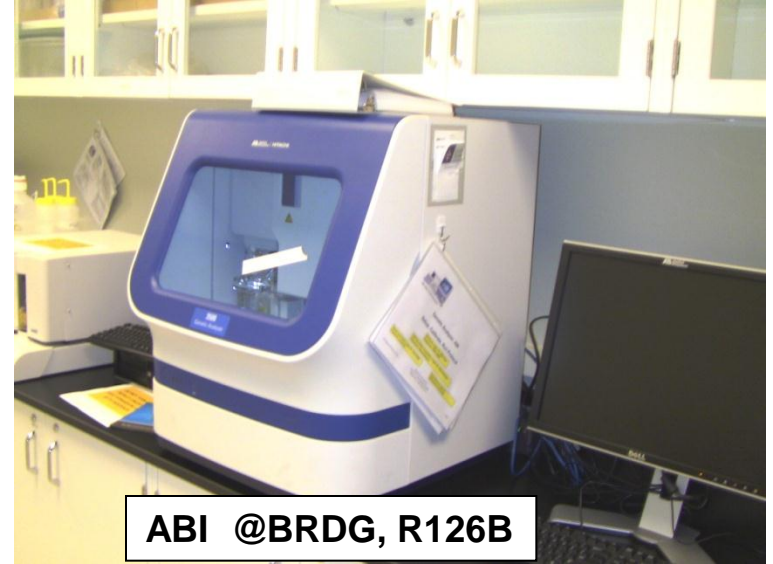




**ABI 3500 Genetic Analyzer**



**ABI @BRDG, R126B**

# **Genetic Analyzer: ABI Theory and Description**

**Windows Logon ID: 3500-User  
Password: 3500-USER**

**Delete LOGON boxes  
before publishing)**

**3500 Run/Data Acquisition Logon ID: Administrator  
Password: Administrator1**

**Sequence Analysis Logon ID : SLCC3500  
Password: password**

**Gene Mapping Logon ID :gm  
Password: SLCC3500**

# Genetic Analyzer: Applied Biosystems 3500 Analyzer

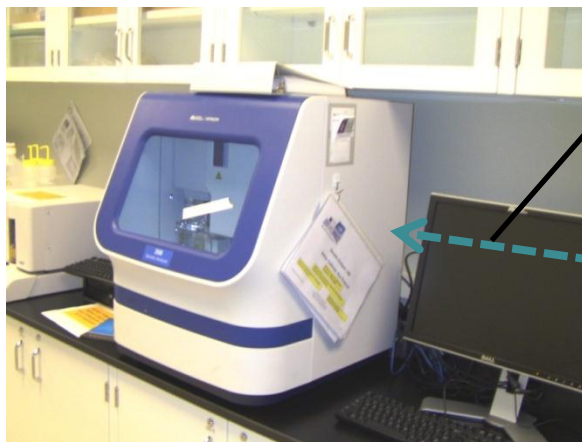


- Main Power Voltage • 100-240V  $\pm$  10% • 50-60 Hz  $\pm$  10%
- Laser Long-life, single-line 505nm, solid-state laser excitation source
- Electrophoresis Voltage Up to 20 kV
- Oven Temperature Active temperature control from 18°C–70°C
- Minimum Computer Requirements • Hardware: Pentium® IV Processor, 1.86 GHz Processor
- Operating System: Windows® Vista® SP1
- Installed RAM: 2GB
- Hard Drive: 1 x 80GB 7200 RPM SATA 3.0Gb/s and 8MB Data Burst Cache
- Operating Environment • Temperature: 15°C–30°C (Room temperature should not fluctuate  $\pm$  2°C during an instrument run)
- Humidity: 20%–80% (non-condensing)
- Current Maximum: 15 amps
- Maximum Power Dissipation 417VA, 371W (approximately not including computer and monitor)
- Dimensions of Electrophoresis Unit • Width (closed-door): 61cm
- Width (open-door): 122 cm
- Depth: 61 cm
- Height: 72 cm
- Weight: 82 kg (approximately)
- Service and Warranty • One-year limited warranty on parts and labor
- Service installation
- Application training

