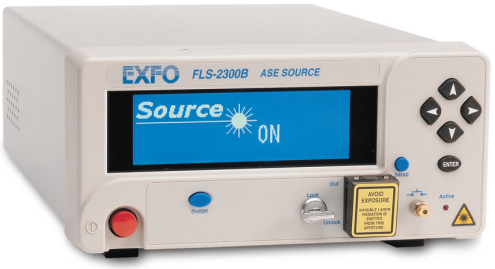
ASE BROADBAND LIGHT SOURCE

FLS-2300B

R&D AND MANUFACTURING

USER GUIDE



www.exfo.com

Telecommunications Test and Measurement

EXFO

EXPERTISE REACHING OUT

EXFO's Commerce And Government Entities (CAGE) code under the North Atlantic Treaty Organization (NATO) is 0L8C3.

The information contained in this publication is subject to change without notice.

Trademarks

EXFO's trademarks have been identified as such. However, the presence or absence of such identification does not affect the legal status of any trademark.

Units of Measurement

Units of measurement in this publication conform to SI standards and practices.

Patents

EXFO's Universal Interface is protected by US patent 6,612,750.

Version number 2.1.0.5

Contents

Contents

Certification InformationF.C.C. Information

Electronic test equipment is exempt from Part 15 compliance (FCC) in the United States. However, compliance verification tests are systematically performed on most EXFO equipment.

CE Information

Electronic test equipment is subject to the EMC Directive in the European Union. The EN61326 standard prescribes both emission and immunity requirements for laboratory, measurement, and control equipment. This unit has undergone extensive testing according to the European Union Directive and Standards.

CSA Information

This unit is certified by the CSA (certificate number 162451) and was evaluated according to applicable CSA and UL standards (as confirmed by "C-US" mark) as well as applicable IEC standards for use in Canada, the United States, and other countries.

EXFO

DECLARATION OF CONFORMITY

Application of Council Directive(s):	73/23/EEC - The Low Voltage Directive 89/336/EEC - The EMC Directive
Manufacturer's Name:	EXFO ELECTRO-OPTICAL ENG.
Manufacturer's Address:	400 Godin Avenue Vanier, Quebec Canada G1M 2K2 (418) 683-0211
Equipment Type/Environment:	Industrial Scientific Equipment
Trade Name/Model No.:	FLS-2300B ASE Braodband Source

Standard(s) to which Conformity is Declared:

EN 61010-1:1993 A2: 1995	**Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements.**
EN 55022:1994/ A2: 1997	**Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment.**
EN 60825-1:1994/ A2: 2001	**Safety of laser products – Part 1: Equipment classifications, requirements, and user's guide**
EN 61326:1997/ A1: 1998	**Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements**

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive and Standards.

Manufacturer

Signature: 

Full Name:	Stephen Bull, E. Eng
Position:	Vice-President Research and Development
Address:	400 Godin Avenue Vanier, Quebec, Canada
Date:	October 31, 2005

1 Introducing the FLS-2300B ASE Broadband Light Source

The FLS-2300B ASE Broadband Light Source is a high-power, unpolarized fiber-optic source that comes with a standard FC-APC output connector.

By optically pumping an erbium-doped fiber, the C+L-band source emits a flattened amplified spontaneous emission (ASE) spectrum over the entire wavelength range.

With this source, there is no need to take a reference at every measurement. The high-power density of the FLS-2300B ASE Broadband Light Source results in a higher dynamic range when measuring a passive device with an optical spectrum analyzer.

