Chapter 6

Tech Pane

This section provides a description of the system diagnostic and maintenance procedures available through the system's Tech Pane.

6.1 Accessing the Tech Pane

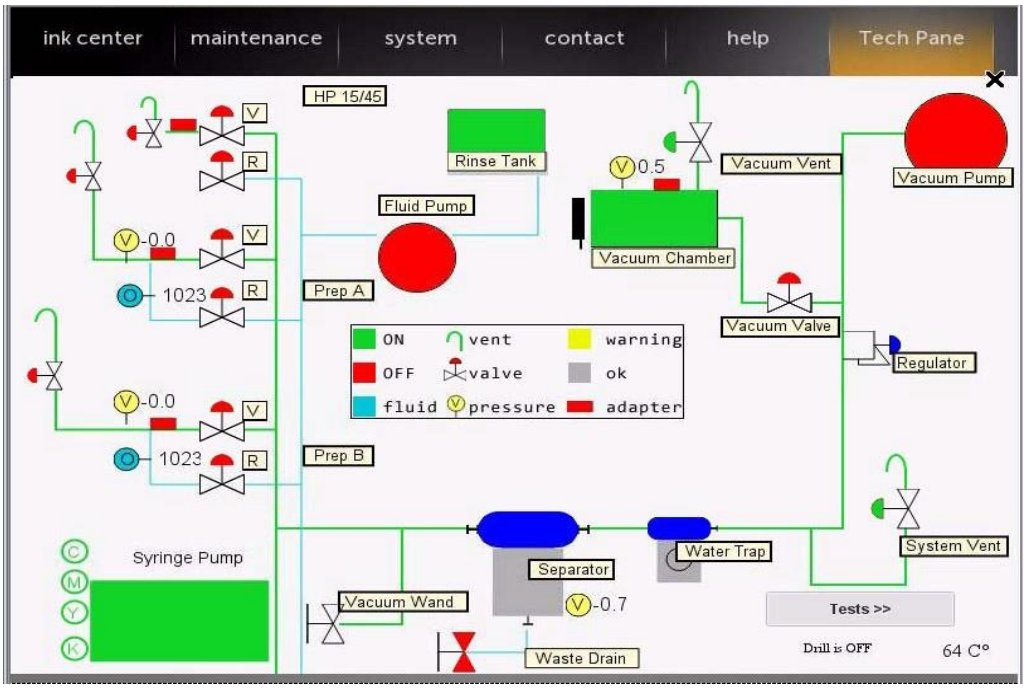
The Tech Pane in the technician configuration consists of a main screen, a Syringe Pump screen, and a Tester screen. These screens are used to troubleshoot and test the various systems and parts in the machine, both manually and automatically.

To access the Tech Pane from the operator screen, log in with the technician code **741963**. A screen asking for the technician's initials will pop up next. Enter your initials and press enter. Once logged in as a technician, press the "**Tech Pane**" tab to bring up the Tech Pane main screen.

6.2 Tech Pane Main Screen

The Tech Pane main screen is arranged in a similar order as the parts on the machine. It allows you to individually control the vacuum pump, fluid pump, various solenoids, etc., and to check various sensors with status indicators. Operate each item by selecting the appropriate icon. A green line is associated with the vacuum system, and a blue line is associated with the fluid system.

Figure 6.1: Tech Pane Main Screen



The status indicators on the screen will be green when activated, except for the Drill indicator in the lower right which shows ON or OFF, and the Chamber Vacuum Vent which is normally closed when powered. This is a troubleshooting tool when testing various sensors in the machine, to determine if a sensor is responding correctly.

***Note**: Please reference the image above for the following sections.*

The abbreviation "inHg" means "inches of mercury" and is used to measure the amount of vacuum.

6.2.1 Fluid Tank and Pump

The Fluid Tank is green when there is sufficient cleaning fluid in the container located in the maintenance drawer. You can manually operate the Fluid Pump to test the plumbing system.

6.2.2 Vacuum Pump and Waste system

This section of the schematic shows the pump, separator, and associated valves, sensors and readings of the vacuum system.

