ABI PRISM® 310

Instrument DNA Analyzer Diagnostics System

User's Manual

Applied Biosystems

For Research Use Only. Not for use in diagnostic procedures.

Please see the *ABI PRISM 310 DNA Analyzer User's Manual* for limited license information.

Applera Corporation is committed to providing the world's leading technology and information for life scientists. Applera Corporation consists of the Applied Biosystems and Celera Genomics businesses.

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About This User's Manual

1

Introduction

Purpose of This Chapter

This chapter provides a general introduction to the ABI PRISM® 310 Diagnostics System software. It also provides information about the organization of the manual and instructions on how to get help from Applied Biosystems.

In This Chapter

The following topics are covered in this chapter:

Safety

Documentation User Attention Words

Five user attention words appear in the text of all Applied Biosystems user documentation. Each word implies a particular level of observation or action as follows.

Note This word is used to call attention to information.

IMPORTANT This word calls attention to information that is necessary for correct operation of the instrument.

CAUTION This word informs the user that damage to the instrument could occur if the user does not comply with the information. It also indicates a potentially hazardous situation that could result in minor or moderate injury to the user.

! WARNING ! This word informs the user that serious physical injury or illness to the user or other persons could occur if these required precautions are not taken.

! DANGER ! Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

Site Preparation and Safety Guide

A Site Preparation and Safety Guide is a separate document sent to all customers who have purchased an Applied Biosystems instrument. Refer to the Guide written for your instrument for information on site preparation, instrument safety, chemical safety and waste profiles.

Safe and Efficient Computer Use

Operating the computer correctly prevents stress-producing effects such as fatigue, pain, and strain.

In order to minimize these effects on your back, legs, eyes, and upper extremities (neck, shoulder, arms, wrists, hands and fingers), design your workstation to promote neutral or relaxed working positions. This includes working in an environment where heating, air conditioning, ventilation, and lighting are set correctly. See the guidelines below.

Note MUSCULOSKELETAL AND REPETITIVE MOTION HAZARD. These hazards are caused by the following potential risk factors which include, but are not limited to: repetitive motion, awkward posture, forceful exertion, holding static unhealthy positions, contact pressure, and other workstation environmental factors.

Guidelines for Safe and Efficient Computer Use:

Step	Action
1	Use a seating position that provides the optimum combination of comfort, accessibility to the keyboard, and freedom from fatigue-causing stresses and pressures. Three basic requirements are: ♦ The bulk of the person's weight should be supported by the buttocks, not the thighs. ♦ Feet should be flat on the floor and the weight of the legs should be supported by the floor, not the thighs. ♦ Lumbar support should be provided to maintain the proper concave curve of the spine.
2	Place the keyboard on a surface that provides: ♦ The proper height to position the forearms horizontally and upper arms vertically. ♦ Support for the forearms and hands to avoid muscle fatigue in the upper arms.
3	Position the viewing screen to the height that allows normal body and head posture. This height depends upon the physical proportions of the user.
4	Adjust vision factors to optimize comfort and efficiency by: ♦ Adjusting screen variables, such as brightness, contrast, and color, to suit personal preferences and ambient lighting. ♦ Positioning the screen to minimize reflections from ambient light sources. ♦ Positioning the screen at a distance that takes into account user variables such as nearsightedness, farsightedness, astigmatism, and the effects of corrective lenses.

Guidelines for Safe and Efficient Computer Use: *(continued)*

Step	Action
5	When considering the user's distance from the screen, the following are useful guidelines: ♦ The distance from the user's eyes to the viewing screen should be approximately the same as the distance from the user's eyes to the keyboard. ♦ For most people, the reading distance that is the most comfortable is approximately 20 inches. ♦ The workstation surface should have a minimum depth of 36 inches to accommodate distance adjustment. ♦ Adjust the screen angle to minimize reflection and glare, and avoid highly reflective surfaces for the workstation.
6	Use a well-designed copy holder, adjustable horizontally and vertically, that allows referenced hard copy material to be placed at the same viewing distance as the screen and keyboard.
7	Keep wires and cables out of the way of users and passers-by.
8	Choose a workstation that has a surface large enough for other tasks and that provides sufficient leg room for adequate movement.

Manual Contents

Assumptions Made

This manual is written for all users of the ABI PRISM® 310 Genetic Analyzer.

Overview of the Contents

This manual explains how to install and use the Diagnostics System software. The Diagnostics System software enables you to verify the performance of the 310 instrument and to diagnose problems when troubleshooting.

This manual consists of the following chapters:

Chapter	Content
1	About This User's Manual
2	Getting Started
3	Software Overview
4	Running Instrument Tests
5	Troubleshooting

Related Manuals

ABI PRISM 310 Genetic Analyzer User's Manual (P/N 903565).

About Diagnostics System Software

Introduction

The Diagnostics System software provides an important tool for validating the performance of the 310 instrument, and for diagnosing potential instrument problems.

How It Is Used

Using the Diagnostics System software, you can:

- Perform instrument validation tests
- Distinguish between instrument and chemistry problems
- Identify potential instrument subsystem failures
- Switch between the Diagnostics System software and the ABI PRISM® 310 Data Collection Software
- Access all troubleshooting and online help windows from the Main menu, as well as from each test component window

Technical Support

Contacting Technical Support

You can contact Applied Biosystems for technical support by telephone or fax, by e-mail, or through the Internet. You can order Applied Biosystems user documents, MSDSs, certificates of analysis, and other related documents 24 hours a day. In addition, you can download documents in PDF format from the Applied Biosystems Web site (please see the section "To Obtain Documents on Demand" following the telephone information below).

To Contact Technical Support by E-Mail

Contact technical support by e-mail for help in the following product areas:

Product Area	E-mail address
Genetic Analysis (DNA Sequencing)	galab@appliedbiosystems.com
Sequence Detection Systems and PCR	pcrlab@appliedbiosystems.com
Protein Sequencing, Peptide and DNA Synthesis	corelab@appliedbiosystems.com
Biochromatography, PerSeptive DNA, PNA and Peptide Synthesis systems, CytoFluor®, FMAT™, Voyager™, and Mariner™ Mass Spectrometers	tsupport@appliedbiosystems.com
LC/MS (Applied Biosystems/MDS Sciex)	apisupport@sciex.com or api3-support@sciex.com
Chemiluminescence (Tropix)	tropix@appliedbiosystems.com

Hours for Telephone Technical Support

In the United States and Canada, technical support is available at the following times:

Product	Hours
Chemiluminescence	8:30 a.m. to 5:30 p.m. Eastern Time
Framingham support	8:00 a.m. to 6:00 p.m. Eastern Time
All Other Products	5:30 a.m. to 5:00 p.m. Pacific Time

To Contact Technical Support by Telephone or Fax

In North America

To contact Applied Biosystems Technical Support, use the telephone or fax numbers given below. (To open a service call for other support needs, or in case of an emergency, dial **1-800-831-6844** and press **1**.)

Product or Product Area	Telephone Dial...	Fax Dial...
ABI PRISM® 3700 DNA Analyzer	**1-800-831-6844,** then press **8**	**1-650-638-5981**
DNA Synthesis	**1-800-831-6844**, then press **21**	**1-650-638-5981**
Fluorescent DNA Sequencing	**1-800-831-6844**, then press **22**	**1-650-638-5981**
Fluorescent Fragment Analysis (includes GeneScan® applications)	**1-800-831-6844**, then press **23**	**1-650-638-5981**
Integrated Thermal Cyclers (ABI PRISM®877 and Catalyst 800 instruments)	**1-800-831-6844**, then press **24**	**1-650-638-5981**
ABI PRISM® 3100 Genetic Analyzer	**1-800-831-6844**, then press **26**	**1-650-638-5981**
BioInformatics (includes BioLIMS®, BioMerge™, and SQL GT™ applications)	**1-800-831-6844**, then press **25**	**1-505-982-7690**
Peptide Synthesis (433 and 43X Systems)	**1-800-831-6844**, then press **31**	**1-650-638-5981**
Protein Sequencing (Procise® Protein Sequencing Systems)	**1-800-831-6844**, then press **32**	**1-650-638-5981**
PCR and Sequence Detection	**1-800-762-4001**, then press **1** for PCR, **2** for the 7700 or 5700, **6** for the 6700 or dial **1-800-831-6844**, then press **5**	**1-240-453-4613**

Product or Product Area	Telephone Dial...	Fax Dial...
Voyager™ MALDI-TOF Biospectrometry and Mariner™ ESI-TOF Mass Spectrometry Workstations	**1-800-899-5858**, then press **13**	**1-508-383-7855**
Biochromatography (BioCAD® Workstations and Poros® Perfusion Chromatography Products)	**1-800-899-5858**, then press **14**	**1-508-383-7855**
Expedite™ Nucleic acid Synthesis Systems	**1-800-899-5858**, then press **15**	**1-508-383-7855**
Peptide Synthesis (Pioneer™ and 9050 Plus Peptide Synthesizers)	**1-800-899-5858**, then press **15**	**1-508-383-7855**
PNA Custom and Synthesis	**1-800-899-5858,** then press **15**	**1-508-383-7855**
FMAT™ 8100 HTS System and Cytofluor® 4000 Fluorescence Plate Reader	**1-800-899-5858**, then press **16**	**1-508-383-7855**
Chemiluminescence (Tropix)	**1-800-542-2369** (U.S. only), or **1-781-271-0045**	**1-781-275-8581**
Applied Biosystems/MDS Sciex	**1-800-952-4716**	**1-650-638-6223**

Outside North America

Region	Telephone Dial...	Fax Dial...
Africa and the Middle East		
Africa (English Speaking) and West Asia (Fairlands, South Africa)	**27 11 478 0411**	**27 11 478 0349**
South Africa (Johannesburg)	**27 11 478 0411**	**27 11 478 0349**
Middle Eastern Countries and North Africa (Monza, Italia)	**39 (0)39 8389 481**	**39 (0)39 8389 493**

Region	Telephone Dial...	Fax Dial...
Eastern Asia, China, Oceania		
Australia (Scoresby, Victoria)	**61 3 9730 8600**	**61 3 9730 8799**
China (Beijing)	**86 10 64106608**	**86 10 64106617**
Hong Kong	**852 2756 6928**	**852 2756 6968**
Korea (Seoul)	**82 2 593 6470/6471**	**82 2 593 6472**
Malaysia (Petaling Jaya)	**60 3 758 8268**	**60 3 754 9043**
Singapore	**65 896 2168**	**65 896 2147**
Taiwan (Taipei Hsien)	**886 2 2358 2838**	**886 2 2358 2839**
Thailand (Bangkok)	**66 2 719 6405**	**66 2 319 9788**
Europe		
Austria (Wien)	**43 (0)1 867 35 75 0**	**43 (0)1 867 35 75 11**
Belgium	**32 (0)2 712 5555**	**32 (0)2 712 5516**
Czech Republic and Slovakia (Praha)	**420 2 61 222 164**	**420 2 61 222 168**
Denmark (Naerum)	**45 45 58 60 00**	**45 45 58 60 01**
Finland (Espoo)	**358 (0)9 251 24 250**	**358 (0)9 251 24 243**
France (Paris)	**33 (0)1 69 59 85 85**	**33 (0)1 69 59 85 00**
Germany (Weiterstadt)	**49 (0) 6150 101 0**	**49 (0) 6150 101 101**
Hungary (Budapest)	**36 (0)1 270 8398**	**36 (0)1 270 8288**
Italy (Milano)	**39 (0)39 83891**	**39 (0)39 838 9492**
Norway (Oslo)	**47 23 12 06 05**	**47 23 12 05 75**
Poland, Lithuania, Latvia, and Estonia (Warszawa)	**48 (22) 866 40 10**	**48 (22) 866 40 20**
Portugal (Lisboa)	**351 (0)22 605 33 14**	**351 (0)22 605 33 15**
Russia (Moskva)	**7 095 935 8888**	**7 095 564 8787**
South East Europe (Zagreb, Croatia)	**385 1 34 91 927**	**385 1 34 91 840**
Spain (Tres Cantos)	**34 (0)91 806 1210**	**34 (0)91 806 1206**
Sweden (Stockholm)	**46 (0)8 619 4400**	**46 (0)8 619 4401**
Switzerland (Rotkreuz)	**41 (0)41 799 7777**	**41 (0)41 790 0676**
The Netherlands (Nieuwerkerk a/d IJssel)	**31 (0)180 331400**	**31 (0)180 331409**

Region	Telephone Dial...	Fax Dial...
United Kingdom (Warrington, Cheshire)	**44 (0)1925 825650**	**44 (0)1925 282502**
All other countries not listed (Warrington, UK)	**44 (0)1925 282481**	**44 (0)1925 282509**
Japan		
Japan (Hacchobori, Chuo-Ku, Tokyo)	**81 3 5566 6230**	**81 3 5566 6507**
Latin America		
Del.A. Obregon, Mexico	**305-670-4350**	**305-670-4349**

To Reach Technical Support Through the Internet

We strongly encourage you to visit our Web site for answers to frequently asked questions and for more information about our products. You can also order technical documents or an index of available documents and have them faxed or e-mailed to you through our site. The Applied Biosystems Web site address is

http://www.appliedbiosystems.com/techsupp

To submit technical questions from North America or Europe:

Step	Action
1	Access the Applied Biosystems Technical Support Web site.
2	Under the **Troubleshooting** heading, click **Support Request Forms**, then select the relevant support region for the product area of interest.
3	Enter the requested information and your question in the displayed form, then click **Ask Us RIGHT NOW** (blue button with yellow text).
4	Enter the required information in the next form (if you have not already done so), then click **Ask Us RIGHT NOW**. You will receive an e-mail reply to your question from one of our technical experts within 24 to 48 hours.

To Obtain Documents on Demand

Free, 24-hour access to Applied Biosystems technical documents, including MSDSs, is available by fax or e-mail or by download from our Web site.

To order documents...	Then...
by index number	a. Access the Applied Biosystems Technical Support Web site at **http://www.appliedbiosystems.com/techsupp** b. Click the **Index** link for the document type you want, then find the document you want and record the index number. c. Use the index number when requesting documents following the procedures below.
by phone for fax delivery	a. From the U.S. or Canada, call **1-800-487-6809,** or from outside the U.S. and Canada, call **1-858-712-0317**. b. Follow the voice instructions to order the documents you want. **Note** There is a limit of five documents per request.
through the Internet for fax or e-mail delivery	a. Access the Applied Biosystems Technical Support Web site at **http://www.appliedbiosystems.com/techsupp** b. Under **Resource Libraries**, click the type of document you want. c. Enter or select the requested information in the displayed form, then click **Search**. d. In the displayed search results, select a check box for the method of delivery for each document that matches your criteria, then click **Deliver Selected Documents Now** (or click the PDF icon for the document to download it immediately). e. Fill in the information form (if you have not previously done so), then click **Deliver Selected Documents Now** to submit your order. **Note** There is a limit of five documents per request for fax delivery but no limit on the number of documents you can order for e-mail delivery.

2 Getting Started

Introduction

Purpose of This Chapter

This chapter describes how to install and run the ABI PRISM® 310 Diagnostics System software. This chapter also describes settings required for communication with the ABI PRISM® 310 Genetic Analyzer.

In This Chapter

The following topics are covered in this chapter:

Installing the Software

How to Install the Software

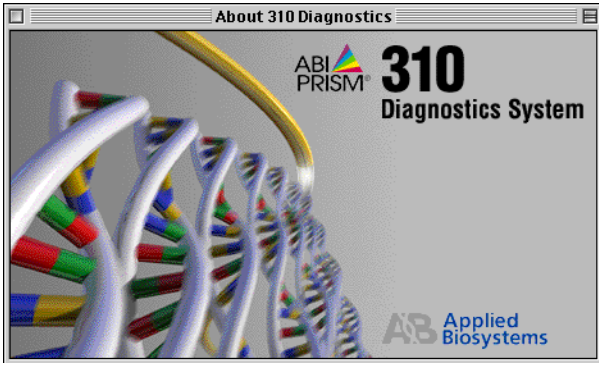
To install the Diagnostics System software from a CD-ROM:

Step	Action
1	Insert the CD into the CD-ROM drive of your Macintosh® computer
2	Double-click the CD image on the desktop to open the CD.
3	Select the **310 Diagnostics Software v.1.5** folder and drag it to your hard drive. The Diagnostics System software is ready to use.

Running the Program

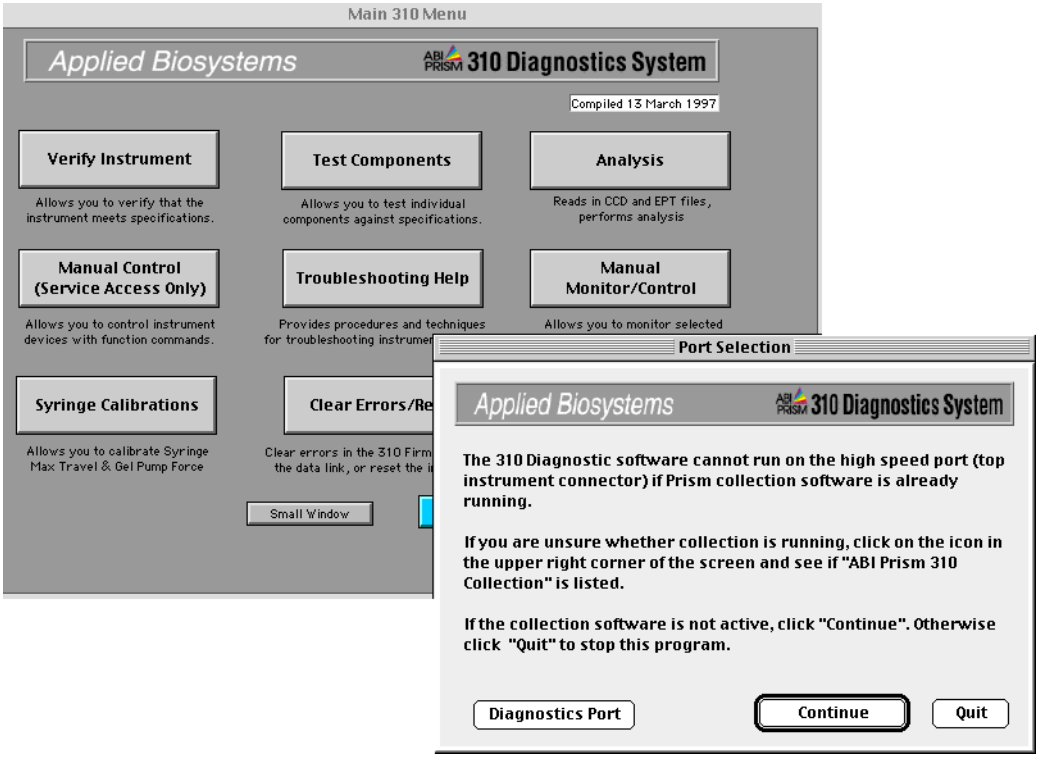
Startup Display

A startup display appears each time you open the application:



Port Selection

The Main 310 Menu appears next, followed by the Port Selection dialog box:



The Port Selection dialog box appears because you cannot run both the ABI PRISM® Data Collection Software and Diagnostics System software at the same time.