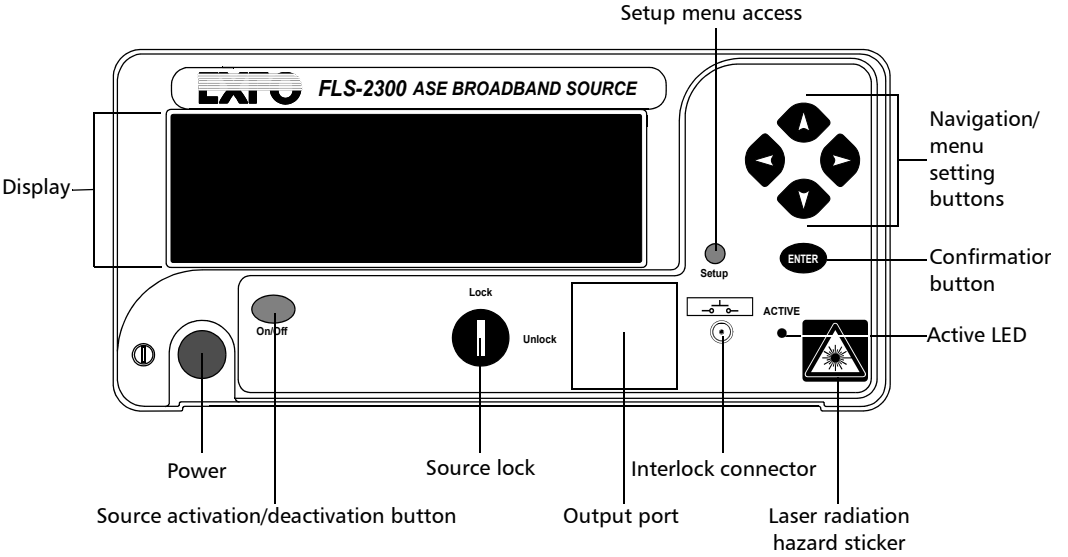
Its unpolarized output makes it particularly suitable for stable and average loss measurements. It is also ideal for component testing, high-sensitivity PMD measurements, communication link characterization and fiber sensing.

The excellent spectral stability of the FLS-2300B source as well as its high output power stability make this source useful for fast and reliable characterization of high-loss DWDM passive components such as thin film filters, arrayed waveguides and fiber Bragg gratings.

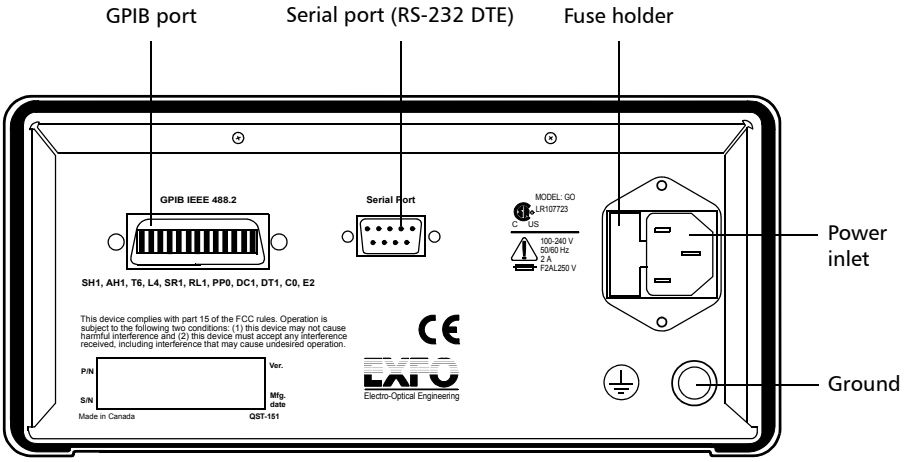
The high output power is stable and flat, making it suitable for simulating uniform noise in receiver bit error rate (BER) tests or testing the gain and the gain flatness of Raman amplifiers.

Depending on your needs, the FLS-2300B ASE Broadband Light Source can be purchased with the gain-flattening option (for applications requiring high flatness).