- Vacuum Pump icon - independently controls the vacuum pump.
- The Separator icon is normally grey. The icon turns yellow when the float in the waste separator reaches the warning position, and red when the float reaches the full position. *Note: the vacuum pump is rendered inactive in the full state.*
- The Waste Drain valve indicator is normally red during machine operation and only changes color (green) when the handle for the waste drain is turned (opened) for draining the waste separator.
- System Vent icon - allows the system to be vented to atmosphere.
- The vacuum readouts are the actual vacuum levels of the separator and vacuum chamber, displayed *in inches of Mercury, or inHg*.

6.2.3 Fill Chamber

This area has the Adapter Seated and Door Closed indicators (red or green depending on the sensor state), in addition to the Black Injector Seated indicator. It also has the Vacuum Vent, Vacuum Valve, and the vacuum level readout display.

- The Vacuum Vent is closed when powered on, which allows the chamber to vent in case the system loses power.
- The Vacuum Valve button for the chamber is normally closed and must be pressed to take a vacuum on the chamber. Once the chamber is at the desired vacuum level, the Vacuum Valve button will isolate the chamber from the vacuum pump, and from the rest of the system.

6.2.4 HP45 Station

Shows the cartridge seated indicator, and has control buttons for the rinse, vent, and vacuum valves.

6.2.5 Prep Station A/B

Each prep station section contains the Adapter Seated indicator - used to test the fill adapters and sensor in each prep station - the control buttons for the rinse, vent, and vacuum valves; and the sensor readouts for ink sensor, vacuum, and pressure (a negative value).

- The ink sensor readout is only activated when the vacuum valve is opened. The sensor reading indicates how much ink is going through the vacuum line from the prep station and cartridge. The higher the number, the clearer the tube. When the sensor is completely occluded by ink passing through, the reading is zero or near zero.
- The vacuum will display what level of vacuum, or pressure, is being put on the prep station. *Pressure will show as a negative value*.

6.2.6 Troubleshooting with the Tech Pane Main Screen

6.2.6.1 Sensor Indicators

Use the various sensor indicators to test the switch or sensor at a specific station. For example, to test the drill handle down switch, pull down on the drill handle and check the Drill ON or OFF indicator to make sure it turns on only when the handle is in the down position.

Additionally, the adapters and reed switches can be tested independently in the various stations (Prep A/B and Fill Chamber) to narrow down if a specific adapter is the issue or a sensor is the cause of the problem.

6.2.6.2 Waste Level Sensor

Use the Waste Warning and Waste Full sensor indicators to test the float sensor assembly in the waste separator while the unit is out of the machine for cleaning or troubleshooting.

6.2.6.3 Fill Chamber Vacuum Leak Check

- **Tips for fixing chamber leaks**
  - On newer machines, the typical cause of fill chamber vacuum leaks is a loose nut on an injector proximity sensor, located at the back of the chamber. The nuts become loose over time and allow a vacuum leak to form.
  - Check the chamber door for cracks inside the vacuum area - cracks around the door handle will not contribute to chamber leaks unless the cracks reach inside the vacuum area, past the door seal.
  - On older machines, the injector holster is a prime suspect for the cause of vacuum leaks. The new style holster is a bit larger and has a lip at the back edge of the top and has not been shown to break down like the older version.

6.3 Tester Board Tab

The Tester Board tab is used to test both the print tester and the individual test adapters.

Figure 6.2: Tester Board tab of the Tech Pane

The Tester Board tab:

