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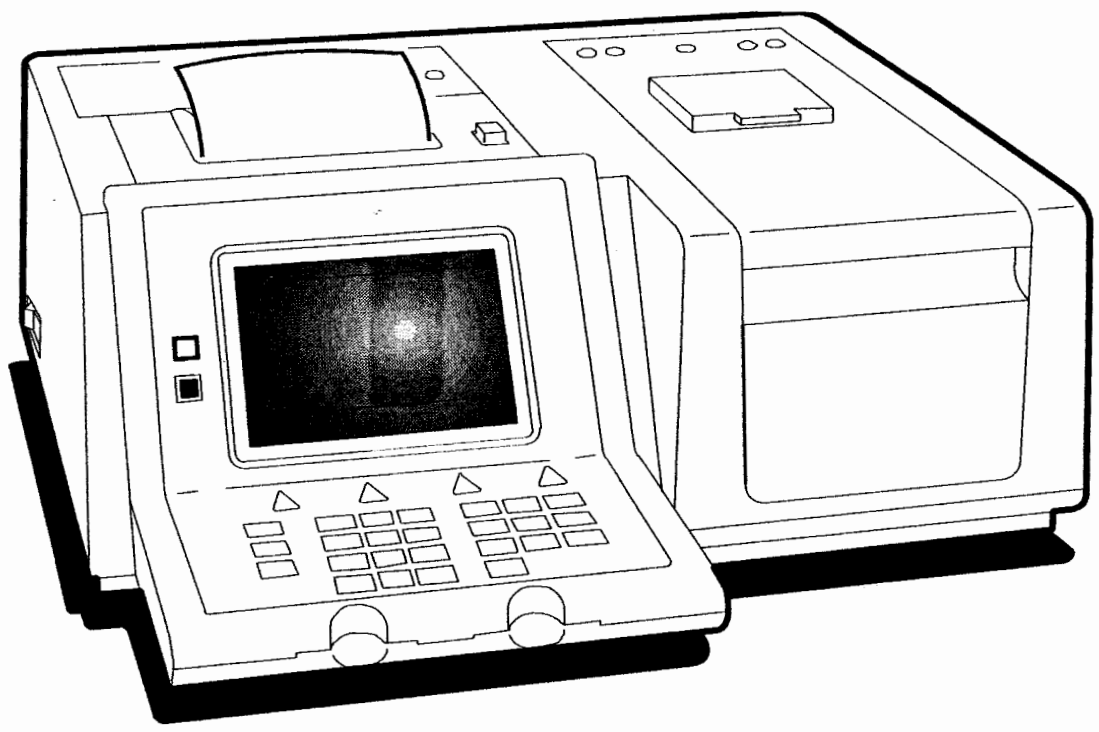
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SPECTRONIC® GENESYS™
Spectrophotometers



OPERATOR'S
MANUAL

MILTON ROY

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Section 1 - Setting up the Instrument

Instrument description

Your SPECTRONIC® GENESYS™ spectrophotometer, shown on the foldout at the beginning of this manual, is an easy-to-use, UV/Visible wavelength 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

Your SPECTRONIC® GENESYS™ spectrophotometer performs absorbance, % transmittance and concentration measurements within the wavelength range of 200 to 1100 nanometers. The instrument also:

- Accepts Application and Memory SoftCards™ for running applications programs and manipulating data
- Supports external devices, such as a printer, plotter or computer
- Automatically prints data to the internal printer or to an external printer
- Controls and operates all accessories

The SPECTRONIC® GENESYS™ offers the following standard features:

- Graphic LCD (40 columns x 16 lines, backlit) display for easy data plotting, test set-up and instrument status information; color display on the GENESYS™ 2, monochrome display on the GENESYS™ 5
- Microprocessor-controlled 8-Position Multi-Cell Holder for increased productivity
- Automatic wavelength calibration on power-up to ensure the instrument is operating properly
- Tactile keyboard with audible response so you know when a key has been completely pressed
- Two card slots for SoftCards™ (Application and Memory) to increase the test and storage capability of the instrument
- Split-beam optical system for stable measurements
- Built-in RS-232-C and Centronics®-compatible ports to support a wide range of output devices

SPECTRONIC® GENESYS™ spectrophotometers can use SoftCards. These small (2" x 4") cards are formatted by the SPECTRONIC® GENESYS™ using the standard DOS format, making it easy to transfer data to and from the instrument. Two types of SoftCards are available • Application SoftCards and Memory SoftCards.

A number of Application SoftCards are available. They contain software used for:

- Scanning
- Kinetics
- Standard curves
- Absorbance difference
- Absorbance ratio
- Multiple wavelength
- Selected data manipulations

The Advanced Scanning Application SoftCard is shipped with the GENESYS™ 2. For information about Application SoftCards, contact your Milton Roy distributor.

Memory SoftCards are used to store data files and/or test parameter files. Applications programs can be transferred from an Application SoftCard to a Memory SoftCard, enabling you to make your own customized Application SoftCards. In addition, Memory SoftCards:

- Allow you to view and output data
- Store programs and data and test files

Your SPECTRONIC® GENESYS™ has two card slots, labeled **A** and **B**, enabling you to have both types of cards (Application SoftCard and Memory SoftCard) in the instrument at the same time.

Specifications

Table 1-1 on the next page lists the specifications for the SPECTRONIC® GENESYS™ series of spectrophotometers.

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Table 1-1 Specifications for SPECTRONIC® GENESYS™ series of spectrophotometers[1, 2]

	SPECTRONIC® GENESYS™ 5	SPECTRONIC® GENESYS™ 2
Spectral slitwidth	5nm	2nm
Optical system	Split-beam, dual detectors	
Wavelength: Range Accuracy Precision	 200 to 1100nm ±1nm ±0.5nm (ASTM method #E275-83)	
Display	Graphic, backlit monochrome LCD	Graphic, backlit color LCD
Display range	-0.1 to 4.0A	
Photometric: Readout Range Accuracy[3]	 Absorbance, % Transmittance and Concentration -3.100A to 4.000A; 0 to 200%T ±0.003A from 0 to 0.3A ±1% of reading from 0.3 to 2A ±2% of reading from 2A to 3A	
Noise (peak-to-peak)	±0.001A at 220 and 340nm at 0A	
Drift	0.002A/hour at 340nm	
Stray Radiant Energy[4]	0.05%T at 220nm, 340nm and 400nm	
Scan Speeds	300nm/min (1 pt/1nm), or 900nm/min (1 pt/3nm)	SLOW: up to 200nm/min (1 pt/0.3nm) MEDIUM: up to 600nm/min (1 pt/1nm) FAST: up to 1800nm/min (1 pt/3nm) TURBO: up to 2400nm/min (1 pt/6nm)
Slew Speed	27,000nm/min (across full wavelength range)	
Standard Cell Holder	8-position, instrument controlled	
Standard Interfaces	RS-232C serial and parallel printer ports	
Dimensions	47.9cm (18.9") width x 55.5cm (22.3") depth x 21.0cm (8.3") height	
Weight	12.3kg (27lbs)	

[1] These specifications are valid only after a 30-minute warm-up period and when the required environmental conditions (see next page) aer met.
[2] When working in the range of 800 to 1100 nm, allow the instrument to warm up for at least an hour.
[3] Measured using NIST 930D filters
[4] 220nm, 340nm, and 400nm measurements with Milton Roy SPECTRONIC Standards (#333150); 220nm measurement with deuterium lamp; 340nm and 400nm measurements with tungsten-halogen lamp

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Environmental and electrical requirements

Your SPECTRONIC® GENESYS™ spectrophotometer has been designed to operate under the environmental and electrical requirements listed in Table 1-2.

Table 1-1 Environmental & Electrical Requirements

Line voltages (separate models)
115V ± 15% at 50 ± 2 Hz and 60 ± 2 Hz
230V ± 15% at 50 ± 2 Hz and 60 ± 2 Hz

Operating environment - The instrument meets the specifications on the previous page under the following conditions after a 30-minute warm-up period.

Ambient temperature	Relative humidity
50•F - 75•F	20% - 80%
75•F - 85•F	20% - 70%
85•F - 95•F	20% - 60%
95•F - 105•F	20% - 50%

Storage environment
-40•F to 140•F (-40•C to 60•C) - Relative humidity not to exceed 60%. 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%.

Setting up the instrument

1. Unpack the shipping carton and verify that you have received all the items listed on the checklist. If any item is missing, contact Milton Roy Customer Service at 800-654-9955 or 716-248-4000.
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. Before connecting the instrument to a power source, check the voltage label on the back panel of the spectrophotometer (see foldout) to determine the pre-set voltage.
   If the voltage shown on the label is not the same as the voltage of your power sources, DO NOT PLUG IN THE INSTRUMENT! Refer to the instructions for *Changing the voltage setting* in the *Maintenance* section.
5. Connect the female end of the power cord into the connector labeled **AC power** on the back panel of the instrument (see foldout).
6. Plug the other end of the power cord into a grounded outlet with the appropriate voltage.
7. Remove the tape used to secure the cell holder during shipment.
8. If the deuterium lamp was shipped in the sample compartment, install the lamp according to the instruction sheet.
9. Ensure that the sample compartment does not contain any samples, and that the sample compartment door and the test tube access door are closed.
10. Turn on the instrument by pressing the power switch to ON (see foldout). 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:
    1) RAM CHECK
    2) BATTERY CHECK
    3) FILTER WHEEL INITIALIZATION
    4) TUNGSTEN LAMP CHECK
    5) DEUTERIUM LAMP CHECK
    6) LAMP ALIGNMENT
    7) WAVELENGTH CALIBRATION
    8) LAMP WARM UP

Note: If necessary, adjust the screen contrast using the two CONTRAST keys (on the left side of the LCD screen, see foldout) until you obtain the best contrast for your viewing angle.

11. When the power-on sequence is completed, allow the lamps to warm up for 30 minutes before taking any readings.

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Setting utility parameters

The utility parameters should be set up after the instrument is first powered up. They include the date and time, the parameters needed to set up printers and plotters, and the language.

1. With the **Acquisition** or **Main Menu** screen displayed, press the **UTILITY** key. The **Utilities** screen (Figure 1-1) appears on the display. From this screen, you can select the language, set the date and time and select the parameters for a printer or plotter.

```
ABS/%T/CONC
UTILITIES
    1.  Lamp Interchange WL          320
    2.  Deuterium Lamp               ON
    3.  Tungsten Lamp                BUSY
    4.  Date, Month                  MAY
    5.  Date, Day                    9
    6.  Date, Year                   1994
    7.  Time                         14:04
    8.  Language                     ENGLISH

  To change item, press number of
  selection. Press EXIT to return.
                                     MORE...
 INITIATE   ALIGN                    NEXT
 RS-232-C   LAMP                     PAGE
```

Figure 1-1 Utilities Set-Up screen

Setting the date and time

- *To change the **day***, press **5**. Type in the number of the day (use the format *XX*; use one or two numbers; e.g., for the first day of the month, type *1*, for the fifteenth, type *15*) and press **ENTER**.
- *To change the **month***, press **4** until the correct month appears.
- *To change the **year***, press **6**. Type in the number of the year (use the format *XXXX*; e.g., for 1995, type *1995*) and press **ENTER**.
- *To change the **time***, press **7**. Type in the time, using military format (*HHMM* using a 24-hour clock; *H* = hour, *M* = minutes). For example, to enter 7:30 a.m., type *0730* and press **ENTER**. To enter 7:30 p.m., type *1930* and press **ENTER**.

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

Setting up parameters for a printer or plotter

To ensure that the SPECTRONIC® GENESYS™ spectrophotometer can output information to a printer or plotter, you need to select the device. These devices include the internal printer as well as devices connected to either the serial port or the (parallel) Centronics®-compatible port.

- With the **Utilities** screen (Figure 1-1) displayed, press the **NEXT PAGE** soft key to access the printer/plotter options. A screen like the one shown in Figure 1-2 appears.

```
ABS/%T/CONC
UTILITIES
    1.  RS-232-C Baud Rate           9600
    2.  RS-232-C Data Bits           8
    3.  RS-232-C Parity              NONE
    4.  RS-232-C Terminator          CR
    5.  Printer                      NONE
    6.  Printer Page Break           FORMFEED
    7.  Plotter                      NONE

  To change item, press number of
  selection. Press EXIT to return.

 INITIATE   ALIGN                    NEXT
 RS-232-C   LAMP                     PAGE
```

Figure 1-2 Utilities screen used to select printer and plotter options

- *To select a **printer***, press **5** until the name of the appropriate printer appears.
- *To select whether or not the printer should perform a formfeed when it reaches the end of a page*, press **6** until the name of the appropriate selection (NONE, FORMFEED) appears.
- *To select a **plotter***, press **7** until the name of the appropriate plotter appears.

Note: For a list of printers and plotters supported by the SPECTRONIC® GENESYS™, refer to the *Accessories* section.

- Press **EXIT** to save the selections and return to the **Acquisition** screen.

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Selecting the language

- Press the number next to **Language** until the name of the appropriate language appears.

Note: The instrument supports English, Spanish, French and German as the language options, but the Application SoftCards you are using may not. Contact your Milton Roy distributor for more information about language options.

Aligning the 8-Position Multi-Cell Holder

To align the 8-Position Multi-Cell Holder, press the **ACC** key. With the **Multi-Cell Holder** screen (Figure 1-3) displayed, you can align the accessory.

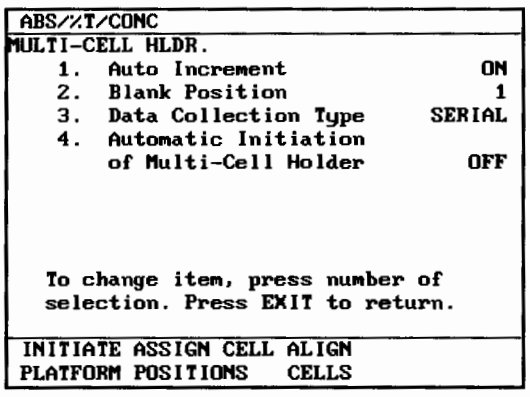


Figure 1-3 *Setting the parameters for the 8-Position Multi-Cell Holder*

The **ALIGN CELLS** soft key function enables the instrument to position low-volume (semi-micro or ultra-micro) cells in various cell positions for optimal results. The instrument optimizes the alignment of the platform by aligning the cells in the light path for precise and accurate results. The alignment is saved when the corresponding test is saved or when the instrument is powered down.

- With the **Multi-Cell Holder** screen (Figure 1-3) displayed, press the **ALIGN CELLS** soft key. The **Cell Positions / Platform Alignment** screen appears.
- Place the cells filled with your reference solution into the appropriate positions in the cell holder.
- Press the **AUTO ALIGN** soft key. A message appears indicating that the cell positions are being aligned.

Notes:

- A number in a particular position indicates that the position is being aligned.
- A "**P**" in a particular position indicates that the position has been properly aligned.
- An "**F**" in a particular position indicates that the alignment has failed for that position.
- When the alignment is complete, press **EXIT** to save and return to the **Multi-Cell Holder** screen.
- If the alignment failed on any position, press **MANUAL ALIGN** and refer to the description in the *Dictionary* section for instructions.

Preparing Memory SoftCards•

Memory SoftCards purchased from Milton Roy Company have a battery installed and are formatted before they are shipped. However, if you purchase a SoftCard from another source, you ***must format it*** before you can use it in your instrument.

Formatting a Memory SoftCard

1. Insert the Memory SoftCard into one of the card slots on the instrument.
2. Press the **SETUP TESTS** key. The **Test Setup** screen appears.

   Note: The active card slot is shown in reverse video at the top right-hand corner of the screen.

3. Press the **CHANGE CARD** soft key, if necessary, to select the card slot containing the Memory SoftCard as the active card slot.
4. Press the **FORMAT CARD** soft key. The instrument formats the Memory SoftCard in the active card slot.

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Replacing the battery

The life of the battery is limited; typical battery life is five years. When the battery voltage drops, a "battery low" pictogram appears on the screen (see foldout). Be sure to replace the battery as soon as the "battery low" pictogram appears. **If you don't replace the battery immediately, you risk losing the data stored on the card.**

The battery can be replaced in the Memory SoftCard* at any time without any loss of data, as long as the card is inserted in a card slot and the instrument is supplying voltage to the card. **You will lose data if the battery dies and the Memory SoftCard is removed from the instrument.**

1. Turn on the instrument.
2. Insert the Memory SoftCard in one of the card slots on the front of the instrument to ensure that the instrument is supplying voltage to the card.
3. While the card is inserted in the instrument and the power is ON, follow the instructions supplied with the card to change the battery.

Securing tests stored on a Memory SoftCard

A special security feature allows test files to be locked so they can be edited only by authorized personnel. This feature is available through **TEST TYPES** and through **FILE OPTIONS**. Passwords are required to lock and unlock the test file.

Note: The password for your instrument is printed on a special card inside the front cover of this manual. You should remove the label and store the password in a secure place.

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NOTE

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

FCC COMPLIANCE STATEMENT FOR U.S.A. USERS

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the reference guide, may cause interference to radio communications. It has been tested and found to comply with the limits in effect at the time of manufacture for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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NEW PRODUCT WARRANTY

Milton Roy 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 Milton Roy 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 Milton Roy 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 Milton Roy'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.

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

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Operation

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Section 2 - Operation

General operating principles

Once you have completed the instrument set-up procedures in the *Setting up the Instrument* section and allowed the instrument to warm up, you can use your SPECTRONIC® GENESYS™ spectrophotometer. Simply select the measurement mode, enter the appropriate wavelength, put your blank and samples into the instrument and read the data displayed on the screen.

However, to take full advantage of the instrument's capabilities, you will probably want to set up some customized tests using the GENESYS™ software.

GENESYS™ software

The software included with your GENESYS™ instrument includes programs for measuring absorbance, %transmittance and concentration and for collecting scan data (GENESYS™ 2 only). It also includes programs that allow you to perform file and program management tasks such as copying and deleting files and programs.

Later in this section, you'll find more detailed descriptions of each of the standard programs:

- A/%T/C program
- File Manager
- Program Manager
- Scanning program (GENESYS™ 2 only)

The descriptions include flowcharts to help you become familiar with how to move around within the software, and some step-by-step guidelines for using the software.

For specific information about the options, keyboard functions and soft keys used to set up and operate your instrument, refer to the *Dictionary* section.

Saving tests and data

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 both tests and data for later use. The SPECTRONIC® GENESYS™ spectrophotometer stores information in two types of files:

- **Test files** 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.
- **Data files** contain the data collected when you run a test. You can view the stored data in graphical or tabular form. The "default" data file contains the scan data for the last scan acquired. When you collect new scan data, the new scan is displayed and replaces the default.

  Note: The acquisition parameters are **not** stored with the data files.

  The scanning program also includes post-processing functions that allow you to manipulate scan data.

  When you run the scanning program (standard on the GENESYS™ 2 only), you can generate data files containing multiple sets of data. The instrument saves all sets of data for each test run in a single data file. A number appears in square brackets next to the data filename indicating how many sets of data are in the data file.

  For example, the data file H247P94 [6] contains six sets of scan data. These data files would be accessed individually as H247P94 (0), H247P94 (1), H247P94 (2), etc.

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A/%T/C program

The A/%T/C program takes measurements in absorbance, transmittance or concentration mode. When you select the A/%T/C program from the **Main Menu**, the **A/%T/C Acquisition** screen (Figure 2-1) appears.

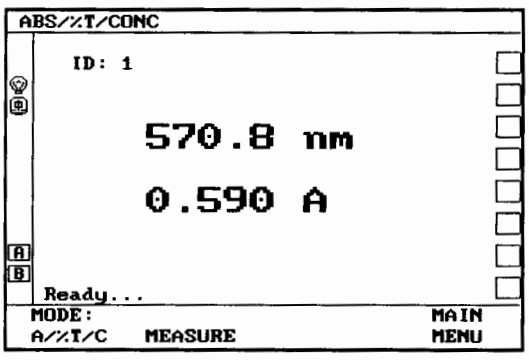


Figure 2-33 ***A/%T/C Acquisition*** *screen*

You can take A/%T/C measurements *manually* or *automatically*. The manual method is quick and easy, but you must set the mode, wavelength, and cell position. It also limits you to single measurements. The automatic method takes a bit longer to set up, but allows you to run the same test over and over again. It also allows you to obtain multiple readings automatically.

The flowchart on the next page shows how to operate the A/%T/C program.

Manual A/%T/C measurements

Setting up manual A/%T/C measurements requires only a few steps • select the mode and wavelength, position the cell in the light path and take the measurement.

To take A/%T/C measurements manually:

- Select the mode for the measurement by pressing **MODE: A/%T/C** until the desired mode appears
- Set the wavelength by pressing **GOTO WL** and entering the desired value
- Position the cells by pressing **CELL Λ** or **CELL V**
- Insert the blank into the current cell position
- Zero the instrument by pressing **AUTOZERO**
- Insert the sample into the current cell position
- Observe the measurement on the screen or print out the result by pressing **PRINT**

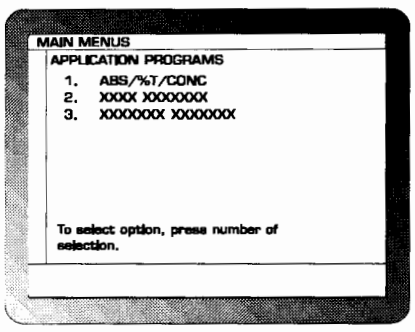
Automatic A/%T/C measurements

When you set up a test to take measurements automatically, you are not limited to single measurements • the test will run until all samples have been measured. In addition, once you have set up and saved a test, you can restore it and run it at a later time.

When taking measurements automatically, you can use a sample identifier (ID) to name each sample. The sample ID can be up to 10 characters (alphabetic or numeric), but it must be completely numeric if you want the ID to increment automatically as sample measurements are taken.

Instead of the sample ID, you can specify a preset label to indicate the type of sample you are measuring. For example, you may use a preset label to indicate that a particular set of measurements is for a series of controls.

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Flow chart of ABS/%T/CONC PROGRAM.

MAIN MENU

1

Takes measurements in absorbance, transmittance, or concentration mode.

MODE A/%T/C | MEASURE | MAIN MENU

Select absorbance, transmittance, or concentration.

Measure samples.

Return to main menu.

For concentration mode only.

MODE: A/%T/C | MEASURE | SET FACTOR/ STANDARD | MAIN MENU

Set factor, set concentration and measure absorbance, select units.

SAMPLE ID

Sample ID.

ACC

Set-up sample holder; blank position, cell alignment, accessory parameters.

EITHER

TEST TYPES

Restore, delete, or lock tests.

OR

SETUP TESTS

Set test name, wavelength, # of samples, high and low limits, autoprint, and autosave parameters.

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Set up a new test:

- Select the mode for the measurement by pressing **MODE: A/%T/C** until the desired mode appears
- Set the sample ID by pressing **SAMPLE ID** and entering the identifier or preset label (optional)
- Set up cell holders and blank location by pressing **ACC** (optional)
  - Turn ON **Auto Increment** if you want the instrument to advance the cell holder automatically after each measurement
  - Specify which cell positions are empty and which contain samples
  - Specify the location of the blank
  - Select **Serial** or **Parallel** data collection
  - Turn ON **Automatic Initiation of Multi-Cell Holder** if desired
- Set up the following test parameters by pressing **SETUP TEST** (optional):
  - Test name
  - Name of file to contain the test data
  - Analytical wavelength
  - Number of samples
  - Initial delay
  - High and low limits for test results
  - AutoPrint function
  - AutoSave function
- Save the test by pressing **SAVE TEST** and entering a test name (optional)

OR

Restore a test:

- Press **TEST TYPES** to display the **TEST TYPES** screen
- Press the number next to the name of the test you want restored

THEN

Run the test:

- Make sure you have the test parameters set or you have restored the appropriate test
- Load your blank and samples into the cell holder according to the cell assignments
- Run the test by pressing **MEASURE**. Remember that when you run a test, the instrument runs the entire test automatically. You can press **STOP TEST** to interrupt the test at any time.

Refer to the *Dictionary* section for instructions about keyboard functions, parameters, options and soft key functions.

File Manager program

The File Manager program allows you to access data files and application program directories, and to perform routine functions on your files, such as viewing, copying, renaming, deleting, converting to ASCII format and converting to Lotus format.

Using the File Manager Program, you can:

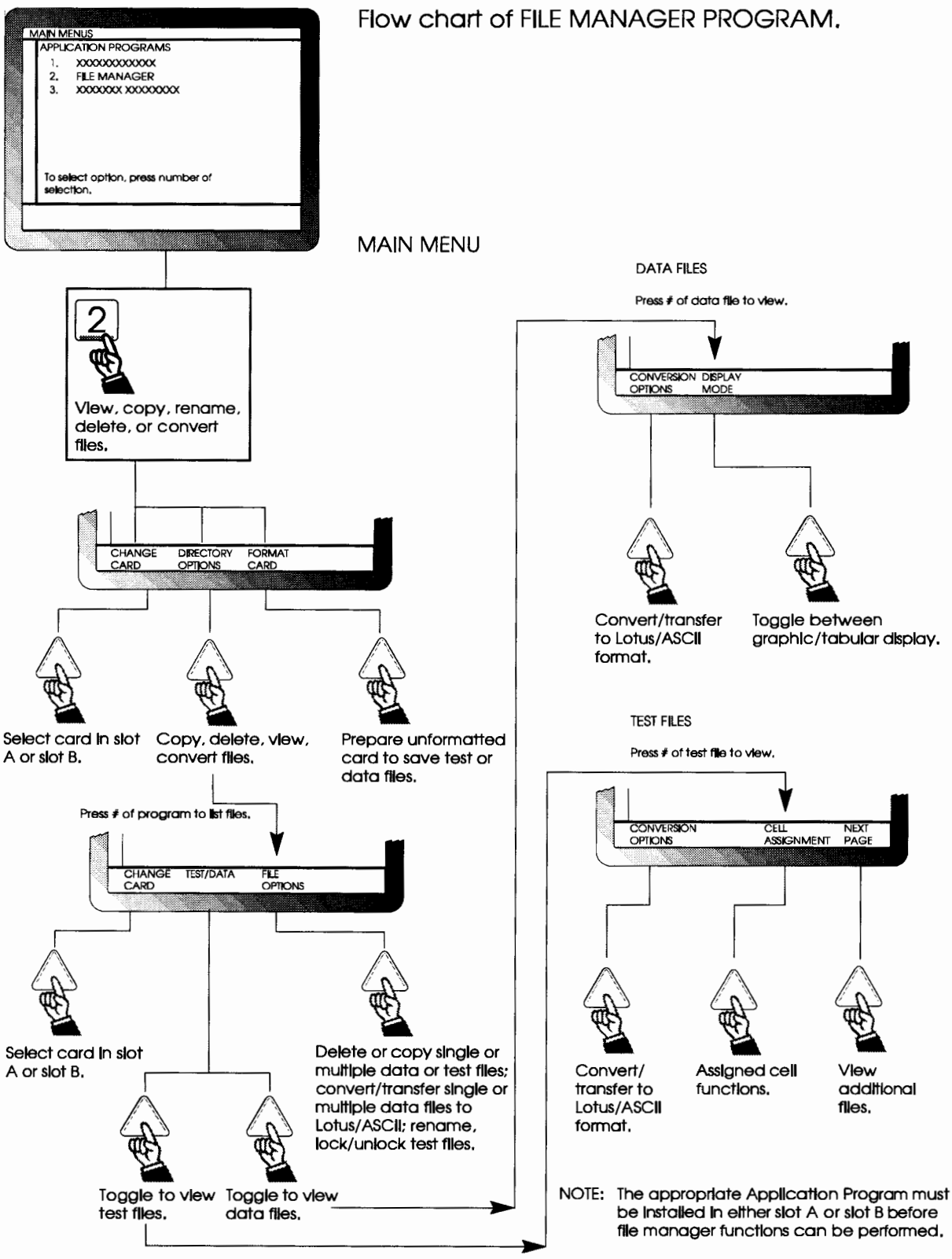
- Copy a directory and its contents from one SoftCard to a second SoftCard (**DIRECTORY OPTIONS**)
- View the directories on both SoftCards
- View the files (test or data) in a specific directory
- View the contents of a file (test or data)
- Delete files (**DELETE, DELETE ALL**)
- Rename files (**RENAME**)
- Copy files (**COPY, COPY ALL**)
- Convert files (single or multiple) to ASCII or Lotus® format (**CONVERSION OPTIONS**)

  Note: A Memory Card Reader connected to a PC is required to access the ***converted*** files. The converted files are not listed by the File Manager program and cannot be deleted.

