GeneAmp® PCR System 9700

0.5mL Sample Block Module

User's Manual

Applied Biosystems

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0.5-mL Sample Block Module

Safety and Regulatory Information

IMPORTANT Read this section before you install the GeneAmp® PCR System 9700 and the 0.5-mL Sample Block Module.

General Symbols

The following symbols are used on Applied Biosystems instruments. Whenever such symbols appear on instruments, please observe appropriate safety procedures.

Electrical Symbols

	This symbol indicates the on position of the main power switch.
	This symbol indicates the off position of the main power switch.
	This symbol indicates the on/off position of a push-push main power switch.
	This symbol indicates that a terminal may be connected to another instrument's signal ground reference. This is not a protected ground terminal.
	This symbol indicates that this is a protected ground terminal that must be connected to earth ground before any other electrical connections are made to the instrument.
	This symbol indicates that this terminal either receives or delivers alternating current or voltage.
	This symbol indicates that this terminal either receives or delivers alternating and direct current or voltage.

	This symbol indicates the presence of high voltage and warns the user to proceed with caution.
	This symbol alerts you to consult the manual for further information and to proceed with caution.

Non-electrical Symbols

	This symbol illustrates a heater hazard. Proceed with caution when working around these areas to avoid being burned by hot components.

Electrical Safety Testing

Routine safety testing of analytical instruments (*e.g.*, high potential voltage testing) may be required by various safety agencies.

	Testing should only be carried out by qualified personnel after seeking advice from the Applied Biosystems Service Department.

Instrument Labels

The following instrument labels are on the system 9700 with the 0.5-mL Sample Block Module installed.

	**! WARNING ! Disconnect supply cord before opening. Grounding circuit continuity is vital for safe operation of equipment. Never operate equipment with grounding conductor disconnected.** *AVERTISSEMENT: Debrancher le cordon d'alimentation avant d'ouvrir la continuite des masses est essentielle.* *Pour un fonctionnement sans danger. Ne jamais utiliser l'equipment si le fil de terre n'est pas raccorde.*
	**! WARNING ! Hot Surface. Use care when working around this area to avoid being burned by hot components.** *Attention. Surface chaude.*

Operating Precautions

Precautions

The following precautions should be taken whenever you operate the system 9700 with the 0.5-mL Sample Block Module installed.

Note This instrument is able to withstand transient overvoltage according to Installation Category II as defined in IEC 1010-1.

General Use

	**CAUTION The instrument should be used according to the instructions provided in this manual. If used otherwise, the protection provided by this instrument may be impaired.**

Environment, Humidity, and Temperature

	**CAUTION This instrument is designed for indoor use.**
	**CAUTION Do not operate in a Cold Room or a refrigerated area.** **The system 9700 will operate safely when the ambient temperature is 5–40 °C (41–104 °F). The system 9700 will meet performance specifications when the ambient temperature is 15–30 °C and the ambient relative humidity is 20–80%. These specifications have been calculated for altitudes between 0 and 2,000 meters.**
	**CAUTION This instrument is not designed for operation in an explosive environment. Do not place the instrument close to potentially explosive materials or objects.**
	**CAUTION This instrument is not designed for operation with the heated cover retracted when running at 4 °C. If the heated cover is retracted and the instrument runs at 4 °C, water condensation may be excessive in the sample block area.**

Sample Block Module

! WARNING ! To protect yourself against burns, do not open the heated cover or touch the sample block module when the word Hot displays on the screen. This indicates a sample block temperature above 50 °C.

The hot areas for the 0.5-mL Sample Block Module are shown below.

CAUTION To protect your samples and to guarantee the best temperature uniformity, keep the heated cover closed at all times, except when loading or unloading samples.

Grounding and Electrical Safety

The system 9700 must be grounded for protection against electrical shock.

! WARNING ! Do not use an adapter to a two-terminal outlet since this does not provide positive ground protection.

Refer to the *GeneAmp® PCR System 9700 Base Module User's Manual* (P/N 0993-6247) for more information on electrical safety.

Voltage Quality

Line voltage must be within ±10% of the nominal value. High or low voltages may have adverse effects on the electronic components of the instrument. In areas where the supplied power is subject to fluctuations exceeding these limits, a power line regulator may be required.

Input/Output Connections

Refer to the *GeneAmp® PCR System 9700 Base Module User's Manual* (P/N 0993-6247) for information on the input and output connections of this instrument.

Physical Specifications

Refer to the *GeneAmp® PCR System 9700 Base Module User's Manual* (P/N 0993-6247) for information on the physical specifications of this instrument.

Pollution Category

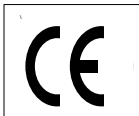
The system 9700 will operate safely in environments that contain nonconductive foreign matter up to Pollution Degree 2 in IEC 1010-1.

Instrument Storage

The system 9700 must be stored at a temperature between -20 °C and 60 °C (-4 °F and 140 °F) at altitudes ranging from 0–12,000 meters above sea level.

IMPORTANT The system 9700 is guaranteed to meet performance specifications only when the ambient temperature is 15–30 °C and the ambient relative humidity is 20–80% (between altitudes of 0 and 2,000 meters).

Communautes Europeennes (CE) Compliance



All instruments shipped to the European Union (EU; formerly known as the European Community) have the CE label on the back of the instrument. This label signifies that these instruments comply with the Electromagnetic Compatibility and Low Voltage Directives.

FCC Compliance (U.U.)

This product is classified as a digital device used exclusively as industrial, commercial, or medical test equipment. It is exempt from the technical standards specified in Part 15 of the FCC Rules and Regulations, based on Section 15.103(c).

Routine Maintenance for Safe Operation

Before using any cleaning or decontamination method, except those recommended in the manual, the user should check with Applied Biosystems to ensure that the proposed method will not damage the equipment.

Maintain your instrument in good working order. In the event that the instrument has been subjected to adverse environmental conditions (such as fire, flood, earthquake, etc.), a service inspection of the instrument should be made to ensure safe operation.

Technical Support

To Reach Us on the Web

Applied Biosystems web site address is:

http://www.appliedbiosystems.com/techsupport

We strongly encourage you to visit our web site for answers to frequently asked questions, and to learn more about our products. You can also order technical documents and/or an index of available documents and have them faxed or e-mailed to you through our site (see the "Documents on Demand" section below).

Hours for Telephone Technical Support

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

Product	Hours
Chemiluminescence	9:00 a.m. to 5:00 p.m. Eastern Time
LC/MS	9:00 a.m. to 5:00 p.m. Pacific Time
All Other Products	5:30 a.m. to 5:00 p.m. Pacific Time

See the "Regional Offices Sales and Service" section below for how to contact local service representatives outside of the United States and Canada.

To Reach Us by Telephone or Fax in North America

Call Technical Support at 1-800-831-6844, and select the appropriate option (below) for support on the product of your choice at any time during the call. (To open a service call for other support needs, or in case of an emergency, press **1** after dialing 1-800-831-6844.)