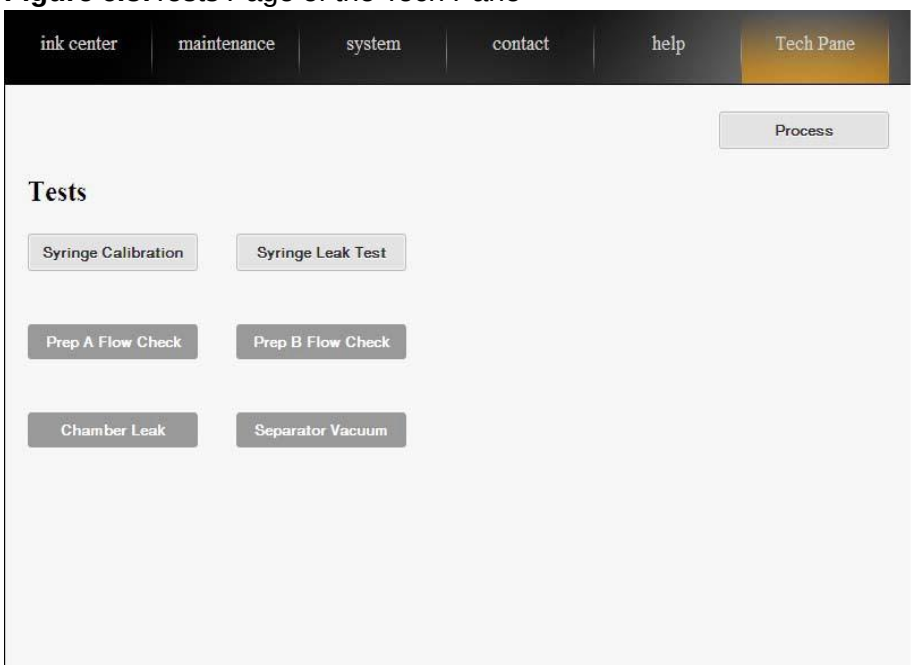
- Poll Adapter: Use this test to check an adapter, or as a basic check to see if the tester system is working.
- Paper Sensor (1/2): Tests the paper sensors and will respond if they sense paper or not. *Note: the system does not know what order the sensors are in, or which sensor is #1 or #2. They are interchangeable.*
- Power: Kills power to the tester assembly, including the electronics inside the machine.
- Reset Interface: Resets the tester interface. Can be helpful after resetting power to the unit.
- E Test: Only used when testing HP2 cartridges at this time. Only use when working with RIS support personnel.
- Meas TSR: Used to measure the TSR (Thermal Sense Resistor) and display the measurement in ohms. Only the first three-digit number is used. Refer to RIS support for actual values.
- The HP3 black test is divided into Short and Long print heads. You can visually check this on the cartridge.
- The other cartridge test prints are self-explanatory.
- Use the Check HP02 button to test the HP02 adapter and a specific tank.

- The remainder of the checks are broken up into the six colors for both standard and XL.

6.4 Tests Page

The Test screen contains diagnostic tests to aid in troubleshooting various areas of the system. The following paragraphs contain a brief description of each test, followed by a more in-depth walk-through of the procedure.

Figure 6.3: Tests Page of the Tech Pane



- Syringe Cal: sets the home position of the syringes; used after removing or tightening any syringe
- Prep A/B Flow Check: runs cleaning fluid through the prep stations for a short period to test fluid flow in and out
- Chamber Leak Test: tests the ability of the fill chamber to achieve and hold 24 inHg of vacuum for 10 seconds
- Syringe Leak Test: two part test; the first part tests the dispense and injector lines for leaks; the second part checks the syringes for leaks
- Separator Vacuum Test: tests the vacuum decay rate of the waste separator
- Syringe Digital Signals: tests the GPIO (input/output) and Error lines between the I/O board and infusion pump

The screen also displays what step each test is completing, and will display a pop-up if any user action is required.

6.4.1 Test Procedures

6.4.1.1 Priming Ink Lines (Located in Maintenance Tab)

This process draws ink from the ink nests to the valves to remove any air from the ink lines. The system does this by systematically pulling ink into the syringes and then sending the ink to waste, at each ink position until all ink nests with ink are primed.

Note: This test is typically only used during an installation to prime ink into the individual ink lines, but may be used to re-prime a line or remove excess air from the ink lines.

Only perform this test after all work is done, all connections are tightened and have been checked, and all ink nests in use are filled with ink.

To begin the test, press Prime Ink Lines. The system will automatically start the process with ink nest 1, will continue through each ink nest that has ink in it, and stop automatically when done.

No user action is required once the process has started.

Figure 6.4: Priming Ink Lines Test in Process

Once the test is complete, check each ink line to make sure the line maintains its prime and the ink does not back away from the ink port on the valve.

RIS support personnel can prime individual ink lines remotely. If you need help doing so, please call RIS Service Support.