- Transfer files (single or multiple) to an IBM®-compatible personal computer (PC) in ASCII or Lotus format (**CONVERSION OPTIONS**)

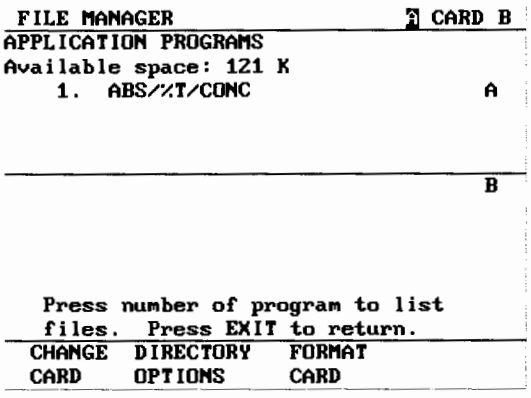
The flowchart on the next page shows how to operate the File Manager program.

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When you select **File Manager** from the **Main Menu**, a screen like the one shown in Figure 2-2 appears.



File Manager screen

In the upper-right corner of this screen, the active SoftCard is identified in reverse video. The screen also displays the space available on the active SoftCard.

From this screen you can also display the contents of a file. When you select a directory, a screen appears listing all the files in that directory. When you select a specific file, a screen appears listing the contents of that file:

- Test files contain a list of all the parameters and their values
- Data files contain all the data obtained during a test

Refer to the *Dictionary* section for instructions about keyboard functions, parameters, options and soft key functions.

Transferring files in ASCII or Lotus format

The file transfer function allows you to transfer test and data files from Memory SoftCards* installed in a SPECTRONIC® GENESYS* spectrophotometer to an IBM-compatible personal computer. You may transfer a single file or all the files in a selected directory.

The available formats are:

- ASCII format - suitable for importing into a word processing program
- Lotus format - suitable for importing into a spreadsheet program

To transfer a file to an IBM-compatible PC, the PC must be running the **File Transfer Program**. This program is contained on a diskette shipped with the instrument.

In addition, the RS-232-C parameters set using **UTILITY** must be identical to those on the PC. If they are not, the **File Transfer Program** will not function.

SPECTRONIC® GENESYS* instruments and the **File Transfer Program** use the YMODEM file transfer protocol to communicate. The **File Transfer Program** defaults to the following RS-232-C parameters:

- Baud rate = 9600
- Parity = NONE
- Port = COM1

If you need to override these defaults, you can use the following command line options:

-pe	parity = EVEN
-po	parity = ODD
-pn	parity = NONE (default)
-b300	baud rate = 300
-b1200	baud rate = 1200
-b2400	baud rate = 2400
-b4800	baud rate = 4800
-b9600	baud rate = 9600 (default)
-c1	port = COM1 (default)
-c2	port = COM2
-c3	port = COM3
-c4	port = COM4

For example, entering the command line

genxfer.exe -pe -b2400 -c2

sets the parity to EVEN, the baud rate to 2400 and the port to COM2.

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Before transferring a file from the instrument to your PC using the default parameter settings, make sure that:

- The spectrophotometer is connected to a serial (RS-232-C) port on the PC as described in the *RS-232-C Interface* section. The program defaults to COM1: as the port being used.
- The RS-232-C parameters on the instrument (**Utility** screen) are set as follows:
  - Baud rate = 9600
  - Parity = NONE
- The file transfer program is installed on the PC. To install the program, copy the *genxfer.exe* file from the **File Transfer Program** diskette to one of the hard drives on the PC.
  Example:
  C:\> copy b:\genxfer.exe c:\

To transfer a single file:

1. On your PC, change to the directory containing the *genxfer.exe* file and type **genxfer.exe** to run the **File Transfer Program**.
2. With the **File Manager** screen (Figure 2-2) displayed on the screen of your instrument, press the number of the directory containing the file you want to transfer. For example, to transfer files in the **ABS/%T/CONC** directory shown in Figure 2-2, press **1**. A screen appears listing the names of the available files.
3. Press the number of the file you want transferred. A screen appears listing the contents of the file.
4. Press **CONVERSION OPTIONS**. A screen appears listing the conversion options.
5. Press the number corresponding to the format you want used for the transfer. The selected file will be transferred in the selected format and will appear in the current PC directory.

   Note: Files transferred in ASCII format will be given the extension *.asc* and those in Lotus format will be given the extension *.lts*.

   A message will appear on the screen of the instrument indicating that the transfer is complete.

To transfer all the files in a selected directory:

1. On your PC, change to the directory containing the *genxfer.exe* file and type **genxfer.exe** to run the **File Transfer Program**.
2. With the **File Manager** screen (Figure 2-2) displayed on the screen of your instrument, press **DIRECTORY OPTIONS**. A screen appears listing the available directories.
3. Press the number of the directory containing the files you want to transfer. For example, to transfer all the files in the **ABS/%T/CONC** directory shown in Figure 2-2, press **1**. A screen appears listing the names of the available files.
4. Press **FILE OPTIONS**. A screen appears listing the options.
5. Press the number corresponding to the format you want used for the transfer. All the files in the selected directory will be transferred in the selected format and will appear in the current PC directory.

   Note: Files transferred in ASCII format will be given the extension *.asc* and those in Lotus format will be given the extension *.lts*.

   A message will appear on the screen of the instrument indicating that the transfer is complete.

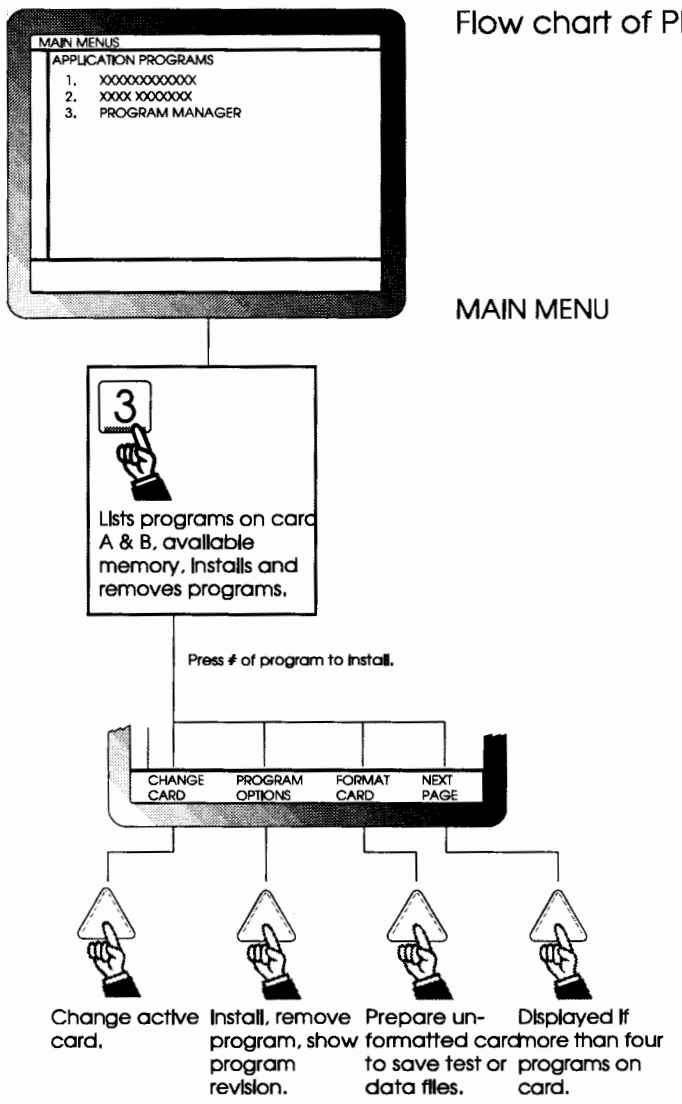
Program Manager program

The **Program Manager** allows you to install or remove an application program from a Memory SoftCard*. This allows you to customize your Memory SoftCards. For example, you may install the **Survey Scan** program on a Memory SoftCard and also store subsequent scans on the same Memory SoftCard.

The flowchart on the next page shows how to operate the Program Manager program.

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Flow chart of PROGRAM MANAGER PROGRAM.



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When you select **Program Manager** from the **Main Menu**, a screen like the one shown in Figure 2-3 appears.

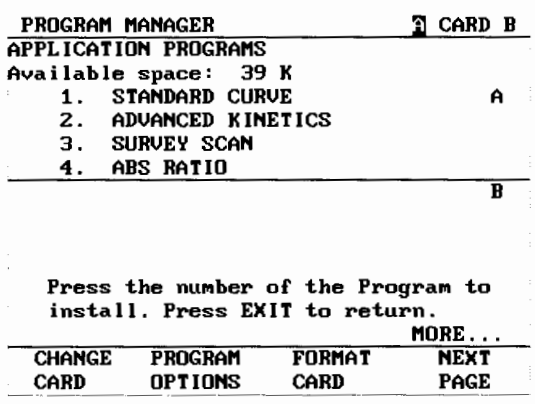


Figure 3-65 Program Manager screen

In the upper-right corner of the **Program Manager** screen, the active SoftCard is highlighted in reverse video. The screen also displays the available space on the active SoftCard.

The **Program Manager** screen is split to display the contents (application programs) of both SoftCards installed in the instrument.

Notes:

- The list includes names of *application programs only.*
- The **NEXT PAGE** "soft" key appears when all the application programs will not fit on one screen. Press **NEXT PAGE** to view any additional pages.

Scanning program *(GENESYS™ 2 only)*

The scanning program obtains a spectrum for a sample in absorbance, transmittance, or derivative (first, second or fourth) mode. When you select the scanning program from the **Main Menu**, the **Scanning** screen (Figure 2-4) appears.

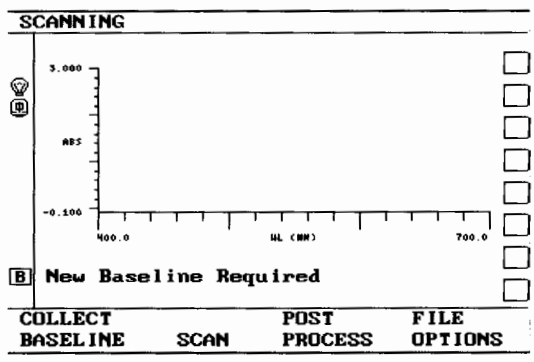
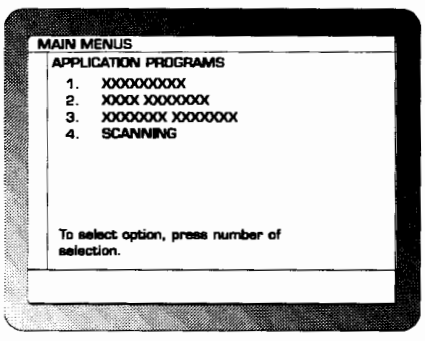


Figure 3-65 Scanning main screen

The flowchart on the next page shows how to operate the Scanning program.

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Flow chart of SCANNING PROGRAM

MAIN MENU

4

Scans samples in absorbance, transmittance, or derivative mode.

COLLECT BASELINE | SCAN | POST PROCESS | FILE OPTIONS

Collect baseline using parameters in test setup.

Collect scan data using test setup parameters.

Modify display and perform calculations on scan data.

Save and unload data, select SoftCard.

ACC

Set-up sample holder; blank position, cell alignment, accessory parameters.

TEST TYPES

Restore, delete, or lock tests.

EITHER

SETUP TESTS

Set test name, A/%T/ or derivative mode, wavelength range, # of samples, scan speed, autoprint, smoothing and repeat scan parameters.

OR

SELECT SCAN | DISPLAY FUNCTIONS | SCALE FUNCTIONS | MATH FUNCTIONS

Select scan data on screen for processing.

Peak/valley labelling.

View tabular data, rescale X- and Y-axes, enable cursor.

Convert units (A/%T), calculate 1st, 2nd, and 4th derivative, smoothing, addition, subtraction, 3-point net, area-under-a-curve calculations.

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Collecting scan data

Set up a new test:

- Set up cell holders and blank location by pressing **ACC**
  - Turn ON **Auto Increment** if you want the instrument to advance the cell holder automatically after each measurement
  - Specify which cell positions are empty and which contain samples
  - Specify the location of the blank
  - Select **Serial** or **Parallel** data collection
  - Turn ON **Automatic Initiation of Multi-Cell Holder** if desired
- Set up the following test parameters by pressing **SETUP TEST** (optional)
  - Test name
  - Name of file to contain the test data
  - Start and stop wavelengths for the scan
  - Scan speed
  - Measurement mode (absorbance or %transmittance)
  - Derivative scan (first, second, fourth)
  - Smoothing (low, medium, high)
  - AutoPrint function
  - Repeat scans
  - Overlay scans

OR

Restore a test:

- Press **TEST TYPES** to display the **TEST TYPES** screen
- Press the number next to the name of the test you want restored

THEN

Collect the scan data:

- Make sure you have the test parameters set or you have restored the appropriate test
- Load your blank and samples into the cell holder according to the cell assignments
- Collect a baseline scan by pressing **COLLECT BASELINE**
- Collect scan data by pressing **SCAN**

Refer to the *Dictionary* section for instructions about keyboard functions, parameters, options and soft key functions.

Processing scan data

Once you have collected data, you can display it on the screen and process it in several ways:

- Change the way the data is displayed (**DISPLAY FUNCTIONS**):
  - Label a curve with measurements at peaks and valleys
- Perform scaling functions (**SCALE FUNCTIONS**):
  - Manually or automatically scale displayed data by changing the scale of the X- and Y-axes
  - Use a cursor to obtain the absorbance value for a selected point on a displayed curve
- Perform mathematical manipulations (**MATH FUNCTIONS**):
  - Switch between absorbance and %transmittance modes by pressing **MODE: A/%T**
  - Calculate first, second or fourth derivative of an absorbance scan
  - Addition/ subtraction of a constant or another scan, multiplication by a constant)
  - Determine 3-point net absorbance for a displayed curve
  - Calculate area under a displayed curve

These functions are all accessed through the **POST PROCESS** soft key that appears on the **Scanning** main screen.

Note: The **POST PROCESS** functions are available ***only*** when data is displayed on the screen. Only the **active** scan (the scan displayed in white) will be processed.

Once a post-processing operation has been performed, you can print or save the data. If you exit, the post-processed data will be erased.

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When you press **POST PROCESS**, a screen like the one shown in Figure 2-5 appears.

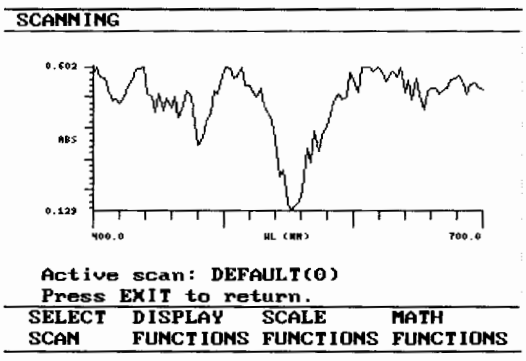


Figure 3-65 POST PROCESS screen

You can also save scan data, load previously saved data files and unload data files (**FILE OPTIONS**).

Refer to the *Dictionary* section for instructions about keyboard functions, parameters, options and soft key functions.

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Section 3 - Dictionary of Parameters, Keyboard Functions and Soft Keys

This section contains definitions, descriptions, instructions and limits for each parameter, keyboard function and soft key function available on the SPECTRONIC® GENESYS™ series of spectrophotometers.

The entries in this section are arranged alphabetically to help you find what you are looking for quickly and easily.

The descriptions also include specific symbols to identify which keys are found on the keyboard and which are soft keys:



Keyboard key



Soft key

All other entries are parameters or options on menus.

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ACC

ACC

Sets parameters (e.g., auto increment, temperature) used to control the automated accessory installed in the instrument.

- Press **ACC** to list the parameters available for whatever accessory is installed.

ADD

△

Allows you to create concentration units.

- Press **ADD** to display the **UNITS SELECTION Input** screen. Use the arrow soft keys to move the cursor around the screen to highlight the desired character, then press **ENTER**.
- When you have selected all the characters, press **EXIT**.

Note:
- A maximum of 10 characters may be selected.

ADD A SCAN

Allows you to add data from a selected scan to the scan data displayed on the screen.

- Select **ADD A SCAN** to list the data files stored on the active card
- Select the data file containing the data to be added to the scan data displayed on the screen. The instrument sums the data and plots the summed data on the screen.

ADD/SUBTRACT A CONSTANT

Allows you to add a constant to, or subtract a constant from, the scan data displayed on the screen.

- Select **ADD/SUBTRACT A CONSTANT** to enter the constant you want added to or subtracted from the scan data displayed on the screen. The instrument calculates the sum or difference and plots the data on the screen.

Limits: -999.9 to +999.9

ALIGN CELLS

△

Enables the instrument to align low-volume (semi-micro or ultra-micro) cells in the light path for precise and accurate results. The alignment is saved when the corresponding test is saved and when the instrument is powered down.

- Press **ALIGN CELLS** to display the **CELL POSITIONS / PLATFORM ALIGNMENT** screen.
- Select either the automatic or manual alignment procedure. Refer to **AUTO ALIGN** (page 3-4) or **MANUAL ALIGN** (page 3-13) for instructions.

ALIGN LAMP

△

Aligns the tungsten lamp after it has been replaced. Refer to the *Maintenance* section for specific instructions on aligning the tungsten lamp.

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AREA UNDER CURVE

Determines the area under a curve defined by two wavelengths. The area can be calculated using either the "baseline" method or the "tangent" method.

Figure 3-2 shows the two methods. When using the "baseline" method, the calculated area is **Area A+B** in Figure 3-2; when using the "tangent" method, the calculated area is **Area A only**.

- Press **AREA UNDER CURVE** to display a cursor line to help you select the wavelengths for the calculation.
- Press the • soft key to move the cursor line to the first wavelength or use the numeric keypad to type the wavelength, then press **ENTER** to select the first wavelength.
- Repeat for the second wavelength. The calculated area under the curve, the baseline for the selected curve appear on the screen and the type of calculation used (baseline or tangent method) appear on the screen.

Notes:

- As you move the cursor line, the current wavelength and data value at that position are displayed below the X-axis.
- If you wish to multiply the calculated area under the curve by a factor, press **FACTOR**, type in its value and press **ENTER**. The factor appears on the screen.
- If you wish to switch to the other calculation method (tangent or baseline), press **TANGENT/BASELINE** and select the wavelengths for the calculation.

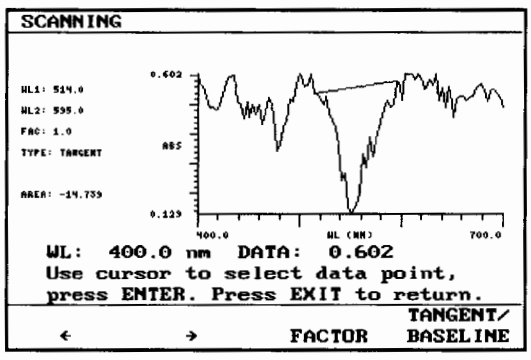


Figure 3-65 *Area under a curve screen with calculation*

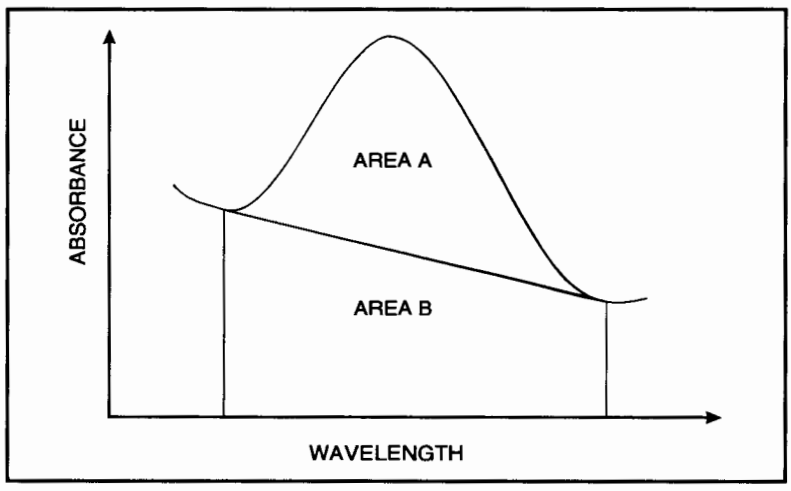


Figure 3-66 *Baseline and tangent methods for calculating area under a curve*

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ASSIGN CELL POSITIONS

Assigns cell positions as either SAMPLE or EMPTY.

The 8-Position Multi-Cell Holder provides eight positions. However, you may install other types of cell holders on the platform. For example, if you have replaced the Multi-Cell Holder with three longpath cell holders (installed on the Cell Holder Platform) in positions 3, 5 and 7, you would designate these as SAMPLE positions.

- Press **ASSIGN CELL POSITIONS** to list each cell position and its current assignment.
- Press the number of the cell position you want to assign until the setting you want (SAMPLE or EMPTY) is displayed
- Continue until you have assigned all the appropriate cell positions.
- Press **EXIT** to save all cell position assignments automatically.

Note:

- The blank position can only be changed from the **Multi-Cell Holder** screen, not from the **Assign Cell Positions** screen.

AUTO ALIGN

Automatically aligns the cells in the light path for precise and accurate results. The alignment is saved when the corresponding test is saved or when the instrument is powered down.

- Press **ALIGN CELLS** to display the **Cell Positions / Platform Alignment** screen.
- Place the cells into the appropriate positions in the cell holder and press **AUTO ALIGN**. A message appears, indicating that the cell positions are being aligned:
  - A number in a particular position indicates that the position is being aligned.
  - A "**P**" in a particular position indicates that the position has been properly aligned.
  - An "**F**" in a particular position indicates that the alignment has failed for that position.
  - If the alignment failed on any position, perform a manual alignment (see **MANUAL ALIGN** on page 3-13).

AUTO INCREMENT

When ON, the instrument automatically moves the 8-Position Multi-Cell Holder to the next position after a measurement is taken.

Notes:
Ensure that **Auto Increment** is set correctly for single or multiple sample measuring:

- To acquire *multiple readings on a single sample*, set **Auto Increment** to OFF.
- To acquire *a single reading on up to eight samples*, set **Auto Increment** to ON.

AUTO SCALE

Instructs the instrument to replot the displayed data using the automatic scaling function.

AUTO ZERO

AUTO ZERO

Sets the instrument to 0.0A or 100%T.

Notes:

- If a blank position (1 to 8) is selected and **AUTO ZERO** is pressed, the cell positioner moves to the blank position and sets 0.0A (100%T).
- If no blank position (NONE) is selected and **AUTO ZERO** is pressed, the instrument sets 0.0A (100%T) on the cell position currently in the light beam.

AUTOMATIC INITIATION OF MULTI-CELL HOLDER

When ON, the instrument automatically repositions the instrument platform at the "home" position each time **MEASURE** is pressed. When OFF, the platform will be repositioned at the "home" position only when **INITIATE PLATFORM** is pressed.

This operation is required when the cell holder has been moved out of alignment while loading samples or sample holders.

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AUTOPRINT

When ON, prints data automatically after data collection.

Note:

- A printer must be installed for **AutoPrint** to function.

AUTOSAVE DATA

Instructs the instrument to save data automatically after collection. **If you want data saved automatically, you must insert a formatted Memory SoftCard in either card slot A or B.**

- Press **AUTOSAVE DATA** until the desired setting (OFF, CARD A, CARD B) is displayed.

BLANK POSITION

Selects the cell position of the blank. You may select one blank position (or none).
Limits: NONE, 1 to 8

- Press **BLANK POSITION** until the appropriate cell position is displayed.

CANCEL

Cancels a selected operation. This soft key function appears if an error occurs while performing an operation.

- Press **CANCEL** to cancel the operation.

CELL Λ

Increments the Multi-Cell Holder one position.

- Press **CELL Λ** until the desired cell position is in the light path.

Note:

- If the holder is in position #8, it will advance to position #1.

CELL V

Decrements the Multi-Cell Holder one position.

- Press **CELL V** until the desired cell position is in the light path.

Note:

- If the holder is in position #1, it will advance to position #8.

CELL ASSIGNMENT

Displays the current cell assignments (SAMPLE, EMPTY) for a stored test.

CHANGE

Changes the concentration units.

- Press **CHANGE** to list the current concentration units.
- Press the number corresponding to the units to be changed.
- Press **ENTER**. The **UNITS SELECTION Input** screen appears.
- Use the arrow soft keys to move the cursor around the screen to highlight the desired character, then press **ENTER**.
- When you have selected all the characters, press **EXIT**.

Note:

- A maximum of 10 characters may be selected.
- You may also use the numeric keypad to enter numbers.
- If you make a mistake, press **CLEAR** to remove one character at a time.

CHANGE CARD

Switches between CARD A and CARD B. The active card is shown in reverse video at the top of the screen.

- Press **CHANGE CARD** to activate the other SoftCard. For example, if the active SoftCard is in **card slot B**, pressing **CHANGE CARD** would change the active SoftCard to the one installed in **card slot A**.

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CLEAR



Clears the numeric or alphanumeric entry field, one character at a time.

- Press **CLEAR** until the desired characters are deleted.

COLLECT BASELINE △

Collects a baseline over the specified wavelength range of a scan.

