GENESYS™ 6
Spectrophotometer

Thermo Spectronic

Operator's Manual

Thermo Spectronic

820 Linden Ave.
Rochester, N.Y., 14625, USA

Declaration of Conformity

(For instruments manufactured after July 1, 2001)

Model:	**GENESYS™ 10 Series**
Catalog Nos.:	**335900, 335900A, 335900P, 335900AP, 335901, 335901A, 335901P, 335901AP**
	335902, 335902A, 335902P, 335902AP, 335903, 335903A, 335903P, 335903AP
	335906, 335906P, 335907, 335907P
Model:	**BioMate™ 3**
Catalog Nos.:	**335904, 335904P, 335905, 335905P**
Model:	**GENESYS™ 6**
Catalog Nos.:	**335908, 335908P**

North American Plug (NEMA 5-15)	Numbers above
European Plug (CEE 7/7 Schuko)	Add a −02 suffix
United Kingdom Plug (BS 1363/A)	Add a −04 suffix

Thermo Spectronic certifies that the **GENESYS 10, GENESYS 6, and BioMate 3 Spectrophotometers** have been tested according to the instrumentation standards listed in this section in compliance with IEC directives and other regulatory requirements. The equipment under test (EUT) consisted of a sample instrument and applicable accessories, which are manufactured by Thermo Spectronic. The EUT was configured to ensure that both the worst case condition, and that all of the accessories were tested. This equipment has been tested for use in non-residential environments.

<u>IEC Directives</u>

89/336/EEC	**Electromagnetic Compatibility Directive**
73/23/EEC	**Low Voltage Directive**

<u>Electromagnetic Compatibility Test Standards</u>

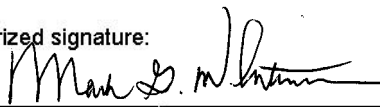|	
IEC 61326-1	1998, Electrical Equipment for Measurement, Control, and Laboratory use - EMC Requirements. Class A Limits
IEC 61000-4-2	1999, Electrostatic Discharge Immunity Test (Test level: 4KV Air Discharge and 4 KV Contact Discharge)
IEC 61000-4-3	1998, Radiated, Radio Frequency, Electromagnetic Field Immunity Test (Test level: 3V/m)
IEC 61000-4-4	1995, Electrical Fast Transient/Burst Immunity Test (Test level: 1KV on the supply lines)
IEC 61000-4-5	1995, Surge Immunity Test (Test level: 0.5KV line to line and 1KV line to earth on the supply lines)
IEC 61000-4-6	1996, Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields (Test level: 3V on the supply lines)
IEC 61000-4-11	1994, Voltage Dips, Short Interruptions, and Voltage Variations Test Level: 1 cycle/100%
CISPR 16-2	1999, Specification for Radio Disturbance and Immunity Measuring Apparatus and Methods– Methods of Measurement of Disturbances and Immunity

<u>Safety Test Standards</u>

IEC 61010-1	1990 + A1 1992 +A2 1995. Safety requirements for Electrical Equipment for Measurement, Control and Laboratory use.

CSA C22.2 No. 1010.1, plus Am 2

IEC 61010-1	1997, Safety requirements for Electrical Equipment for Measurement, Control and Laboratory use; Part 1: General Requirements Test level: Installation Category II, Pollution Degree 2

Authorized signature:

Date: 27 February 2002

Mark G. Whiteman, President
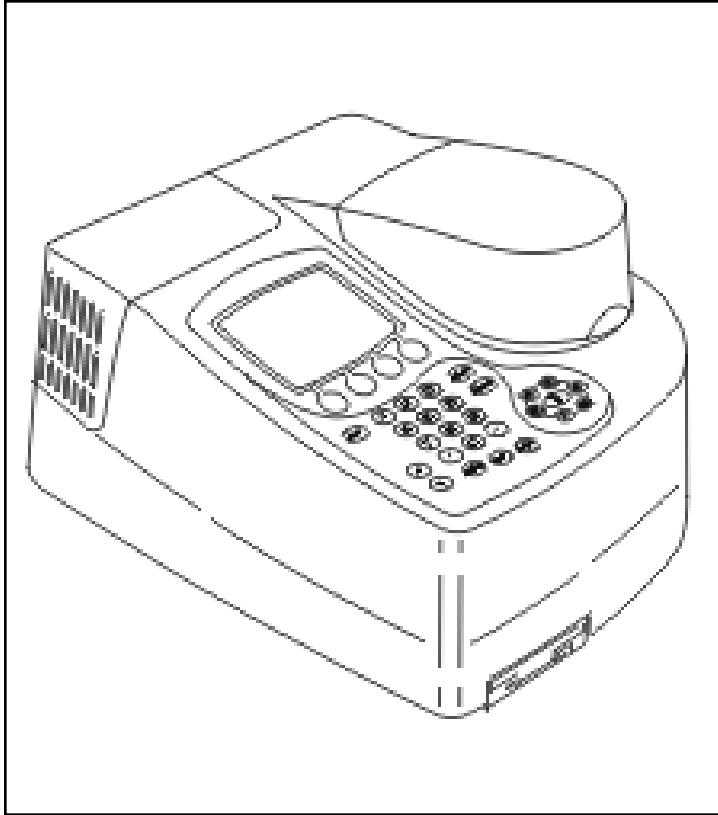
Figure 1   GENESYS™ 6 spectrophotometer
            Espectrofotómetro GENESYS™ 6
            Spectrophotomètre GENESYS™ 6
            GENESYS™ 6 Spektrophotometer
            Spettrofotometro GENESYS™ 6
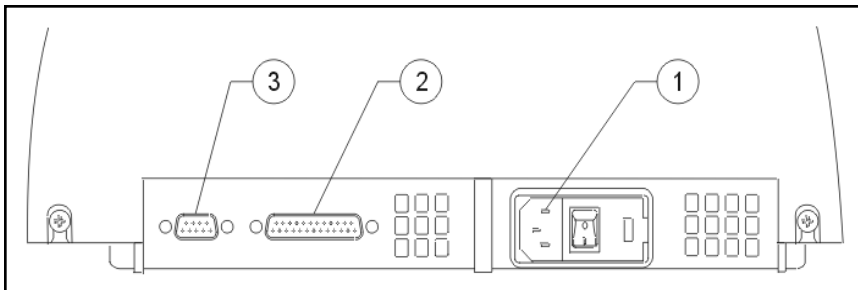

Figure 2   Back panel of the spectrophotometer
            Panel posterior del espectrofotómetro
            Panneau arrière du spectrophotomètre
            Rückwand des Spektrophotometer
            Pannello posteriore dello spettrofotometro

Key/Leyenda/ Légende/
Legende/ Legenda

① *A/C power connector*
    Conector C/A
    Connecteur courant A/C
    Stromanschluss
    Connettore alimentazione CA

② *Parallel port*
    Puerto Paralelo
    Port parallèle
    Parallelanschluss
    Porta parallela

③ *RS232C port*
    Salida RS232C
    Port RS232C
    RS232C Port
    Porta RS232C

Figure 3   Installing the paper roll holders for the internal printer (335988)
           Instalando los soportes del papel de la impresora interna (335988)
           Installation des porte-rouleaux pour imprimante interne (335988)
           Installieren des Papierrollenhalter für den internen Drucker (335988)
           Installazione dei supporti carta sulla stampante interna (335988)
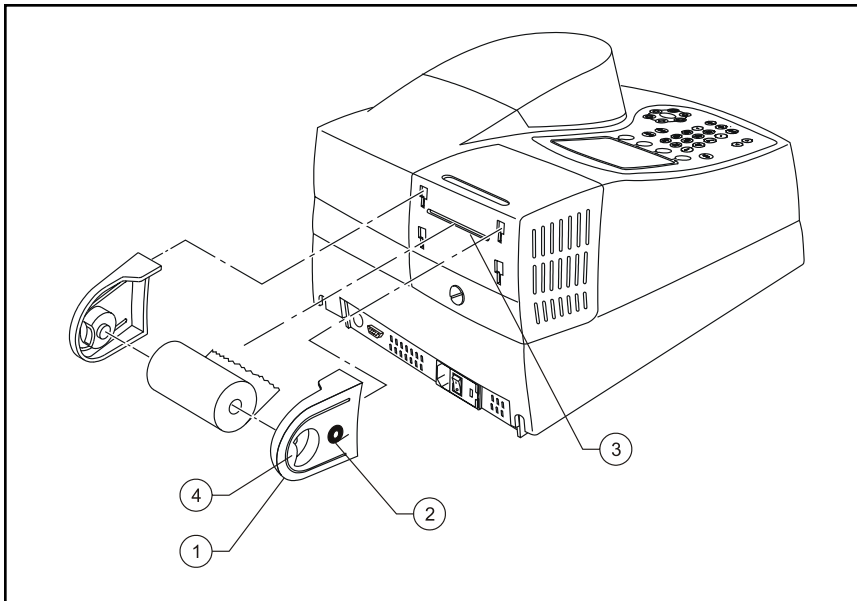
Key/Leyenda/ Légende/
Legende/ Legenda

① *Paper roll holder*
   Soporte del papel
   Porte-rouleaux
   Papierrollenhalter
   Supporto rotolo carta

② *Icon for paper direction*
   Dirección del papel
   Icône de direction du papier
   Symbol für die Papierrichtung
   Indicazione direzione carta

③ *Paper entry slot*
   Ranura de entrada del papel
   Fente d'entrée du papier
   Papiereinzugsschlitz
   Fessura entrata carta

④ *Finger tab*
   Lengüeta
   Languette
   Lasche
   Braccetto

Figure 4   Keypad of the GENESYS™ 6 spectrophotometer
           Teclado del espectrofotómetro GENESYS™ 6
           Clavier du spectrophotomètre GENESYS™ 6
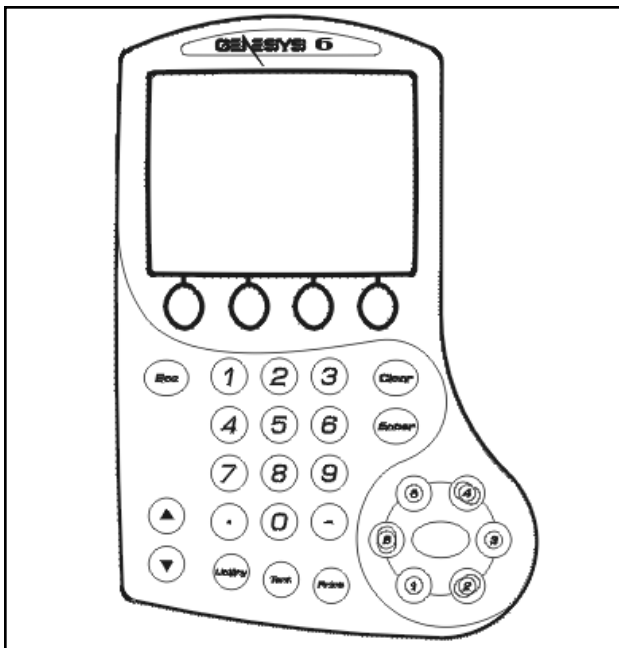   *Tastatur des GENESYS™ 6 Spektrophotometer*
           La tastiera sullo spettrofotometro GENESYS™ 6

Key/ Leyenda/ Légende/ Legende/
Legenda

① *Cell position keys*
   [for 6-Position Cell Holder]
   Teclas de posicion de celda
   [para portaceldas de 6-Posiciones]
   Touches de position des cuves
   [pour porte-cuves à 6 emplacements]
   Kuevetten-Positionstasten
   [für den 6fach Kuevettenhalter]
   Tasti posizione cella
   [per supporto cella a 6 posizioni]

② *Function keys*
   Teclas de función
   Touches de fonction
   Funktionstasten
   Tasti funzione
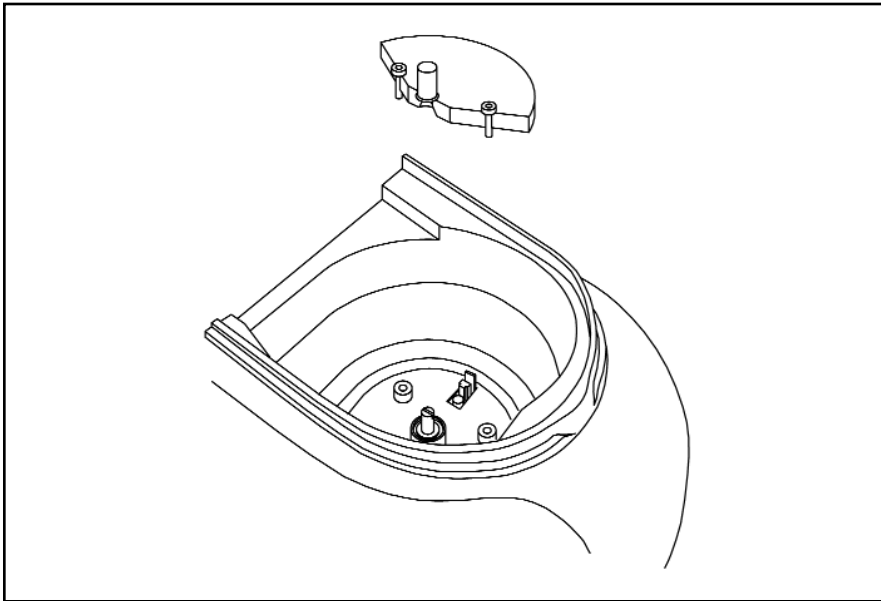
Figure 5   Installing the Single-Position Cell Holder (335916)
            Instalando el portaceldas sencillo (335916)
            Installation du porte-cuves à emplacement unique (335916)
            Installieren des Einfach-Kuevettenhalters (335916)
            Installazione del supporto cella a posizione singola (335916)
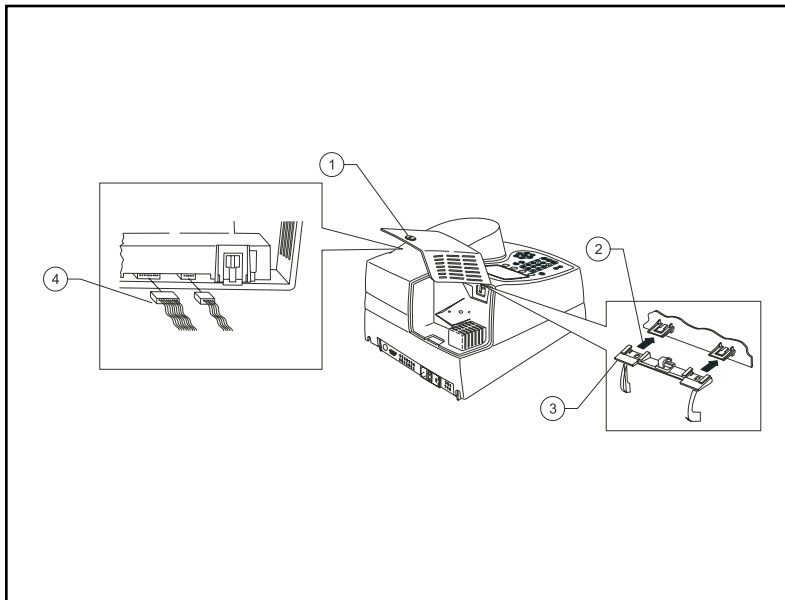
Figure 6   Installing the printer (335988)
            Instalando la impresora (335988)
            Installation de l'imprimante (335988)
            Installieren des Druckers (335988)
            Installazione della stampante (335988)

Key/Leyenda/ Légende /Legende/ Legenda

①   *Captive screw on lamp door*
    Tornillo en la puerta de la lámpara
    Vis captive du cache de la lampe
    Verschlussschraube fuer den Lampenraum
    Vite sullo sportello lampada

②   *Removing door from hinge*
    Removiendo la puerta
    Pour ôter le cache de la charnière
    Entfernen der Klappe
    Rimozione dello sportello

③   *Hinge*
    Bisagra
    Charnière
    Schanier
    Cerniera

④   *Connecting wires to printer*
    Conectando los cables de la impresora
    Connexion des fils à l'imprimante
    Anschließen der Kontakte am Drucker
    Collegamento dei cavi alla stampante
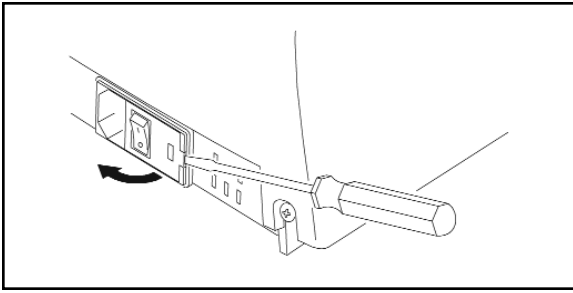
Figure 7   Removing the cover of the fuse compartment
Removiendo la tapa del compartimiento del fusible
Pour ôter la protection du compartiment à fusibles
Entfernen der Abdeckung
Rimozione del coperchio del compartimento fusibili
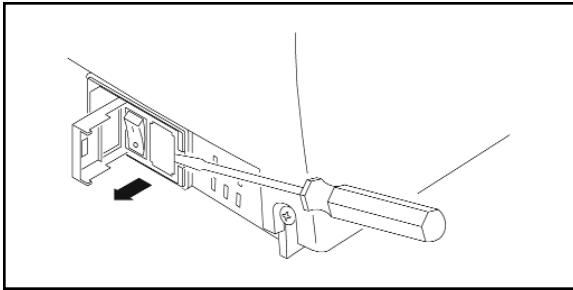
Figure 8   Removing the fuse holder
Removiendo el porta fusible
Enlèvement du porte-fusibles
Entfernen des Sicherungshalters
Rimozione del portafusibile
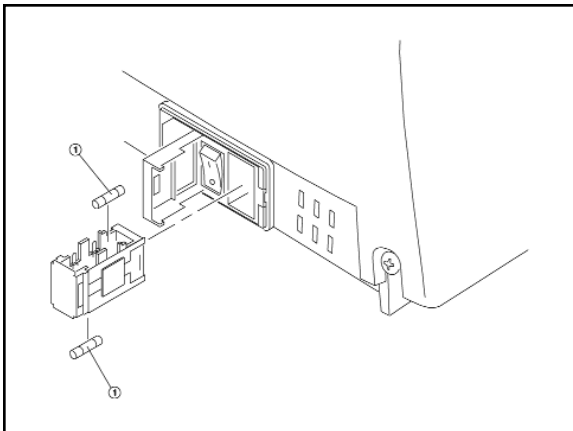
Figure 9   Removing and replacing the fuses
Removiendo y reemplazando los fusibles
Enlèvement et remplacement des fusibles
Tauschen der Sicherungen
Rimozione e sostituzione dei fusibili

NOTE

This operator's manual contains information, instructions and specifications for the Thermo Spectronic spectrophotometer that were believed accurate at the time this manual was written. However, as part of Thermo Spectronic's on-going program of product development, the specifications and operating instructions may be modified or changed from time to time. Thermo Spectronic reserves the right to change such operating instructions and specifications. Under no circumstances shall Thermo Spectronic be obligated to notify purchasers of any future changes in either this or any other instructions or specifications relating to Thermo Spectronic products, nor shall Thermo Spectronic be liable in any way for its failure to notify purchasers of such changes.

GENERAL SAFETY NOTES USED IN THIS MANUAL

This symbol alerts you to important information about using the instrument.
Be sure to read and follow the associated instructions carefully.

This symbol alerts you to potential electrical hazards.
Be sure that only qualified personnel perform the related procedures.

This symbol alerts you to hot surfaces.
Be sure to read and follow the associated instructions carefully.

NEW PRODUCT WARRANTY

Thermo Spectronic instrumentation and related accessories are warranted against defects in material and workmanship for a period of one (1) year from the date of delivery. This warranty is provided only if the warranty registration card is returned to Thermo Spectronic within fifteen (15) days after delivery.

This warranty covers parts (except those specified below) and labor, and applies only to equipment which has been installed and operated in accordance with the operator's reference guide and which has been serviced only by authorized Thermo Spectronic dealers or service personnel. This warranty does not apply to equipment and accessories that have been modified or tampered with in any way, misused, or damaged by accident, neglect, or conditions beyond Thermo Spectronic's control.

This warranty does not apply to lamps, glassware, and similar expendable components. However, such parts and components may be warranted by their manufacturer.

Thermo Spectronic is not responsible under this warranty for loss in operating performance due to environmental conditions.

THIS WARRANTY IS IN LIEU OF ALL WARRANTIES EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY OR OTHERWISE, and states Thermo Spectronic's entire and exclusive liability and the Customer's exclusive remedy for any claim in connection with the sale or furnishing of services, goods, or parts, their design, suitability for use, installation, or operations. Thermo Spectronic will in no event be liable for any direct, indirect, special, or consequential damages, whatsoever, including loss of goodwill, whether grounded in tort (including negligence), strict liability or contract, and Thermo Spectronic's liability under no circumstances will exceed the contract price for the goods and/or services for which liability is claimed.

UPDATE POLICY

Thermo Spectronic may, from time to time, revise the performance of its products, and in doing so incur no obligation to furnish any such revisions to any Thermo Spectronic customer.

SOFTWARE PASSWORD

This password allows you to enter the security section of the software used on the Thermo Spectronic spectrophotometer. Through the security section, you can "lock" test setups (test parameters) so that they may not be altered. The password also allows you to remove the security so that you may edit the test parameters. Please refer to the appropriate section in this Operator's Manual for more information on locking a test.

PASSWORD: 4 3 6 3 7 9 7

Thermo Spectronic

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Setting Up the Instrument

Instrument description

The spectrophotometer, shown in Figure 1, is an easy-to-use, UV-Visible spectrophotometer designed for quantitative measurements in:

- Industrial quality control and research laboratories, including food and beverage, chemical and pharmaceutical applications

- Academic research and teaching laboratories

- Environmental laboratories, including water and wastewater applications

- Life science laboratories, for working on proteins and nucleic acid research

    Your spectrophotometer offers:

- Unique optical system that ensures accuracy and precision

- Automatic wavelength calibration on power-up to ensure that the instrument is operating properly

- Built-in applications software for concentration, standard curve, absorbance ratio, absorbance difference, scanning, kinetics, multi-wavelength analysis and three-point net absorbance

- Built-in procedures that allow you to validate the performance of your instrument

Setting up the instrument

1. Carefully unpack the shipping carton and verify that you have received all the items listed below.

    - GENESYS 6 spectrophotometer

    - Power cord

    - Operator's Manual packet - GENESYS 6 spectrophotometer

    - Dust cover

2. Place the instrument on a flat, even surface that is:

    - As far as possible from any strong electric or magnetic fields and from any electrical device that may generate high-frequency fields

    - Free of dust, corrosive gases and strong vibrations

3. Remove any obstructions or materials that could hinder the flow of air under, behind and around the instrument.

4. Connect the female end of the power cord into the connector labeled **A/C power** on the back panel of the instrument (see Figure 2).

