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PERKIN ELMER

Lambda 11

UV/Vis Spectrometer

Operation and Parameter Description

Part Number B050-9912
Publication B2157.10
Release 3.0/Oct. 94

UV/Vis/NIR Spectroscopy

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Safety Information

This section contains important safety information. Please read this information carefully before you install the instrument and observe the recommendations at all times.

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Safety Information

IEC 1010 – Safety Requirements

This instrument has been designed and tested in accordance with Perkin-Elmer specifications and IEC 1010-1: *Safety requirements for electrical equipment for measurement, control, and laboratory use*. This instrument is protected in accordance with IEC Class 1 rating.

This manual contains information and warnings that must be followed by the user to ensure safe operation and to maintain the instrument in a safe condition.

Before using this instrument it is essential to read the manual carefully and to pay particular attention to any advice it contains concerning potential hazards that may arise from the use of the instrument.

This advice is intended to supplement, not supersede, the normal safety code of behavior prevailing in the user's country.

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Safety Conventions in the Manual

Possible hazards that could harm the user or result in damage to the instrument are clearly stated at appropriate places throughout this manual.

Read the manuals for the instrument before you start working with the instrument.

The following conventions are used to indicate warnings and special circumstances:

W01.01



WARNING

Warning

*We use the term WARNING to inform you about situations that could result in **personal injury** to yourself or other persons. Details about these circumstances are in a box like this one.*

C01.01



CAUTION

Caution

*We use the term CAUTION to inform you about situations that could result in **serious damage** to the instrument or other equipment. Details about these circumstances are in a box like this one.*

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Electricity

To ensure satisfactory and safe operation of the instrument, it is essential that the green/yellow lead of the line power cord is connected to true electrical earth (ground).
If any part of the instrument is not installed by a Perkin-Elmer service representative, ensure that the line power plug is wired correctly:

Terminal	Cord Lead Colors	
	International	USA
Live	Brown	Black
Neutral	Blue	White
Protective Conductor (earth/ground)	Green/Yellow	Green

W02.01

WARNING

Any interruption of the protective conductor inside or outside the instrument or disconnection of the protective conductor (earth/ground) terminal is likely to make the instrument dangerous.
Intentional interruption is prohibited.

W02.02

WARNING

Lethal voltages are present in the instrument.
Even with the power switch OFF, line power voltages can still be present within the instrument.
When the instrument is connected to line power, terminals may be live, and opening covers or removing parts (except those to which access can be gained by hand) is likely to expose live parts.
Capacitors inside the instrument may still be charged even if the instrument has been disconnected from all voltage sources.

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When working with the instrument:

- Connect the instrument to a correctly installed line power outlet that has a protective conductor (earth/ground).
- Do not attempt to make internal adjustments or replacements except as directed in this manual.
- Do not operate the instrument with any covers or parts removed.Servicing should be carried out only by a Perkin-Elmer Service Representative or similarly authorized and trained person.
- Disconnect the instrument from all voltage sources before opening it for any adjustment, replacement, maintenance or repair.
  If, afterwards, the opened instrument must be operated for further adjustment, maintenance or repair, this must only be done by a skilled person who is aware of the hazard involved.
- Use only fuses with the required current rating and of the specified type for replacement.
  Do not use makeshift fuses or short circuit the fuse holders.
- Whenever it is likely that the instrument is no longer electrically safe for use, make the instrument inoperative and secure it against any unauthorized or unintentional operation.

  The instrument is likely to be electrically unsafe when it:
  - shows visible damage;
  - fails to perform the intended measurement;
  - has been subjected to prolonged storage under unfavorable conditions;
  - has been subjected to severe transport stresses.

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Environment

W01.03



WARNING

Explosive Atmosphere

This instrument is not designed for operation in an explosive atmosphere.

The instrument has been designed for indoor use and will operate correctly under the following conditions:

- Indoors;
- Temperature +15 °C to +35 °C;
- Relative humidity 75 % max.

Chemicals

Use, store, and dispose of chemicals that you require for your analyses in accordance with the manufacturer's recommendations and local safety regulations.

Waste Disposal

Waste vessels may contain acidic or organic solutions and small amounts of the elements that were analyzed.
If these materials are toxic, you may have to treat the collected effluent as hazardous waste. Refer to your local safety regulations for proper disposal procedures.

Deuterium lamps are maintained under reduced pressure. Handle and dispose of them correctly to minimize the implosion risk.

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UV Radiation

Particular attention is drawn to the health hazard presented by UV radiation.

When the deuterium (UV) lamp is switched on, do not open the spectrometer top cover for longer than is necessary to perform adjustments, etc.

Never gaze into the deuterium lamp.

Always wear UV-absorbing protective glasses when the spectrometer top cover is open.

Radio Frequency

This equipment generates radio frequency energy and if not installed and used properly, i.e. in strict accordance with the instruction manual, may cause harmful interference to radio communications.

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Translations of Warnings



*We use the term **WARNING** to warn you about situations that could result in personal injury to yourself or other persons.*
Details about these circumstances are in a box like this one.

F

*Nous utilisons le terme **WARNING** pour vous avertir de situations qui peuvent provoquer des dommages personnels à vous ou à une tierce personne. Tous détails relatifs à ce risque sont décrits dans une case comme celle-ci.*

I

*Vienne usato il termine **WARNING** per avvisare di situazioni che potrebbero causare danni a personne.*
Ulteriori dettagli si trovano scritti in tabella come questa.

E

*Usamos el término **WARNING** para advertirle acerca de situaciones que pudieran ocasionar daño personal a usted mismo o a alguien más.*
Detalles acerca de estas circunstancias aparecen en recuadros como éste.



*We use the term **CAUTION** to warn you about situations that could result in serious damage to the instrument or other equipment.*
Details about these circumstances are in a box like this one.

F

*Nous utilisons le terme **CAUTION** pour vous prévenir de situations qui peuvent provoquer des sérieux dommages à l'instrument ou à un autre équipement.*
Tous détails à propos des risques possibles seront décrits dans une case telle que celle-ci.

I

*Vienne usato il termine **CAUTION** per avvisare di situazioni che potrebbero causare danni allo strumento o ad altre attrezzature.*
Ulteriori dettagli si trovano scritti in tabella come questa.

E

*Usamos el término **CAUTION** para advertirle acerca de situaciones que pudieran acabar en serio daño al instrumento o a otros equipamientos.*
Detalles acerca de estas circunstancias estàn en recuadros como éste.

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WARNING

Switch OFF the spectrometer, and remove the line power connector before you alter or make any new electrical connections.

F

Mettez le spectromètre en position OFF, et enlevez le câble secteur avant que vous n'apportiez des changements aux connexions électriques.

I

Spegnere lo spettrofotometro e togliare l'alimentazione principale prima di alterare o fare nuove connessioni elettriche.

E

Apagar el espectrofotòmetro y desconectar de red antes de alterar o hacer nuevas conexiones eléctricas.



WARNING

Switch OFF the spectrometer, computer and printer, and remove the line power connectors before you alter or make any new electrical connections.

F

Mettez le spectromètre, l'ordinateur et l'imprimante en position OFF, et à enlevez les câbles secteur avant de faire les moindres connexions électriques.

I

Spegnere lo spettrofotometro, il computer, la stampante e togliare l'alimentazione principale prima di alterare o fare nuove connessioni elettriche.

E

Apagar el espectrofotòmetro, ordenador e impresora y desconectar los conectores de la red antes de alterar o hacer nuevas conexiones eléctricas.

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Preface

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Lambda 11 User Documentation

The Lambda 11 UV/Vis spectrometer is intended for routine UV/Vis analyses.
To support this instrument, the User Documentation is divided into a number of manuals, each with a related range of topics.

The following manuals are provided for your Lambda 11:

- **Quick Reference** containing an overview of the keyboard and key functions and a list of the applications available on the Lambda 11.
- **Installation, Maintenance and System Description** providing specific information on setting up and maintaining your Lambda 11.
- **Operation and Parameter Description** containing information on the operation of Lambda 11.