To ensure that scan data is corrected for optical and solvent variations across a range of wavelengths, the instrument requires a valid baseline.

Whenever you change the test setup or load a different test, the instrument checks the start and stop wavelength values and the scan speed. If the scan speed is lower than the previous setting or if either wavelength value is outside the range of the current scanning baseline, the message "New Baseline Required" appears. When the instrument has collected the baseline data, the date and time when the baseline was collected are displayed on the screen.

- Ensure that the start and stop wavelengths match those of the test you want to run, load your blank in the blank position of the cell holder and close the cover of the sample compartment.
- Press **COLLECT BASELINE**. When the instrument has collected the baseline data, the date and time when the baseline was collected are displayed on the screen.

Notes:

- Make sure that the appropriate lamp is turned ON (use **UTILITY** to turn lamps ON and OFF). If a lamp is turned OFF but is needed for the selected wavelength range, the message "Setting lamp state. . ." is displayed and the instrument automatically turns ON the lamp.
- Be sure to select the BLANK position using the **ACC** key. If no blank position is defined, the baseline will be collected for the current position.

CONTRAST



Two keys control the contrast of the display.

- Press the top CONTRAST key to lighten the display.
- Press bottom CONTRAST key to darken the display.

CONVERSION OPTIONS △

Allows you to convert GENESYS* test and data files to either ASCII or Lotus format.

- Press **CONVERSION OPTIONS** to list the available conversion options.
- Press the number corresponding to the type of conversion you want done on the file. When the file has been converted, the message "Operation successful" appears on the screen.

CONVERT ALL △

Converts all selected files to the selected format (ASCII or Lotus) at one time.

CONVERT TO ASCII FORMAT △

Converts selected file(s) to ASCII format (suitable for importing into a word processing program).

- Select **CONVERT TO ASCII FORMAT** to display a list of files.
- Press the number corresponding to the file you want converted. The file is converted to ASCII format.
- Press **ENTER**.
- Press **EXIT**.

Note: A Memory Card Reader connected to a PC is required to access the ***converted*** files. The converted files are not listed by the File Manager program and cannot be deleted.

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CONVERT TO LOTUS FORMAT △

Converts selected file(s) to Lotus format (suitable for importing into a spreadsheet program).

- Select **CONVERT TO LOTUS FORMAT** to display a list of files.
- Press the number corresponding to the file you want converted. The file is converted to Lotus format.
- Press **ENTER**.
- Press **EXIT**.

Note: A Memory Card Reader connected to a PC is required to access the ***converted*** files. The converted files are not listed by the File Manager program and cannot be deleted.

COPY ALL △

Copies all the directories on one SoftCard* or all the files in a selected directory to another SoftCard* at one time.

COPY DIRECTORY

Copies a selected directory on one SoftCard* to another SoftCard.

- Press the number corresponding to the directory you want copied.
- Press **COPY DIRECTORY**.

COPY TO OTHER CARD

Copies selected file(s) on one SoftCard* to another SoftCard*.

- Select **COPY TO OTHER CARD** to display a list of files.
- Press the number corresponding to the file you want copied. The file is copied to the other SoftCard*.
- Press **ENTER**.
- Press **EXIT**.

CURSOR △

Provides a cursor line to select wavelengths and data values on a displayed scan.

- Press **CURSOR** to display a vertical line and to identify the two arrow soft keys.
- Use the left and right arrow soft keys to move the cursor. The current wavelength and data value are displayed below the X-axis.

DATA COLLECTION TYPE

Specifies the type of data collection for the measurement:

- **Serial** - The blank is measured once, then each sample is measured
- **Parallel** - The blank is measured immediately before each sample is measured
- Press the number next to **Data Collection Type** until the desired selection is displayed.

Note:

- If the blank position is set to NONE, only SERIAL data collection is allowed.

DATA FILENAME

Allows entry of a data filename. The filename will be used when the **AutoSave** function is ON.

- Press **DATA FILENAME** to display the **DATA FILENAME Input** screen.
- Use the arrow soft keys to highlight the first character to be used for the data filename and press **ENTER** to select it.
- Continue until you have selected all the characters for the data filename, then press **EXIT**.

Notes:

- A maximum of eight characters is allowed for the filename.
- A Memory SoftCard* must be inserted in a card slot for the **AutoSave Data** function to be operational.
- You may also use the numeric keypad to enter numbers.
- If you make a mistake, press **CLEAR** to remove one character at a time.

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DATA MODE: ABS/%T

Switches between absorbance and transmittance modes for scan data displayed on the screen.

- Press **DATA MODE: ABS/%T** until the desired selection is displayed.

DATE, DAY

Selects a numerical day of the month.

- Press the number next to **Date, Day**.
- Enter the desired date.
- Press **EXIT**.

Note:
- Use the format *X* or *XX*; e.g., for the first day of the month, type *1*; for the fifteenth, type *15*

DATE, MONTH

Selects the month of the year.

- Press the number next to **Date, Month** until the desired month is displayed.

DATE, YEAR

Selects the year.

- Press the number next to **Date, Year**.
- Enter the desired year.
- Press **EXIT**.

Note:
- Use the format *XXXX*; e.g., for 1995, type *1995*
- If you make a mistake, press **CLEAR** to remove one character at a time.

DELETE

Deletes a selected item from a list.

- Press **DELETE** to display the list.
- Press the number corresponding to the item to be deleted.
- Press **ENTER** to verify that you want the selected item deleted.
- If the selection is not the one you want deleted, press **EXIT**. When the item has been deleted, an updated list appears on the screen.

DELETE ALL

Deletes all the directories on one SoftCard or all the files in a selected directory at one time.

DELETE DIRECTORY

Deletes a selected directory from a Memory SoftCard.

- Press the number corresponding to the directory you want deleted.
- Press **DELETE DIRECTORY**.

DELETE TEST

Deletes a selected test.

- Press **DELETE** to display a list of the tests.
- Press the number corresponding to the test to be deleted.
- Press **ENTER** to verify that you want the selected test deleted.
- If the selection is not the one you want deleted, press **EXIT**. When the test has been deleted, an updated list appears on the screen.

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DERIVATIVE

Collects a real-time derivative scan.
Limits: FIRST, SECOND, FOURTH, OFF

- Press the number next to **Derivative** until the desired derivative is displayed.

DEUTERIUM LAMP

Turns the deuterium lamp on or off.

Note:
- A **BUSY** label indicates that the lamp is needed based on the current wavelength setting.

DIRECTORY OPTIONS △

Copies or deletes selected directories at one time.

- Press **DIRECTORY OPTIONS** to list your options.
- Select the function you want to perform and follow the instructions on the screen.

DISPLAY FUNCTIONS △

Accesses labeling and sensitivity parameters for peaks and valleys in the data.

- Press **DISPLAY FUNCTIONS** to list your options.
- Select the parameter you want to define and follow the instructions on the screen.

ENTER



Accepts the highlighted item.

EXIT



Exits the screen currently displayed and accepts any changes made.

FACTOR



Multiplies the calculated three point net absorbance by a factor.

- Press **FACTOR**.
- Enter the desired value.
- Press **ENTER**. The factor appears on the screen.

FILE OPTIONS △

Copies, deletes, renames or locks and unlocks selected files.

- Press **FILE OPTIONS** to list the file options.
- Select the function you want to perform and follow the instructions on the screen.

FIRST DERIVATIVE

Determines the first derivative of the scan data displayed on the screen.

- Select **FIRST DERIVATIVE**. The instrument calculates the derivative and plots the data on the screen.

FORMAT CARD △

Formats a Memory SoftCard.

- Press **FORMAT CARD**. A message appears warning you that formatting a card will destroy its contents.
- Press **ENTER** to the Memory SoftCard in the active card slot.

Notes:
- Memory SoftCards **must** be formatted before they can be used to store information.
- The Memory SoftCard to be formatted must be inserted into one of the card slots and must be the active card.
- The active card is identified in reverse video in the top right-hand corner of the screen. Press **CHANGE CARD** to switch the active card if necessary.

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FOURTH DERIVATIVE

Determines the fourth derivative of the scan data displayed on the screen.

- Select **FOURTH DERIVATIVE**. The instrument calculates the derivative and plots the data on the screen.

GOTO WL



Sets the analytical wavelength.
Limits: 200.0 to 1100.0

Either:

- Press **GOTO WL** and enter the desired analytical wavelength.
- Press **ENTER**.

Or:

- Enter the desired analytical wavelength and press **GOTO WL**.

HI

Indicates that the result is above the specified **High Limit**.

HIGH LIMIT

Enters a value indicating the highest acceptable result.
Limits: -9999 to 9999

- Select **High Limit** and enter the desired value.
- Press **ENTER**.
- Press **EXIT**.

Note:

- If the measured test value is above the specified limit, the message *HI* is displayed next to the measured value.

HIGH SMOOTHING

Removes the effects of noise from the data displayed on the screen.

- Select **HIGH SMOOTHING**. The instrument smooths the data over each 12 nm interval (using moving boxcar averaging) and displays the smoothed data plot on the screen.

INITIATE PLATFORM



Resets the platform to the "home" position. You can use this whenever the position of the platform is in question.

Note:

- The "platform" is the plate on which the 8-Position Multi-Cell Holder is mounted.

INITIATE RS-232-C



Activates the RS-232-C port. It also deactivates the LCD screen and the keyboard of the SPECTRONIC® GENESYS™ spectrophotometer so that you can use an external computer to control the instrument. The *RS-232-C* section of this manual contains more specific information about the RS-232-C interface.

- Press **INITIATE RS-232-C**. A screen appears listing the settings for the RS-232-C parameters, along with the message "RS-232-C port activated."

Note:

- Press **EXIT** at any time to return to the **Main Menu**.

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INSTALL PROGRAM

Installs an application program onto a Memory SoftCard.

- Select **INSTALL PROGRAM** to enter the number of the application program you want to install. When the instrument has installed the selected program, the name of the program appears in the list of application programs. For example, Figure 3-3 shows that the **ADVANCED KINETICS** program was installed on **card B**.

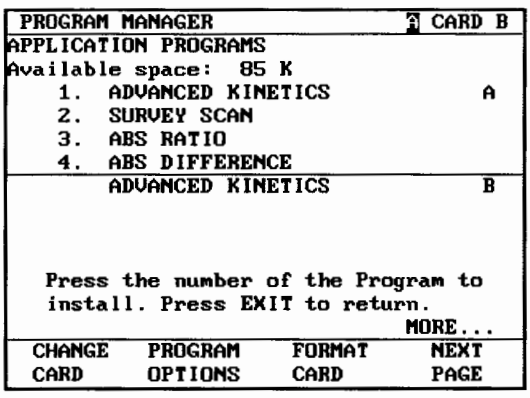


Figure 3-67 *Program Manager screen showing that ADVANCED KINETICS program was installed on **card B***

Note:

- The application program that you want to install on a Memory SoftCard must be on the **active** SoftCard. Use the **CHANGE CARD** soft key to activate the Program SoftCard, if necessary. The application programs on the card will be numbered.

INTERVAL TIME (seconds)

Specifies the length of time between repeat scans (from the beginning of one scan to the beginning of the next scan).
Limits: 0.1 to 999.0 seconds

- Press the number next to **Interval Time** and enter the desired value.
- Press **ENTER**.
- Press **EXIT**.

Note:

- If you set the interval time too low for the instrument to complete its measurement, a warning message will appear while the test is running stating that the interval time has been exceeded. The instrument will collect data as fast as possible, exceeding the total run time if necessary to measure the requested number of samples.

LABEL PEAKS

When ON, the calculated peaks (maxima) of scan data will be displayed. Both the wavelength value and the measurement data (either absorbance or %transmittance) will appear on the data screen.
Limits: ON, OFF

LABEL VALLEYS

When ON, the calculated valleys (minima) of scan data will be displayed. Both the wavelength value and the measurement data (either absorbance or %transmittance) will appear on the data screen.
Limits: ON, OFF

LAMP INTERCHANGE WL

Specifies the wavelength at which the source lamp changes between the tungsten-halogen lamp and the deuterium lamp.
Limits: 320 - 360 nm

- Select **Lamp Interchange WL** and enter the desired value.
- Press **ENTER**.
- Press **EXIT**.

Note:

- To optimize the data, select a wavelength at some distance from the analytical wavelength of the solution you are measuring.

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LANGUAGE

Selects the language to be used for the screen displays.

- Press the number next to **Language** until the name of the appropriate language appears.

Note:
- The instrument supports English, Spanish, French and German as the language options, but the Application SoftCards you are using may not. Contact your Milton Roy distributor for more information about language options.

LINE FEED

Advances the paper in the internal printer (if installed).

Note: The LINE FEED key is located on top of the instrument, next to the internal printer.

LO

Indicates that the result is below the specified **Low Limit**.

LOCK / UNLOCK

"Locks" a test so it can be modified only by someone with the appropriate password. A "key" pictogram appears next to the name of each locked test to indicate that a password is required to modify the test.

- Press **LOCK / UNLOCK**. A screen appears prompting you to enter the password.
- Type the appropriate password and press **ENTER**.
- Press the number corresponding to the test to be locked (or unlocked). The test will be locked (or unlocked).

Note:
- The test in current memory cannot be locked. Only tests that are stored on Memory SoftCards can be locked or unlocked.

LOCK ALL

Locks all the files listed in a selected directory at one time.

LOW LIMIT

Enters a value indicating the lowest acceptable result.
Limits: -9999 to 9999

- Select **Low Limit** and enter the desired value.
- Press **ENTER**.
- Press **EXIT**.

Note:
- If the measured test value is below the specified limit, the message *LO* is displayed next to the measured value.

LOW SMOOTHING

Removes the effects of noise from the data displayed on the screen.

- Select **LOW SMOOTHING** and the instrument smooths the data over each 3 nm interval (using moving boxcar averaging) and displays the smoothed data plot on the screen.

MAIN MENU

Returns you to the GENESYS™ **Main Menu** screen, listing the programs available on your instrument.

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MANUAL ALIGN

Aligns the cell positions manually. The following conditions require manual alignment to ensure proper positioning of the cells in the light beam:

- When only some of the cell positions are defined as SAMPLE
- When an automatic alignment fails on any position
- Press **ALIGN CELLS** to display the **Cell Positions / Platform Alignment** screen.
- Place the cells into the appropriate positions in the cell holder
- Press **MANUAL ALIGN** to display the **Manual Platform Alignment** screen.
- Use the • and • arrow soft keys to select the cell position to be aligned and the • and • arrow soft keys to align the selected position.
- When the maximum value is displayed (number to the right of the cell positions on the screen), press **ENTER**. The maximum value indicates that the cell holder is at the optimum position in the light beam.

Note:

- When **ENTER** is pressed, a "P" should appear in the box for the aligned cell position. **If an "F" appears**, the cell holder was not at the maximum when **ENTER** was pressed. This means that the manual alignment must be repeated on that position.

MANUAL SCALE

Allows you to select a different scale for scan data displayed on the screen.

- Press **MANUAL SCALE** to list the maximum and minimum for both the X- and Y-axes.
- Select the maximum or minimum you want to modify and follow the instructions on the screen.

Note:

- The limits for the maximum and minimum values are determined by the range of values of the instrument.

MATH FUNCTIONS

Performs selected mathematical manipulations on scan data displayed on the screen. The manipulations available include adding/subtracting a constant, adding/subtracting a scan, taking derivatives, smoothing a curve, determining three-point net absorbance for a selected curve and calculating the area under a selected curve.

- Press **MATH FUNCTIONS** to list the mathematical manipulations available.
- Select the function you want to perform and follow the instructions on the screen.

MAX X VALUE

Specifies the maximum value for the X-axis when you are manually scaling scan data.

Note:

- The limit for the maximum value is 1100 nm.

MAX Y VALUE

Specifies the maximum value for the Y-axis when you are manually scaling scan data.

Note:

- The limit for the maximum value is determined by the instrument display range (4A or 200%T).

MEASURE

Begins measuring the sample or standard solution in the cell.

Notes:

- Be sure to load your samples in the cell holder and to close the cover of the sample compartment before pressing **MEASURE**.
- Verify that the accessory parameters (**Auto Increment, Data Collection Type, Auto Initiation, Blank Position**) are set correctly before pressing **MEASURE**. Press **ACC** to access these parameters.

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MEASUREMENT MODE

Specifies whether measurements will be in absorbance or %transmittance.
Limits: ABS, %T

MEDIUM SMOOTHING

Removes the effects of noise from the data displayed on the screen. When you select **MEDIUM SMOOTHING**, the instrument smooths the data over each 6 nm interval (using moving baxcar averaging) and displays the smoothed data plot on the screen.

MIN X VALUE △

Specifies the minimum value for the X-axis when you are manually scaling scan data.
Limit: 200nm

MIN Y VALUE △

Specifies the minimum value for the Y-axis when you are manually scaling scan data.
Limit: -3.0A, 0%T

MINUS (-) [-]

Toggles numerical values between positive and negative.

MODE: A/%T/C △

Selects the test mode (absorbance [A], % transmittance [%T] or concentration [C]).

Notes:

- When concentration mode is selected, the factor and the concentration units (if selected) are also displayed. The factor (1 / ab) is the inverse of the slope of the standard curve. If no units have been selected, a "C" appears next to the concentration value.

MULTIPLY A CONSTANT

Multiplies the scan data displayed on the screen by a constant.
Limits: -999.9 to +999.9

- Select **MULTIPLY A CONSTANT** to enter the constant by which you want to multiply the scan data displayed on the screen. When you enter the constant, the instrument calculates the product and plots the data on the screen.

NEXT PAGE △

Displays the next screenful of a list or other information.

NUMBER KEYS [0] [9]

These keys are used to enter numeric values and to select numbered menu options.

NUMBER OF SAMPLES

Sets the number of samples that will be measured. When the value of this option is greater than one, the instrument automatically positions the cell holder and measures the specified number of samples. When the 8-Position Multi-Cell Holder is installed, one to eight samples may be measured at one time.

- Press the number next to **Number of Samples** and enter the desired value.
- Press **EXIT**.

Notes:

- The limits for the maximum and minimum values are determined by the type of accessory installed. The number of samples may be up to the number of cell positions for the accessory. For example, the Thermoelectric Flowcell has one cell position available, the Thermoelectric Cuvette Holder has two.
- Ensure that the **Number of Samples** is greater than one and that **AutoIncrement** is ON for multiple measurements.

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OPTIMIZE ENERGY

Runs an energy scan of both lamps. You should run an energy scan each time you install a new deuterium or tungsten-halogen lamp. Refer to the *Maintenance* section for specific instructions on running an energy scan.

OVERLAY SCANS

When ON, subsequent scans will be displayed on the same set of axes. Scans are displayed in different colors, with the current scan displayed in white.

PARALLEL

Method of data collection in which the blank is measured immediately before each sample is measured.

PEAK SENSITIVITY

Sets a threshold to indicate where a peak occurs in scan data.

Limits: 0.001 to 3.000

PERIOD

Enters a decimal point for numerical values.

PLOTTER

Selects the external plotter on the RS-232-C (serial) port.

Limits: NONE, HP LASERJET, HPGL PLOTTER

- Press the number next to **Plotter** until the desired selection appears.
- Press **EXIT**.

POST PROCESS

Accesses data manipulation and processing functions available for scan data. The functions available include:

- **SELECT DATA**
- **DISPLAY FUNCTIONS**
- **SCALE FUNCTIONS**
- **MATH FUNCTIONS**

- Press **POST PROCESS** to display the post-processing soft keys at the bottom of the screen.
- Select the function you want to perform and follow the instructions on the screen.

PRINT

Sends screen information or test results to the selected printer (internal or external to the instrument).

PRINTER

Selects the internal printer or an external printer connected to the Centronics®-compatible port.

Limits: NONE, INTERNAL, IBM PROPRINTER II, IBM PROPRINTER III, EPSON FX-850, HP LASERJET

- Press the number next to **Printer** until the desired selection appears.
- Press **EXIT**.

PRINTER PAGE BREAK

Specifies whether or not the printer should perform a formfeed when it reaches the end of a page. (60 lines = 1 page)

Limits: NONE, FORMFEED

- Press the number next to **Printer Page Break** until the desired selection appears.
- Press **EXIT**.

Notes:

- When using the internal printer, you should set **Printer Page Break** to NONE.
- When using an external printer, you may want to set **Printer Page Break** to FORMFEED.

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PROGRAM OPTIONS △

Allows you to install a program, remove a program and check the revision of an application program.

- Press **PROGRAM OPTIONS** to list the program options available.
- Select the function you want to perform and follow the instructions on the screen.

REMOVE PROGRAM

Removes an application program from a Memory SoftCard.

- Select **REMOVE PROGRAM** and enter the number of the application program you want to remove. When the instrument has removed the selected program, the name of the program is removed from the list of application programs.

Note:

- The application program that you want to remove on a Memory SoftCard must be on the **active** SoftCard. Use the **CHANGE CARD** soft key to select the correct SoftCard, if necessary. The application programs on the card will be numbered.

RENAME

Renames a stored test or data file.

- Select **RENAME** to select the file you want to rename. A screen appears prompting you to enter the new filename.
- Use the arrow soft keys to highlight the first character to be used for the filename and press **ENTER** to select it.
- Continue until you have selected all the characters for the data filename, then press **EXIT**.

Notes:

- You may also use the numeric keypad to enter numbers.
- If you make a mistake, press **CLEAR** to remove one character at a time.

RETRY △

Retries a selected operation. This soft key function appears if an error occurs while performing an operation.

- Press **RETRY** to try the operation again.

RS-232-C BAUD RATE

Specifies the speed at which the instrument will transmit data.
Limits: 300, 1200, 2400, 4800, 9600

- Press the number next to **RS-232-C Baud Rate** until the desired value appears.
- Press **EXIT**.

RS-232-C DATA BITS

Specifies the number of data bits for the RS-232-C interface.
Limits: 7 or 8

- Press the number next to **RS-232-C Data Bits** until the desired value appears.
- Press **EXIT**.

RS-232-C PARITY

Specifies the parity for the RS-232-C interface.
Limits: NONE, EVEN, ODD

- Press the number next to **RS-232-C Parity** until the desired value appears.
- Press **EXIT**.

RS-232-C TERMINATOR

Specifies the terminator for the RS-232-C interface.
Limits: CR, LF, CRLF

- Press the number next to **RS-232-C Terminator** until the desired value appears.
- Press **EXIT**.

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SAMPLE ID



Changes or enters a new alphanumeric sample identifier.

- Press **SAMPLE ID** to display the **Sample I.D. Input** screen.
- Use the arrow soft keys to highlight the first character to be used for the sample ID and press **ENTER** to select it.
- Continue until you have selected all the characters for the sample ID, then press **EXIT**.

Notes:

- The ID can be up to 10 characters (alphabetic or numeric), but the ID must be completely numeric if you want the ID to increment automatically as sample measurements are taken.
- You may also use the numeric keypad to enter numbers.
- If you make a mistake, press **CLEAR** to remove one character at a time.
- To assign a preset label instead of a sample ID, use the arrow "soft" keys to highlight the appropriate label. The preset label will appear in the "Entry:" field after it has been highlighted and entered.

SAVE DATA



Saves scan data to a Memory SoftCard.

- Press **SAVE DATA** to display the **DATA FILENAME Input** screen.
- Use the arrow soft keys to highlight the first character to be used for the data filename and press **ENTER** to select it.
- Continue until you have selected all the characters for the data filename, then press **EXIT**. The instrument saves the data to the Memory SoftCard installed in the card slot.

Notes:

- You may also use the numeric keypad to enter numbers.
- If you make a mistake, press **CLEAR** to remove one character at a time.

SAVE TEST



Saves a test to a Memory SoftCard that has been formatted. Accessory parameters, including the alignment, are saved when the test is saved.

When you press **SAVE TEST**, a message appears, indicating that the test has been saved. The test name and date the test was saved are displayed on the screen.

Notes:

- *One* test is stored in the instrument itself. This stored test is the last test loaded before the instrument was powered down.
- A Memory SoftCard must be inserted into one of the card slots and must be the active card.

SCALE FUNCTIONS



Allows you to select the data mode (absorbance or % transmittance, change the scale (manually or automatically) or use a cursor line to obtain the absorbance value for selected points on the displayed curve.

SCAN



Initiates a scan of the sample in the cell.

Note:

- Be sure to load your samples in the cell holder and to close the cover of the sample compartment before pressing **SCAN**.

SECOND DERIVATIVE

Determines the second derivative of the scan data displayed on the screen.

- Select **SECOND DERIVATIVE**. The instrument calculates the derivative and plots the data on the screen.

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SELECT SCAN

Selects which set of data will be used for any post-processing functions. The selected scan is displayed in white.

- Press **SELECT SCAN** to switch from one data set to another until the appropriate set is displayed in white.

SELECT UNITS

Specifies the units to be used for concentration measurements.

- Select **SELECT UNITS** to access the **UNITS SELECTION** screen, displaying the current list of concentration units. You may also **ADD**, **DELETE** and **CHANGE** units from this screen.

SERIAL

Method of data collection in which the blank is measured once, then each sample is measured.

SET CONC. AND ABS.

Enters the concentration of a standard and its absorbance.

- Select **Set Conc. and Abs.** to enter the concentration of your standard (**Limits:** ±29997.0).
- Enter the absorbance of the standard (**Limits:** ±3.0). The calculated factor appears on the **FACTOR / STANDARD SETUP** screen.

SET CONC. AND MEASURE ABS.

Enters the concentration of a standard and its absorbance.

- Select **Set Conc. and Measure Abs.** to enter the concentration of your standard (**Limits:** ±29997.0).
- Insert the cell containing the standard solution into the cell holder and press **MEASURE**. When the measurement is complete, the calculated factor appears on the **FACTOR / STANDARD SETUP** screen.

SET FACTOR

Enters the factor to be used when taking measurements in concentration mode. A factor (1 / ab) is the inverse of the slope of the concentration curve. It is used to obtain the concentration of an unknown solution by multiplying the absorbance of the solution by the value of the factor.
Limits: ±9999.00

- Press the number next to **Set Factor** and enter the desired value.
- Press **ENTER**.
- Press **EXIT**.

SET FACTOR/STANDARD

- Sets a factor
- Sets the concentration and measures the absorbance of a standard
- Sets the concentration and absorbance of a standard
- Selects the concentration units to be used for results

- Press **SET FACTOR/STANDARD** to display the **FACTOR/STANDARD SETUP** screen.
- Select the function you want to perform and follow the instructions on the screen.

SETUP TESTS

Accesses the application program set-up screen, allowing you to enter instrument and test parameters for the current test, save a test or format a Memory SoftCard.

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SHOW PROGRAM REVISION

Displays the revision level of an application program.

- Select **Show Program Revision** to enter the number of the application program whose revision level you want to check.

START WAVELENGTH

Enters the value of the minimum wavelength for the scan.
Limits: 200.0 to 1100.0 nm

STOP TEST

Interrupts the test that the instrument is running.