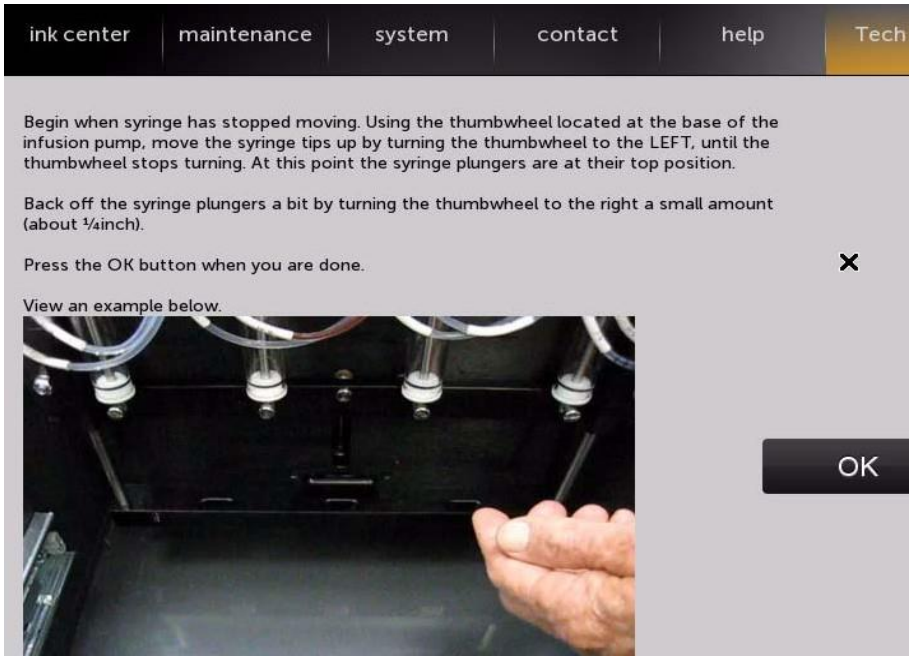
6.4.1.2 Syringe Calibration

This process is used to set the home position of the syringes after they are tightened or changed. Since all four syringes move at the same time - you only need to run Syringe Calibration test once.

TASK

1. To begin the test, press Syringe Cal. The process will start and display the following screen:

Figure 6.5: Syringe Cal Test in Process



At this point the syringe plungers are in what's called "soft home" position. The syringe plungers are not actually touching the tops of the syringes.

2. Using the thumbwheel located at the base of the infusion pump, move the syringe tips up by turning the thumbwheel to the LEFT, until the thumbwheel stops turning. At this point the syringe plungers are at their top position.
3. Back off the syringe plungers a bit by turning the thumbwheel to the right a small amount (about ¼").
4. Press the OK button when you are done.

The system stores the home position setting into memory.

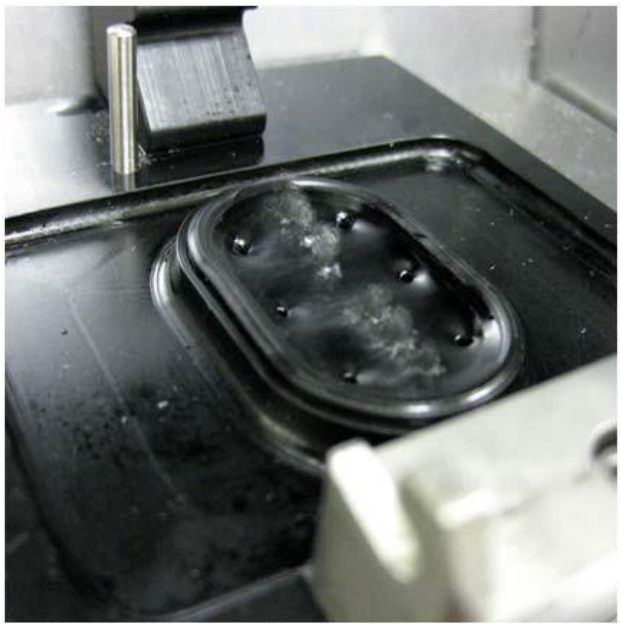
6.4.1.3 Prep A/B Flow Check

These tests (both are functionally the same) are used to flow cleaning fluid into each prep station and then vacuum the fluid out.

To begin the test, press the Prep A (or B) Flow Check. No user action is required once the process has started.

The result is a small fountain of fluid at the prep station as pictured below.

Figure 6.6: Prep A/B Flow Check Test in Process



The cleaning fluid comes in through the six center holes, and is vacuumed out through the six outer holes.

The fountain should be above the height of the rim of the oval section, and the fluid at the center should be higher than the rest of the fluid flowing out.

If the fluid is not being vacuumed out through all six holes evenly, use a large paper clip to clean out the clogged holes.

Note: The two center vacuum holes at the edge are straight down; the four corner vacuum holes are slanted towards the middle. The prep station is made of solid aluminum and won't be damaged by the paper clip.