This manual is the *Operation and Parameter Description* manual. It describes the operation of the instrument and provides information about the parameters.

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Document Conventions

The conventions below are used to warn you about potentially hazardous situations and to provide other specific information:

W01.01



Warning
We use the term WARNING to inform you about situations that could result in ***personal injury*** *to yourself or other persons. Details about these circumstances are in a box like this one.*

C01.01



Caution
We use the term CAUTION to inform you about situations that could result in ***serious damage*** *to the instrument or other equipment. Details about these circumstances are in a box like this one.*

Note: *A note indicates important supplementary information. Failure to follow this information could typically lead to incorrect analytical results or a deterioration in instrument performance.*

Other useful information, reminders and the like are printed in italics.

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Introduction 1

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Introduction 1

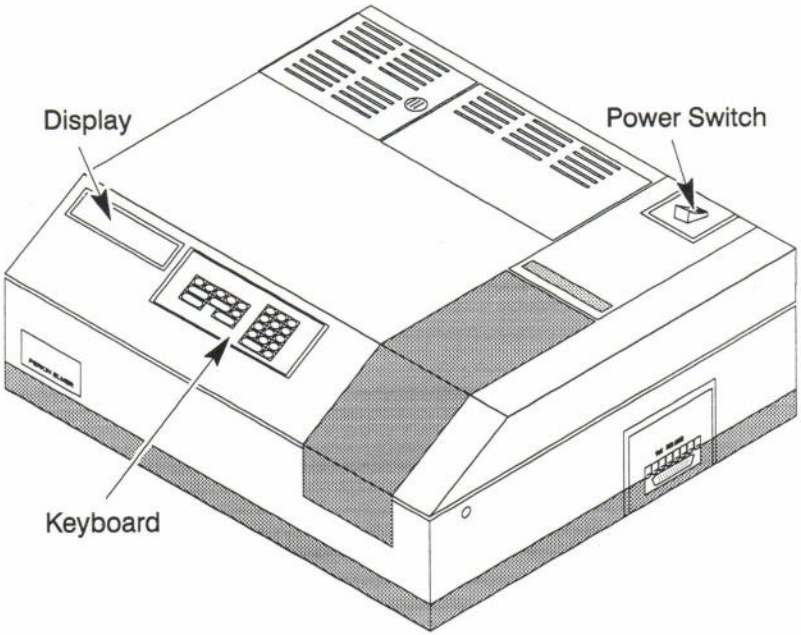


Figure 1-1 Lambda 11 Operating Controls

Lambda 11 is a single beam instrument intended for routine UV/Vis analysis. The parameters and entries to operate the instrument are entered through the keyboard and the information is shown on the display.

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1.1 Display

Information, parameters and entries are shown on a two line vacuum fluorescence display with 20 alphanumeric characters per line.

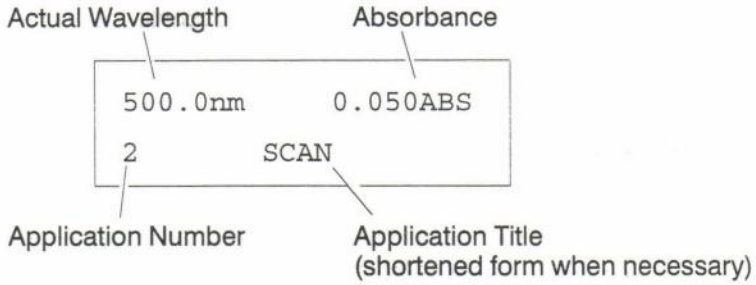
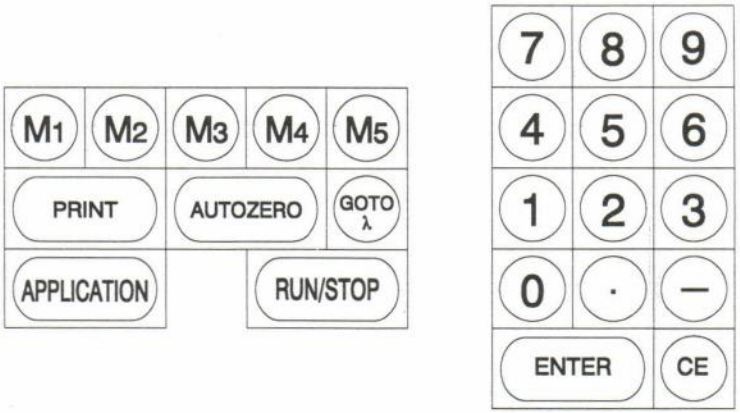


Figure 1-2 Example of a Standby Display

The measurement range is from 0 %T to 100 %T, or from −3.000 A to +3.000 A.
If you obtain a value outside this range, adjust the sample concentration (dilute the sample), or check that the beam is not obstructed.

1.2 Keyboard



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1.2.1 The Keys and their Function

Key	Function
M_1 to **M_5**	Calls up application. Application reassigned to **[M_n]** with **[•] [APPLICATION]** (refer to Section 2.5, page 2-5).
PRINT	Prints out wavelength and value shown on display. **[1] [PRINT]**; prints out the parameters for the current application. **[2] [PRINT]**; prints out the directory. **[3] [PRINT]**; prints out a short help message for the current application. **[4] [PRINT]**; line feed. **[5] [PRINT]**; form feed. **[6] [PRINT]**; prints Peltier temperature. **[7] [PRINT]**; prints out instrument status.
AUTOZERO	Autozero; refer to Section 2.7, page 2-7.
GOTO λ	To change the wavelength.
RUN/STOP	Starts or stops an application.
APPLICATION	Calls up an application in turn. Calls up a specified application when used with the numerical keys. **[•] [APPLICATION]** reassigns application to **[M_n]**. (refer to Section 2.5, page 2-5).
0 to **9**	Numerical keys
•	Decimal point; **[•] [APPLICATION]** saves an application to **[M_n]**.
–	Minus used to: a) enter negative numerical values, b) select the next parameter option in turn in the parameter loop, c) **[–] [APPLICATION]** moves to previous application.
ENTER	Calls up parameters, confirms parameter entry and moves to the next parameter.
CE	Clears unconfirmed parameter entry.

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Operation 2

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Operation 2

Please take your time when operating the instrument, wait until the "BUSY" display has switched off before pressing the next key in the sequence. This allows the software to complete the calculations and the motors to move the optics to their required setting.

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2.1 Starting Up



Electrical Hazard
To prevent potential injury to yourself and damage to the instrument, before switching on, check that the instrument contains the correct power unit for the line power supply prevailing in your locality.
The permitted voltage for the power unit in your instrument is shown next to the power switch.

1) Switch on at power switch

   Before starting an analysis, leave the instrument switched on for about half an hour to allow the lamps to warm up and stabilize. This is normally sufficient for short analysis runs. For longer analysis runs and higher stability, allow two hours warm up time.
   See also WAKEUP, Section 2.11, page 2-12.

2) Wait for the initialization phase.

3) The display shows the last application used prior to shutdown.

e.g.

```
500.0nm      0.050ABS
2            SCAN
```

2.2 Shutdown

1) Remove samples from instrument.

2) Press (APPLICATION) to return the instrument to standby.

   You can also return to standby by pressing (RUN/STOP) twice in quick succession or (Mn) once.

3) Switch the power switch to off.

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2.3 Selecting an Application

Select an application using one of the following ways:

- Press (APPLICATION) repeatedly to call up each application in turn, until you reach the application you require.
- Type the application number and press (APPLICATION) to call up a particular application.
- Press (–) and then (APPLICATION) to call up the previous application.
- Press one of the (M_n) keys to call up an application previously assigned to that key.

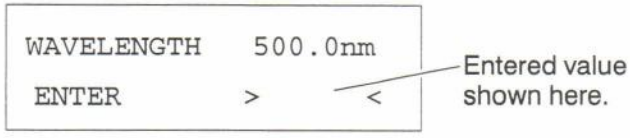
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2.4 Changing Parameters

You can change parameters on the applications.