Front Panel


Setup menu access
FLS-2300 ASE BROADBAND SOURCE
Display
Navigation/
menu
setting
buttons
Setup
ENTER
Confirmation
button
Lock
On/Off
Unlock
ACTIVE
Active LED
Power
Source lock
Interlock connector
Source activation/deactivation button
Output port
Laser radiation
hazard sticker

Back Panel


GPIB port
Serial port (RS-232 DTE)
Fuse holder
GPIB IEEE 488.2
Serial Port
MODEL: GO
LR107723
C US
100-240 V
50/60 Hz
2 A
F2AL250 V
SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E2
This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.
P/N
S/N
Ver.
Mfg. date
Made in Canada
QST-151
EXFO
Electro-Optical Engineering
Power inlet
Ground

Safety Features

To comply with laser safety regulations, each FLS-2300B ASE Broadband Light Source is supplied with special security features.

Interlock Connector

The FLS-2300B ASE Broadband Light Source is equipped with a remote interlock connector so you can install a security switch or panic button. The ASE Broadband Light Source is shipped with an internally shorted interlock cap. It is your responsibility to install external remote interlocks to ensure safe use of these sources.

The  sticker is affixed to the front panel, just above the interlock connector to identify it.

The interlock circuit has the following characteristics:

- When it is open, the ASE Broadband Light Source cannot be activated.
- If the ASE Broadband Light Source is active before the interlock circuit is opened, it becomes inactive. For your safety, the ASE Broadband Light Source will not become active automatically upon closing the interlock circuit. You will have to turn it on again. Putting the application's switch to OFF will shut down the instrument at any time.

The state of the interlock circuit (open or closed) is indicated in the ASE Broadband Light Source.

Protection Key

For additional safety, you cannot activate the ASE Broadband Light Source (with the ON/OFF button) without unlocking it.

Once you unlocked the instrument, the **Interlock** icon shows as opened.

Interlock circuit is open.

Three-Second Safety Delay

The FLS-2300B ASE Broadband Light Source provides a three-second safety delay between the instrument activation and actual light emission. During this three-second delay, you may cancel the activation of the laser by using the instrument activation/deactivation button, by opening the interlock circuit or by using the software key button.

Note: *Pressing the source* activation/deactivation *(*On/Off*) button won't have any effect, since the source initialization is already underway.*

Conventions

Before using the product described in this manual, you should understand the following conventions:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in *death or serious injury*. Do not proceed unless you understand and meet the required conditions.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *minor or moderate injury*. Do not proceed unless you understand and meet the required conditions.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *component damage*. Do not proceed unless you understand and meet the required conditions.

IMPORTANT

Refers to information about this product you should not overlook.

2 Safety Information

WARNING

Do not install or terminate fibers while a light source is active. Never look directly into a live fiber and ensure that your eyes are protected at all times.

WARNING

Use of controls, adjustments and procedures for operation and maintenance other than those specified herein may result in hazardous radiation exposure.

Laser Safety Information

The laser radiation warning sticker below appears on the shutter of the output port.

Your instrument is a Class 1M laser product in compliance with standards IEC 60825-1 Amendment 2: 2001 and 21 CFR 1040.10. Invisible laser radiation may be encountered at the output port.

The product is safe under reasonably foreseeable conditions of operation but it may be hazardous if you use optics within a diverging or collimated beam. *Do not view directly with optical instruments.*

Affixed to module's top panel

The unit has an active LED on its front panel. When lit, this LED indicates that an optical signal is being emitted from the source port.

The active LED will turn on three seconds before the source starts emitting.

Electrical Safety Information

This unit uses an international safety standard three-wire power cable. This cable serves as a ground when connected to an appropriate AC power outlet.

Note: *If you need to ensure that the unit is completely powered off, disconnect the power cable.*

WARNING

- **Insert the power cable plug into a power outlet with a protective ground contact. Do not use an extension cord without a protective conductor.**
- **Before powering on the unit, connect all grounding terminals, extension cords and devices to a protective ground via a ground socket. Any interruption of the protective grounding is a potential shock hazard and may cause personal injury. Whenever the ground protection is impaired, do not use the unit and secure it against any accidental operation.**
- **Do not tamper with the protective ground terminal.**

The color coding used in the electric cable depends on the cable. New plugs should meet the local safety requirements and include:

- adequate load-carrying capacity
- ground connection
- cable clamp

IMPORTANT

EXFO assumes no liability if you attempt to perform internal service on this unit.