- **8 capillary system that can easily be upgraded to a 24-capillary system when you're ready**
- **New single-line 505 nm, solid-state long-life laser—utilizes a standard power supply; requires no heat-removal ducting**
- **Powerful, integrated data collection and primary analysis software provides real-time assessment of data quality**
- **Radio Frequency Identification (RFID) technology tracks key consumables data and records administrative information**
- **Advanced multiplexing capabilities for DNA fragment analysis with up to six unique dyes**
- **Unrivaled application flexibility—one array and one polymer are used for most applications**
- **Simple setup, operation and maintenance—the easiest-to-run, easiest-to-own DNA sequencer to date**

# Genetic Analyzer: Applied Biosystems Information

Online Information and Worldwide Sites: [www.appliedbiosystems.com/](http://www.appliedbiosystems.com/)  
Online Support and Information: [www.appliedbiosystems.com/support/](http://www.appliedbiosystems.com/support/)  
Online Computer Session Support: [abi.webex.com/](http://abi.webex.com/)  
[Equipment Information](#)  
Instrument Model: 3500 (ex: 3500 or 7900 or SOLID)  
Instrument Serial Number: 22117-071 (ex: 2009XXX)  
Computer Mfr Model: Optiplex 960 (ex: Optiplex™ 960 or Latitude E6500)  
Computer Mfr Serial Number (SN): Service Tag H26PVL1 (ex: FMWXXXX)  
Other Equipment & SN (as applicable): Xress Svc. Code: 37137517093 (  
[Software/Firmware Information](#)  
Computer Operating System & SP: Vista SP2 (ex: Win XP Pro SP3 or Vista Bus SP1)  
Instrument Software & Version: DC1.0 (ex: Data Collection ver 3.0)  
Other Software/Firmware & Version: GM4.1 (ex: Genepmapper 4.0)  
Other Software/Firmware & Version: Seq-A 5.4 (ex: Seq Analysis v5.3)  
Other Software/Firmware & Version: VR1.1 (ex: SDS 1.2.3)  
Products & Service: 800-831-6844  
Field Service Engineer: John Buck