5. Plug the other end of the power cord into a grounded outlet with the appropriate voltage.

6. Ensure that the sample compartment does not contain any samples, and that the sample compartment door is closed.

7. Snap the paper roll holders (if needed) into place as shown in Figure 3. They will fit flush with the top of the instrument.

8. Turn on the instrument by pressing the power switch to ON (1=ON, 0=OFF). The power-on sequence will appear on the display and the instrument will go through its self-diagnostics. The instrument performs these diagnostics in the sequence shown:

    a) Logo

    b) Initializing

    c) Calibrating filter wheel

    d) Finding zero order

    e) Finding energy peak

    f) Calibrating grating

Setting utility parameters

You should set up some of the utility parameters after the instrument is first powered up. These parameters include the date and time, standby setting, language, screen contrast settings and parameters needed to set up the printer.

You can set up the other utility parameters, or change the utility settings, at any time except when an entry screen is displayed or when the instrument is carrying out a task (such as setting the blank).

- Press the **UTILITY** key. The **Utility** screen appears on the display.

From this screen, you can set the date and time, select the standby settings, select the language, reset the lamp hours, select the contrast settings and select the parameters for a printer.

Selecting the language

The instrument supports English, Spanish, French, German and Italian as the language options.

- With the **Utility** screen displayed, press the arrow keys to highlight **Language** and press **ENTER**.

- Press the arrow keys to highlight the language you want to select and press **ENTER**.

```
Utility                    9:51 14Feb02

        Software Revision:  0.008a

Printer                              RS232
Date/Time Setup              9:51 14Feb02
Standby                             15 min
Baseline Expiration (hr:min)          0:08
Beeper                                  On
Language                           English
% of lamp life used                  0.14%
Screen Contrast
Printout Contrast
Stored Tests Directory
Diskette Files
Calculator

Press ↑ or ↓ to select parameter.
```
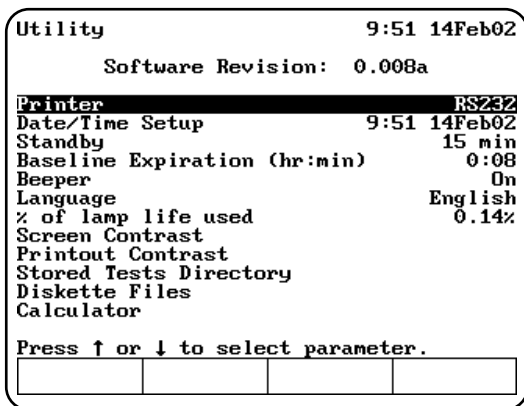
Setting the date and time

To access the date and time settings:

- With the **Utility** screen displayed, press the arrow keys to highlight **Date/Time Setup** and press **ENTER**. The screen displays the three date/time options that you can modify - date, time format and time.

To set the date:

- Press the arrow keys to highlight **Set Date** and press **ENTER**.

- Press **Set Day**, type the date, then press **ENTER**.

- Press **Set Month**, highlight the correct month, then press **ENTER**.

- Press **Set Year**, type the year, then press **ENTER**.

- When the date is correct, press **ESC** to save the settings and return to the **Utility** screen.

To select the time format:

You can set up the spectrophotometer to display the time in either am/pm format or in 24-hour format.

- To change the display format for the time, press the arrow keys to highlight **Time Format** and press **ENTER** until the format that you want to use (AM/PM or 24 hour) appears.

To set the time:

- Press the arrow keys to highlight **Set Time** and press **ENTER**.

- To set the hour, press **Set Hour**, type in the hour and press **ENTER**.

- To set the minutes, press **Set Minute**, type in the minute and press **ENTER**.

- To select between AM and PM, press **Set AM/PM** until the appropriate setting appears.

Note: Any changes you make are saved automatically (even during power down) by battery backup.

Selecting standby settings

To prolong xenon lamp life, your GENESYS spectrophotometer has been pre-set at the factory to automatically go into standby mode after 15 minutes. To change Standby Mode time:

- With the **Utility** screen displayed, press the arrow keys to highlight **Standby** and press **ENTER**.

- Press the arrow keys to highlight the length of time you want the instrument will wait before entering standby mode and press **ENTER**.

Setting baseline expiration time

If you will be performing scans on your samples, you can set a time limit for a collected baseline.

To set the baseline expiration time:

- With the **Utility** screen displayed, press the arrow keys to highlight **Baseline Expiration (hr:min)** and press **ENTER**.

- Enter the desired time into the Entry baseline expiration time field. Press **ENTER**.

Setting the screen contrast

To make it easier to read the display, you can adjust the screen contrast on the spectrophotometer.

- With the **Utility** screen displayed, press the arrow keys to highlight **Screen Contrast** and press **ENTER**.

- Press the arrow keys to adjust the screen contrast.

• When the screen contrast is correct, press **ESC**.

Setting up the internal printer

To set up the printer properly, you need to load the paper and set the utility parameters for the printer. Before setting up the parameters for the printer, be sure that the printer is installed. If you have ordered the internal printer as a separate item, you will need to install it. Refer to the section *Connecting & using accessories* for instructions on installing the printer.

Loading paper in the internal printer

Note: *Make sure that the paper roll holders are in place as shown in Figure 3. When installed correctly, they will fit flush with the top of the instrument.*

• Cut the paper so the edge is even.

Note: *Arrows on the paper roll holders indicate the direction of the paper feed (see Figure 3).*

• Feed the paper straight into the paper entry slot. The printer grabs the end of the paper and pulls it in.

• In Basic Absorbance/%Transmittance (%T), when the paper stops, press **ENTER** to continue advancing the paper until the paper comes out of the paper exit slot.

• Pull out on the finger tabs on the paper roll holders and secure the roll of paper onto the paper roll holder.

Setting the utility parameters for the printer

If you wish to use a printer you can output to:

• Internal printer.

• External RS232 printer.

• Parallel port to an HP PCL formatted printer.

To ensure that the spectrophotometer can output information correctly to the printer, you need to select the appropriate device.

• Press the **UTILITY** key. The **Utility** screen appears on the display.

• Press the arrow keys to highlight **Printer** and press **ENTER**.

```
Utility                        9:54 14Feb02

         Software Revision:  0.008a

Printer
Date/Time Setu   Internal         Off
Standby          RS232             On
Baseline Expir   Parallel         Off
Beeper
Language         Press ↑ or ↓ to select
% of lamp life   Press ENTER to change
Screen Contras   Press ESC to exit
Printout Contr
Stored Tests Directory
Diskette Files
Calculator

Press ↑ or ↓ to select parameter.
```
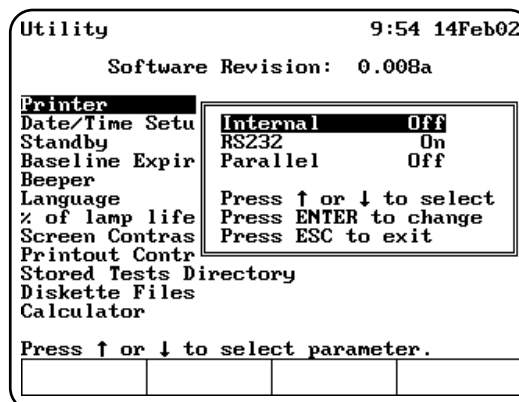
• Select the printer that you want to use and press **ENTER** until **On** appears.

• Press **ESC** to save the settings and return to the Utility screen.

Selecting and positioning glassware

The wavelength range for different types of cells varies depending on the manufacturer:

• Glass - From 320 to 360nm, up to 1100nm.

• Quartz - From 190 to 230nm, up to 1100nm.

• Disposable - Refer to manufacturer's specifications and ensure that you work within the recommended range.

Test tubes vs. cuvettes

• Square cuvettes that are carefully matched (see "Correcting for cell variability" below) yield very precise results. Matched test tubes, when properly handled, can show as little as 1-2% deviation between readings.

• The pathlength of test tubes is not as well defined as in square cuvettes. However, constructing a standard curve eliminates the need for great accuracy in knowing the pathlength, provided that the same pathlength cell is used for all blanks, standards and samples.

Other guidelines

• Be sure to position cuvettes and test tubes so that the clear sides face the light beam. This means that one clear side should face the front of the instrument and the other clear side should face the back of the instrument.

Note: *Test tubes should always be placed in the instrument in exactly the same orientation in the light beam. A fiducial mark on the test tube helps you orient the test tubes consistently and correctly.*

• When using small aperture cells:

  • Always use masked cells.

  • Use the same cell (or cuvette) for your blank and your samples.

Correcting for cell variability

Due to variability in cell manufacture, each cell may have slightly different absorbance and reflection characteristics. Although it would be ideal to use exactly the same cell for every reading, it is usually inconvenient to clean cells between readings.

Your instrument uses an automated program to correct for cell variability, allowing you to use up to six unmatched cuvettes. Nearly any cell can be used with a high degree of accuracy if you have run the cell correction program on those cells.

Z-dimensions

The figure below illustrates the position of the light beam in the spectrophotometer.

The specifications for the sample compartment, including the dimensions of the beam are:

• Z-dimension

  • Square cuvettes/Test tubes   8.5mm

• Beam size   2mm (wide) x 7mm (high)
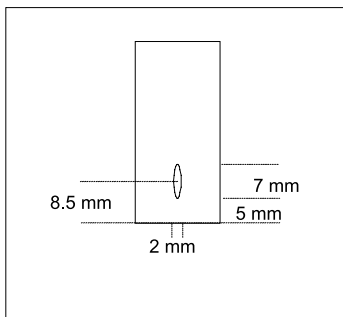
Using the Instrument

Management of Test Files and Data Files

Your instrument can manage test files and data files in the following ways:

- Test files can be saved and retrieved from the internal memory or from the floppy drive.

- Data files can be saved to the floppy drive for further processing on a computer (they cannot be retrieved and viewed on the instrument).

Saving tests

When you power-down the instrument, the current test is maintained by battery back-up. This means that when you turn the instrument on again, the cell holder alignment and values for all parameters will be the same as they were when the instrument was last used. When you load a test that has been saved, the values for all parameters stored with that test will replace the current values for the test parameters.

As you create customized tests and collect data, you will be saving tests for later use. The spectrophotometer uses test files to contain the values for all the parameters needed to run a test, including the alignment of the cell holder and the other parameters for the accessories installed. Once you select the values for the parameters, you can assign a test name and save the test. You can then restore the test and run it without having to set up the parameters again.

Saving a test

To get started, press the **TEST** key on the keypad. When the **Test Types** screen appears, highlight one of the tests and press **ENTER**. The **Test Setup** screen appears.

```
Advanced A-%T-C          11:42 4Feb02
                              BLANK

Test Name                      ------
Measurement Mode            Absorbance
Wavelength                    546.0nm
Delay Time (min:sec)            0:00
Sample Positioner             Auto 6
Number of Samples                  1

More parameters...




Press ↑ or ↓ to select item to change.
         │  Save  │ Stored │  Run
         │  Test  │ Tests  │  Test
```
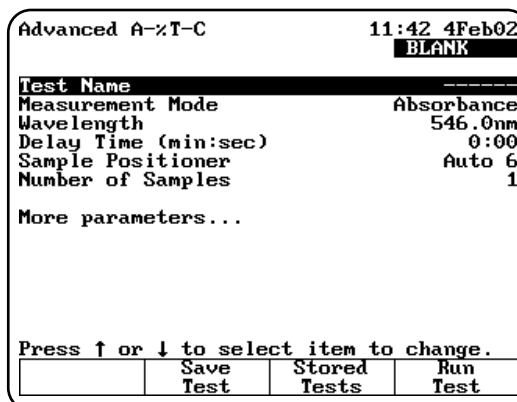
Specifying names for tests

When you save tests, you need to specify the name you want to use for the file. The spectrophotometer does not have a full keypad, so you need to select the characters for the filename from a character list.

1. After setting up the values for the test parameters, use the arrow keys to highlight **Test Name.** Press **ENTER**. The **Create Test Name** screen appears.

```
Create Test Name         2:07pm 22Oct01


ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

abcdefghijklmnopqrstuvwxyz ■*/µ()#



Test Name = _





Press ↑ or ↓ to select character.
Press Accept Name to save the test.
 Delete │ Delete  │  Add   │ Accept
  Name  │Character│Character│  Name
```
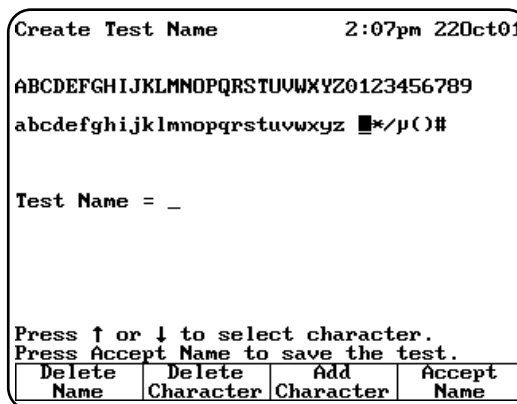
You can use this screen to:

• Delete the name of a test

• Delete a character in the name of a test

• Add a character to the name of a test

• Accept the name of a test

2. Use the arrow keys to highlight the first character you want to use for the name of your test and press **Add Character** to add the selected character to the name.

3. Continue selecting and adding characters until you have selected all the characters for the name.

4. Press **Accept Name** to accept the name and return to the previous screen. The name of the test appears at the top of the screen showing the test parameters.

Saving a test to the internal memory or floppy drive

After you have specified the name of the test, you can save it to either internal memory or the floppy drive.

1. With the Test setup screen displayed, press **Save Test**.

```
Scanning                  3:46pm 19Feb02
                                    BLANK
Test  Save as an internal test
Meas  Save test to the floppy disk
Star  Save test to internal and floppy
Stop
Samp  Press ↑ or ↓ to select
Scan  Press ENTER
Inte  Press ESC to exit
Cell
ID# (0=OFF)                            1
Auto Print                          Off
Auto Save                           Off


Press ↑ or ↓ to select item to change.
```

2. Use the arrow keys to highlight where you want the test to be saved and press **ENTER**. The instrument saves the test to the selected location.

Saving data files to a floppy disk

Your instrument can save data from all tests to the floppy drive in ASCII format with a .txt extension. The data file can be imported directly into a word processor or into a spreadsheet.

Note: *If you are importing your data into a spreadsheet program for data manipulation, you will need to use the spreadsheet parsing function to parse the data into separate cells.*

You can set up your instrument to automatically save the data after it has been collected using the Auto Save function, or you can choose to save the data after all the data has been acquired. In both cases, you will need to enter a data file name.

Autosaving data to a floppy disk

1. With a test setup screen displayed, set **Auto Save** to **On**. The **Test Name** parameter line appears.

```
Absorbance Difference     10:05am 19Feb02
                                   Cell # 5

Cell Correction                     Off
ID# (0=OFF)                           1
Low/High Limits                -9999/9999
Statistics                          Off
Auto Print                          On
Auto Save                           On
Test Name                        ------

More parameters...




Press ↑ or ↓ to select item to change.
            Save       Stored
            Test       Tests
```

2. Highlight **Test Name** and press **ENTER**. The **Create Data File Name** screen appears

```
Create Test Name          10:51am 19Feb02

ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

abcdefghijklmnopqrstuvwxyz

 `~!@#$%^()-_+=[]{};',.

Test Name = A




Press ↑ or ↓ to select character.
 Delete    Delete      Add      Accept
 Name     Character  Character   Name
```

You can use this screen to:

 • Delete the name of a data file

 • Delete a character in the name of a data file

 • Add a character to the data file name

 • Accept the name of the data file

3. Use the arrow keys to highlight the first character you want to use for the name of your test and press **Add Character** to add the selected character to the name.

4. Continue selecting and adding characters until you have selected all the characters for the name.

5. Press **Accept Name** to accept the name and return to the previous screen. The data that is

collected in this test will be saved with the given data file name on the floppy disk.

Saving data to a floppy disk after data collection

```
Absorbance Difference      11:10am 19Feb02
Test Name: 123                    Cell # 1

       Abs        Abs       Result
ID#  620.0nm    680.0nm        C
───  ────────   ────────   ──────────
  1    0.430      0.010       0.420




Page 1, Sample 1
              Save                Measure
              Data                Sample
```

1. With the data acquisition screen displayed, press **Save Data**.

2. The **Create Data File Name** screen appears. Use the arrow keys, **Add Character** and **Accept Name** keys to enter a data file name. The data will be saved to the floppy disk.

Loading test files

Saved test files can be loaded into a test program from either the internal memory or the floppy disk from the Utilities screen.

1. To access the test files, press the **UTILITY** button on the keyboard. The **Utilities** screen appears

2. Use the arrow keys to highlight **Stored Test Directory** and press **ENTER**.

```
Utility                    12:42pm 19Feb02
         Sof┌──────────────────────────┐
            │Load internal test        │
Printer     │Load test from floppy disk│
Date/Time   │                          │
Standby     │Press ↑ or ↓ to select    │
Baseline E  │Press ENTER               │
Beeper      │Press ESC to exit         │
Language    └──────────────────────────┘
% of lamp life used                 0.23%
Screen Contrast
Printout Contrast
Stored Tests Directory
Diskette Files
Calculator

Press ↑ or ↓ to select parameter.
```

3. Use the arrow keys to select the location of the files you want to load and press **ENTER**.

4. Highlight the test you want to load and press **ENTER**.

Viewing and deleting data files

1. To access data files, press the **UTILITY** button on the keyboard. The **Utilities** screen appears.

2. Use the arrow keys to highlight **Diskette Files** and press **ENTER.** The **Utilities File Directory** is displayed.

```
Utility Files Directory    1:52pm 19Feb02

FILTER.g6data.ss                    19Mar02
GREEN.g6data.sc                     19Mar02
More tests...










Press ↑ or ↓ to select test.
              Lock      Delete
             Unlock      File
```

3. Use the arrow keys to select the data file you want to delete or lock/unlock.

4. Press **Delete** or **Lock Unlock** to delete or lock/unlock the data file. If you want to lock or unlock access to the file, you must enter the password located on page iii of this manual.

Specifying concentration units

When you run concentration tests, you need to specify the units you want to use when reporting concentrations. The spectrophotometer includes a set of basic concentration units and you can also enter custom units if you wish.

All programs in the spectrophotometer use the same list of basic units:

• Concentration	• mg/mL
• ppm	• µg/L
• ppb	• M/L
• g/L	• mM/L
• mg/L	• IU

In addition to these units, you can create your own custom unit, using a character list like the one

described in *Specifying names for tests*. Once you create a custom unit, it will appear in the list that you use to select the units.

To select the units

1. Highlight the **Units** parameter on the screen and press **ENTER**.

2. Use the arrow keys to highlight the unit you want to select and press **ENTER**.

```
Advanced A-%T-C              1:44pm 20Jan01

                        C
Test Name               ppm
Measurement Mo          ppb
Wavelength              g/L
Delay Time (mi          mg/L
Conc of Standa          mg/mL
Factor                  µg/mL
Units                   M/L
Sample Positio          mM/L
Number of Samp          IU
                        [Unit]   ------
More parameter
                        Press ↑ or ↓ to select
                        Press ENTER

Press ↑ or ↓ to select item to change.
                             Edit
                            [Unit]
```
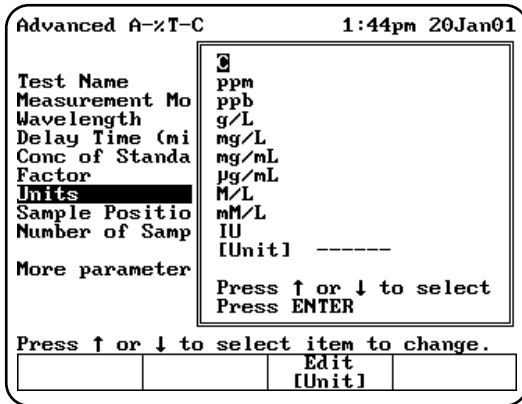
To create custom units

In addition to the basic concentration units, you can create one other custom concentration unit and add it to the list.

1. With the list of basic units displayed, use the arrow keys to highlight **[Unit]** and press **ENTER**.

   OR

   Press **Edit [Unit]** on a test set-up screen for a test with units.

   The character list appears. You can use this screen to:

   • Delete the name of a unit

   • Delete a character in the name of a unit

   • Add a character to the name of a unit

   • Accept the name of a unit

```
Edit [Unit]                  2:13pm 22Oct01


ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

abcdefghijkĺmnopqrstuvwxyz _*/µ()#


Unit = lb/gal




Press ↑ or ↓ to select character.

  Delete    Delete      Add      Accept
   Name    Character Character    Name
```
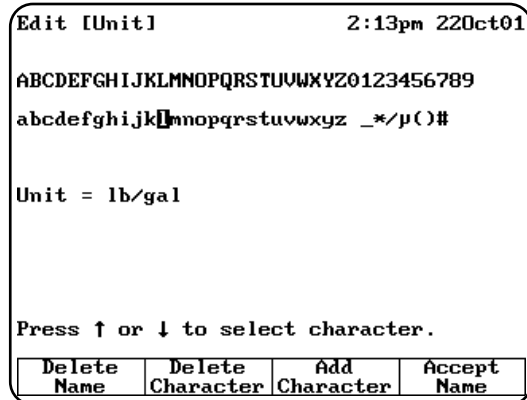
2. Use the arrow keys to highlight the first character you want to use for the name of your custom unit and press **Add Character** to add the selected character to the name.

3. Continue selecting and adding characters until you have selected all the characters for the name.

4. Press **Accept Name** to accept the name and return to the previous screen. The name of the new custom unit appears on the list of basic units.

Using the SmartStart feature

The SmartStart feature enables you to select the test methods you use most frequently and have them appear when you start up your instrument. If your laboratory runs only a single test, you can use the SmartStart feature to select it and it will appear each time you start up your instrument. Similarly, if you have a set of tests you run, you can use SmartStart to select them so the list appears when you start up the instrument.