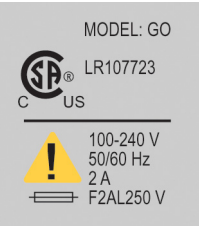
WARNING

- **Use this unit indoors only.**
- **Position the unit so that the air can circulate freely around it.**
- **Operation of any electrical instrument around flammable gases or fumes constitutes a major safety hazard.**
- **Do not remove unit covers during operation.**
- **To avoid electrical shock, do not operate the unit if any part of the outer surface (covers, panels, etc.) is damaged.**
- **Only authorized personnel should carry out adjustments, maintenance or repair of opened units under voltage. A person qualified in first aid must also be present. Do not replace any components while power cable are connected.**
- **Use only fuses with the required rated current and specified type (IEC, 5 mm x 20 mm (0.197 in x 0.787 in), fast-blow, 250 V, 2 A). Do not use repaired fuses or short-circuited fuse holders.**
- **Capacitors inside the unit may be charged even if the unit has been disconnected from its electrical supply.**

Equipment Ratings	
Temperature ➤ Operation ➤ Storage	 0 °C to 40 °C (32 °F to 104 °F) -40 °C to 70 °C (-40 °F to 158 °F)
Relative humidity[a]	0 % to 80 % non-condensing
Maximum operation altitude	2000 m (6562 ft)
Pollution degree	2
Installation category	II
Power supply rating[b]	100 V to 240 V (50 Hz/60 Hz) maximum input power 2 A

a. Measured in 0 °C to 31 °C (32 °F to 87.8 °F) range, decreasing linearly to 50 % at 40 °C (104 °F).
b. Not exceeding ± 10 % of the nominal voltage.

The following label is located on the back panel of the unit:



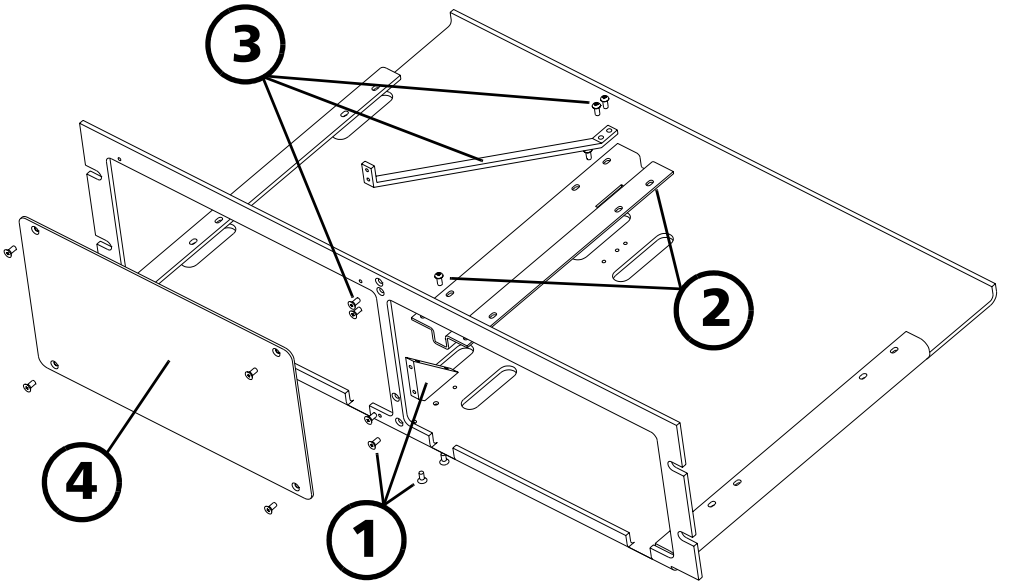
3 Getting Started with Your Light Source

Installing your FLS-2300B ASE Broadband Light Source in a Rackmount

You can place your FLS-2300B ASE Broadband Light Source in a rackmount to facilitate its usage.