For Support On This Product	Dial 1-800-831-6844, and...
ABI PRISM® 3700 DNA Analyzer	**Press** **8** / **FAX** 650-638-5891
ABI PRISM® 3100 Genetic Analyzer	**Press** **26** / **FAX** 650-638-5891
BioInformatics (includes BioLIMS™, BioMerge™, and SQL GT™ applications)	**Press** **25** / **FAX** 505-982-7690
DNA Synthesis	**Press** **21** / **FAX** 650-638-5981
Fluorescent DNA Sequencing	**Press** **22** / **FAX** 650-638-5891
Fluorescent Fragment Analysis (includes GeneScan® applications)	**Press** **23** / **FAX** 650-638-5891
Integrated Thermal Cyclers	**Press** **24** / **FAX** 650-638-5891

For Support On This Product	Dial 1-800-831-6844, and...
PCR and Sequence Detection	**Press**: **5**, or call 1-800-762-4001, and press 1 for PCR, or 2 for Sequence Detection **FAX**: 240-453-4613
FMAT	**Telephone**: 1-800-899-5858, and press 1, then press 6 **FAX**: 508-383-7855
Peptide and Organic Synthesis	**Press**: **31** **FAX**: 650-638-5981
Protein Sequencing	**Press**: **32** **FAX**: 650-638-5981
Chemiluminescence	**Telephone**: 1-800-542-2369 (U.S. only), or 1-781-271-0045 (Tropix) **FAX**: 781-275-8581 (Tropix) 9:00 a.m. to 5:00 p.m. ET
LC/MS	**Telephone**: 1-800-952-4716 **FAX**: 650-638-6223 9:00 a.m. to 5:00 p.m. PT

Documents on Demand

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

You can access Documents on Demand through the internet or by telephone:

If you want to order...	Then...
through the internet	Use http://www.appliedbiosystems.com/techsupport You can search for documents to order using keywords. Up to five documents can be faxed or e-mailed to you by title.
by phone from the United States or Canada	a. Call 1-800-487-6809 from a touch-tone phone. Have your fax number ready. b. Press **1** to order an index of available documents and have it faxed to you. Each document in the index has an ID number. (Use this as your order number in step “d” below.) c. Call 1-800-487-6809 from a touch-tone phone a second time. d. Press **2** to order up to five documents and have them faxed to you.

If you want to order...	Then...
by phone from outside the United States and Canada	a. Dial your international access code, then 1-858-712-0317 from a touch-tone phone. Have your complete fax number and country code ready (011 precedes the country code). b. Press **1** to order an index of available documents and have it faxed to you. Each document in the index has an ID number. (Use this as your order number in step "d" below.) c. Call 1-858-712-0317 from a touch-tone phone a second time. d. Press **2** to order up to five documents and have them faxed to you.

To Reach Us by E-Mail

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

For this product area	Use this e-mail address
Chemiluminescence	info@appliedbiosystems.com
Genetic Analysis	galab@appliedbiosystems.com
LC/MS	apisupport@sciex.com
PCR and Sequence Detection	pcrlab@appliedbiosystems.com
Protein Sequencing, Peptide and DNA Synthesis	corelab@appliedbiosystems.com

Regional Offices Sales and Service

If you are outside the United States and Canada, you should contact your local Applied Biosystems service representative.

The Americas	
United States Applied Biosystems 850 Lincoln Centre Drive Foster City, California 94404 Tel: (650) 570-6667 (800) 345-5224 Fax: (650) 572-2743	Latin America (Del.A. Obregon, Mexico) Tel: (305) 670-4350 Fax: (305) 670-4349

Europe	
Austria (Wien) Tel: 43 (0)1 867 35 75 0 Fax: 43 (0)1 867 35 75 11	Hungary (Budapest) Tel: 36 (0)1 270 8398 Fax: 36 (0)1 270 8288
Belgium Tel: 32 (0)2 712 5555 Fax: 32 (0)2 712 5516	Italy (Milano) Tel: 39 (0)39 83891 Fax: 39 (0)39 838 9492
Czech Republic and Slovakia (Praha) Tel: 420 2 61 222 164 Fax: 420 2 61 222 168	The Netherlands (Nieuwerkerk a/d IJssel) Tel: 31 (0)180 331400 Fax: 31 (0)180 331409
Denmark (Naerum) Tel: 45 45 58 60 00 Fax: 45 45 58 60 01	Norway (Oslo) Tel: 47 23 12 06 05 Fax: 47 23 12 05 75

Europe	
Finland (Espoo) Tel: 358 (0)9 251 24 250 Fax: 358 (0)9 251 24 243	Poland, Lithuania, Latvia, and Estonia (Warszawa) Tel: 48 (22) 866 40 10 Fax: 48 (22) 866 40 20
France (Paris) Tel: 33 (0)1 69 59 85 85 Fax: 33 (0)1 69 59 85 00	Portugal (Lisboa) Tel: 351 (0)22 605 33 14 Fax: 351 (0)22 605 33 15
Germany (Weiterstadt) Tel: 49 (0) 6150 101 0 Fax: 49 (0) 6150 101 101	Russia (Moskva) Tel: 7 095 935 8888 Fax: 7 095 564 8787
Spain (Tres Cantos) Tel: 34 (0)91 806 1210 Fax: 34 (0)91 806 1206	South Africa (Johannesburg) Tel: 27 11 478 0411 Fax: 27 11 478 0349
Sweden (Stockholm) Tel: 46 (0)8 619 4400 Fax: 46 (0)8 619 4401	United Kingdom (Warrington, Cheshire) Tel: 44 (0)1925 825650 Fax: 44 (0)1925 282502
Switzerland (Rotkreuz) Tel: 41 (0)41 799 7777 Fax: 41 (0)41 790 0676	South East Europe (Zagreb, Croatia) Tel: 385 1 34 91 927 Fax: 385 1 34 91 840
Middle Eastern Countries and North Africa (Monza, Italia) Tel: 39 (0)39 8389 481 Fax: 39 (0)39 8389 493	Africa (English Speaking) and West Asia (Fairlands, South Africa) Tel: 27 11 478 0411 Fax: 27 11 478 0349
All Other Countries Not Listed (Warrington, UK) Tel: 44 (0)1925 282481 Fax: 44 (0)1925 282509	

Japan
Japan (Hatchobori, Chuo-Ku, Tokyo) Tel: 81 3 5566 6100 Fax: 81 3 5566 6501

Eastern Asia, China, Oceania	
Australia (Scoresby, Victoria) Tel: 61 3 9730 8600 Fax: 61 3 9730 8799	Malaysia (Petaling Jaya) Tel: 60 3 758 8268 Fax: 60 3 754 9043
China (Beijing) Tel: 86 10 6238 1156 Fax: 86 10 6238 1162	Singapore Tel: 65 896 2168 Fax: 65 896 2147

Eastern Asia, China, Oceania	
Hong Kong Tel: 852 2756 6928 Fax: 852 2756 6968	Taiwan (Taipei Hsien) Tel: 886 2 2698 3505 Fax: 886 2 2698 3405
Korea (Seoul) Tel: 82 2 593 6470/6471 Fax: 82 2 593 6472	Thailand (Bangkok) Tel: 66 2 719 6405 Fax: 66 2 319 9788

About the 0.5-mL Sample Block Module

Overview

The GeneAmp® PCR System 9700 amplifies nucleic acids using the polymerase chain reaction (PCR) process. The 0.5-mL Sample Block Module attaches to the top of the GeneAmp® PCR System 9700 Base Module and allows you to perform up to 60 reactions.

