PELA-1050

INTRODUCTION

The PELA-1050 is a custom accessory that modifies the Perkin Elmer Lambda 900 Spectrophotometer. This accessory replaces the standard detector compartment in the instrument with a 60 mm diameter Spectralon® collection sphere and custom detectors and preamplifier board. Spectralon is Labsphere's proprietary white, diffuse reflectance material. The advantage in using this accessory is that beam alignment onto the detector optics is no longer critical.

Since the PMT and PbS detectors are now mounted within a Spectralon integrating sphere, they are illuminated with only diffuse, homogenous light. When the sample beam strikes the sphere wall, the light undergoes many diffuse reflections before reaching the detectors. Because the detectors are baffled from the input beam's first strike, they are insensitive to any movement or slight misalignment of that beam.

The accessory is also useful for measuring samples that spread the beam out slightly, including second-surface mirrors and slightly translucent samples.

The PELA-1050 allows for repeatable measurements using the Lambda 900 with Labsphere's PELA-6000 Series VN Accessories and other accessories where precise detector alignment may be an issue (such as Perkin Elmer's transmittance compartment devices and variable angle accessory). It is also useful with the biconical reflectance (PELA-1022) accessory and the specular reflectance accessories (PELA-1025, PELA-1026, and PELA-1029). The PELA-1050 accessory operates within the 190 to 2500 nm wavelength range, using a combination of PMT and PbS detectors.

This manual contains first time installation and alignment instructions for the PELA-1050. These first time installation procedures are for authorized, qualified, and experienced Perkin Elmer technicians only. The customer may perform subsequent installations. Refer to your Perkin Elmer manual as applicable. The PELA-1050 accessory will not affect the normal operating procedures for the instrument.

UNPACKING AND INSPECTION

The PELA-1050 was thoroughly inspected before shipping and should be ready to operate after completing the set-up instructions. All Labsphere instrumentation is packaged and shipped in reinforced shipping containers. Carefully check the components after unpacking for any damage that may have occurred during shipping. If there is any such damage, file a claim immediately with the freight carrier and contact Labsphere's Customer Service Department at

☎(603) 927-4266.

APPLICATION SUPPORT

Labsphere is committed to leadership in reflectance technology. If you have any applications questions or difficulty using this spectroscopy accessory, call your Labsphere Spectroscopy Product Specialist at

☎(603) 927-4266.

INSTALLATION

CAUTION Do not attempt first time installation of the PELA-1050 unless you are an authorized, qualified, and experienced Perkin Elmer technician. Observe all warning messages in the Perkin Elmer documentation. The customer may perform subsequent installations.

1. Following the instructions in your Lambda 900 manual, remove the detector compartment from the instrument.
2. Position the PELA-1050 as shown below, with the optics on the left. Refer to the baseplate top view depicted in Figure 1.