To install the rackmount:

1. Fix the angle iron using four flat Phillips screws.



2. Fix the rackmount bracket to the frame using two round Phillips screws.

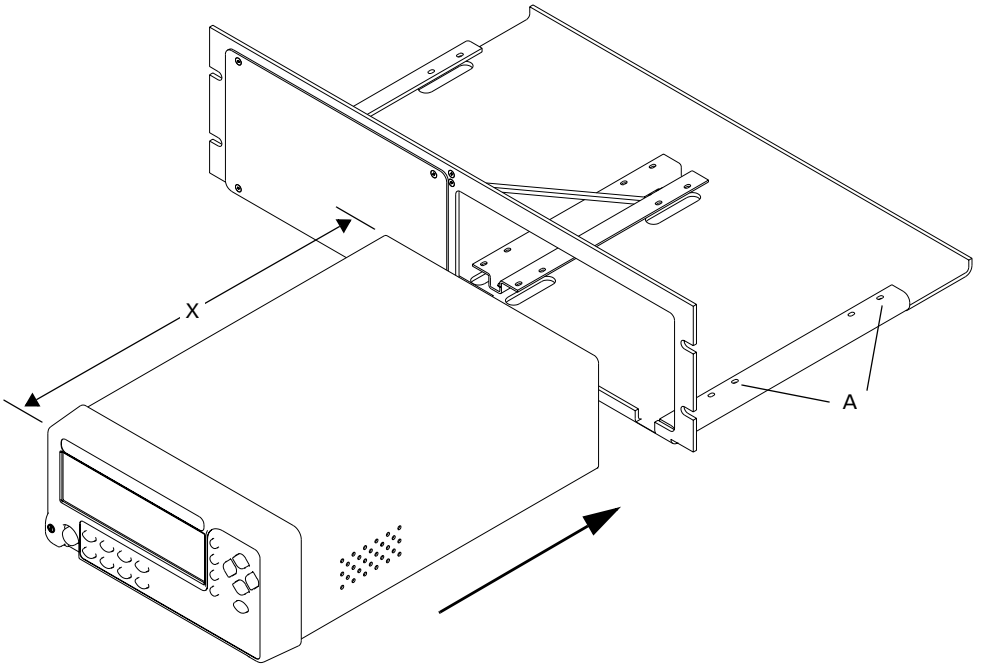
3. Fix the rackmount stiffener using two flat Phillips screws (for the front panel) and two round Phillips screws.

4. If your rackmount will contain only one unit, fix the rackmount cover plate to the empty part of the frame using four flat Phillips screws.

To install your FLS-2300B ASE Broadband Light Source in a rackmount:

1. Slide the benchtop unit into the rackmount and tighten it from underneath using the four cover fixing screws.

If measurement X on the illustration exceeds 11.125 in., fix the unit into the four holes identified as A. Otherwise, use the other four holes.



2. If a second benchtop is to be installed, remove the cover plate and repeat step 1.

Turning On and Off the ASE Broadband Light Source

WARNING

Before turning on the source, please read the *Electrical Safety Information* on page 9.

To turn on and off the ASE Broadband Light Source :

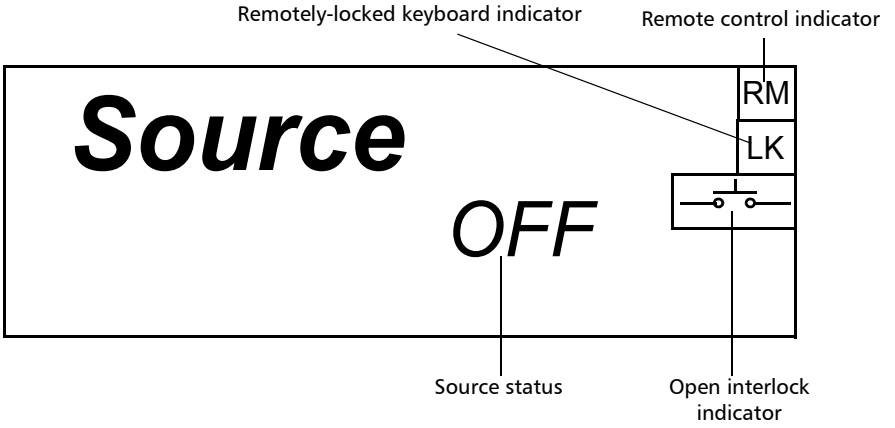
Press the red button located in the lower left-hand corner of the front panel.