You can remove the 0.5-mL Sample Block Module and replace it with another sample block module as needed. Interchangeability lets you change sample well formats as well as throughput capacity.

IMPORTANT Interchanging sample block modules may require a firmware change. If the sample block module is placed on a base module running an earlier software version, the instrument will not operate correctly. To upgrade the base module software, use the 3.5" floppy disk that is shipped with the 0.5-mL Sample Block Module. For instructions on upgrading the software, see the *GeneAmp® PCR System 9700 Base Module User's Manual* (P/N 0993-6247) or visit our web site (www.appliedbiosystems.com/techsupport).

Diagram

Sample Block

The sample block has 60 wells (10 x 6) for use with GeneAmp® Thin-Walled Tubes with Flat Caps (0.5-mL volume).

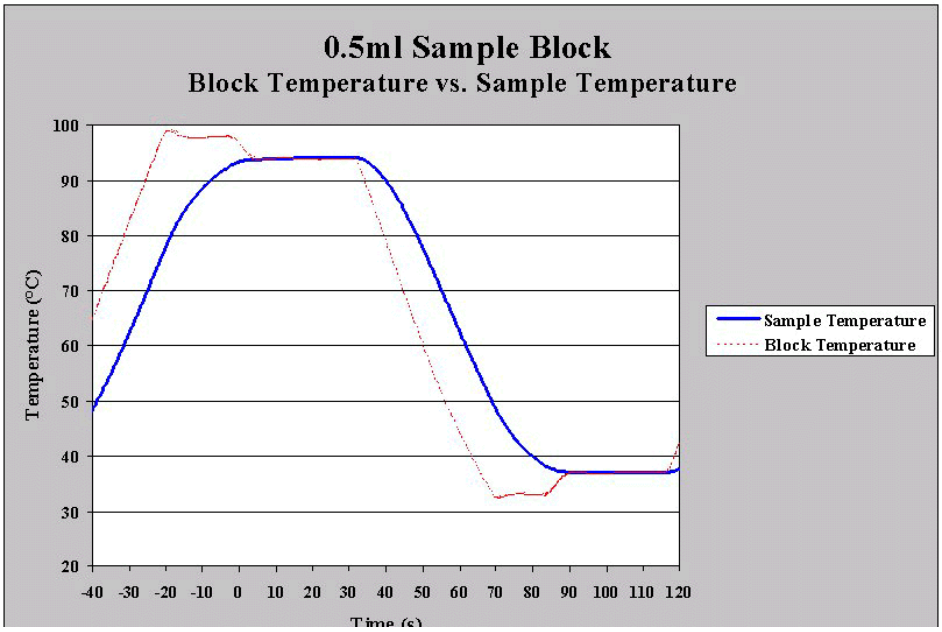
The sample block can operate in one of two modes:

- Sample control (0.5-mL Mode button)

  In this mode, the instrument calculates the temperature of the sample during cycling. You can enter various reaction volumes and the instrument will compensate for this (*e.g.,* 20 µL heats and cools faster than 100 µL). In this mode, the sample block itself overshoots the setpoint temperature to get the sample to temperature more quickly, but the sample temperature will not overshoot. The clock starts counting down hold time once the sample is within one degree of the setpoint temperature.

Note The temperature displayed on the screen is the calculated sample temperature.

The illustration below depicts the profile of the sample control mode.



- Block control (Block Mode button)

  In this mode, the reaction volume and sample temperature are ignored. The sample block itself goes to the programmed setpoint without overshooting. The clock starts counting down hold time once the sample block reaches the setpoint temperature.

Note The temperature displayed on the screen is the block temperature.

Heated Cover

The heated cover slides over the sample block and performs two functions:

- It raises the temperature of the upper part of the tube (the part above the sample block) above the temperature of the sample mixture. This eliminates condensation, which may have a negative effect on your chemistry.
- It puts pressure on the reaction tubes and frame to seat them firmly and precisely in the sample block. This is important for proper heat transfer.

Peltier Heating/ Cooling Unit

The internal Peltier heating/cooling unit is housed in the sample block module. The sample block module is made of aluminum to provide the optimal thermal transfer rate.

A Resistive Temperature Device (RTD) sensor in the sample block module provides:

- Wide temperature range: 4–99.9 °C
- Accuracy: ±0.25 °C from 35–100 °C
- Heat/cool rate: 1.5 °C per second
- Temperature uniformity: ±0.5 °C (measured 30 seconds after the clock starts)
- Long-term stability and high reliability

Modules, Accessories, and Disposables

Overview The modules and accessories listed below are available for the GeneAmp® PCR System 9700 Base Module. The disposables are for use with the 0.5-mL Sample Block Module.

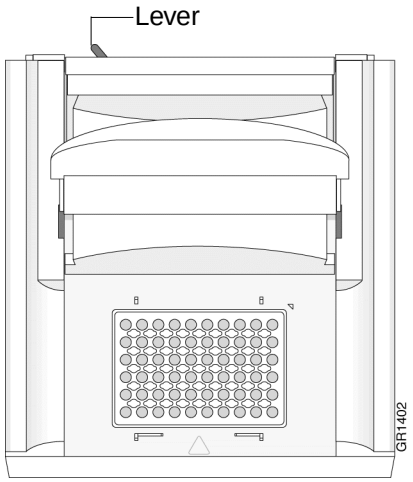
Ordering Order modules, accessories, and disposables from Applied Biosystems by part number. See the tables below.