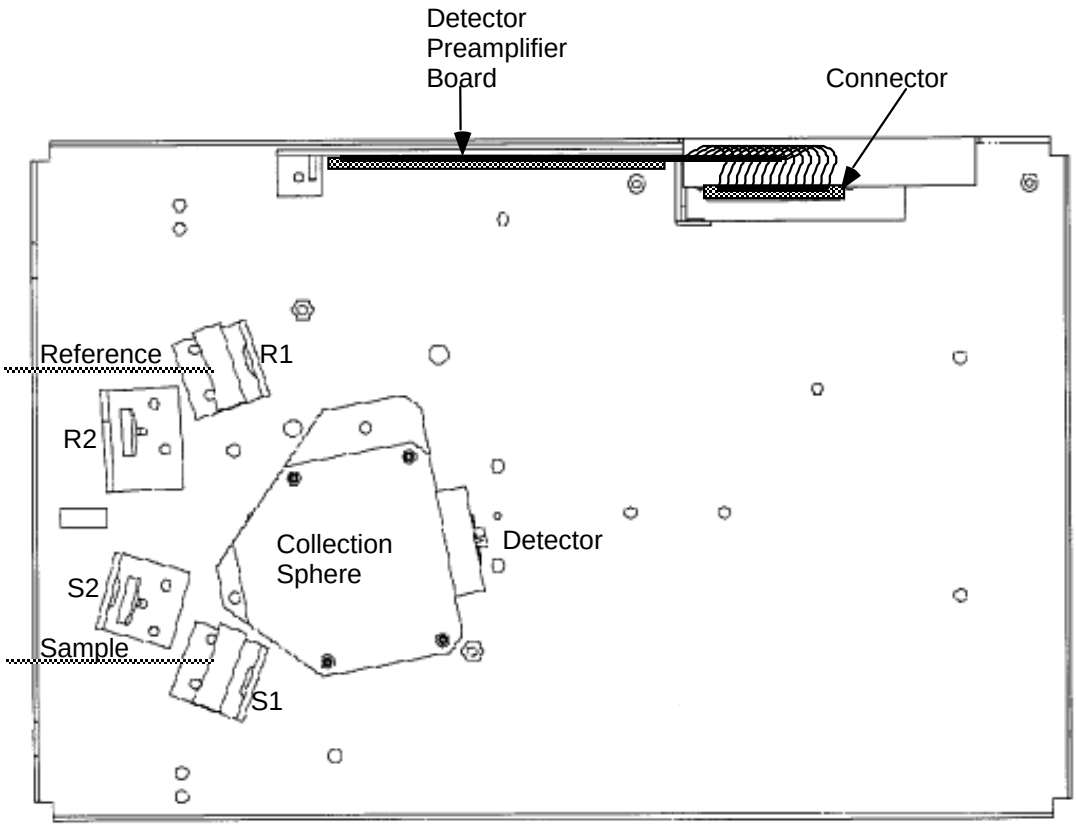

Figure 1. PELA-1050 Baseplate, Top View

3. Set the PELA-1050 into the Lambda 900 instrument as shown, in place of the standard detector compartment. Note that you must seat the accessory over the instrument's alignment pins.
4. Remove the two thumbscrews that secure the plastic optics cover onto the accessory. Lift the plastic optics cover off the accessory. (This will be replaced after the alignment is complete.)
5. Remove the three thumbscrews that secure the detector preamplifier board cover. Lift the detector preamplifier board cover off.
6. Loosen **but do not remove** the two cap screws (using a 3 mm hex wrench) and one Phillips screw (using a Phillips screwdriver) on the preamplifier cable connector. (This will allow the connector to align and seat properly.)
7. Attach the detector preamplifier cable connector to the mating connector in the instrument's detector compartment area. Ensure that the connector is fully seated.
8. Secure the PELA-1050 into the Lambda 900 instrument by tightening the four captive slotted mounting screws.
9. Retighten the two cap screws (using a 3 mm hex wrench) and one Phillips screw (using a Phillips screwdriver) on the connector. (This will secure the connector and board alignment with the instrument.)
10. Replace the board cover and secure with three thumbscrews.
11. Proceed to the alignment procedure.

Note: Once the board and connector are aligned to match the instrument, this connector/board alignment should not have to be performed again unless a different instrument is used.

ALIGNMENT

This alignment will be easier to perform if you remove the sample compartment from the instrument per the instructions given in your Perkin Elmer Lambda 900 manual. Complete the steps given below to align the PELA-1050.

1. Set the instrument to white light according to the instructions given in your Lambda 900 manual.
2. Remove the optics cover (if necessary) by first loosening the two thumbscrews on top. Make sure that the instrument's sample compartment is removed or is empty.
3. (Use an L-shaped, 2 mm hex wrench to adjust mirrors.) Refer to Figure 1. Adjust mirror S1 so that the sample beam is centered on mirror S2.
4. Adjust mirror S2 so that the sample beam is centered on the entrance port of the collection sphere (without clipping).
5. Adjust mirror R1 so that the reference beam is centered on mirror R2.
6. Adjust mirror R2 so that the reference beam is centered on the entrance port of the collection sphere (without clipping).
7. Replace the optics cover and secure by tightening the two thumbscrews on top.
8. Replace the detector compartment cover as described in your Lambda 900 manual.

OPERATION

Operating Suggestions

Since any integrating sphere accessory acts as an attenuator of signal, run scans at longer Signal Averaging Times, or wider Slit-Bandwidth, than in ordinary transmittance work.

Diagnostic Scans

A series of diagnostic scans was performed on each accessory at the factory prior to shipping. The results of the diagnostic scans obtained on your accessory are provided in the Quality Assurance Document. Upon first installation of this accessory, or if problems with the accessory are suspected, repeat these diagnostics, as described below and compare the results with those provided by the factory.

Along with the results of the diagnostic scans performed on this accessory at the factory, the Quality Assurance Document includes a print-out of the instrument parameters used in performing each scan. To reproduce these diagnostic scans, first set the instrument parameters to match those in the QC scan method following the Lambda 900 software instructions.

Make sure the instrument is turned on and warmed-up according to the Perkin Elmer instructions. Initialize the instrument software. Refer to the Perkin Elmer manual as necessary in conjunction with this manual to perform the diagnostic scans.

Ensure that the accessory alignment has been completed. Close all covers to prevent light leaks.

Reference Beam Energy Scan

1. Set starting parameters according to Table 1. Select Reference beam where indicated.
2. Steps 3 through 6 are to maximize the energy in order to provide successful scans.
3. Change abscissa value to 1,200 nm.
4. Adjust the NIR slit width until the energy value ≈ 80% (± 5%) is obtained.
5. Change the abscissa value to 500 nm.
6. Adjust the UV-VIS gain until the energy value ≈ 80% (± 5%) is obtained.
7. Set the scan parameters to 200 - 2,500 nm.
8. Start a scan according to the Perkin Elmer Manual.