Running Diagnostics

To run the Diagnostics System software:

Step	Action
1	Determine if the Data Collection software is running. **Note** If you are unsure whether Data Collection software is running, click the Macintosh **Finder** icon and see if **ABI PRISM 310 Collection** is listed.
2	If the Data Collection software is not running, click the **Continue** button. The **Set Communications Mode** dialog box opens.
3	If the Data Collection software is running: ♦ Click the **Quit** button in the **Port Selection** dialog box ♦ Close the Data Collection software program ♦ Open the Diagnostics System software again
4	When **Port Selection** reappears, click the **Continue** button. The **Set Communications Mode** dialog box opens.

Communicating with the Instrument

Cable Connection

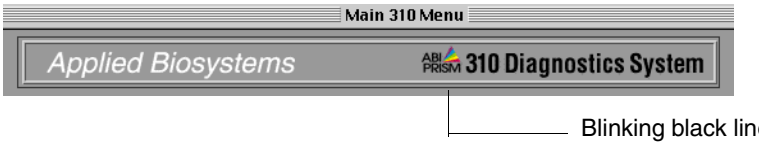
The Diagnostics System software and the Data Collection software use the same cable and ports.

If the cable is not installed, plug it into the Macintosh computer modem port and the port labeled Control/Data on the 310 instrument.

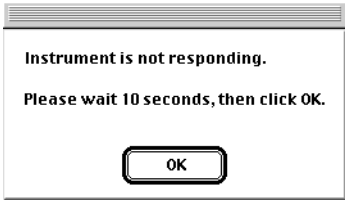
Establishing Communication

When you open the application, the Macintosh attempts to establish communication with the 310 instrument.

To set the Macintosh–310 instrument communication mode:

Step	Action
1	The **Set Communications Mode** dialog box is shown below. 
2	If communication is established, this dialog box closes and a fine black line around the Applied Biosystems logo appears and blinks on and off, indicating that communication is occurring: 

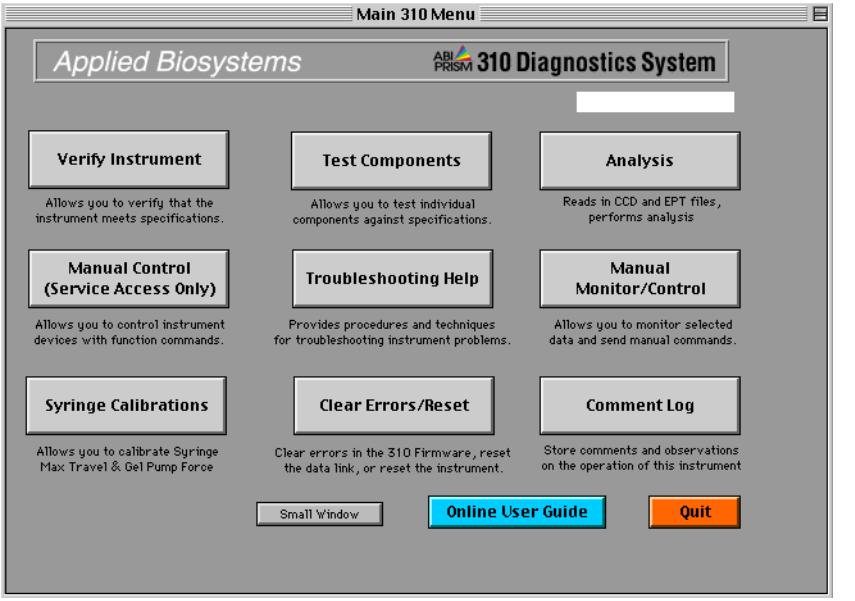
To set the Macintosh–310 instrument communication mode: *(continued)*

Step	Action
3	If communication is not established, a message box appears as shown below.  Wait 10 seconds, then click **OK** to attempt a second communication.
4	If the second attempt fails: a. click the **Abort** button in the **Set Communications Mode** dialog box b. click the **Clear Errors/Reset** button in the **Main 310 Menu** c. Select **Reset Communications** from the menu
5	Press the **Reset** button in the back of the instrument. **Note** For instructions on using the **Reset** button, click **Troubleshooting Help** in the **Main 310 Menu** window.

Exiting the Program

Quitting the Program

To quit the Diagnostics System software, you first return to the Main 310 Menu:



To quit the program:

Step	Action
1	In the **Main 310 Menu** window, click the **Quit** button. The Diagnostics System software closes.<

3 Software Overview

Introduction

Purpose of This Chapter

This chapter illustrates and describes the menus and windows in the ABI PRISM® 310 Diagnostics System software and shows how to navigate the software.

In This Chapter

The following topics are covered in this chapter:

Section: Main Menu Panels

In This Section The following topics are covered in this section:

Menus and Windows

Introduction

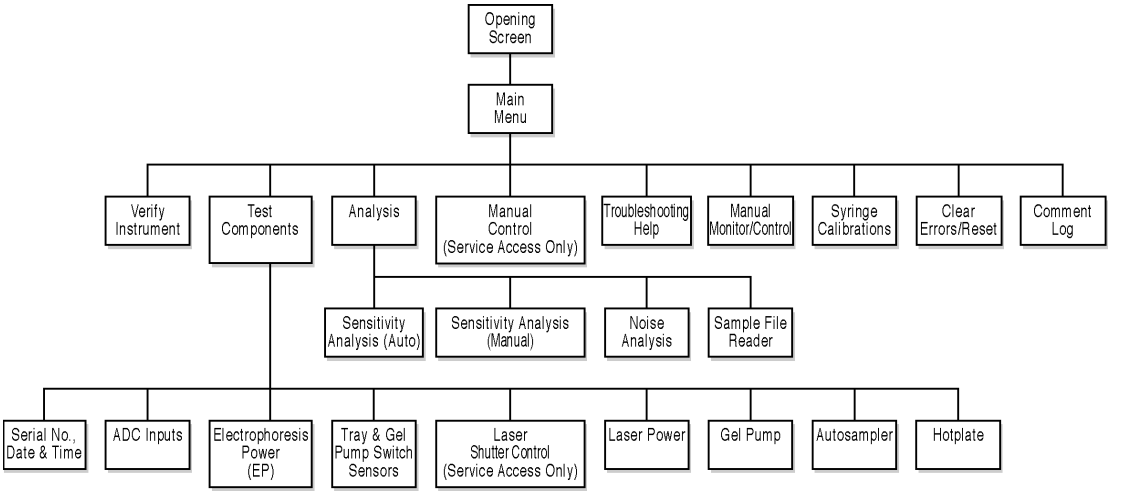
The Diagnostics System interface consists of a number of menus and windows.

Menus have buttons from which you can select a test. Windows have instructions for testing the ABI PRISM® 310 Genetic Analyzer, or one of its components.

Flow Diagram

The flow diagram of menus and windows shown below provides a layout of all the diagnostics menus and windows.

Note Many of these windows can only be accessed or used by service engineers.



Navigation

You can navigate from one menu or window to another by clicking buttons located on the menus and windows.

You must go back to a higher level of menu by clicking Return or Done to quit that particular menu or window before proceeding to another window.

Main Menu

Purpose

The Main 310 Menu window has four categories of tests:

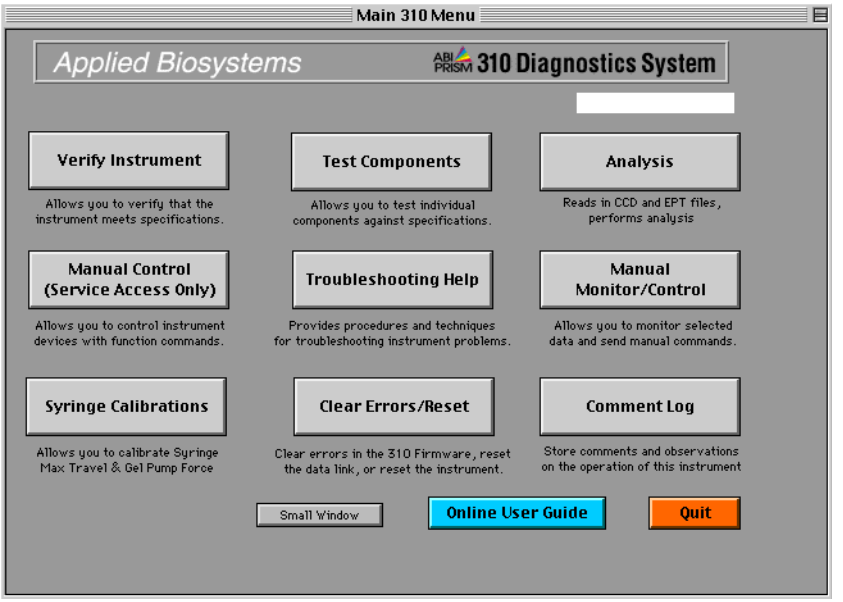
- Verify Instrument
- Test Components
- Analysis
- Syringe Calibrations

It also has help functions and utilities for Applied Biosystems service engineers.

You can access diagnostics tests and help windows using the buttons in the Main 310 Menu window.

Illustration

The Main 310 Menu window is shown below.



Main Menu Buttons

The function for each button is shown below.

Button	Function
Verify Instrument	Tests one or more selected components to be checked against specifications. Essential to validation protocols.
Test Components	Performs expanded testing for one selected component at a time. Some of these tests may be performed when an instrument problem is suspected.
Analysis	Performs several tests which are used in troubleshooting certain types of problems.
Manual Control	For the use of Applied Biosystems service engineers only. Allows independent function control of various subsystems.
Troubleshooting Help	Provides procedures and assistance for troubleshooting each major subsystem and run conditions.
Manual Monitor/Control	Intended for Applied Biosystems service engineers. Used to monitor selected data and send manual commands.
Syringe Calibrations	Used to calibrate syringe Max Travel and Gel Pump Force.
Clear Errors/Reset	Intended for Applied Biosystems service engineers. Used to clear errors in the 310 instrument firmware, reset the data link, and reset the instrument.
Comment Log	Used primarily by Applied Biosystems service engineers to enter information on recent service calls.
Window	Toggles between large and small window size.
Online User Guide	Displays the online *ABI PRISM 310 Diagnostics System User's Manual*.
Quit	Quits the Diagnostics System software.

Verify Instrument

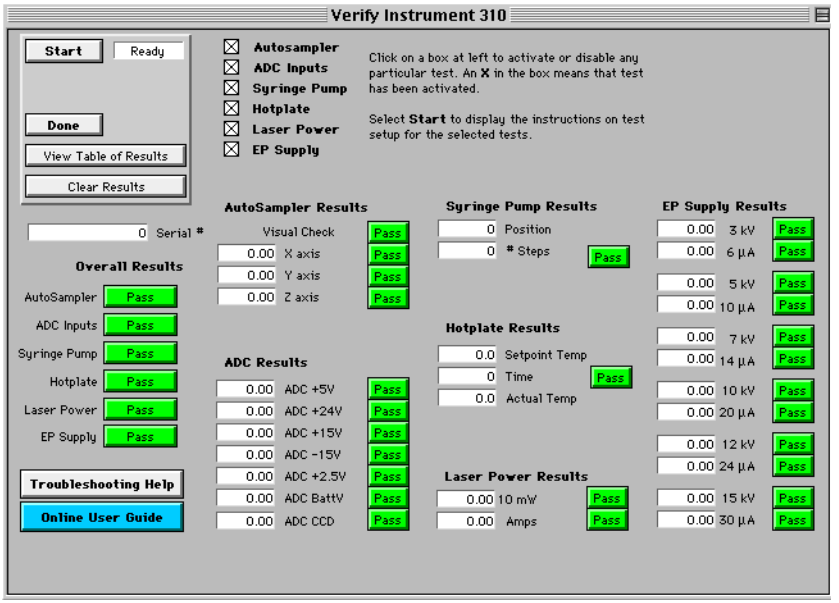
Purpose

The Verify Instrument test panel provides an overall view of the functionality of the 310 instrument.

Verify Instrument tests all 310 instrument subsystems. It is ideally suited for validation checks as it reconciles the 310 instrument performance with the specifications for each subsystem.

Illustration

The Verify Instrument 310 window is shown below.



Verify Instrument Window Parts

The Verify Instrument test panel has the following components:

Window Part	Function
Start or **Stop**	Starts the Verify Instrument test, which typically takes about 10 minutes to complete if all subtests are run. Click **Stop** to stop the test at any time.
Ready	Ready to start. Will also give the name of the test that is running.
Done	Exit the test.
View Table of Results	Shows test results after they are all completed.
Clear Results	Clears the test results currently displayed.
Overall Results	Shows test results for all subsystem tests as pass or fail.
Troubleshooting Help	Button flashes when a failure occurs. Click the **Troubleshooting Help** button to view on-screen procedures for troubleshooting instrument problems.
Online User Guide	Displays the online *ABI PRISM 310 Diagnostics System User's Manual*.
Test Selection	Tests can be selected or deselected using the checkboxes in the listing.
AutoSampler Results	Gives results of AutoSampler tests as pass or fail. Gives coordinates for x, y, z Home Sensing.
ADC Results	Gives results of tests for analog-to-digital conversion (ADC) signals as pass or fail and gives the achieved value for each test.
Syringe Pump Results	Gives the position of the syringe at the end of the test and the number of steps it took to move home from position 60. Indicates whether this is a pass or fail result.
Hotplate Results	Gives results of testing as pass or fail and gives the achieved value for each test.
EP Supply Results	Gives results of tests for the Electrophoresis Power (EP) supply as pass or fail and gives the achieved value for each test.
Laser Power Results	Gives test results as pass or fail and gives the achieved value in milliwatts and amperes.

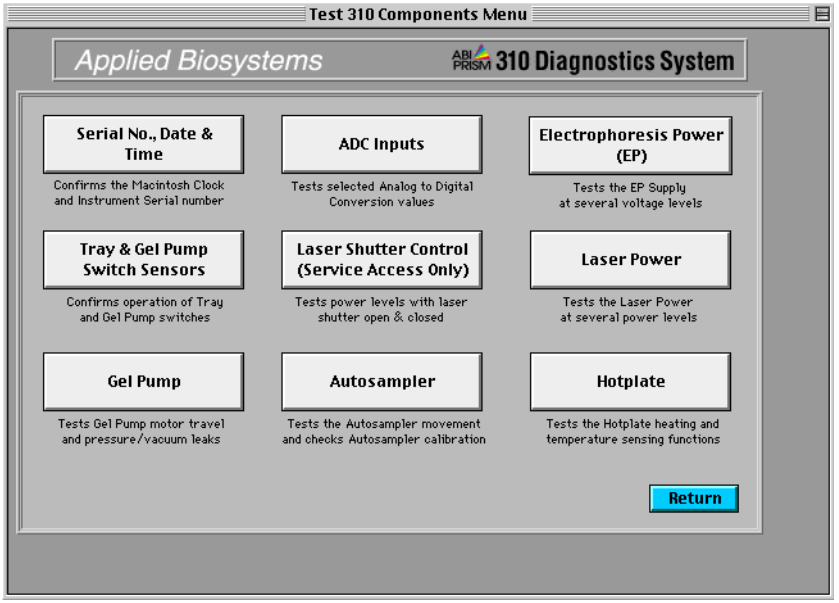
Test Components

Purpose

Test Components provides subsystem-specific tests that can be used when troubleshooting or when the Verify Instrument test indicates a subsystem problem.

Illustration

The Test 310 Components Menu window is shown below.



Test Instrument Buttons

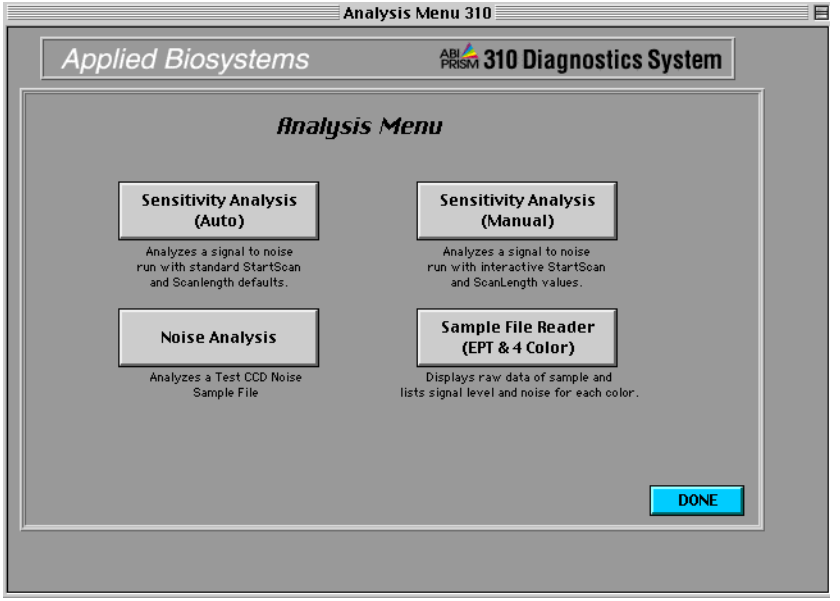
The function for each button is shown below.