Modules and Accessories	Part Number
96-Well Sample Block Module	N805-0251
Dual 384-Well Sample Block Module	N805-0400
0.5-mL Sample Block Module	4309131
0.5-mL Sample Block Module Temperature Verification Kit	4309924

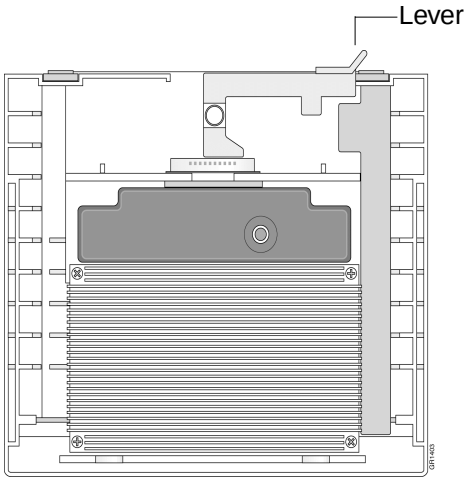
Disposables	Part Number
GeneAmp® 0.5-mL Thermal Insulation Frame (box of 8)	4308927
GeneAmp® Thin-Walled Tubes with Flat Caps	N801-0737

Installing the 0.5-mL Sample Block Module

Overview A lever behind the sample block module releases it from the GeneAmp® PCR System 9700 Base Module. Diagrams of the top and bottom of the 0.5-mL Sample Block Module are shown below.



Top view, 0.5-mL Sample Block Module



Bottom view, 0.5-mL Sample Block Module

Installing the Sample Block Module

To install the sample block module into the GeneAmp® PCR System 9700 Base Module:

Step	Action
1	Pull the lever out from the sample block module.
2	Place the sample block module onto the base module, then push the sample block module back to seat the electrical connections.
3	Push the lever into the base module to secure the sample block module.

Note If the sample block module is not seated correctly, the instrument cannot be turned on.

Loading Samples

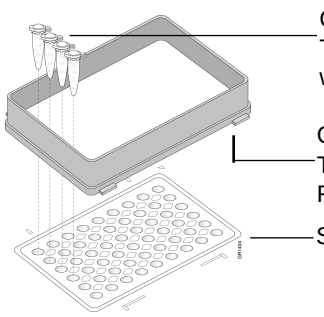
Loading Samples: Overview

The following procedures describe:

- The reaction tube/frame configuration
- How to load samples into the reaction tubes
- How to place the reaction tubes and frame into the sample block

Reaction Tube/Frame Configuration

Use the following reaction tube/frame configuration for the 0.5-mL Sample Block Module.

With this vessel...	Use...	As Shown
GeneAmp® Thin-Walled Tubes with Flat Caps	GeneAmp® 0.5-mL Thermal Insulation Frame	

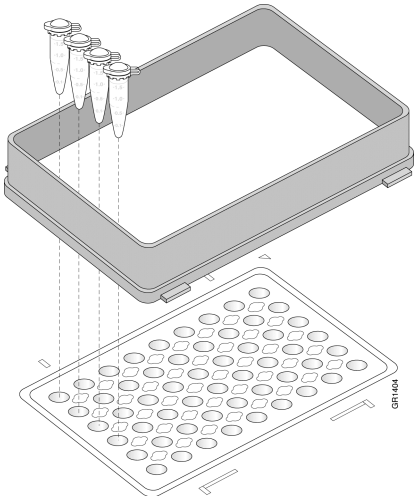
Loading Samples into the Reaction Tubes

To load samples into the reaction tubes:

Step	Action
1	Pipette samples into the reaction tubes. **Note** The sample volume range is 20–100 µL.
2	Close the reaction tubes with the flat caps.
3	Continue with “Placing the Reaction Tubes into the Sample Block” on page 1-18.

Placing the Reaction Tubes into the Sample Block

To place the reaction tubes into the sample block:

Step	Action
1	Place the GeneAmp Thin-Walled Tubes with Flat Caps directly into the sample block. Set the GeneAmp 0.5-mL Thermal Insulation Frame over the tubes. See the diagram below.  **IMPORTANT** Be sure to use the frame. It insulates your samples and prevents the heated cover from damaging the reaction tubes.
2	Slide the heated cover forward. **Note** To ensure a proper seal, pull the heated cover completely forward.
3	Pull the heated cover lever down to engage the heated cover with the reaction tubes.
4	Process your samples as usual.

Cleaning the Sample Block Module

Cleaning: Overview

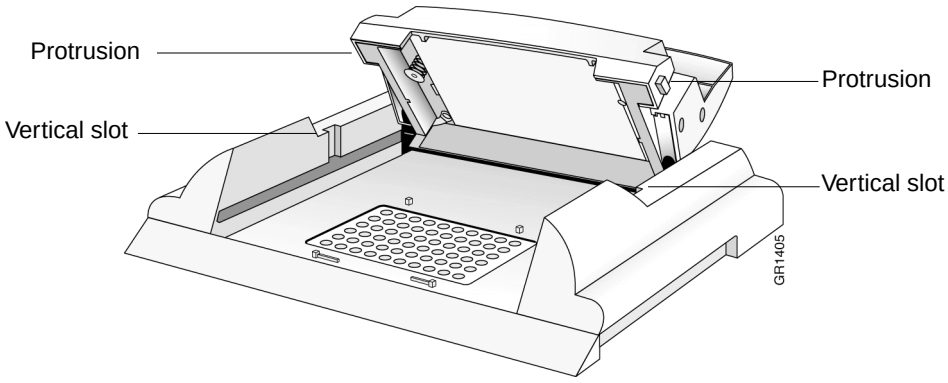
The following procedures describe:

- The cleaning position of the sample block module
- How to clean the heated cover
- How to clean the sample block wells

IMPORTANT Before using any cleaning or decontamination method, except those recommended in this manual, check with Applied Biosystems to ensure that the proposed method will not damage the equipment.

Cleaning Position

To clean the 0.5-mL Sample Block Module, slide the heated cover back, then slide the protrusions on the lid up through the vertical slots in the module rails. The cleaning position is shown below.



Cleaning the Heated Cover

Clean the heated cover once a month or more frequently if needed.

! WARNING ! During instrument operation, the temperature of the heated cover can be as high as 108 °C and the temperature of the sample block module can be as high as 100 °C. Before performing this procedure, wait until the heated cover and sample block module reach room temperature.

To clean the heated cover:

Step	Action
1	Turn off the instrument.
2	Wait 20–30 minutes for the heated cover to cool down.
3	Raise the heated cover lever and slide the cover back almost, but not completely, to the back of its slide.
4	Line up the protrusions on the side of the heated cover with the vertical slots in the module rails.
5	Lift up the front of the heated cover until the protrusions travel up the vertical slots all the way to the top.
6	Soak a cotton swab or piece of clean cloth with pure isopropanol and gently wipe the bottom of the cover.
7	Remove any remaining isopropanol from the cover and return the cover to its normal position.

To clean the heated cover: *(continued)*

Step	Action
8	If the cover becomes contaminated with amplified DNA: a. Raise the heated cover to the cleaning position. b. Wipe the cover with a cloth or cotton swab soaked in 10% bleach. c. Wipe with a damp cloth.

Cleaning the Sample Block Wells

Clean the sample block wells once a month or more frequently if needed.