1) Press (ENTER), the display will show the first of the parameters which can be changed.

e.g.



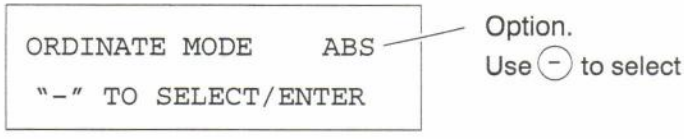
2) Enter parameter value using the numeric keys.

3) Press (ENTER) to confirm and move to next parameter display.

Parameters are in a loop, i.e. you continue to the next parameter in turn when you press the (ENTER) key.

4) Some parameters contain options.

e.g.



Press (–) to select your desired option.

Options are in a loop, i.e. you continue onto the next option in turn when you press the (–) key.

5) Press (ENTER) to exit the option loop and confirm the selection and move to the next parameter display.

6) When you have set all the parameters and options, press (RUN/STOP) to exit the parameter loop and continue the analysis.

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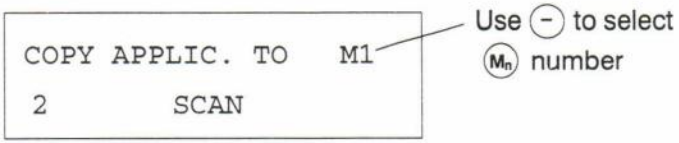
2.5 Assigning the M_n Keys

The applications you use most often can be assigned to the (Mn) keys 1 to 5.
Any of the applications can be assigned to any of the (Mn) keys.
The first five applications are assigned to these keys at the manufacturing site.

Reassign the (Mn) keys as follows:

1) Call up desired application, refer to Section 2.3, page 2-3.

2) Press (●) and then (APPLICATION).
The following is an example of the display shown

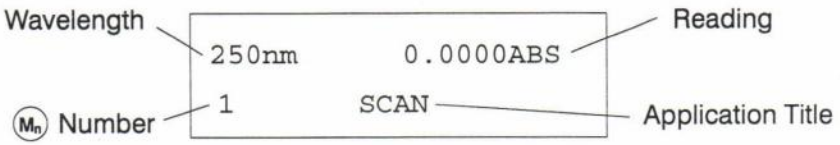


3) Press (−) to select the desired (Mn) number.

You can return to standby by pressing (CE).

4) Press (ENTER) to confirm.

5) Check the application is saved to the (Mn).
The following is an example of the display shown:

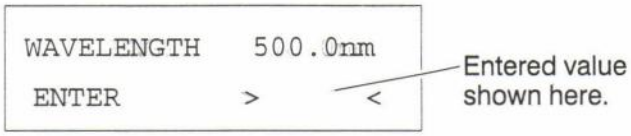


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2.6 Changing the Wavelength

You can change the wavelength in standby at any time using one of the following ways:

1) Press (GOTO λ).
The following display is shown:



2) Enter new wavelength using the numeric keys.

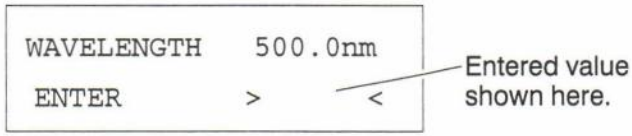
3) Press (ENTER) to confirm.

4) Wait until the instruments sets the new wavelength.

or

1) Type the required wavelength.

2) Press (GOTO λ).
The following display is shown:



3) Wait until the instruments sets the new wavelength.

The new wavelength is now set and you can continue with your analysis.

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2.7 Autozero and Background Correction

Both autozero and background correction are performed by pressing the (AUTOZERO) key.

The mode of autozero depends on the actual application and whether the instrument is in standby or run.

- Autozero sets the baseline to 0 A, 100%T, etc. at a preselected wavelength.

  When you press (AUTOZERO) in standby or at the start of a run in applications with fixed wavelength measurements, an autozero is performed.
  Performing an autozero in standby does not affect the autozero in the application.

- Background correction sets the baseline to 0 A, 100%T, etc. over a preselected wavelength range.

  When you press (AUTOZERO) at the start of a run in a scan application, a background correction is performed.

Note: *You must perform autozero at the start of an application and at regular intervals during the analysis run, e.g. after every 10th sample.*

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2.8 Running a Sample

There are two ways to run a sample:

- the application, the parameters are set accordingly.
- the quick sample run, where the default standby parameters are used.

2.8.1 Running an Application

1) Prepare sample.
2) Select application (refer to list Chapter 3, page 3-1).
3) Where applicable, press (ENTER) to change parameters (refer to Section 2.4, page 2-4, and list Chapter 3, page 3-1).
4) Press (RUN/STOP) to start the application.
   The following is an example of the display shown

e.g.

```
SCAN                SMPL 1
RUN/STOP OR AUTOZERO
```

5) If you require autozero press (AUTOZERO), if not then proceed to step 6.
   You must perform an autozero at the start of a run and at regular intervals during the analysis run.
6) Place the sample in the sample holder.
7) Close the sample compartment cover.

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8) Press (RUN/STOP) to start the analysis.

9) When the results are printed out and the analysis is complete, the instrument requests the next sample.

e.g.

```
SCAN              SMPL 2
RUN/STOP OR AUTOZERO
```

You can change the sample number by typing a number and pressing (ENTER).

10) Continue as described in steps 6 through 9 until all the samples have been run.

2.8.2 Quick Sample Run

1) Prepare sample.

2) Press (GOTO λ) and select the required wavelength, refer to Section 2.6, page 2-6.

3) Place blank solution in the cell holder (or use air as blank).

4) Close the sample compartment cover.

5) Press (AUTOZERO).

6) Place the sample in the sample holder.

7) Close the sample compartment cover.

8) Press (PRINT). The absorbance or %T reading and wavelength is then printed out.
To change from absorbance to %T use the Timedrive application.

9) Continue as described above until all the samples have been run.

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2.9 Print

The data, results and graphs are printed out automatically during each sample analysis run.
The form of the printout depends on the application chosen.

2.9.1 Print Key Functions

Supplementary information is printed out when you press the following print key combinations.
The instrument must be in the standby mode.
The print key is inactive during a run.

- Press (PRINT) to print out the actual wavelength and the reading value shown on the top line of the display.
- Press (1) then (PRINT) to print out the parameters of the actual application.
- Press (2) then (PRINT) to print out a directory of the applications available.
- Press (3) then (PRINT) to print out the help message for the actual application.
- Press (4) then (PRINT) for a line feed
- Press (5) then (PRINT) for a form feed
- Press (6) then (PRINT) to print out the cell holder temperature shown on the display of the Peltier application.
  Functions only when the Peltier accessory is installed.
- Press (7) then (PRINT) to print out instrument status.

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2.10 Date and Time

You can change the date and time using application 900 as follows:

1) Call up DATE/TIME application number 900, refer to Section 2.3, page 2-3.

2) Press (ENTER).

3) Press (−) to select internal or realtime clock.

   The internal clock must be reset to actual time after each switch on, and has the following functions: date (YYMMDD) and time (HHMM). The realtime clock need only be set once, and has the following functions: day (Monday, Tuesday, etc…), date (YYMMDD) and time (HHMM), and continues working when the instrument is switched off.

4) Press (ENTER) to confirm and move to next parameter.

5) Type in the date using the numeric keys (year, month, day). e.g. 930509.

6) Press (ENTER) to confirm and move to next parameter.

7) Press (−) to select the day (only with realtime clock)
   e.g. Monday, Tuesday, etc...

8) Press (ENTER) to confirm and move to next parameter.

9) Type in the time using the numeric keys (hours, minutes, 24 hour clock). e.g. 0955, 1326.

10) Press (ENTER) to confirm and move to next parameter.

11) Press (RUN/STOP) to activate the clock.
    The instrument then automatically returns to standby.

The time and date are now set and are printed out with the heading of the results for each application.