Button	Function
Serial No., Date & Time	Gives the 310 instrument serial number and the date and time from the Macintosh® clock. Allows you to reset these values.
ADC Inputs	Tests selected analog-to-digital conversion values. Recommended for Applied Biosystems service engineers only.
Electrophoresis Power (EP)	Tests the EP supply at several voltage levels. Recommended for Applied Biosystems service engineers only.
Tray & Gel Pump Switch Sensors	Tests the tray and gel pump switches. Recommended for Applied Biosystems service engineers only.
Laser Shutter Control (Service Access Only)	For the use of Applied Biosystems service engineers only. Tests laser power levels with the shutter open and closed.
Laser Power	Tests the laser power. Recommended for Applied Biosystems service engineers only.
Gel Pump	Tests gel pump motor positioning and pressure/vacuum leaks. Recommended for Applied Biosystems service engineers only.
AutoSampler	Tests the AutoSampler movement and checks AutoSampler calibration.
Hotplate	Tests the Hotplate heating and temperature sensing.
Return	Returns to the **Main 310 Menu** window.

Analysis

Purpose The Analysis menu is used to perform tests that access the sample files generated by the ABI PRISM® 310 Data Collection Software. These tests can be used when you are troubleshooting run results. See Chapter 7, “Troubleshooting,” in the *ABI PRISM 310 Genetic Analyzer User’s Manual*.

Illustration The Analysis Menu 310 window is shown below.



Analysis Buttons

The function for each button is shown below.

Button	Function
Sensitivity Analysis (Auto)	Analyzes a signal-to-noise run. Used as part of a Sensitivity test when troubleshooting run results.
Sensitivity Analysis (Manual)	Analyzes a signal-to-noise run. Used as part of a Sensitivity test when troubleshooting run results
Noise Analysis	Used to analyze a CCD Noise test. Recommended for Applied Biosystems service engineers only.
Sample File Reader (EPT & 4 Color)	Uses sample files to run EPT and Four-Color tests when troubleshooting run results.
Done	Returns to the **Main 310 Menu** window.

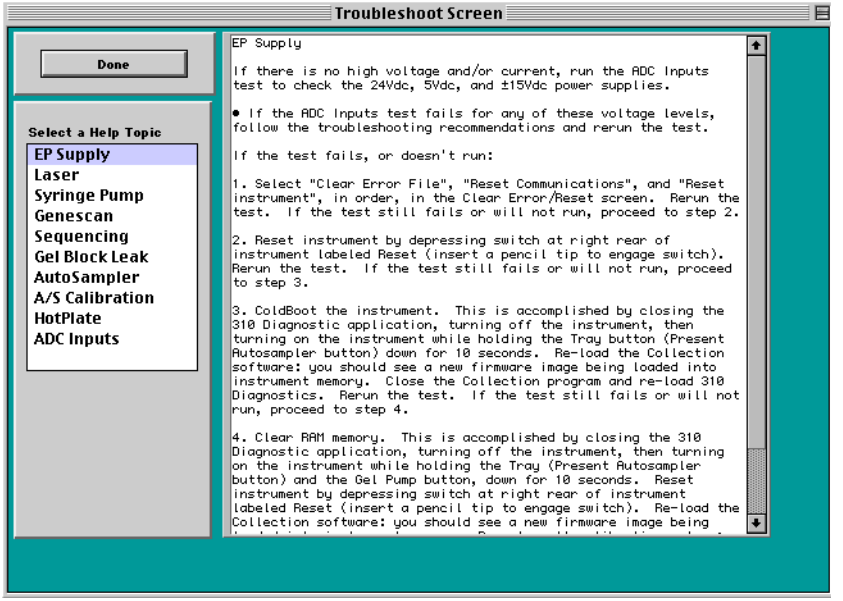
Troubleshooting Help

Purpose

The Troubleshooting Help button accesses lists of troubleshooting actions for all subsystems.

Illustration

The Troubleshoot Screen window is shown below.



Accessing Troubleshooting Help

At any time, you can click the Troubleshooting Help button in any Test Components window to get troubleshooting help.

When a test failure occurs, this button flashes on and off.

Troubleshooting Window Parts

Use and functions of parts of the Troubleshoot Screen window are given below.

Window Part	Function
Done	Click this button to return to the **Main 310 Menu** window.
Select a Help Topic	Click a topic to bring up the corresponding Help text.
Troubleshooting Text	Window displaying procedures for troubleshooting the selected Help topic.

Syringe Calibrations

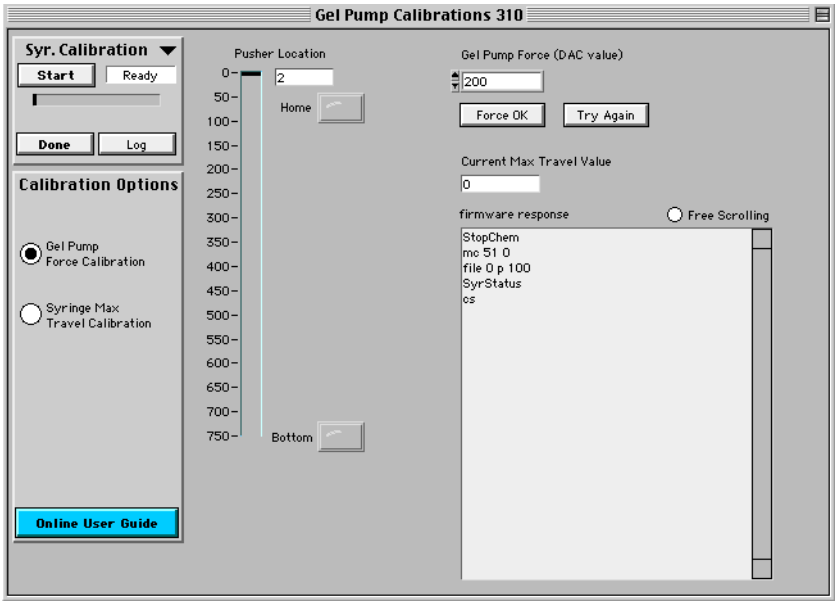
Purpose

Click the Syringe Calibrations button to access the Gel Pump Calibrations 310 window. Use this window to:

- Test and calibrate the gel pump force.
  - This test requires a tool to measure force (P/N T-6100).
- Test and calibrate the Max Travel for a syringe.

Illustration

The Gel Pump Calibrations 310 window is shown below.



Syringe Calibrations Buttons

The function for each button is shown below.

Name	Function
Start or **Stop**	Click **Start** to start the selected calibration. Click **Stop** to stop the test.
Ready	Gives instrument status. Reads status of syringe pump during the test.
Test Status	Shows progress of test.
Done	Returns you to the **Main 310 Menu**.
Log	Click here to record test results in the log.
Calibration Options	Select **Syringe Max Travel Calibration.** For the **Gel Pump Force Calibration** a tool is needed, so this test is recommended for Applied Biosystems service engineers. **Note** You can perform this test yourself if you have the force tool (P/N T-6100).
Online User Guide	Displays the Online *ABI PRISM 310 Diagonstics System User's Manual*.
Pusher Location	Tracks the location of the syringe pusher.
Home	The highest point of travel for the syringe pusher.
Bottom	The bottom of the syringe pusher range of travel.
Gel Pump Force (DAC Value)	Gives the current Gel Pump Force value.
Force OK	If the Gel Pump Force value is acceptable, click here to stop the calibration.
Try Again	Click here to recalibrate the Gel Pump Force.
Current Max Travel Value	Gives the current Syringe Max Travel value.

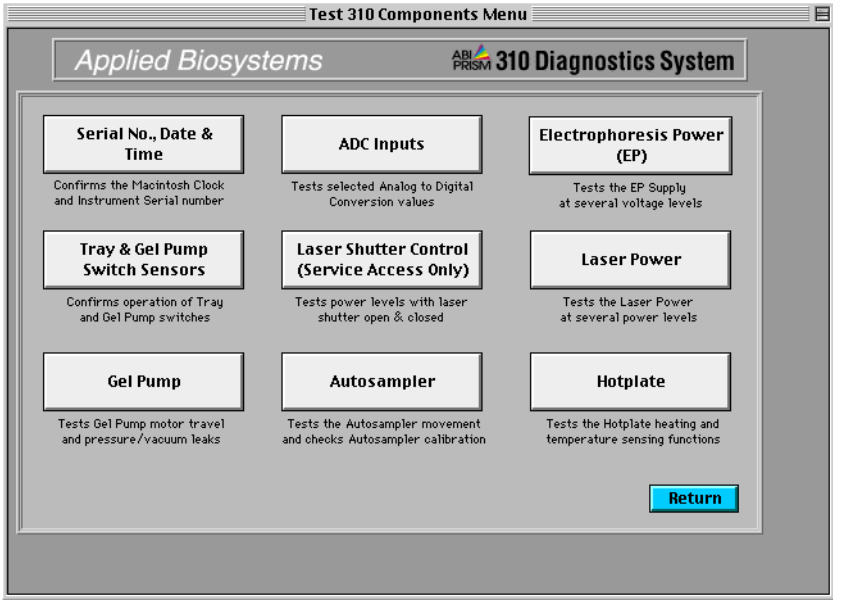
Section: Test Components Panels

In This Section The following topics are covered in this section:

Test Instrument Components Menu

Purpose The Test 310 Components Menu window accesses a number of instrument tests. While many of these tests are intended for the use of Applied Biosystems service engineers, there are some which are of use to the laboratory user.

Illustration The Test 310 Components Menu window is shown below.



Test Components Buttons

The function for each button is given below.

Button	Function
Serial No., Date & Time	Gives the 310 instrument serial number and the date and time from the Macintosh clock. Allows you to reset these values.
ADC Inputs	Tests selected analog-to-digital conversion values. Recommended for Applied Biosystems service engineers only.
Electrophoresis Power (EP)	Tests the EP power supply at several voltage levels. Recommended for Applied Biosystems service engineers only.
Tray & Gel Pump Switch Sensors	Tests operation of tray and gel pump switches. Recommended for Applied Biosystems service engineers only.
Laser Shutter Control (Service Access Only)	For the use of Applied Biosystems service engineers only. Tests power levels with laser shutter open and closed.
Laser Power	Tests the laser power. Recommended for Applied Biosystems service engineers only.
Gel Pump	Tests gel pump motor travel and pressure/vacuum leaks. Recommended for Applied Biosystems service engineers only.
Autosampler	Tests the AutoSampler movement and checks AutoSampler calibration.
Hotplate	Tests the Hotplate heating and temperature sensing.
Return	Returns to the **Main 310 Menu** window.

Serial Number, Date, and Time

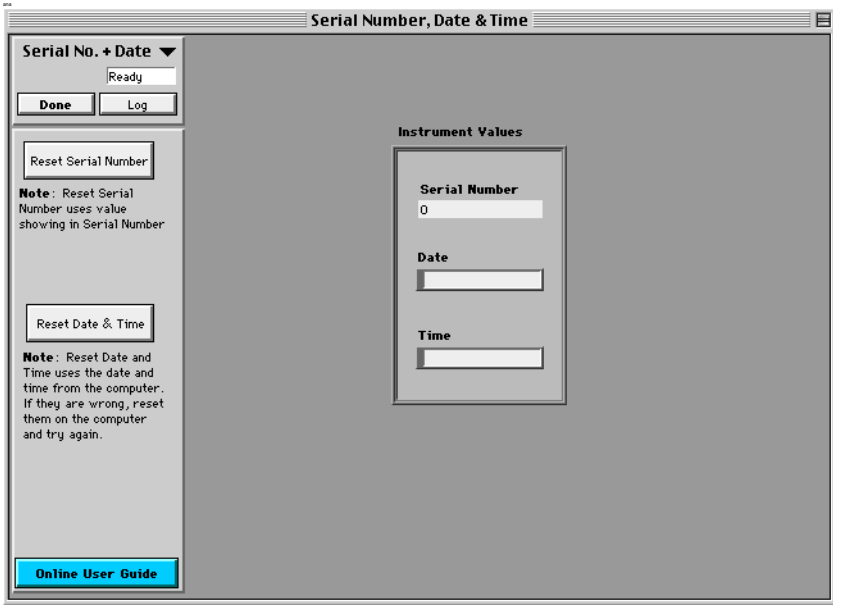
Purpose

The Serial #, Date & Time window displays the information being received by the Diagnostics System software.

The instrument serial number and the computer date and time should always match the values showing in the value boxes. If these are incorrect, the 310 instrument or the Macintosh computer should be checked.

Illustration

The Serial #, Date & Time window is shown below.



Serial #, Date & Time Window Parts

The function for each window part is given below.

Window Part	Function
Ready	Indicates the program status.
Done	Click this button to leave this window and return to the **Test 310 Components Menu** window.
Log	Intended for the use of Applied Biosystems service engineers.
Reset Serial Number	Click this button to use the value entered in Serial Number entry window.
Reset Date & Time	Resets the date and time to the computer date and time.
Instrument Values	Allows the entry of a new value for the instrument serial number and displays the current computer date and time.
Online User Guide	Displays the online *ABI PRISM 310 Diagnostics System User's Manual*.

Correcting Displayed Values

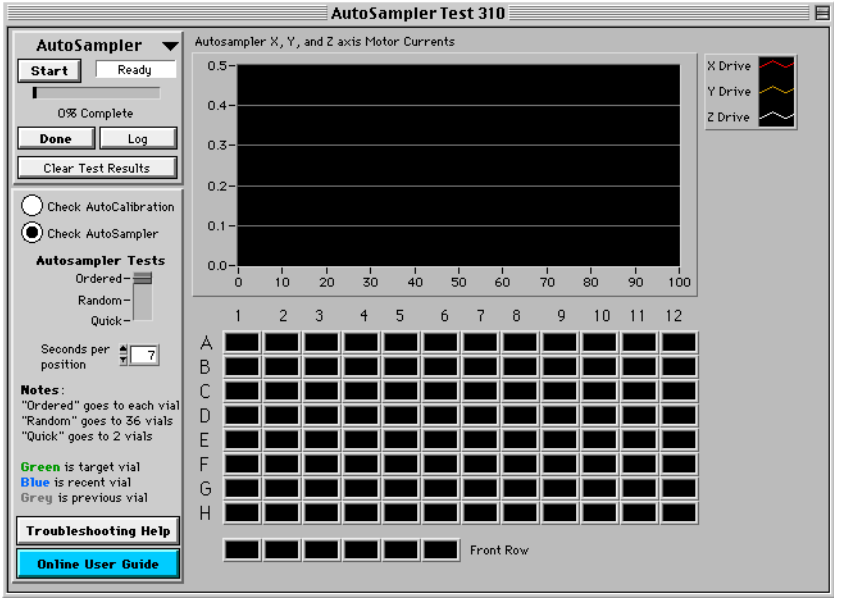
You can correct any displayed values that are incorrect.

If...	Then...
there is a serial number discrepancy	press the **Reset Serial Number** button and enter the correct information from the instrument.
either the date or time shown is incorrect	you must a. first make the correction in the Macintosh **Date & Time** control panel b. then press the **Reset Date & Time** button in the 310 Diagnostics **Serial No., Date & Time** window.

AutoSampler Test

Purpose The Autosampler button accesses tests that check the AutoSampler operation and calibration accuracy. This is a more in-depth test of the AutoSampler than that in the Verify Instrument test.

Illustration The AutoSampler Test 310 window is shown below.



AutoSampler Window Parts

The function for each window part is given below.

Window Part	Function
Start or **Stop**	Click **Start** to begin the selected test. You can click **Stop** to stop the test at any time.
Test status	Indicates whether testing is ready to start or in progress.
Done	Click this button to return to the **Test 310 Components Menu**.
Log	Intended for the use of Applied Biosystems service engineers.
Clear Test Results	Click here to remove any test results that are still showing.
Test Options	You can select either **Check AutoCalibration** or **Check AutoSampler**.
Seconds per position	Choose the number of seconds for each vial tested.
Troubleshooting Help	This button will flash if a failure occurs. Click **Troubleshooting Help** to display procedures and techniques for identifying instrument problems.
Online User Guide	Click this button to display the *ABI PRISM 310 Diagnostics System User's Manual*.
Graph of test results	Plots current of one phase of each motor (x, y, z).
AutoSampler tray schematic	Shows test progress with color coding: target well is green, last well tested is blue, and previously tested wells are grey.
Plot preferences	Allows you to select point style, line style, interpolation, and color for the graph of the test results.