To clean the sample block wells:

Step	Action
1	Turn off the instrument.
2	Wait 1 minute for the sample block module to cool.
3	Remove the reaction tubes and frame from the sample block module and set them aside.
4	Use a cotton swab soaked in pure isopropanol to clean the sample block wells thoroughly.
5	Remove any remaining isopropanol from the heated cover before reloading the reaction tubes and frame.
6	If the sample block wells become contaminated with amplified DNA: a. Clean the wells thoroughly with a cotton swab soaked in 10% bleach. b. Wipe with a damp cloth.

Running the Calibration Verification Test

Overview

Use this test to verify the temperature calibration of your GeneAmp® PCR System 9700 0.5-mL Sample Block Module.

To complete the Calibration Verification Test, you will perform the following procedures:

Step	Action	See Page
1	Setting Up the 0.5-mL Probe Assembly	1-22
2	Configuring the System 9700	1-23
3	Running the Test	1-24
4	Evaluating the Results	1-26

Equipment Required

This test requires the 0.5-mL Sample Block Module Temperature Verification Kit (P/N 4309924).

Your kit includes:

- Cotton swabs
- Light mineral oil
- GeneAmp® 0.5-mL Thermal Insulation Frame
- 0.5-mL Probe Assembly
- Digital thermometer with 9V battery installed

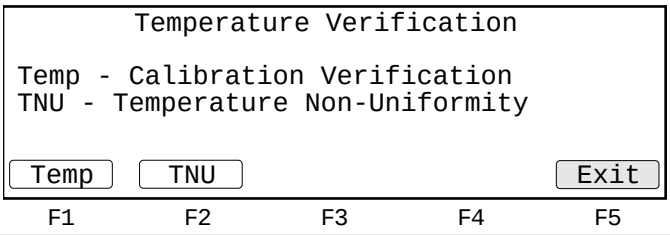
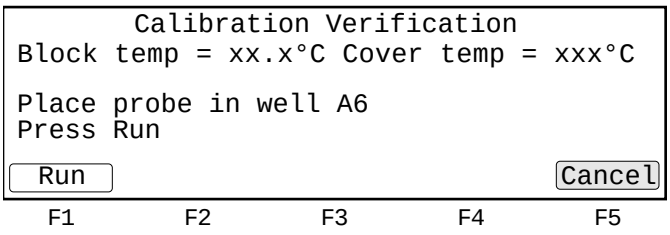
Setting Up the 0.5-mL Probe Assembly

To set up the 0.5-mL Probe Assembly:

Step	Action
1	If the heated cover is in the forward position, lift the lever, then slide the heated cover back.
2	Place the GeneAmp 0.5-mL Thermal Insulation Frame on the sample block.
3	Use a cotton swab to coat well A6 with mineral oil.
4	Place the 0.5-mL Probe Assembly into well A6.
5	Thread the probe wire through the channel in the 0.5-mL Thermal Insulation Frame to prevent damage to the probe and lead wires.
6	Make sure the probe is connected to the digital thermometer.
7	Slide the heated cover forward and pull the lever down. **IMPORTANT** Seat the probe properly and close the heated cover carefully. If the probe wire is crushed when the heated cover is closed, the probe may be damaged.
8	Turn on the digital thermometer. **Note** Refer to the instructions included with your Temperature Verification Kit for a detailed description on operating the digital thermometer.
9	Continue with “Configuring the System 9700” on page 1-23.

Configuring the System 9700

To configure the system 9700 for the Calibration Verification Test:

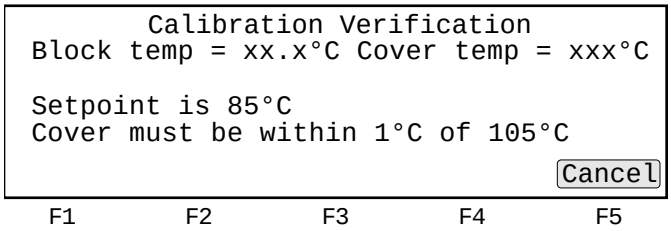
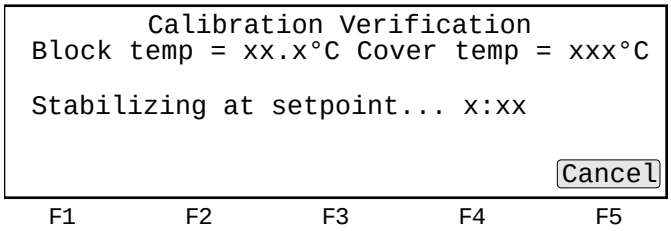
1	Complete the procedures in “Setting Up the 0.5-mL Probe Assembly” on page 1-22.
2	Turn on the system 9700. The main menu appears.
3	Press Util**.** The Utilities screen appears. **Note** To press the menu items, use the corresponding F keys. For example, Util is F4 on this menu.
4	Press Diag. The Diagnostics screen appears.
5	Press TmpVer. The Temperature Verification screen appears. 
6	Press Temp. This automatically configures the system 9700 for the Calibration Verification Test. The Calibration Verification screen appears. 
7	Continue with “Running the Test” on page 1-24.

Running the Test

Use the digital thermometer to take temperature readings of the sample well connected to the 0.5-mL Probe Assembly. You will take a reading at two different setpoint temperatures.

Note If necessary, press Cancel to exit the test.

To run the Calibration Verification Test:

Step	Action
1	Complete the procedures in “Configuring the System 9700” on page 1-23.
2	Press Run. This starts the Calibration Verification Test. **Note** To press the menu items, use the corresponding F keys. For example, Run is F1 on this menu. The Calibration Verification screen appears with the setpoint value displayed.  **Note** The cover must be within 1 °C of 105 °C. It may take several minutes for the system 9700 to ramp up.
3	The Calibration Verification screen counts down the time until the setpoint is reached.  When the “Stabilizing at setpoint...” value decrements to zero, read the digital thermometer. **Note** Refer to the instructions included with your Temperature Verification Kit for a detailed description on operating the digital thermometer.