Setting up a single-test SmartStart

1. Press the **TEST** key on the keypad to display the **Test Types** screen.

2. Press the **Stored Test** key to display the **Test File Location** screen.

```
Utility                    12:42pm 19Feb02
         Sof ┌──────────────────────────┐
             │ Load internal test       │
Printer      │ Load test from floppy disk│
Date/Time    │                          │
Standby      │ Press ↑ or ↓ to select   │
Baseline E   │ Press ENTER              │
Beeper       │ Press ESC to exit        │
Language     └──────────────────────────┘
% of lamp life used                  0.23%
Screen Contrast
Printout Contrast
Stored Tests Directory
Diskette Files
Calculator

Press ↑ or ↓ to select parameter.
┌──────┬──────┬──────┬──────┐
│      │      │      │      │
```

3. Use the arrow keys to select the location of the test you want to select as a SmartStart test and press **ENTER.**

4. When the appropriate test is highlighted, press **Select Test** to add the selected test to the SmartStart menu. An arrow sign ">" will indicate the test has been selected.

5. Press **Load Test.**
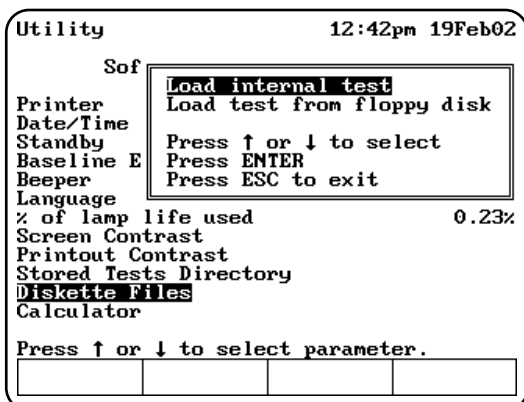
6. The parameter screen of the test you selected will be displayed.

Note: *At this point, you can power down the instrument and then power it back up. When it starts up again, the parameter screen for the selected test will be displayed.*

Setting up a multiple-test SmartStart

1. Press the **TEST** key on the keypad to display the **Test Types** screen.

2. Press the **Stored Test** key to display the **Test File Location** screen.

3. Use the arrow keys to select the location of the test you want to select as a SmartStart test and press **ENTER.**

4. When the appropriate test is highlighted, press **Select Test** to add the selected test to the SmartStart menu. An arrow sign ">" will indicate the test has been selected.

5. Continue scrolling through the list and add tests until you have made all the appropriate selections.

6. Press **ESC** to return to the **Test Types** screen.

Note: *At this point, you can power down the instrument and then power it back up. When it starts up again, the list of tests you've selected will be displayed.*

Using the Cell Correction program

Note: *The Cell Correction program is not active in the Main (**Basic Absorbance/%T/Basic Concentration screen**).*

Note: *The Cell Correction feature is active only when the 6-Position Sample Holder is set to either **Auto 6** or **Auto 3**. The feature is not active when the cell holder is set to **1-Cell Platform** or **Manual 6**, nor when the Single Cell Holder is installed.*

Every test setup screen provides access to the cell correction program. Before running the cell correction program:

- Clean the inside and outside of all the cells to be matched.

- Fill the cells with distilled water (or other blank solution), and place them in the sample compartment (see "Selecting and positioning glassware" in the preceding section). Be sure to place the blank cuvette in Cell "B" of the sample compartment.

  TIP: *If one cell has lower absorbance than the others, make it the blank.*

Running the Cell Correction program:

1. Press the **TEST** key on the keypad. When the **Test Types** screen appears, highlight the test you want to run and press **ENTER**.

```
Test Types                 1:55pm 20Jan01
Advanced A-%T-C
Standard Curve
Absorbance Ratio
Absorbance Difference
Kinetics
Scanning
3-Point Net
Multiwavelength
Performance Validation




Press ↑ or ↓ to select test type.
┌──────┬────────┬────────┬──────┐
│      │ Main   │ Stored │      │
│      │ Screen │ Tests  │      │
```
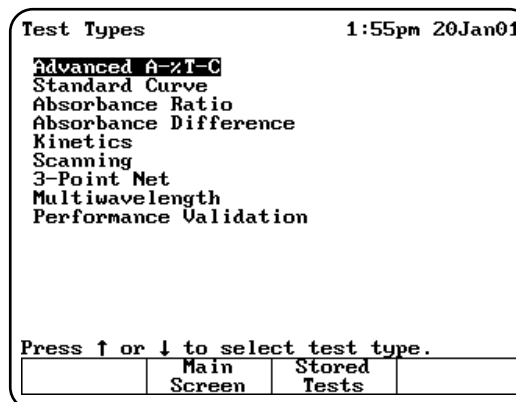
2. Highlight **Cell Correction** and press **ENTER**.

```
Advanced A-%T-C              12:23 15Feb02
                                  BLANK
Cell Correction                      Off
ID# (0=OFF)                            1
Low/High Limits              -9999/9999
Statistics                           Off
Auto Print                            On
Auto Save                            Off

More parameters...




Press ↑ or ↓ to select item to change.
            Save     Stored     Run
            Test     Tests      Test
```

The Cell Correction function is now activated, as indicated by the word **On** across from **Cell Correction** on the test setup screen.

```
Advanced A-%T-C              1:59pm 20Jan01
                                  BLANK

Cell Correction                       On
Setup Correction
ID# (0=OFF)                            1
Low/High Limits              -9999/9999
Statistics                           Off

More parameters...




Press ↑ or ↓ to select item to change.
            Save     Stored
            Test     Tests
```

Note: *When Cell Correction is activated, additional parameter lines are added to the screen above the **Cell Correction** line. If the **Cell Correction** line is no longer visible on the screen, highlight **More parameters...** and press ENTER.*

3. Highlight **Set Up Correction** and press **ENTER**. The **Cell Correction** screen appears.

4. Highlight **Correction Mode** and press **ENTER** to set the mode to either:

   • **Scan** - Cell Correction is run on a blank and one sample cell for the range of wavelengths you specify in **Scanning** mode.

   • **Discrete nms** - The Cell Correction program is run on a blank and up to five sample cells for up to 31 user-specified, discrete wavelengths.

```
Cell Correction             4:35am 21Jan01
                                  BLANK
Correction Mode           Discrete nms
Date Corrected                  ------
Sample Positioner              Auto 6
Number of Matched Cuvettes          1






Press ↑ or ↓ to select item to change.
  Set nms                          Run
                                   Corr.
```

5. If you selected Scan mode in the preceding step, press **Run Corr.** to start the Cell Correction program. If you selected Discrete nms mode, first specify the wavelengths using the procedures which follow, and then the Cell Correction program.

The Cell Correction program will measure the other cells against the blank and will record, store and date the measurements. From these measurements the Cell Correction program establishes the required correction factors, which then are automatically applied during all subsequent tests (if Cell Correction is activated).

Specifying wavelengths for Discrete nms mode:

1. With the **Test Setup** screen displayed, highlight **Sample Positioner** and press **ENTER** to set this parameter to either **Auto 3** (when using three large cell holders) or **Auto 6** (when using six small cell holders).

2. Highlight **Number of Matched Cuvettes** and press **ENTER**. Then use the keypad to specify the number of cells you are matching. Press **ENTER**.

```
Cell Correction            3:12pm 24Jan01
                                     BLANK
Correction Mode             Discrete nms
Date Corrected                      ------
Sample Positioner                   Auto 6
Number of Matched Cuvettes               1




    Entry:
    Enter Number of Samples (1 - 5)
```

3. Press **Set nms** to select the wavelengths for which the Cell Correction program will be run. A list of wavelengths appears.

```
Cell Correction            4:40am 21Jan01
                                     BLANK

            nm
    1      600
    2      540
    3      450
    4      ----



    Entry: 405
    Enter Wavelength (190 - 1100)
```

Note: *Cells should be matched at all analytical wavelengths because matching at one wavelength does not guarantee matching at others.*

4. Use the arrow keys to highlight the position where you want to enter the first wavelength.

5. Press **Add nm**.

6. Enter the value for the wavelength and press **ENTER**.

7. Continue until you have entered all the wavelengths.

After all the wavelengths have been entered, press **Run Corr.** to start the Cell Correction program. The Cell Correction program will measure the other cells against the blank and will record, store and date the measurements. From these measurements the Cell Correction program establishes the required correction factors, which

then are automatically applied during all subsequent tests (if Cell Correction is activated).

Taking measurements

The spectrophotometer lets you use different cell holders and cell holder accessories to take measurements. When you set up your test parameters, you will select the type of measurement you want to use and indicate how many samples you have. You can choose from the following options:

- **Auto 6** - You can take one blank measurement and up to five sample measurements without changing the samples in the cell holder. The instrument automatically measures the blank (in the blank position), then automatically advances the cell holder to the appropriate position for the next measurement.

- **Auto 3** - You can take up to three measurements without changing the samples in the cell holder. The instrument automatically measures the blank (in the blank position), then automatically advances the cell holder to the appropriate position for the next measurement.

- **Single Cell Platform** - You place the blank in the cell holder, measure it, place a sample in the cell holder, then measure your sample. This process is completely manual. In fact, the cell position buttons on the keypad do not function when you select Single Cell Platform even if you have a 6-Position Cell Holder installed in the sample compartment.

- **Manual 6** - You can take up to six measurements without changing the samples in the cell holder, using the cell position buttons on the keypad to advance the cell holder to the appropriate position for the next measurement. You place the blank in the blank position and your samples in the other cell positions. Regardless of where the cell holder is positioned, when you press Measure Blank the cell holder automatically goes to the blank position and measures the blank. However, you can use the cell position buttons to select a different position for the measurement.

Note: *When you have the 6-Position Cell Holder installed, the instrument always considers the material in the B position as a blank. This means that even after measuring your*

blank the first time, you can place unknowns only in positions 1 through 5.

Basic Absorbance/%T measurements

The Absorbance/%Transmittance (%T) program takes measurements and displays them as either absorbance or %T. For each measurement taken, the absorbance (or %T) appear on the screen, along with the type of measurement, the date and time, the wavelength and the cell position used for the measurement. All the steps for taking measurements in the two modes are the same - the only difference will be the units used to display the results.

When you use the Basic Absorbance/%T program, you can perform these tasks:

• Set the wavelength

• Measure a blank

• Measure unknowns

If you want to work with %T instead of absorbance, simply press **Change Mode** until you see the %T mode. You can switch from one mode to another whenever you see the **Change Mode** function key.

```
┌─────────────────────────────────────┐
│ Absorbance           2:16pm 22Oct01 │
│                          ▐Cell # 1▌  │
│                                      │
│                                      │
│            0.321A                    │
│                                      │
│            444nm                     │
│                                      │
│ ┌──────┬──────┬──────┬──────┐        │
│ │Measure│     │ Set  │Change│        │
│ │ Blank │     │  nm  │ Mode │        │
│ └──────┴──────┴──────┴──────┘        │
└─────────────────────────────────────┘
```
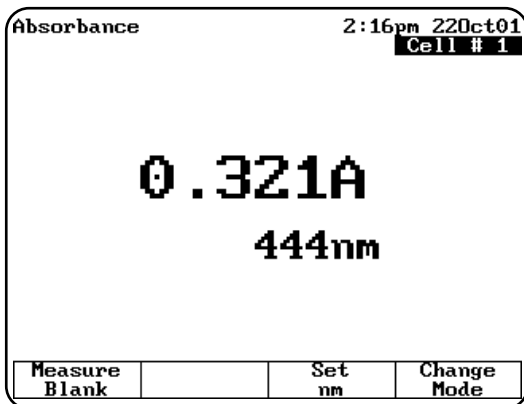
Setting the wavelength

1. Press **Set nm** or any number key to set the wavelength.

```
┌─────────────────────────────────────┐
│ Absorbance           2:17pm 22Oct01 │
│                          ▐Cell # 1▌  │
│                                      │
│                                      │
│            0.321A                    │
│                                      │
│            444nm                     │
│                                      │
│ ┌─────────────────────────────────┐ │
│ │ Enter Wavelength (190 - 1100)   │ │
│ └─────────────────────────────────┘ │
│ ┌──────┬──────┬──────┬──────┐        │
│ │      │      │ Set  │      │        │
│ │      │      │  nm  │      │        │
│ └──────┴──────┴──────┴──────┘        │
└─────────────────────────────────────┘
```
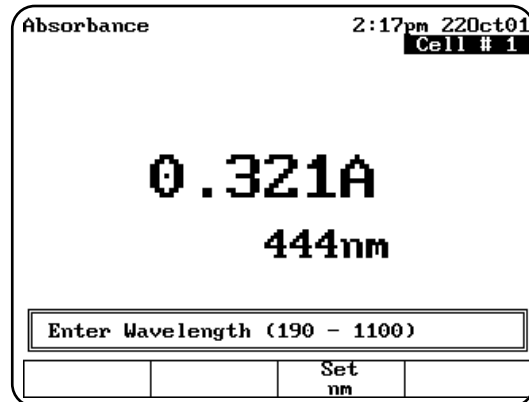
2. Enter the wavelength where you want the measurements taken, then press **Set nm** again.

Measuring a blank

1. Place the blank in the cell holder. If your instrument has a 6-Position Cell Holder, be sure to place the blank in the B position.

2. If you want to enter an absorbance or transmittance value for the blank, press a number key and enter the concentration in the **Entry** field.

3. Press **Measure Blank** to measure the blank. When the instrument is finished measuring the absorbance of the blank, the message disappears.

Measuring unknowns

1. If your instrument is equipped with the 6-Position Cell Holder, place the unknown you want to measure in one of the cell positions and press the corresponding cell position button on the keypad to move the cell holder to the measuring position. The absorbance (ABS) or %transmittance (%T) measurement appears on the display.

   If your instrument is equipped with the Single Cell Holder Platform, remove the blank and place the unknown in the cell holder. The absorbance or %transmittance measurement appears on the display.

Basic Concentration measurements

Measuring concentration is similar to measuring absorbance or %T and you use the **Change Mode** function key to switch to concentration measurements. The spectrophotometer allows you to measure concentration using either a factor or a standard to convert absorbance readings to concentration units.

- When you use a factor, you need to specify the factor and the concentration units.
- When you use a standard, you need to specify the concentration of the standard and measure its absorbance.

When you use the Basic Concentration program, you can perform these tasks:

- Set the wavelength
- Measure a blank
- Measure a standard *OR* enter a factor
- Measure unknowns

The steps for taking measurements in the two modes are similar - the only difference will be whether you measure a standard or enter a factor.

Setting the wavelength & mode

1. Press **Set nm** or any number key to set the wavelength.

2. Enter the wavelength where you want the measurements taken, then press **Set nm** again.

3. Press **Change Mode** until the appropriate measurement mode (Concentration with Standard or Concentration with Factor) appears.

Measuring a blank

1. Place the blank in the cell holder. If your instrument has a 6-Position Cell Holder, be sure to place the blank in the B position.

2. If you want to enter a concentration for the blank, press a number key and enter the concentration in the **Entry** field.

3. Press **Measure Blank** to measure the blank. When the instrument is finished measuring the absorbance of the blank, the message disappears.

Measuring a standard

1. If necessary, press **Change Mode** to switch to the **Concentration with Standard** mode.

```
Conc/Std                8:13am 21Jan01
  Factor=1              (------)
  Std=1 C                          BLANK


              -0.001C

               590nm



 Measure  | Units/  | Set   | Change
 Blank    | Standard| nm    | Mode
```
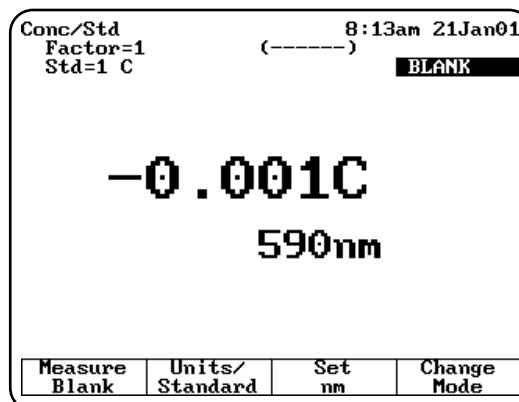
2. If your instrument is equipped with the 6-Position Cell Holder, place the standard in one of the cell positions and press the corresponding cell position key on the keypad.

   If your instrument is equipped with the Single Cell Holder Platform, remove the blank and place the standard in the cell holder.

3. Press **Units/Standard** to set the units and measure the standard.

4. Press **Enter Conc**, then use the number keys to enter the concentration value of the standard and then press **ENTER**.

5. Press **Select Units**, then use the arrow keys to highlight the entry in the **Units** field and press **ENTER** to select the units for the concentration.
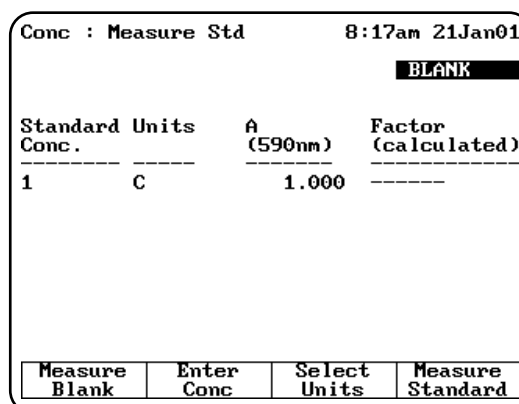
```
Conc : Measure Std       8:17am 21Jan01
                                 BLANK


Standard Units   A        Factor
Conc.            (590nm)  (calculated)
_____ _____   _____  _____
1        C        1.000    ------




 Measure  | Enter  | Select | Measure
 Blank    | Conc   | Units  | Standard
```

5. Press **Measure Standard** to measure the standard. When the instrument is finished measuring the absorbance of the standard, it displays the absorbance and calculated factor.

Entering a factor

```
Conc with Factor        2:44pm 22Oct01
                              Cell # 5
Factor                           56.78
Units                           pM/µL




Press ↑ or ↓ to select item to change.
              Enter    Select
              Factor   Units
```

1. If necessary, press **Change Mode** to switch to the **Concentration with Factor** mode.

2. Press **Units/Factor** to set the factor and select the units.

3. Use the arrow keys to highlight the entry in the **Factor** field and press **Enter Factor** to enter the factor.

4. Use the number keys to enter the factor.

5. Press **Enter Factor** to accept the factor and return to the screen displaying the factor and units. The factor you just entered appears on the display.

```
Conc/Factor             2:42pm 22Oct01
   Factor=1                   Cell # 5



        0.310pM/µL

            475nm




Measure   Units/    Set      Change
Blank     Factor    nm       Mode
```

6. Press **ESC** to return to the **Concentration with Factor** screen.

Measuring unknowns

1. If your instrument is equipped with the 6-Position Cell Holder, place the unknown you want to measure in one of the cell positions and press the corresponding cell position button on the keypad to move the cell holder to

the measuring position. The measurement appears on the display.

If your instrument is equipped with the Single Cell Holder Platform, remove the blank and place the unknown in the cell holder. The measurement appears on the display.

```
Conc/Factor             2:46pm 22Oct01
   Factor=56.78               Cell # 3



        1.866pM/µL

            475nm




Measure   Units/    Set      Change
Blank     Factor    nm       Mode
```

Advanced A/%T/C - Absorbance & %Transmittance measurements

When you use the Advanced A/%T/C program for absorbance or %transmittance measurements, you can perform these tasks:

•   Select the measurement mode you want to use (Absorbance or %Transmittance)

•   Run Cell Correction program

•   Recall a test OR set up your test parameters

•   Measure a blank

•   Measure unknowns

To get started, press the **TEST** key on the keypad. When the **Test Types** screen appears, highlight **Advanced A/%T/C** and press **ENTER**.

```
Advanced A-%T-C         8:43am 21Jan01
                                BLANK

Test Name                          AAA
Measurement Mode            Absorbance
Wavelength                       546nm
Delay Time (min:sec)              0:00
Sample Positioner               Auto 6
Number of Samples                    4

More parameters...



Press ↑ or ↓ to select item to change.
              Save     Stored    Run
              Test     Tests     Test
```

Recalling a test

1. With the **Advanced A/%T/C** screen displayed, press **Stored Tests**. Use the arrow keys to select the location of the saved tests and press **ENTER**.

2. Use the arrow keys to highlight the name of the test you want to recall and press **ENTER**. The parameters for the selected test appear on the screen.

From this screen, you can:

•   Set up test parameters

•   Run Cell Correction program

•   Save a test

•   View the list of stored tests

•   Measure a blank and unknowns

Setting up test parameters

1. With the **Advanced A/%T/C** screen displayed, use the arrow keys to highlight the name of the parameter you want to set.

   Some parameters appear only if you select one of the concentration modes, while others appear regardless of the measurement mode you select. A complete list of the parameters are located in Appendix B.

2. When the parameters are set, you can press **Save Test** to save the test or **Measure Sample** to measure a blank or unknowns.

Taking measurements

```
Advanced A-%T-C              11:49 4Feb02
Test Name: IRON TEST         Cell # 4

         Abs
ID#     540.0nm
---    --------
  1      0.050
  2      0.022
  3      0.036
  4      0.076




Page 1, Samples 1 - 4
        +-----------+-----------+
        |   Save    |  Measure  |
        |   Data    |  Samples  |
        +-----------+-----------+
```

Taking measurements automatically (using Auto 6 or Auto 3)

1. With the **Advanced A/%T/C** screen displayed and the parameters set, press **Run Sample**. The **Advanced A/%T/C** measurement screen appears.

2. Place the blank and the unknowns in the correct cell positions.

3. Press **Measure Sample** to measure the unknowns. The instrument automatically measures the blank first, then measures the unknowns and displays the sample measurements on the screen.

Taking measurements manually (using Manual 6 or Single Cell Platform)

1. With the **Advanced A/%T/C** screen displayed and the parameters set, press **Measure Sample**. The **Advanced A/%T/C** measurement screen appears, prompting you to place your samples in the cell holder.

2. Place the blank and unknowns in the cell holder. If your instrument is equipped with a 6-Position Cell Holder, be sure to place the blank in the B position. You can place up to five samples in the cell holder.

3. Press **Measure Blank** to measure the blank. If your instrument is equipped with a 6-Position Cell Holder, it automatically moves to the B position to measure the blank. When it completes the measurement, it returns to its previous cell position.

4. Press **Measure Sample** to measure the unknowns. The sample measurement appears on the screen. If your instrument is equipped with a 6-Position Cell Holder, press the cell position buttons on the keypad to reposition the cell holder and measure the rest of the unknowns manually.