Ethernet NIC Motherboard  
to ABI Instrument rear panel



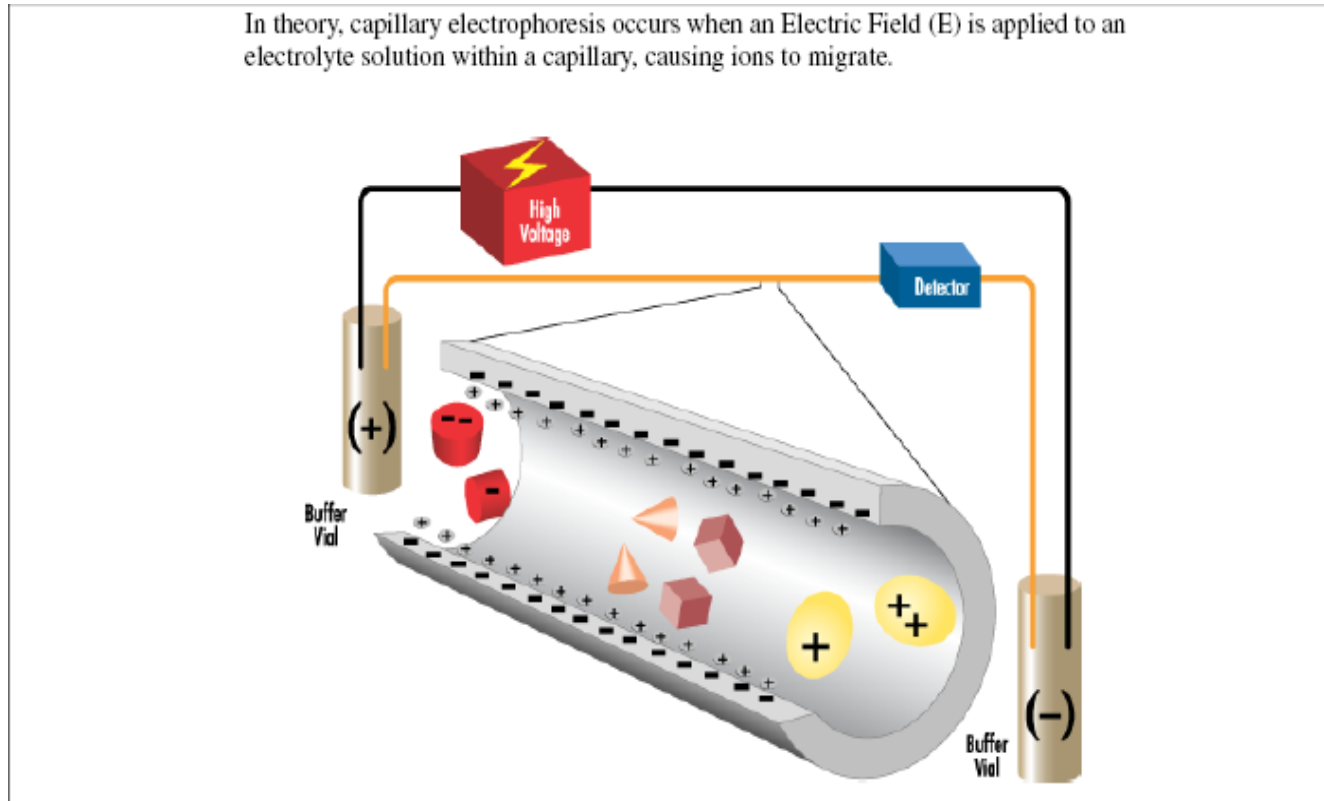
Ethernet to LAN Internet →

[Link to ABI 3500 User Manual...pdf \(18mb\)](#)

[Link to Sequencing Protocol from BB ...pdf](#)

# Genetic Analyzer: Capillary Electrophoresis Overview

[Link to Animation of Automated DNA sequencing at Cold Spring Harbor website.](#)



- Driving force on ions is the applied electrical field to the electrolyte within a capillary
- DNA fragments are separated as they migrate by size exclusion Sieving effect
- Dye labeled fragments detected by fluorescence and laser and rendered into the sequence

*Craig Venter, who founded Celera began his college career at the Community College of San Mateo in CA*

# Genetic Analysis: ABI Videos; Basic System Overview, Big-Dye Sequencing, Fragment Analysis

[ABI Big Dye Direct Sequencing Process](#)

[http://www.youtube.com/watch?v=cqFTGQ\\_JO1c&feature=relmfu](http://www.youtube.com/watch?v=cqFTGQ_JO1c&feature=relmfu)

[ABI 3500 System Overview for Sequencing and Fragment Analysis](#)

<http://www.youtube.com/watch?v=RY2Rn2ggjdA&feature=relmfu>

[ABI Fragment Analysis](#)

<http://www.youtube.com/watch?v=43-OQTLtrwQ>

[ABI Introduction to Gene Expression](#)

# Genetic Analyzer: ABI 3500 Theory of; During Run

- Prepares the capillary by pumping fresh polymer solution under high pressure from the polymer delivery pump to the waste position in the Cathode Buffer Container (CBC).
- Electrokinetically injects the sample into the capillary using a low-voltage for a few seconds.
- Washes the capillary tips in the rinse position of the CBC, then returns the capillary to the buffer position of the CBC.
- Ramps the voltage up to a constant voltage.

A high electric field is created between the ground end of the Anode Buffer Container (ABC) and the negative voltage applied to the load header of the capillary array. This field pulls the negatively charged DNA through the separation polymer. The smaller fragments migrate faster than the larger fragments and reach the detector first.

To insure optimal separation and maintain denaturation of the DNA, the capillaries are thermally controlled in the oven and in the detection cell. The oven has a Peltier heat unit and fan-circulated air. The Peltier can heat and cool the oven to maintain sub-ambient temperatures, which are useful for non-denaturing applications such as SSCP (Single-strand conformation polymorphism).

- In the detection cell, the dyes attached to DNA are excited by a narrow beam of laser light. The laser light is directed into the plane of the capillaries from both the bottom and top. A small amount of laser light is absorbed by the dyes and emitted as longer wavelength light in all directions.