To run the Calibration Verification Test: *(continued)*

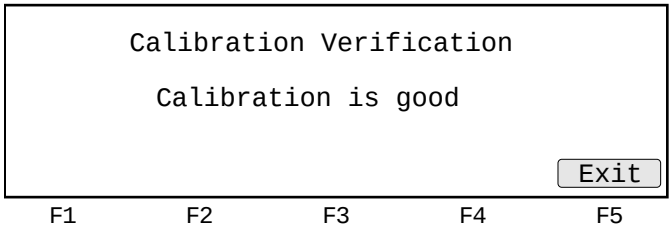
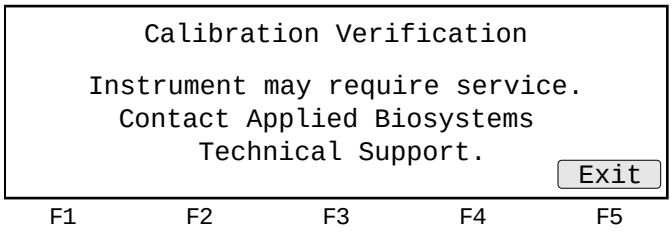
Step	Action
4	Using the numeric keys, type the value displayed on the digital thermometer in the "Enter actual block temperature" field. Calibration Verification Block temp = xx.x°C Cover temp = xxx°C Enter actual block temperature [xx.x] [Cancel] F1 F2 F3 F4 F5 **Note** The digital thermometer displays a four-digit value; round this off to three digits before typing it in the Calibration Verification screen. **Note** If desired, record this value on the Calibration Verification Test Data Sheet (page 1-38) to keep a permanent record of the test.
5	Press ENTER. The system 9700 automatically begins the second reading (45 °C setpoint). The Calibration Verification screen appears with the setpoint value displayed. Calibration Verification Block temp = xx.x°C Cover temp = xxx°C Setpoint is 45°C Cover must be within 1°C of 105°C [Cancel] F1 F2 F3 F4 F5 **Note** The cover must be within 1 °C of 105 °C.
6	Repeat steps 3 and 4 for the second reading.
7	The system 9700 evaluates the calibration of the sample block temperature for the setpoint values you entered and displays the results. A summary screen appears at the conclusion of the test. Calibration Verification Actual temperature at 85 °C [xx.x] Actual temperature at 45 °C [xx.x] [Accept] [Cancel] F1 F2 F3 F4 F5 If you entered values on the Calibration Verification Test Data Sheet, compare those values with the actual test results.
8	Press Accept. To interpret the results, see "Evaluating the Results" on page 1-26.

To run the Calibration Verification Test: *(continued)*

Step	Action
9	When you have completed all measurements, be sure to: ♦ Press Exit. ♦ Remove the 0.5-mL Probe Assembly from the sample block. ♦ Turn off the digital thermometer and clean off the oil. ♦ Remove the 0.5-mL Thermal Insulation Frame from the sample block. **IMPORTANT** Make sure the sample block is at room temperature (~25 °C) before removing the frame.

Evaluating the Results

When the system 9700 completes the Calibration Verification Test, one of two screens appears. See the table below to evaluate the results.

If the sample block module...	Then the...
Is properly calibrated	Calibration Verification screen appears with the following message displayed. 
Does not pass the Calibration Verification Test	Calibration Verification screen appears with the following message displayed.  ♦ If the test fails, repeat the procedure to make sure the meter was not misread or that errors were not made entering data. ♦ If the test fails again, contact Applied Biosystems Technical Support. See “Technical Support” on page 1-6.

Running the Temperature Non-Uniformity Test

Overview

Use this test to verify the temperature uniformity of the GeneAmp® PCR System 9700 0.5-mL Sample Block Module.

To complete the Temperature Non-Uniformity Test, you will perform the following procedures:

Step	Action	See Page
1	Setting Up the 0.5-mL Probe Assembly	1-28
2	Running the Test	1-30
3	Evaluating the Results	1-33

Equipment Required

This test requires the 0.5-mL Sample Block Module Temperature Verification Kit (P/N 4309924).

Your kit includes:

- Cotton swabs
- Light mineral oil
- GeneAmp® 0.5-mL Thermal Insulation Frame
- 0.5-mL Probe Assembly
- Digital thermometer with 9V battery installed

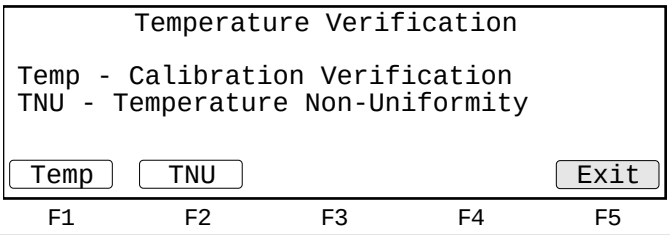
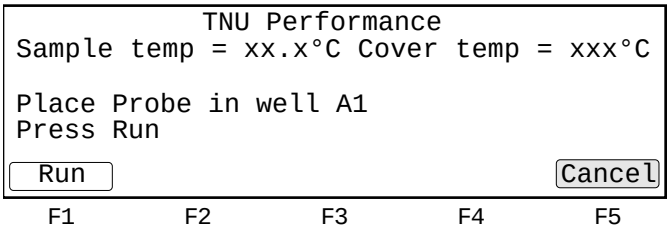
Setting Up the 0.5-mL Probe Assembly

To set up the 0.5-mL Probe Assembly:

Step	Action
1	If the heated cover is in the forward position, lift the lever, then slide the heated cover back.
2	Place the GeneAmp 0.5-mL Thermal Insulation Frame on the sample block.
3	Use a cotton swab to coat the following wells with mineral oil: A1, D1 A6, D7 A10, E8 B3, F1 C5, F5 C10, F10
4	Place the 0.5-mL Probe Assembly into well A1. **Note** As the test progresses, you will move the 0.5-mL Probe Assembly to each of the test wells.
5	Thread the probe wire through the channel in the 0.5-mL Thermal Insulation Frame to prevent damage to the probe and lead wires.
6	Make sure the probe is connected to the digital thermometer.
7	Slide the heated cover forward and pull the lever down. **IMPORTANT** Seat the probe properly and close the heated cover carefully. If the probe wire is crushed when the heated cover is closed, the probe may be damaged.
8	Turn on the digital thermometer. **Note** Refer to the instructions included with your Temperature Verification Kit for a detailed description on operating the digital thermometer.
9	Continue with “Configuring the System 9700” on page 1-29.

Configuring the System 9700

To configure the system 9700 for the Temperature Non-Uniformity Test:

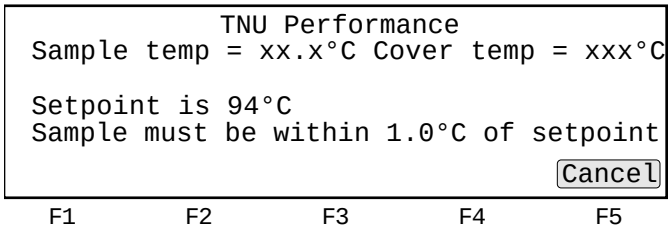
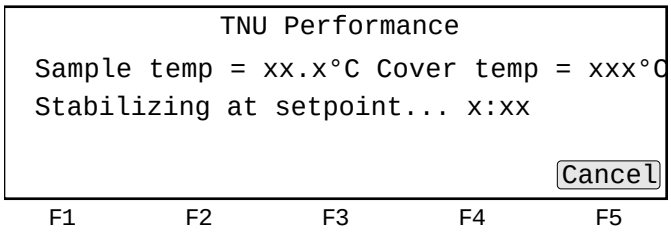
1	Complete the procedures in “Setting Up the 0.5-mL Probe Assembly” on page 1-28.
2	Turn on the system 9700. The main menu appears.
3	Press Util**.** The Utilities screen appears. **Note** To press the menu items, use the corresponding F keys. For example, Util is F4 on this menu.
4	Press Diag. The Diagnostics screen appears.
5	Press TmpVer. The Temperature Verification screen appears. 
6	Press TNU. This automatically configures the system 9700 for the Temperature Non-Uniformity Test. The TNU Performance screen appears. 
7	Continue with “Running the Test” on page 1-30.

