrew **on the side** of the Piercing System. Tighten the Thumbscrew completely. Verify the Needle Piston Assembly is locked in position and cannot pivot outwards. Figure 33

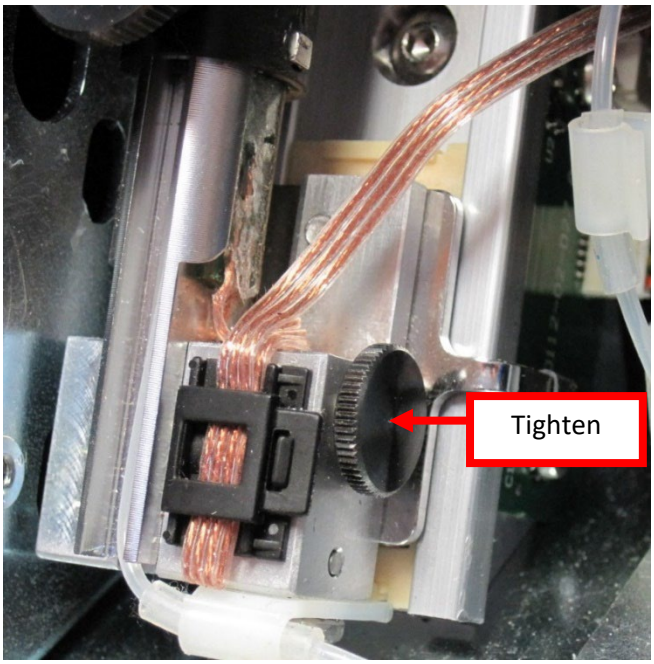

Figure 33

8.11. Replace the Probe Wire into the black Wire Clip. Figure 34

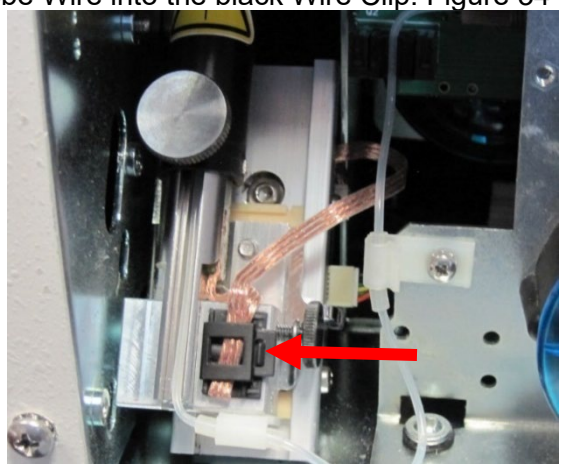

Figure 34

9. Install Mainboard

9.1. Install the new Mainboard (112-02-009). Refer to step 2.8 of this procedure. All wires have labels that indicate the connectors they should be connected to. It can also be found on document 112-27-003 - iSED Main PCB Wiring and Test Point Diagram.

9.2. Attach the two wires leading from the power switch to the main electronics board. Figure 35

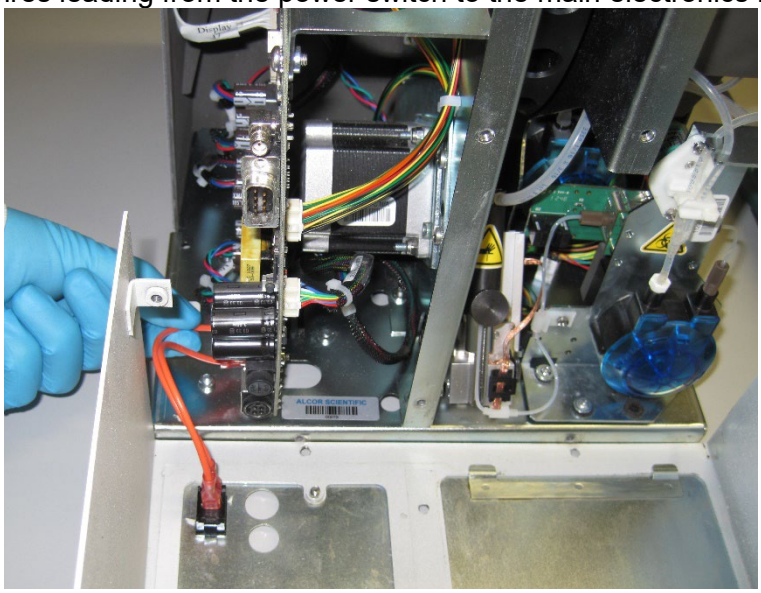

Figure 35

9.3. If the main board that is being replaced is REV E or older, replace the current printer wire with the new printer wire provided in the kit (112-02-024).