If cleaning the holes does not remedy the flow issue, check the prep station vacuum filters for clogging.

If the flow of fluid into the prep station is lower than normal, there may be a blockage in the fluid input side of the prep station, or the rinse valve is not opening correctly.

6.4.1.4 Chamber Leak

The Chamber Leak test provides an automatic way to test the ability of the fill chamber to hold a vacuum.

To begin the test, press Chamber Leak. The only action required by the operator is to make sure the chamber door is down in the closed position. The test will remind you if the door is not down.

Once the test begins, the system pulls a vacuum to 24 inHg then shuts off the vacuum pump and holds the chamber vacuum for 10 seconds.

The ideal test output is to have no decay in the vacuum, but a slight amount of decay is acceptable.

The system will display the pass or fail results as illustrated below.

Figure 6.7: Chamber Leak Test Results

A test failure indicates a leak in the chamber that can affect the fill process and needs to be addressed.

6.4.1.5 Syringe Leak

The Syringe Leak test is perhaps the single most important diagnostic test in the system. This test checks the following two areas for vacuum leaks:

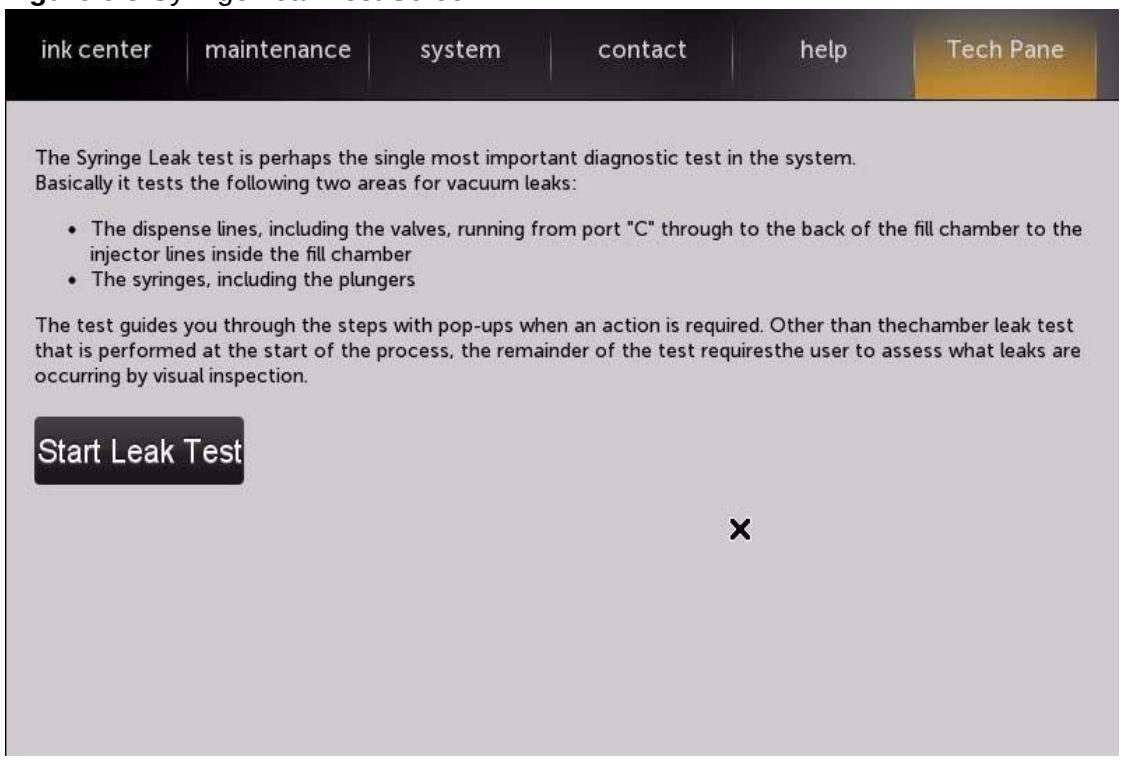
- The dispense lines, including the valves, running from port "C" through to the back of the fill chamber to the injector lines inside the fill chamber
- The syringes, including the plungers

The test guides you through the steps with pop-ups when an action is required. Other than the chamber leak test that is performed at the start of the process, the remainder of the test requires the user to assess what leaks are occurring by visual inspection.