Running the Test

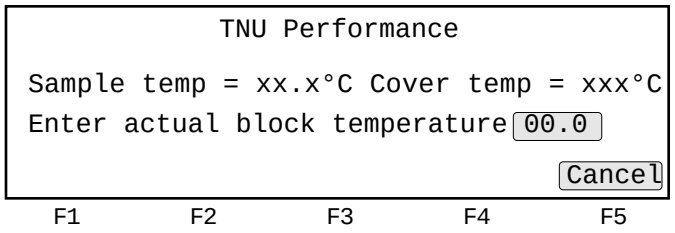
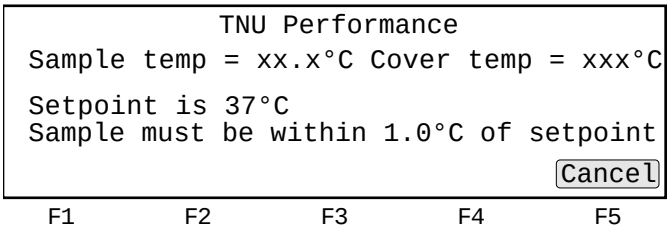
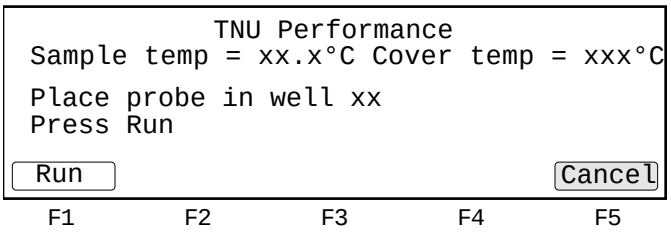
The Temperature Non-Uniformity Test uses the 0.5-mL Probe Assembly to test the temperature uniformity of 12 different wells in the sample block.

Note If necessary, press Cancel to exit the test.

To run the Temperature Non-Uniformity Test:

Step	Action
1	Complete the procedures in “Setting Up the 0.5-mL Probe Assembly” on page 1-28.
2	Press Run. This starts the Temperature Non-Uniformity Test. **Note** To press the menu items, use the corresponding F keys. For example, Run is F1 on this menu. The TNU Performance screen appears with the setpoint value displayed.  **Note** The sample block must be within 1.0 °C of the setpoint. In addition, the cover must be within 1 °C of 105 °C. It may take several minutes for the system 9700 to ramp up.
3	The TNU Performance screen counts down the time until the setpoint is stabilized.  When the “Stabilizing at setpoint...” value decrements to zero, read the digital thermometer. **Note** Refer to the instructions included with your Temperature Verification Kit for a detailed description on operating the digital thermometer.

To run the Temperature Non-Uniformity Test: *(continued)*

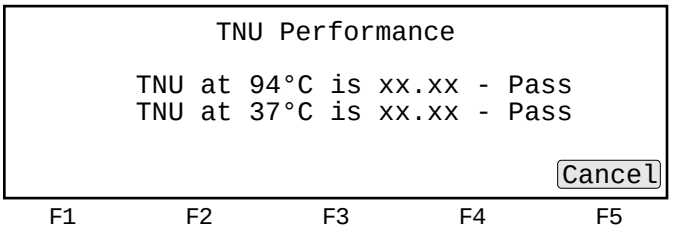
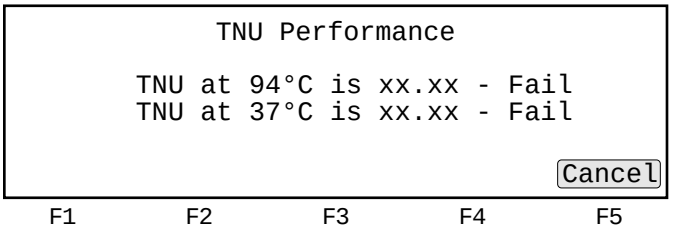
Step	Action
4	Using the numeric keys, type the value displayed on the digital thermometer in the "Enter actual block temperature" field.  **Note** The digital thermometer displays a four-digit value; round this off to three digits before typing it in the TNU Performance screen. **Note** If desired, record this value on the Temperature Non-Uniformity Test Data Sheet (page 1-39) to keep a permanent record of the test.
5	Press ENTER. The system 9700 automatically begins the second reading (37 °C setpoint). The TNU Performance screen appears with the setpoint value displayed.  **Note** The sample block must be within 1.0 °C of the setpoint.
6	Repeat steps 3 and 4 for the second reading.
7	Press ENTER. The TNU Performance screen appears with the following prompt: 

To run the Temperature Non-Uniformity Test: *(continued)*

Step	Action
8	Slide the heated cover back and repeat steps 4–7 of “Setting Up the 0.5-mL Probe Assembly” on page 1-28 and steps 2–7 of this procedure. Complete these steps for all 12 wells to be tested: A1 D1 A6 D7 A10 E8 B3 F1 C5 F5 C10 F10
9	The system 9700 evaluates the uniformity of the sample block temperature for the setpoint values you entered and displays the results. A summary screen appears at the conclusion of the test. Well 94 °C 37 °C Well 94 °C 37 °C A1 xx.x xx.x C5 xx.x xx.x A6 xx.x xx.x C10 xx.x xx.x A10 xx.x xx.x D1 xx.x xx.x B3 xx.x xx.x D7 xx.x xx.x Accept More Cancel F1 F2 F3 F4 F5 If you entered values on the Temperature Non-Uniformity Test Data Sheet, compare those values with the actual test results.
10	Press Accept. To interpret the results, see “Evaluating the Results” on page 1-33.
11	When you have completed all measurements, be sure to: ♦ Press Cancel. ♦ Remove the 0.5-mL Probe Assembly from the sample block. ♦ Turn off the digital thermometer and clean off the oil. ♦ Remove the 0.5-mL Thermal Insulation Frame from the sample block. **IMPORTANT** Make sure the sample block is at room temperature (~25 °C) before removing the frame.

Evaluating the Results

When the system 9700 completes the Temperature Non-Uniformity Test, the TNU Performance screen appears. See the table below to evaluate the results.

If the...	Then...
Temperature of the sample block wells is uniform,	"Pass" appears after each setpoint temperature. 
Temperature variation of the sample block wells exceeds performance specifications,	"Fail" appears after the setpoint temperature(s) for which the test failed.  ♦ If the test fails, repeat the procedure to make sure the meter was not misread or that errors were not made entering data. ♦ If the test fails again, contact Applied Biosystems Technical Support. See "Technical Support" on page 1-6.