Advanced A/%T/C - Concentration measurements

When you use the Advanced A/%T/C program for concentration measurements, you can perform these tasks:

•   Select the measurement mode you want to use (concentration with one standard or concentration with a factor)

- Recall a test *OR* set up your test parameters

- Measure a standard *OR* enter a factor (only if you select either concentration with one standard or concentration with a factor)

- Measure a blank and unknowns

To get started, press the **TEST** key on the keypad. When the **Test Types** screen appears, highlight **Advanced A/%T/C** and press **ENTER**.

```
Advanced A-%T-C        10:08am 21Jan01
                              BLANK

Test Name                         AAA
Measurement Mode             Conc/Std
Wavelength                      546nm
Delay Time (min:sec)             0:00
Conc of Standard                  100
Factor                          877.1
Units                          ------
Sample Positioner              Auto 6
Number of Samples                   4

More parameters...


Press ↑ or ↓ to select item to change.
   Run      Save    Stored     Run
 Standard   Test    Tests      Test
```

Recalling a test

1. With the **Advanced A/%T/C** screen displayed, press **Stored Tests**. Use the arrow keys to select the location of the saved tests and press **ENTER**.

2. Use the arrow keys to highlight the name of the test you want to recall and press **ENTER**. The parameters for the selected test appear on the screen.

Setting up test parameters

1. With the **Advanced A/%T/C** screen displayed, use the arrow keys to highlight the name of the parameter you want to set.

   Some parameters appear only if you select one of the concentration modes, while others appear regardless of the measurement mode you select. A complete list of the parameters are located in Appendix B.

2. When the parameters are set, you can press **Save Test** to save the test or **Run Test** or **Run Standard** to measure a standard.

Measuring a standard

Measuring a standard automatically (using Auto 6 or Auto 3)

1. With the **Advanced A/%T/C** screen displayed and the Measurement Mode set to **Conc/Std**, press **Run Standard**. The **Measure Standard** screen appears.

```
Advanced A-%T-C           10:17 20Feb02
Test Name: STANDARD TEST         BLANK

  Conc.         Abs         Factor
   ppb        650.0nm     calculated
 --------     --------     ----------
 --------     --------


  Entry:
  Enter a number (0.001 to 9999)

```

2. Use the number keys to enter the concentration value of the standard and press **ENTER**.

3. Press **Measure Standard**.

4. Place the blank and standard in the correct cell positions.

5. Press **ENTER** to measure the blank and the standard. The instrument automatically measures the blank first, then measures the unknowns and displays the absorbance and calculated factor.

Measuring a standard manually (using Manual 6 or Single Cell Platform)

```
Advanced A-%T-C        10:08am 21Jan01
                              BLANK

Test Name                         AAA
Measurement Mode             Conc/Std
Wavelength                      546nm
Delay Time (min:sec)             0:00
Conc of Standard                  100
Factor                          877.1
Units                          ------
Sample Positioner            Manual 6

More parameters...



Press ↑ or ↓ to select item to change.
   Run      Save    Stored     Run
 Standard   Test    Tests      Test
```

1. With the **Advanced A/%T/C** screen displayed and the Measurement Mode set to **Conc/Std**, press **Run Standard**. The **Measure Standard** screen appears.

2. Use the number keys to enter the concentration value of the standard and press **ENTER**.

3. Place the blank and standard in the correct cell positions.

4. Press **Measure Blank** to measure the blank. If your instrument is equipped with a 6-Position Cell Holder, it automatically moves to the B position to measure the blank. When it completes the measurement, it returns to its previous cell position.

5. Press **Measure Standard** to measure the standard. When the instrument is finished measuring the absorbance of the standard, it displays the absorbance and calculated factor.

Entering a factor

1. With the **Advanced A/%T/C** screen displayed and the **Measurement Mode** set to **Conc/Factor**, use the arrow keys to highlight **Factor**.

2. If you need to change the factor, use the number keys to enter the correct factor.

3. If you need to change the units, use the arrow keys to highlight **Units** and select the correct units.

Measuring unknowns

Measuring unknowns automatically (using Auto 6 or Auto 3)

1. With the **Advanced A/%T/C** screen displayed and the **Measurement Mode** set to **Conc/Std** or **Conc/Factor**, press **Run Test**. The **Advanced A/%T/C** measurement screen appears, prompting you to place your samples in the cell holder.

2. Place the blank and unknowns in the correct cell positions. Press **ENTER**. The instrument automatically measures the blank first, then measures the unknowns and displays the sample measurements on the screen.

3. Press **Measure Sample** to measure additional unknowns.

Measuring unknowns manually (using Manual 6 or Single Cell Platform)

1. With the **Advanced A/%T/C** screen displayed and the **Measurement Mode** set to **Conc/Std** or **Conc/Factor**, press **Run Test**. The **Advanced A/%T/C** measurement screen appears.

2. Place the blank and unknown in the correct cell position. If your instrument is equipped with a 6-Position Cell Holder, you can place up to five samples in the cell holder.

3. Press **Measure Blank** to measure the blank. If your instrument is equipped with a 6-Position Cell Holder, it automatically moves to the B position to measure the blank. When it completes the measurement, it returns to its previous cell position.

4. Press **Measure Sample** to start the measurement. If your instrument is equipped with a 6-Position Cell Holder, press the cell position buttons on the keypad to reposition the cell holder and measure the rest of the unknowns manually.

Standard Curve

When you use the Standard Curve program, you can perform these tasks:

• Recall a standard curve *OR* create a standard curve (set up the parameters and then measure the standards for the curve)

• Run the Cell Correction program

• Measure unknowns

• View the data - select between graphical and tabular displays

• Edit a standard curve - change the number of standards, select a different curve fit or delete points from the curve

To get started, press the **TEST** key on the keypad. When the **Test Types** screen appears, highlight **Standard Curve** and press **ENTER**. The **Standard Curve** screen appears.

```
Standard Curve              15:28 4Feb02
                                 BLANK
Test Name                        AMMONIA
Date Standards Measured           ------
Wavelength                       660.0nm
Ref. Wavelength Correction           Off
Curve Fit                         Linear
Number of Standards                    5
Units                                ppm
Sample Positioner                 Auto 6
Number of Samples                      1

More parameters...


Press ↑ or ↓ to select item to change.
   Run      Save      Stored
Standards   Test       Tests
```

Recalling a standard curve

1. With the **Standard Curve** screen displayed, press **Stored Tests**. Use the arrow keys to select the location of the saved tests and press **ENTER**.

2. Use the arrow keys to highlight the name of the test you want to recall and press **ENTER**. The parameters for the selected test appear on the screen.

Setting the parameters for a standard curve

1. Place the standards in the correct cell positions.

2. Set the parameters for measuring the standards. Refer to the list of parameters in Appendix B for a description of each.

   • Enter the Test Name, Wavelength, Reference Wavelength Correction and Reference Wavelength.

   • Select the Curve Fit, Units and Sample Positioner.

   • Set the Number of Standards and Number of Samples.

   • Enter the low and high limits.

   • Select the settings for the Statistics and AutoPrint functions.

   • Run the Cell Correction program

Measuring the standards for a standard curve

Measuring standards automatically (using Auto 6 or Auto 3)

1. Place the blank and standards in the correct cell positions.

2. When all the parameters are correct, press **Run Standards** to set up and run the standards.

```
Standard Curve              15:39 4Feb02
Test Name: AMMONIA               BLANK
Std      Conc.         Abs
 #        ppm         660.0nm
---    ----------    --------
  1       0.120      ---------
  2       0.200      ---------
  3     ----------   --------
  4     ----------   --------
  5     ----------   --------


  Entry:
  Enter a number (0.001 to 9999)
```

3. Enter the concentration value into the **Entry** concentration field and press **ENTER**. When you've entered all the concentration values, the **Standards** screen appears.

4. Press **Measure Standards** to measure the blank and standards. The instrument automatically measures the blank first, then measures the standards. When the instrument has measured all the standards, the **Standards** screen appears, showing the absorbance of each standard, along with the slope, intercept and correlation coefficient of the standard curve.

Measuring standards manually (using Manual 6 or Single Cell Platform)

1. Place the blank and standards in the correct cell positions.

2. When all the parameters are correct, press **Run Standards** to set up and run the standards.

```
Standard Curve              12:50 14Feb02
Test Name: AMMONIA                  BLANK

Std      Conc.          Abs
 #       mg/L          660.0nm
---    ---------      ---------
 1       25.00        ---------
 2       45.00        ---------
 3       55.00        ---------
 4       75.00        ---------
 5       100.0        ---------




Page 1, Standards 1 - 5
 Measure  |  Save   |  Edit
  Blank   |  Test   | Standards
```

3. Enter the concentration value into the **Entry** concentration field.

4. When you have entered all the concentration values, the **Standards** screen appears.

5. Press **Measure Blank** to measure the blank. If your instrument is equipped with a 6-Position Cell Holder, it automatically moves to the B position to measure the blank. When it completes the measurement, it returns to its previous cell position.

6. Press **Measure Standards** to measure the standards. If your instrument is equipped with a 6-Position Cell Holder, press the cell position buttons on the keypad to re-position the cell holder and measure the rest of the standards manually.

When the instrument has measured all the standards, the **Standards** screen appears, showing the absorbance of each standard, along with the slope, intercept and correlation coefficient of the standard curve.

```
Standard Curve              15:50 4Feb02
Test Name: AMMONIA                 Cell # 5

Std      Conc.          Abs
 #        ppm          660.0nm
---    ---------      ---------
 1       0.120          0.087
 2       0.200          0.140
 3       0.250          0.152
 4       0.400          0.268
 5       0.500          0.312

Curve Fit                        Linear
Slope      =    0.6091 Std Dev    = 0.011
Intercept =   0.01272 Corr Coeff = 0.995

Page 1, Standards 1 - 5
  View   |  Save   |  Edit     |  Run
  Graph  |  Test   | Standards |  Test
```

You can use this screen to:

- Display a graph of the standard curve data (press **View Graph**)

- Save the standard curve (press **Save Test**)

- Edit the standards (press **Edit Standards**)

- Measure your samples (press **Run Test**)

Measuring unknowns

Measuring unknowns automatically (using Auto 6 or Auto 3)

1. With the **Standards** screen displayed, press **Run Test**. The **Samples** screen appears.

2. Place the blank and unknowns in the correct cell positions.

3. Press **ENTER** to measure. The instrument automatically measures the blank first, then measures the unknowns. When the instrument has measured all the unknowns, the **Standard Curve** screen appears, showing the absorbance and concentration of each unknown.

If you want to switch between tabular and graphical displays, press **View Graph/Tabular**.
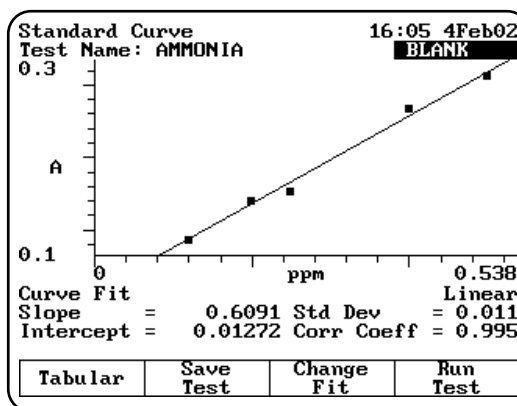
```
Standard Curve              16:05 4Feb02
Test Name: AMMONIA                  BLANK
0.3




 A



0.1
     0             ppm           0.538
Curve Fit                        Linear
Slope      =    0.6091 Std Dev    = 0.011
Intercept =   0.01272 Corr Coeff = 0.995

 Tabular  |  Save   |  Change  |  Run
          |  Test   |   Fit    |  Test
```

Measuring unknowns manually (using Manual 6 or Single Cell Platform)

1. With the Standards screen displayed, press **Run Test**. The **Samples** screen appears.

2. Place the blank and unknowns in the correct cell positions.

3. Press **Measure Blank** to measure the blank. If your instrument is equipped with a 6-Position Cell Holder, it automatically moves to the B position to measure the blank. When it

completes the measurement, it returns to its previous cell position.

4. Press **Measure Samples** to measure the unknowns. If your instrument is equipped with a 6-Position Cell Holder, press the cell position buttons on the keypad to re-position the cell holder and measure the rest of the unknowns manually. When the instrument has measured all the unknowns, the Standards screen appears, showing the absorbance and concentration of each unknown.

Editing a standard curve

You may edit the concentration of any standard on a standard curve. In addition, you may change the number of standards, select a different curve fit or delete points from the curve.

```
Standard Curve               16:17 4Feb02
Test Name: AMMONIA              BLANK

Std    Conc.    │Edit Concentration │
 #      ppm     │Add Standard       │
───   ───────── │Delete             │
  1      0.12   │Clear Measurements │
  2      0.20   │Reset Standards    │
  3      0.25   │                   │
  4      0.40   │Press ↑ or ↓ to select│
  5      0.50   │Press ENTER        │


Curve Fit                          Linear
Slope     =    0.6091 Std Dev   = 0.011
Intercept =    0.01272 Corr Coeff = 0.995
Page 1 of 0, Standards 1 - 5
Press ↑ or ↓ to view data
```
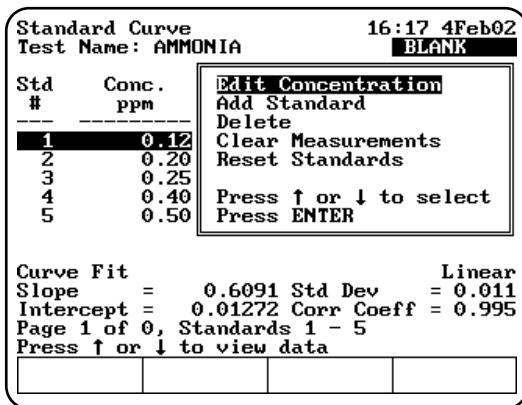
To edit the concentration of a standard

1. With the standard curve displayed on your screen, use the arrow keys to highlight the standard you want to edit. Press **Edit Standards**.

2. With the **Edit Concentration** highlighted, Press **ENTER**.

3. Press **Edit Conc** or a number key.

4. Enter the concentration value in the **Entry** field.

5. When the concentration value is correct, press **ENTER** to accept the value.

To add a standard

1. With the standard curve displayed on your screen, press **Edit Standards**.

2. Use the arrow keys to highlight **Add Standard.**

3. Enter the concentration value of the additional standard in the **Entry** field.

4. When the concentration value is correct, press **ENTER** to accept the value.

5. Press **Measure Standards** to remeasure all the standards.

To delete a standard

1. With the standard curve displayed on your screen, use the arrow keys to highlight the standard you want to delete. Press **Edit Standards**.

2. Use the arrow keys to highlight **Delete Standard**. Press **ENTER** to delete the standard.

To clear measurements

1. With the standard curve displayed on your screen, press **Edit Standards**.

2. Use the arrow keys to highlight **Clear Measurements** and press **ENTER**. All the absorbance measurements will be removed from the screen.

To reset standards

1. With the standard curve displayed on your screen, press **Edit Standards**.

2. Use the arrow keys to highlight **Reset Standards** and press **ENTER**. All the standards and measurements will be removed.

To select a different curve fit for a standard curve

Note: *To change the curve fit for a standard curve, you must display the standard curve as a graph, not as a table.*

1. With the standard curve you want to edit displayed as a graph on your screen, press **Change Fit**.

```
Standard Curve                16:21 4Feb02
Test Name: AMMONIA              [BLANK]
0.3  ┐
     │       ┌──────────────────────────┐
     │       │ Linear                    │
     │       │ Linear Through Zero        │
     │       │ Linear Regr 2nd Order      │
   A │       │ Linear Regr 3rd Order      │
     │       │ Linear Regr 4th Order      │
     │       │ Segmented                  │
     │       │                            │
     │       │ Press ↑ or ↓ to select     │
0.1  ┤       │ Press ENTER                │
     │       └──────────────────────────┘
     └─┬──────────────┬──────────────┬──
       0            ppm            0.538
Curve Fit                        Linear
Slope      =    0.6091 Std Dev    = 0.011
Intercept  =    0.01272 Corr Coeff = 0.995
┌────────┬────────┬────────┬────────┐
│        │        │        │        │
└────────┴────────┴────────┴────────┘
```
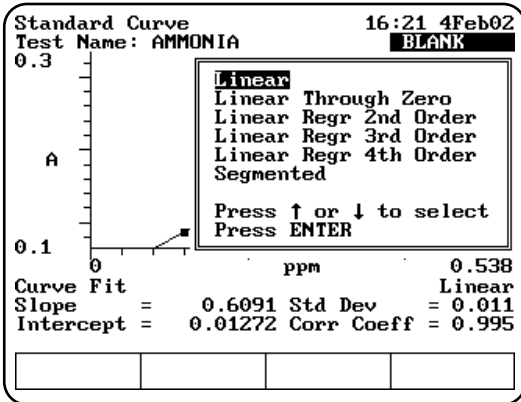
2. Use the arrow keys to highlight the curve fit you want to use for the standard curve and press **ENTER**. The instrument applies the selected curve fit to the data and displays the new graph.

Absorbance Ratio

When you use the Absorbance Ratio program, you can perform these tasks:

- Recall a test *OR* set up your test parameters
- Run the Cell Correction program
- Measure a blank
- Measure unknowns

To get started, press the **TEST** key on the keypad. When the **Test Types** screen appears, highlight **Absorbance Ratio** and press **ENTER**.

Recalling a test

```
Absorbance Ratio             10:32 20Feb02
                               [BLANK]
Test Name                     456[Saved]
Wavelength 1                     260.0nm
Wavelength 2                     280.0nm
Ref. Wavelength Correction          Off
Sample Positioner                Auto 6
Number of Samples                     5

More parameters...




Press ↑ or ↓ to select item to change.
┌────────┬────────┬────────┬────────┐
│        │ Save   │ Stored │ Run    │
│        │ Test   │ Tests  │ Test   │
└────────┴────────┴────────┴────────┘
```

1. With the **Absorbance Ratio** screen displayed, press **Stored Tests**. Use the arrow keys to select the location of the saved tests and press **ENTER**.

2. Use the arrow keys to highlight the name of the test you want to recall and press **ENTER**. The parameters for the selected test appear on the screen.

From this screen, you can:

- Set up test parameters
- Run the Cell Correction program
- Save a test
- View the list of stored tests
- Measure a blank
- Measure unknowns

Setting up test parameters

1. With the **Absorbance Ratio** screen displayed, use the arrow keys to highlight the name of the parameter you want to set.

2. When the parameters are set, you can press **Save Test** to save the test or **Run Test** to measure a blank or unknowns.

Measuring unknowns

Measuring unknowns automatically (using Auto 6 or Auto 3)

```
Absorbance Ratio             13:14 14Feb02
Test Name: ------              [BLANK]

      Abs     Abs     Abs
ID#  660.0   640.0  Ref.WL    Result
---   ---     ---     ---       ---




     ┌──────────────────────────┐
     │                          │
     │  Insert samples 1 - 5    │
     │  into positions 1 - 5    │
     │                          │
     │  Press ENTER to measure  │
     └──────────────────────────┘
┌────────┬────────┬────────┬────────┐
│        │        │        │        │
└────────┴────────┴────────┴────────┘
```

1. Place the blank and unknowns in the correct cell positions. Press **ENTER** to start the measurement. The instrument automatically measures the blank first, then measures the unknowns and displays the sample measurements on the screen.

Measuring unknowns manually (using Manual 6 or Single Cell Platform)

1. With the **Absorbance Ratio** screen displayed, press **Run Test**.

```
Absorbance Ratio          13:22 14Feb02
Test Name: ------             Cell # 1

     Abs     Abs     Abs
ID#  660.0   640.0   Ref.WL   Result
---  ---     ---     ---      ---







   Measure
    Blank
```

2. Place the blank and unknown in the correct cell position. If your instrument is equipped with a 6-Position Cell Holder, you can place up to five samples in the cell holder.

3. Press **Measure Blank** to measure the blank. If your instrument is equipped with a 6-Position Cell Holder, it automatically moves to the B position to measure the blank. When it completes the measurement, it returns to its previous cell position.

4. Press **Measure Sample** to start the measurement. If your instrument is equipped with a 6-Position Cell Holder, press the cell position buttons on the keypad to re-position the cell holder and measure the rest of the unknowns manually.
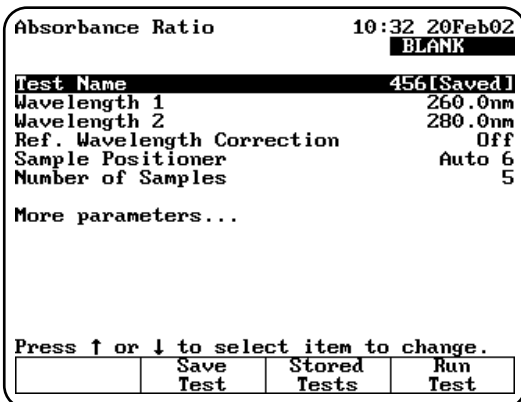
Absorbance Difference

When you use the Absorbance Difference program, you can perform these tasks:

- Recall a test *OR* set up your test parameters
- Run the Cell Correction program
- Measure a blank
- Measure unknowns

To get started, press the **TEST** key on the keypad. When the **Test Types** screen appears, highlight **Absorbance Difference** and press **ENTER**.

```
Absorbance Difference     12:59pm 3Jan02
                              BLANK

Test Name                        ------
Wavelength 1                    546.0nm
Wavelength 2                    546.0nm
Ref. Wavelength Correction          Off
Factor 1                          1.000
Factor 2                          1.000
Units                               ppm
Sample Positioner                Auto 6
Number of Samples                     1

More parameters...


Press ↑ or ↓ to select item to change.
            Save     Stored     Run
            Test     Tests      Test
```

Recalling a test

1. With the **Absorbance Difference** screen displayed, press **Stored Tests**. Use the arrow keys to select the location of the saved tests and press **ENTER**.