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2.11 Wakeup

You can set the instrument to switch on the lamps to warm up before the start of the working day using wakeup.
When this application is activated the lamps are switched off and are then switched on again at the preselected time.
Set the wakeup as follows:

1) Check that the time and date are set in the realtime clock.
2) Call up WAKEUP application 901, refer to Section 2.3, page 2-3.

e.g.

```
250.0nm      0.000ABS
901     WAKEUP
```

3) Press (ENTER).

e.g.

```
DATE              000000
ENTER         >       <
```

4) Type in the date you wish to use the WAKEUP function using the numeric keys (year, month, day). e.g. 930509.
5) Press (ENTER) to confirm and move to next parameter.

e.g.

```
TIME                0000
ENTER           >     <
```

6) Type in the time you wish the lamps to switch on using the numeric keys (hours, minutes, 24 hour clock). e.g. 0655.

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7) Press (ENTER) to confirm and move to next parameter.

8) Use (-) to select UV lamp ON or OFF.

e.g.

```
LAMP UV              ON
"-" TO SELECT/ENTER
```

9) Press (ENTER) to confirm and move to next parameter.

10) Use (-) to select Vis lamp ON or OFF.

e.g.

```
LAMP VIS             ON
"-" TO SELECT/ENTER
```

11) Press (ENTER) to confirm and move to next parameter.

Press (APPLICATION) to exit the wakeup application and return to standby without changing any parameters.

12) Press (RUN/STOP) to start the wakeup application.
Both lamps go off.

e.g.

```
WAKE UP AT
          930509  0655
```

Date (year, month, day)

Time (hours, minutes)

13) Leave the power switch switched on.

To exit the wakeup application press (RUN/STOP) again, and the display returns to standby. Both lamps go on.

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2.12 Lamp Configuration

You can conserve the lifetime of a lamp by switching it off when it is not required.

Switch off a lamp only when it is not required for a prolonged period.

Lamp Type	Wavelength Range
Deuterium (UV)	326 nm to 200 nm
Halogen (Vis)	900 nm to 326 nm

Use the lamp configuration as follows:

1) Call up Lamp Configuration application 902, refer to Section 2.3, page 2-3.

e.g.

```
LAMP UV          OFF
"-" TO SELECT/ENTER
```

2) Use (-) to select UV lamp ON or OFF.

The lifetime of the deuterium lamp will be markedly reduced if it is switched on and off frequently.

3) Press (ENTER) to confirm and move to next parameter.

e.g.

```
LAMP VIS         ON
"-" TO SELECT/ENTER
```

4) Use (-) to select Vis lamp ON or OFF.

5) Press (ENTER) to confirm and move to next parameter.

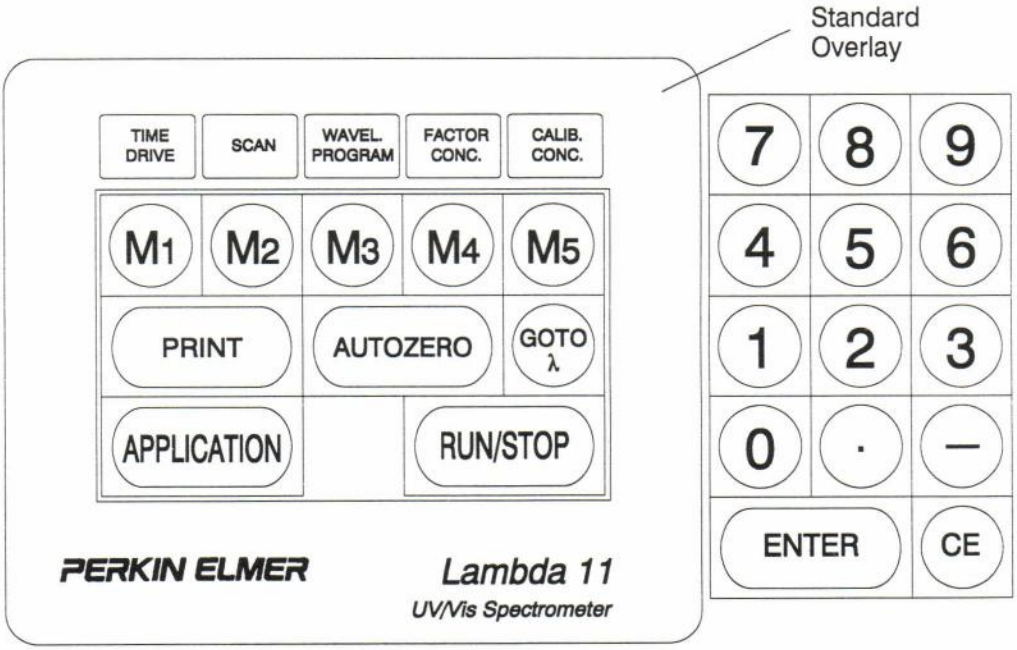
6) Press (RUN/STOP) to activate. The selected lamp goes out and the instrument returns automatically to standby.

Press (APPLICATION) to exit the Lamp Configuration application and return to standby without changing any parameters.

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2.13 Overlay

A keyboard overlay is provided for Lambda 11 showing the applications assigned to the (Mn) keys. This serves as a reminder of the default applications.



There is also a Lambda 11/Bio blank overlay on which you can write the applications you have assigned to the (Mn) keys.

Use a marker with ink that can be erased by wiping with a soft cloth moistened with alcohol.

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Applications and Parameters 3

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Applications and Parameters 3

The following is a list of the applications with their corresponding parameters.
The parameters in bold can be changed. The other parameters are set at the factory and cannot be changed.
The order of the parameters is from left to right.

1 Timedrive

Measures changes in sample absorption at a fixed wavelength over a period of time.

ORDINATE MODE	**ABS**	**WAVELENGTH**	**500.0 nm**
FACTOR	1.0	RESPONSE	1 s
LAMP	UV+VIS	**CYCLES**	**1**
CYCLE TIME	**0.04 min**	**GRAPHICS PLOT**	**YES**
ORD.MAX	**1.000 ABS**	**ORD.MIN**	**0.000 ABS**
SCALE	**20 mm/min**	**PRINT DATA**	**NO**

2 Scan

Scans a spectrum.

ORDINATE MODE	**ABS**	**WAV. MAX**	**900.0 nm**
WAV. MIN	**200.0 nm**	**SPEED**	**960 nm/min**
SMOOTH	0 nm	LAMP	UV+VIS
CYCLES	1	CYCLE TIME	0.01 min
GRAPHICS PLOT	**YES**	**ORD.MAX**	**1.000 ABS**
ORD.MIN	**0.000 ABS**	**SCALE**	**50.0 nm/cm**
OVERLAY	NO	**PRINT DATA**	**YES**
THRESHOLD	**0.1 ABS**		

Parameters in **bold** can be changed, the others cannot be changed.

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3 Wavelength Program

Successive measurement of one sample at different (up to 8) wavelengths.

ORDINATE MODE	**ABS**	**# WAVELENGTHS**	**1**
WAV. 1	**260.0 nm**	**FACTOR 1**	**1.0**
RESPONSE	1 s	LAMP	UV+VIS
CYCLES	1	CYCLE TIME	0.01 min
GRAPHICS PLOT	NO	PRINT DATA	YES

4 Factor Concentration

Quantitative analysis without calibration.
Absorbance at a specific wavelength is multiplied by a factor to give concentration of analyte.

MODE	ABS	**WAV. 1**	**500.0 nm**
# OF REFERENCES	1	**CONC UNIT**	**C**
REF 1	5.0 C	REFERENCES	OLD
VALUE 1	5.0	CUR. FIT	LINEAR
FACTOR	**1.0**	RESPONSE	1 s
LAMP	UV+VIS	CYCLES	1
CYCLE TIME	0.01 min	PRINT DATA	YES
PLOT REFS.	NO	PRINT REFS.	NO

5 Calibration Concentration

Quantitative analysis measurement after calibration using up to 8 references.
Different calibration curve fitting techniques available.