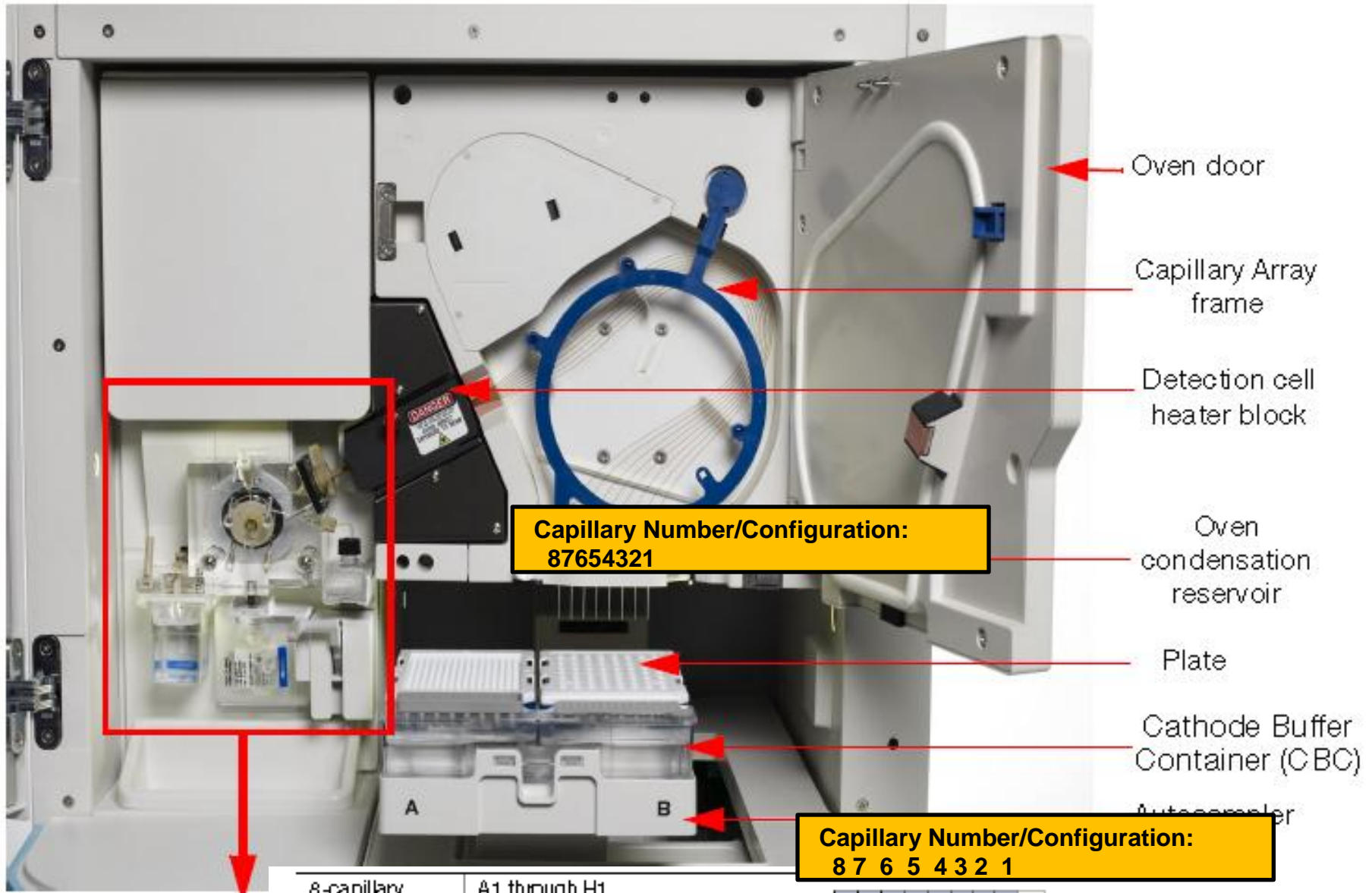
# Genetic Analyzer: ABI 3500 Theory of Operation: Results

The software generates an electropherogram (intensity plot) for each dye based on the migration of DNA fragments over the run and generates primary analysis results:

- For sequencing applications, the electropherogram is adjusted to compensate for slight mobility differences due to the dyes, then basecalling is performed and quality values are assigned.
- For fragment and HID analysis, the software uses the internal size standard to assign a fragment size and a sizing quality value to each peak.