STOP WAVELENGTH

Enters the value of the maximum wavelength for the scan.
Limits: 200.0 to 1100.0 nm

SUBTRACT A SCAN

Subtracts scan data from a selected scan from the scan data displayed on the screen.

- Select **Subtract a Scan** to list the data files stored on the active card.
- Select the data file containing the data you want subtracted from the scan data displayed on the screen. The instrument subtracts the data and plots the data on the screen.

TABULAR

Switches between tabular and graphical displays of scan data. Tabular data includes wavelength and data value.

TANGENT/BASELINE

Switches between the tangent and baseline methods for calculating the area under a curve for scan data. See Figure 3-2 in **AREA UNDER CURVE** for more information about the two calculation methods.

TEST NAME

Specifies a name to be used for a selected set of test parameters.

- Select **Test Name** to display the **TEST NAME Input** screen appears.
- Use the arrow soft keys to move the cursor around the screen to select each character, then press **ENTER**.
- When you have selected all the characters, press **EXIT**.

Notes:
- A maximum of eight characters may be selected.
- You may also use the numeric keypad to enter numbers.
- If you make a mistake, press **CLEAR** to remove one character at a time.

TEST/DATA

Switches between test files and data files in a selected directory.

TEST TYPES

TEST TYPES

Loads a specific stored test from a Memory SoftCard or from the instrument. It also allows you to delete and lock/unlock tests.

- Press **TEST TYPES** to display the **TEST TYPES** screen.
- Select the function you want to perform and follow the instructions on the screen.

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THREE POINT NET

Determines the absorbance of a sample at three wavelengths and calculates the peak height relative to a calculated baseline.

The Three Point Net Absorbance analysis is used to correct for the effects of a broad sloping baseline on a peak height calculation. Figure 3-5 shows an example of this type of curve.

The baseline corrected absorbance for the sample is calculated using the following equation:

$$\text{Baseline corrected absorbance} \quad A_2 \left(A_3 \quad ([A_1 \quad A_3] \quad \frac{3 \quad 2}{3 \quad 1}) \right)$$

where:

A = Absorbance
λ_1 = Base wavelength 1
λ_2 = Peak wavelength
λ_3 = Base wavelength 2

- Select **Three Point Net** to display a cursor line to help you select the wavelengths for the calculation.
- Press the • soft key to move the cursor line to the first wavelength or use the numeric keypad to type the wavelength, then press **ENTER** to select the first wavelength.
- Repeat for the other two wavelengths. The calculated 3-point net absorbance and the baseline for the selected curve appear on the screen.

Notes:

- As you move the cursor line, the current wavelength and data value are displayed below the X-axis.
- If you wish to multiply the calculated 3-point net absorbance by a factor, press **FACTOR**, type in its value and press **ENTER**. The factor appears on the screen.

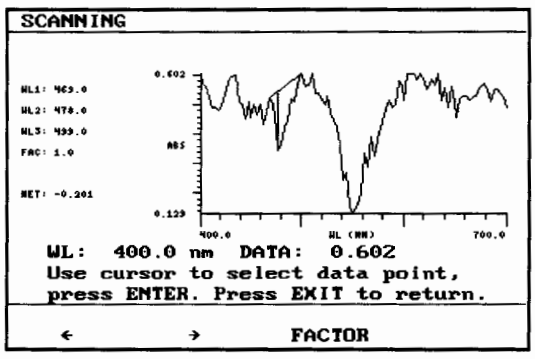


Figure 3-68 *Three point net absorbance screen with calculation*

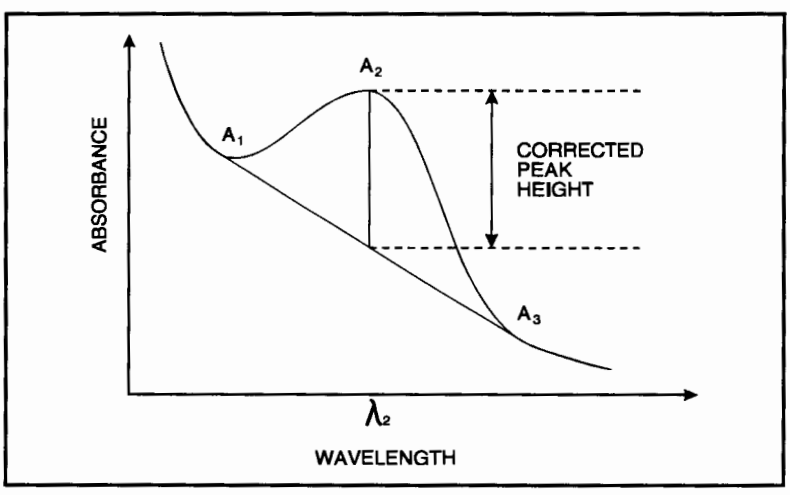


Figure 3-69 *3-Point Net Absorbance sample curve*

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TIME

Specifies the current time.

Note:

- Use military format (*HHMM* using a 24-hour clock; *H* = hours, *M* = minutes); e.g., to enter 7:30 a.m., type *0730*; to enter 7:30 p.m., type *1930*

TOTAL RUN TIME

Specifies the total time for data collection.
Limits: 0.0 to 99999.0 seconds

TRANSFER ALL

Transfers all selected files to the selected format (ASCII or Lotus) at one time. Refer to ***Transferring files in ASCII or Lotus format*** in the *Operation* section for instructions on transferring files.

TRANSFER TO ASCII FORMAT

Transfers selected file(s) to ASCII format (suitable for importing into a word processing program). Refer to ***Transferring files in ASCII or Lotus format*** in the *Operation* section for instructions on transferring files.

TRANSFER TO LOTUS FORMAT

Transfers selected file(s) to Lotus format (suitable for importing into a spreadsheet program). Refer to ***Transferring files in ASCII or Lotus format*** in the *Operation* section for instructions on transferring files.

TUNGSTEN LAMP

Turns the tungsten lamp on or off.

Note:

- A **BUSY** label indicates that the lamp cannot be turned off based on the current wavelength setting.

UNLOAD ALL

Unloads all the scan data that is currently displayed.

UNLOAD DATA

Removes selected scan data from the scan data that is currently displayed.

- Press **UNLOAD DATA** to list the scan data files currently displayed.
- Press the number corresponding to the scan data you want removed from the scan data displayed on the screen. When you return to the display screen, the selected scan data will not appear.

UNLOCK ALL

Unlocks all the files listed in a selected directory at one time.

UTILITY

UTILITY

Accesses selected instrument functions (lamp interchange wavelength, time/date settings, language, turning lamps on and off, printer/plotter devices, parameters for RS-232-C port).

- Press **UTILITY** to display the **UTILITIES** screen.
- Select the function you want to perform and follow the instructions on the screen.

VALLEY SENSITIVITY

Sets a threshold to indicate where a valley occurs in scan data.
Limits: 0.001 to 3.000

WAVELENGTH

Enters a value for the analytical wavelength, in nanometers.
Limits: 200.0 to 1100.0 nm

- Press the number next to **Wavelength** and enter the desired value.
- Press **EXIT**.

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Accessories

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Section 4 - Accessories

General Information

Your SPECTRONIC® GENESYS™ spectrophotometer supports a variety of accessories, including sample-handling accessories, data-handling accessories (SoftCards), printers, plotters and external computers. The *Accessory Guide* (inserted at the end of this section) describes the sample-handling and data-handling accessories in detail, including part numbers, related accessories and ordering information.

This section describes how to remove the 8-Position Multi-Cell Holder and install other cell holder accessories in the sample compartment.

It also describes the printer and plotters that you can use with your SPECTRONIC® GENESYS™ spectrophotometer and how to install them. Finally, this section includes instructions for connecting an external computer to your instrument. The RS-232-C interface is described separately in the *RS-232-C Interface* section.

Cell Holder Platform

The Cell Holder Platform (335626) is available as an accessory and it can accommodate the following cell holders:

- Up to eight standard Single Cell Holders (336028)
- Up to four Rectangular (335112) or Cylindrical (336012) Longpath Cell Holders
- Up to four Thermal Blocks (335079)
- Up to four Adjustable Filter Holders (336017)
- Up to four Test Tube Holders (336014)

Information on using cell holders other than the 8-Position Multi-Cell Holder is included in the *Accessory Guide*.

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 various cell holders on the Cell Holder Platform. Refer to the *Accessory Guide* for more information.

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8-Position Multi-Cell Holder

The standard cell holder for the SPECTRONIC® GENESYS™ is the 8-Position Multi-Cell Holder which comes installed in the instrument. However, it can easily be removed to install other accessories.

Removing the 8-Position Multi-Cell Holder

1. Open the sample compartment and let the sample compartment door rest on its hinge.
2. With one hand, pinch the cell holder retainer spring at the front of the instrument platform.
3. With the other hand, pull up on the 8-Position Multi-Cell Holder and lift it out of the sample compartment (Figure 4-1).

Replacing the 8-Position Multi-Cell Holder

1. Align the 8-Position Multi-Cell Holder on the platform with the pin located at the far end of the instrument platform.
2. Pinch the cell holder retainer spring and push the 8-Position Multi-Cell Holder down onto the instrument platform.
3. Align the 8-Position Multi-Cell Holder as described in the *Setting up the Instrument* section.

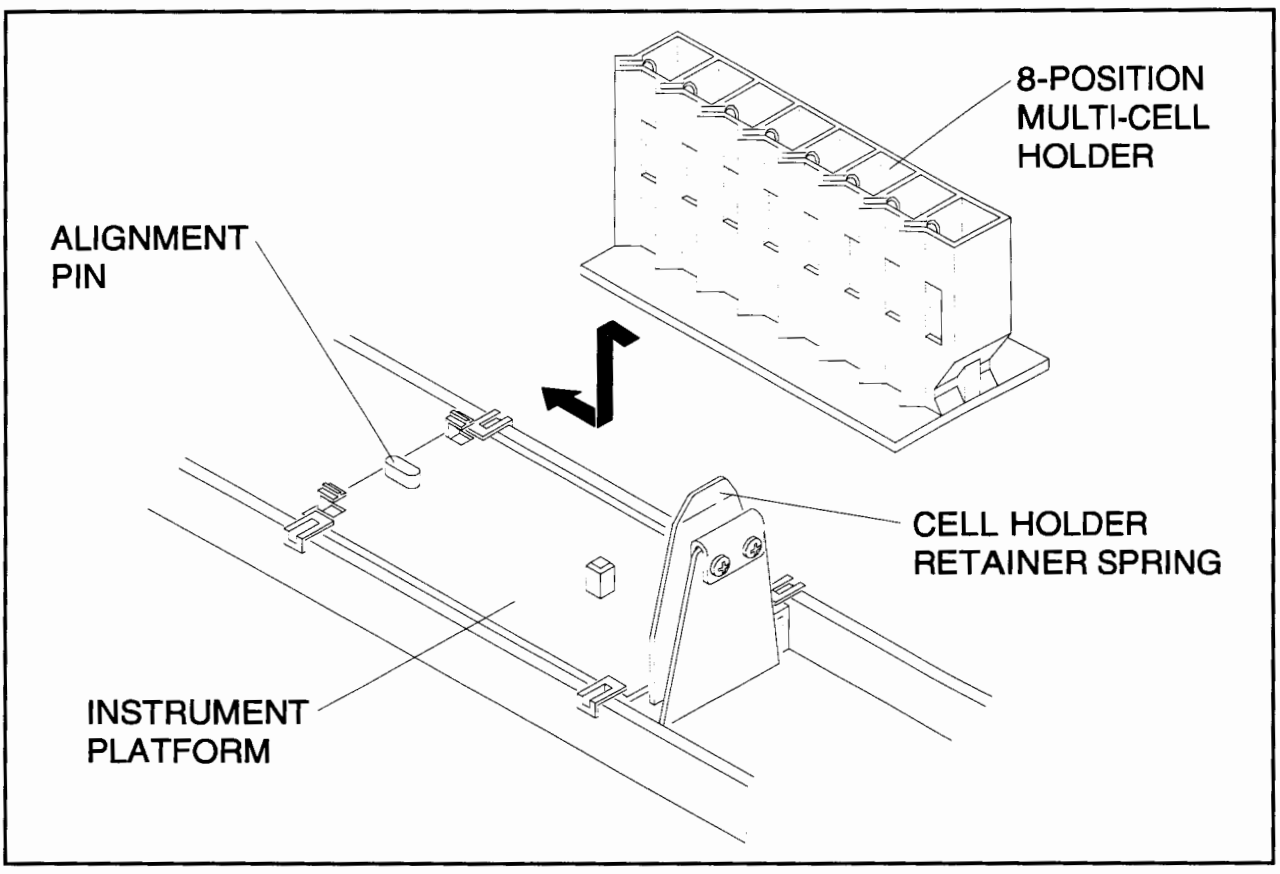


Figure 4-97 Removing / Replacing the 8-Position Multi-Cell Holder

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Installing accessory cell holders

1. Remove the 8-Position Multi-Cell Holder from the sample compartment as described in *Removing the 8-Position Multi-Cell Holder*.
2. Install the desired accessory cell holders on the Cell Holder Platform (335626) by tightening the set screw on each cell holder.
3. After installing the cell holders on the Cell Holder Platform (Figure 4-2), align the Cell Holder Platform on the instrument platform with the pin located at the far end of the platform.
4. Pinch the cell holder retainer spring and push the Cell Holder Platform down onto the instrument platform.
5. Manually align the cell holder positions (see **MANUAL ALIGN** in the *Dictionary* section).

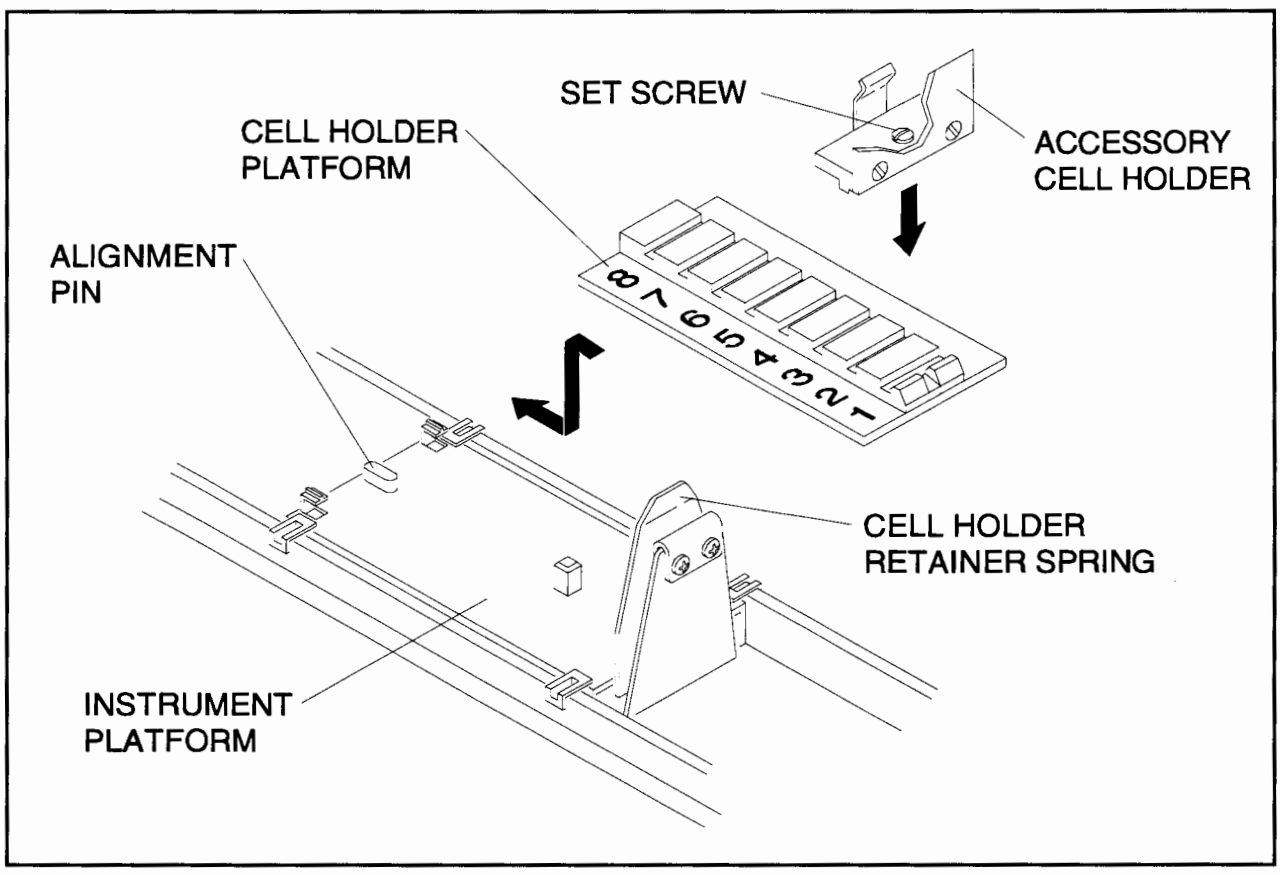


Figure 4-98 Installing Cell Holders on the Cell Holder Platform

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Printers / Plotters

Two accessory printers are available from Milton Roy for the SPECTRONIC® GENESYS™ spectrophotometer - one is internal and the other is external to the instrument. The SPECTRONIC® GENESYS™ supports various printers which can be connected through the parallel port on the back of the instrument. See page 4-7 for more information.

In addition, the SPECTRONIC® GENESYS™ enables you to plot data on a plotter connected to the serial port on the back of the instrument. See page 4-7 for more information.

Internal printer

The internal printer (336088) is installed in the instrument and supports both text and graphics. Print resolution is equal to the display resolution of the instrument (320 x 240 pixels). Shown in Figure 4-3, the internal printer uses paper that is 112 mm wide.

- *To install the internal printer*, see the following instructions.
- *To print*, press the **PRINT** key on the keyboard.
- *To advance the paper*, press the **Line Feed** key on the printer.

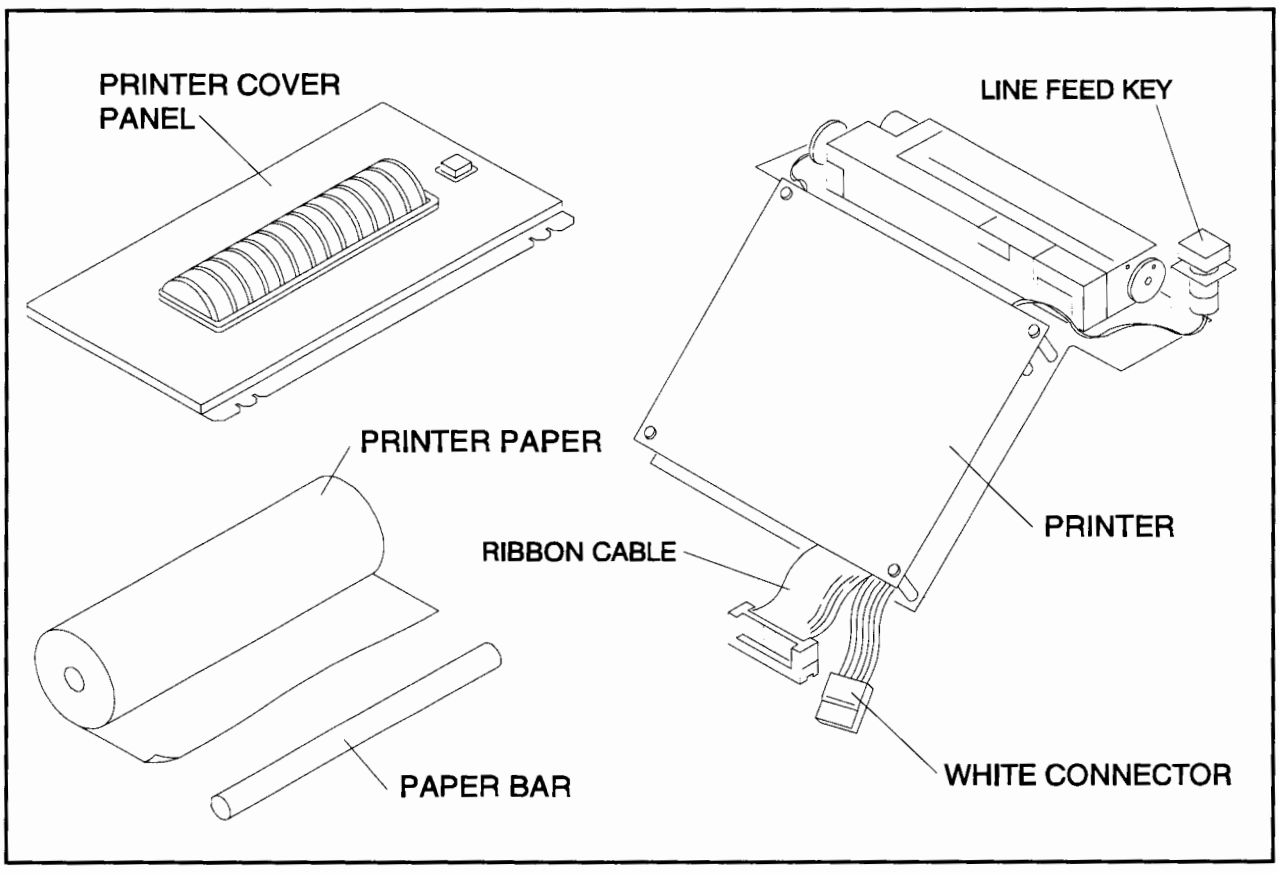


Figure 4-99 Internal Printer (336088)

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Installing the internal printer

WARNING

Turn off the instrument and disconnect the power cord from the outlet before installing

1. Turn off the instrument and disconnect the power cord.
2. With a flat-blade screwdriver, lift the printer cover (see foldout) and remove it from the instrument.
3. Unfold the two cables located under the panel (Figure 4-4).
4. Connect the ribbon cable (20-pin) to the ribbon cable connector on the printer (Figure 4-3).
5. Connect the white connector (4-pin) to the white connector on the printer (Figure 4-3).
6. Slide the printer, with the printer head on top and the circuit board facing the front, into the instrument cover slot.

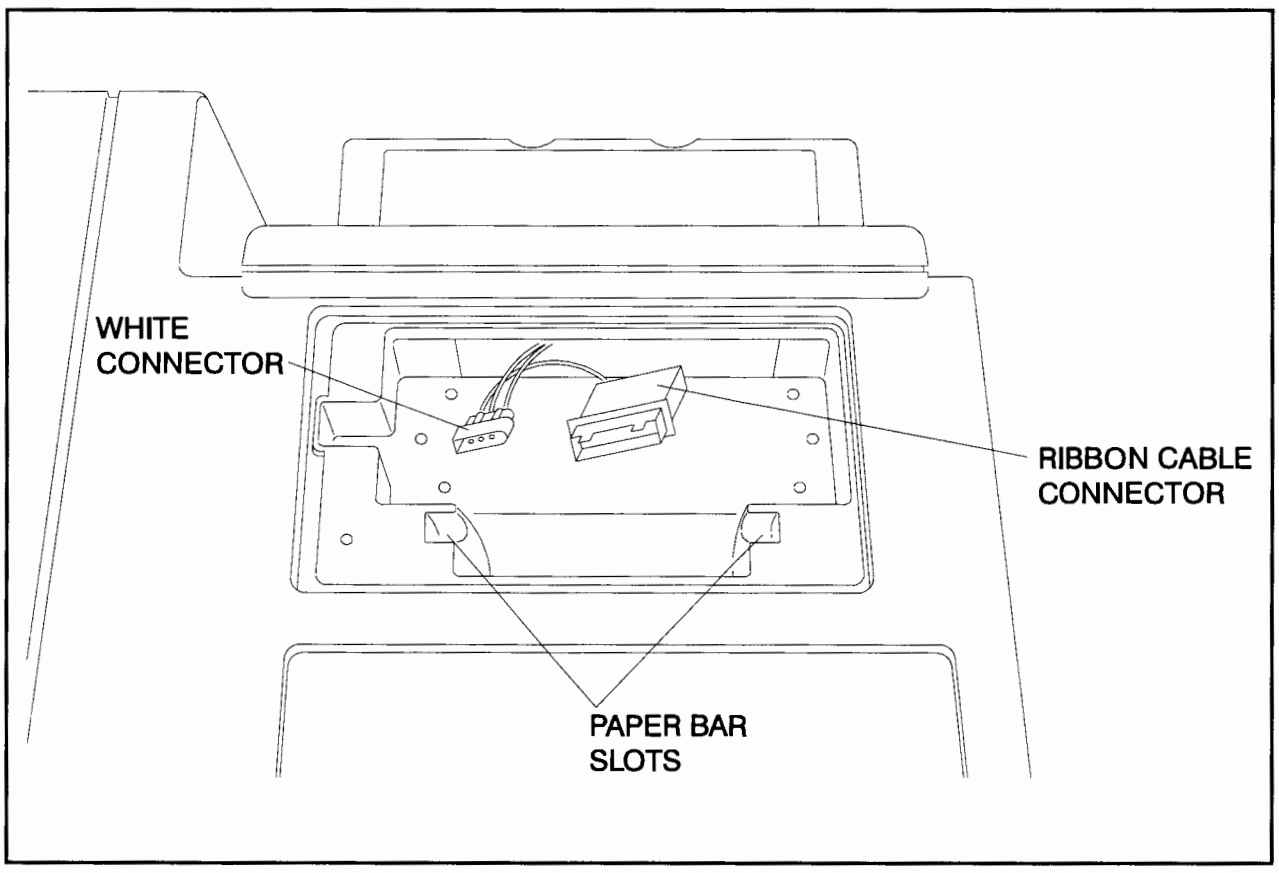


Figure 4-100 *Location of cables under the panel for the Internal Printer (336088) • viewed from the rear of the instrument*

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7. With a Phillips screwdriver, tighten the two captive screws (Figure 4-5) on either side of the printer.
8. Plug the power cord into the outlet and turn on the power switch.
9. Cut the paper at the end of the roll in a "V" to make a point at the end of the paper.
10. Carefully feed the printer paper (from the bottom of the paper roll; shiny side down) into the back of the printer using the **Line feed** key on the printer.
11. Place the printer paper on the paper bar and place the paper bar in the appropriate slot on the printer compartment (Figure 4-4).
12. When the paper is installed, thread the paper through the panel slot in the printer cover panel and snap the printer cover panel back into the instrument cover.
13. With the **Acquisition** screen displayed, press the **UTILITY** key.
14. With the **UTILITIES** screen displayed, press the **NEXT PAGE** "soft" key.
15. Press the number next to **Printer** until **INTERNAL** appears.
16. Press **EXIT** to return to the **Acquisition** screen.
17. To test the printer, press the **PRINT** key on the keyboard.