2. Use the arrow keys to highlight the name of the test you want to recall and press **ENTER**. The parameters for the selected test appear on the screen.
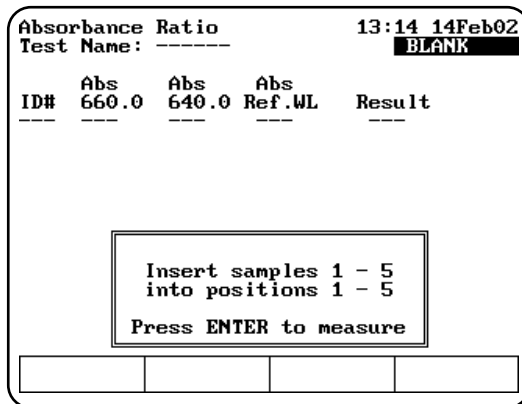
   From this screen, you can:

   - Set up test parameters
   - Set up Cell Correction program
   - Save a test
   - View the list of stored tests
   - Measure a blank
   - Measure unknowns

Setting up test parameters

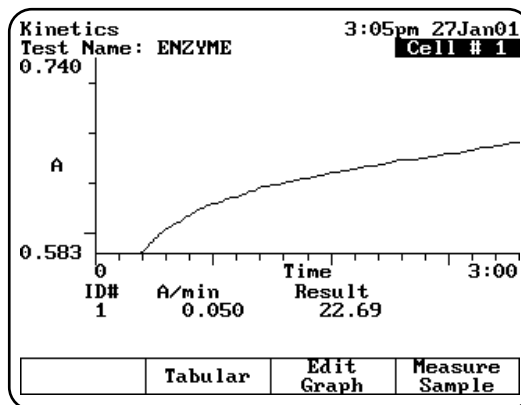1. With the **Absorbance Difference** screen displayed, use the arrow keys to highlight the name of the parameter you want to set.

2. When the parameters are set, you can press **Save Test** to save the test or **Run Test** to measure a blank or unknowns.

Measuring unknowns

Measuring unknowns automatically (using Auto 6 or Auto 3)

1. With the **Absorbance Difference** screen displayed, press **Run Test**.

2. Place the blank and unknowns in the correct cell positions.

3. Press **ENTER** to start the measurement. The instrument automatically measures the blank first, then measures the unknowns and displays the sample measurements on the screen.

```
Absorbance Difference        13:29 14Feb02
Test Name: TEST 9               BLANK

     Abs     Abs     Abs     Result
ID#  429.0   630.0   Ref.WL    ppm
---  ------  ------  ------  ----------




        +------------------------+
        |  Insert samples 1 - 5  |
        |  into positions 1 - 5  |
        |                        |
        |  Press ENTER to measure|
        +------------------------+

   +--------+-------+-------+--------+
   |        |       |       |        |
   +--------+-------+-------+--------+
```

Measuring unknowns manually (using Manual 6 or Single Cell Platform)

1. With the **Absorbance Difference** screen displayed, press **Run Test**.

2. Place the blank and unknown in the correct cell position. If your instrument is equipped with a 6-Position Cell Holder, you can place up to five samples in the cell holder.

3. Press **Measure Blank** to measure the blank. If your instrument is equipped with a 6-Position Cell Holder, it automatically moves to the B position to measure the blank. When it completes the measurement, it returns to its previous cell position.

```
Absorbance Difference        13:39 14Feb02
Test Name: TEST 9               Cell # 1

     Abs     Abs     Abs     Result
ID#  429.0   630.0   Ref.WL    ppm
---  ------  ------  ------  ----------








   +--------+-------+-------+--------+
   |Measure |       |       |        |
   | Blank  |       |       |        |
   +--------+-------+-------+--------+
```

4. Press **Measure Sample** to start the measurement. If your instrument is equipped with a 6-Position Cell Holder, press the cell position buttons on the keypad to re-position the cell holder and measure the rest of the unknowns manually.

Kinetics

When you use the Kinetics program, you can perform these tasks:

• Recall a test *OR* set up your test parameters

• Run the Cell Correction program

• Measure a blank

• Measure an unknown

• Recalculate reaction rates

• Modify the scale of the plot

When you use the Kinetics program, you can choose to work with either graphical data or with tabular data. You can perform the same functions regardless of the type of display you select. However, the location of function keys varies depending on the type of display you choose.

Note: *The Kinetics program allows you to measure only one unknown at a time.*

Note: *The Kinetics program allows you to collect up to 400 data points per run. When you set up your test parameters, be sure to select the interval time and total run time accordingly.*

To get started, press the **TEST** key on the keypad. When the **Test Types** screen appears, highlight **Kinetics** and press **ENTER**.

Recalling a test

1. With the **Kinetics** screen displayed, press **Stored Tests**. Use the arrow keys to select the location of the saved tests and press **ENTER**.

2. Use the arrow keys to highlight the name of the test you want to recall and press **ENTER**. The parameters for the selected test appear on the screen.

```
Kinetics                    13:45 14Feb02
                               Cell # 1

Test Name                       ------
Measurement Mode             Absorbance
Wavelength                      546.0nm
Ref. Wavelength Correction         Off
Delay Time (min:sec)              0:00
Interval Time (min:sec)           0:01
Total Run Time (hr:min:sec)    0:05:00
Measure Blank                     Once
Display Result (Rate * Factor)      On

More parameters...



Press ↑ or ↓ to select item to change.
              Save      Stored     Run
              Test      Tests      Test
```

From this screen, you can:

- Set up test parameters

- Run the Cell Correction program

- Save a test

- View the list of stored tests

- Measure a blank

- Measure unknowns

Setting up test parameters

1. With the Kinetics screen displayed, use the arrow keys to highlight the name of the parameter you want to set.

2. When the parameters are set, you can press **Save Test** to save the test or **Run Test** to measure a blank or an unknown.

Measuring unknowns

Note: *If your instrument is equipped with a 6-position cell holder, be sure to place the blank in position B and the unknown in cell position #1. The instrument always uses cell position #1 to scan the unknown.*

1. With the **Kinetics** test parameters displayed on the screen, press **Run Test**.

2. If you have a 6-position cell holder, place the blank in position B and the unknown in position #1. Press **Measure Sample** to measure the blank and the unknown. When the instrument completes the measurement, the kinetics data and rate appear on the screen.

3. If you have 1-position cell holder, press **Measure Blank** to measure the blank, then insert your unknown and press **Measure Sample**. When the instrument completes the measurement, the kinetics data and rate appear on the screen.

```
Kinetics                   3:05pm 27Jan01
Test Name: ENZYME             Cell # 1
0.740



A



0.583
     0              Time           3:00
  ID#      A/min    Result
   1       0.050    22.69


           Tabular    Edit     Measure
                      Graph    Sample
```
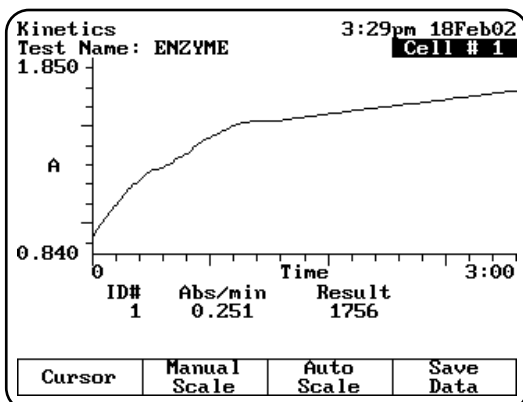
If you want to switch between tabular and graphical displays, press **Graph/Tabular**.

When you have a graphical display, you can press **Edit Graph**, then press **Cursor** to move the cursor line from one position to another on the plot. As the cursor moves the rate and result values indicate the values for the point on the plot where the cursor is located.

Rescaling & recalculating graphical kinetics results

Within the Kinetics program, you can view and manipulate your results either in graphical form or in tabular form. When your results are displayed on the screen, you can modify the range (start and stop time) and the instrument automatically recalculates the reaction rate.

When you are working with graphical kinetics results, you need to press **Edit Graph** before you can rescale and recalculate.

```
Kinetics                    3:29pm 18Feb02
Test Name: ENZYME              Cell # 1
1.850 ┐

   A

0.840 ┘
      0              Time              3:00
      ID#    Abs/min      Result
       1      0.251        1756

  ┌─────────┬─────────┬─────────┬─────────┐
  │ Cursor  │ Manual  │  Auto   │  Save   │
  │         │ Scale   │  Scale  │  Data   │
  └─────────┴─────────┴─────────┴─────────┘
```

You can modify the scale of your kinetics data plot in two ways - automatically or manually. When you select Auto Scale, the instrument automatically scales the X- and Y-axes so all the data appears on the plot. When you select Manual Scale, you select specific minimum and maximum values for the X- and Y-axes. Whenever you modify the scale, the instrument also automatically recalculates and displays the new reaction rate and result.

When the edit screen appears, you can:

- Use the Auto Scale function to change the scale, display the new graph and recalculate the results

- Use the Manual Scale function to change the scale, display the new graph and recalculate the results

- Use the cursor to select new minimum or maximum values for the X-axis and recalculate the results.

To use the Auto Scale function

1. With your kinetics data displayed on the **Edit Graph** screen, press **Auto Scale**. The instrument automatically adjusts the minimum and maximum values for the X- and Y-axes so all the data appears on the plot. The instrument also recalculates the results, using all the data, and displays it on the screen.
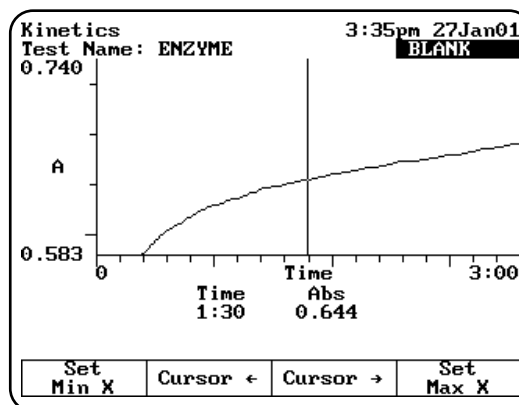
To use the Manual Scale function

1. With your kinetics data displayed on the edit screen, press **Manual Scale**. The manual scale options appear.
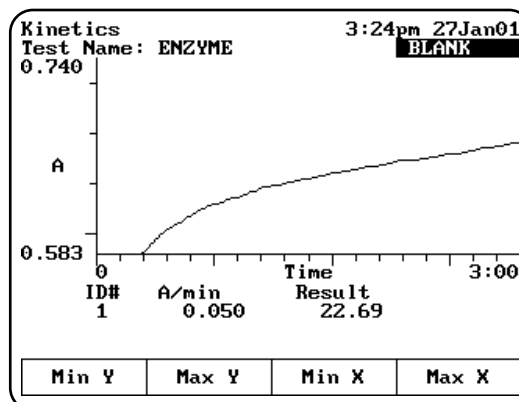
2. Use the number keys to enter the appropriate minimum or maximum value for the X- or Y-axis, then press the appropriate function key (**Min Y, Max Y, Min X, Max X**) to accept it. The instrument redraws the plot using the minimum and maximum value you have entered and displays the recalculated rate and result.

3. Continue until you have entered all the values you want to change.

To use the cursor

1. With your kinetics data displayed on the edit screen, press **Cursor**. The cursor options appear.

```
Kinetics                    3:24pm 27Jan01
Test Name: ENZYME               BLANK
0.740 ┐

   A

0.583 ┘
      0              Time              3:00
      ID#    A/min        Result
       1      0.050        22.69

  ┌─────────┬─────────┬─────────┬─────────┐
  │ Min Y   │ Max Y   │ Min X   │ Max X   │
  └─────────┴─────────┴─────────┴─────────┘
```

```
Kinetics                    3:35pm 27Jan01
Test Name: ENZYME               BLANK
0.740 ┐

   A

0.583 ┘
      0              Time              3:00
             Time        Abs
             1:30        0.644

  ┌─────────┬─────────┬─────────┬─────────┐
  │  Set    │Cursor ← │Cursor → │  Set    │
  │ Min X   │         │         │ Max X   │
  └─────────┴─────────┴─────────┴─────────┘
```

2. Press **Cursor** ← or **Cursor** → to position the cursor line on the appropriate point on the graph. The instrument displays the data for the selected point.

---

3. When the cursor line is in the correct position, press **Set Min X or Set Max X** to accept the selected point. The instrument redraws the plot using the minimum and maximum value you have selected and displays the recalculated rate and result.

Rescaling & recalculating tabular kinetics results

When you are working with tabular kinetics results, you need to press **Edit Data** before you can rescale and recalculate.

After collecting your kinetics data, you can use all the data for the rate calculation or you can select specific start and end times. Whenever you modify the start and end times or select all the data, the instrument automatically recalculates and displays the new reaction rate and result.

When the edit screen appears, you can:

- Use all the data to recalculate the results
- Select specific start and end times for the rate calculation and recalculate the results.

```
Kinetics                          12:57 30Jan01
Test Name: KINETICS               [Cell # 1]

HH:MM:SS    Abs     Delta    Lin
_____  _____  _____   ___
→   0:00   0.417   ------   ---
    0:10   0.471   0.054    ---
    0:20   0.510   0.039    L
    0:30   0.534   0.024    L
    0:40   0.550   0.016    L
    0:50   0.559   0.010    L
    1:00   0.568   0.008    L
    1:10   0.574   0.007    L

   ID#     min/Abs     Result
    1       0.000      0.013

Press ↑ or ↓ for more data...
 Use all  |        |  Start  |  End
  data    | Graph  |  Time   |  Time
```

To use all the data to calculate the reaction rate

1. With your table of kinetics data displayed on the edit screen, press **Use all data**. The instrument calculates the rate and displays it on the screen.

To select specific start and end times for the rate calculation

1. With your table of kinetics data displayed on the edit screen, use the arrow keys on the keypad to move the highlight symbol (→) to the appropriate data point in the table.

2. Press **Start Time** or **End Time**. The instrument displays the recalculated rate and result.

Scanning

When you use the Scanning program, you can perform these tasks:

- Recall a test *OR* set up your test parameters
- Run the Cell Correction program
- Collect a baseline scan
- Scan an unknown
- View scan data
- Change the scale of the data plot
- Determine 3-point net measurements
- Calculate the area under a curve
- Label peaks and valleys

Note: *The Scanning program allows you to measure only one unknown at a time. Auto 6, Auto 3 and Manual 6 are not available for scanned measurements.*

Note: *If you want to set a baseline expiration time, press UTILITIES, then use the arrow keys to highlight Baseline Expiration. Press ENTER and set the desired time.*

To get started, press the **TEST** key on the keypad. When the **Test Types** screen appears, highlight **Scanning** and press **ENTER**.
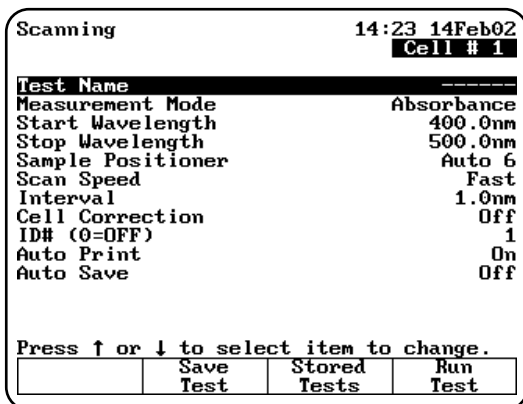
Recalling a test

1. With the **Scanning** screen displayed, press **Stored Tests**. Use the arrow keys to select the location of the saved tests and press **ENTER**.

2. Use the arrow keys to highlight the name of the test you want to recall and press **ENTER**. The parameters for the selected test appear on the screen.

From this screen, you can:

- Set up test parameters
- Set up Cell Correction program
- Save a test
- View the list of stored tests
- Collect a baseline
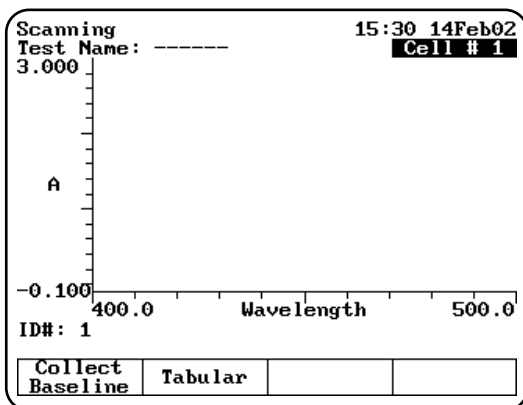- Scan unknowns

Setting up test parameters

1. With the **Scanning** screen displayed, use the arrow keys to highlight the name of the parameter you want to set.

2. When the parameters are set, you can press **Save Test** to save the test or **Run Test** to measure a blank or an unknown.

```
Scanning                 14:23 14Feb02
                              Cell # 1
Test Name                      ------
Measurement Mode            Absorbance
Start Wavelength               400.0nm
Stop Wavelength                500.0nm
Sample Positioner               Auto 6
Scan Speed                        Fast
Interval                        1.0nm
Cell Correction                    Off
ID# (0=OFF)                          1
Auto Print                          On
Auto Save                          Off


Press ↑ or ↓ to select item to change.
          Save    Stored     Run
          Test    Tests      Test
```

Collecting a baseline scan

Note: *If your instrument is equipped with a 6-Position Cell Holder, be sure to place the blank in the B position. The instrument always uses the B position to collect the baseline.*

1. With the **Scanning** test parameters displayed, press **Run Test**.

2. Place the blank in the B position.

3. Press **Collect Baseline** to collect the baseline. When the instrument is finished measuring the blank, the message disappears.

```
Scanning                 15:30 14Feb02
Test Name: ------             Cell # 1
3.000


 A



-0.100
      400.0     Wavelength      500.0
ID#: 1

  Collect    Tabular
  Baseline
```

Note: *If you want to switch between tabular and graphical displays, press **Graph/Tabular.***

Scanning an unknown

Note: *If your instrument is equipped with a 6-Position Cell Holder, be sure to place the unknown in cell position #1. The instrument always uses cell position #1 to scan the unknown.*

1. With the Scanning test parameters displayed on the screen, press **Run Test**.

2. If your instrument is equipped with a 6-Position Cell Holder, be sure to place the unknown in cell position #1.

3. Press **Measure Sample** to measure the unknown.

Note: *If you want to switch between tabular and graphical displays, press **Graph/Tabular**.*

Note: *You may need to use the up and down arrow keys to view all the data for the scan.*

```
Scanning                  8:12 15Feb02
Test Name: FILTER             Cell # 1
2.220


 A



0.070
      350.0     Wavelength      500.0
ID#: 1
Baseline collected 15Feb02
  Collect              Edit     Measure
  Baseline  Tabular    Graph    Sample
```
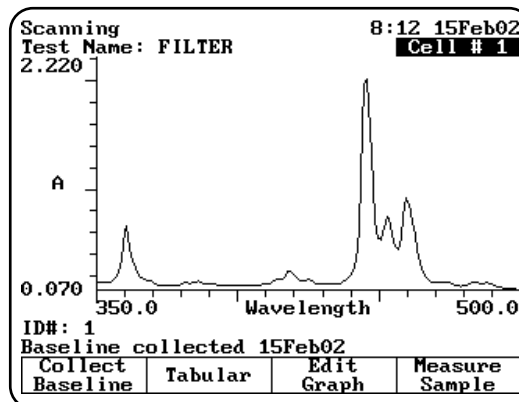
Viewing & manipulating scan data

Within the Scanning program, you can view and manipulate your results either in graphical form or in tabular form.

When you are working with graphical scan data, you need to press **Edit Graph** before you can perform other functions on the scan data.

When the edit graph screen appears, you can:

• Rescale the graph

• Determine 3-point net values

• Calculate area under a curve

• Label peaks and valleys
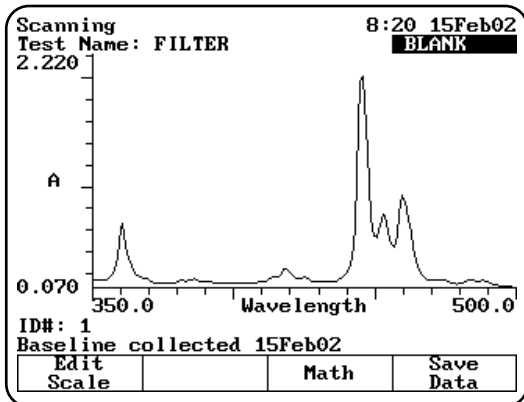
Rescaling graphical scan data

You can modify the scale of your scan data plot in two ways - automatically or manually. When you select Auto Scale, the instrument automatically scales the X- and Y-axes so all the data appears on the plot. When you select Manual Scale, you select specific minimum and maximum values for the X- and Y-axes. Whenever you modify the scale, the instrument also automatically recalculates and displays the new data plot.

Press **Edit Scale** to modify the scale. When the edit scale screen appears, you can:

• Use the Auto Scale function to change the scale and display the new graph

• Use the Manual Scale function to change the scale and display the new graph

• Use the cursor to identify specific points along the X-axis
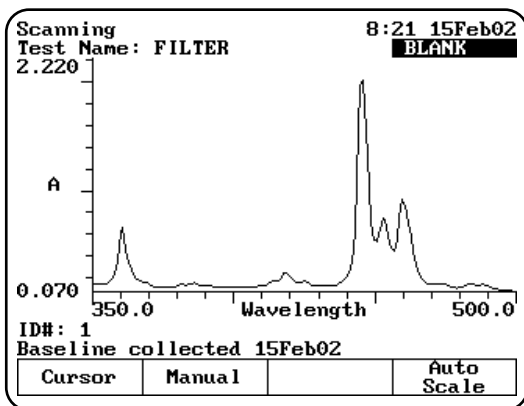
To use the Auto Scale function

1. With your scan data displayed on the edit scale screen, press **Auto Scale**. The instrument automatically adjusts the minimum and maximum values for the X- and Y-axes so all the data appears on the plot.

To use the cursor

1. With your scan data displayed on the edit scale screen, press **Cursor**. The cursor options appear.
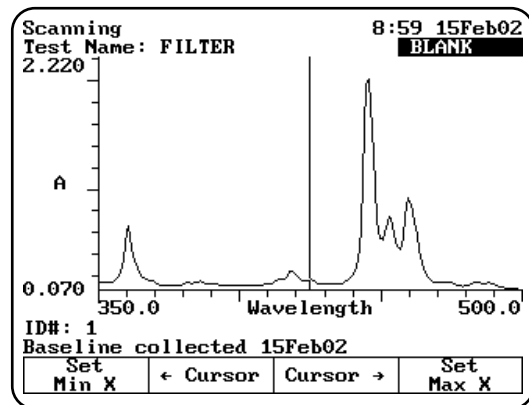
2. Use **Cursor** ← to move the cursor to the desired minimum wavelength value. Press **Set Min X** to redraw the plot using the new minimum wavelength value. Repeat using **Cursor** → and **Set Max X** to set the new maximum wavelength.

To use the Manual Scale function

1. With your scan data displayed on the edit scale screen, press **Manual Scale**. The manual scale options appear.
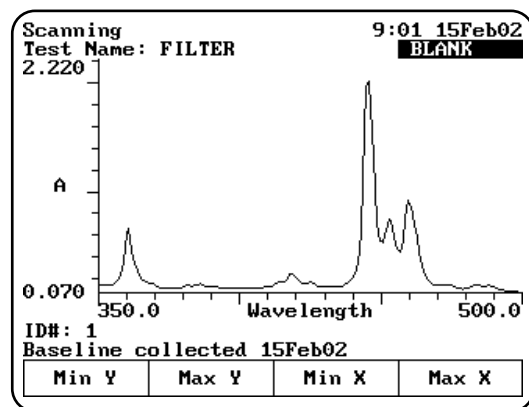
2. To set the minimum or maximum value for the X- or Y-axis, press **Min Y, Max Y, Min X or Max X**. A screen appears prompting you to enter the appropriate value.