TASK

1. To begin the test, press the Test button on the Tech Pane main screen. On the next screen, select Syringe Leak.
2. If the chamber door is not shut, the system will prompt you to shut the door before it continues with the test.

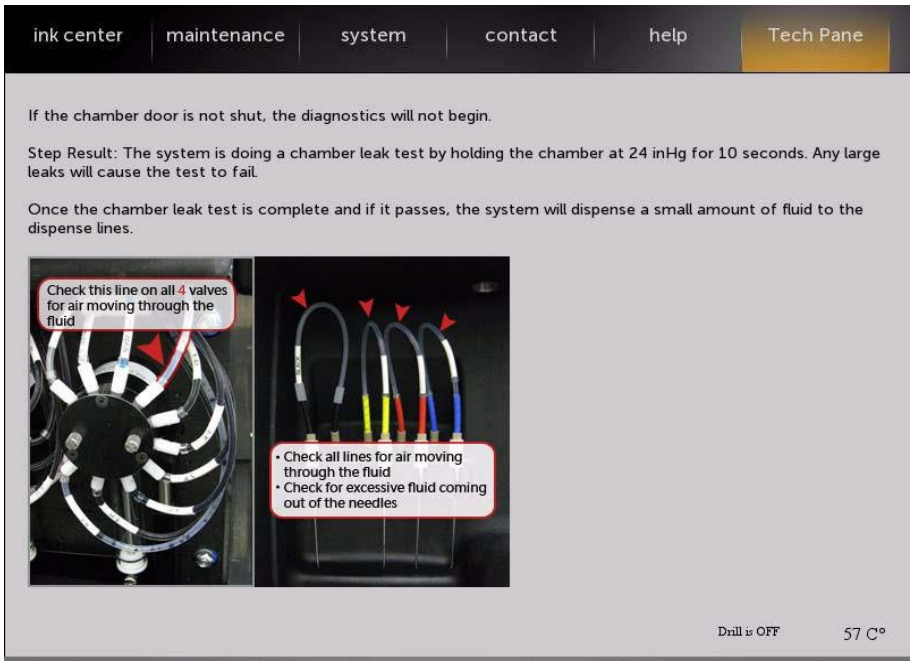
Figure 6.8: Syringe Leak Test Screen



Step Result: The system will first hold the chamber at 24 inHg for 10 seconds. Any large leaks will cause the test to fail.

Next the system will dispense a small amount of fluid to the dispense lines.

Figure 6.8: Syringe Leak Test Screen



Step Result: A small dialog will display, directing you to check the dispense lines for air flowing through the dispense lines.

There are two places to check for air movement: the dispense line from each valve at port "C", and the injector lines inside the fill chamber.

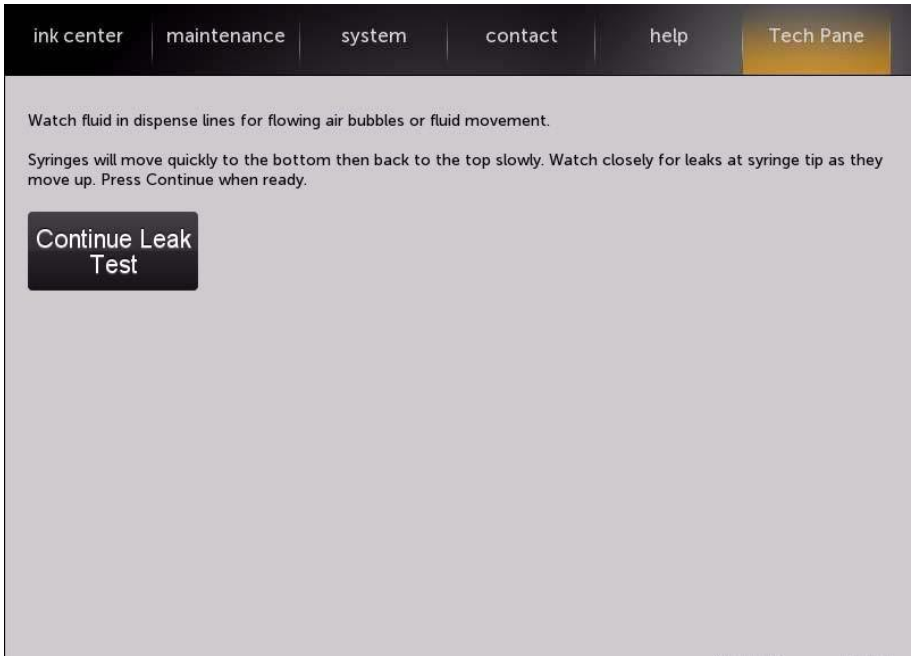
3. Look at each line carefully for moving air or fluid, not stationary bubbles. Fluid or air movement at the dispense line from port "C" of a valve indicates an air leak either at the connection of the line to the valve, or internally to the valve. Fluid or air movement in the lines inside the fill chamber indicates a leak in the connection at the back of the chamber.
4. Also check for a large amount of fluid pooling under any of the injectors (more than the others - some fluid pooling is okay). This is another indication that an air leak is present in the system.