MODE	ABS	**WAV. 1**	**500.0 nm**
# OF REFERENCES	**3**	**CONC UNIT**	**C**
REF 1	**1.0 C**	**REF 2**	**2.0 C**
REF 3	**3.0 C**	**REFERENCES**	**NEW**
VALUE 1	0.1	VALUE 2	0.2
VALUE 3	0.3	**CUR. FIT**	**LINEAR**
FACTOR	**1.0**	RESPONSE	**1 s**
LAMP	UV+VIS	CYCLES	1
CYCLE TIME	0.01 min	PRINT DATA	YES
PLOT REFS.	**NO**	PRINT REFS.	YES

Parameters in **bold** can be changed, the others cannot be changed.

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6 One Reference Concentration

Quantitative analysis using 1 reference for calibration. Linear calibration curve passing through zero.

MODE	ABS	**WAV. 1**	**500.0 nm**
# OF REFERENCES	1	**CONC UNIT**	**C**
REF 1	**5.0** C	**REFERENCES**	**NEW**
VALUE 1	5.0	CUR. FIT	LINEAR
FACTOR	**1.0**	RESPONSE	1 s
LAMP	UV+VIS	CYCLES	1
CYCLE TIME	0.01 min	PRINT DATA	YES
PLOT REFS.	**NO**	PRINT REFS.	YES

7 Two Reference Concentration

Quantitative analysis using 2 references for calibration. Linear calibration curve with or without intercept.

MODE	ABS	**WAV. 1**	**500.0 nm**
# OF REFERENCES	2	**CONC UNIT**	**C**
REF 1	**1.0 C**	**REF 2**	**2.0 C**
REFERENCES	**NEW**	VALUE 1	0.1
VALUE 2	0.2	**CUR. FIT**	**LINEAR**
FACTOR	**1.0**	RESPONSE	1 s
LAMP	UV+VIS	CYCLES	1
CYCLE TIME	0.01 min	PRINT DATA	YES
PLOT REFS.	**NO**	PRINT REFS.	YES

8 Three Reference Concentration

Quantitative analysis using 3 references for calibration. Different calibration curve fitting techniques available.

MODE	ABS	**WAV. 1**	**500.0 nm**
# OF REFERENCES	3	**CONC UNIT**	**C**
REF 1	**1.0 C**	**REF 2**	**2.0 C**
REF 3	**3.0** C	**REFERENCES**	**NEW**
VALUE 1	0.1	VALUE 2	0.2
VALUE 3	0.3	**CUR. FIT**	**LINEAR**
FACTOR	**1.0**	RESPONSE	1 s
LAMP	UV+VIS	CYCLES	1
CYCLE TIME	0.01 min	PRINT DATA	YES
PLOT REFS.	**NO**	PRINT REFS.	YES

Parameters in **bold** can be changed, the others cannot be changed.

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9 Concentration Variable

Quantitative analysis at 1, 2 or 3 wavelengths using up to 8 references for calibration.
Different calibration curve fitting techniques available.

MODE	**ABS**	**WAV. 1**	**500.0 nm**
# OF REFERENCES	**3**	**CONC UNIT**	**C**
REF 1	**1.0 C**	**REF 2**	**2.0 C**
REF 3	**3.0** C	**REFERENCES**	**NEW**
VALUE 1	0.1	VALUE 2	0.2
VALUE 3	0.3	**CUR. FIT**	**LINEAR**
FACTOR	**1.0**	RESPONSE	1 s
LAMP	UV+VIS	CYCLES	1
CYCLE TIME	0.01 min	PRINT DATA	YES
PLOT REFS.	**NO**	PRINT REFS.	YES

10 Survey Scan

Scans a survey spectrum (fast scan speed).

ORDINATE MODE	**ABS**	**WAV. MAX**	**900.0 nm**
WAV. MIN	**200.0 nm**	SPEED	2880 nm/min
SMOOTH	0 nm	LAMP	UV+VIS
CYCLES	1	CYCLE TIME	0.01 min
GRAPHICS PLOT	YES	**ORD.MAX**	**1.000 ABS**
ORD.MIN	**0.000 ABS**	SCALE	50.0 nm/cm
OVERLAY	NO	PRINT DATA	NO

11 Absorbance Scan

Scans absorbance spectra.

ORDINATE MODE	ABS	**WAV. MAX**	**900.0 nm**
WAV. MIN	**200.0 nm**	SPEED	960 nm/min
SMOOTH	0 nm	LAMP	UV+VIS
CYCLES	1	CYCLE TIME	0.01 min
GRAPHICS PLOT	YES	**ORD.MAX**	**1.000 ABS**
ORD.MIN	**0.000 ABS**	**SCALE**	**50.0 nm/cm**
OVERLAY	NO	**PRINT DATA**	**YES**
THRESHOLD	**0.1 ABS**		

Parameters in **bold** can be changed, the others cannot be changed.

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12 Transmittance Scan

Scans transmittance spectra.

ORDINATE MODE	%T	**WAV. MAX**	**900.0 nm**
WAV. MIN	**200.0 nm**	SPEED	960 nm/min
SMOOTH	0 nm	LAMP	UV+VIS
CYCLES	1	CYCLE TIME	0.01 min
GRAPHICS PLOT	YES	**ORD.MAX**	**100.0 %T**
ORD.MIN	**0.000 %T**	**SCALE**	**50.0 nm/cm**
OVERLAY	NO	**PRINT DATA**	**YES**
THRESHOLD	**1.0 %T**		

13 UV Scan

Scans absorbance spectra between 400 nm and 200 nm.

ORDINATE MODE	**ABS**	WAV. MAX	400.0 nm
WAV. MIN	200.0 nm	SPEED	960 nm/min
SMOOTH	0 nm	LAMP	UV+VIS
CYCLES	1	CYCLE TIME	0.01 min
GRAPHICS PLOT	YES	**ORD.MAX**	**1.0 ABS**
ORD.MIN	**0.000 ABS**	SCALE	20.0 nm/cm
OVERLAY	NO	**PRINT DATA**	**YES**
THRESHOLD	**0.1 ABS**		

14 Vis Scan

Scans absorbance spectra between 900 nm and 400 nm.

ORDINATE MODE	**ABS**	WAV. MAX	900.0 nm
WAV. MIN	400.0 nm	SPEED	960 nm/min
SMOOTH	0 nm	LAMP	UV+VIS
CYCLES	1	CYCLE TIME	0.01 min
GRAPHICS PLOT	YES	**ORD.MAX**	**1.000 ABS**
ORD.MIN	**0.000 ABS**	SCALE	50.0 nm/cm
OVERLAY	NO	**PRINT DATA**	**YES**
THRESHOLD	**0.1 ABS**		

Parameters in **bold** can be changed, the others cannot be changed.

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15 Repetitive Scan

Scans the same sample repetitively.

ORDINATE MODE	**ABS**	**WAV. MAX**	**400.0 nm**
WAV. MIN	**200.0 nm**	SPEED	960 nm/min
SMOOTH	0 nm	LAMP	UV+VIS
CYCLES	**1**	**CYCLE TIME**	**0.01 min**
GRAPHICS PLOT	YES	**ORD.MAX**	**1.000 ABS**
ORD.MIN	**0.000 ABS**	**SCALE**	**50.0 nm/cm**
OVERLAY	**YES**	**PRINT DATA**	**YES**
THRESHOLD	**0.1 ABS**		

16 Cycle Wavelength Program

Successive measurement of one sample at different (up to 8) wavelengths.
Measures changes in sample absorption at different wavelengths over a period of time.

ORDINATE MODE	**ABS**	**# WAVELENGTHS**	**1**
WAV. 1	**260.0 nm**	FACTOR 1	1.0
RESPONSE	1 s	LAMP	UV+VIS
CYCLES	**1**	**CYCLE TIME**	**0.01 min**
GRAPHICS PLOT	NO	PRINT DATA	YES

Parameters in **bold** can be changed, the others cannot be changed.