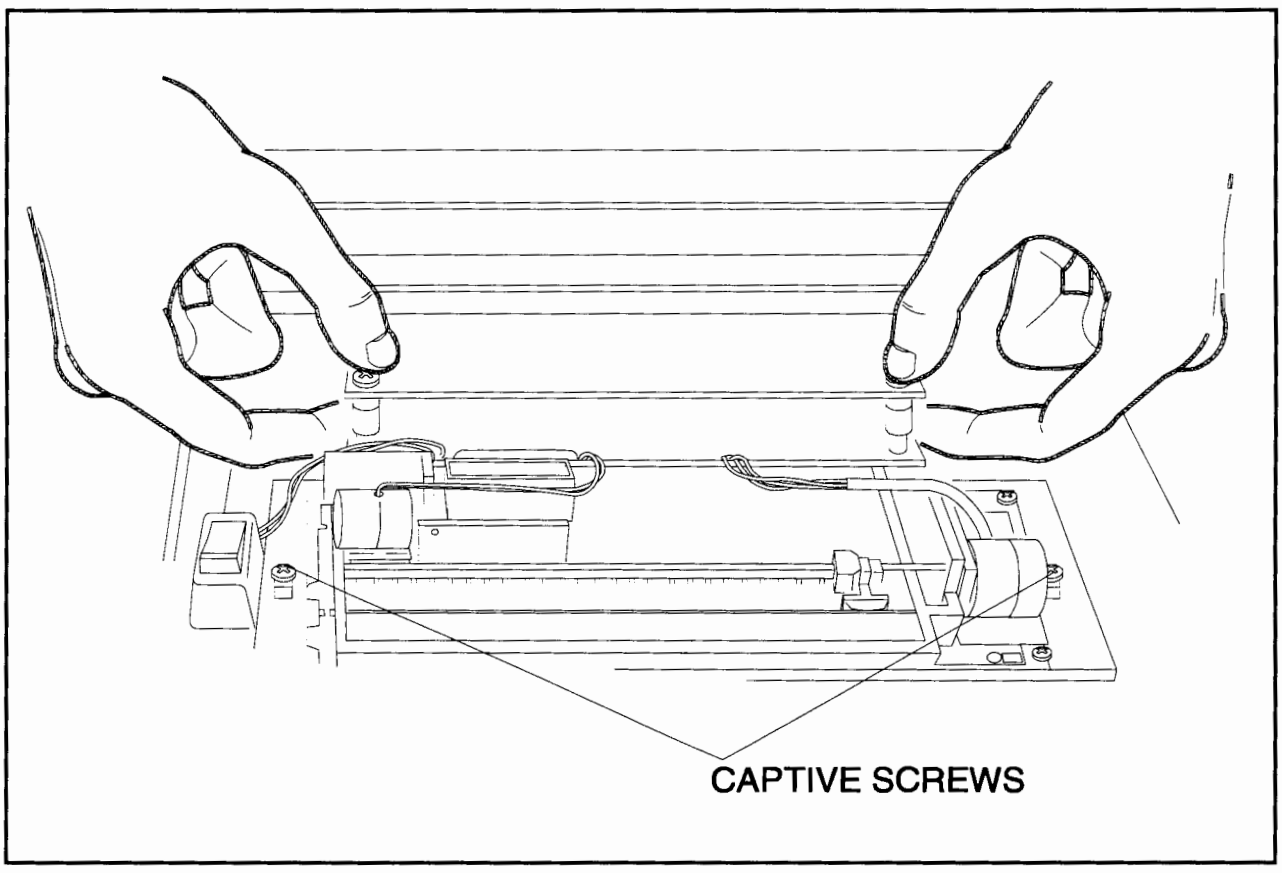


Figure 4-101 Inserting the Internal Printer (336088) • viewed from the rear of the instrument

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External printers

When connected to the parallel printer port of the instrument, the accessory external dot-matrix printer (335644) supports both text and graphics.

The instrument also supports these printers:
- IBM Proprinter II
- IBM Proprinter III
- Epson FX-850
- HP Laserjet

Installing an external printer

To connect an external printer, connect the printer cable (336044) to the Centronics®-compatible printer port (parallel printer port) on the back of the instrument (see foldout).

1. Press **UTILITY**, then **NEXT PAGE** to display the printer option.
2. Press the number next to **Printer** until the name of the appropriate printer appears. Selected printers support both high and low resolution options. When you select "high" resolution, the printing may take a little longer than "low" resolution.
3. Set **Printer Page Break** to FORMFEED or NONE. When set to FORMFEED, a page break is sent after 60 lines are printed.
4. Press **EXIT** to return to the **Acquisition** screen.
5. Turn on the printer, set the top of form and turn the printer on line.
6. To test the printer, press **PRINT** on the keyboard.

Notes:
- When installing an **IBM ProPrinter II**, be sure that **DIP switch 6** is set to **ON**. (Please refer to the manufacturer's instructions for more information.)
- The **Epson FX-870** is supported in **IBM Emulation mode**. (See manufacturer's instructions for more information.)
- Laserjet printers store all characters until a formfeed is received. Either press the formfeed on the Laserjet printer or set the **Printer Page Break** to FORMFEED.

External plotters

Your SPECTRONIC® GENESYS* supports single-color plots, regardless of the capability of the plotter. For color plotters, the first available pen will be used. The SPECTRONIC® GENESYS* supports the following plotters:
- HP Laserjet - all series supporting HPGL
- HP Color Plotter 7440A using HPGL
- Generic HPGL format plotter

Installing an external plotter

1. Press **UTILITY**, then **NEXT PAGE** to display the plotter option.
2. Press the number next to **Plotter** until the name of the appropriate plotter appears.
3. Press **EXIT** to return to the **Acquisition** screen.
4. To test the plotter, press **PRINT** on the keyboard.

External computers

To connect an external computer, connect the computer cable to the 9-pin RS-232-C port on the back of the instrument (see foldout).
- To connect the SPECTRONIC® GENESYS* to an IBM AT, use a DB9 pin (female) to DB9 pin (female) interface cable (336042).
- To connect the SPECTRONIC® GENESYS* to an IBM PC/XT or P/S2 models, use a DB9 pin (female) to DB25 pin (female) interface cable (336041).
- To connect the SPECTRONIC® GENESYS* to an Apple computer, use a DB9 pin (female) to DB25 pin (male) interface cable (345002-111) and a DB25 pin (female) to DB25 pin (male) straight-connect interface cable. (You can obtain the straight-connect cable from your local computer store.)

Refer to the *RS-232-C Interface* section for information about using an external computer with your SPECTRONIC® GENESYS* spectrophotometer.

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CONFIGURATIONS AVAILABLE FOR USE WITH THE SPECTRONIC® GENESYS™ SERIES SPECTROPHOTOMETERS

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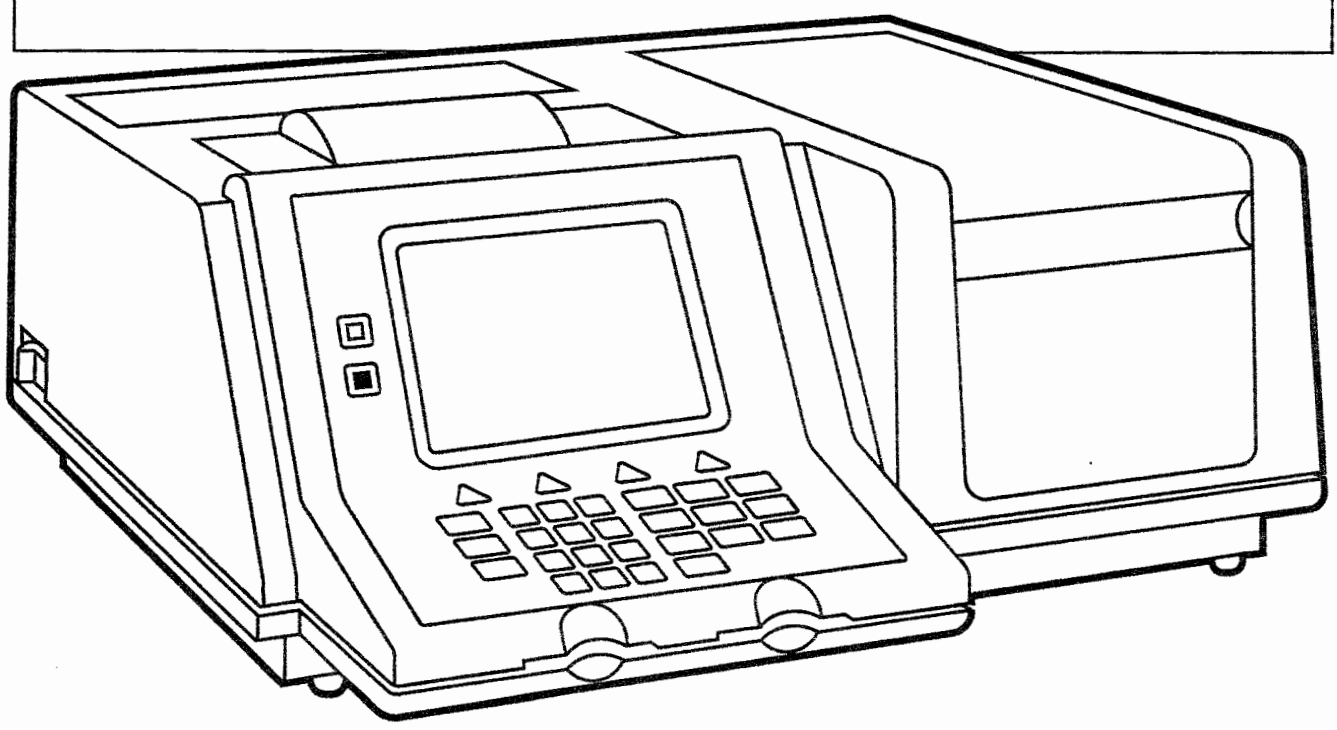
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10mm PATHLENGTH CUVETTES/MULTIPLE CUVETTES



10mm Pathlength
Square Cuvette
#331742 Quartz
#331709
Optical Glass

OR



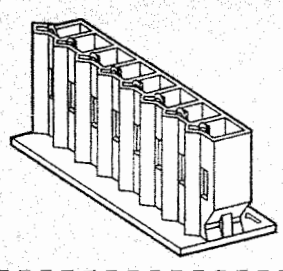
10mm Pathlength
Test Tube
#331775
Optical Glass

OR

Any Cuvette Measuring 12.5mm W x 12.5mm D and up to 88mm H, with a Z-Dimension of 8.5mm

Requires

Accommodates up to 8 Cells



Standard 8-Position Multi-Cell Holder
#336027

OR



10mm Pathlength
Square Cuvette
#331742 Quartz
#331709
Optical Glass

OR



10mm Pathlength
Test Tube
#331775
Optical Glass

OR

Any Cuvette Measuring 12.5mm W x 12.5mm D and up to 88mm H, with a Z-Dimension of 8.5mm

Requires

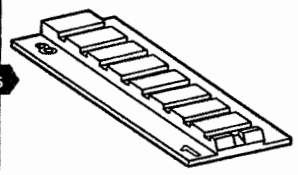
Accommodates 1 Cuvette



Single Cell
Holder
#336028

Requires

Accommodates up to 8 Holders



Cell Holder Platform
#335626

2

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10mm PATHLENGTH CUVETTES/SINGLE CUVETTES



10mm Pathlength
Square Cuvette
#331742 Quartz
#331709
Optical Glass

OR



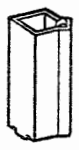
10mm Pathlength
Test Tube
#331775
Optical Glass

OR

Any Cuvette Measuring 12.5mm W x 12.5mm D and up to 88mm H, with a Z-Dimension of 8.5mm

Requires

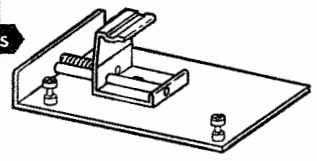
Accommodates 1 Cuvette



Single Cell
Holder
#336028

Requires

Accommodates 1 Holder



Adjustable
Cell Holder Platform
#336016

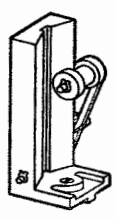
OR



10mm Pathlength
Test Tube
#331775
Optical Glass

Requires

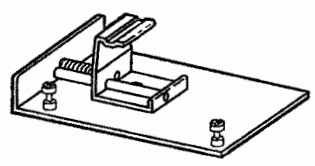
Accommodates 1 Test Tube



Test Tube Holder
#336014

Requires

Accommodates 1 Holder



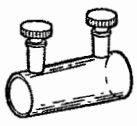
Adjustable
Cell Holder Platform
#336016

3

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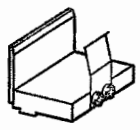
LONG PATHLENGTH CUVETTES/MULTIPLE CUVETTES



Cylindrical Cell
Quartz
50mm Pathlength #331768
100mm Pathlength #331769
Optical Glass
50mm Pathlength #331731
100mm Pathlength #331732
or Other Cylindrical Cells
Between 10 and 100mm in Length

Requires

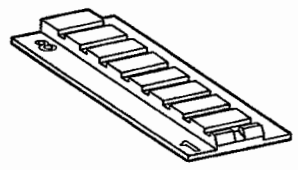
Accommodates 1 Cell



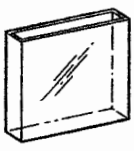
Cylindrical Longpath
Cell Holder
#336012

Requires

Accommodates up to 4 Holders



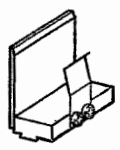
Cell Holder Platform
#335626



Rectangular Cell
Quartz
50mm Pathlength #331734
100mm Pathlength #331767
Optical Glass
50mm Pathlength #331733
100mm Pathlength #331766
or Other Rectangular Cells
Between 10 and 100mm in Length

Requires

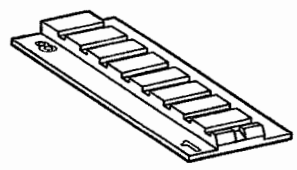
Accommodates 1 Cell



Rectangular Longpath
Cell Holder
#335112

Requires

Accommodates up to 4 Holders



Cell Holder Platform
#335626

Test Tube (Optical Glass)
20mm Pathlength #331777
or Other Test Tubes
up to 25mm in Diameter

Requires

Accommodates 1 Test Tube

Test Tube Holder
#336014

Requires

Accommodates up to 4 Holders

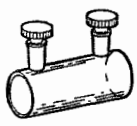


Cell Holder Platform
#335626

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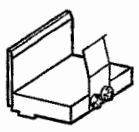
LONG PATHLENGTH CUVETTES/SINGLE CUVETTES



Cylindrical Cell
Quartz
50mm Pathlength #331768
100mm Pathlength #331769
Optical Glass
50mm Pathlength #331731
100mm Pathlength #331732
or Other Cylindrical Cells
Between 10 and 100mm in Length

Requires

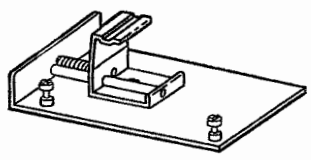
Accommodates 1 Cell



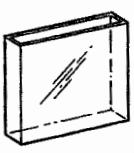
Cylindrical Longpath
Cell Holder
#336012

Requires

Accommodates 1 Holder



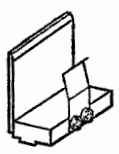
Adjustable
Cell Holder Platform
#336016



Rectangular Cell
Quartz
50mm Pathlength #331734
100mm Pathlength #331767
Optical Glass
50mm Pathlength #331733
100mm Pathlength #331766
or Other Rectangular Cells
Between 10 and 100mm in Length

Requires

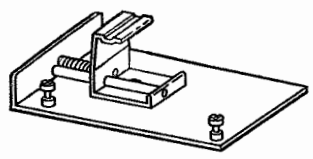
Accommodates 1 Cell



Rectangular Longpath
Cell Holder
#335112

Requires

Accommodates 1 Holder



Adjustable
Cell Holder Platform
#336016



Test Tube (Optical Glass)
20mm Pathlength #331777
or Other Test Tubes
up to 25mm in Diameter
and up to 152mm Tall

Requires

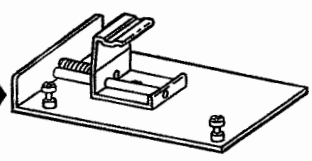
Accommodates 1 Test Tube



Test Tube Holder
#336014

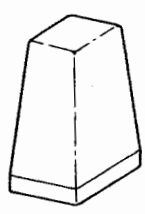
Requires

Accommodates 1 Holder



Adjustable
Cell Holder Platform
#336016

Optional

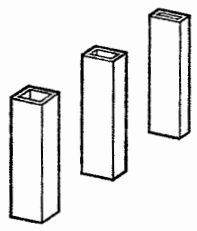


Light Shield
#336015
(For Tubes 88 to
152mm Tall)

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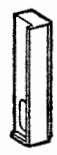
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SHORT PATHLENGTH CUVETTES/MULTIPLE CUVETTES



Customer Supplied
1, 2, or 5mm
Pathlength Cuvette

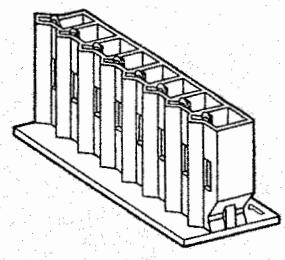
Requires



5mm Spacer
#336029 or
8/9mm Spacer
#336030

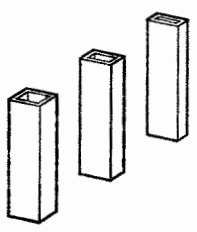
Requires

Accommodates up to
8 Cells with Spacers



Standard 8-Position Multi-Cell Holder
#336027

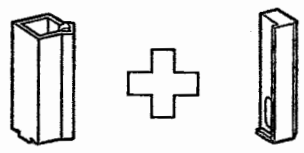
OR



Customer Supplied
1, 2, or 5mm
Pathlength Cuvette

Requires

Accommodates
1 Cuvette with Spacer

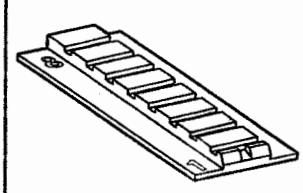


Single Cell Holder
#336028

5mm Spacer
#336029 or
8/9mm Spacer
#336030

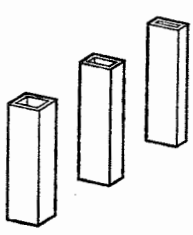
Requires

Accommodates
up to 8 Holders



Cell Holder Platform
#335626

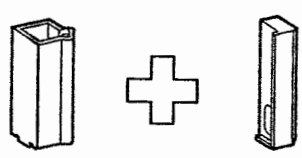
SHORT PATHLENGTH CUVETTES/SINGLE CUVETTES



Customer Supplied
1, 2, or 5mm
Pathlength Cuvette

Requires

Accommodates
1 Cuvette with Spacer

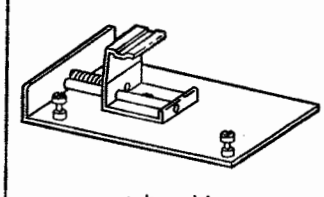


Single Cell Holder
#336028

5mm Spacer
#336029 or
8/9mm Spacer
#336030

Requires

Accommodates
1 Holder



Adjustable
Cell Holder Platform
#336016

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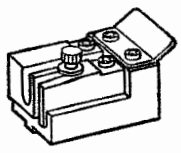
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FILTERS/MULTIPLE FILTERS

Customer Supplied
Glass or Plastic Filters
up to 305mm Long x
80mm Tall x 10mm Thick

Minimum Dimensions of
1cm Square and
Thickness of 1mm

Requires

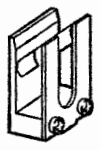


Adjustable Filter Holder
#336017

OR

Customer Supplied
Glass or Plastic
Filters/Lenses
from 1mm to 8mm Thick

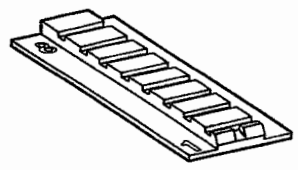
Requires



Filter Holder
#335428

Requires

Accommodates
up to 4 Holders



Cell Holder Platform
#335626

FILTERS/SINGLE FILTERS

Customer Supplied
Glass or Plastic Filters
up to 305mm Long x
80mm Tall x 10mm Thick

Minimum Dimensions of
1cm Square and
Thickness of 1mm

Requires

Adjustable Filter Holder
#336017

OR

Custamer Supplied
Glass or Plastic
Filters/Lenses
from 1mm to 8mm Thick

Requires

Filter Holder
#335428

Requires

Accommodates
1 Holder

Adjustable
Cell Holder Platform
#336016

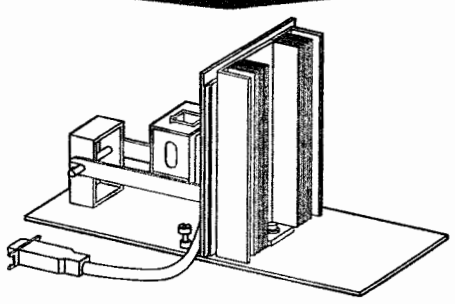
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TEMPERATURE CONTROLLED APPLICATIONS
THERMOELECTRIC CONTROL

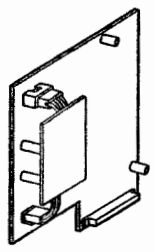
TEMPERATURE RANGE 25-40°C

Accommodates 1 Cuvette

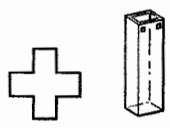


One-Position Thermoelectric Cell Holder
#336024

Requires

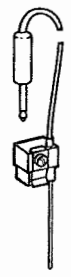


Accessory Board Kit #336081



10mm Pathlength Square Cuvette #331742 Quartz #331709 Optical Glass

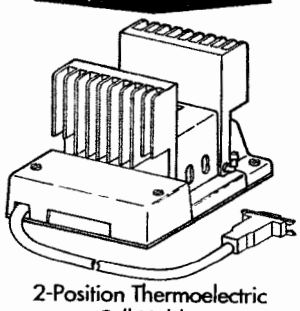
Optional



Temperature Probe #336040

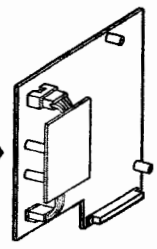
TEMPERATURE RANGE 8° BELOW AMBIENT-60°C

Accommodates up to 2 Cuvettes

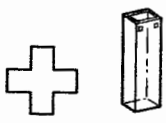


2-Position Thermoelectric Cell Holder
#336025

Requires



Accessory Board Kit #336081

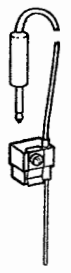


10mm Pathlength Square Cuvette #331742 Quartz #331709 Optical Glass

Optional

CUSTOMER SUPPLIED EXTERNAL WATER BATH (Required Only If Using Above 50°C or Below 15°C).

Optional



Temperature Probe #336040

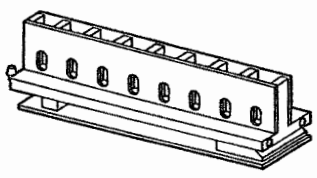
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TEMPERATURE CONTROLLED APPLICATIONS
WATER BATH CONTROL

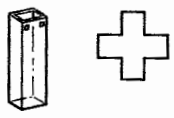
TEMPERATURE RANGE 4-80°C

Accommodates up to 8 Cuvettes



8-Position Water Jacketed Cell Holder #336079

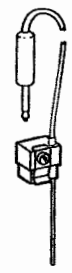
Requires



10mm Pathlength Square Cuvette #331742 Quartz #331709 Optical Glass

CUSTOMER SUPPLIED EXTERNAL WATER BATH

Optional



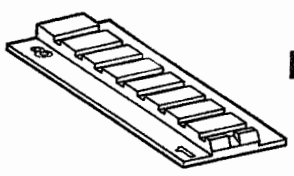
Temperature Probe #336040

Requires

Accessory Board Kit #336081

TEMPERATURE RANGE 4-80°C

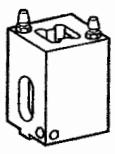
Accommodates up to 4 Thermal Blocks



Cell Holder Platform #335626

Requires

Accommodates 1 Cuvette



Water-Jacketed Thermal Block #335079



10mm Pathlength Square Cuvette #331742 Quartz #331709 Optical Glass

CUSTOMER SUPPLIED EXTERNAL WATER BATH

Optional



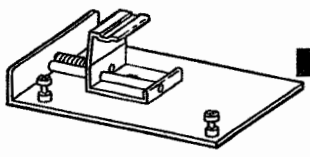
Temperature Probe #336040

Requires

Accessory Board Kit #336081

TEMPERATURE RANGE 4-80°C

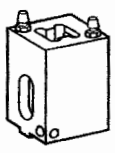
Accommodates 1 Thermal Block



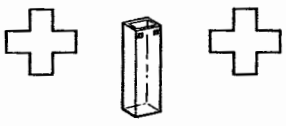
Adjustable Cell Holder Platform #336016

Requires

Accommodates 1 Cuvette



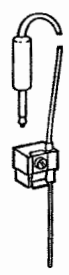
Water-Jacketed Thermal Block #335079



10mm Pathlength Square Cuvette #331742 Quartz #331709 Optical Glass

CUSTOMER SUPPLIED EXTERNAL WATER BATH

Optional



Temperature Probe #336040

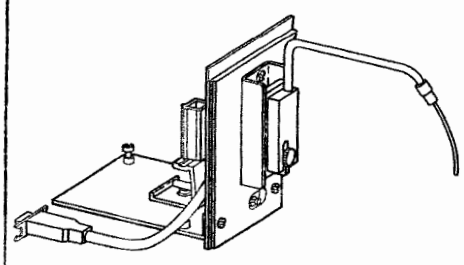
Requires

Accessory Board Kit #336081

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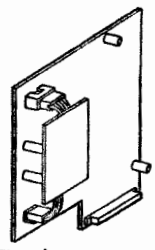
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SIPPER SYSTEMS/AMBIENT TEMPERATURES

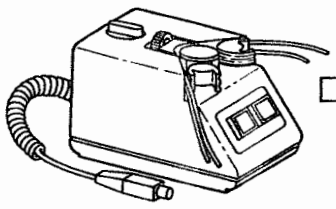


Ambient Sipper Accessory
#336074

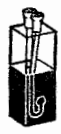
Requires



Accessory
Board Kit
#336081



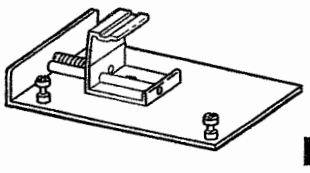
Peristaltic Pump
#336082



10mm
Pathlength
Flowcell
#335172
Quartz
or #335171
Optical Glass

OR

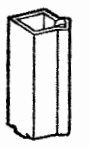
Accommodates
1 Holder



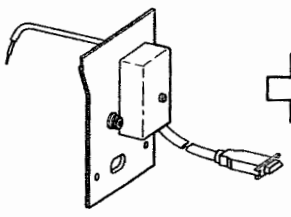
Adjustable
Cell Holder Platform
#336016

Requires

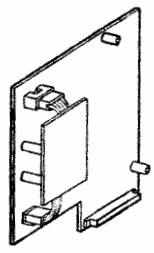
Accommodates
1 Cuvette



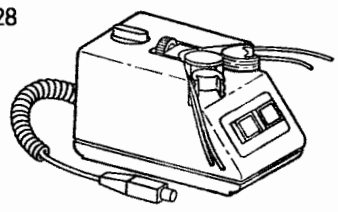
Single Cell
Holder
#336028



Sipper
Switch
#336075



Accessory
Board Kit
#336081

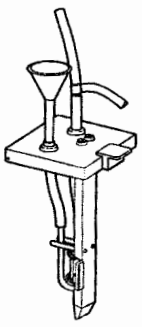


Peristaltic Pump
#336082



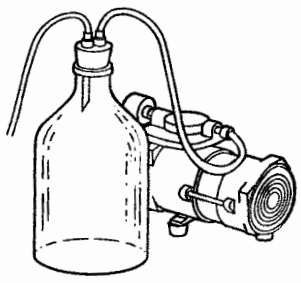
10mm
Pathlength
Flowcell
#335172
Quartz
or #335171
Optical Glass