Step Result: The valves will cycle to an ink port, then back to dispense

Step Result: Check again for leaks at all points mentioned before.

The next dialog box to display describes the second part of the syringe leak test.

Figure 6.10: Syringe Leak Test, Syringes Moved to Bottom



5. Press Continue Leak Test.

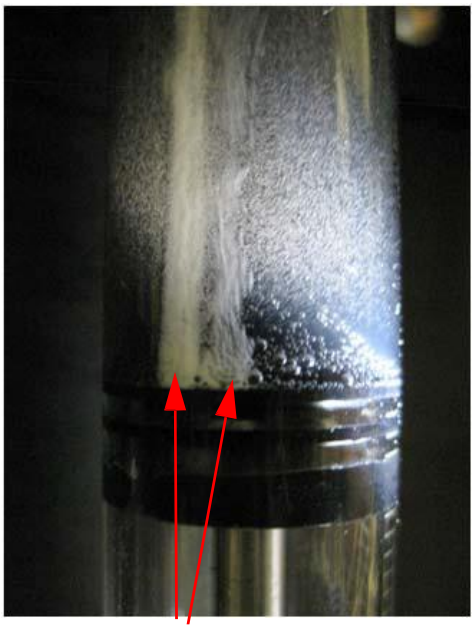
   Step Result: The syringes will begin to move as the dialog box states.

   At the point where the syringes are bottomed out and start to move up, you will want to pay attention to the top of each syringe plunger for air moving across the seal.

Note: There may be bubbles in the fluid or on top of the fluid slug in the syringe. This is normal and should be ignored.

Step Result: If there is a leak in the syringe, it will show as a stream of bubbles traveling up into the fluid slug, much like air bubbles in a fish tank, as illustrated below.

Figure 6.10: Syringe Leak Test, Syringes Moved to Bottom



Leaks in the syringe (extreme case) - you may see a smaller amount of air flow, and any air leaking through justifies replacing the syringe.

6. Another dialog box will display, asking if you want to run the syringes up and down again. Press "No" to end the Syringe Leak test.

Note: Be sure to run "Syringe Calibration" on page 6-9 if you replace any syringes.

6.4.1.6 Syringe Digital Signals

This test runs quickly and requires no input.

To begin the test, press Syringe Digital Signals. The test runs automatically, and any errors are noted on the screen. The test will automatically retest the failed line.

Figure 6.12: Syringe Digital Signals Test in Progress

This test is normally used while working with RIS support.

6.4.1.7 Sep Vacuum

The Sep (separator) Vacuum test checks the decay rate of the separator and associated vacuum system.

This test may not run correctly if another test has been run previously. Check the position of all valves and vents and make sure they are in the default position before running the test.

To start the test, press Sep Vacuum. The test runs automatically and does not require any input.

Figure 6.12: Syringe Digital Signals Test in Progress

The test turns on the vacuum pump, runs it for seven seconds, then shows the vacuum level at the separator.

The test then measures the vacuum decay for ten seconds and displays the output.

A normal rate of decay is approximately 1 inHg per second. Due to a software glitch, the program may show a passing decay rate but fail the test. Use your best judgment with the outcome of this test.

A rate of decay of greater than 2 inHg per second indicates a leak in the separator vacuum system.

The most common cause of this type of leak is the waste cleanup wand being stuck open internally. Remove and clean the wand assembly thoroughly to remedy this problem.

If the wand is not the cause of the leak, go through the vacuum system and check all fittings for loose or leaking tubing connections. Also check and tighten the separator jar body to the lid if necessary.

Figure 6.12: Syringe Digital Signals Test in Progress