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17 Ratio

Ratio of absorbance readings of wavelength pairs.
One wavelength pair may be entered.

ORDINATE MODE	RAT	CONC UNIT	RAT
# WAVELENGTHS	2	**WAV. 1**	**360.0 nm**
WAV. 2	**418.5 nm**	FACTOR 1	1.0
FACTOR 2	1.0	RESPONSE	1 s
LAMP	UV+VIS	CYCLES	1
CYCLE TIME	0.01 min	GRAPHICS PLOT	NO
PRINT DATA	YES		

18 Difference

Difference of absorbance readings of wavelength pairs.
One wavelength pair may be entered.

ORDINATE MODE	DIF	CONC UNIT	DIF
# WAVELENGTHS	2	**WAV. 1**	**360.0 nm**
WAV. 2	**418.5 nm**	**FACTOR 1**	**1.0**
FACTOR 2	**1.0**	RESPONSE	1 s
LAMP	UV+VIS	CYCLES	1
CYCLE TIME	0.01 min	GRAPHICS PLOT	NO
PRINT DATA	YES		

Parameters in **bold** can be changed, the others cannot be changed.

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900 Date/Time To enter and change the time and date.

CLOCK	**REALTIME**	**DAY**	**MONDAY**
DATE	**YYMMDD**	**TIME**	**HHMM**

901 Wakeup To switch on the lamps and allow them to warm up before the start of the working day.

DATE	**YYMMDD**	**TIME**	**HHMM**
LAMP UV	**ON**	**LAMP VIS**	**ON**

902 Lamp Configuration To switch off the lamp not in use.

BASELINE CORR ?	ON	**LAMP UV**	**ON**
LAMP VIS	**ON**		

903 Peltier Enter target temperature for Peltier thermostatted cell holder.

This application only shows when the Peltier accessory is installed.

PELTIER ?	**OFF**	**TEMPERATURE**	**25.0°C**
CALIB. MODE	NO		

906 Printer Config To configure the instrument for the type of printer used. Options for printer type are:
AUTO; INTERNAL; EPSON LQ; EPSON EX/FX.

PRINTER ON?	**YES**	**PRINTER**	**AUTO**
GAP	**4**	**COLOUR ON?**	**YES**
PLOT HEADER	**YES**		

920 Peltier Calib. Enter target temperature for Peltier thermostatted cell holder.

This application only shows when the Peltier accessory is installed.

PELTIER ?	**ON**	**TEMPERATURE**	**25.0°C**
CALIB. MODE	**INTERN**	**CALIB. TEMP**	**25.0°C**

Parameters in **bold** can be changed, the others cannot be changed.

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3.1 Parameter Information

The parameters are listed in alphabetical order showing their value ranges, or options, and giving a description of their function.
Parameters shown in bold text may be changed.

Parameter	Range/Option	Description
ACCESSORY	MANUAL, CELL SIPPER	Lets the instrument recognize type of **accessory** connected. **MANUAL** is for operations without using an accessory. **CELL** is for operations with a cell changer, the instrument automatically recognizes which changer. **SIPPER** is for operations with a sipper, the instrument automatically recognizes which sipper. *This parameter only shows when an accessory board is installed in the instrument.*
AUTO PURGE	YES, NO	Turns the **auto**matic **purge** function on or off. *Used with the sipper accessory.*
CALIB. MODE	NO INTERN EXTERN	**Calib**ration **Mode** to select Perkin-Elmer (INTERNAL) temperature sensor, or other (EXTERNAL) temperature sensor or switch off (NO) CALIB. MODE. *Shows only in Peltier calib. application.*
CALIB. TEMP	10.0°C to 55.0°C	**Calib**ration **Temp**erature. This temperature is measured with an external temperature sensor. Refer to Appendix A1.2.2, page A0-4 *Shows only in Peltier calib. application with Calib. Mode set to Extern.*
CELL 5	1 to 5	To enter the location of the cell, or cells, to be measured in the changer
CELL 6	1 to 6	To enter the location of the cell, or cells, to be measured in the changer
CELL 8	1 to 8	To enter the location of the cell, or cells, to be measured in the changer

Parameters in **bold** can be changed, the others cannot be changed.

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Parameter	Range/Option	Description
CELL 9	1 to 9	To enter the location of the cell, or cells, to be measured in the changer
CELL 1-7	1 to 7	To enter the location (1 to 7) of the cell, or cells, to be measured in the 13 cell changer.
CELL 8-13	1 to 6	To enter the location (8 to 13) of the cell, or cells, to be measured in the 13 cell changer.
CLOCK	REALTIME INTERNAL	REALTIME need only be set once. INTERNAL must be reset after switch on. Refer to Section 2.10, page 2-11.
COLOUR ON?	YES, NO	To switch on the colour graphics of the printer or plotter. *Only when a colour printer, or plotter is connected.*
CONC UNIT	**C**, g/L, mg/L, mg/mL, mg/dL, µg, µg/mL, mol, mmol, nmol, pmol, ppm, ppb, RAT, DIF	**Concentration Unit**, defines the concentration unit used for the run. **C** is any concentration unit. **g/L** is gram per liter. **mg/L** is milligram per liter. **mg/mL** is milligram per milliliter. **mg/dL** is milligram per deciliter. **µg** is microgram. **µg/mL** is microgram per milliliter. **mol** is mole. **mmol** is millimole. **nmol** is nanomole. **pmol** is picomole. **ppm** is parts per million (mg/kg) **ppb** is parts per billion (µg/kg) **RAT** is ratio. **DIF** is difference. **%** is percent. **APHA** is color number. *The units may appear in capitals on the display.*

Parameters in **bold** can be changed, the others cannot be changed.

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Parameter	Range/Option	Description
CUR. FIT	LINEAR, LINEAR INTERC, QUADRATIC, QUAD INTERC	Different types of calibration **Curve Fit** can be calculated by the instrument software. LINEAR — used when the measured value varies linearly with concentration, the curve passes through the origin. LINEAR INTERC — used when the measured value varies linearly with concentration, the curve has an intercept on the measured value axis to compensate for background interferences. QUADRATIC — used when the measured value does not vary linearly with concentration, the curve passes through the origin. QUAD INTERC — used when the measured value does not vary linearly with concentration, the curve has an intercept on the measured value axis to compensate for background interferences.
CYCLES	1 to 99	Sets the number of times the sample will be scanned or measured.
CYCLE TIME	0.002 to 999.99	The time between the start of one cycle to the start of the next.
DAY	MONDAY to SUNDAY	Sets the day (only with realtime clock).
DATE	YYMMDD	Sets the date in numerals (Year, Month, Date).
FACTOR #	+ or – 0.00001 to 9999.9	Factor applied to a measured value to obtain a result, e.g. the absorbance can be multiplied by a factor to give a result in concentration.
GAP	1 to 9	Sets the gap between two pages. *Used in printer config application.*
GRAPHICS PLOT	YES, NO	Plots out a graphic representation of the data when activated.

Parameters in **bold** can be changed, the others cannot be changed.

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Parameter	Range/Option	Description
LAMP	UV+Vis	Automatic lamp changeover. *To switch on or off a particular lamp, refer to Lamp Configuration Section 2.12, page 2-14.*
MODE	ABS, %T, DELTA ABS, 3WL Analysis	Sets the **mode** in which the measurements are made. **ABS** is **abs**orbance **%T** is percent **t**ransmittance **DELTA ABS** is **delta abs**orbance **3WL Analysis** is **3** wave**l**ength **analysis** *Refer to Section 3.2, page3-15, Absorbance Measurements.*
ORD.MAX	−9999.9 to 9999.9	Sets the maximum ordinate scale range for graphics plots.
ORD.MIN	−9999.9 to 9999.9	Sets the minimum ordinate scale range for graphics plots.
ORDINATE MODE	ABS, %T, CONC. D1, D2, D3, D4, RAT, DIF.	Sets the **ordinate mode** in which the measurements are made. **ABS** is absorbance. **%T** is transmittance. **CONC** is concentration units. **D1** is first derivative. **D2** is second derivative. **D3** is third derivative. **D4** is forth derivative. **RAT** is ratio of absorbances. **DIF** is difference of absorbances.
OVERLAY	YES, NO	Prints spectra from the same batch onto the same graphics plot when activated.
PELTIER ?	ON, OFF	To activate the Peltier accessory. *(only with Peltier accessory installed)*
PLOT HEADER	YES, NO	To switch on or off the printout **Header**. Used in the printer config application.
PLOT REFS.	YES, NO	**Plot**s the calibration curve when activated.