9.4. Attached the two cable wires leading from the printer to the main electronics board. Place the panel in a leaning manner to account for the inner tabs, avoid damaging any components inside the analyzer. Figure 36

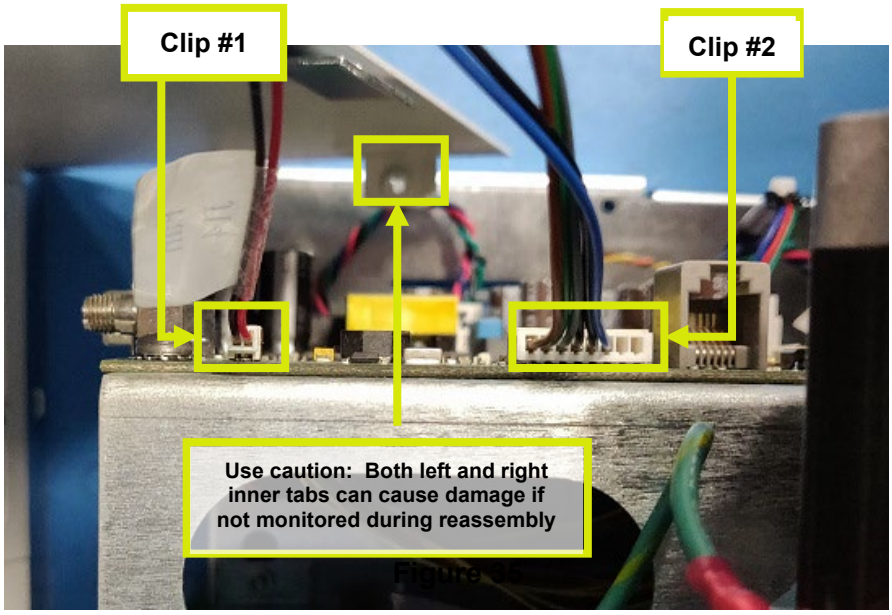

Figure 36

9.5. Verifying everything is plugged back in and that the enclosure is tightly flush with the front molding, screw all ten screws on the back and underside of the analyzer (Refer to steps 2.3 and 2.4 of this procedure).

9.6. Install the new wash and waste bottles.

9.7. Turn the instrument on.

9.8. Perform 3 wash cycles (Figure 37) and check for leaks.

Figure 37

9.9. If wash is successful and there is no leak, proceed with next steps. If not, it's advisable to check connections of tubing and mainboard wiring before contacting Alcor.

10. Update settings.

10.1. On the Main screen, press the "Tools" icon. Figure 38

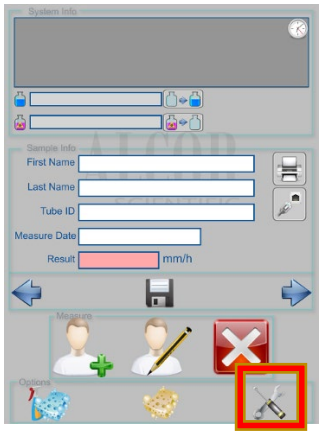

Figure 38

10.2. Enter the code "19912" in the popup dialog box and press the enter key to access Service screen.

10.3. Update the settings for Loading Offset, withdraw offset and Ejector offset with the data gathered on step 1. Figure 39

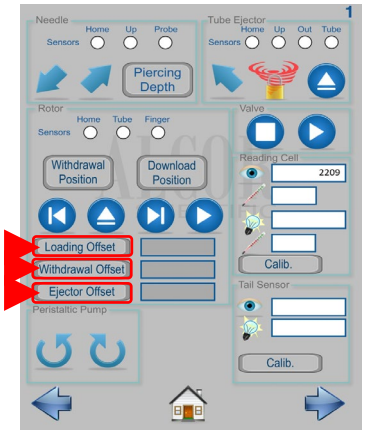

Figure 39

10.3.1. All manufacturing settings pre setup on the new mainboard should work properly. However, if data cannot be retrieved from the device, Tech Service can provide manufacturing settings for your specific device SN. Inquires can be sent through techservice@alcorscientific.com.

10.3.2. You can find below brief explanation of each critical mechanical setting for verification purposes only.

10.3.2.1. **Loading Offset (Rotor Home on printout)** corresponds to Rotor home position and can influence tube loading position. Standard value is 25.

Use  button to proper position rotor on home position.

10.3.2.2. **Withdrawn offset (Rotor Pierce on printout)** is the position of the tube in relation to piercing system. Alignment can be made with assistance of procedure 112-24-050 – Needle alignment and Piercing Depth Calibration

10.3.2.3. **Ejector Offset (Rotor Extract on printout)** is the position of ejector shaft in relation to rotor tube slot. It should be centered. See Figure 40 for reference. Use Download Position button to proper position rotor on the ejection position.

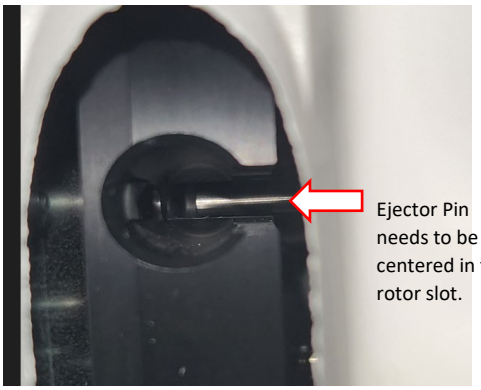

Figure 40

10.4. Press the right-hand pointing blue arrow at the lower right corner of the screen 1 time, or until Tech Screen #2 is displayed (screen number is shown in the upper right corner of the screen).