If the autoanalysis functionality has been set up, the system transfers the sample data to a secondary analysis software application for further processing. Alternatively, you can manually transfer the sample data to a secondary analysis software application for further processing.

# Genetic Analyzer: ABI 3500 Interior (Upper Portion)



**Capillary Number/Configuration:  
87654321**

**Capillary Number/Configuration:  
8 7 6 5 4 3 2 1**



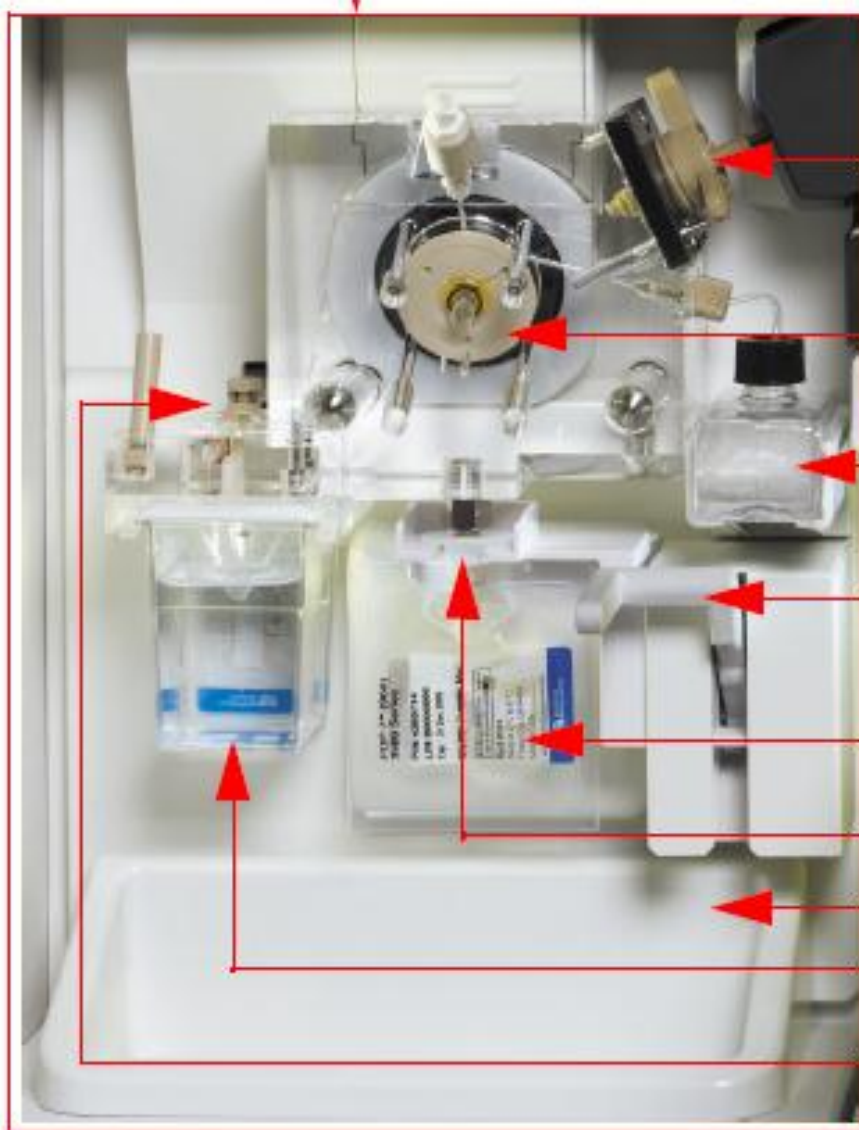
8-capillary  
96-well plate

A1 through H1

I	II	III	IV	V	VI	VII	VIII	IX	X
									1
									2
									3
									4



# Genetic Analyzer: ABI, Interior (Lower portion)



Array-head lock mechanism

Polymer Delivery Pump (PDP)