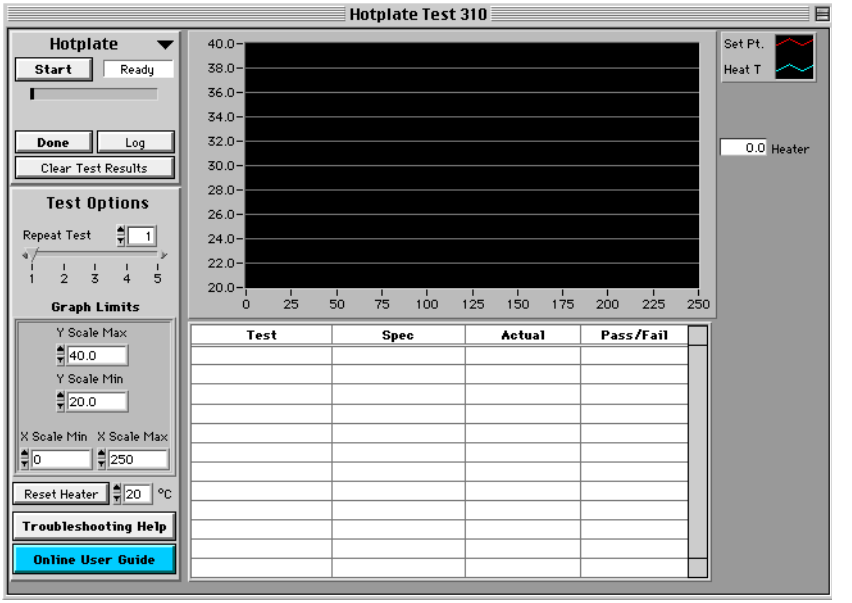
Test Hotplate

Purpose

If you have any concerns about the electrophoresis temperature, you can use this test to check the Hotplate temperature control and sensing.

Illustration

The Hotplate Test 310 window is shown below.



Hotplate Window Parts

The function for each window part is given below.

Window Part	Function
Start or **Stop**	Click **Start** to begin the test. You can click **Stop** to stop the test at any time.
Test status	Indicates whether testing is ready to start or in progress.
Done	Click this button to return to the **Test 310 Components Menu**.
Log	Intended for the use of Applied Biosystems service engineers.
Clear Test Results	Click here to remove any test results that are still showing.
Test Options	Select the number of times (1–5) to repeat the test.
Graph Limits	Set the x- and y- scale minimum and maximum values. The default settings are 20°–40 °C.
Reset Heater	Click here to set the temperature between 0 and 70°C before you start the test. (not available during the test)
Troubleshooting Help	This button flashes if a failure occurs. Click **Troubleshooting Help** to display procedures and techniques for identifying instrument problems.
Online User Guide	Click this button to display the *ABI PRISM 310 Diagnostics System User's Manual*.
Graph of test results	Plots real-time data.
Test results	Displays test results and Pass/Fail.
Plot preferences	Allows you to select point style, line style, interpolation, and color for the graph of the test results.
Heater	Displays the actual and target temperatures.

Section: Analysis Panels

In This Section The following topics are covered in this section:

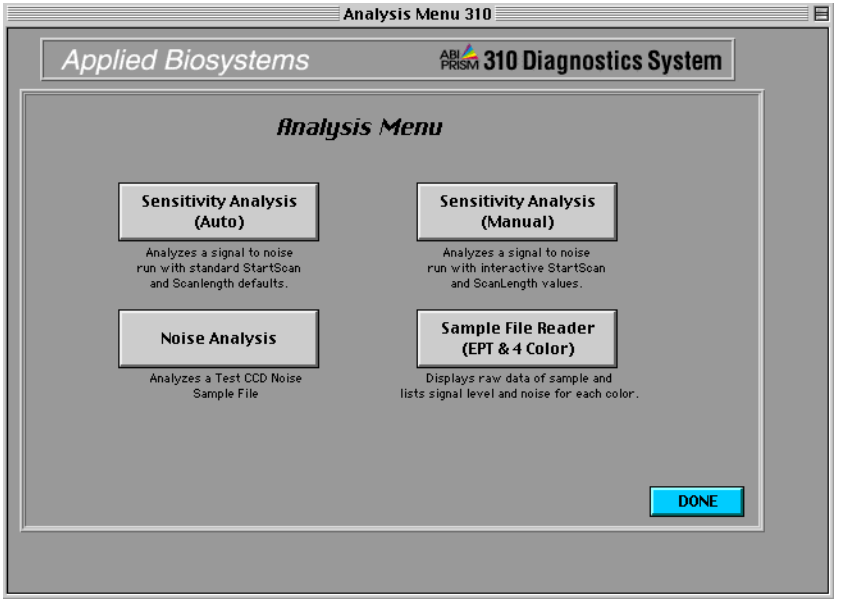
Analysis Menu

Purpose

The Analysis menu allows you to analyze the sample files generated by the Data Collection software. You can examine the amount of background noise influencing the electropherogram baseline. You can also determine the amount of noise coming from the Charge Coupled Device (CCD).

Illustration

The Analysis Menu 310 window is shown below.



Analysis Buttons

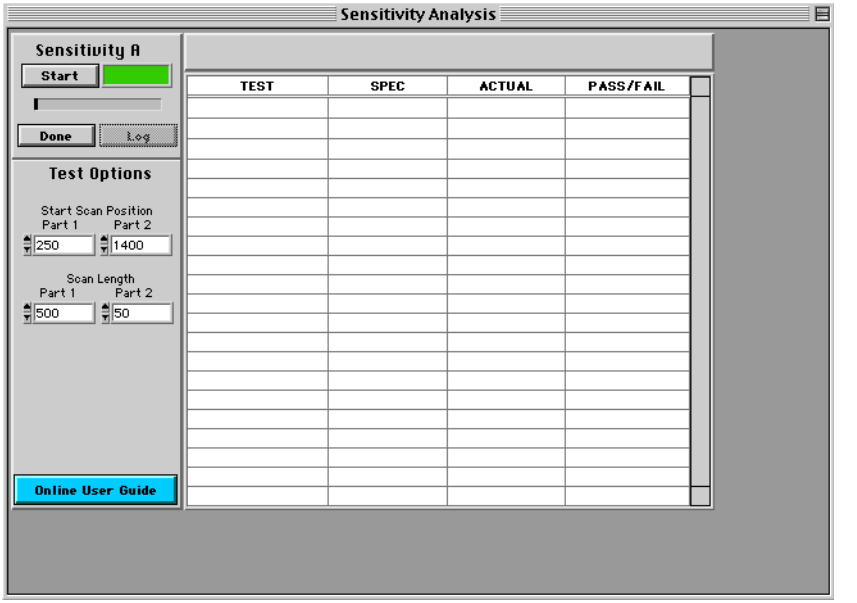
The function for each button is given below.

Button	Function
Sensitivity Analysis (Auto)	Analyzes a signal-to-noise run. Used as part of a Sensitivity test when troubleshooting run results.
Sensitivity Analysis (Manual)	Analyzes a signal-to-noise run. Used as part of a Sensitivity test when troubleshooting run results. Recommended for Applied Biosystems service engineers only.
Noise Analysis	Used to analyze a CCD Noise test. Recommended for Applied Biosystems service engineers only.
Sample File Reader (EPT & 4 Color)	Uses sample files to run EPT and Four-Color tests when troubleshooting run results.
Done	Returns to the **Main 310 Menu** window.

Sensitivity Analysis (Auto)

Purpose The Sensitivity Analysis window is used to test for signal-to-noise ratios in test sample files.

Illustration The Sensitivity Analysis window is shown below.



Sensitivity Analysis Window Parts

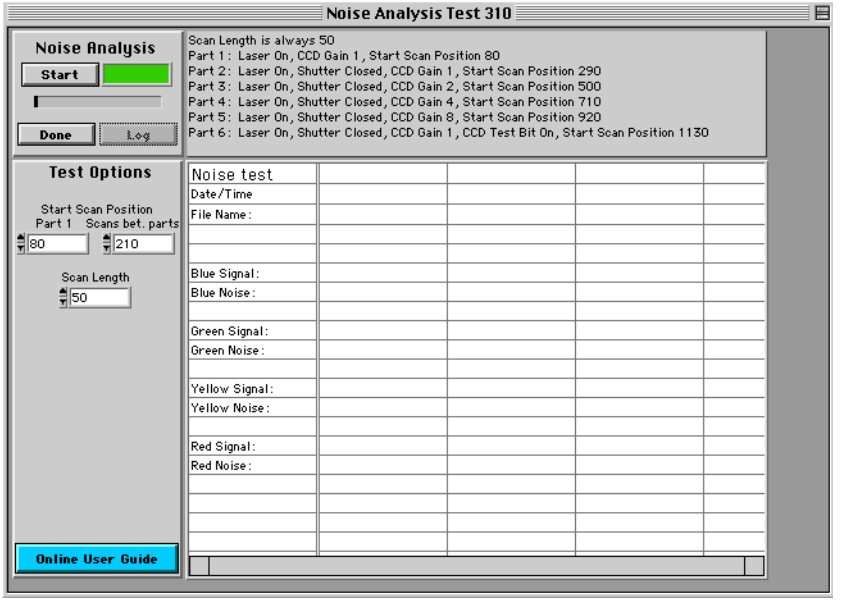
The function for each window part is given below.

Window Part	Function
Start	Click **Start** to find and select the test sample file.
Done	Click **Done** to return to the **Analysis** window.
Log	Intended for the use of Applied Biosystems engineers.
Test Options	The text boxes below **Test Options** allow you to set the values for raw data start and stop scan poisitons.
Online User Guide	Click this button to display the *ABI PRISM 310 Diagnostics System User's Manual*.
Test results	The spreadsheet formatted area on the right side of the window. When the test is complete, the results are displayed here.

Noise Analysis Window

Purpose The Noise Analysis window is used to analyze test sample files for signal and noise levels.

Illustration The Noise Analysis Test 310 window is shown below.



Noise Analysis Window Parts

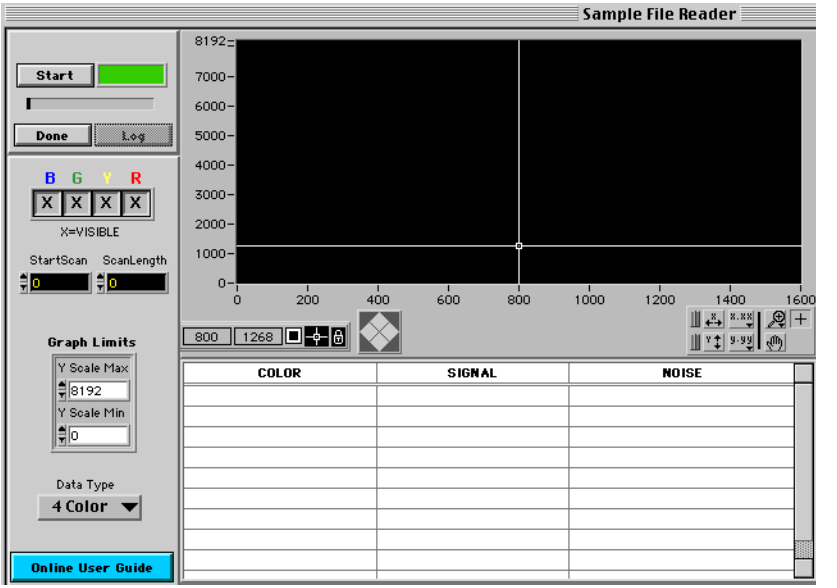
The function for each window part is given below.

Window Part	Function
Start	Click **Start** to find and select the test sample file.
Done	Click **Done** to return to the **Analysis** window.
Log	Intended for the use of Applied Biosystems engineers.
Test Options	The text boxes below **Test Options** allow you to set the values for the six test parameters.
Online User Guide	Click this button to display the online *ABI PRISM 310 Diagnostics System User's Manual*.
List of test parameters	Lists the six test parameters that are used.
Test results	The spreadsheet-formatted area on the right side of the window. When the test is complete, the results are displayed here.

Sample File Reader Window

Purpose The Sample File Reader window allows you to analyze any sample file for signal and noise levels, and to display four-color information for the file.

Illustration The Sample File Reader window is shown below.



Sample File Reader Window Parts

The function for each window part is given below.

Window Part	Function
Start	Click **Start** to find and select the test sample file.
Done	Click **Done** to return to the **Analysis** window.
Print	Click **Print** to print the test results.
BGYR	Click the boxes to select the colors to view.
StartScan and **ScanLength**	These text boxes allow you to set the values for raw data start and stop scan poisitons.
Graph Limits	Use these text boxes to set the Y-axis maximum and minimum values.
Data Type	This box toggles between **4 Color** and **EPT** data types.
Online User Guide	Click this button to display the *ABI PRISM 310 Diagnostics System User's Manual*.
Test results	There are two displays of results. The upper-right portion of the window show the results graphically, and the lower-right portion of the window shows the results numerically.

Running Instrument Tests 4

Introduction

Purpose of This Chapter

This chapter describes how to perform instrument tests that are useful for instrument validation or troubleshooting run results.

In This Chapter

The following topics are covered in this chapter:

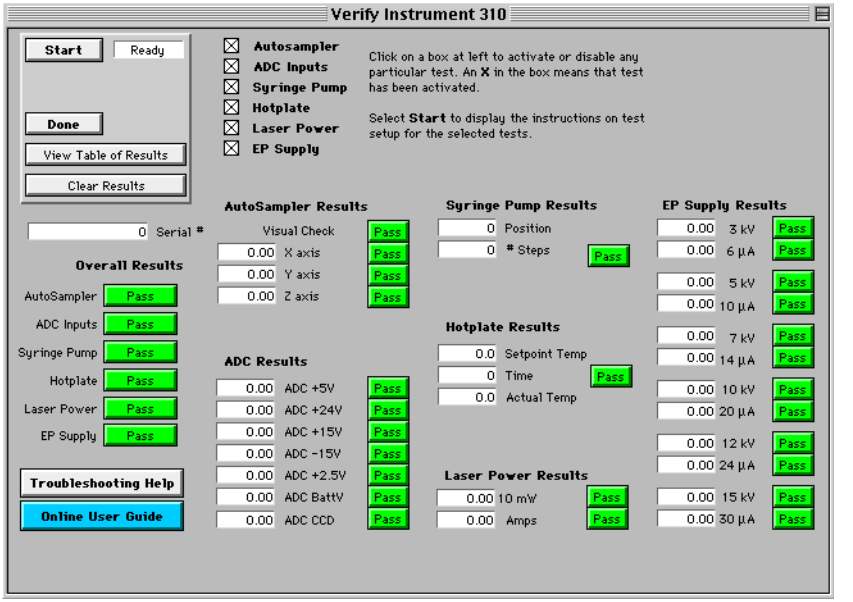
Verify Instrument Test

Purpose The Verify Instrument test should be run as a validation test, ideally once per week, or at a minimum once per month. It takes only about 10 minutes to run, and after the first minute it can be left to run on its own.

The Verify Instrument test also helps to identify subsystem problems, so potential problem areas can then be checked in greater depth with other tests.

The Verify Instrument test is invaluable in troubleshooting as it will assist in narrowing down the potential cause of a problem.

Illustration The Verify Instrument 310 window is shown below.

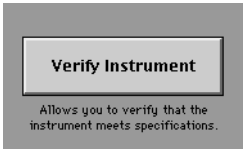
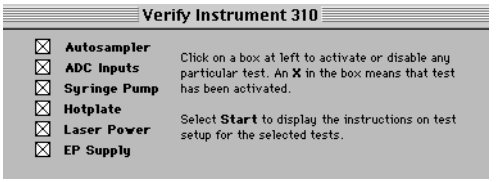


Test Description

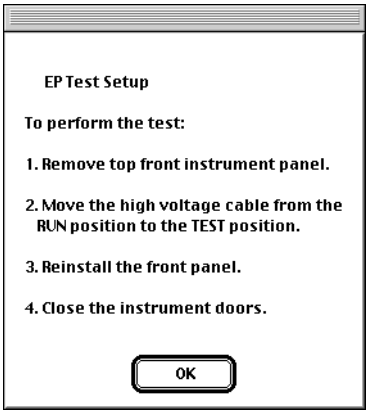
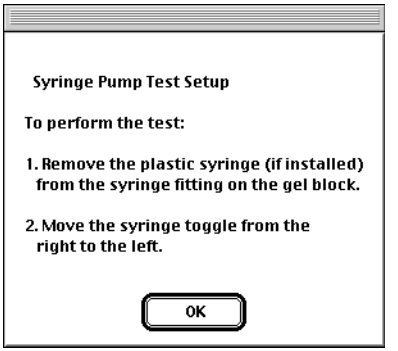
The Verify Instrument test checks and tests all selected subsystems and measures them against specifications. It then returns the achieved values and passes or fails the subsystem.

Test Procedure

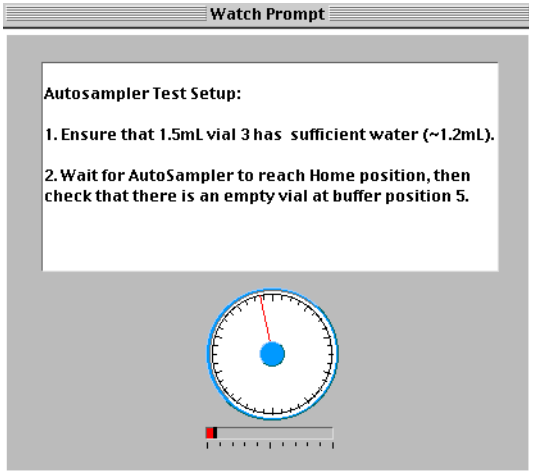
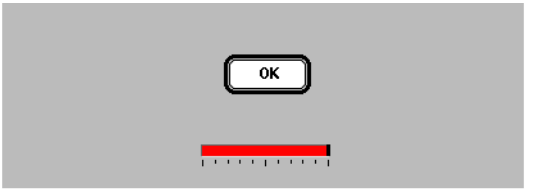
To run the Verify Instrument test:

Step	Action
1	Open the ABI PRISM® 310 Diagnostics System software.
2	In the **Main 310** window, click the **Verify Instrument** button:  The **Verify Instrument 310** window opens.
3	Select the desired tests in the test list:  When selected, an **X** appears in the checkbox to the left of the test.
4	Click the **Start** button. The test starts. **Note** If selected, the **Autosampler** test runs first. This is the only test that requires your observation and input while it is running.