Parameters in **bold** can be changed, the others cannot be changed.

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Parameter	Range/Option	Description
PRINTER	AUTO, INTERNAL, EPSON LQ, EPSON EX/FX	To configure the type of printer used with the instrument. **Auto** is any external printer. **Internal** is the built-in printer. **Epson LQ** is the Epson LQ printer. **Epson EX/FX** is the Epson EX/FX printer.
PRINT DATA	YES, NO	**Print**s out **data** automatically when activated.
PRINT REFS.	YES, NO	**Print**s out data from the **ref**erences when activated.
REFERENCES	OLD, NEW	**Reference** solutions. Old means you wish to use the "OLD" stored calibration curve. New means you wish to make a "NEW" calibration curve.
REF #	0.0 to 9999.9	You can enter the concentration of the **ref**erence solution at which measurements are made. The number 1 is shown for the first reference solution, 2 for the second, 3 for the third ...etc.
# OF REFERENCES	1 to 8	You can enter the number **of reference** solutions.
RESPONSE	1s	**Response** time, defined as the time a signal requires to reach 98% of full scale deflection after a jumpwise change. This function suppresses noise.
SAMPLE TIME	0.1 to 99.9	Time (min) during which the sample is aspirated into the flowcell. *Used with the single sipper accessory.*
SCALE	(SCAN) 0.5, 1.0, 2.0, 5.0, 10.0, 20.0, 50.0, 100.0 nm/cm. (TIMEDRIVE & WAVPROG) 1, 2, 5, 10, 20, 50, 100 mm/min	Abscissa **scale** range.
SMOOTH	0 nm	Compensates for noise on the analysis signal. **Smooth**s the signal using the Savitzky-Golay algorithm.

Parameters in **bold** can be changed, the others cannot be changed.

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Parameter	Range/Option	Description
SPEED	30, 240, 960, 2880 nm/min	Select the scan **speed**. *With slow scan speed in derivative mode it may take up to a minute before the instrument starts a scan. This is to allow the motors to move the filters etc. to the correct position.*
STIRRER	ON, OFF	Turns the stirrer on or off. *Used with the 13 cell changer.*
TEMPERATURE	15.0°c to 45.0°C	To enter the temperature of the Peltier cell holder. *Shows only in Peltier applications.*
THRESHOLD	0.0 to 9999	**Threshold** value. Only values above this limit are used for peak detection.
TIME	HHMM	To enter the time (hours, minutes, 24 hour clock).
VALUE #		After calibration, the absorbance **value**s for the reference solutions are automatically entered. The instrument calculates the calibration curve from these values.
WAVELENGTH	200 nm to 900 nm	The **wavelength** at which measurements are made.
# WAVELENGTH	1 to 8	Number of **wavelengths** at which the measurement is made.
WAV. #	200 nm to 900 nm	First **wav**elength at which measurements are made. The number 1 is shown for the first wavelength, 2 for the second, 3 for the third …etc.
WAV. MAX	200 nm to 900 nm	Upper **wav**elength limit.
WAV. MIN	200 nm to 900 nm	Lower **wav**elength limit.
ZERO IN CELL 1	YES, NO	Carries out an auto**zero** at the start of each cycle on the sample **cell** placed in location **1** of the 9 cell changer. *Used with the Oligoquant applications and the Peltier 9 cell changer.* *Cell 1 must be entered as one of the cell locations.*

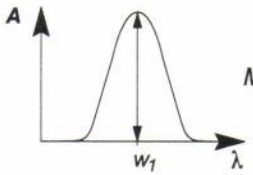
Parameters in **bold** can be changed, the others cannot be changed.

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3.2 Absorbance Measurements

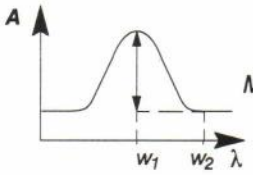
There are three absorbance modes in concentration applications for you to select:

ABS: Measuring absorbance at one wavelength:



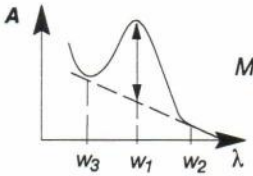
$$\text{Measured value} = A_{w1}$$

DELTA ABS: Correction for an offset baseline by measuring at two wavelengths



$$\text{Measured value} = A_{w1} - A_{w2}$$

3 WL ANLYS: Correction for a sloping baseline by measuring at three wavelengths:



$$\text{Measured value} = A_{w1} - \frac{(A_{w2} - A_{w3})(w_1 - w_3)}{w_2 - w_3} - A_{w3}$$

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Error Messages

4

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Error Messages 4

4.1 Error Messages Shown on the Display

Error	Description and Remedy
BUS ERROR	This error is shown when the instrument has an address error. Make a note of the steps you made leading up to this message. Press the (APPLICATION) key to continue after the bus error has been displayed. If you cannot continue call your Perkin-Elmer office and inform them of the error and the steps you made leading up to the error.
SYSTEM ERROR	This error is shown when the instrument operating software "crashes". A full reset is then automatically carried out. After the instrument is reset one of the following messages is shown on the second line of the display: BATTERY LOW TIMER FAIL RS232-IRQ FAIL TIMER-IRQ FAIL make a note of this message. Press the (APPLICATION) key to continue after the system error has been displayed. If you cannot continue call your Perkin-Elmer office and inform them of the error message.

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Error	Description and Remedy
SPECTROMETER FULL RESET DONE	This error is shown after changing the instrument software, or after a full reset, when the spectrometer data is defect. Make a note of the steps you made leading up to this message. Press the (APPLICATION) key to continue after this error has been displayed. If you cannot continue call your Perkin-Elmer office and inform them of the error and the steps you made leading up to the error.
DIALOG, FULL RESET DONE	This error is shown after changing the instrument software, or after a full reset, when the method memory is defect. All the saved applications are deleted. Make a note of the steps you made leading up to this message. Press the (APPLICATION) key to continue after this error has been displayed. If you cannot continue call your Perkin-Elmer office and inform them of the error and the steps you made leading up to the error.
SPECTROMETER + DIALOG FULL RESET DONE	This error is shown after changing the instrument software, or after a full reset. All the saved applications are deleted. Make a note of the steps you made leading up to this message. Press the (APPLICATION) key to continue after this error has been displayed. If you cannot continue call your Perkin-Elmer office and inform them of the error and the steps you made leading up to the error.
ERROR: ACCESSORY NOT INITIALIZED	This error is shown when the instrument gets no response from an attached accessory during start up. Check the accessory is: ▶ correctly plugged in ▶ switched on ▶ functioning normally

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Error	Description and Remedy
ERROR: APPLICATION No. DOES NOT EXIST	This error is shown when you enter a number for an application that does not exist. Press the (APPLICATION) key to return to the original standby display. Call up an application which does exist.
OUT OF RANGE: (valid range displayed)	This error is shown when you enter a value outside the range valid for the parameter. Press the (ENTER) key to return to the original parameter display. Enter a value within the range.
ERROR: NO ENERGY	This error is shown when not enough energy is detected. Check: The sample compartment that nothing is blocking the beam. The lamps for loose connection, or lamp burnt out. For defective detector.
ERROR: NO ENERGY, UV LAMP	This error is shown when not enough energy is received from the UV lamp. Check: The sample compartment that nothing is blocking the beam. The lamps, loose connection, lamp burnt out. For defective detector.
ERROR: NO ENERGY, VIS LAMP	This error is shown when not enough energy is received from the Vis lamp. Check: The sample compartment that nothing is blocking the beam. The lamps, loose connection, lamp burnt out. For defective detector.