Table 1. Instrument Parameters for Sample Beam Energy Scan and Reference Beam Energy Scan

Parameter	Setting
Lamps	**UV/VIS ON**
Beam	**Single Beam**
Method	**Scan**
Data Interval	**1 nm**
Abscissa Start	**2500 nm**
Abscissa End	**200 nm**
Slit Mode UV/VIS	**Fix**
Slit UV/VIS	**2 nm**
Integr. Time UV/VIS	**0.08 s**
Gain UV/VIS	**User defined**
Slit Mode NIR	**Fix (2 - 4 nm)**
Integr. Time NIR	**0.12 s**
Gain NIR	**(2 - 4)**
Ord. Mode	**E1 and E2**
Sample Beam	**Front**
Attenuators	**Sample Beam--100% Reference Beam--100%**

Sample Beam Energy Scan

1. Set starting parameters according to Table 1. Select Sample beam where indicated.
2. Steps 3 through 6 are to maximize the energy in order to provide successful scans.
3. Change abscissa value to 1,200 nm.
4. Adjust the NIR slit width until the energy value ≈ 80% (± 5%) is obtained.
5. Change the abscissa value to 500 nm.
6. Adjust the UV-VIS gain until the energy value ≈ 80% (± 5%) is obtained.
7. Set the scan parameters to 200 - 2,500 nm.
8. Start a scan according to the Perkin Elmer Manual.

100% Baseline Scan

1. Set starting parameters according to Table 2.
2. Run an uncorrected baseline scan, followed by a 0% transmittance scan. (Check the instrument manual--this step may be performed automatically when you collect the uncorrected baseline scan)

3. Without changing the accessory's configuration, start a sample scan according to the Perkin Elmer Manual. This produces a 100% baseline scan on the accessory.

Table 2. Instrument Parameters for Uncorrected, 0% Transmittance and Corrected Baseline Scans

Parameter	Setting
Lamps	**UV/VIS ON**
Beam	**Double Beam**
Method	**Scan**
Data Interval	**1 nm**
Abscissa Start	**2500 nm**
Abscissa End	**190 nm**
Slit Mode UV/VIS	**Fix**
Slit UV/VIS	**2 nm**
Integr. Time UV/VIS	**0.08 s**
Slit Mode NIR	**Servo**
Integr. Time NIR	**0.12 s**
Gain NIR	**2**
Ord. Mode	**% R**
Sample Beam	**Front**
Attenuators	**Sample Beam--100% Reference Beam--100%**

Blocked Beam Zeroline Scan

1. Set starting parameters according to Table 3.
2. Set the sample beam attenuator to 0% or manually place an opaque sample in the entrance port of the collection sphere port.
3. Start the scan to produce a blocked beam zeroline scan using the uncorrected baseline scan and the 0% transmittance scan from Step 2 of the 100% Baseline Scan procedure (See *Diagnostic Scans* section.)
4. Remove the opaque sample or 0% transmittance sample beam attenuator when the scan is complete.

Table 3. Instrument Parameters for Beam Blocked Scan

Parameter	Setting
Lamps	**UV/VIS ON**
Beam	**Double Beam**
Method	**Scan**
Data Interval	**1 nm**
Abscissa Start	**2500 nm**
Abscissa End	**200 nm**
Slit Mode UV/VIS	**Fix**
Slit UV/VIS	**2 nm**
Integr. Time UV/VIS	**0.08 s**
Slit Mode NIR	**Servo**
Integr. Time NIR	**0.12 s**
Gain NIR	**2**
Ord. Mode	**% R**
Sample beam	**Front**
Attenuators	**Sample Beam--0% Reference Beam--100%)**

Time drive at 500 nm

1. Set starting parameters according to Table 4. (Set the wavelength to 500 nm.)
2. Perform an autozero at 500 nm.
3. Run a time drive at 500 nm.

Table 4. Instrument Parameters for Time drive Scans at 1500 nm and 500 nm.

Parameter	Setting
Lamps	**UV/VIS ON**
Beam	**Double Beam**
Method	**Time Drive**
Total Time	**180 s**
Time Interval	**1 s**
Wavelength	**500.0 nm and 1500.0 nm**
Slit Mode UV/VIS	**Fix**
Slit UV/VIS	**2 nm**
Integr. Time UV/VIS	**0.24 s**
Slit Mode NIR	**Servo**
Integr. Time NIR	**0.24 s**
Gain NIR	**2**
Ord. Mode	**% R**
Sample Beam	**Front**
Attenuators	**Sample Beam--100% Reference Beam--100%**

Time drive at 1500 nm

1. Set starting parameters according to Table 4. (Set the wavelength to 1500 nm.)
2. Perform an autozero at 1500 nm.
3. Run a time drive at 1500 nm.

MAINTENANCE

General Information

When not in use, the accessory should be stored in a controlled environment. Dust and moisture may adversely affect its performance.

PRECAUTIONS:

- Never disconnect or connect the detector preamp board with the instrument powered ON.
- Do not remove the cover to the detector preamplifier electronics.
- Do not handle the photodetectors or mirrors.
- Do not allow foreign objects to enter the integrating sphere.
- Clean dust and particulate debris from the sphere and mirrors using a gentle stream of clean air.

Mirror Cleaning

The transfer optics mirrors should never be touched or handled. However, most accessory mirrors do have a protective overcoat to allow cleaning if necessary. If mirror cleaning is required, contact Labsphere Customer Service at **(603) 927-4266** for assistance.