3. Use the number keys to enter the correct value, then press the appropriate function key (**Min Y, Max Y, Min X, Max X**) to accept it. The instrument redraws the plot using the minimum and maximum values you have entered.

Performing calculations on the scan data

You can modify your graph by performing calculations on the data. From the **Edit Graph** screen, press **Math**. When the Math screen appears, you can:

- Smooth data
- Determine 3-point net
- Calculate the area under a curve
- Label peaks and valleys
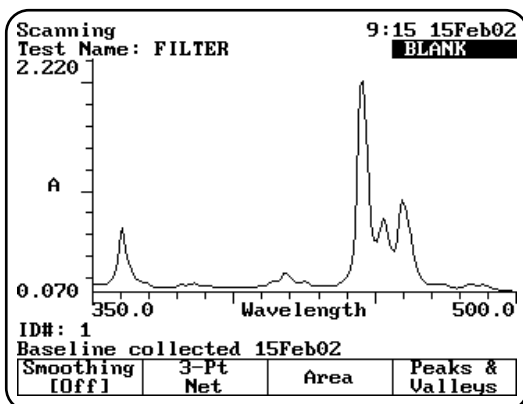
Smoothing data

If your scan shows signs of sampling noise, you can smooth the appearance of your graph with the smoothing function.

1. With your scan data displayed on the edit graph screen, press **Smoothing [On]**. The instrument performs a data smoothing function on the data and displays the smoothed graph.

Determining 3-point net measurements

1. With your scan data displayed on the edit graph screen, press **Math**. The **Math calculation** screen appears.

2. Press **3-Pt Net** to enter the **3-point net measurement** screen. A screen showing the cursor options and three cursor lines (designated for the left, center and right wavelengths) appears.
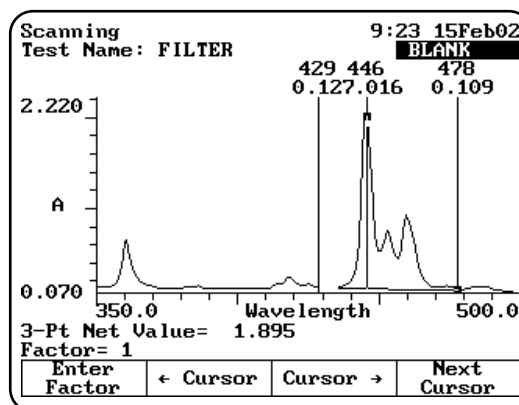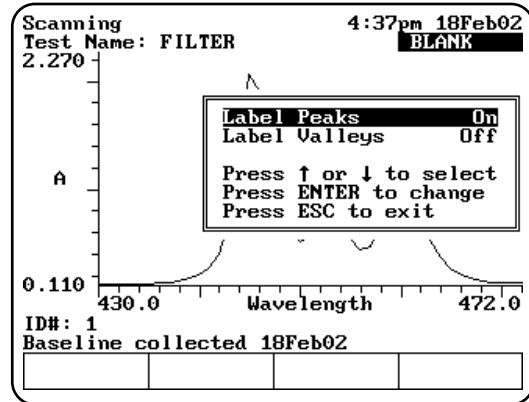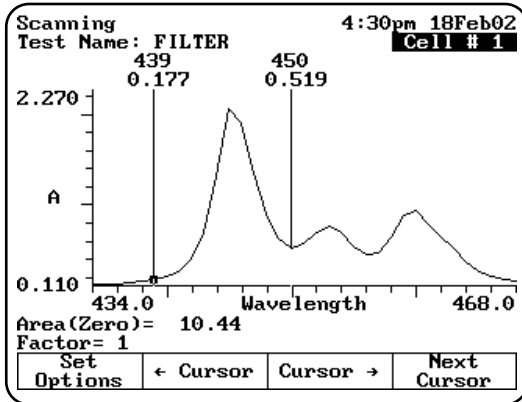

3. Use **Cursor →** and **Cursor ←** to position the left cursor line to the desired wavelength value. The instrument calculates the 3-point net absorbance for the selected wavelengths.

4. Continue selecting the other wavelengths by pressing **Next Cursor** to activate the center and right cursor lines. Select the wavelengths by positioning the cursor with the **Cursor ←** and **Cursor →** keys. Repeat until all three wavelengths have been selected.

5. Press **Enter Factor** to access the set factor box. Enter the desired factor and press **ENTER**. The instrument calculates the value for the 3-point net absorbance for the selected wavelengths, multiplied by the selected factor.

Calculating the area under a curve

1. With your scan data displayed on the edit graph screen, press **Math**. The **Math Calculation** screen appears.

2. Press **Area**. The **Area under the curve** measurement screen appears.

```
Scanning                    4:30pm 18Feb02
Test Name: FILTER              Cell # 1
          439       450
          0.177     0.519
2.270

  A

0.110
      434.0      Wavelength      468.0
Area(Zero)=  10.44
Factor= 1
   Set                            Next
 Options   ← Cursor  Cursor →    Cursor
```

3. Use **Cursor →** and **Cursor ←** to position the left cursor line to the desired wavelength value. The instrument calculates the area under the curve for the selected wavelengths.

4. Continue selecting the other wavelengths by pressing **Next Cursor** to activate the next cursor line. Select the wavelength by positioning the cursor with the **Cursor →** and **Cursor ←** keys.

5. Press **Set Options** to access the **set options** window.

6. Use the up and down arrows to highlight **Factor.** Enter the desired factor and press **ENTER**.

7. Use the up and down arrow to highlight **Calculation baseline.** Press **ENTER** to toggle between **Zero** and **Tangent**.

8. Press **ESC** to return to the area under a curve screen. The instrument calculates the area under a curve for the selected wavelengths, factor and calculation method.
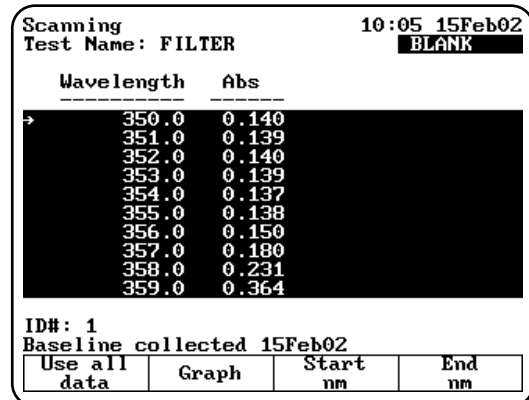
Labeling peaks and valleys

1. With your scan displayed on the edit graph screen, press **Math**. The **Math Calculation** screen appears..

```
Scanning                    4:37pm 18Feb02
Test Name: FILTER               BLANK
2.270
                    ∧
                ┌──────────────────────┐
                │ Label Peaks       On │
                │ Label Valleys    Off │
  A             │                      │
                │ Press ↑ or ↓ to select│
                │ Press ENTER to change │
                │ Press ESC to exit    │
                └──────────────────────┘
0.110
      430.0      Wavelength      472.0
ID#: 1
Baseline collected 18Feb02
```

2. Press **Peaks & Valleys**. The **Label Peaks and Valleys** window appears.

3. Use the arrow keys to select the type of labels you want displayed and press **ENTER.** The instrument labels the selected items on your scan data plot.

Viewing & rescaling tabular scan data

When you are working with tabular scan data, you need to press **Edit Data** before you can perform other functions on the scan data.

```
Scanning                    10:05 15Feb02
Test Name: FILTER               BLANK

   Wavelength     Abs
   ──────────    ──────
→      350.0     0.140
       351.0     0.139
       352.0     0.140
       353.0     0.139
       354.0     0.137
       355.0     0.138
       356.0     0.150
       357.0     0.180
       358.0     0.231
       359.0     0.364

ID#: 1
Baseline collected 15Feb02
 Use all              Start      End
  data     Graph       nm        nm
```

To use all the scan data

1. With your table of scan data displayed on the edit screen, press **Use all data**.

To select specific start and end wavelengths

1. With your table of scan data displayed on the edit screen, use the arrow keys on the keypad to move the highlight symbol (→) to the appropriate data point in the table.

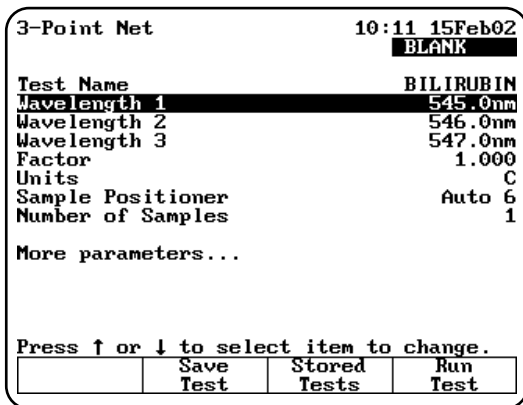**2.** Press **Start nm** or **End nm**. The instrument highlights the selected data points.

You can press **Graph** to display the plot using the highlighted data points.

3-Point Net

When you use the 3-Point Net program, you can perform these tasks:

- Recall a test *OR* set up your test parameters

- Run the Cell Correction program

- Measure a blank

- Measure unknowns

To get started, press the **TEST** key on the keypad. When the **Test Types** screen appears, highlight **3-Point Net** and press **ENTER**.

```
3-Point Net                    10:11 15Feb02
                                    BLANK

Test Name                       BILIRUBIN
Wavelength 1                      545.0nm
Wavelength 2                      546.0nm
Wavelength 3                      547.0nm
Factor                            1.000
Units                                 C
Sample Positioner                 Auto 6
Number of Samples                     1

More parameters...




Press ↑ or ↓ to select item to change.
           Save      Stored      Run
           Test      Tests       Test
```

Recalling a test

1. With the **3-Point Net** screen displayed, press **Stored Tests**. Use the arrow keys to select the location of the saved tests and press **ENTER**.

2. Use the arrow keys to highlight the name of the test you want to recall and press **ENTER**. The parameters for the selected test appear on the screen.

    From this screen, you can:

    - Set up test parameters

    - Run the Cell Correction program

    - Save a test

    - View the list of stored tests

    - Measure a blank

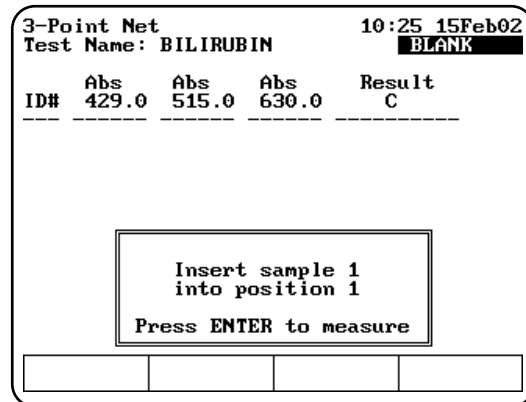   - Measure unknowns

Setting up test parameters

1. With the **3-Point Net** screen displayed, use the arrow keys to highlight the name of the parameter you want to set.

2. When the parameters are set, you can press **Save Test** to save the test or **Run Test** to measure a blank or unknowns.

Taking measurements
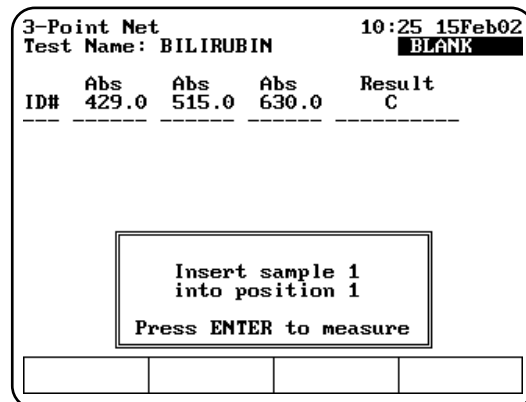
Taking measurements automatically (Auto 6 or Auto 3)

1. With the **3-Point Net Setup** screen displayed and the parameters set, press **Run Test**. The **3-Point Net** measurement screen appears.

```
3-Point Net                    10:25 15Feb02
Test Name: BILIRUBIN                BLANK

      Abs     Abs     Abs     Result
ID#   429.0   515.0   630.0      C
---  ------  ------  ------  ----------




            Insert sample 1
            into position 1

         Press ENTER to measure
```

2. Place the blank and the unknowns in the correct cell positions.

3. Press **ENTER** to start the measurements. The instrument automatically measures the blank first, then measures the unknowns and displays the sample measurements on the screen.

Taking measurements manually (using Manual 6 or Single Cell Platform)

1. With the **3-Point Net** screen displayed and the parameters set, press **Run Test**. The **3-Point Net** measurement screen appears.

```
3-Point Net                    10:25 15Feb02
Test Name: BILIRUBIN                BLANK

      Abs     Abs     Abs     Result
ID#   429.0   515.0   630.0      C
---  ------  ------  ------  ----------




            Insert sample 1
            into position 1

         Press ENTER to measure
```

2. Place the blank and unknowns in the cell holder. If your instrument is equipped with a 6-Position Cell Holder, be sure to place the blank in the B position. You can place up to five samples in the cell holder.

3. Press **Measure Blank** to measure the blank. If your instrument is equipped with a 6-Position Cell Holder, it automatically moves to the B position to measure the blank. When it completes the measurement, it returns to its previous cell position.

4. Press **Measure Sample** to measure the unknowns. The sample measurement appears on the screen. If your instrument is equipped with a 6-Position Cell Holder, press the cell position buttons on the keypad to reposition the cell holder and measure the rest of the unknowns manually.

Multiple Wavelengths

When you use the Multiple Wavelengths program, you can perform these tasks:

- Recall a test *OR* set up your test parameters
- Run the Cell Correction program
- Add or delete wavelengths and factors
- Measure a blank
- Measure unknowns

To get started, press the **TEST** key on the keypad. When the **Test Types** screen appears, highlight **Multiple Wavelengths** and press **ENTER**.

```
Multiwavelength              10:32 15Feb02
                                 Cell # 1

Test Name                          ──────
Measurement Mode              Absorbance
Sample Positioner                 Auto 6
Number of Samples                      1
Cell Correction                      Off
ID# (0=OFF)                            1
Auto Print                            On
Auto Save                            Off




Press ↑ or ↓ to select item to change.
┌─────────┬────────┬────────┬─────────┐
│ Set nms │ Save   │ Stored │         │
│         │ Test   │ Tests  │         │
└─────────┴────────┴────────┴─────────┘
```

Recalling a test

1. With the **Multiple Wavelengths** screen displayed, press **Stored Tests**. Use the arrow keys to select the location of the saved tests and press **ENTER**.

2. Use the arrow keys to highlight the name of the test you want to recall and press **ENTER**. The parameters for the selected test appear on the screen.

From this screen, you can:

- Set up test parameters
- Run the Cell Correction program
- Save a test
- View the list of stored tests
- Measure a blank
- Measure unknowns

Setting up test parameters

1. With the **Multiple Wavelengths** screen displayed, use the arrow keys to highlight the name of the parameter you want to set.

*Refer to the procedures below for specific instructions on adding or deleting wavelengths and factors.

2. If you have previously selected the wavelengths you wish to measure, you can press **Save Test** to save the test or **Run Test** to measure a blank or unknowns.

3. If you have not selected the wavelengths, you can add wavelengths and factors as shown below.

Adding wavelengths & factors

Note: *You can enter factors only when the measurement mode is set to Concentration/Factor.*

1. With the **Multiple Wavelengths** screen displayed, press **Set nms**. The wavelength screen appears, listing the wavelengths and factors specified for the measurements.

```
Multiwavelength            4:41pm 18Feb02
Test Name: ------              BLANK

WL#     nm
---   ------
  1   610.0
  2   620.0
  3   680.0
  4   ------




Page 1
Press ↑ or ↓ to view data
┌─────────┬─────────┬─────────┬─────────┐
│  Edit   │   Add   │         │   Run   │
│         │   nm    │         │  Test   │
└─────────┴─────────┴─────────┴─────────┘
```

2. Use the arrow keys to highlight the position where you want to enter the first wavelength and factor pair.

3. Press **Add nm**.

4. Enter the values for the wavelength and factor and press **ENTER**.

5. When the values are correct, press **Add nm**.

6. Continue until you have entered all the wavelengths and factors.

Deleting wavelengths & factors

1. With the **Multiple Wavelengths** screen displayed, use the arrow keys to highlight Set nms. The wavelength screen appears, listing the wavelengths and factors specified for the measurements.

Note: *If no wavelength values have been entered, the wavelength and factor columns will be empty.*

2. Use the arrow keys to highlight the first wavelength and factor pair you want to delete.

3. Press **Delete nm**.

Taking measurements

Taking measurements automatically (Auto 6 or Auto 3)

1. The **Multiple Wavelength** acquisition can be accessed from either the **Set nms** screen shown above or from the **Multiple Wavelength** set up screen. Press **Run Test**. The **Multiple Wavelength** measurement screen appears.

```
Multiwavelength            4:46pm 18Feb02
Test Name: ------              BLANK
ID#: 1

            Result
   nm        Abs
------   ----------


        ┌─────────────────────┐
        │                     │
        │   Insert sample 1   │
        │   into position 1   │
        │                     │
        │ Press ENTER to measure │
        └─────────────────────┘

┌─────────┬─────────┬─────────┬─────────┐
│         │         │         │         │
└─────────┴─────────┴─────────┴─────────┘
```

2. Place the blank and the unknowns in the correct cell positions.

3. Press **ENTER** to start the measurement. The instrument automatically measures the blank first, then measures the unknowns and displays the sample measurements on the screen.

Taking measurements manually (using Manual 6 or Single Cell Platform)

1. With the **Multiple Wavelength** screen displayed and the parameters set, press **Run Test**. The **Multiple Wavelengt**h measurement screen appears.

2. Place the blank and unknowns in the cell holder. If your instrument is equipped with a 6-Position Cell Holder, be sure to place the blank in the B position. You can place up to five samples in the cell holder.

3. Press **Measure Blank** to measure the blank. If your instrument is equipped with a 6-Position Cell Holder, it automatically moves to the B position to measure the blank. When it completes the measurement, it returns to its previous cell position.

4. With the list of wavelengths (and factors) displayed, press **Measure Samples** to measure the unknowns. The instrument measures the absorbance at each wavelength and displays it on the screen. If you have set the measurement mode to Concentration/Factor, the instrument also displays the calculated concentration at each wavelength.If your instrument is equipped with a 6-Position Cell

Holder, press the cell position buttons on the keypad to reposition the cell holder and measure the rest of the unknowns manually.

Using the Performance Validation Program

Overview

The Performance Validation program allows you to run tests to check the performance of your instrument. Available tests include:
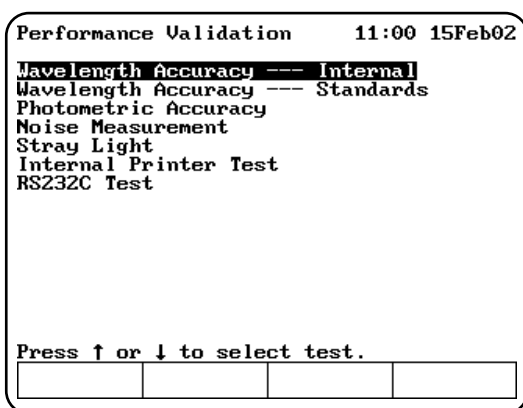
- Wavelength Accuracy - Internal
- Wavelength Accuracy - Standards
- Photometric Accuracy
- Noise Measurement
- Stray Light
- Internal Printer Test
- RS232C Test

Running the appropriate performance validation tests regularly and maintaining a log of your results helps document the reliability of the instrument and indicates potential performance issues.

Note: *If you have a printer installed and turned on, the instrument automatically prints out the test results for each performance validation test that you run. You can also press the **PRINT** key to print another copy of the results.*

Accessing the Performance Validation tests

1. Press the **TESTS** key on the keypad. The **Test Types** screen appears.

2. Highlight Performance Validation and press **ENTER**. The **Performance Validation** screen appears.

```
Performance Validation      11:00 15Feb02
Wavelength Accuracy --- Internal
Wavelength Accuracy --- Standards
Photometric Accuracy
Noise Measurement
Stray Light
Internal Printer Test
RS232C Test




Press ↑ or ↓ to select test.
```

Troubleshooting checklist

If a Performance Validation test fails, follow the instructions below to help you diagnose common problems that may cause a test to fail. If a test continues to fail after you have tried all the recommendations in the list, follow the troubleshooting list for the test being run (included with the description of each test).

- Make sure you are following the instructions for the test properly.
- Make sure filters and standards are clean.
- Make sure the sample compartment door is closed while the test is running.
- Make sure the sample compartment is clear of any obstructions.
- Make sure the 6-Position Cell Holder is installed properly; run the test once with the sample compartment door open to verify that the 6-Position Cell Holder is moving smoothly.
- Turn the instrument power OFF, then ON; verify that no problems are indicated by the power-on diagnostics.
- Make sure the lamp is ON.
- Make sure the lamp compartment is clear of any obstructions.

> ⚠ **WARNING**
>
> Do not open the lamp compartment unless the instrument power is OFF.
>
> Do not turn the instrument power ON unless the lamp compartment is closed!

Wavelength Accuracy - Internal

This test locates the peaks and displays the expected and measured wavelengths for the peaks at the following wavelengths:

- Measures wavelength accuracy for the xenon lamp at 229, 529 and 883nm.

When running the internal standard test, remember that:

- The wavelengths are preset and cannot be changed.

- The xenon lamp has a preset tolerance of ±2.0nm.

- The cell holder should be empty.

1. With the **Performance Validation** screen displayed, use the arrow keys to highlight **Wavelength Accuracy - Internal**.

2. Press **ENTER**. The **Wavelength Accuracy - Internal** screen appears.

3. Press **Start Test** to run the test. The results of the test appear on the screen, indicating pass or fail for each wavelength.

```
Performance Validation        8:54 1Feb02
Wavelength Accuracy --- Internal


Expected    Tolerance   Measured   Result
nm          ±nm         nm
247.5       ± 1         247.5      Pass
529.0       ± 1         529.1      Pass
824.2       ± 1         824.2      Pass




Make sure the Blank position is empty.
Press Start Test
                                    Start
                                    Test
```

If the test fails, follow these guidelines:

- Repeat the test several times to verify that the test is failing consistently.