Upon startup, the unit beeps twice, performs a self-test and then displays the main window with the source deactivated.

When the unit is turned off, the current Setup menu settings remain in a storage device called non-volatile memory. These settings include display features and remote control.

FLS-2300B ASE Broadband Light Source Display

Form the main window of your unit, you can get important information on the source with just one glance.



- The *source status* indicator shows whether the source is active or not (ON/OFF). In the case of an active source, a graphical element representing a light beam is also displayed.
- The *remote control* indicator (**RM**) appears when the unit is currently controlled by remote commands (via GPIB or RS-232 communication mode).
- The *locked keyboard* indicator (**LK**) shows that a remote application prevents you from using the keyboard of the unit.

Note: *The term ‘‘keyboard‘‘ refers to all front panel buttons –except the red button used to power the unit on or off.*The *open interlock* indicator is displayed as soon as the source lock or the interlock connector (both located on front panel of the unit –see page 2) is open. For your safety, the source is automatically deactivated.

4 Setting ASE Broadband Light Source Parameters

The blue button on the right side of the display provides access to the single-level Setup menu. You can access the Setup menu even while the source is active. The figure below shows Setup menu items.

Refresh Rate	8 Hz	RS232 / GPIB	GPIB
Backlight	ON	GPIB Addr.	12
Contrast	▼ ◐ ▲	Baud Rate	N.A.
Video Mode	STD	Flow Ctrl	N.A.
Exit			

To set a parameter:

1. Use arrows on the front panel of the unit to select the parameter you want to modify. The current selection is displayed in reverse video.
2. Press ENTER to edit the parameter. The cell containing the value will turn to reverse video, indicating you can modify its contents.
3. Use the up/down arrows to select the appropriate value.
4. Confirm your selection by pressing ENTER. The display wiil return to normal.

To exit the Setup menu, press the blue button providing access to the menu. You can also select the **Exit** item from the Setup menu (last item at the bottom of the window) and press ENTER. The ASE Broadband Light Source will revert to its state prior to entering the menu.

Note: *The unit will beep whenever it does not allow an operation.*

Setting Refresh Rate

You can define the refresh rate of the display.

To set the refresh rate:

1. Press the Setup button.
2. Use the up/down or left/right arrow keys to select **Refresh Rate** (the item will be displayed in reverse video).

Refresh Rate	8 Hz	RS232 / GPIB	GPIB
Backlight	ON	GPIB Addr.	12
Contrast	▼ ◐ ▲	Baud Rate	N.A.
Video Mode	STD	Flow Ctrl	N.A.
Exit			

3. Press ENTER to access the **Refresh Rate** edit box.
4. Use the up/down arrow keys to set the refresh rate between 1/2 Hz, 1 Hz, 2 Hz, 4 Hz, 8 Hz and 16 Hz.
5. Press ENTER to confirm the new refresh rate.

Setting Backlight

In certain circumstances, you might want to deactivate the display backlight.

To deactivate the backlight:

1. Press the Setup button.
2. Use the up/down or left/right arrow keys to select **Backlight** (the item will be displayed in reverse video).
3. Press ENTER to access the **Backlight** edit box.
4. Use the up/down arrow keys until the backlight value changes to *OFF*.
5. Press ENTER to confirm the new backlight setting.

To reactivate the backlight:

➤ Standing very close to the screen to see the information displayed, repeat steps 1 to 4 above (but set the backlight value to *ON*).