OR



Funnel Flowcell System #336076
(Includes 10mm Pathlength Optical Glass Cell)

Requires



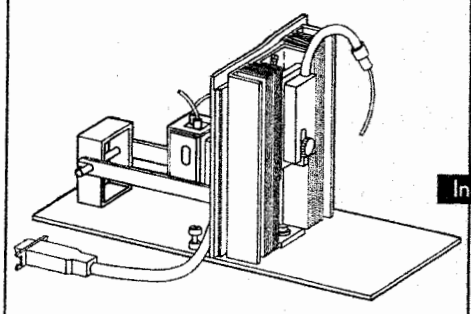
External Vacuum Pump
#336077 (115V) or #336077-02 (230V)

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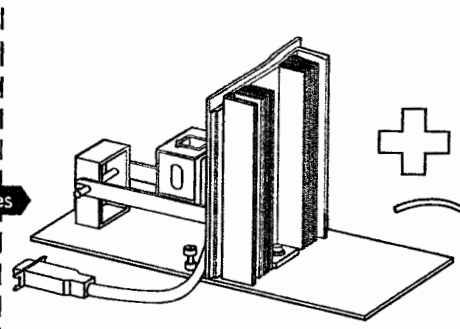
SIPPER SYSTEMS/TEMPERATURE-CONTROLLED

TEMPERATURE RANGE 25-40°C

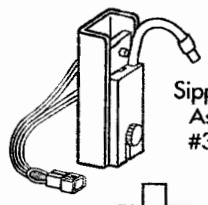


Thermoelectric Sipper System
#336086

Includes



One-Position Thermoelectric Cell Holder
#336024

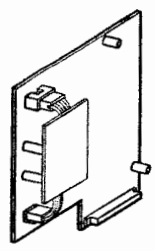


Sipper Spout Assembly
#336073

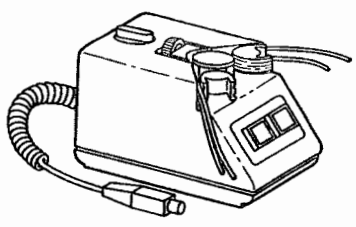


10mm Pathlength Flowcell
#331792
Metal-Clad Quartz

Requires

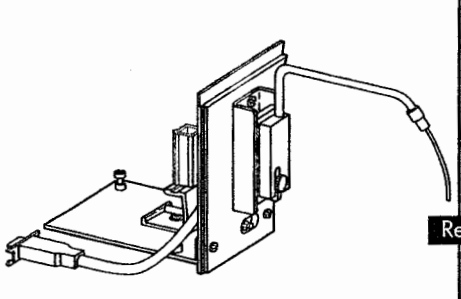


Accessory Board Kit
#336081



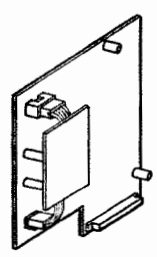
Peristaltic Pump
#336082

TEMPERATURE RANGE DEPENDENT ON OPTIONAL WATER BATH

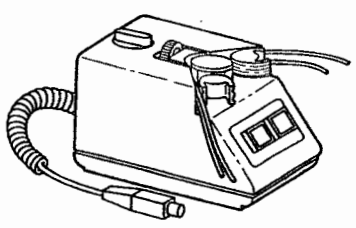


Ambient Sipper Accessory
#336074

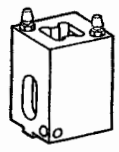
Requires



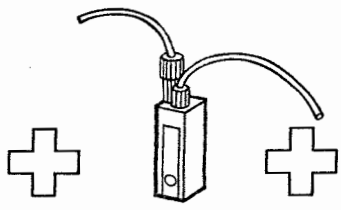
Accessory Board Kit
#336081



Peristaltic Pump
#336082



Water-Jacketed
Thermal Block
#335079



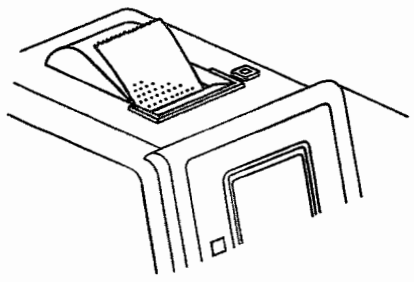
10mm Pathlength Flowcell
#331792
Metal-Clad Quartz

CUSTOMER SUPPLIED EXTERNAL WATER BATH

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OUTPUT DEVICES/INTERNAL



Internal Printer
#336088

OUTPUT DEVICES/EXTERNAL

SUPPORTED EXTERNAL PRINTERS:

IBM Proprinter II
IBM Proprinter III
Epson FX-850
HP Laserjet IIP
HP Laserjet IIP Plus
HP Laserjet III
HP Laserjet IIIP

SUPPORTED EXTERNAL PLOTTERS:

HP Laserjet IIP Using HPGL
HP Laserjet III Using HPGL
HP Laserjet IIIP Using HPGL
Generic HPGL Format Plotter

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PERFORMANCE VALIDATION SoftCard™

PERFORMANCE VALIDATION SoftCard #336090-10 Contains Tests for:
Wavelength Accuracy
Noise
Stray Radiant Energy
Photometric Linearity/Accuracy
Photometric Repeatability
Output Devices
(In English, French, German and Spanish)

Recommended → SPECTRONIC STANDARDS #333150

Optional → DIAGNOSTIC PLUG #336035 (FOR TESTING OUTPUT DEVICES)

OR

PERFORMANCE VALIDATION SoftCard #336090-10 Contains Tests for:
Wavelength Accuracy
Noise
Stray Radiant Energy
Photometric Linearity/Accuracy
Photometric Repeatability
Output Devices
(In English, French, German and Spanish)

Recommended → HOLMIUM OXIDE FILTER #333158
NIST SRM #2010a*
NIST SRM #930D/1930*
*Not available from Milton Roy.

Optional → DIAGNOSTIC PLUG #336035 (FOR TESTING OUTPUT DEVICES)

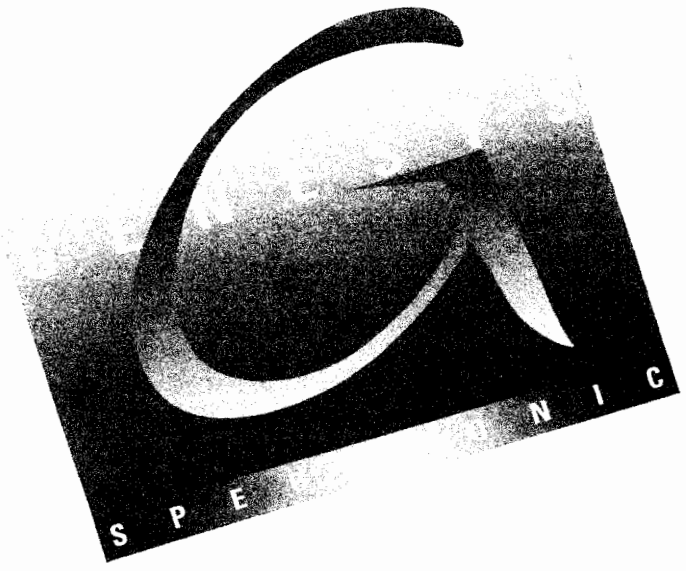
APPLICATION SoftCards™

APPLICATION I SoftCard #336090-01 Contains:
Survey Scan
Standard Curve
Simple Kinetics
Absorbance Ratio
3-Point Net Absorbance
Area Under A Curve
(In English, French, German and Spanish)

APPLICATION II SoftCard #336090-02 Contains:
Survey Scan
Standard Curve
Absorbance Ratio
Absorbance Difference
Advanced Kinetics
Multiple Wavelengths
3-Point Net Absorbance
Area Under A Curve
(In English, French, German and Spanish)

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RS-232-C

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Section 5 - RS-232-C Interface

The SPECTRONIC® GENESYS™ spectrophotometer has a built-in RS-232-C interface that enables the instrument to communicate with an external computer that is RS-232-C compatible. This section:

- Describes the RS-232-C (serial) port of the SPECTRONIC® GENESYS™ spectrophotometer
- Describes how to set up the interface between the spectrophotometer and an RS-232-C compatible computer
- Lists and describes the commands for the RS-232-C interface

Remote operation

By communicating with external devices, selected instrument functions can be performed remotely. Remote functions include:

- Wavelength control
- Accessory control
- Data acquisition
- Lamp control

Instrument automation provides several advantages, including:

- Minimizes operator error in setting up and running tests, and in reporting data
- Frees the operator to perform other tasks while the analysis is running
- Considerably enhances the versatility of the instrument because the user can develop or purchase software to meet specific needs

Notes:

- The RS-232-C command set is supported in the English language only.
- The RS-232-C interface cannot be used with serial printers, data loggers or other similar devices.

Pin functions

The serial port connector on the rear panel of the SPECTRONIC® GENESYS™ spectrophotometer is a nine-pin connector (male; DCE format). Figure 5-1 and Table 5-1 identify the pin functions for the nine-pin connector.

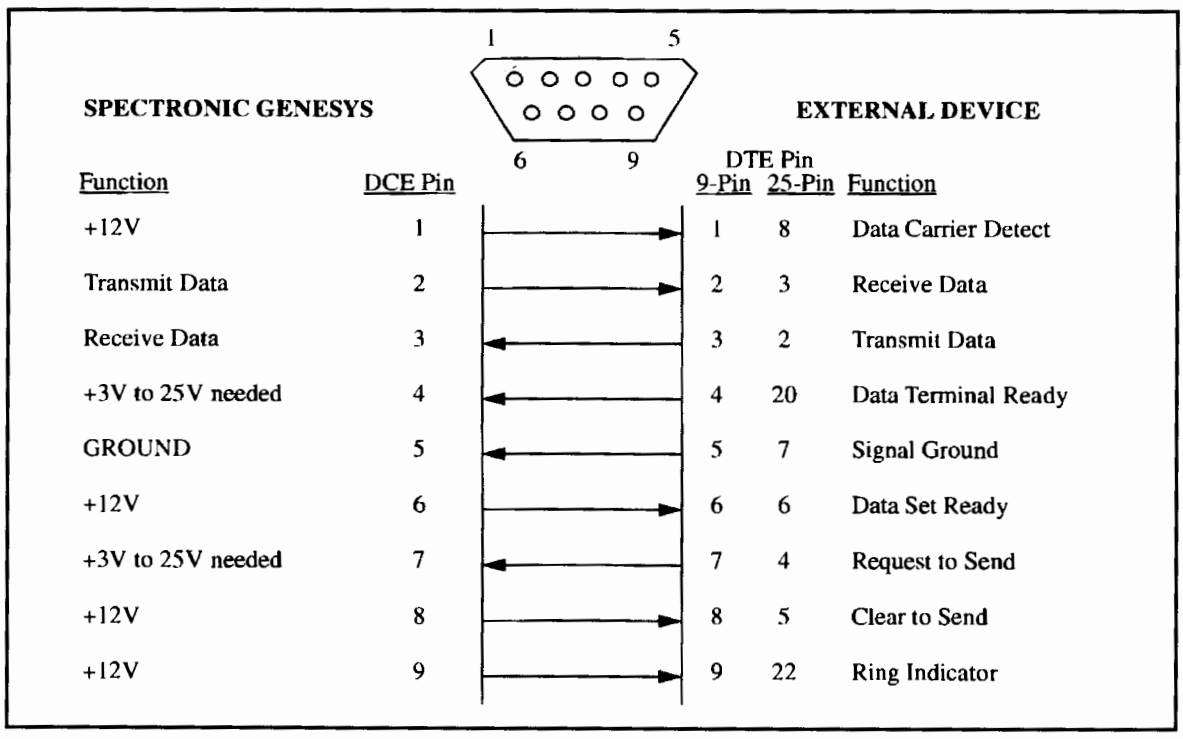


Figure 5-129 Connector-to-connector information flow

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Table 5-129 Pin functions of RS-232-C port on SPECTRONIC® GENESYS™ spectrophotometers

Pin #	*Signal name*	*Function*
1	Data Carrier Detect	Spectrophotometer supplies +12V when power is ON and the instrument is operational.
2	Receive Data	Spectrophotometer transmits data to the computer.
3	Transmit Data	Spectrophotometer receives data from the computer.
4	Data Terminal Ready	Spectrophotometer requires +3V to +25V from the external device before transmitting data.
5	Signal Ground	Acts as return for data and control signals.
6	Data Set Ready	Spectrophotometer supplies +12V when power is ON and the instrument is operational.
7	Request to Send	Spectrophotometer requires +3V to +25V from the external device before transmitting data.
8	Clear to Send	Spectrophotometer supplies +12V when power is ON and the instrument is operational.
9	Ring Indicator	Spectrophotometer supplies +12V when power is ON and the instrument is operational.

IMPORTANT!

The signal names listed in Table 5-1 are those assigned to the pins in the RS-232-C interface connector on the IBM computer. Connecting these SPECTRONIC® GENESYS™ spectrophotometer pins to IBM RS-232-C pins with these names ensures the correct connection (see Figure 5-1).

Connecting a device to the RS-232-C port (interface)

You can connect a variety of electronic devices (with two-way communication capability) to the RS-232-C port of the spectrophotometer. However, any device you connect to the interface must meet certain standards to ensure compatibility and to prevent possible damage to the spectrophotometer. Refer to Table 5-1 for a description of the nine-pin connector used as part of the interface.

Be sure to follow the installation instructions in the manual provided by the manufacturer of the selected external device. Once you assign the proper pinouts on the connector cable, just connect the female end of the RS-232-C cable from your external device to the nine-pin D connector of the RS-232-C port of the spectrophotometer.

Table 5-2 lists the specifications for the RS-232-C interface on the SPECTRONIC® GENESYS™.

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Table 5-130 Specifications for the RS-232-C Interface

Interface	RS-232-C compatible, 9-pin D connector (male) (DCE format) (mate: 9-pin female)
Data transmission rate (baud rate)	Five software-selectable rates: 300, 1200, 2400, 4800, 9600
Transmission mode	Full duplex, ASCII code
Data	• 8 data bits,* one stop bit and one start bit • Selectable parity: ODD/EVEN **or** OFF
Signal characteristics	• Receiver input threshold: -3 to +3 V minimum • Receiver maximum input voltage: -25 to +25 V • Transmit: ±12 V nominal
Line terminators	Three software-selectable terminators: • Carriage return • Line feed • Carriage return / line feed
Commands	• Wavelength control • Lamp control • Accessory control • Data acquisition

* You may select seven data bits on the **Utilities** screen; however, the eight data bit mode is recommended.

Setting RS-232-C parameters

1. With the **Acquisition** or **Main Menu** screen displayed, press the **UTILITY** key to display the **Utilities** screen.
2. Press **NEXT PAGE** to access the options for the RS-232-C interface. A screen like the one shown in Figure 5-2 appears.
3. Set the values for baud rate, number of data bits, parity and terminator parameters.
4. Press **INITIATE RS-232-C** to transfer control from the spectrophotometer to the computer.

```
ABS/%T/CONC
UTILITIES
    1.  RS-232-C Baud Rate          9600
    2.  RS-232-C Data Bits             8
    3.  RS-232-C Parity             NONE
    4.  RS-232-C Terminator           CR
    5.  Printer                     NONE
    6.  Printer Page Break      FORMFEED
    7.  Plotter                     NONE

  To change item, press number of
  selection. Press EXIT to return.

 INITIATE   ALIGN                  NEXT
 RS-232-C   LAMP                   PAGE
```

Figure 5-130 Utilities screen used to select printer and plotter options

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Command descriptions

Each command decription includes the command syntax and any appropriate parameters that can be used with the command.

ACCESSORY
List installed accessories. This list may contain:

PLATFORM	Movable platform
PROBE	Temperature Probe
PUMP	Peristaltic Pump
TEC1	1-Position Thermoelectric Cuvette Holder
TEC2	2-Position Thermoelectric Cuvette Holder
TEFC	Thermoelectric Flowcell

ACCESSORY <accessory>
Returns YES if the specified accessory is present, or NO otherwise. <accessory> is one of the following values:

PLATFORM	Movable platform
PROBE	Temperature Probe
PUMP	Peristaltic Pump
TEC1	1-Position Thermoelectric Cuvette Holder
TEC2	2-Position Thermoelectric Cuvette Holder
TEFC	Thermoelectric Flowcell

ALIGN
Returns the step number for the current cell position. The step number is returned as an integer in the range of 0 to 730.

ALIGN <step number>
Sets the alignment step number for the current cell position. <step number> is an integer in the range of 0 to 730.

ALIGN +
Increments the alignment step number for the current cell position.

ALIGN -
Decrements the alignment step number for the current cell position.

ALIGNAUTO
Automatically aligns the current cell position in the multiple cell holder.

ALIGNAUTO ALL
Automatically aligns all cell positions in the multiple cell holder.

ANSWERBACK
Returns the current answerback settings.

ANSWERBACK "<success msg>" "<failure msg>"
Enables command completion answerback using the specified values.

ANSWERBACK OFF
Disables command completion answerback.

AUTOZERO
Sets the currently measured absorbance to 0.0.

AUTOZERO <absorbance>
Sets the currently measured absorbance to the specified absorbance. <absorbance> is a number in the range of -3.000 to 3.000.

BASELINE
Generates a scan baseline over the instrument's entire wavelength range.

BASELINE <resolution> <start wavelength> <stop wavelength>
[GENESYS™ 2 only] Generates a scan baseline over the specified wavelength range. <resolution> is a number in the range of 0.3 to 6.0 that specifies the number of nanometers per point in the scan (i.e., the speed of the scan). <start wavelength> and <stop wavelength> are numbers in the range of 200.0 to 1100.0 nanometers.

CELL
Returns the current cell position. The cell position is an integer in the range of 1 to 8.

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CELL <cell number>
Sets the current cell position to the specified value. <cell number> is an integer in the range of 1 to 8.

CELL +
Increments the current cell position.

CELL -
Decrements the current cell position.

CELL INITIATE
Initializes the platform to the "home" position, then returns to the current cell position.

COMMENT OFF
Indicates the end of a comment block. The **COMMENT ON** command remains in effect until this command is sent. Comment blocks may be nested.

COMMENT ON
This allows a section of a program to be commented out. This command remains in effect until the **COMMENT OFF** is sent. Comment blocks may be nested.

DATA
Returns the current photometric data in the current measurement mode. In absorbance mode, the data is a number in the range of -3.100 to +4.000. In % transmittance mode, the data is a number in the range of 0.0 to 200.0.

DATAMODE
Returns the current measurement mode. Returned values are:

ABS	Indicates data will be returned as absorbance
TRANS	Indicates data will be returned as % transmittance

DATAMODE ABS
Sets the current measurement mode to absorbance.

DATAMODE TRANS
Sets the current measurement mode to transmittance.

DEUTERIUM
Returns the current state of the deuterium lamp. Returned values are:

ON	Indicates the lamp is on
OFF	Indicates the lamp is off
OUT	Indicates the lamp is burned out

DEUTERIUM OFF
Turns the deuterium lamp off.

DEUTERIUM ON
Turns the deuterium lamp on. This command will fail if the lamp is burned out.

DISPLAY "<printable ASCII string>"
Displays a string on the Genesys screen. Printable ASCII characters and the bell character "\g" are supported.

ECHO "<ANSI C ASCII string>"
Sends a string out the RS-232 port. ANSI C escape sequences are supported. The returned value will be the specified string with any escape sequences interpreted.

EXIT
Exits remote mode and executes the Main Menu.

LAMPCHANGE
Returns the current lamp change wavelength in nanometers. The lamp change wavelength will be in the range of 320.0 to 360.0.

LAMPCHANGE <wavelength>
Sets the lamp change wavelength to the specified value. This command will cause the required lamp to be turned on, if necessary. <wavelength> is a number in the range of 320.0 to 360.0 nanometers.

MODEL
Indicates the instrument model (e.g., "GENESYS 5").

OPTIMIZE
Calibrates the instrument to the energy output of the lamps.

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PRINT "<ANSI C ASCII string>"
Sends a string to the current printer. ANSI C escape sequences are supported.

PRINTINIT
Initializes the printer.

PRINTLOG OFF
Disables logging of all input and output to the current printer.

PRINTLOG ON
Enables logging of all input and output to the current printer.

PUMP <speed> <direction> <duration>
Pumps at the specified speed for the specified duration in the specified direction. <direction> is either CW (clockwise) or CCW (counter-clockwise). <speed> may be one of:
SLOW
MEDIUM
FAST
<duration> is 0 to 999 seconds.

REVISION <ROM>
Returns the revision of the specified instrument ROM. The ROM's that may be specified are:

ACC	Accessory Board ROM
ASH	ASH/Barcode Reader Board ROM
MAIN	Main instrument ROM
OB	Optical Bench ROM
PUMP	Pump Board ROM

This command will fail if the specified board is not present. The returned value will be a string indicating the revision of the specified ROM.

SCAN <resolution> <start wavelength> <stop wavelength>
Returns the current photometric data at all wavelengths in the specified range. The <resolution> is a number in the range of 0.3 to 6.0 that specifies the number of nanometers per point in the scan (i.e., the speed of the scan). One wavelength and measurement will be returned on each line. The format of the line will be
<wavelength> <data>
where <wavelength> is a number between 200.0 and 1100.0 and <data> is the same as the output of the DATA command.

Notes:
- If <start wavelength> and <stop wavelength> are not specified, data from 200.0 to 1100.0 nm will be returned.
- A baseline must be collected prior to running the **SCAN** command.

SIPPER
Returns the type of the last sipper switch action. The returned value will be UP, DOWN or NONE.

STIR
Returns the current stirrer speed. The returned value is in the range of 0 to 10, where 0 is off and 10 is the fastest speed.

STIR <speed>
Turns on the stirrer at the specified speed. <speed> is an integer from 0 to 10, where 0 is off and 10 is the fastest speed.

TEMP
Returns the current temperature in degrees Celsius. The temperature is a number with one decimal place.

TEMPCTRL
Returns the status of temperature control. Returned values are:

ON	Indicates that temperature control is enabled
OFF	Indicates that temperature control is disabled

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TEMPCTRL OFF
Disables temperature control.

TEMPCTRL ON
Enables temperature control.

TEMPDEV
Returns the current temperature sensing device.
Returned values are:
BLOCK Indicates the temperature is determined by the block
PROBE Indicates the temperature is determined by the probe

TEMPDEV BLOCK
Sets the temperature sensing device to the block (peltier device).

TEMPDEV PROBE
Sets the temperature sensing device to the probe.

TEMPSETPT
Returns the current temperature setpoint. The returned value is a number in a range that is specific to the thermoelectric device.

TEMPSETPT <temperature>
Sets the temperature setpoint to the specified value. <temperature> is a number in a range that is specific to the thermoelectric device.

TUNGSTEN
Returns the current state of the tungsten lamp.
Returned values are:
ON Indicates the lamp is on
OFF Indicates the lamp is off
OUT Indicates the lamp is burned out

TUNGSTEN OFF
Turns the tungsten lamp off.

TUNGSTEN ON
Turns the tungsten lamp on. This command will fail if the lamp is burned out.

WAVELENGTH
Returns the current measurement wavelength. The returned value is a number in the range of 200.0 to 1100.0.

WAVELENGTH <wavelength>
Sets the measurement wavelength to the specified value. <wavelength> is a number in the range of 200.0 to 1100.0.

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Maintenance

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Section 6 - Maintenance

Your SPECTRONIC® GENESYS™ 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
- Replacing and aligning the lamps
- Replacing the instrument battery
- Changing the fuse and voltage setting
- Cleaning and maintaining the internal printer

This section also includes lists 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 Milton Roy Company 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 Milton Roy Instrument Service representative to perform any service procedure you do not feel

Routine care

Routine care for your SPECTRONIC® GENESYS™ 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 Milton Roy Cell Cleaning Solution (333554) to clean your cells.

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.

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Note: To prepare chromic acid cleaning solution, slowly add (with stirring) 800 mL of concentrated sulfuric acid to 458 mL 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 (Milton Roy Cell Cleaning Solution, 333554), 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.

Cleaning the air filter

1. Turn off the instrument. This prevents dust and lint on the filter from being pulled into the instrument by the fan.
2. Pull the foam air filter out of the area directly behind the fan (see foldout).
3. Clean the filter by shaking off the dust. If necessary, you can wash the filter in warm soapy water to remove excessive dirt and then rinse thoroughly.

   Note: The filter **must be completely dry** before it is replaced in the instrument.

4. Insert the clean air filter in the area directly behind the fan.

Replacing lamps

Replacing the tungsten-halogen lamp

WARNING

The tungsten-halogen and deuterium lamps get very hot during operation. Before removing either lamp, turn off the instrument and allow the lamps to cool down for 10 minutes.

The deuterium lamp produces ultraviolet (UV) radiation which can damage the eye and burn the skin. Minimize exposure to hands and wear UV-absorbing glasses whenever the

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IMPORTANT!
To avoid personal injury or damage to the instrument, follow these instructions **carefully**.

1. **Turn off and unplug the instrument.**
2. Make sure that the sample compartment is empty (remove samples and holders) and that the lamp has had time (at least 10 minutes) to cool off.
3. Remove the cover of the lamp compartment (a coin will release the lock).
4. Unscrew and remove the thumbscrew securing the lamp assembly.
5. Disconnect the deuterium lamp connector.
6. Carefully raise the lamp and lift it slightly to the left to unhook the tab at the base.
7. Position the new lamp in the lamp compartment and hook the tab at the base.
8. Connect the deuterium lamp connector.
9. Replace the thumbscrew and tighten to secure the lamp assembly.
10. Use a soft, lint-free cloth to wipe off any fingerprints on the lamp.
11. Replace the cover of the lamp compartment.
12. Plug the instrument into an appropriate wall outlet and turn on the power.
13. During the power-on sequence, the lamp interchange mirror will automatically align on the tungsten-halogen and the deuterium lamps.

Note: The lamp interchange mirror automatic alignment, which takes place during the power-on sequence, aligns the light beam horizontally. Vertical alignment of the tungsten-halogen lamp is a manual adjustment. This adjustment may provide additional energy to the optical system. Follow the vertical alignment (page 6-4) and optimizing energy (page 6-5) procedures to "calibrate" the system to the new lamp.