- Contact technical support for more troubleshooting advice.

Wavelength Accuracy - Standards

This test measures the absorbance of a filter standard at up to five wavelengths and compares the results with specified tolerances. The wavelengths and tolerances are preset, but you should change them to the values on the certificate of calibration included with your standards.

Note: *Only the middle wavelength of the SPECTRONIC Standards wavelength standard is certified. The wavelength accuracy test passes or fails based on this wavelength alone. The other two wavelengths may be used for long-term repeatability testing. The initial target values may be determined by running the wavelength accuracy test once, and taking note of the values reported in the Measured Wavelength column.*

1. With the **Performance Validation** screen displayed, use the arrow keys to highlight **Wavelength Accuracy - Standards** and press **ENTER**. The **Wavelength Accuracy - Standards** screen appears.

```
Performance Validation       11:52 1Feb02
Wavelength Accuracy --- Standards


Expected    Tolerance   Measured   Result
nm          ±nm         nm




    Entry:
    Enter Wavelength (190.0 - 1100.0)
                        Add
                        nm
```

Adding wavelengths

1. If you need to add a wavelength, press **Add nm** and enter the wavelength value in the **Entry** field.

2. When the value is correct, press **Add nm** again to add the wavelength to the list. The screen changes to prompt you to enter the tolerance for the wavelength you just entered.

```
Performance Validation       13:22 1Feb02
Wavelength Accuracy --- Standards


Expected    Tolerance   Measured   Result
nm          ±nm         nm
399.0




    Entry:
    Enter Tolerance (1.0-20.0)
                        Add
                        Tolerance
```
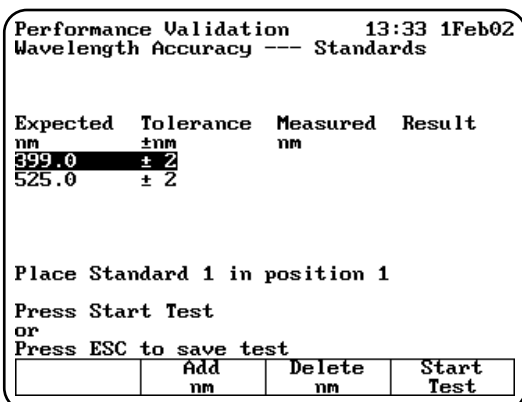
3. Enter the tolerance value in the **Entry** field.

4. When the value is correct, press **Add Tolerance** to add the tolerance.

Deleting wavelengths

1. If you want to delete a wavelength, use the arrow keys to highlight the appropriate wavelength.

```
┌──────────────────────────────────────┐
│ Performance Validation    13:33 1Feb02│
│ Wavelength Accuracy --- Standards     │
│                                        │
│                                        │
│ Expected  Tolerance  Measured  Result │
│ nm        ±nm        nm               │
│ 899.0     ± 2                         │
│ 525.0     ± 2                         │
│                                        │
│                                        │
│                                        │
│ Place Standard 1 in position 1        │
│                                        │
│ Press Start Test                      │
│ or                                     │
│ Press ESC to save test                │
│ ┌─────────┬─────────┬─────────┐       │
│ │   Add   │ Delete  │  Start  │       │
│ │   nm    │   nm    │  Test   │       │
│ └─────────┴─────────┴─────────┘       │
└──────────────────────────────────────┘
```

2. When the appropriate wavelength is highlighted, press **Delete nm** to confirm that you want to delete the wavelength.

Running the test

1. With the **Wavelength Accuracy - Standards** screen displayed, make sure that the wavelengths and tolerances are set correctly.

2. Press **Start Test** to run the test. The results of the test appear on the screen, indicating pass or fail for each wavelength.

If the test fails, follow these guidelines:

• Repeat the test several times to verify that the test is failing consistently.

• Make sure the target value you entered for the calibrated wavelength is the same as the value printed on the SPECTRONIC Standards certificate.

• Make sure the tolerance value you entered for the calibrated wavelength is the same as the value given in the SPECTRONIC Standards User's Manual.

Photometric Accuracy

This test measures the absorbance (or %transmittance) of a set of standards and compares the results with specified tolerances. The absorbances and tolerances are preset, but you should change them to the values on the report of calibration included with your standards.

Note: *You can display the tolerances for this test in either absorbance or %transmittance.*

1. With the **Performance Validation** screen displayed, use the arrow keys to highlight **Photometric Accuracy**.

2. Press **ENTER**. The **Photometric Accuracy** screen appears.

```
┌──────────────────────────────────────┐
│ Performance Validation    13:59 1Feb02│
│ Photometric Accuracy                  │
│                                        │
│                                        │
│ # nm      Expected   Tol.   Meas.     │
│           Abs        ±Abs   Abs  Result│
│ 1 590.0 0.301        ±0.010           │
│ 2 590.0 1.000        ±0.052           │
│                                        │
│                                        │
│                                        │
│ Place Standards 1 - 2 in positions 1 - 2│
│                                        │
│ Press Start Test                      │
│ or                                     │
│ Press ESC to save test                │
│ ┌────────┬──────┬───────┬───────┐     │
│ │ Change │ Add  │Delete │ Start │     │
│ │ to %T  │ Std  │ Std   │ Test  │     │
│ └────────┴──────┴───────┴───────┘     │
└──────────────────────────────────────┘
```
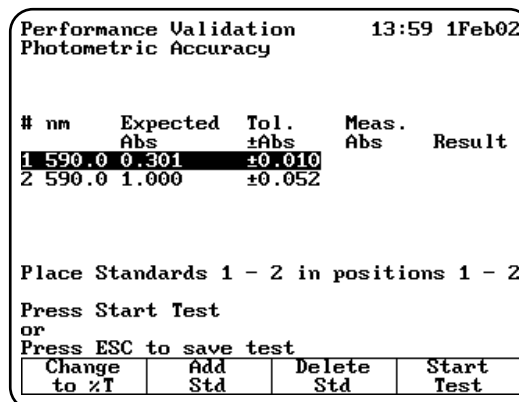
Selecting the mode

1. To switch between absorbance and %transmittance, press **Change to %T** (or **Change to ABS**) until the appropriate mode appears.

Adding standards

You will need to set three values whenever you add a standard - the wavelength, the absorbance (or %transmittance) and the tolerance value.

1. If you need to add a standard, press **Add Std** and enter the wavelength value in the **Entry** field.

2. When the wavelength value is correct, press **Add Std** again to add the wavelength to the list. The screen changes to prompt you to enter the absorbance (or %transmittance) for the wavelength you just entered.

3. Enter enter the tolerance value in the **Entry** field.

4. Press **Start Test** or Press **ESC** to save test.

```
Performance Validation      14:07 1Feb02
Photometric Accuracy


# nm      Expected   Tol.    Meas.
          %T         ±%T     %T      Result
1 590.0   50.0       ± 1.2
2 590.0   10.0       ± 1.2
3 ▓▓▓▓▓


Place Standards 1 - 2 in positions 1 - 2
┌─────────────────────────────────────┐
│ Entry:                               │
│ Enter Wavelength (190.0 - 1100.0)    │
└─────────────────────────────────────┘
┌──────────┬──────────┬────────┬────────┐
│          │ Add      │        │        │
│          │ nm       │        │        │
```

Deleting standards

1. If you need to delete a standard, use the arrow keys to highlight the appropriate standard.

```
Performance Validation      14:17 1Feb02
Photometric Accuracy


# nm      Expected   Tol.    Meas.
          %T         ±%T     %T      Result
1 590.0   50.0       ± 1.2
2 590.0   10.0       ± 1.2
3 590.0   47.7       ± 1.2


Place Standards 1 - 3 in positions 1 - 3

Press Start Test
or
Press ESC to save test
┌──────────┬──────────┬────────┬────────┐
│ Change   │ Add      │ Delete │ Start  │
│ to Abs   │ Std      │ Std    │ Test   │
```

2. When the appropriate standard is highlighted, press **Delete Std** to confirm that you want to delete the standard.

Running the test

1. With the **Photometric Accuracy** screen displayed, make sure that the wavelengths, absorbance (or %transmittance) values and tolerances are set correctly.

2. Press **Start Test** to run the test. The results of the test appear on the screen, indicating pass or fail for each wavelength.

```
Performance Validation      11:44 15Feb02
Photometric Accuracy


# nm      Expected   Tol.    Meas.
          %T         ±%T     %T      Result
1 590.0   10.1       ± 1.2   10.1    Pass
2 590.0   9.4        ± 1.2    9.4    Pass


Place Standards 1 - 2 in positions 1 - 2

Press Start Test
or
Press ESC to save test
┌──────────┬──────────┬────────┬────────┐
│ Change   │ Add      │ Delete │ Start  │
│ to Abs   │ Std      │ Std    │ Test   │
```

If the test fails, follow these guidelines:

- Repeat the test several times to verify that the test is failing consistently.

- Make sure you follow the guidelines provided with the standard reference materials.

- Contact technical support for more troubleshooting advice.

Noise Measurement

This test measures the amount of noise (peak-to-peak) at specified wavelengths:

- Measures noise at 230 and 340nm

All parameters are preset and cannot be changed. When running the noise test, remember that:

- The wavelengths are preset and cannot be changed.

- The Blank position should be empty.

- Position #1 should be used for the 2A filter in a 6-cell holder only (if measured).

1. With the **Performance Validation** screen displayed, use the arrow keys to highlight **Noise Measurement**.

2. Press **ENTER**. The **Noise Measurement** screen appears.

```
Performance Validation      11:54 15Feb02
Noise Measurement


@0A      Peak-to-Peak  Meas.   Result
         Tolerance     Abs
230.0nm  ≤0.002        0.000   Pass
340.0nm  ≤0.001        0.000   Pass

@2A      Peak-to-Peak  Meas.   Result
         Tolerance     Abs
230.0nm  ≤0.003        0.000   Pass
340.0nm  ≤0.002        0.000   Pass


Make sure the Blank position is empty.
Place 2A filter in Cell Position 1
Press Start Test
                              Start
                              Test
```
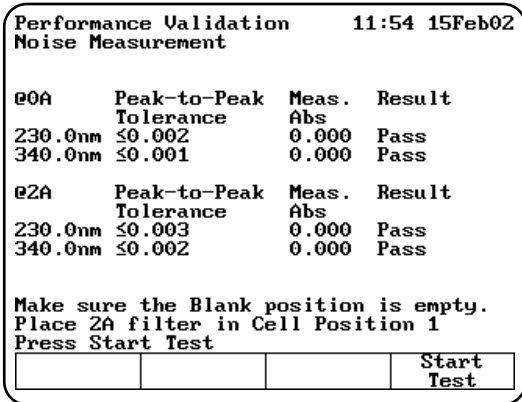
3. Make sure that the Blank position is empty and insert the 2A filter in position #1 if you are measuring at 2A.

4. Press **Start Test** to run the test. The results of the test appear on the screen, indicating pass or fail for each wavelength.

If the test fails, follow these guidelines:

- Repeat the test several times to verify that the test is failing consistently.

- Make sure the instrument is warmed up for at least 30 minutes, standby mode = OFF.

- Make sure the instrument is plugged into a stable power supply.

- Contact technical support for more troubleshooting advice.

Stray Light

This test measures the amount of stray light at selected wavelengths and compares them to specified tolerances. The wavelengths are preset and cannot be changed. You should change the tolerances for the desired wavelengths. Running the stray light test takes approximately thirty seconds.

When running the stray light test, remember that:

- You will need the SPECTRONIC Standards Stray Radiant Energy filters or equivalent.

- Position B should be empty.

- Position #1 should be used for SRE 220.

- Position #2 should be used for SRE 340.

- Position #3 should be used for SRE 400.

You may use other filters, but they must have ≤0.1%T at the wavelength of interest.

1. With the **Performance Validation** screen displayed, use the arrow keys to highlight **Stray Light**.

2. Press **ENTER**. The **Stray Light** screen appears.

```
Performance Validation      2:01pm 3Jan02
Stray Light


Wavelength  Expected   Measured
220.0nm     ≤ 0.1%T    0.1%T    Pass
340.0nm     ≤ 0.1%T    0.1%T    Pass
400.0nm     ≤ 0.1%T    0.1%T    Pass




Place SRE filters in position 1 - 3.
Press Start Test
                              Start
                              Test
```
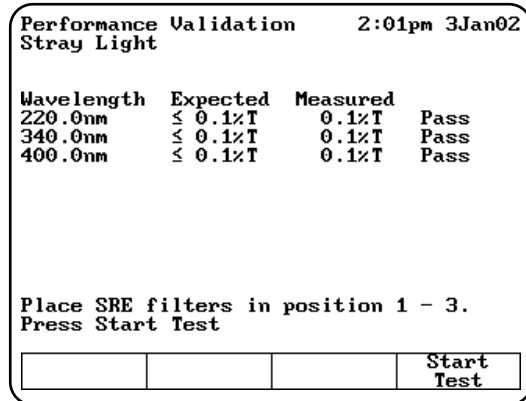
Running the test

1. With the **Stray Light** screen displayed, make sure that the wavelengths and tolerances are set correctly.

2. Press **Start Test** to run the test. The results of the test appear on the screen, indicating pass or fail for each wavelength.

If the test fails, follow these guidelines:

- Repeat the test several times to verify that the test is failing consistently.

- Make sure all the filters being used are SPECTRONIC Standards Stray light filters, or exact equivalents.

- Contact technical support for more troubleshooting advice.

Internal Printer Test

The Internal Printer test allows you to verify that the internal printer is functional. To run the test, you will need to have the internal printer installed. Running the internal printer test takes no more than 20 seconds after you press **Stop**.

1. Verify that the internal printer is installed properly and is selected. If necessary, press the **UTILITY** key, then select the internal printer.

2. With the **Performance Validation** screen displayed, use the arrow keys to highlight **Internal Printer Test**.

3. Press **ENTER**. The **Internal Printer Test** screen appears.

```
╭─────────────────────────────────────╮
│ Performance Validation   11:58 15Feb02│
│ Internal Printer Test                 │
│                                       │
│                                       │
│                                       │
│                                       │
│ Press Start Test to start printer test.│
│                                       │
│                                       │
│                                       │
│                                       │
│                              ┌───────┐│
│                              │ Start ││
│                              │ Test  ││
╰──────────────────────────────┴───────┴╯
```
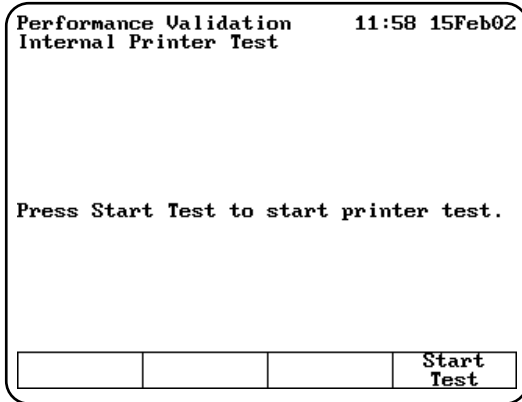
4. Press **Start Test** to run the test. The test print routine appears on the printer.

While the test is running, you can press **Stop Test** to stop it.

If the test fails, follow these guidelines:

• Make sure that the internal printer is the selected printer device on the **Utilities** screen.

• Make sure that the internal printer is installed correctly. (Return to the main screen and press **ENTER**. If the paper does not move, the printer may not be installed correctly.)

• Make sure that the thermal paper is threaded with the thermal side toward the printer head (the outside surface of the roll is the thermal surface).

• Contact technical support for more troubleshooting advice.

RS232C Test

The RS232C test allows you to verify that the RS232C port is functional. To run the test, you will need to have the RS232 Test Plug (336035) attached to the RS232C port on the back panel of the instrument. Running the RS232C test takes approximately five minutes.

1. Verify that the RS232 Test Plug is securely attached to the RS232C port on the back panel of the instrument.

2. With the **Performance Validation** screen displayed, use the arrow keys to highlight **RS232C Test**.

3. Press **ENTER**. The **RS232C Test** screen appears.

```
╭─────────────────────────────────────╮
│ Performance Validation   12:04 15Feb02│
│ RS232C Test                           │
│                                       │
│                                       │
│                                       │
│      Install serial port wrap plug.   │
│            Press Start Test           │
│                                       │
│                                       │
│                                       │
│                              ┌───────┐│
│                              │ Start ││
│                              │ Test  ││
╰──────────────────────────────┴───────┴╯
```
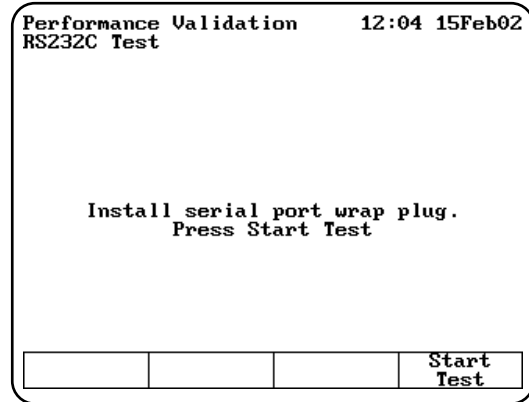
4. Press **Start Test** to run the test. When the test is complete, the message "RS232 OK" or RS232 Failed" appears on the screen.

While the test is running, you can press **Stop Test** to stop it.

If the test fails, follow these guidelines:

• Make sure that the test plug is installed correctly and is not loose or damaged.

• Contact technical support for more troubleshooting advice.

Connecting & Using Accessories

General information

The spectrophotometer supports a variety of sample-handling accessories. This section describes how to connect and use the following types of accessories:

- Cell holders and cell holder accessories
- Internal printer
- External computer

Cell holders & cell holder accessories

The following table lists the cell holders and cell holder accessories available for the spectrophotometer.

Changing cell holders

If you want to use longpath cells (cylindrical or rectangular), use test tubes, measure solid filters or regulate cell temperature via an external water circulator, you must install the appropriate cell holders. You can easily remove the 6-Position Cell

Catalog #	Description
335916	**Single Cell Holder Platform** -with single cuvette holder installed.
336014	**Test Tube Holder** - Accommodates test tubes up to 25mm in diameter and up to 102mm tall, C.O.D. reagent vials and Hach vials (24mm diameter and 60mm tall); fits on 335927 6-Position Cell Holder (holds three) or 335916 Single Cell Holder Platform (holds one).
335917	**Adjustable Filter Holder** - Accommodates glass or plastic filters up to 50mm long x 80mm tall x 10mm thick; minimum thickness of 1mm; fits on 335927 6-Position Cell Holder (holds three) or 335916 Single Cell Holder Platform (holds one).
335428	**Filter Holder** - Accommodates filters/lenses up to 50mm long x 80mm tall x 1-8mm thick; fits on 335927 6-Position Cell Holder (holds three) or 335916 Single Cell Holder Platform (holds one).
335079	**Thermal Block** - Controls the temperature of one 10mm pathlength square cuvette within the range of 20 to 100ºC; fits on 335927 6-Position Cell Holder (holds three) or 335916 Single Cell Holder Platform (holds one); requires external water bath and 335920 Accessory Door for routing circulating water.
336028	**Single Cell Holder** - Accommodates 10mm test tubes, 10mm square cuvettes, short pathlength cuvettes with spacers, and 10mm ultra-microcell; fits on 335927 6-Position Cell Holder or 335916 Single Cell Holder Platform.
335911	**Cylindrical Longpath Cell Holder** - Accommodates a cylindrical cell with 10-50mm pathlength, 22-25mm diameter; fits on 335927 6-Position Cell Holder (holds three) or 335916 Single Cell Holder Platform (holds one).
335912	**Rectangular Longpath Cell Holder** - Accommodates a rectangular cell with 10-50mm pathlength, 12.5mm wide; fits on 335927 6-Position Cell Holder (holds three) or 335916 Single Cell Holder Platform (holds one).
336012	**Cylindrical Longpath Cell Holder** - Accommodates one cylindrical cell with 10-100mm pathlength, 22-25mm diameter; requires 335916 Single Cell Holder Platform.
335112	**Rectangular Longpath Cell Holder** - Accommodates one rectangular cell with 10-100mm pathlength, 12.5mm wide; requires 335916 Single Cell Holder Platform.
335988	**Internal Printer Assembly** - Includes 1 roll of paper.
335975*	**Sipper System** - For measurements in the 325-1100 wavelength range; includes 335982 Peristaltic pump, 335171 Optical glass flowcell, 335916 Single cell platform, 335920 Accessory door kit and pump tubing, 110 VAC.
335976*	**Sipper System -** Same as 335975 except for measurements in the 190-1100 wavelength range, 110 VAC.

Catalog #	Description
335982*	**Peristaltic Pump** - Includes set of Norprene pump tubing; used with 335171 Optical Glass flowcell or 335172 Quartz flowcell and 335920 Accessory Door Kit. 115V, 50/60Hz.
335982-02	**Same as 335982 except with Europlug 230 VAC**
335982-04	**Same as 335982 except with UK plug 230 VAC**
335920	**Accessory Door Kit** - Includes spout and four ports for circulating water around water-jacketed cells, or for waste outlet for flowcell systems.
335977	**Funnel Flowcell** - 10mm pathlength, optical glass, for measurements between 335-1100nm; fits on 335916 Single Cell Holder Platform (holds one).
335927	**6-Position Cell Holder** - platform with six (6) 336028 single cell holders installed.
333150	**SPECTRONIC Standards**
336029	**Spacers** - 5mm, set of 2, for use with 5mm short pathlength cuvettes in any square cell holder.
336030	**Spacers** - 8mm, set of 2, for use with 2mm or 1mm short pathlength cuvettes in any square cell holder.
335942	**Serial interface cable** to connect the spectrophotometer to an IBM-compatible PC.
331751	**Ultra-microcell** - 10 µl fill volume, 1mm pathlength, 40mm tall, quartz.
331752	**Ultra-microcell** - 70 µl fill volume, 10mm pathlength, 50mm tall, quartz. Requires 335916 Single Cell Holder Platform (holds one) for optimal performance

Note: *If you want to use 100mm longpath cells, you must install the Single-Position Cell Platform.*

*To order an accessory with a Europlug, add -02 to the catalog number. To order an accessory with a UK plug, add -04 to the catalog number.

Holder installed in the instrument and install other accessory cell holders.

*Whenever you change from one type of cell holder to another, you must measure a blank. This ensures that the instrument can detect which type of cell holder is installed.