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4.2 Error Messages Printed by the Printer

Error	Description and Remedy
Wavelength Data Invalid Start Background Correction Again	This message is printed when you try to change the set of wavelengths without first carrying out a background correction.
Value outside range Check References, or Change Curve Fit Algorithm	This message is printed when the value for the sample lies outside the calibration curve. Dilute the sample, or recalibrate using more references, or change the curve fit algorithm
Cannot Approximate Calibration Curve Check References, or Change Curve Fit Algorithm	This message is printed when the non-linearity of the references is so great that you cannot fit a curve to them using the present curve fit algorithm. Check that the references are prepared correctly, or try a different curve fit.
Two Different Solutions with same ABS (absorbance) Value Change Curve Fit Algorithm	This message is printed when two samples of different concentration exhibit the same absorbance value. This may be due to non-linear absorbance. Check references, or change concentration range, or change curve fit algorithm.
No Peaks Detected. Change Threshold Value	This message is printed when no peaks are detected by the peak detector. Reduce the threshold value.

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Help Messages

5

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Help Messages

5

Short help messages giving a quick description for each application can be printed out by pressing (3) and then (PRINT).

The following is a list of the help messages available:

Application	Description
1	Timedrive Measures changes in sample absorption at a fixed wavelength over a period of time.
2	Scan Scans a spectrum.
3	Wavelength program Successive measurement of one sample at different (up to 8) wavelengths.
4	Factor Concentration Quantitative analysis without calibration. Absorbance at specific wavelength is multiplied by a factor to give concentration of analyte.
5	Calibration Concentration Quantitative analysis. Calibration using up to 8 references. Different calibration curve fitting techniques available.
6	One Reference Concentration Quantitative analysis using one reference for calibration. Linear calibration curve passing through zero.

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Application	Description
7	Two Reference Concentration Quantitative analysis using two references for calibration. Linear calibration curve with or without intercept.
8	Three Reference Concentration Quantitative analysis using three references for calibration. Linear calibration curve passing through zero.
9	Concentration variable Quantitative analysis at 1, 2 or 3 wavelengths. Calibration using up to 8 references. Different calibration curve fitting techniques available.
10	Survey Scan Scans a survey spectrum (Fast scan speed).
11	Absorbance Scan Scans absorbance spectra.
12	Transmittance Scan Scans transmittance spectra.
13	UV Scan Scans absorbance spectra between 400 nm and 200 nm.
14	VIS Scan Scans absorbance spectra between 900 nm and 400 nm.
15	Repetitive Scan Scans the same sample repetitively.
16	Cycle Wavelength Program Successive measurement of one sample at different (up to 8) wavelengths. Measures changes in sample absorption at different wavelengths over a period of time.
17	Ratio Determines ratio of absorbance readings at different wavelengths. One wavelength pair may be entered.
18	Difference Determines differences of absorbance readings at different wavelengths. One wavelength pair may be entered.

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Application	Description
900	Date and Time To enter and change the date and time (realtime clock).
901	Wakeup To switch on the lamps at a predefined time to allow them to warm up before the start of the working day.
902	Lamp Configuration To switch off the lamp not in use.
903	Peltier To enter the desired temperature for the Peltier cell holder.
920	Peltier Calib To enter the desired temperature for the Peltier cell holder and compensate for temperature differences between the Peltier element and the measurement cell.

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Appendix

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Accessory Appendix 1

Certain accessories for the Lambda 11 spectrometer, such as cell changers and Peltier cell holders, are operated from the spectrometer.
If you wish to use one of these accessories, an accessory printed circuit board must be installed in the spectrometer.

If you order this accessory PCB at the same time as your spectrometer, the PCB will be installed at the manufacturing site.

If you order this accessory PCB at a later date, field installation should only be performed by your Perkin-Elmer service engineer, or similarly qualified and authorized person.
We strongly recommend that you do not attempt to install this PCB yourself.

On the following pages is given information specific to using the accessory with the Lambda 11 spectrometer.
Additional information is given in the accessory's manual, e.g. installation, maintenance, etc....

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A1.1 Setting Accessory Parameter

When the accessory board is installed, an extra parameter appears on the display.

e.g.

```
ACCESSORY      MANUAL
"-" TO SELECT/ENTER
```

You must set this parameter for your accessory:

SETTING	ACCESSORY
MANUAL	for manual operations, e.g. with single cell holders, or with Peltier single cell holder.
CELL	for operations with cell changers, e.g. with the five, six, eight, nine (Peltier), and thirteen cell changers. *The instrument automatically recognizes which cell changer.*
SIPPER	for operations with sippers. *The instrument automatically recognizes which sipper.*

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A1.2 Peltier Accessories

When the Peltier accessory is installed, two extra applications appear:

903 Peltier.
920 Peltier Calib.

A1.2.1 Application 903 Peltier.

You set the temperature for the Peltier cell holder with this application.

1) Press (ENTER).

2) Set Peltier to ON.

e.g.

```
PELTIER?              ON
"-" TO SELECT/ENTER
```

3) Press (ENTER).

4) Set required temperature.

e.g.

```
TEMPERATURE    25.0°C
ENTER          > 26.0<
```

Last confirmed temperature.

Selected temperature.

5) Press (RUN/STOP) to start the application.
Allow 10 minutes for the temperature to equilibrate.

6) When the cell holder temperature has reached equilibrium, press (RUN/STOP) to return to the standby display.

The Peltier temperature control continues to function.

You are now ready to start an analysis.

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A1.2.2 Application 920 Peltier Calib.

You set the temperature for the Peltier cell holder with this application. This application also compensates for the temperature difference between the Peltier-element and the cell.

1) Press (ENTER).

2) Set Peltier to ON.

e.g.

```
PELTIER?              ON
"-" TO SELECT/ENTER
```

3) Press (ENTER).

4) Set required temperature.

e.g.

```
TEMPERATURE    25.0°C
ENTER          > 26.0<
```

Last confirmed temperature.

Selected temperature.

5) Press (ENTER).

6) Set calib mode to NO.

e.g.

```
CALIB. MODE           NO
"-" TO SELECT/ENTER
```

7) Press (RUN/STOP) to start the application.
Allow 10 minutes for the temperature to equilibrate.
When EXTERN, check temperature at your sensor, see step 10.

8) Press (RUN/STOP).

9) Then press (ENTER) repeatedly until the CALIB. MODE parameter is displayed.

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e.g.

```
CALIB. MODE          NO
"-" TO SELECT/ENTER
```

10) Select INTERN, or EXTERN.
INTERN is for the Perkin-Elmer temperature sensor.
EXTERN is for any other temperature sensor.
When INTERN is selected, the Perkin-Elmer temperature sensor sends the readings automatically to the instrument.

11) Press (ENTER).

12) When EXTERN is selected the parameter CALIB. TEMP appears.

e.g.

```
CALIB. TEMP    25.0°C
ENTER          > 26.0<
```

Last confirmed temperature.

New temp. entered from Extern. sensor reading.

13) Enter the temperature reading from the external temperature sensor.

14) Press (RUN/STOP) to start the application. The following display appears.

e.g.

```
SPL.           OPT.
25.0°C         24.8°C
```

Wait until temperature equilibrium is reached.
SPL. temperature at the sample cell holder.
OPT. temperature at the Perkin-Elmer sensor (only when connected).

15) When the cell holder temperature has reached equilibrium, press (RUN/STOP) to return to the standby display.
The Peltier temperature control continues to function.

You are now ready to start an analysis.

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A1.2.3 Cell Changers

With the cell changer accessories an extra parameter appears.

e.g.



You must enter the location in the cell changer of the cell, or cells, to be measured.

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PERKIN ELMER

Lambda 11 – Operation and Parameter Description

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