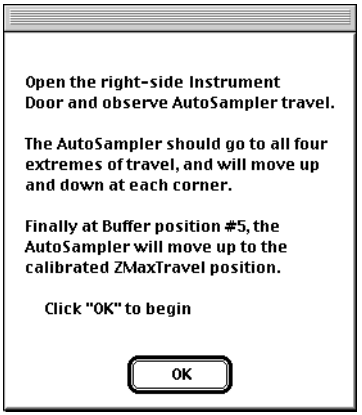
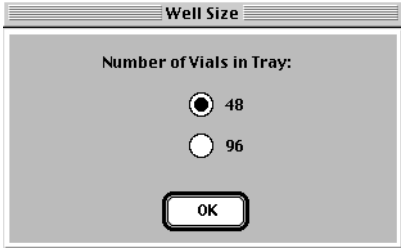
To run the Verify Instrument test: *(continued)*

Step	Action
5	A series of message boxes open with instructions for you to prepare for the tests. The first messge box is **EP Test Setup**: 
6	Follow the instructions, and click **OK.** The **Syringe Pump Test Setup** message box opens: 

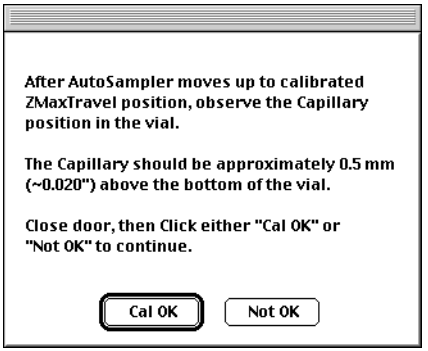
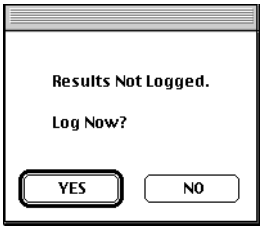
To run the Verify Instrument test: *(continued)*

Step	Action
7	Follow the instructions, and click **OK.** The **Watch Prompt** message box opens:  When the timer is complete, the clock disappears and the **OK** button appears: 

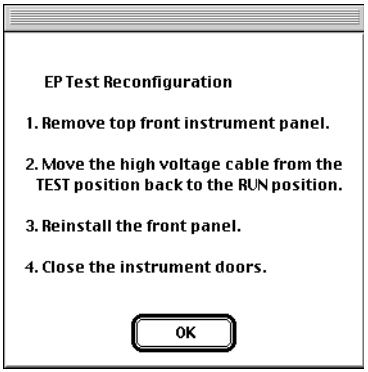
To run the Verify Instrument test: *(continued)*

Step	Action
8	Follow the instructions, and click **OK.** The following message box appears: 
9	Follow the instructions, and click **OK**. The **Well Size** box appears: 

To run the Verify Instrument test: *(continued)*

Step	Action
10	Select the desired number of wells and click **OK**. The following message box appears: 
11	Follow the instructions, and click the **Cal OK** or the **Not OK** button to continue. The remainder of the Verify Instrument test runs without attention. When complete, results and pass/fail status are seen in the results section of the **Verify Instrument 310** window.
12	When all tests are complete, click **Done**. The **Log Now?** message box appears as shown. 

To run the Verify Instrument test: *(continued)*

Step	Action
13	Click **Yes** to log your results. The **EP Test Reconfiguration** message box appears: 
14	Follow the instructions, and click **OK**. The **Verify Instrument 310** window closes.

Syringe Max Travel

Purpose

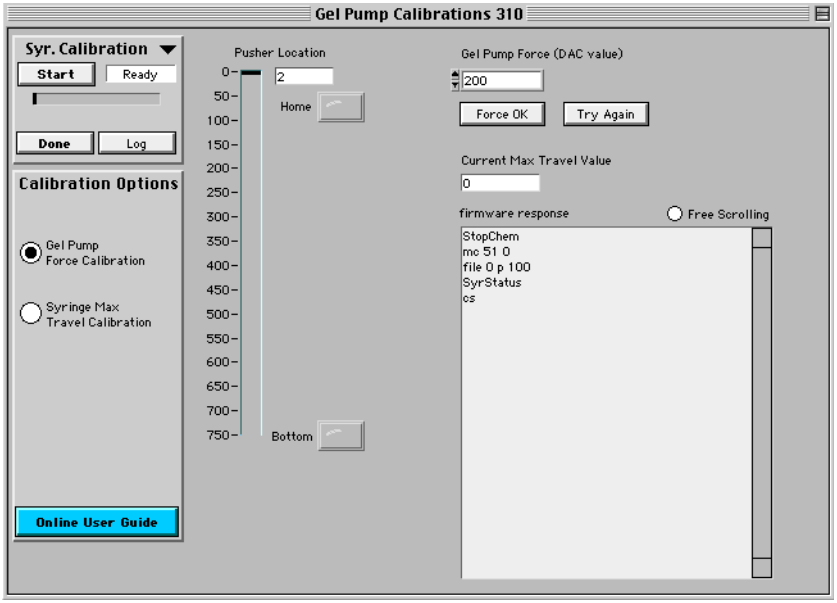
The Syringe Max Travel calibration measures the maximum range of travel of the syringe. Travel is measured in the number of steps the syringe takes to move from its home, or highest, position to its mechanical bottom.

A Syringe Max Travel value is required for each size of glass syringe you use.

When you install a syringe, you must input the Syringe Max Travel value for that syringe into the Function pop-up menu of Manual Control of the ABI PRISM® 310 Data Collection Software. If you enter the wrong Syringe Max Travel value, an error message appears.

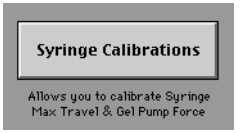
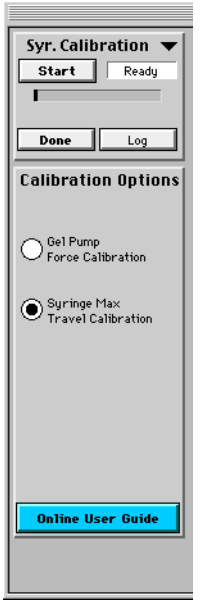
Illustration

The Gel Pump Calibrations 310 window is shown below.

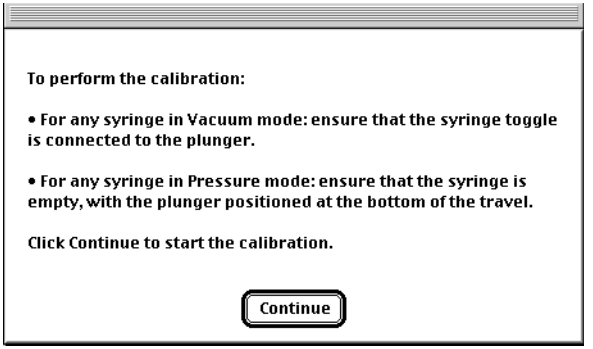


Test Procedure

To calibrate Syringe Max Travel:

Step	Action
1	Open the Diagnostics System software.
2	In the **Main 310** window, click the **Syringe Calibrations** button (shown below).  The **Gel Pump Calibrations 310** window opens.
3	On the left side of the windw, under **Calibration Options**, select **Syringe Max Travel Calibration** as shown below. 

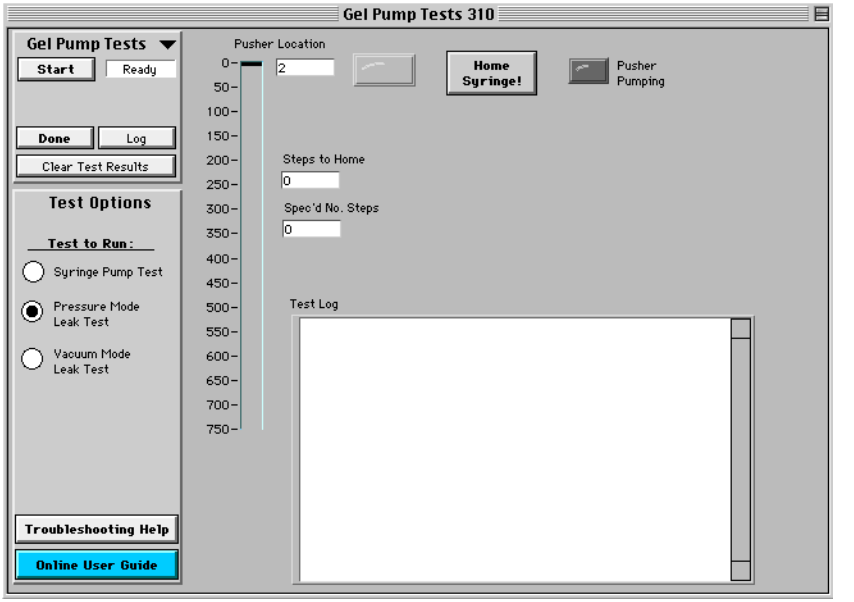
To calibrate Syringe Max Travel: *(continued)*

Step	Action
4	Click **Start**. The following message box appears: 
5	Follow the instructions, and click **Continue**. The calibration proceeds.
6	When the calibration is complete, the calibrated value is given under **Current Max Travel Value** as shown below. 
7	Record this value, and click **Done**. The **Gel Pump Calibrations 310** window closes.

Syringe Pressure Leak Test

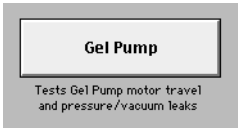
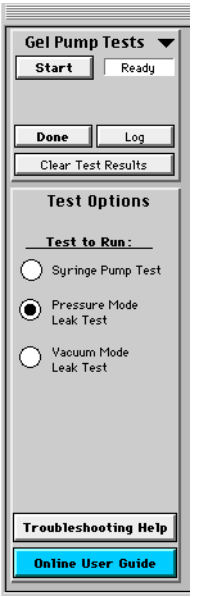
Purpose The Syringe Pressure Leak test measures gel consumption during a fixed span of movement of the syringe plunger. This test determines if there is a leak by checking for excessive gel consumption during the test.

Illustration The Gel Pump Tests 310 window is shown below.



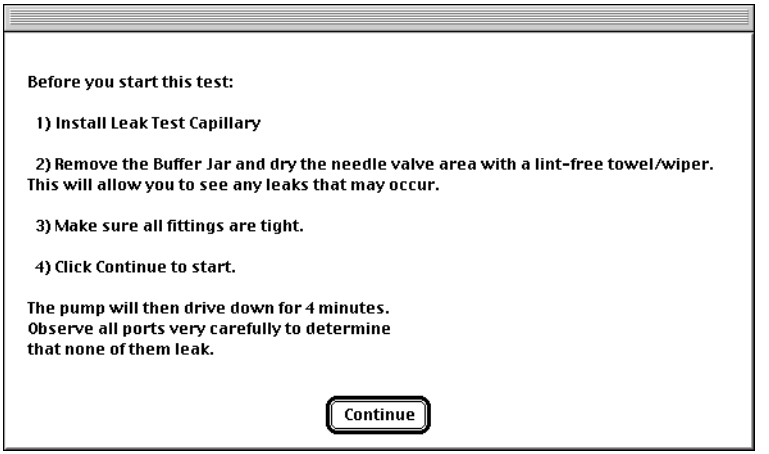
Test Procedure

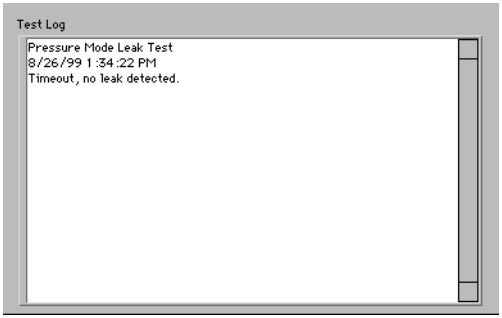
To run the Syringe Pressure Leak test:

Step	Action
1	Open the Diagnostics System software.
2	In the **Main 310** window, click the **Test Components** button:  The **Test 310 Components Menu** window opens.
3	Click the **Gel Pump** button:  The **Gel Pump Tests 310** window opens.
4	On the left side of the window, under **Test Options**, select **Pressure Mode Leak Test** as shown below. 

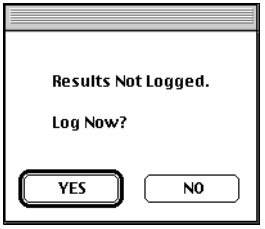
To run the Syringe Pressure Leak test: *(continued)*

Step	Action
5	Click **Start**. The following message box appears:
6	Follow the instructions, and click **Continue**. The test proceeds.
7	The test runs for 4 minutes. As the test is running, watch all ports for leaks.
8	Test results are given in the **Test Log** as shown below.





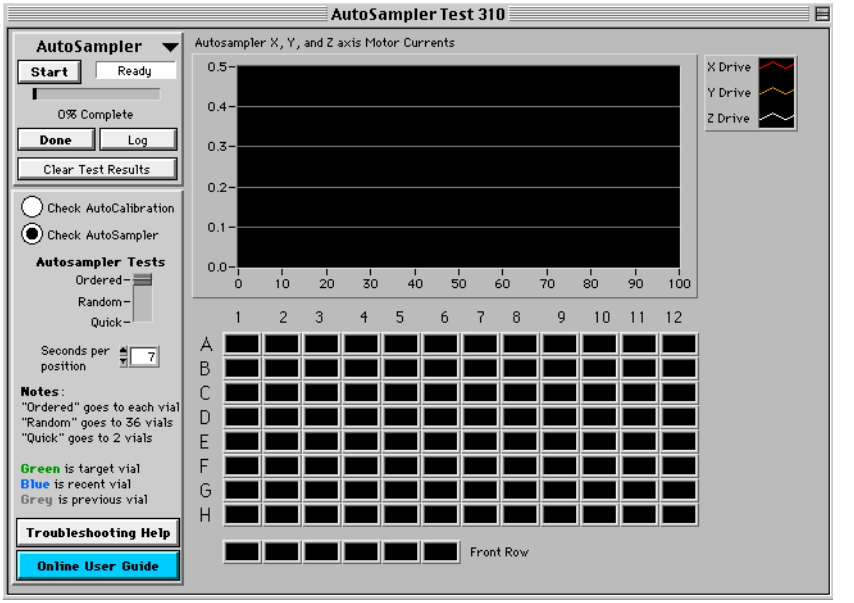
To run the Syringe Pressure Leak test: *(continued)*

Step	Action
9	Click **Done**. The following message appears: 
10	Click the appropriate button. The **Gel Pump Tests 310** window closes.

AutoSampler Operation Test

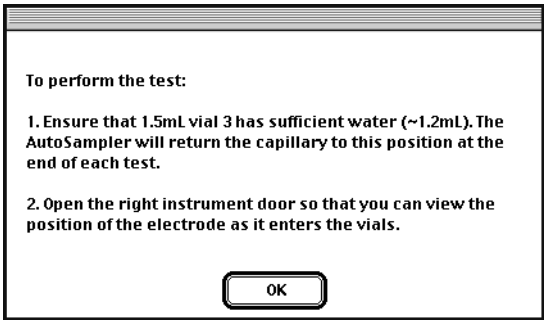
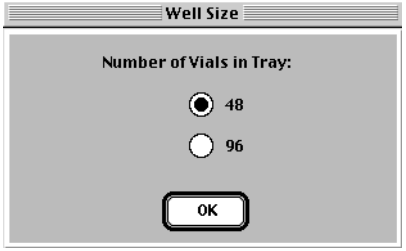
Purpose The AutoSampler test is used when you want to test or verify the Autosampler positioning.

Illustration The AutoSampler Test 310 window is shown below.

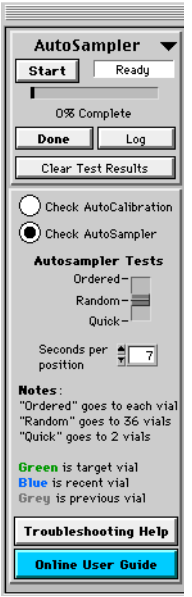


Test Procedure

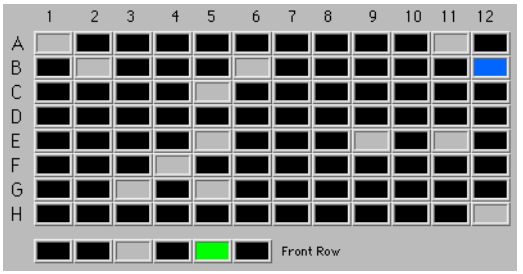
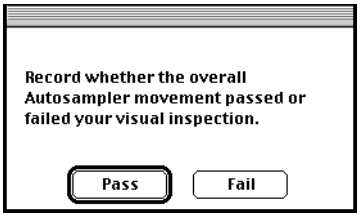
To test the operation of the Autosampler:

Step	Action
1	In the **Test 310 Components Menu** window, click the **Autosampler** button. The **AutoSampler Test 310** window opens.
2	The message box shown below immediately appears: 
3	When you have read the message, click **OK** and the message box closes. The **Well Size** dialog box immediately opens: 
4	Select the desired size and click **OK**. The **Well Size** dialog box closes.

To test the operation of the Autosampler: *(continued)*

Step	Action
5	In the **AutoSampler Test 310** window, select **Check AutoSampler**, as shown in the panel below. 
6	Determine the number of wells you want to test, then select the scope of the test using the sliding selection bar under **Autosampler Tests**: ♦ **Ordered** goes to each vial ♦ **Random** goes to 36 vials ♦ **Quick** goes to two vials (first and last)
7	Make sure that all wells to be tested in the tray contain a vial, then click the **Start** button. The test starts.

To test the operation of the Autosampler: *(continued)*

Step	Action
8	Watch the Autosampler positioning as the test proceeds. The tray grid in the window shows the progress of the test as in the example below.  The vials are color coded: ♦ Green is the target vial ♦ Blue is the most recent vial ♦ Grey is the previous vial or vials
9	When the test is complete, the message box shown below appears: 
10	Click the **Pass** or **Fail** button to record the results. When the message box closes, click **Done**.