Internal printer

Installing the internal printer

```
          ⚠
              WARNING

Turn off the instrument and disconnect the
power cord from the outlet before installing the
internal printer.
```

1. Loosen the captive screw (#1, Figure 6) on the lamp door by rotating it counterclockwise about ¼ turn.

2. Open the lamp door.

3. Use a pen or screwdriver to lift the tabs holding the door to the hinge (#2 & #3, Figure 6).

4. Slide the door off the hinge.

5. Remove the printer (already installed on the printer door) from its packing.

6. Unclip the connector wires on the door hinge.

7. Lower the hinge so it is out of the way.

8. Connect the wires (#4, Figure 6) and press into place with a small screwdriver. There is only one way that the connectors will fit. Each connector has a slight D shape. Make sure the side of the connector with the shiny metal contacts (see Figure 6) and faces away from the printer and towards the plastic door.

9. Use the clip on the hinge to secure the wires.

10. Install the printer door by sliding it back onto the hinge (#3, Figure 6).

11. Close the lamp door.

12. Tighten the captive screw (#1, Figure 6) on the printer door to hold it securely in place.

13. Load the paper into the printer (*see instructions in Setting up the instrument*).

Loading the paper in the internal printer

For instructions on loading the paper in the internal printer, see *Setting up the instrument*.

External Printers

The GENESYS 6 is able to print to external desktop printers supporting HP PCL format such as the HP DeskJet 600, 800 and 900 series printers.

Note: *PCL format does not support HP "Windows" printers*

To print to an HP PCL format printer, connect the 347070-189 parallel interface cable to the parallel printer port on the back of the instrument (#3, Figure 2).

External computers

To connect an external computer, make sure that the pin-outs on the connectors are set according to the illustration below.

To connect an external computer, connect the computer cable to the 9-pin RS232C port on the back of the instrument (#2, Figure 2). Be sure to use a DB9 pin (female) to DB9 pin (female) interface cable (335942).

Contact technical support for more information about using an external computer with the spectrophotometer.

```
Protocol to use with external device:
     Baud rate       19,200
     Data bits:      8
     Parity:         Off
     Stop Bit:       1
```

GENESYS 10				**EXTERNAL DEVICE**	

			DTE Pin		
Function	DCE Pin		9-Pin	25-Pin	Function
	1		1	8	Data Carrier Detect
Transmit Data	2	→	2	3	Receive Data
Receive Data	3	←	3	2	Transmit Data
	4		4	20	Data Terminal Ready
GROUND	5	←	5	7	Signal Ground
	6		6	6	Data Set Ready
Clear To Send	7	←	7	4	Request To Send
Request To Send	8	→	8	5	Clear To Send
	9		9	22	Ring Indicator
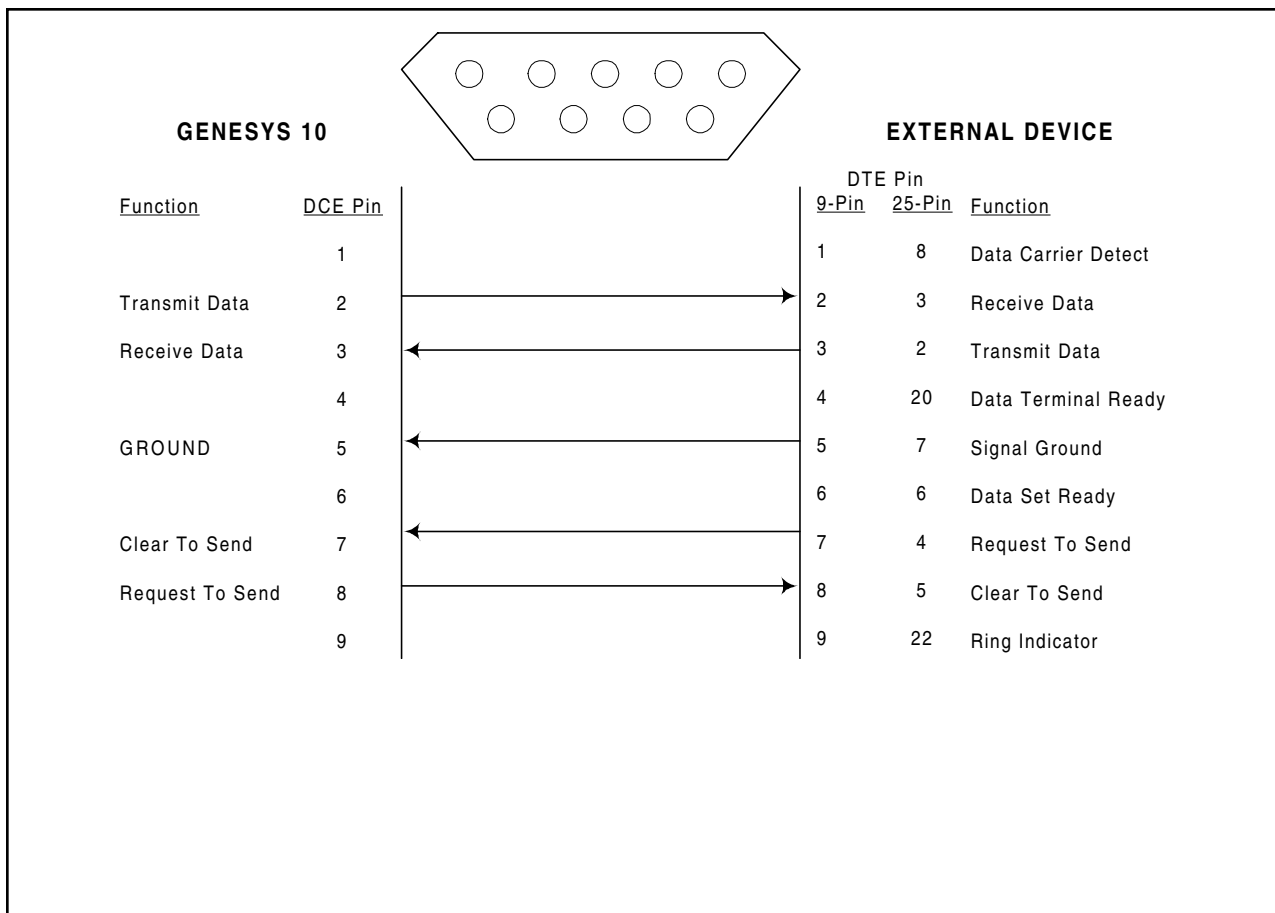
Performing Maintenance Procedures

The spectrophotometer is durable and reliable, so routine maintenance is minimal. This section includes complete instructions for:

- Routine care, cleaning and maintenance of the instrument and cells
- Changing the fuse and voltage setting

This section also includes a list of replacement parts and accessories.

```
┌─────────────────────────────────────────┐
│          ⚠                              │
│               WARNING                   │
│                                         │
│  Operating the instrument with the      │
│  cover off exposes the operator to      │
│  potentially dangerous voltages and     │
│  ultraviolet (UV) radiation.            │
│  Therefore, the distributor recommends  │
│  that only authorized service           │
│  representatives perform procedures     │
│  requiring removal of the instrument    │
│  cover and replacement of electrical    │
│  components. To protect both yourself   │
│  and the instrument, be sure to         │
│  contact an authorized service          │
│  representative to perform any service  │
│  procedure you do not feel comfortable  │
│  performing.                            │
└─────────────────────────────────────────┘
```

Routine care

Routine care for the spectrophotometer does not require a lot of time. To help minimize maintenance time and to increase the life and performance of your instrument, please follow these guidelines:

- To prevent dust from accumulating on and in the instrument, always replace the dust cover when the instrument is not turned on. The dust cover, supplied with the instrument, is resistant to most aqueous solutions.

- Do not use or store the instrument in a corrosive environment.

- Gently wipe the outside of the instrument with a soft cloth to remove any dust or spills. Water, isopropyl alcohol and other common laboratory cleaning agents may be used if necessary.

- Always clean up spills to prevent or minimize damage to the instrument. If concentrated acids or bases, or any hydrocarbon materials, are spilled on the instrument, be sure to clean up the affected area *immediately*.

- Use water, alcohol or other common laboratory cleaning agents to clean the keyboard. It is recommended that you clean spills off the keyboard as soon as they occur.

Cleaning

Cleaning and maintenance of cells

Cleaning of cells both inside and out is important not only because any contaminating material may absorb light, but also because material within the cell may react chemically with subsequent reagents or standards introduced into the cell. Cleaning methods depend to some extent on the nature of the contaminating material. Sodium (or ammonium) hydroxide and dilute hydrochloric acid may be used to remove some acidic and basic contaminants, respectively. Clorox (undiluted or 1:1) is very effective in removing proteinaceous and bacterial contaminants. You may also use Cell Cleaning Solution (332260-169) to clean your cells.

```
┌─────────────────────────────────────────┐
│          ⚠                              │
│               WARNING                   │
│  Handle and dispose of chromic acid     │
│  with care!                             │
└─────────────────────────────────────────┘
```

Finally, soaking in chromic acid will remove most contaminants, but the acid should be handled, and disposed of, with care. Because of the exothermic reaction of the acid and water, any heat generated should be quickly dissipated to avoid altering the pathlength of the cell. Cells should not be placed in hot chromic acid.

Note: *To prepare chromic acid cleaning solution, slowly add (with stirring) 800mL of concentrated sulfuric acid to 458mL of distilled water containing 92 g of sodium dichromate ($Na_2Cr_2O_7 \cdot 2H_2O$). This cleaning solution should be red-brown. Discard, using proper disposal methods, when green tinge appears.*

Cells with scratches in the optical path should be discarded because scratches will cause anomalous absorbance readings. Cells should be protected during cleaning and never thrown into a bath with glassware where they might get scratched, or placed in a wire rack that might scratch them. The outside of the cells may be wiped with a soft, lint-free tissue, and should be kept free of fingerprints.

Micro flowcells can be kept clean by:

- Flushing well with a solvent after use

- Aspirating dilute acid, base, non-filming detergent or Clorox through the cell in short bursts

- Storing with distilled water in the cell

Cleaning the windows of the sample compartment

Follow these guidelines to clean the windows of the sample compartment:

- **Do not use acetone** to clean the windows of the sample compartment. Instead, use a non-abrasive laboratory cleaning solution (Cell Cleaning Solution, 332260-169), distilled water or alcohol.

- Use the liquid and a soft, lint-free cloth to clean the windows. Do not apply too much pressure or the surface of the windows may be damaged. Be sure to remove all fingerprints.

Changing the fuse

The fuse is located in the power entry module located at the center of the back panel of the instrument (Figure 2).

- 120VAC, 2.5A, Slo-Blo

- 240VAC, 1.25A, Slo-Blo (2 required)

See *Replacement parts* on page 5-3 for a list of replacement part numbers.

⚠ **WARNING**

The instrument fuse must be replaced with the same type and rating fuse.

⚠ **WARNING**

If the fuse fails repeatedly, it may indicate a serious problem with the instrument. Contact your service representative as soon as possible.

---

1. Turn off and unplug the instrument.

2. Position the instrument so you can access the power entry module on the back of the instrument.

3. Remove the power cord.

4. Insert a flat-blade screwdriver into the notch (Figure 8) on the fuse cover and pry off the cover.

5. Use a flat-blade screwdriver to remove the fuse holder (Figure 9).

6. Unsnap both fuses (Figure 10) to remove them.

7. Insert the new fuses, pushing them in so they snap into place.

8. Replace the fuse cover.

9. Replace the power cord.

10. Plug the instrument back in the appropriate outlet and turn on the power.

Note: *If the fuse blows again, contact your distributor or service at the number(s) listed on the back cover.*

Replacement parts

Catalog #	Description
335916	**Single Cell Platform** - with single cuvette holder installed.
336028	**Single Cell Holder** - Accommodates 10mm test tubes, 10mm square cuvettes, short pathlength cuvettes with spacers, and 10mm ultra-microcell; fits on 335927 6-Position Cell Holder or 335916 Single Cell Holder Platform.
335927	**6-Position Cell Holder** - with six (6) 336028 single cell holders installed.
335988	**Internal Printer Assembly**.
333152	**Sensitized Paper** - (100 sheets) for SPECTRONIC Standards.
335965	**Replacement Dust Cover.**
335954	**Printer Paper** - Package of 5 rolls.
335908-10001	**GENESYS 6 Operator's Manual.**
335901-10020	**Service Manual,** includes printed service manual and CD ROM.
335901-10040	**GENESYS 10 and GENESYS 6 Service Manual,** includes CD ROM only.
335971	**Replacement silicon tubing** for 335982 Peristaltic pump, 5mm OD, 1.5mm ID, 25 foot roll.

Appendix A - Specifications

Specifications

Table 1 Specifications for GENESYS 6 UV-Visible spectrophotometer

FEATURE	SPECIFICATIONS
Optical design	Split-beam, grating-based, dual detectors
Spectral bandwidth	1.8nm
Lamp source	Xenon; 5 years typical
Wavelength:	
Range	190 - 1100nm
Accuracy	± 1.0nm
Repeatability	± 0.5nm
Photometric:	
Range	0.3 - 125%T; -0.1 - 3.0 A; ± 9999C
Readout	Absorbance, Transmittance, Concentration
Accuracy[1]	0.5% or 0.005A, whichever is greater, up to 2A
Noise	≤ 1mA at 0A; ≤ 2mA at 2A, peak-to-peak at 340nm
Drift	≤ 1mA/hour
Stray light[2]	≤ 0.1%T at 220, 340 and 400nm
Scanning Speed	10 -- 2,000nm/min
Slew rate	11,000nm/min
Scanning Sampling Interval	0.1, 0.2, 0.5, 1.0, 2.0, 5.0nm
Sample Holder	Automatic 6-cell positioner
Display	320 x 240 pixel LCD, 96.5 (3.8") x 71 (2.8") mm
Keypad	Membrane
Disc Drive	3.5" floppy; 1.44 Mb
Test Storage	Up to 80 tests in non-volatile memory; floppy disk
Data Storage	Floppy disk
Internal Printer (optional)	40-column graphical
Output	Bi-directional RS232C; parallel output in HP PCL format
Languages (user selectable)	Software and Printout: English, French, German, Spanish, Italian Operator's Manual: English, French, German, Spanish, Italian
Power Requirements	Selected automatically; 100 - 240 Volts
Dimensions	330W x 410D x 235H mm (13" x 16" x 9")
Weight	9.1 Kg (20.1 lb)
Warranty	1 year

[1] Measured using NIST 930D filters
[2] 220nm, 340nm and 400nm measurements with SPECTRONIC Standards (#333150)

Table 2 ***Environmental and electrical***
requirements (meets the IEC 1010-1
international safety standard)

Line voltages
100 - 240 VAC ±10%
50 - 60 Hz
80 VA max
Operating environment
Ambient temperature - 5° to 40° C (23° F to 104° F)
Relative humidity - 20% - 80% RH
Storage environment
-20° C to 70° C (24.8° F to 158° F) Relative humidity not to exceed 0.040 pounds moisture per pound of dry air. Allow instrument to adjust to room temperature for 24 hours after taking it out of storage.
Temperature should be maintained at ±4° F. Relative humidity should be maintained to ±5%.
Altitude
From below sea level to 2000 meters (6562 feet)
For indoor use only
Installation Category II
Pollution Degree 2

Parameter	Description
# of Wavelengths	Number of wavelengths set for multiple wavelength analysis
# of wavelengths for wavelength accuracy	Used to determine wavelength accuracy of unit
# Phot Accy Standards	Used to determine photometric accuracy of unit
%Transmittance	Sets transmittance value
Absorbance	Sets absorbance value
AutoPrint	Turns automatic printout on or off
Baseline Expiration	Sets time when baseline will expire
Cell Correction	Program that automatically corrects for variances in absorption between the cuvettes used to hold and measure samples
Cell Pos #	Position placed in light path; set by selection of sample positioner
Concentration	Sets concentration value
Correction Mode	Mode for cell correction collection
Curve Fit	Type of Line fit calculation
Delay Time	Time from Test Initiation to first measurement; allows for sample equilibration
Factor	Abs x Factor 1 = Concentration Abs/min x Factor 2 = Result
Factor 1	Abs(WL1) x Factor = Result
Factor 2	Abs(WL2) x Factor = Result
Factor 3-31	Abs(WL3-31) x Factor = Result
ID#	Numeric Identifier - autoincrements during test until reset or test is exited
Intercept	Where line crosses the y-axis (abs where conc=0)
Interval Time	Time between repeated readings
Languages	Language of any text on screen
Lock/Unlock	Used to protect stored tests from accidental deletion or alteration
Low/High Limits	Lowest & highest acceptable results, outside of which the result is flagged as 'Low' or 'High'
Measurement Mode	The type of photometric data reported for a measurement
Number of Matched Cuvettes	Number of cuvettes that will be run in the Correction Program (maximum of 5)
Number of Samples	Number of samples to be measured in the whole test
Number of Standards	Number of standards to be measured for standard curve
Phot Accy Tolerance	±Photometric accuracy acceptable
Pk-Pk Noise Tolerance	±Noise acceptable
Printer	Selects output mode

Parameter	Description
Ref Wavelength	Internal Reference wavelength; for each reported measurement, measures analytical wavelength & reference wavelength. Reported measurement = Abs@Analytical WL - Abs@Reference WL
Ref Wavelength Correction	Turns internal zeroing on or off
Sample Positioner	Type of Positioner - Empty = no auto turret Manual = turret moved by buttons Auto 3 = turret auto moved - B, 2, 4 Auto 6 = turret auto moved - B,1,2,3,4,5
Save Parameters	
Scan Speed	nm/min for a scan
Setup Correction	Initiates the procedure to collect the data necessary to correct for cuvette variances
Slope	$\Delta Abs/\Delta Concentration$
SRE Tolerance	±Stray radiant energy acceptable
Standby	Time since last keystroke or instrument activity; powers down unit to minimum energy required.
Start Wavelength	Beginning wavelength for a scan
Statistics	Turns stats on or off; if ON, calculates average and Std Dev of results; Statistics registers are cleared when Statistics = OFF &/or when instrument is OFF, &/or when test parameters are changed, &/or when test is saved (or resaved)
Std Concentration	Concentration of analyte in standard solution
Stop Wavelength	Ending wavelength for a scan
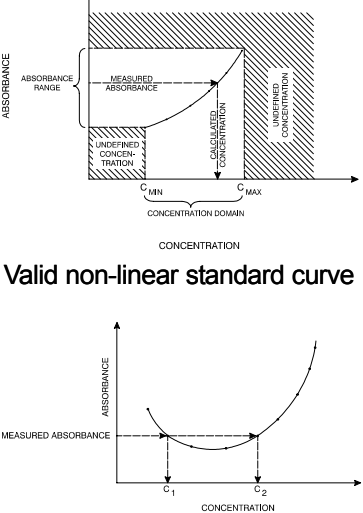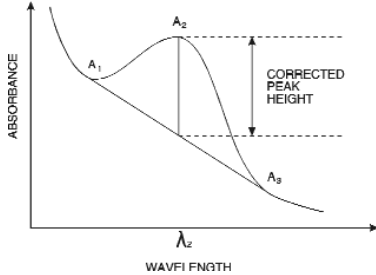
Calculations

Table 3 Calculations for Software

Calculation	Calculation(s)	Graphs
Standard Curves		
Partial sums	$SX = \Sigma x_i$ $SY = \Sigma y_i$ $SXX = \Sigma x_i^2$ $SYY = \Sigma y_i^2$ $SXY = \Sigma x_i y_i$ $SQX = \Sigma(x_i - \overline{x})^2 = N*SXX - SX^2$ $SQY = \Sigma(y_i - \overline{y})^2 = N*SYY - SY^2$ $SSXY = \Sigma(x_i - \overline{x})(y_i - \overline{y}) = N*SXY - SX*SY$ *where:* x_i = *concentration of ith standard* y_i = *absorbance of ith standard* N = *number of standards*	
Linear regression (general case)	$A = A(c)$ *where:* A = *absorbance* c = *concentration* *A(c) is defined by an equation of the form* $A(c) = a_4 c^4 + a_3 c^3 + a_2 c^2 + a_1 c + a_0$ *where:* a_0 = *Y-axis intercept* $a_1 \ldots a_4$ = *coefficients* The coefficients are computed using the least squares method.	
Linear regression through zero	$A = a_1 * (c)$ *where:* A = *absorbance* c = *concentration* a_1 = *slope* The slope is calculated as $a_1 = \dfrac{SXY}{SXX}$ This model requires: • Slope is not equal to zero • At least one standard data point with concentration not equal to zero	
Segmented model	The segmented model requires: • Data for at least two standard data points with different concentrations and absorbances • Slopes of all segments must be ascending (positive) **OR** descending (negative)	

Calculation	Calculation(s)	Graphs
Validity of standard curves	$A(c_1) > A(c_2)$ for all $c_1 > c_2$ *or* $A(c_1) < A(c_2)$ for all $c_1 > c_2$ *where:* A = *absorbance* c_1, c_2 = *concentration* If this is not the case, then there will be more than one solution within the specified domain, and the message "Curve cannot be used to determine unknown concentrations - it may produce ambiguous results" will appear when the curve is viewed.	 Valid non-linear standard curve Invalid non-linear standard curve
Statistics (Linear regression general case)	$$\sigma = \sqrt{\frac{\Sigma(y_i - \overline{y}_i)^2}{N - n - 1}}$$ *where:* n = *degree of polynomial* $$r = \frac{|SSXY|}{\sqrt{SQX * SQY}}$$ **Note:** The calculation for the correlation coefficient only applies to first-order linear regression curves (first-degree polynomials).	
Linear regression through zero model	$$\sigma = \sqrt{\frac{SYY - (a_1 * SXY)}{N - 1}}$$	
Absorbance Ratio	$$\frac{Abs\lambda_1}{Abs\lambda_2} \quad or \quad \frac{Abs\lambda_1 - Abs_{ref}}{Abs\lambda_2 - Abs_{ref}}$$	
Absorbance Difference	$Result = Abs\lambda_1 * factor\ 1 - Abs\lambda_2 * factor\ 2$ or $(Abs\lambda_1\ Abs\lambda_{ref}) * factor\ 1 - (Abs\lambda_2 - Abs\lambda_{ref}) * factor\ 2$	

Calculation	Calculation(s)	Graphs
3-Point Net	Baseline corrected absorbance = $$A_2 - \left(A_3 + \left([A_1 - A_3] * \frac{\lambda_3 - \lambda_2}{\lambda_3 - \lambda_1}\right)\right)$$	3-Point Net Absorbance sample curve

Index

Z

Thermo Electron Spectroscopy

Thermo Spectronic