OR

➤ Reset the unit to the default factory parameters (see *Resetting the ASE Broadband Light Source* on page 21).

Setting Contrast

To modify the contrast:

1. Press the Setup button.
2. Use the up/down or left/right arrow keys to select **Contrast** (item will appear in reverse video).
3. Press ENTER to access the **Contrast** edit box.
4. Use the up/down arrow keys to adjust the contrast as required.
5. Press ENTER to confirm the contrast adjustment.

Setting Video Mode

To change the video mode:

1. Press the Setup button.
2. Use the up/down or left/right arrow keys to select **Video Mode** (item will appear in reverse video).
3. Press ENTER to access the **Video Mode** edit box.
4. Use the up/down arrow keys to set the required video mode.

Refresh Rate	8 Hz	RS232 / GPIB	GPIB
Backlight	ON	GPIB Addr.	12
Contrast	▼ ◐ ▲	Baud Rate	N.A.
Video Mode	STD	Flow Ctrl	N.A.
Exit			

Refresh Rate	8 Hz	RS232 / GPIB	GPIB
Backlight	ON	GPIB Addr.	12
Contrast	▼ ◐ ▲	Baud Rate	N.A.
Video Mode	INV	Flow Ctrl	N.A.
Exit			

5. Press ENTER to confirm the video mode.

Resetting the ASE Broadband Light Source

You may want to reset the ASE Broadband Light Source parameters to their original values.

To reset parameters to values at time of purchase, while turning on the unit:

Press ENTER until the unit beeps three times.

All the user-defined parameters are automatically reset. The following table presents the parameters and their default values.

Parameters	Reset Value or State
Source	OFF
Backlight	ON
Video mode	STD (standard)
Refresh rate	4 Hz
RS232/GPIB (remote control)[a]	GPIB
GPIB address[a]	12
Baud rate[a]	N.A.
Flow ctrl[a]	N.A.

a. Parameter cannot be reset by a remote control command.

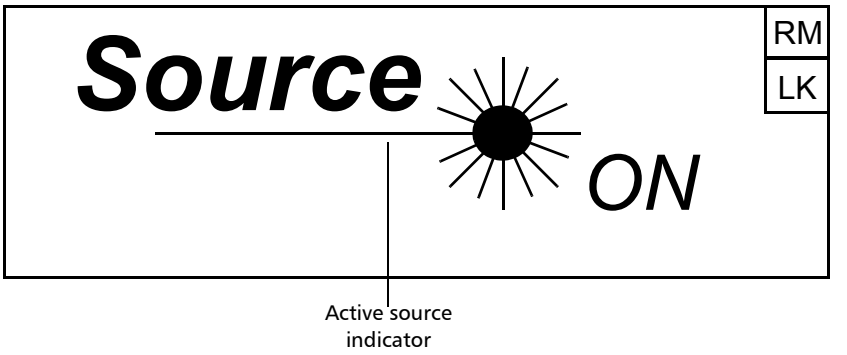
5 Operating the ASE Broadband Light Source

To activate the source:

1. Setup the source as explained in *Setting ASE Broadband Light Source Parameters* on page 17.
2. Make sure that the interlock circuit is closed by turning the source lock to the *Unlock* position.
3. The *open interlock* indicator should not be displayed. If it is, simply close the interlock circuit. Source lock and interlock connector are located on the front of the unit.

To activate the source, press on the *On/Off* button. The active LED on the module front will light up, and the front display will read "*Source ON*", also showing a light beam icon.

The word "*ON*" will flash during the three-second safety delay.