Running System Performance Diagnostics

Overview

After you have configured the GeneAmp® PCR System 9700, conduct the System Performance Diagnostics to verify the integrity of the cooling and heating system.

There are two System Performance Diagnostics:

- Rate Test
- Cycle Test

Equipment Required

These diagnostics require:

- GeneAmp® 0.5-mL Thermal Insulation Frame

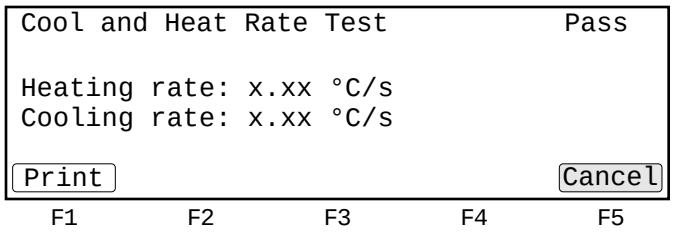
Running the Rate Test

Use the Rate Test to verify that the Peltier units are operating correctly. The test takes approximately 10 minutes to run.

To run the Rate Test:

Step	Action
1	Turn on the system 9700. The main menu appears.
2	Press Util**.** The Utilities screen appears. **Note** To press the menu items, use the corresponding F keys. For example, Util is F4 on this menu.
3	Press Diag. The Diagnostics screen appears.
4	Press System. The System Performance screen appears. System Performance Rate - Cool and Heat Rate Test Cycle - Cycle Performance Test [Rate] [Cycle] [Exit] F1 F2 F3 F4 F5
5	Press Rate from the System Performance screen. WARNING!!! Install the appropriate empty Consumables into the Sample Block. Refer to System Performance Section of Block User Manual. [Cont] [Cancel] F1 F2 F3 F4 F5 **Note** You will install the GeneAmp 0.5-mL Thermal Insulation Frame.
6	Place the 0.5-mL Thermal Insulation Frame in the sample block. Slide the heated cover forward and pull the lever down.
7	After you have installed the frame, press Cont. The instrument runs through a series of tests where the sample block is stabilized at 35 °C, 94 °C, and 4 °C.

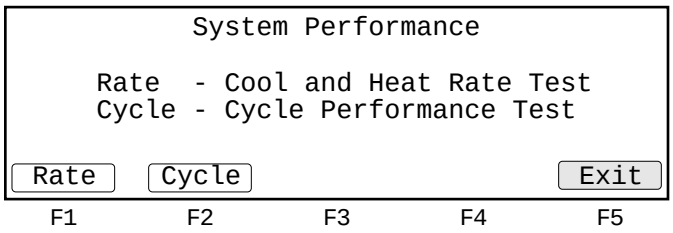
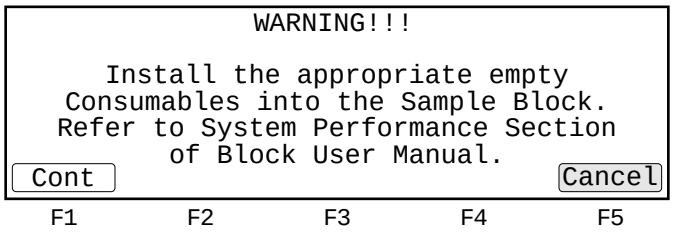
To run the Rate Test: *(continued)*

Step	Action
8	At the conclusion of the test, the Cool and Heat Rate Test screen appears. The screen displays the test results and whether the test passed or failed.  Check your Rate Test results against the passing ranges listed below. Heating Rate > 1.5 °C /second Cooling Rate > 1.5 °C /second
9	If the test fails, repeat the procedure once. If the test fails again, contact Applied Biosystems Technical Support. See “Technical Support” on page 1-6.

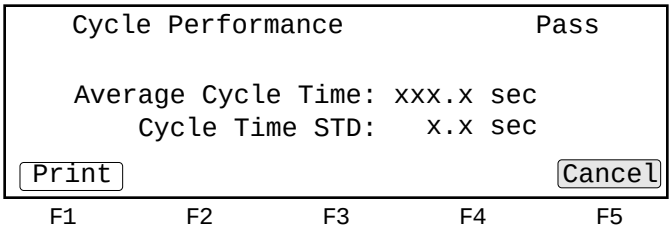
Running the Cycle Test

Use the Cycle Test to verify that the PCR cycling function operates properly. This test takes approximately 15 minutes to run.

To run the Cycle Test:

Step	Action
1	Turn on the system 9700. The main menu appears.
2	Press Util**.** The Utilities screen appears. **Note** To press the menu items, use the corresponding F keys. For example, Util is F4 on this menu.
3	Press Diag. The Diagnostics screen appears.
4	Press System. The System Performance screen appears. 
5	Press Cycle from the System Performance screen. This runs the Cycle Test.  **Note** You will install the GeneAmp 0.5-mL Thermal Insulation Frame.
6	Place the 0.5-mL Thermal Insulation Frame in the sample block. Slide the heated cover forward and pull the lever down.
7	After you have installed the frame, press Cont. The Cycle Test executes a two-temperature PCR cycling protocol, then measures and reports the average cycle time and the cycle-to-cycle variation.
IMPORTANT Pressing Pause during the Cycle Test may generate false test results. Re-run the Cycle Test if Pause was pressed during the test.	

To run the Cycle Test: *(continued)*

Step	Action
8	At the conclusion of the test, the Cycle Performance screen appears. The screen displays the test results and whether the test passed or failed.  Check your Cycle Test results against the passing ranges listed below. Average Cycle Time 125 seconds Cycle Time STD < 5 seconds
9	If the test fails, repeat the procedure once. If the test fails again, contact Applied Biosystems Technical Support. See “Technical Support” on page 1-6.

Data Sheet: Calibration Verification Test

Instructions

When running the Calibration Verification Test, record the setpoint values for **well A6** on this data sheet. At the end of the Calibration Verification Test, check the values displayed on the system 9700 against the values recorded here. This will help maintain accurate test records.

Note If desired, you may photocopy this page.

Date	Tested By	Probe Serial No.	Meter Serial No.	Setpoint Value: Well A6	
				85 °C	45 °C

Data Sheet: Temperature Non-Uniformity Test

Instructions When running the Temperature Non-Uniformity Test, record the setpoint values for the wells listed on this data sheet. At the end of the Temperature Non-Uniformity Test, check the values displayed on the system 9700 against the values recorded here. This will help maintain accurate test records.

Note If desired, you may photocopy this page.

Date		
Tested By		
Probe Serial No.		
Meter Serial No.		
Setpoint Value	**94 °C**	**37 °C**
A1		
A6		
A10		
B3		
C5		
C10		
D1		
D7		
E8		
F1		
F5		
F10		

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