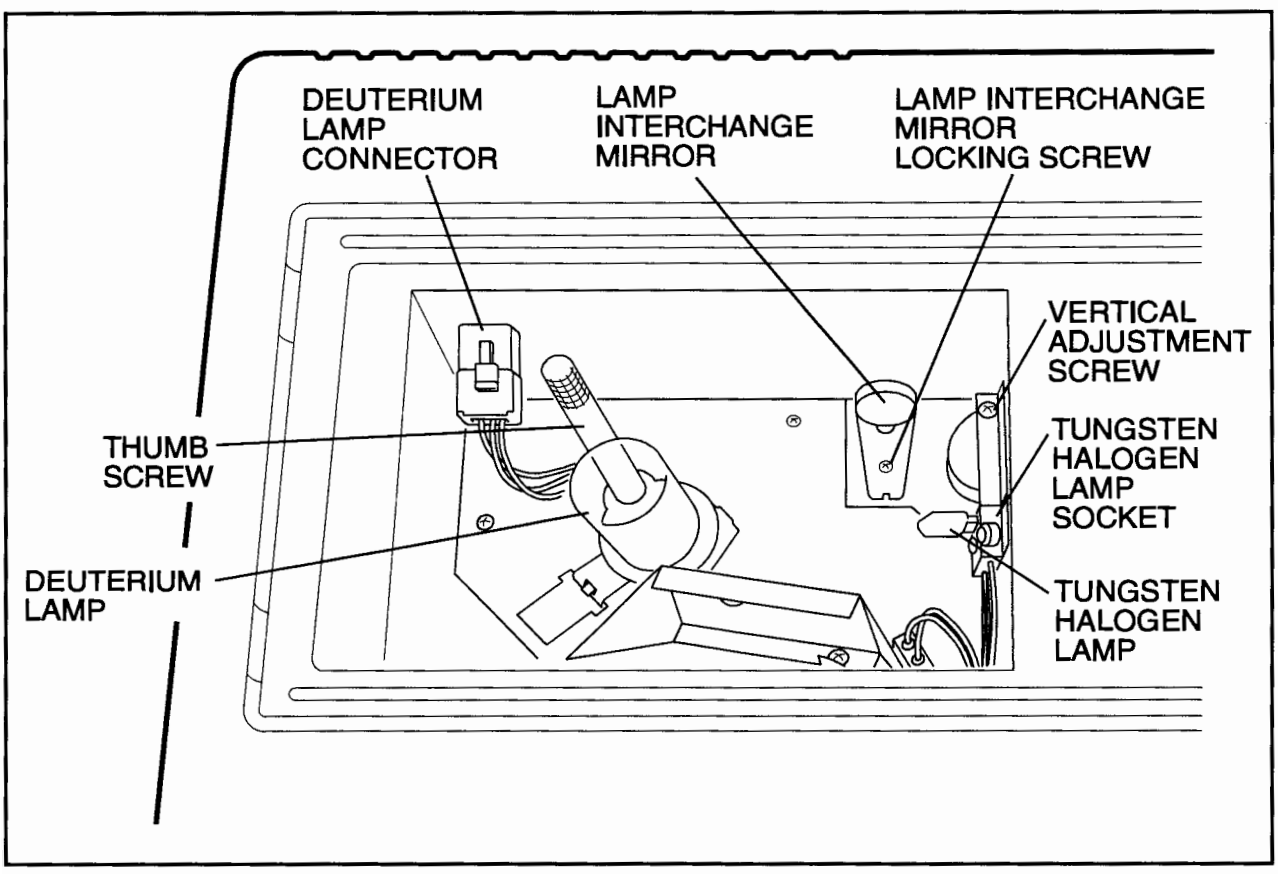


Figure 6-161 Lamp compartment

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Aligning the tungsten lamp vertically

This adjustment positions the reflected tungsten-halogen light image so it falls fully (top to bottom) onto the entrance slit to the monochromator.

> **CAUTION**
>
> This procedure requires removal of the cover of the lamp compartment while the instrument is turned on. This exposes the operator to ultraviolet (UV) radiation which can damage the eye and burn the skin. Minimize exposure to hands and wear UV-absorbing glasses to protect your eyes whenever the lamps are

IMPORTANT!
To avoid personal injury or damage to the instrument, follow these instructions **carefully**.

1. Turn on the instrument and allow the power-on sequence to be completed.
2. When the **Main Menu** (or the **Acquisition** screen) appears, press the **UTILITY** key.
3. Press **2** to turn off the deuterium lamp.
4. Press the **ALIGN LAMP** "soft" key. The instrument will set the wavelength to 550 nm and will change the electronics to alignment mode.
5. Remove the cover of the lamp compartment.
6. Locate the vertical adjustment screw (Figure 6-1).

   Note: The vertical adjustment screw is very close to the lamp interchange mirror. Use caution when working in this area, and be careful **NOT** to touch the lamp interchange mirror.

7. Slowly adjust the vertical alignment screw while watching the display.
   - *If the energy decreases*, reverse the direction of the adjustment.
   - *If the energy increases*, continue adjusting in the same direction.
8. Adjust the vertical alignment screw until the reading reaches a maximum.
9. Replace the cover of the lamp compartment.
10. Press **EXIT** to end the alignment diagnostic. Follow the optimizing energy procedure (page 6-5) before using the instrument.

Replacing the deuterium lamp

> **WARNINGS**
>
> The tungsten-halogen and deuterium lamps get very hot during operation. Before removing either lamp, turn off the instrument and allow the lamps to cool down for 10 minutes.
>
> The deuterium lamp produces ultraviolet (UV) radiation which can damage the eye and burn the skin. Minimize exposure to hands

IMPORTANT!
To avoid personal injury or damage to the instrument, follow these instructions **carefully.** ***Do not touch the glass portions of the deuterium lamp assembly with your bare fingers - use a lint-free cloth!***

1. **Turn off and unplug the instrument.**
2. Make sure that the lamp has had time (at least 10 minutes) to cool off.
3. Remove the cover of the lamp compartment.
4. Disconnect the power leads for the deuterium lamp by pulling the three-wire deuterium lamp connector from the back wall of the lamp compartment.
5. Grasp the old deuterium lamp and the locking handle (Figure 6-1) and squeeze them together.
6. Lift the old deuterium lamp out of the locking holder and set the lamp aside.
7. Using a soft lint-free cloth, hold the new deuterium lamp by the locking handle. Make sure you don't touch the quartz envelope of the deuterium lamp.

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8. Carefully route the cable on the replacement deuterium lamp through the locking bracket.
9. Insert the new deuterium lamp onto the illumination assembly, aligning the locking handle so that it faces away from the lamp interchange mirror (Figure 6-1).
10. Squeeze the locking handle toward the lamp as you insert the new deuterium lamp into the holder. You may push down on the top of the new deuterium lamp to seat it in the holder.
11. When the lamp is seated, release the locking handle to secure the new deuterium lamp in position.
12. Plug the three-wire connector into the socket at the rear of the lamp compartment.
13. Use a soft, lint-free cloth to wipe off any oil or fingerprints which may be on the deuterium lamp.
14. Replace the cover of the lamp compartment.
15. Plug the instrument in and turn it on. The instrument will run its power-on sequence and automatically align the deuterium lamp.

Note: If you have a problem, follow these steps:
- Turn the instrument off and allow the lamp to cool. Then reinsert the lamp and turn the instrument back on.
- If the problem persists, contact Milton Roy Instrument Service at 800-654-9955 or 716-248-4000.

Optimizing energy

Whenever you replace either the tungsten-halogen lamp or the deuterium lamp, you should optimize the energy. This procedure performs an energy scan on a wavelength-by-wavelength basis. It takes approximately five minutes on a SPECTRONIC® GENESYS™ 5 and 12 to 15 minutes on a GENESYS™ 2.

1. Press **UTILITY**.
2. Press **ALIGN LAMP**.
3. Press **OPTIMIZE ENERGY**. The message "Setting lamp state" will appear.
4. When the lamp state is set, make sure the sample compartment is empty and closed, then press **ENTER** to start the scan.
5. Press **EXIT** when the scan is complete.

Replacing the instrument battery

The instrument battery (336001-738) provides power for the backup Random Access Memory (RAM) components. A missing, defective or depleted battery can cause a battery voltage error message during power-on diagnostics. In addition, setup parameters stored in RAM can be lost or revert to default settings. Any RAM data lost will have to be reset after the battery is replaced. Follow the procedure below to replace the battery, then refer to the information on page 6-7 if you need to reset lost setup parameters.

1. **Turn off and unplug the instrument.**
2. If any accessory is plugged into the socket at the rear of the sample compartment, disconnect it. This socket is part of the Accessory Board located behind the sample compartment. To access the instrument battery, you must remove the Accessory Board.
3. Position the instrument so you can access the rear panel (see foldout).
4. Loosen the single screw securing the Accessory Board and the Accessory Board cover plate.
5. Remove the cover plate and set it aside.
6. The Accessory Board plugs into a socket on the Optical Bench Board (the board to which the battery is secured).
   Grasp the bottom left section of the Accessory Board and pull it back through the opening in the rear panel to disconnect the plug. You should now be able to see the instrument battery (1/2AA lithium) in the battery socket mounted on the Optical Bench Board.
7. The battery is surrounded by a plastic strap used to secure the battery during shipment. Use a pair of diagonal cutters to remove it.

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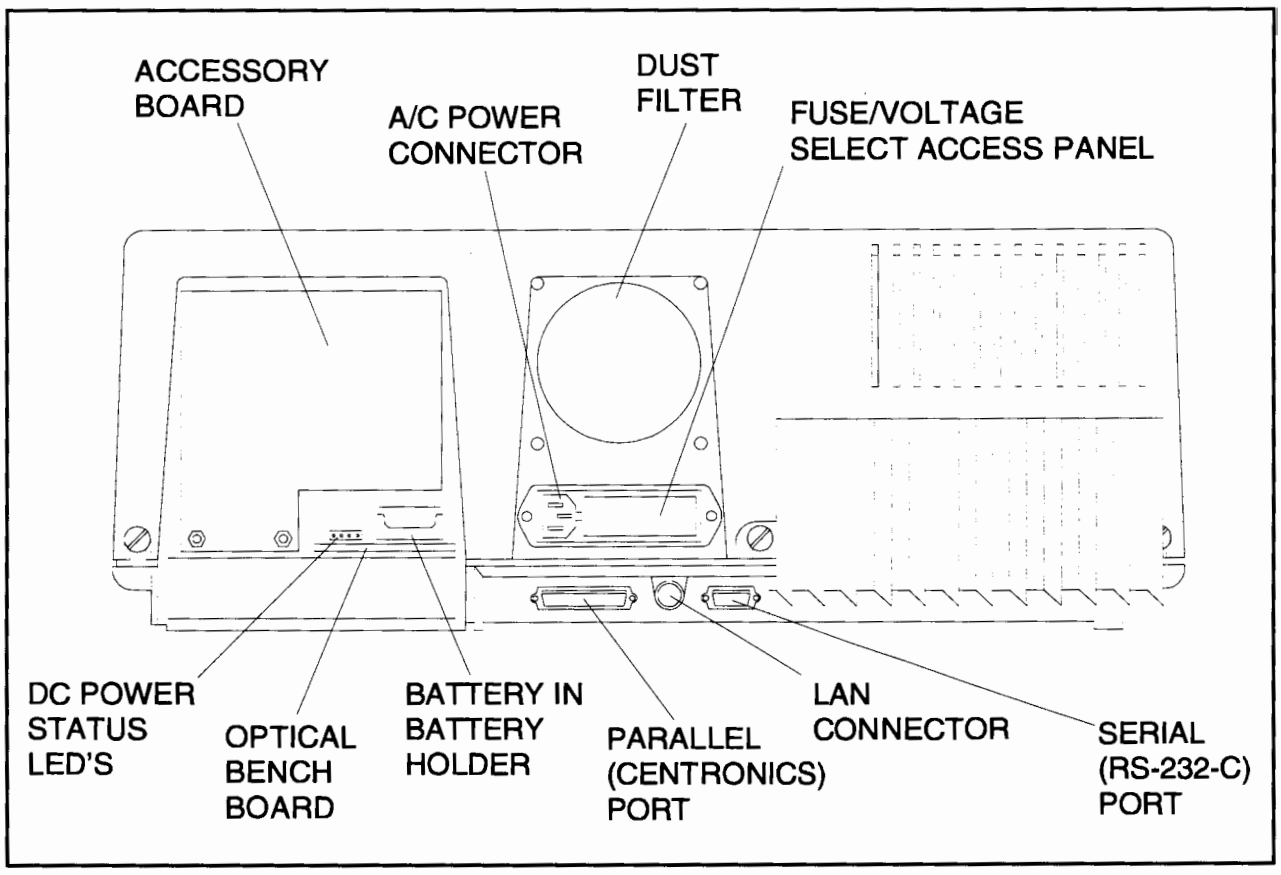


Figure 6-162 Location of Accessory Board and Instrument Battery

8. Observe which end of the battery is plus (to the right, when viewed from the rear of the instrument) and then remove the battery by lifting it straight up and out of the socket.
9. If you have a GENESYS* 5:
   a. Plug in the instrument. (You can ignore the error messages displayed during the next step.)
   b. Turn on the instrument for approximately 10 seconds to ensure that the electronics are in the proper state.
   c. **Turn off and unplug the instrument.**
10. Identify the positive (+) and negative (-) ends of the replacement instrument battery and battery holder.
11. Insert the battery into the battery holder with the positive (+) and negative (-) ends aligned as when the battery was removed in step 8.
12. Replace the Accessory Board which was removed in step 6.
13. Replace the Accessory Board cover plate and secure with the single screw.
14. Tighten the screw to secure the Accessory Board and the cover plate.
15. Reconnect any accessories disconnected in step 2.
16. Position the instrument so you can access the front panel, plug the instrument in and turn on the power.

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Resetting setup parameters

It is possible for battery-backed-up memory to be corrupted when the instrument battery is replaced. If the memory is corrupted, you will need to reset the setup parameters. The following list identifies the parameters you may need to reset and the section of this manual containing the appropriate instructions.

- Date and time (*Setting up the Instrument*)
- Language (*Setting up the Instrument*)
- Printer (*Setting up the Instrument*)
- Plotter (*Setting up the Instrument*)
- Lamp change wavelength (*Dictionary*)
- Cell alignment (*Setting up the Instrument*)
  Note: If you have a cell-holder accessory installed, refer to the manual shipped with the accessory for instructions.
- Printer page break (*Dictionary*)
- Last test setup used (*Operation*)
- Concentration units (*Dictionary*)
- Serial port setup (*RS-232-C*)

In addition, you may also need to reset the Motor Step-to-WL table code and/or the instrument baseline. If either of these needs to be reset, the instrument will prompt you to do so. The code for the instrument Motor Step-to-WL table is located on a sticker underneath the instrument keyboard.

Note: Some of these parameters are not available in all versions of the instrument software. If your version of the software does not prompt for these parameters, you may ignore them.

Changing the fuse

The fuse is located within the power entry module located at the center of the rear panel of the instrument (see foldout).

120VAC, 2.5A, Slo-Blo	333526
240VAC, 1.25A, Slo-Blo	336013

1. Turn off and unplug the instrument.
2. Position the instrument so you can see the power entry module on the rear panel.
3. Remove the power cord (see foldout).
4. Insert a flat-blade screwdriver (" wide blade) into the fuse/voltage select cover removal notch. Pry off the fuse/voltage select cover.
5. Pull out the fuse/voltage select cover (Figure 6-3). This removes the fuse holder assembly and allows you to access the fuse.
6. Remove the fuse by unsnapping it from the contact on the fuse/voltage select cover.
7. Snap a new fuse into the contact on the fuse/ voltage select cover.
8. Reinsert the fuse/voltage select cover with the new fuse.
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 Milton Roy Instrument Service at 800-654-9955 or 716-248-4000.

Changing the voltage setting

You may select either 120 VAC or 240 VAc for the line voltage on your SPECTRONIC® GENESYS™ spectrophotometer. The power entry module located at the center of the rear panel contains a voltage selection card that enables you to select the correct voltage. **The proper line voltage must be selected to ensure that the instrument operates properly and/or to prevent damage to the instrument.**

Determine the current line voltage setting by examining the voltage selection indicators (see Figure 6-3) on the rear panel of the instrument. A white peg appears in the hole adjacent to the 120 VAC or 240 VAC setting to indicate the current setting.

If the current line voltage is different from the line voltage being supplied to the instrument, you have two choices:

- Use an outlet that supplies the line voltage indicated on the instrument
- Change the voltage setting on the instrument

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Follow the procedure below to change the voltage setting on the instrument.

1. **Turn off and unplug the instrument.**
2. Position the instrument so you can see the power entry module on the rear panel.
3. Remove the power cord (see foldout).
4. Insert a flat-blade screwdriver (•" wide blade) into the fuse/voltage select cover removal notch. Pry off the fuse/voltage select cover (Figure 6-3). This allows you to access the fuse and the voltage selection card (Figure 6-4).
5. Grasp the exposed edge of the voltage select card with a pair of needle-nose pliers.
6. Remove the card by pulling it horizontally out of the voltage select card slot.

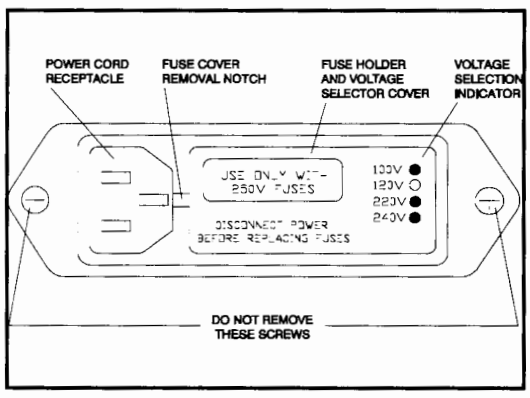


Figure 6-163 Fuse / Voltage select cover

7. Position the white plastic indicator dot on the voltage select card so it is in the 120 VAC position or the 240 VAC position as indicated in Figure 6-4.

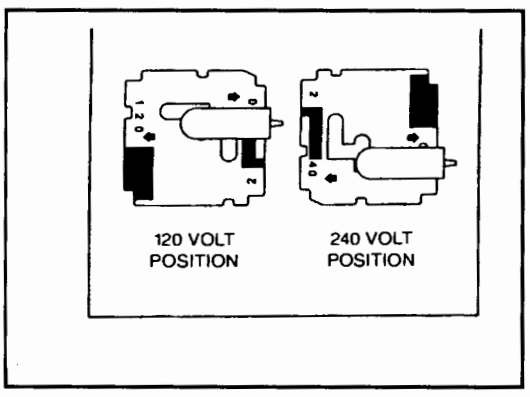


Figure 6-164 Orienting the voltage select card

8. Firmly insert the voltage select card back into the voltage select card slot.
9. If you have changed the voltage, you must also change the fuse holder:
   - For 240V operation, there should be two fuse holders.
   - For 110V operation, there should be one fuse holder and a shorting bar.

   Loosen the Phillips screw, slide the fuse holder away from the screw hole, then lift up. Flip the fuse holder over and replace it on the voltage cover, making sure the edges seat properly. Tighten the Phillips screw and place the correct fuse(s) in the fuse holder. Refer to Table 6-1 for part numbers for the fuses.

10. Replace the fuse/voltage select cover, making sure that the white peg on the voltage select card extends through the correct opening.
11. Replace the power cord.
12. Plug the instrument back in and turn on the power.

Replacing the paper in the internal printer

1. Cut the paper at the end of the roll in a "V" to make a point at the end of the paper.
2. Carefully feed the printer paper (shiny side down) into the printer using the **Line feed** key on the printer.
3. When the paper is installed, thread the paper through the panel slot in the printer cover and snap the printer cover panel back into the instrument cover.
4. To test the printer, press the **PRINT** key on the keyboard.

Cleaning the internal printer head

Run a piece of coarse paper (similar to construction paper) back and forth through the printer head to remove any dirt.

Replacement parts

Table 6-1 lists the replacement parts for your

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SPECTRONIC® GENESYS™ spectrophotometer.

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Table 6-161 Replacement parts for SPECTRONIC® GENESYS™ spectrophotometers

Accessory Sample Compartment Door with Light Shield	336024-122
Fan filter (package of 6)	335660
Battery (instrument)	336001-738
Deuterium lamp	343425
Dust cover	336065
Fuse (for 120V operation, 2.5A, Slo-Blo, package of 4)	333526
Fuse (for 240V operation, 1.25A, Slo-Blo, package of 8)	336013
Lamp area cover	336001-174
Power cord (120V U.S.)	335001-785
Printer area cover (if internal printer installed)	336001-173
Printer well cover (if no printer installed)	336001-175
Sample area front cover	336001-176
Sample compartment cover	336001-172
Tungsten-halogen lamp (package of 2 lamps)	335423

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Section 7 - Diagnostics & Troubleshooting

In addition to the general maintenance procedures described in the *Maintenance* section, periodically you may need to perform selected diagnostic and troubleshooting procedures. For example, you should check wavelength calibration and photometric linearity to verify the instrument's performance.

This section includes selected diagnostic procedures that you can perform and a troubleshooting guide.

Checking the wavelength calibration

Normally, your SPECTRONIC® GENESYS™ spectrophotometer retains its wavelength calibration indefinitely. However, if the instrument receives a severe shock or is abused, use one of the following items to check the wavelength calibration:

- Wavelength Accuracy Test filter from SPECTRONIC® Standards (#333150)
- NIST Standards

Checking photometric linearity

If you suspect the photometric linearity of your instrument is not adequate, first check your analytical procedure and technique. You can check the photometric linearity of the instrument by inspecting the standard curve of a chemical species known to obey Beer's Law. A linear standard curve indicates photometric linearity and low stray light levels.

We recommend one of the following items to check photometric linearity:

- SPECTRONIC® Standards (#333150)
- NIST Standards #930 and #1930

General troubleshooting

Your SPECTRONIC® GENESYS™ spectrophotometer should provide consistently reliable performance. However, if you have problems operating the instrument, you can often resolve them by performing a few basic checks:

- Ensure that the instrument is getting the right power; i.e., steady line voltage at the correct voltage for the instrument.
- Verify that the line voltage selection card (mounted in the fuse compartment of the main unit) is set for the correct line voltage.
- Check that the instrument goes through the power-on sequence properly when you turn it on.
- Observe and record any error messages.

Generally, when you enter a value outside the limits for a parameter, the instrument will beep three times to warn you. The instrument will continue to display the limits for the parameter (**Entry:** will remain the same) until you enter a value which is within the limits for the parameter.

You may want to obtain and use the Performance Validation SoftCard™ (336090-10) to evaluate and track the performance of your instrument. For more information, contact your Milton Roy distributor.

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Table 7-1 Alphabetical list of error messages

Message	Cause	Action
Access denied (<SoftCard letter>:)	Write-protect violation on Memory SoftCard. The write-protect tab is set to "protect."	Remove the SoftCard and turn off the write-protection mechanism. Re-insert the SoftCard.
Accessory un-installed. Please re-install and press CANCEL.	An accessory was removed from the instrument while running an application.	Re-install the accessory that was removed and press **CANCEL**.
Bad format (<SoftCard letter>:)	Memory SoftCard has a bad format.	Format the SoftCard (see *Formatting a Memory SoftCard* in the *Setting up the Instrument* section).
Cannot execute <program name>	An application program could not load.	Insert the SoftCard containing the application program and try the operation again. If the problem persists, call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Corrupted test/data file filename: <filename>	The specified test or data file is corrupt.	The specified test or data file can no longer be used. Delete the file and use a different one.
Database read error	There was an error reading a text string from the language database.	Call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Database file: <basename>.sdb not found	The specified language database was not found.	Call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Dead battery (<SoftCard letter>:)	Battery in Memory SoftCard is dead; data may be lost.	Replace the battery according to the procedure in the *Setting up the Instrument* section.
Debug message: <specific message>	A debugging message put in by the programmer is being displayed.	Call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Error saving test. Test <testname> exists and is locked.	An attempt was made to save to a locked test file.	Unlock the test file and try to save the test file again OR save the test using a new name.
File access denied (<filename>)	An attempt was made to write to a locked file.	Unlock the file and try the write operation again.

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Message	Cause	Action
Global system data is corrupt press IGNORE to reload defaults	Non-volatile instrument memory is corrupt or not initialized.	Press **IGNORE**. The default instrument settings will be loaded into the non-volatile memory.
I/O error (<SoftCard letter>:)	SoftCard is not making a good connection with the instrument.	Remove the SoftCard and insert it again. If the problem persists, call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Illegal interrupt number #### called from ####:####	An illegal interrupt has occurred within the instrument.	Call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Incompatible programs ROM version ###, application number ###	The application is not compatible with the system firmware and will not run.	Run a compatible version of the application OR call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Instrument error: <specific message>	An error occurred that prevents the program from executing.	Call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Internal filesystem error (<SoftCard letter>:)	This error indicates a serious corruption on the specified SoftCard.	Try to back-up the SoftCard using the File Manager program then reformat the SoftCard according to the procedure in the *Setting up the Instrument* section.
LAN communication error	Interference or faulty connection with internal LAN.	Call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
LAN error response received IDENTIFIER: ## <specific LAN error message>	An internal hardware error that prevents the system from operating has occurred.	Call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Low battery (<SoftCard letter>:)	Low voltage in the battery in the Memory SoftCard.	Replace the battery in the SoftCard according to the procedure in the *Setting up the Instrument* section.
Memory allocation error	An error occurred in the system memory.	Call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Microsoft runtime error <specific message>	This indicates an error message from the Microsoft library.	Call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.

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Message	Cause	Action
Not enough space (<SoftCard letter>:)	The specified SoftCard does not have enough free space to perform the requested operation.	Delete information from the SoftCard, or use another SoftCard that has enough free space.
Not Installed (<SoftCard letter>:)	Memory SoftCard is not inserted in the card slot.	Insert a SoftCard into the specified card slot.
Optical bench does not respond	The optical bench is not responding to the computer board master.	Call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Plotter communication error	A serial communication error occurred on the connection to the plotter.	1) Check that the cable connecting the plotter is connected properly. 2) Check the baud rate, parity, word size and number of stop bits on both the instrument and the plotter.
Plotter disconnected	An attempt was made to access the plotter, but no plotter is connected.	Re-connect the plotter.
Plotter is off-line	An attempt was made to access the plotter, but it is off-line.	Put the plotter on-line.
Plotting complete Please replace paper	The page plot is complete.	Load the plotter with a new sheet of paper to plot the next page.
<screen is cleared> Power failure: cycle power to restart	AC power has been briefly interrupted; a brownout may have occurred.	Turn off the instrument and then turn it back on.
Printer disconnected	An attempt was made to access the printer, but no printer is connected.	• If the printer is the external printer, re-connect it. • If the printer is the internal printer, call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Printer error	A printer fault has occurred.	1) Check that the printer is ON, connected, on-line, has paper and that the paper is inserted correctly. 2) Reinstall the printer by pressing **UTILITY** and selecting the appropriate printer.
Printer is off-line	An attempt was made to access the printer, but it is off-line.	Put the printer on-line.
Printer out of paper	The printer does not have any paper.	Re-load the printer with paper.