To test the operation of the Autosampler: *(continued)*

Step	Action
11	In the **Log Now?** message box that comes up, as shown below, click **Yes** or **No**.  The **AutoSampler Test 310** window closes.

What to Expect

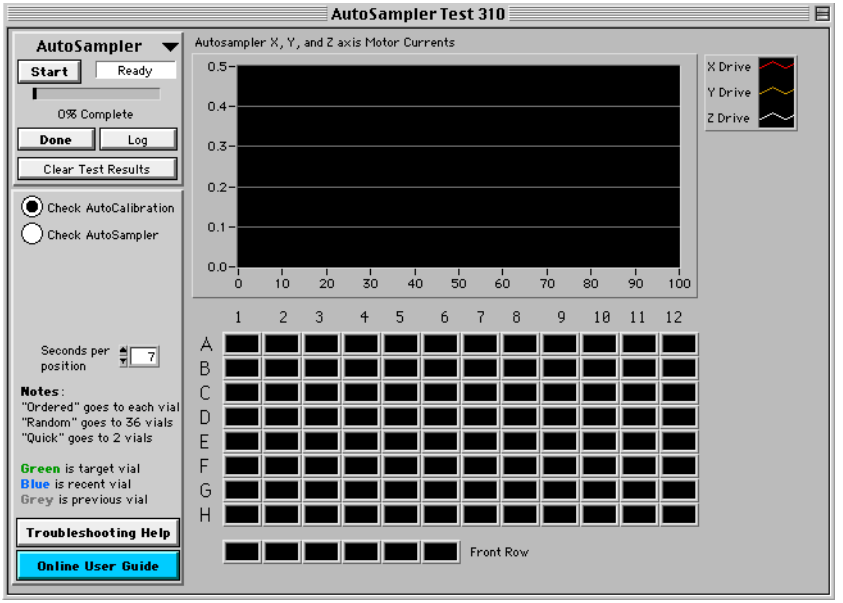
- The % Complete bar, under the Start and Ready buttons, indicates the test progress.
- The Troubleshooting Help button flashes if a failure occurs.
- Any Autosampler failures are identified.

AutoCalibration Test

Purpose The AutoCalibration test is accessed from the AutoSampler Test 310 window. This test checks and validates the Autosampler calibration. Use it when you suspect the Autosampler is not properly calibrated.

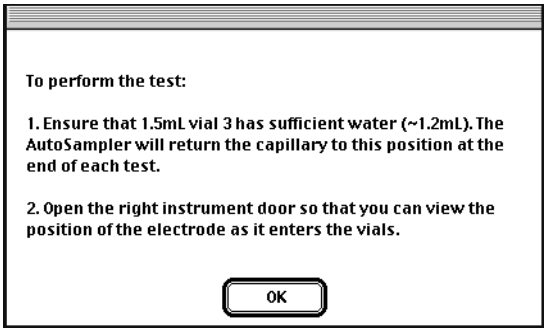
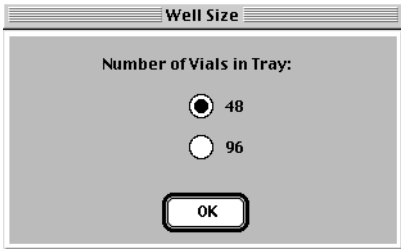
Note A bent electrode is a common symptom of an improperly calibrated Autosampler.

Illustration The AutoSampler Test 310 window is shown below.

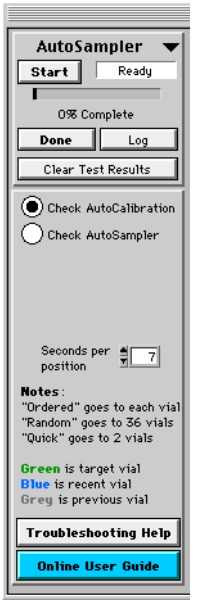
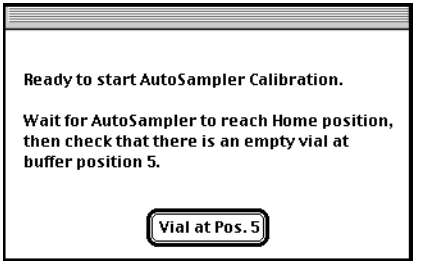


Test Procedure

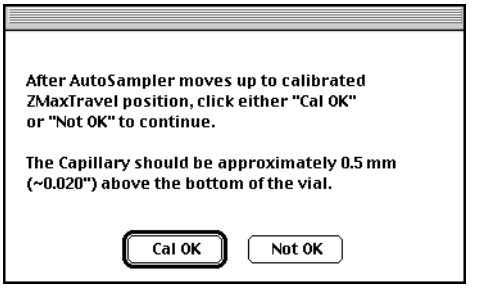
To run a calibration test for the AutoSampler:

Step	Action
1	In the **Test 310 Components Menu** window, click the **Autosampler** button. The **AutoSampler Test 310** window opens.
2	The message box shown below immediately appears: 
3	When you have read the message, click **OK** and the message box closes. The **Well Size** dialog box immediately opens: 
4	Select the desired size, and click **OK**. The **Well Size** dialog box closes.
5	Place an empty vial at buffer position 5 in the AutoSampler.

To run a calibration test for the AutoSampler: *(continued)*

Step	Action
6	In the **AutoSampler Test 310** window, select **Check AutoCalibration**, as shown in the panel below, then click **Start**.  The **Ready to start AutoSampler Calibration** message box opens. 
7	Wait for the AutoSampler to reach its Home position, then click the **Vial at Pos. 5** button. The AutoCalibration test runs.

To run a calibration test for the AutoSampler: *(continued)*

Step	Action
8	When the test is done, the following message box appears: 
9	Check the position of the AutoSampler and click ♦ **Cal OK** or ♦ **Not OK** The message window closes. The process repeats as the test continues through all positions.
10	When finished, click **Done** to close the **AutoSampler Test 310** window.

What to Expect

- The % Complete bar, under the Start and Ready buttons, indicates the test progress.
- The Troubleshooting Help button flashes if a failure occurs.
- AutoSampler calibration is checked when the test is complete.
- System failures are identified.

Hotplate Test

Purpose

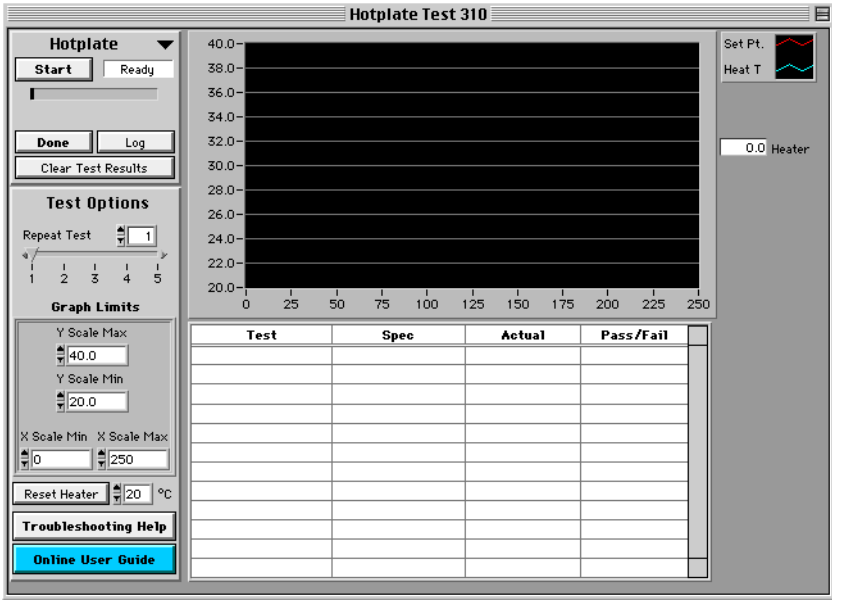
The Hotplate test identifies problems in the hotplate system that may cause erratic or incorrect electrophoresis temperatures.

Test Description

The Hotplate test identifies problems in achieving the set temperature in a specified length of time. The test selects a setpoint temperature 5 °C above the current temperature of the hotplate. It then heats the hotplate and determines if the setpoint is reached within 210 seconds.

Illustration

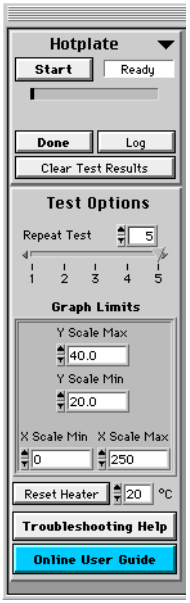
The Hotplate Test 310 window is shown below.



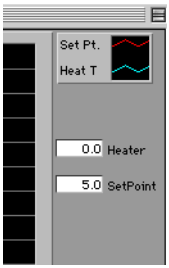
Test Procedure

Note Multiple repeats of this test are recommended, as it is sometimes the only way to identify a borderline problem.

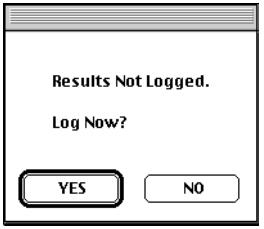
To test the operation of the hotplate:

Step	Action
1	In the **Test 310 Components Menu** window, click the **Hotplate** button. The **Hotplate Test 310** window opens.
2	Set the number of repeats to **5** using the slider bar or the up and down arrows under **Test Options**, as shown below. 

To test the operation of the hotplate: *(continued)*

Step	Action
3	Click **Start**. The Hotplate test finds the current temperature of the hotplate. It then selects a **SetPoint** temperature 5 °C above the current hotplate temperature. The **Heater** and **SetPoint** temperatures are displayed in the upper-right section of the **Hotplate Test 310** window:  The timer starts and the hotplate is heated.
4	If the **SetPoint** temperature is not achieved within 210 seconds, the hotplate fails. The test repeats for the selected number of times, and results are recorded in the log portion of the **Hotplate Test 310** window as in the example below. **Test** / **Spec** / **Actual** / **Pass/Fail** 8/25/99 12:56:15 PM Temperature Test — Repeat 1 Set Point — 5.0 Heater Temp — 0.00 — Out Range Heater Time — 210 seconds — 210 seconds — Fail 8/25/99 12:59:50 PM Temperature Test — Repeat 2 Set Point — 5.0 Heater Temp — 0.00 — Out Range Heater Time — 210 seconds — 212 seconds — Fail
5	When all repetitions have been performed and the test is complete, click **Done**.

To test the operation of the hotplate: *(continued)*

Step	Action
6	In the **Log Now?** message box that comes up, as shown below, click **Yes** or **No**.  The **Hotplate Test 310** window closes.

What to Expect

- The % Complete bar is activated when the test starts, and indicates the test progress.
- If open interlocks are detected, an on-screen message appears telling you to close the doors.
- System failures, as defined by the Hotplate specifications, are identified.

EPT Data, Sample File Reader

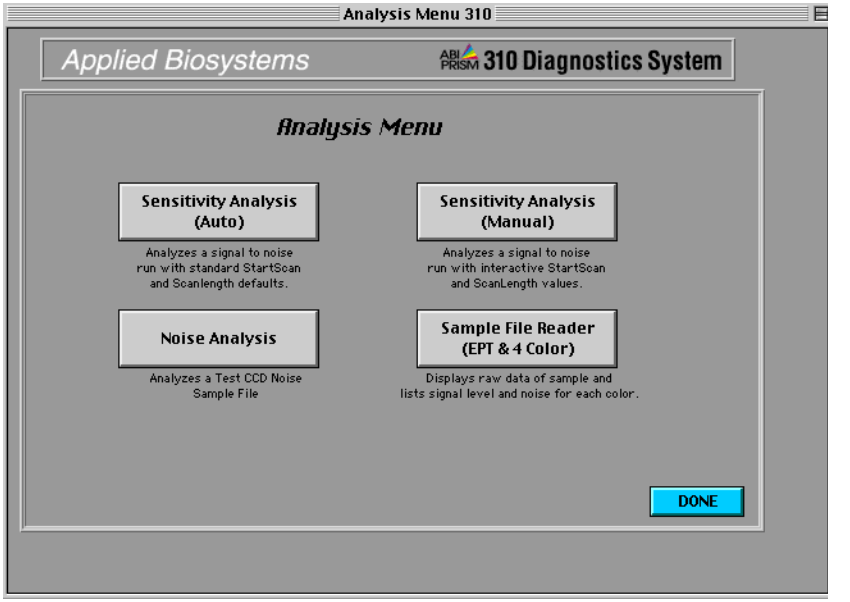
Purpose

The Sample File Reader analyzes the data in sample files for signal and noise levels at chosen scanpoints and scanlengths. Select the EPT option to view the electrophoresis voltage and current, laser power, and temperature data in a given sample file.

You may want to check EPT data when troubleshooting certain types of problems with resolution, such as the broadening of peaks or migration times that are too fast or too slow. (See Chapter 5 “Troubleshooting” on page 5-1.)

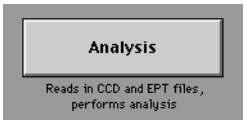
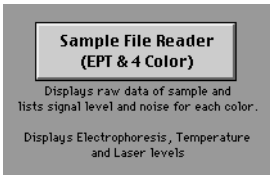
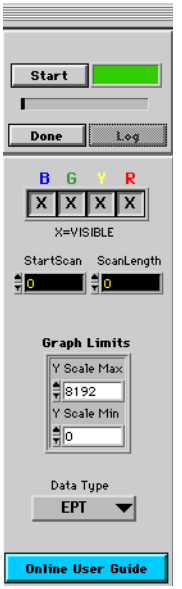
Illustration

The Sample File Reader is accessed through the Analysis Menu 310 window, shown below.

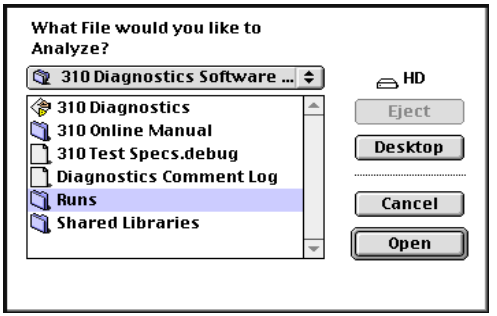
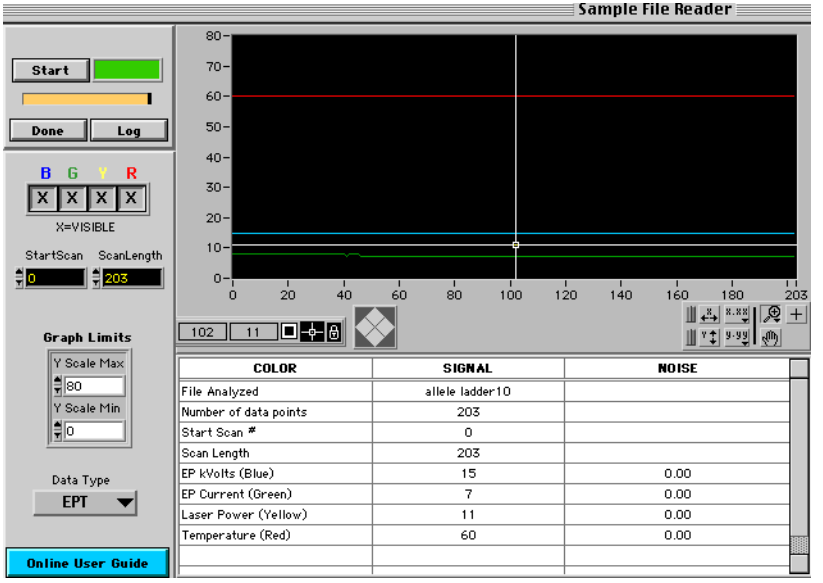


Test Procedure

To analyze EPT data:

Step	Action
1	Open the Diagnostics System software.
2	In the **Main 310** window, click the **Analysis** button:  The **Analysis 310 Menu** window opens.
3	Click the **Sample File Reader** button:  The **Sample File Reader** window opens.
4	Under **Data Type**, select **EPT** : 

To analyze EPT data: *(continued)*

Step	Action
5	Click **Start**. A dialog box opens: 
6	Select the sample file you want to run from the **Runs** folder and click **Open**. The EPT data for the run is displayed as in the example below. 

To analyze EPT data: *(continued)*

Step	Action
7	When EPT data is displayed, only one data point for each 32 scanpoints is shown. The data is color coded as follows: **Blue** — Electrophoresis voltage (0–15 kV) **Green** — Electrophoresis current (0–200 µA) **Yellow** — Laser power (0–10 mW) **Red** — Hotplate temperature (0–70 °C)
8	Click **Done**. The **Sample File Reader** window closes.

310 Collection Software Test Modules

Purpose

You can perform a diagnostic run after a Data Collection software test module is selected in the Sample Sheet. The Diagnostics System software analyzes the run results and evaluates subsystem operation.

Specific run conditions and parameters are required for each type of diagnostic run. Separate test modules are available to verify each Data Collection software subsystem.

310 Collection Software Test Modules

There are four test modules:

- Test CCD Sensitivity
- Test CCD Noise
- Test 4-Color Collection
- Test Prerun

Note The modules can be run by using a sample sheet and injection list from either ABI PRISM® Sequencing Analysis Software or ABI PRISM® GeneScan® Analysis software.

Sensitivity Test

Purpose

The Sensitivity test is useful in locating the subsystem source of problems that manifest as attenuated peaks or diminished sensitivity.

Test Description

The Sensitivity test is performed on a sample file that is generated using a sensitivity capillary. The Data Collection software is used to generate the data, then the Diagnostics System software is used to perform the analysis.