10.5. Update the SN, Language, Date & Time, and printing preferences from previous mainboard OR, if cannot turn unit on, based on Customer preference. See Figure 41.

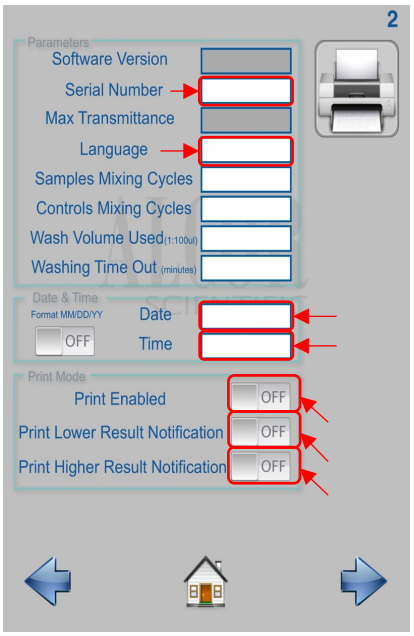

Figure 41

10.6. Press the right-hand pointing blue arrow to access Tech Screen #3

10.7. Update the LIS settings according to customer preferences. Figure 42

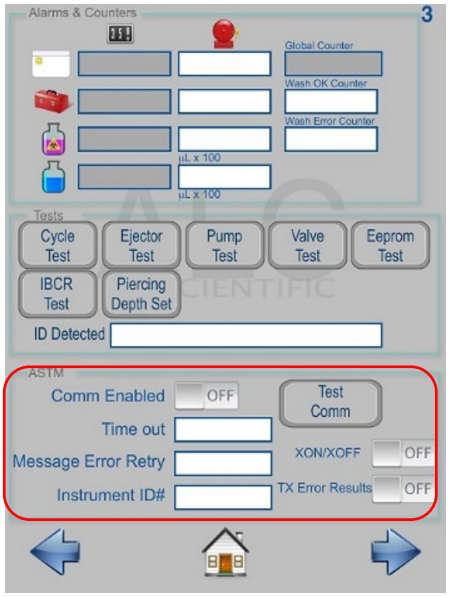

Figure 42

10.8. **<u>Do not change any settings on Tech Screen #4</u>**

10.9. Perform deep wash of the unit, follow instructions on the screen. Figure 43

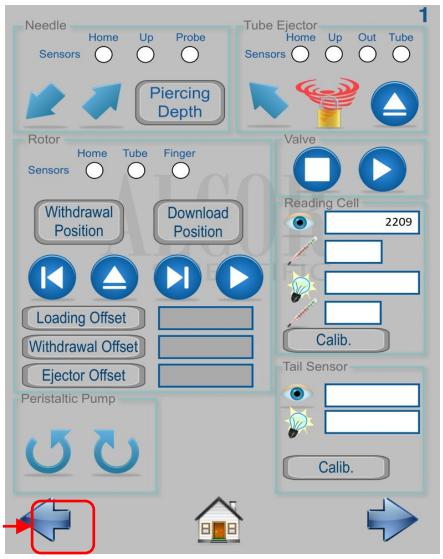

Figure 43

10.10. If the transfer card was used on step 1, proceed, and insert the transfer card on the Smart card slot to transfer the tests on the card. If not, proceed to the next step.

10.11. Access the service screen, press the right-hand pointing blue arrow to access Tech Screen #2 (refer to Steps 4.1 and 4.2) and select the printer icon to print the Configuration report. Figure 44

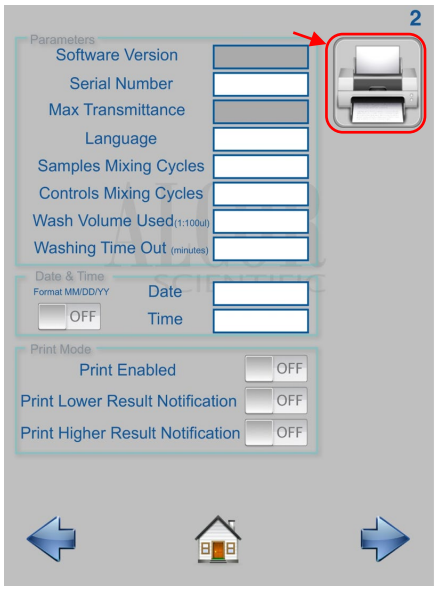

Figure 44

10.12. Follow procedure 112-07-002 - iSED Correlation Protocol

Contact Technical Support @ (800)-495-5270 or +1 (401) 737-3774 for any assistance.