Water Trap Waste Container

Lever to install and remove polymer pouch

Polymer pouch

Check Valve (CV) Fitting

Drip Tray

Anode Buffer Container (ABC)

Buffer-Pin Valve

# Genetic Analyzer: ABI 3500 Parts and Function of Each

Part	Function
Autosampler	Holds the sample plates and Cathode Buffer Container (CBC) and moves to align the plates and CBC with the capillaries.
Oven	Maintains uniform capillary array temperature.
Oven condensation reservoir	Collects condensation from the oven.
Pump block	Includes the displacement pump chamber, polymer chambers, piston water seal, syringe fitting array attachment point (array port), the lower polymer block, and the CV/Fitting (Check Valve pouch attachment fitting).
Detection cell heater block	Holds the detection cell in place for laser detection and maintains the detection cell temperature of 50 °C.
Polymer Delivery Pump (PDP)	Pumps polymer into the array and allows for automated maintenance procedures.
Lower polymer block	Contains the buffer valve, anode electrode, buffer gasket, and holds the anode buffer container.
Radio Frequency Identification (RFID)	RFID tags to read the following information for primary instrument consumables:
Capillary Array	Enables the separation of the fluorescent-labeled DNA fragments by electrophoresis. It is a replaceable unit composed of 8 or 24 capillaries (50 cm and 36 cm length). <b>Note:</b> The 36 cm capillary is for HID applications, only.
Anode Buffer Container (ABC)	The Anode Buffer Container (ABC) contains 1X running buffer to support all electrophoresis applications on the instrument. It has a built-in overflow chamber to maintain constant fluid height.
Cathode Buffer Container (CBC)	The Cathode Buffer Container (CBC) contains 1X running buffer to support all electrophoresis applications on the instrument.
Polymer pouch	Supplies polymer to the Polymer Delivery Pump.
Conditioning reagent	The pouch is used for priming the polymer pump, washing the polymer pump between polymer type changes, and during instrument shut down. It has adequate volume for a one-time use.

# Genetic Analyzer: ABI 3500 Run/Acquisition Dashboard

Library Maintenance Tools Manage Preferences Help Log Out

## Common Operations



## Quick View

### Gauges

#### POP7 Polymer



574 Samples Remaining  
(34 Injections Remaining)

#### AB 356 Buffer - (Anode)



7 Days Remaining  
(96 Injections Remaining)

#### AB 356 Buffer - (Cathode)



7 Days Remaining  
(96 Injections Remaining)

#### 50cm - 24 cap



43 Injections Remaining

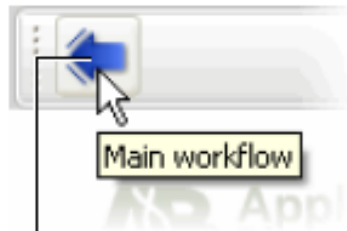
## Consumables Information

Refresh

Consumable	Name	Status	Days on Instrument	Expiration Date	Lot Number	Part Number
Polymer	POP7	574 Samples Remaining	1	28-Mar-2009 11...	51A007	4315230
Anode Buffer	AB 356 Buffer	5 Days Remaining	1	28-Mar-2010 11...	518007	4315931
Cathode Buffer	AB 356 Buffer	5 Days Remaining	1	28-Mar-2009 11...	518007	4315931
Capillary Array	50cm - 24 cap	117 Injections Remaining	80	31-Dec-2009 11...	806005	4319699 - Serial # 606245

## Maintenance Notifications

Name	Priority	Notification Date	Description	Action
Replace cathode buffer c...	HIGH	22-Mar-2009 1...	Replace c...	✓ ✗
Clean Drip Tray	HIGH	22-Mar-2009 1...	Clean Drip...	✓ ✗
Clean Autosampler	HIGH	22-Mar-2009 1...	Clean Aut...	✓ ✗
Restart computer, Instru...	MEDIUM	22-Mar-2009 1...	Restart co...	✓ ✗
Defragment Hard Drive	MEDIUM	22-Mar-2009 1...	Defragme...	✓ ✗



Main workflow