Test Procedure

Generate a Sample File in the Data Collection Software

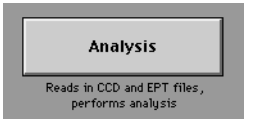
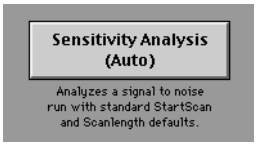
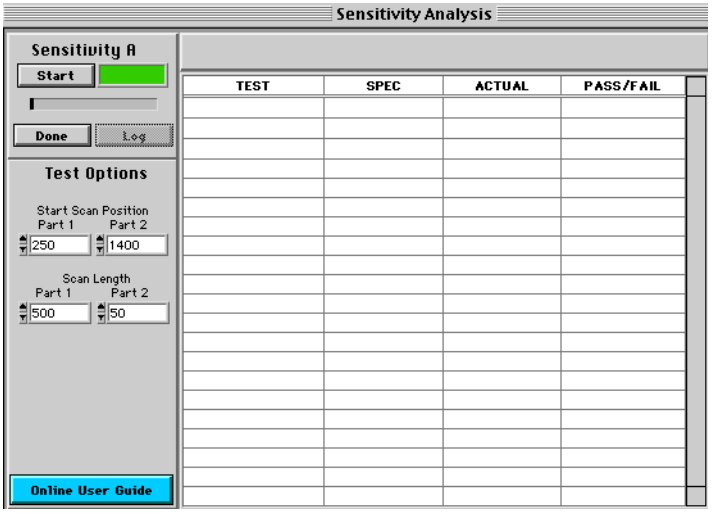
Note For specifics on using the Data Collection software, please see the *ABI PRISM 310 Genetic Analyzer User's Manual*.

To generate a sample file:

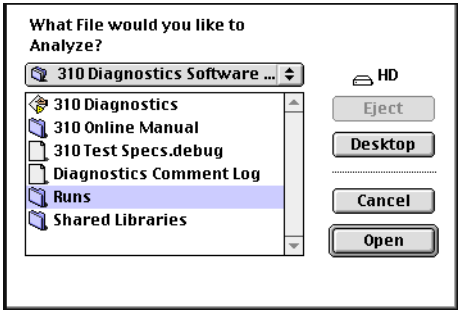
Step	Action
1	Install a sensitivity capillary on the ABI PRISM® 310 Genetic Analyzer.
2	Open the Data Collection software.
3	Create a sample sheet for one sample.
4	Create a new injection list.
5	Open the newly created sample sheet and select the **Test CCD Sensitivity** module.
6	Deselect the **Autoanalyze** function.
7	Click **Run**.
8	When the run is finished, quit the Data Collection software.

Perform the Analysis in the Diagnostics System Software

To analyze a sample file:

Step	Action
1	Open the Diagnostics System software.
2	In the **Main 310** window, click the **Analysis** button:  The **Analysis Menu 310** opens.
3	Click the **Sensitivity Analysis (Auto)** button:  The **Sensitivity Analysis** window opens: 

To analyze a sample file: *(continued)*

Step	Action
4	Click **Start**. A dialog box opens, as shown below. 
5	In the **Runs** folder, open the newly completed sample file. The sample file is analyzed and signal-to-noise values are generated.
6	When complete, the results are displayed as shown below. **Sensitivity Analysis** TEST | SPEC | ACTUAL | PASS/FAIL Signal to Noise (Sensitiv | | | 11/5/99 | 1:05 PM | | File Name: | Sens 1 | | Start/Scan/Length(1): | 250 | 500 | Start/Scan/Length(2): | 1400 | 50 | Signal | 950 - 1800 | 11 | FAIL Noise | < 6 | 3.58 | PASS | | | | | | 540 Signal w/Cap | NONE | 495.07 | 586 Signal w/Cap | < 2900 | 440.86 | 586 Noise w/Cap | NONE | 1.80 | 625 Signal w/Cap | NONE | 567.13 | 625 Noise w/Cap | NONE | 1.79 | 540 Signal Background | NONE | 491.26 | 586 Signal Background | NONE | 435.52 | 586 Noise Background | NONE | 1.47 | 625 Signal Background | NONE | 562.66 | 625 Noise Background | NONE | 2.01 | 540 Signal Net | NONE | 3.81 | 586 Signal Net | NONE | 5.34 |
7	When you are finished reviewing the results, click **Done**. The **Sensitivity Analysis** window closes.

Specifications

The specifications this test uses are:

- Signal value range = 950-1800
- Noise value < 6
- 586 Signal with Cap < 2900

Results and Interpretation

If...	Then...
the sensitivity is greater than the specification, but the signal value is low (<1000)	a service engineer is needed to test the laser light output.
the sensitivity is less than the specification, and the noise with cap is greater than 3	rerun the test, allowing more time for the baseline to stabilize. **Note** If this fails, see Noisy Baseline troubleshooting.
the sensitivity is less than the specification, and the noise with cap is less than 2900	Clean the capillary and try again. **Note** If this fails, the optics need to be checked by a service engineer.

IMPORTANT The Start Scan default number is 250 for part 1 and 1400 for part 2. If the signal-to-noise specification fails, analyze the sample file using the Sensitivity Analysis (Manual) button and modify the start scan numbers to collect a clean, noise-free length of the baseline for part 1 and part 2.

CCD Noise Test

Purpose

The Noise Analysis window is used to analyze Test CCD Noise sample files. It reports the various signal and noise levels for each segment of the test.

Test Description

The CCD Noise test is performed without a capillary installed to check the optics, CCD, and Controller PCA. This test displays the following baseline levels at different settings, each for 1 minute:

- Background level with laser on
- Dark current baseline levels at gain settings of 1X, 2X, 4X, and 8X
- CCD test bit on

Test Procedure

Generate a Sample File in the Data Collection Software

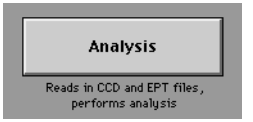
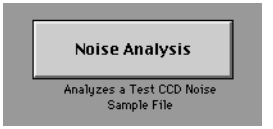
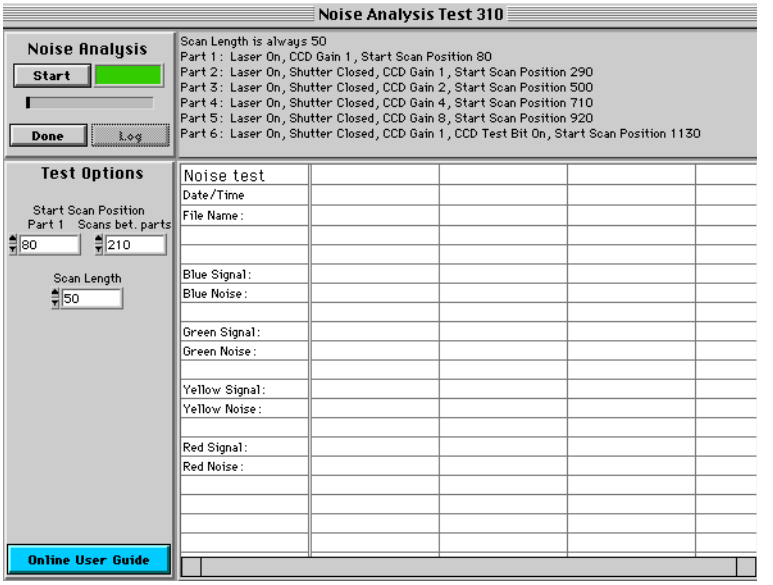
Note For specifics on using the Data Collection software, please see the *ABI PRISM 310 Genetic Analyzer User's Manual*.

To generate a sample file:

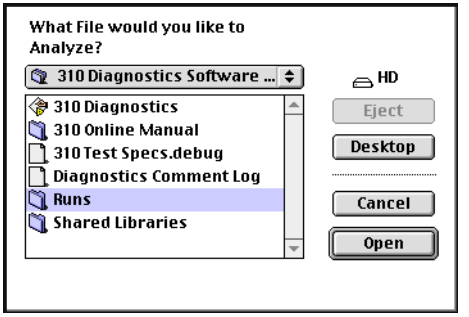
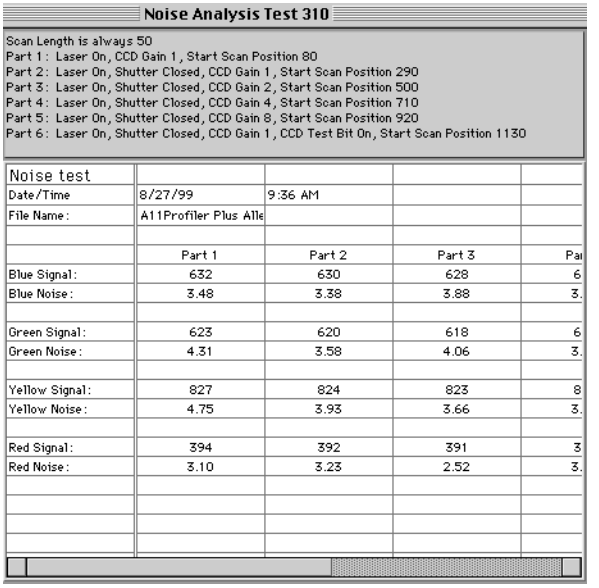
Step	Action
1	Remove the capillary on the 310 instrument.
2	Open the Data Collection software.
3	Create a sample sheet for one sample.
4	Create a new injection list.
5	Select the **Test CCD Noise** module.
6	Deselect the **Autoanalyze** function.
7	Click **Run**.
8	When the run is finished, quit the Data Collection software.

Perform the Analysis in the Diagnostics System Software

To analyze a sample file:

Step	Action
1	Open the Diagnostics system software.
2	In the **Main 310** window, click the **Analysis** button:  The **Analysis Menu 310** opens.
3	Click the **Noise Analysis** button:  The **Noise Analysis Test 310** window opens: 

To analyze a sample file: *(continued)*

Step	Action
4	Click **Start**. A dialog box opens as shown below. 
5	In the **Runs** folder, open the newly completed sample file. The sample file is analyzed and values for noise and signal are generated for each of six conditions.
6	When complete, the results are displayed as shown below.  **Note** The horizontal slider bar at the bottom of the window can be used to scroll through all the columns of data.

To analyze a sample file: *(continued)*

Step	Action
7	When you are finished reviewing the results, click **Done**. The **Noise Analysis** window closes.

Specifications

Baselines should be at the levels given below.

Part	Test Condition	Signal Level	Noise
1	Background	100–1000	1–5
2	Dark current 1X	100–500	1–4
3	Dark current 2X	100–600	1–5
4	Dark current 4X	150–900	2–9
5	Dark current 8X	200–1700	5–17
6	CCD test bit on	900–1000	1–3

Results and Interpretation

If...	Then...
the noise values are within limits	reinstall the capillary and perform the 4-Color Baseline test.
the dark current noise levels are within limits but the background noise values are high	check if there is fluorescent material in the capillary holder aperture.
all the noise values are high	there is a problem with the CCD or the Controller PCA. This requires a service engineer.

Four-Color Baseline Test

Purpose

The 4-Color Baseline test analyzes a sample file to determine the noise levels of the four colors.

The 4-Color Baseline test is used when troubleshooting problems with high or noisy baselines.

Test Description

The test is performed with the laser in run mode and with a gel-filled capillary installed. The module typically runs for 5 minutes.

Test Procedure

Generate a Sample File in the Data Collection Software

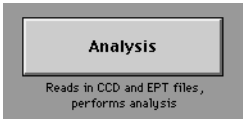
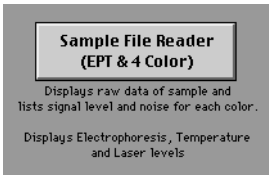
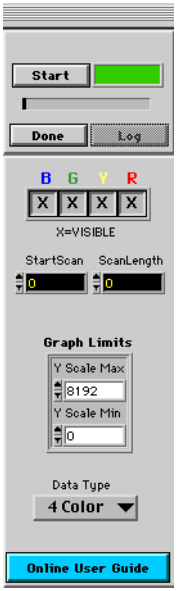
Note For specifics on using the Data Collection software, please see the *ABI PRISM 310 Genetic Analyzer User's Manual*.

To generate a sample file:

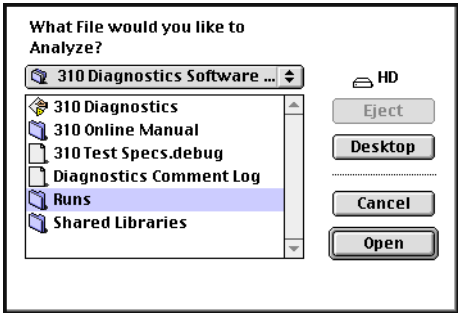
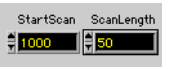
Step	Action
1	Install a gel-filled capillary on the 310 instrument.
2	Open the Data Collection software.
3	Create a sample sheet for one sample.
4	Create a new injection list.
5	Enter the newly created sample sheet and select the **Test 4-Color Baseline** module.
6	Deselect the **Autoanalyze** function.
7	Click **Run**.
8	When the run is finished, quit the Data Collection software.

Perform the Analysis in the Diagnostics Software

To analyze a sample file:

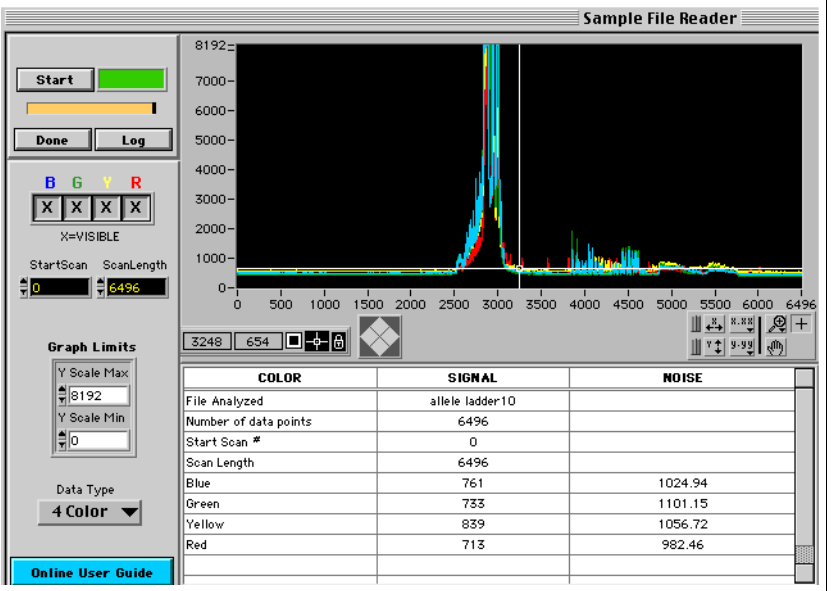
Step	Action
1	Open the Diagnostics System software.
2	In the **Main 310** window, click the **Analysis** button:  The **Analysis Menu 310** opens.
3	Click the **Sample File Reader** button:  The **Sample File Reader** window opens.
4	Under **Data Type**, make sure that **4 Color** is selected: 

To analyze a sample file: *(continued)*

Step	Action
5	Click **Start**. A dialog box opens as shown below. 
6	In the **Runs** folder, open the newly completed sample file. The sample file is analyzed.
7	Select a level length of the baseline to analyze.  Under **Start Scan**, enter an appropriate start point. Then enter `50` under **Scan Length**.

To analyze a sample file: *(continued)*

Step	Action
8	Click **Enter**. A value for signal and noise is generated for each color, as in the example below.



COLOR	SIGNAL	NOISE
File Analyzed	allele ladder10	
Number of data points	6496	
Start Scan #	0	
Scan Length	6496	
Blue	761	1024.94
Green	733	1101.15
Yellow	839	1056.72
Red	713	982.46

9	When you are finished reviewing the results, click **Done**. The **Sample File Reader** window closes.

Specifications

Signal and noise values vary considerably, but you should expect to see the following approximate range of values for a blank baseline (at the start of a run):

Color	Signal	Noise
Red	700–1600	3–6
Yellow	700–1600	3–6
Green	300–1000	3–6
Blue	300–1000	3–6

Results and Interpretation

If...	Then...
background values are high	the problem is the capillary and/or the gel.
background values are within limits	go to the Prerun test.

PrerunTest

Purpose

The Prerun test examines and analyzes four-color baseline data from a sample file. Together with the 4-Color Baseline test it is used for troubleshooting and narrowing down the potential cause of a problem.

The Prerun test is used when troubleshooting problems with high or noisy baselines, or drifting baselines.

Test Description

The analysis portion of this test is the same as for the 4-Color Baseline test, however the conditions of the run are different. The Prerun test is performed with the laser in run mode and high voltage (10,000 Vdc) applied.

The test typically runs for 10 minutes.

Test Procedure

Generate a Sample File in the Data Collection Software

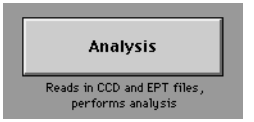
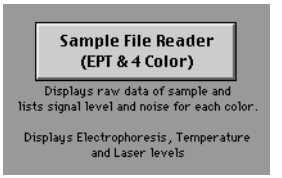
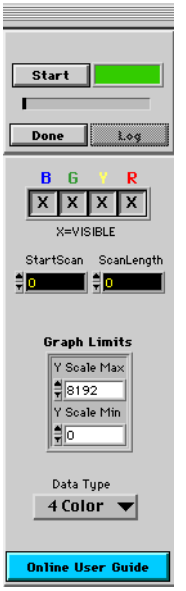
Note For specifics on using the Data Collection software, please see the *ABI PRISM 310 Genetic Analyzer User's Manual*.