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Message	Cause	Action
Remove write-protect on (<SoftCard letter>:)	An attempt was made to write to a SoftCard that has been protected against writes.	Remove the SoftCard and turn off the write-protection mechanism. Re-insert the SoftCard.
sys_init_memory(): out of memory	The system ran out of memory during initialization.	Call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
System baseline error A new base line will be generated Press IGNORE and wait about 20 minutes	The system baseline is invalid and must be rebuilt.	Press **IGNORE** and wait for the new baseline to be built.
System clock error press IGNORE to reset to <time and date>	System clock has been corrupted with an invalid time or date.	Press **IGNORE** to accept the default time and date. Then press **UTILITY** and set the correct time and date according to the procedure in the *Setting up the Instrument* section.
Test/data file <filename>. The file is incompatible with the current version of the software.	The specified test or data file is not compatible with the software that is running on the instrument.	Use a different test or data file OR use the version of the software that is compatible with the desired test or data file.
Too little light	The illumination level may be too low. This error may also occur if the path of the light beam is disturbed or if the sample has too high an absorbance.	1) Check the light path and remove any blockage in the sample compartment. 2) Set **AutoZero**. 3) Set the lamp interchange wavelength to 340 nm. 4) Adjust the tungsten lamp. 5) Replace the tungsten lamp. 6) Perform the optimize energy procedure. If the condition still exists, call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Too much light	The illumination level is too high; there is too much light in the sample compartment.	1) Close the door of the sample compartment. 2) Set **AutoZero**. 3) Perform the optimize energy procedure. If the condition still exists, call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.

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Message	Cause	Action
Tungsten lamp burned out.	The tungsten lamp has burnt out.	Install a new tungsten lamp according to the procedure in the *Maintenance* section.
Turn plotter ON	An attempt was made to access the plotter, but it is OFF.	Turn on the plotter.
Turn printer ON	An attempt was made to access the printer, but it is OFF.	Turn on the printer.
Unexpected LAN response. Sent: ## Got: Addr ##, Command ##, Status ##, Data ## . . .	An error occurred in the optical subsystem.	Call Milton Roy Technical Support at 800-654-9955 or 716-248-4000.
Value outside photometric range	1) The reading is outside the photometric measurement range of the instrument. 2) The sample may be too dark.	1) Re-enter values and make sure they are within the operating range of the instrument. 2) Dilute the sample OR change to a different wavelength.

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Appendix

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Appendix A - Selecting glassware & Preparing samples/standards

Preparing samples and standards

To ensure accurate and consistent results, always follow good laboratory practices when preparing samples and standards. Treat samples and standards the same throughout the preparation and measurement procedures. Use consistent measuring and mixing techniques and be sure to clean glassware thoroughly, both inside and out. Contaminating material on glassware may absorb light, and may also react chemically with reagents or standards.

Selecting glassware

For best results, exactly the same cell (square cuvette or test tube) should be used for every reading - blanks, standards and samples. In practice, however, it is usually inconvenient to clean cells between readings. Consequently, many different cells are used. The operator must ensure that each of the cells used has identical optical characteristics.

The traditional approach to matching cells in a single-beam instrument is to ensure that the absorbance and reflection characteristics of the glass or quartz are the same. This is done by cleaning the inside and outside of all the cells to be matched, filling the cells with distilled water and measuring the transmittance (or absorbance) near 100%T (0A). The agreement between transmittance readings indicates the degree of matching between cells.

Matching cells in a single-beam instrument should always be done at the analytical wavelength because matching at one wavelength does not guarantee matching at others. If the selected cells do not match, it is better to find cells that *do* match rather than applying corrections to the data.

In addition to comparing cells containing water, the cells should also be filled with the solution to be measured. This provides an additional check and alerts the operator to any discrepancies in pathlength which would not be detected by matching with water only.

Test tubes must also be matched and *always* 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 in the sample compartment.

Square cuvettes that are carefully matched 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.

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

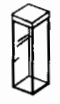
- Glass: From 320 to 360 nm (depending on manufacturer) up to 1100 nm
- Quartz: From 200 to 230 nm (depending on manufacturer) up to 1100 nm
- Disposable: Refer to manufacturer's specifications and ensure that you work within the recommended range.

Note: When using small aperture cells, please be sure to follow these guidelines:

- Always use masked cells.
- Align the cell holder using the cells you intend to use when measuring samples.
- Use the same cell (or cuvette) for your blank and your samples.

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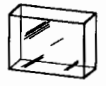
CELL SELECTION CHART FOR SPECTRONIC® GENESYS™ Spectrophotometers

PICTURE	DESCRIPTION	CATALOG NUMBER	PATHLENGTH	DIMENSIONS	VOLUME	USABLE RANGE	NUMBER INCLUDED	REMARKS
	Square Cuvette Optical Glass	331709	10 mm	45 H x 12.5² mm	min 1.3 ml max 4.0 ml	320-1100 nm	Matched set of 2	
	Square Cuvette Quartz	331742				200-1100 nm		
	Ultra-Microcell Quartz	331752	10 mm	50 H x 12.5² mm	min 0.07 ml (70 µl) max 3.0 ml	200-1100 nm	One	·Masked ·Sample Chamber Aperture Dimensions: 2 H x 2-2.5 W mm ·Z-Dimension 8.5 mm
	Flowcell Optical Glass	335171	10 mm	38.5 H x 12.5² mm	0.08 ml (80 µl) chamber volume	320-1100 nm	One	·Sample Chamber Aperture Diameter 3 mm ·Z-Dimension 8.5 mm
	Flowcell Quartz	335172				200-1100 nm		
	10 mm Test Tube Optical Glass	331775	10 mm (0.39")	88 H x 12 OD mm (3.5" x 0.48")	In test tube holder: min 1.3 ml max 6.5 ml In sq. holder: min 1.5 ml max 6.5 ml	340-1100 nm	Box of 12	·The 10 mm Test Tube (#331775), only, can be used in the following square cuvette holders - the single cuvette holder (#336028), the standard 8-Position Multi-Cell Holder (#336027), or the test tube holder (#336014)
	20 mm Test Tube Optical Glass	331777	20 mm (0.8")	88 H x 22 OD mm (3.5" x 0.9")	min 4.5 ml max 27.0 ml			
	1/2" Test Tube Optical Glass	331780	0.459" (11.7 mm)	4" H x 0.5" OD (101.6 x 12.7 mm)	min 1.3 ml max 10.0 ml			
	3/4" Test Tube Optical Glass	331781	0.675" (17.2 mm)	6" H x 0.715" OD (152.4 x 18.2 mm)	min 3.0 ml max 33.0 ml			
	1" Test Tube Optical Glass	331782	0.880" (22.4 mm)	6" H x 0.96" OD (152.4 x 24.4 mm)	min 5.5 ml max 55.0 ml			·Test Tube #331773 has flat bottom
	1" Short Test Tube Optical Glass	331773	0.880" (22.4 mm)	2.56" H x 0.96" OD (65.0 x 24.4 mm)	min 6.0 ml max 24.0 ml			

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CELL SELECTION CHART FOR SPECTRONIC® GENESYS™ 5
Continued

PICTURE	DESCRIPTION	CATALOG NUMBER	PATHLENGTH	DIMENSIONS	VOLUME	USABLE RANGE	NUMBER INCLUDED	REMARKS
	Longpath Cylindrical Cell, Optical Glass	331731	50 mm	Outer Diameter, 22 mm Inner Diameter, 19 mm	min 13.0 ml max 13.0 ml	320-1100 nm	Matched set of 2	·Double Stoppered
	Longpath Cylindrical Cell, Quartz	331768	50 mm		min 13.0 ml max 13.0 ml	200-1100 nm		
	Longpath Cylindrical Cell, Optical Glass	331732	100 mm		min 28.0 ml max 28.0 ml	320-1100 nm		
	Longpath Cylindrical Cell, Quartz	331769	100 mm		min 28.0 ml max 28.0 ml	200-1100 nm		
	Longpath Rectangular Cell, Optical Glass	331733	50 mm	45 H x 12.5 W mm	min 6.5 ml max 20.0 ml	320-1100 nm	Matched set of 2	
	Longpath Rectangular Cell, Quartz	331734	50 mm		min 6.5 ml max 20.0 ml	200-1100 nm		
	Longpath Rectangular Cell, Optical Glass	331766	100 mm		min 16.5 ml max 56.0 ml	320-1100 nm		
	Longpath Rectangular Cell, Quartz	331767	100 mm		min 16.5 ml max 56.0 ml	200-1100 nm		

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Appendix B - Sample Compartment Layout / Dimensions

The sample compartment of your SPECTRONIC® GENESYS™ spectrophotometer contains the 8-Position Multi-Cell Holder that is included with the instrument. This cell holder can accommodate up to eight of the following cells:

- Square cuvettes (regular, semi-micro, 40 •L micro, flowthrough) - see *Appendix A* for more information
- Test tubes (10 mm pathlength, 88 mm tall - Milton Roy #331775)
- Short pathlength cuvettes (1 mm, 2 mm or 5 mm pathlength), spacers are required

Note: Semi-micro and ultra-micro cuvettes must be manually aligned in the Multi-Cell Holder.

Figure B-1 and Figure B-2 illustrate the SPECTRONIC® GENESYS™ spectrophotometer light beam. Table B-1 contains the specifications for the sample compartment, including the dimensions of the beam.

Figure B-33 *Light beam (10 mm square cuvettes)*

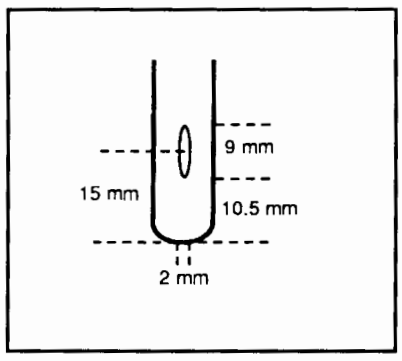


Figure B-34 *Light beam (10 mm test tubes)*

Table B-65 *Light beam specifications*

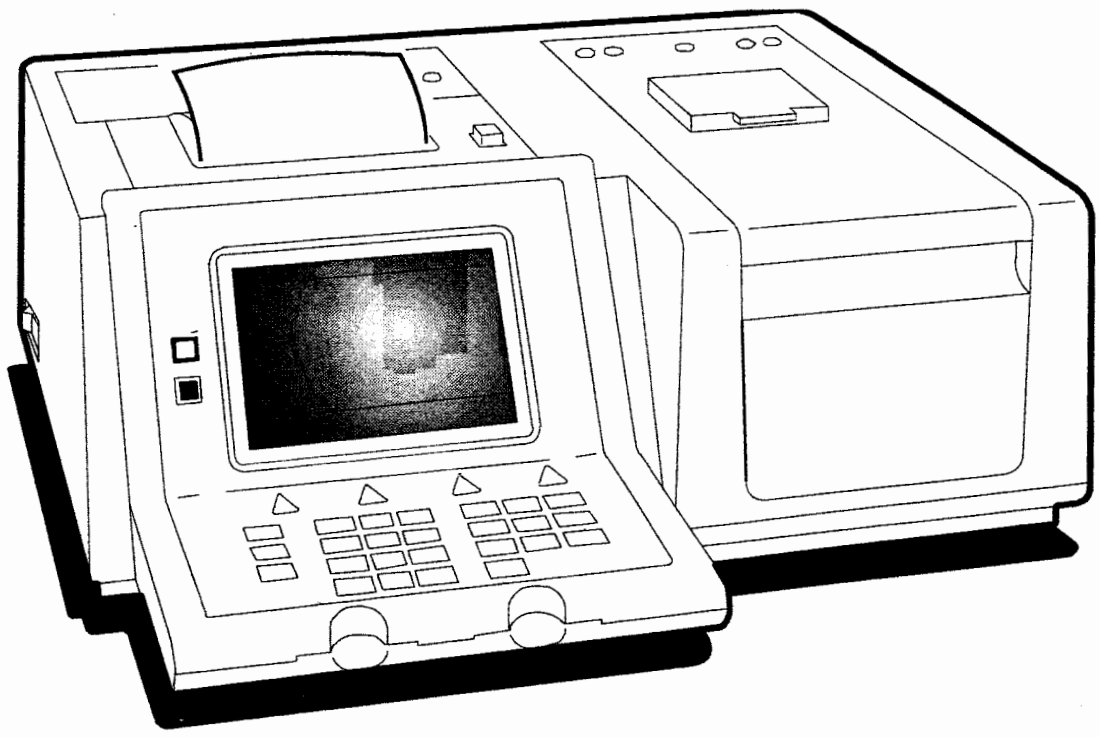
Z-dimension	
Square cuvettes	8.5 mm
Test tubes	15 mm
Beam size	2 mm (wide) x 9 mm (high)

The test tube access door is the hinged cover on top of the sample compartment door. This access door is particularly useful when test tubes greater than 100 mm in length are used. The test tubes can be inserted through this door into the accessory Test Tube Holder (336014). Test tubes greater than 100 mm in length also require the use of the Light Shield (336015).

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SPECTRONIC® GENESYS™
Spectrophotometers



Condescent
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OPERATOR'S MANUAL

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Pictogram	Component / Status	Pictogram	Component / Status
	Tungsten lamp lit		Thermoelectric accessory installed
	Tungsten lamp burnt out		SoftCard™ installed in card slot A
	Deuterium lamp lit		SoftCard installed in card slot B
	Deuterium lamp burnt out		Battery (in Memory SoftCard) low*
	Printer Selected		Battery (in Memory SoftCard) dead
	Pump installed		

* When this pictogram appears, be sure to replace the battery in the Memory SoftCard™ *promptly*. Refer to the instructions provided with the Memory SoftCard for the procedure to replace the battery.

Note: If the battery dies, you will lose all data on the Memory SoftCard when the card is removed from the instrument.

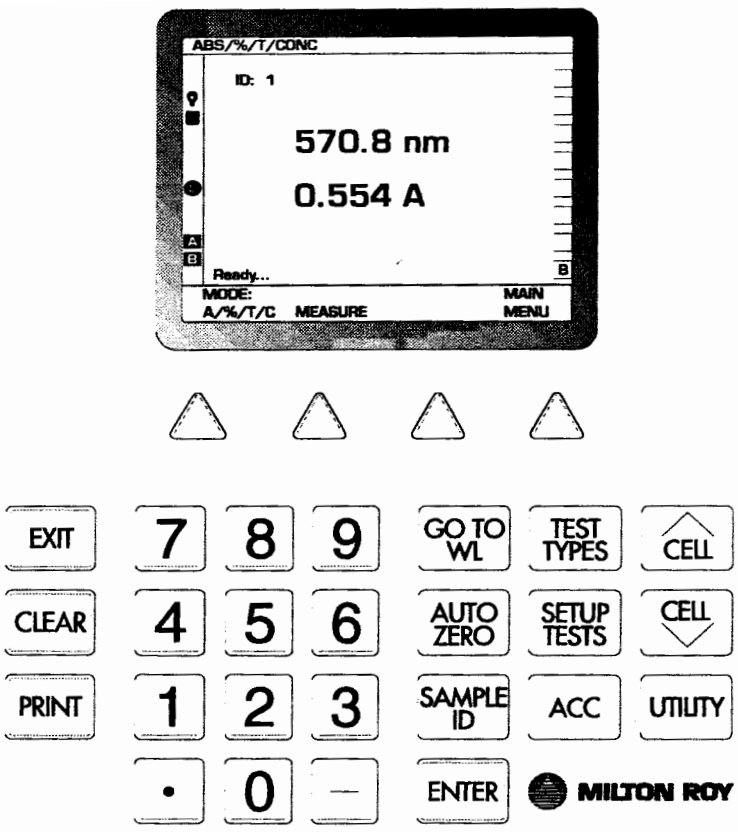


In addition to the above pictograms, a pictogram illustrating a key is displayed on the screen when you set up a test and "lock" it. This means that the test cannot be edited, it can only be run. A password must be used to "unlock" the test.

Pictograms used in SPECTRONIC® GENESYS™ spectrophotometers

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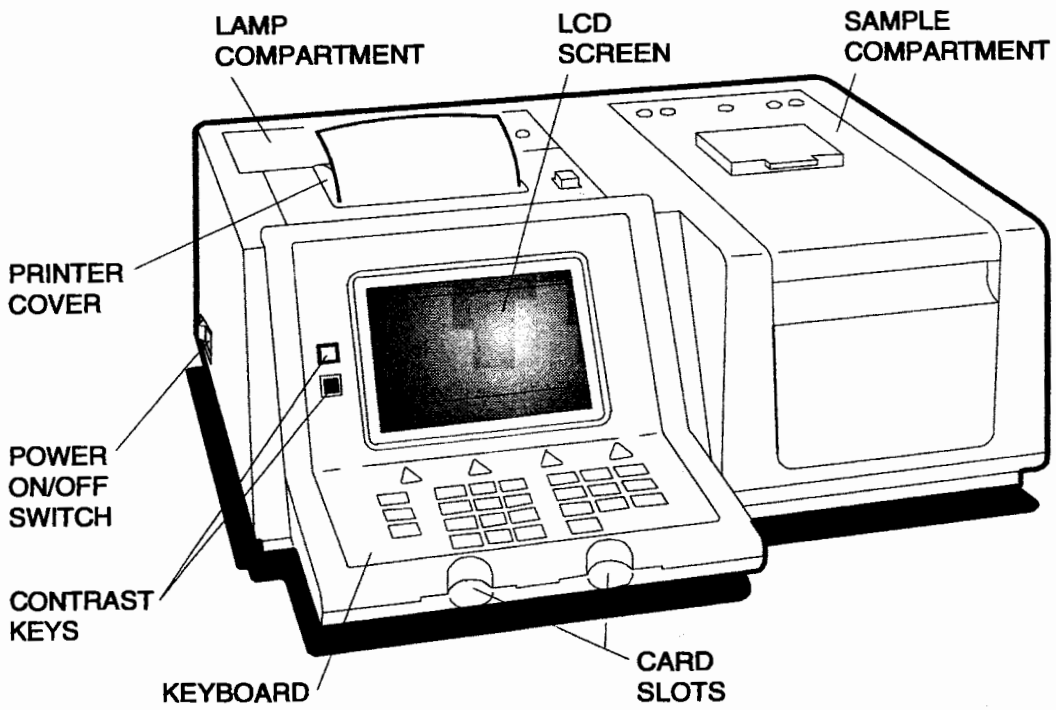


Main keyboard and screen display of SPECTRONIC® GENESYS™ spectrophotometers

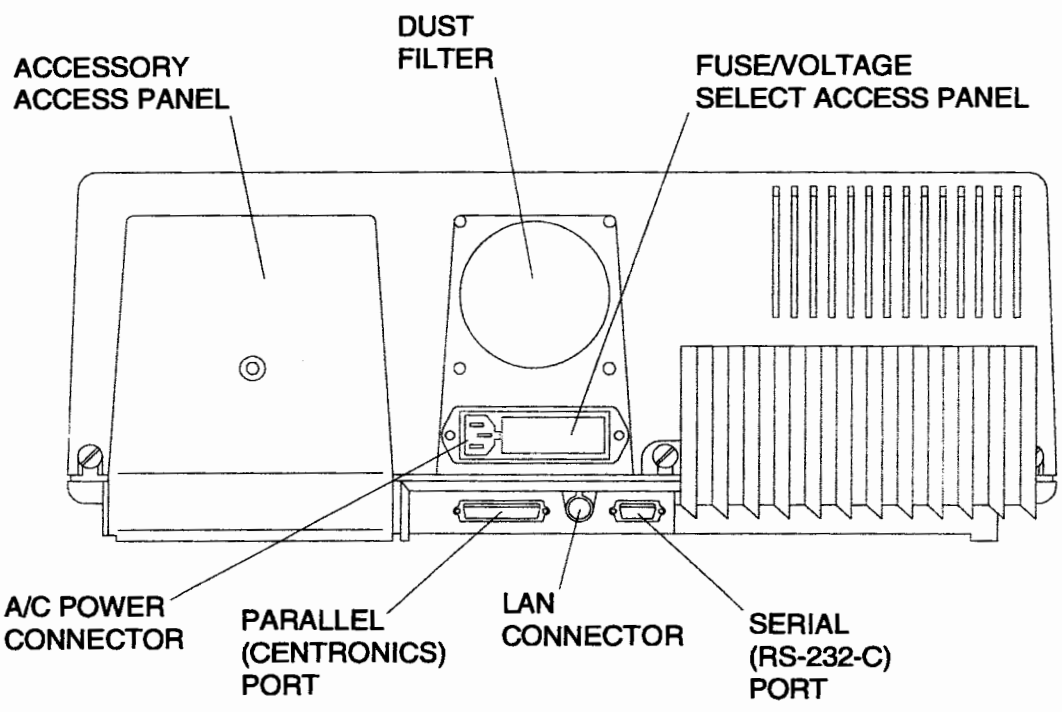
Name of key	Function
ACC	Sets parameters (e.g., auto increment, temperature) used to control the automated accessory currently installed in the instrument
AUTO ZERO	Sets the instrument to 0.0A or 100%T
CELL Λ	Increments the Multi-Cell Holder one position (from position #8, the holder will advance to position #1)
CELL V	Decrements the Multi-Cell Holder one position (from position #1, the holder will advance to position #8)
CLEAR	Clears the numeric or alphanumeric entry field, one character at a time
CONTRAST	Controls the contrast of the display
ENTER	Accepts the displayed entry
EXIT	Backs up one screen in the software or out of the screen currently displayed. Pressing this key causes the instrument to accept any valid changes made.
GOTO WL	Sets the analytical wavelength
MINUS (-)	Used for numerical entries
NUMBER KEYS	Used for numerical entries
PERIOD (.)	Used for numerical entries
PRINT	Sends screen information or test results to the selected printer (internal or external to the instrument)
SAMPLE ID	Sets (changes and enters a new sample identifier (alphanumeric)
SETUP TESTS	Accesses the application program set-up screen, enabling you to enter instrument and test parameters for the current test
TEST TYPES	Loads a specific test, previously stored, from a Memory SoftCard™ or from the instrument (default test)
UTILITY	Accesses selected instrument functions (lamp interchange wavelength, time/date settings, language, turning lamps on and off, printer/plotter devices, parameters for RS-232-C port)

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Front view of SPECTRONIC® GENESYS™ spectrophotometers



Back panel of SPECTRONIC® GENESYS™ spectrophotometers

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Appendix C - Optical Description

Your SPECTRONIC GENESYS spectrophotometer is a split-beam instrument equipped with two detectors, as shown in Figure C-1.

The overall optical system of the instrument offers several advantages:

- The two detectors are UV-enhanced silicon diode detectors. One detector is used for sample measurements and the other for reference measurements. The reference detector monitors any small source fluctuations. In addition, the location of the reference detector reduces polarization, resulting in smoother data and more consistent results.
- The instrument uses a crossed Czerny-Turner monochromator with a blazed holographic grating (1200 grooves / millimeter) which provides better performance in the UV and near IR regions.
- The appropriate source lamp is selected automatically (based on the switchover wavelength selected by the user). Upon power-up, the lamp position is automatically optimized and aligned for greater precision and accuracy.
- The light beam is 9 millimeters (mm) high by 2 mm wide. Using a beam this high minimizes sensitivities to small variations in the vertical position of the sample cell.

The GENESYS™ 2 model differs from the GENESYS™ 5 model in the following ways:

- The GENESYS™ 2 has a 2 nm single band width versus the 5 nm single band width of the GENESYS™ 5.
- The GENESYS™ 2 has a chopped optical system for better signal-to-noise performance.

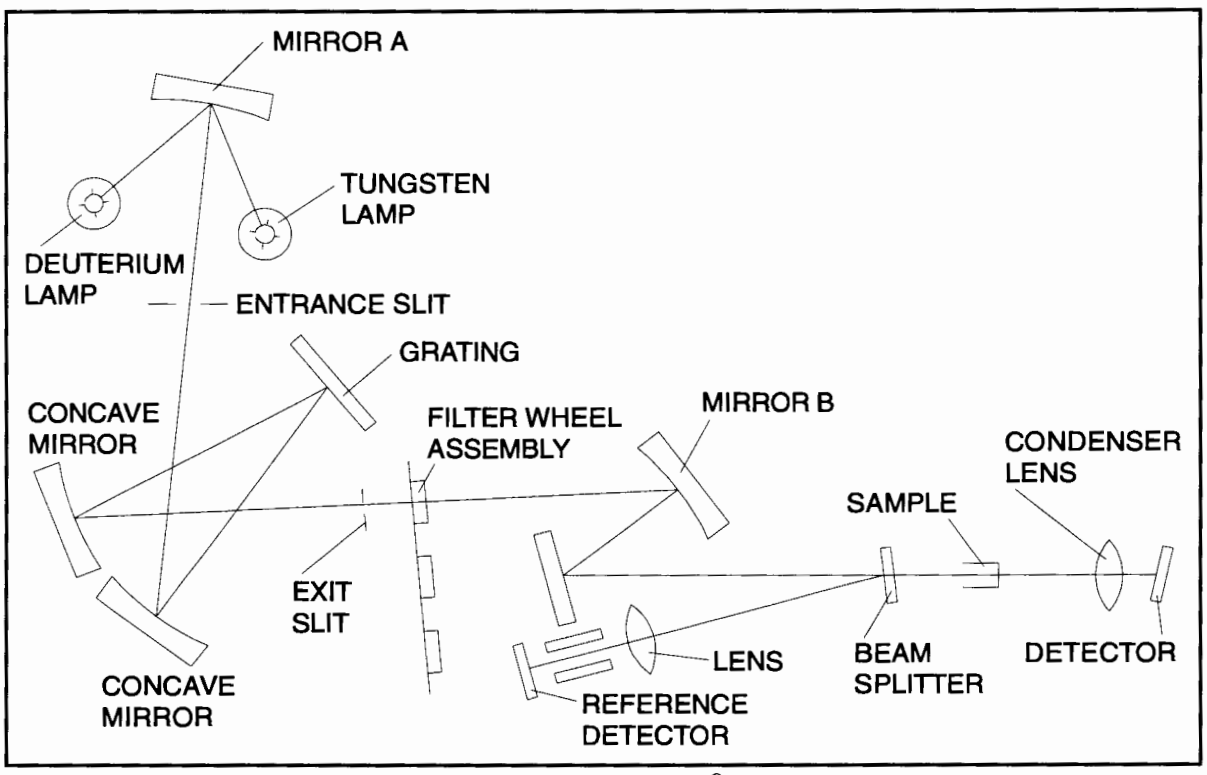


Figure C-65 Optical diagram for SPECTRONIC® GENESYS™ spectrophotometers

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