To generate a sample file:

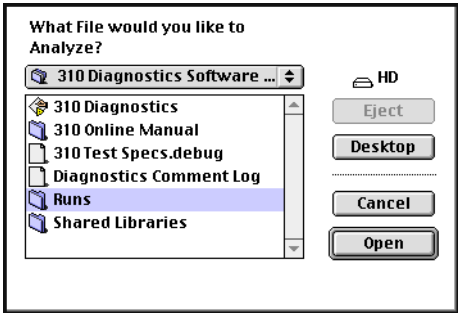
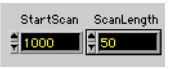
Step	Action
1	Install a gel-filled capillary on the 310 instrument.
2	Ensure that a vial with sufficient buffer is in buffer position 1 of the AutoSampler.
3	Open the Data Collection software.
4	Create a sample sheet for one sample.
5	Create a new injection list.
6	Deselect the **Autoanalyze** function.
7	Click **Run**.
8	When the run is finished, quit the Data Collection software.

Perform the Analysis in the Diagnostics System Software

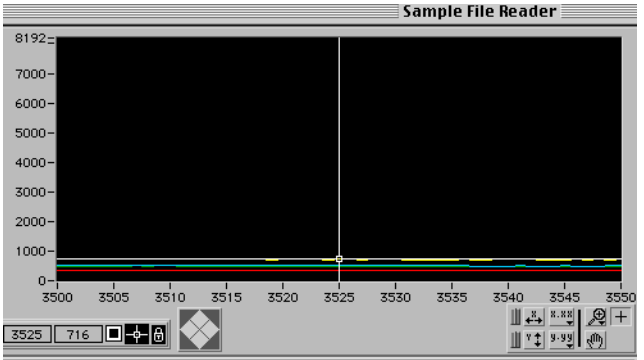
To analyze a sample file:

Step	Action
1	Open the Diagnostics System software.
2	In the **Main 310** window, click the **Analysis** button.  The **Analysis Menu 310** opens.
3	Click the **Sample File Reader** button.  The **Sample File Reader** window opens.
4	Under **Data Type**, leave **4 Color** (the default value) selected as shown below. 

To analyze a sample file: *(continued)*

Step	Action
5	Click **Start**. A dialog box opens as shown below. 
6	In the **Runs** folder, open the newly completed sample file. The sample file is analyzed.
7	Select a level length of the baseline to analyze.  Under **Start Scan**, enter an appropriate start point. Then enter `50` under **Scan Length**.

To analyze a sample file: *(continued)*

Step	Action
8	Click **Enter**. A value for signal and noise is generated for each color as in the example below.  **COLOR** / **SIGNAL** / **NOISE** File Analyzed — A11Profiler Plus Allelic ladder Number of data points — 7040 Start Scan # — 3500 Scan Length — 50 Blue — 508 — 2.23 Green — 488 — 3.74 Yellow — 720 — 2.73 Red — 348 — 1.71
9	When you are finished reviewing the results, click **Done**. The **Sample File Reader** window closes.

Specifications

Signal and noise values vary considerably, but you should expect to see the following approximate range of values:

Color	Signal	Noise
Red	700–1600	3–6
Yellow	700–1600	3–6
Green	300–1000	3–6
Blue	300–1000	3–6

Results and Interpretation

If...	Then...
background values are high	the problem is the gel, a contaminated electrode, or something else migrating through the gel.
background values are within limits	the problem may have been a bad or contaminated sample. Perform another run with freshly made standard.

5 Troubleshooting

Introduction

Purpose of This Chapter

This chapter reviews run problems and their possible causes.

In This Chapter

The following topics are covered in this chapter:

Determining Tests to Run

Running the Verify Instrument Test First

With any problem that develops on the ABI PRISM® 310 Genetic Analyzer, first run the Verify Instrument test. The Verify Instrument test will help in determining whether a problem is due to the instrument hardware or chemistry, and will point to individual component tests that may be needed.

Use the Verify Instrument test in conjunction with the Troubleshooting Data table below to help in pinpointing the problem system(s).

Preparing to Troubleshoot a Problem

When troubleshooting 310 instrument problems:

Step	Action
1	Understand: ♦ The chemistry ♦ Labeling of the samples ♦ How the 310 instrument collects data ♦ How the data analysis software programs work
2	Review the experiment for errors in primer design, sample quantitation and purification, pipetting problems, software preference settings and other common mistakes.
3	Examine the data. Describe the problem as specifically as possible: ♦ Is it a problem with the sample peaks, the baseline, or the peaks of only one color? ♦ Does the problem exist in all parts of the run or does it affect only DNA fragments of a certain length? ♦ Is the problem visible in raw data? analyzed data? log files? Continue to ask these types of questions until you have described the problem as specifically and thoroughly as possible.
4	List possible causes of the problem. See the troubleshooting table in this chapter for help.
5	For each “possible cause” you have listed, ask: Does other information support or contradict this as the cause of the problem?

When troubleshooting 310 instrument problems: *(continued)*

Step	Action
6	If necessary, collect more information to narrow the list of possible causes.
7	Correct the problem where possible, and test the fix.
8	If you need to call Service, communicate what you have determined and any tests you have performed. This will assist your service engineer in narrowing down the problem.

Troubleshooting

Introduction

Whenever possible, run the recommended test(s) when troubleshooting a problem. Then, if a service call is necessary, the service engineer will be able to prepare specifically for your service call.

Note Always run the Verify Instrument test before troubleshooting a problem, as it will eliminate many potential causes.

Symptoms and Possible Resolutions

Problems with Peak Quality and Resolution

Symptom	Possible Causes	Type of Action
Attenuated Peaks No Peaks Poor or No Sensitivity	♦ Bad polymer or sample; bubble in vial ♦ Misaligned or dirty capillary ♦ Defective capillary	Replace bad solutions; spin sample; clean, realign capillary and window or replace capillary See the *ABI PRISM 310 Genetic Analyzer User's Manual* troubleshooting guide
	♦ Autosampler needs calibration ♦ Incorrect capillary height adjustment or capillary not in vial	ABI PRISM® 310 Diagnostics System software Run Autosampler AutoCalibration test
	♦ Defective high voltage supply or misconnected cable ♦ Defective laser	Call service engineer
	♦ CCD needs calibration or is defective ♦ Misaligned optics	Diagnostics System software Run Sensitivity test Call service engineer

Problems with Peak Quality and Resolution *(continued)*

Symptom	Possible Causes	Type of Action
Poor Resolution: Broadening of peaks or low peaks Migration time too slow or fast	♦ Injection time too long ♦ Bad/old solutions, sample or water ♦ Defective capillary ♦ Ambient room temperature is low	Reduce injection time, replace solutions, or replace capillary; correct room temperature See the *ABI PRISM 310 Genetic Analyzer User's Manual* troubleshooting guide
	♦ Bad/old solutions or water ♦ Incorrect syringe max travel	Diagnostics System software Check the EPT data in the Sample File Reader Calibrate the syringe max travel
	♦ Incorrect gel pump force ♦ Defective high voltage ♦ Defective controller PCA	Call service engineer
Incorrect or varying sample migration time	♦ Bad polymer ♦ bad sample ♦ Fluctuating ambient temperature ♦ Defective capillary ♦ Defective gel block (corrosion at anode)	Replace polymer solutions Make new sample Correct room temperature Replace capillary Replace gel block
	♦ Incorrect/varying hotplate temperature	Diagnostics System software Run Hotplate test
	♦ Wrong gel pump force ♦ High voltage arcing ♦ Defect in electrode block assembly ♦ Defective high voltage power supply ♦ Defective controller PCA	Call service engineer

Problems with Signal Strength and Quality

Symptom	Possible Causes	Type of Action
Zero Baseline or No Baseline Offset Solid blue line, made up of all four colors, at or near bottom of the CCD window	♦ Capillary window misaligned	Realign capillary
	♦ High voltage arcing	Diagnostics System software See Troubleshooting Help
	♦ Defective laser shutter solenoids ♦ Defective laser ♦ Optics misaligned ♦ Defective CCD ♦ Defective controller PCA	Diagnostics System software Run CCD Noise test Call service engineer
High Baseline	♦ Dirty or misaligned capillary window ♦ Bad buffer or polymer ♦ Fluorescing material in the capillary holder ♦ Defective capillary	Clean capillary window or realign capillary Replace buffer or polymer Clean capillary holder Replace capillary
	♦ Defective controller ♦ Defective CCD	Diagnostics System software Run 4-Color Baseline test Run Prerun test Call service engineer

Problems with Signal Strength and Quality *(continued)*

Symptom	Possible Causes	Type of Action
Noisy Baseline Spikes in the Baseline	♦ Bad buffer or polymer ♦ Dirty capillary holder aperture ♦ Defective capillary	Replace buffer or polymer Clean capillary holder Replace capillary
	♦ Defective high voltage power supply ♦ Defective CCD ♦ Defective controller PCA	Diagnostics System software Run CCD Noise test Run 4-Color Baseline test Run Prerun test Call service engineer
Shift in Baseline	♦ Fluctuating AC power ♦ Capillary moves in capillary holder	Use an Uninterruptable Power Supply (UPS) Tape capillary to hotplate
	♦ Defective CCD cable ♦ Defective controller PCA ♦ Defective CCD	Diagnostics System software Run CCD Noise test Run Prerun test Call service engineer
Drifting Baseline	♦ Contaminated or defective capillary ♦ Bad polymer ♦ Bad sample ♦ Contaminated electrode	Replace capillary Replace polymer solutions Make new sample Replace electrode
	♦ Defective CCD cable ♦ Defective CCD ♦ Defective controller PCA	Diagnostics System software Run CCD Noise test Run Prerun test Call service engineer

Problems with Current or Light Output

Symptom	Possible Causes	Type of Action
Low light power output High laser current (>7.8A)	♦ Defective laser ♦ Defective laser power supply ♦ Defective controller PCA	Call service engineer
No current	♦ Plugged or defective capillary ♦ Bad polymer or water ♦ Buffer level low or depleted	Replace capillary Replace solutions Refill buffer jar/vial
	♦ Unfilled capillary or bubbles in capillary ♦ Defective high voltage power supply ♦ Defective controller PCA	Call service engineer
Low current	♦ Bubble in capillary ♦ Bad water, buffer or polymer ♦ Plugged or defective capillary	Replenish gel in capillary Replace solutions Replace capillary
	♦ Defective high voltage power supply ♦ Defective controller PCA	Call service engineer
Fluctuating current	♦ Bubble in capillary or gel block ♦ Buffer level low or depleted ♦ Broken or cracked capillary	Replenish gel Refill buffer jar/vial Replace capillary
	♦ Arcing to conductive surface on 310 instrument	Diagnostics System software See Troubleshooting Help
	♦ Defect in electrode block assembly ♦ Defective high voltage power supply ♦ Defective controller PCA	Call service engineer

Problems with Current or Light Output *(continued)*

Symptom	Possible Causes	Type of Action
High current	♦ Incorrect buffer/polymer concentration	replace polymer and buffer solutions
	♦ Arcing to conductive surface on 310 instrument	Diagnostics System software See Troubleshooting Help
	♦ Defective high voltage power supply ♦ Defective controller PCA	Call service engineer

Problems with Temperature

Symptom	Possible Causes	Type of Action
Temperature not at setpoint during run Cannot control temperature Hotplate will not heat Basecalling or sizecalling errors	♦ Defective hotplate	Diagnostics System software Run Hotplate test See Troubleshooting Help
	♦ Failed Hotplate test ♦ Defective Main Power Supply ♦ Defective controller PCA ♦ Defective cable assembly	Call service engineer
Hotplate is very hot but status readout indicates 0 °C	♦ Defective controller PCA ♦ Defective cable assembly	Call service engineer

Problems with Autosampler Movement

Symptom	Possible Causes	Type of Action
Run paused: “Autosampler Times Out” Run paused: “Move to position is bigger than max position” Improper positioning or incomplete travel Bent electrode No movement in one or more directions Nonstop driving in one direction	♦ Incorrectly calibrated	Diagnostics System software Run AutoCalibration test
	♦ Failed Autocalibration test ♦ Defective LEDs ♦ Defective main power supply ♦ Defective controller PCA ♦ Defective motor/lead screw assembly	Call service engineer

Problems with Syringe Leaks or Movement

Symptom	Possible Causes	Type of Action
Run paused: "Step time too Short to execute function" Run paused: "Detected error related to syringe pump"	♦ Defective syringe pump ♦ Defective main power supply ♦ Defective LED assembly ♦ Defective controller PCA ♦ Defective lead screw	Call service engineer
Run paused: "Syringe leak detected"	♦ Leaking syringe, loose fittings ♦ Leaking syringe, defective fittings ♦ Dried polymer in gel block ♦ Cracked or defective gel block	Make sure both O-rings are in place and fittings snug Replace syringe Flush with hot water Replace gel block
	♦ Leaking at buffer valve or capillary fittings	Diagnostics System software Run Pressure Leak test
	♦ Incorrect syringe force ♦ Buffer valve will not close	Call service engineer
Syringe will not move up or down	♦ Problem with power supply	Diagnostics System software See Troubleshooting Help
	♦ Defective syringe pump ♦ Defective main power supply ♦ Defective LED assembly ♦ Defective controller PCA ♦ Defective lead screw	Call service engineer

Problems with Syringe Leaks or Movement *(continued)*

Symptom	Possible Causes	Type of Action
Syringe will not move to home position Syringe moves to bottom of travel and continues to drive downward	♦ Board corrupted	Perform a cold boot (See the *ABI PRISM 310 Genetic Analyzer User's Manual*, "Performing a Cold Boot.")
	♦ Defective home sensor ♦ Defective controller PCA ♦ Defect in encoder assembly	Call service engineer

Test Specifications

A

Verify Instrument Specifications

The specifications used for each subsystem are given in the tables below.

Serial Specifications:

Item	Specification
Serial Port Address	Modem
Wait after writing (ms)	400
Serial Port Timeout (ms)	1000

ADC Limits:

Level Tested	Low Limit	High Limit
+5 V	4.9000	5.5000
+24 V	23.5000	24.5000
+15 V	14.4000	15.6000
-15 V	–15.6000	–10.0000
+2.5 V	2.4500	2.5500
Batt	3.3000	4.4000
CCD	–18.0000	–14.5000

Syringe Pump Specifications:

Test Parameter	Value
Max LP Current	8.00
Pressure Mode Leak Len.	20
Vacuum Mode Leak Len.	50
Syringe Pump Distance	60

Syringe Pump Specifications:

Test Parameter	Value
Syringe Pump Tolerance	12
Default No. of Steps	4

Laser Power Limits:

Level Tested	Low Limits	High Limits
10 mW	9.0000	11.0000

Baud Rates:

Fast	Slow
57600	9600

Analysis Parameters:

Test Parameter	Value
Signal high	1800
Signal low	950
Noise Limit	6
Signal Slope	–0.15
Signal Height 586	2900

Hotplate Temperature Specifications:

Test Parameter	Value
Lo Temp Limit °C	15.00
Hi Temp Limit °C	70.00
Temperature Variance °C (from set point)	1.00
TempTimeout (seconds)	210

EP Voltage Limits:

Level Tested	Low Limit	High Limit
3 kV	2.9000	3.0750
5 kV	4.7250	5.2250
7 kV	6.7250	7.2250
10 kV	9.7250	10.2250
12 kV	11.7250	12.2250
15 kV	14.7250	15.2250

EP Current Limits:

Level Tested	Low Limit	High Limit
3 kV	5.5000	6.5000
5 kV	9.0000	10.5000
7 kV	13.0000	14.5000
10 kV	18.5000	21.0000
12 kV	22.3000	25.2000
15 kV	28.0000	31.5000

Sensitivity Test Specifications

The specifications this test uses are:

- Signal value range = 950–1800
- Noise value < 6
- 586 Signal with Cap < 2900

Sensitivity Test Results and Interpretation

If...	Then...
the sensitivity is greater than the specification, but the signal value are low (<1000)	a service engineer is needed to test the laser light output.
the sensitivity is less than the specification, and the noise with cap is greater than 3	rerun the test, allowing more time for the baseline to stabilize. **Note** If this fails, see Noisy Baseline troubleshooting.
the sensitivity is less than the specification, and the noise with cap is less than 2900	Clean the capillary and try again. **Note** If this fails, the optics need to be checked by a service engineer.

CCD Noise Test Specifications

Baselines should be at the levels shown below.

Part	Test Condition	Signal Level	Noise
1	Background	100–1000	1–5
2	Dark current 1X	100–500	1–4
3	Dark current 2X	100–600	1–5
4	Dark current 4X	150–900	2–9
5	Dark current 8X	200–1700	5–17
6	CCD test bit on	900–1000	1–3

CCD Noise Test Results and Interpretation

If...	Then...
the noise values are within limits	reinstall the capillary and perform the 4-Color Baseline test.
the dark current noise levels are within limits, but the background noise values are high	check if there is fluorescent mterial in the capillary holder aperture.
all the noise values are high	there is a problem with the CCD or the Controller PCA. This requires a service engineer.

Four-Color Baseline Test Specifications

Signal and noise values vary considerably, but you should expect to see the following approximate range of values for a blank baseline (at the start of a run):

Color	Signal	Noise
Red	700–1600	3–6
Yellow	700–1600	3–6
Green	300–1000	3–6
Blue	300–1000	3–6

Four-Color Baseline Test Results and Interpretation

If...	Then...
background values are high	the problem is the capillary and/or the gel.
background values are within limits	go to the Prerun test.

Prerun Test Specifications

Signal and noise values vary considerably, but you should expect to see the following approximate range of values:

Color	Signal	Noise
Red	700–1600	3–6
Yellow	700–1600	3–6
Green	300–1000	3–6
Blue	300–1000	3–6

Prerun Test Results and Interpretation

If...	Then...
background values are high	the problem is the gel, a contaminated electrode, or something else migrating through the gel.
background values are within limits	the problem may have been a bad or contaminated sample. Perform another run with freshly made standard.

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