To deactivate the source:

To deactivate the source, press the *On/Off* button again. The active LED on the module front will then turn off and the display will read "*Source OFF.*"

Note: *To obtain optimum stability, let the laser source warm up for 2 hours.*

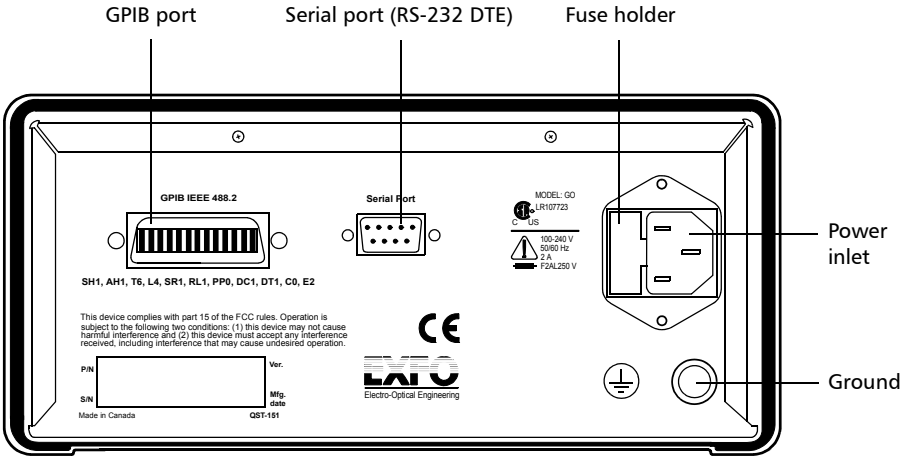
6 Controlling the Source Remotely

You can control the CD/PMD Analyzer Source remotely either by:

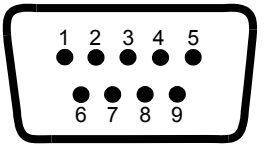
- a GPIB interface (through a GPIB cable connected to the GPIB port)

or

- an RS-232 interface (through a serial cable connected to the serial port).



The RS-232 connector (serial port) at the back of the ASE Broadband Light Source uses a DTE pinout configuration.



Pin Number	Description	Direction
2	Receive (Rx)	Input
3	Transmit (Tx)	Output
5	Signal ground (Gnd)	—

The commands used in both protocols are the same and are summarized in two reference tables:

- Common GPIB commands are listed in *IEEE 488.2 Commands—Quick Reference* table on page 61.
- Specific commands for the ASE Broadband Light Source are shown in the *Product-Specific Commands—Quick Reference* table on page 83.

You can find detailed information in the Remonte Control Commands appendix.

When the ASE Broadband Light Source is remotely controlled, **RM** appears in the upper right-hand corner of the display.

Setting Remote Command Mode

To remotely control the ASE Broadband Light Source, you must set a GPIB address or activate the RS-232 port.

To set a remote command mode:

1. Press the Setup button.
2. Use the up/down or left/right arrow keys to select **RS232 / GPIB**. The current setting is displayed.

Note: *If* GPIB *is currently selected and you want to specify a GPIB address, see* *Setting GPIB Address* on page 28.

Refresh Rate	8 Hz	RS232 / GPIB	GPIB
Backlight	ON	GPIB Addr.	12
Contrast	▼ ◐ ▲	Baud Rate	N.A.
Video Mode	STD	Flow Ctrl	N.A.
Exit			

3. Press ENTER to access the **RS232 / GPIB** edit box.
4. Use the up/down arrow keys to toggle between *GPIB* and *RS232*.
5. Press ENTER to confirm.

If you selected *RS232*, the **GPIB Addr.** menu option is deactivated ("*N.A.*" is displayed).

If you selected *GPIB*, the **Baud Rate** and **Flow Ctrl** menu options are disabled ("*N.A.*" is displayed). If necessary, you can change the GPIB address.

Setting GPIB Address

If GPIB is selected as the remote command mode, you can select the GPIB address you want to use from 1 to 30 (default value is 12).

To set a GPIB address:

1. Press the Setup button.
2. Use the up/down or left/right arrow keys to select **GPIB Addr.** The current GPIB address is displayed.

Note: *If you are in RS-232 mode, the GPIB address cell will display* "N.A." *You must change the communication mode to* GPIB *before setting an address.*

Refresh Rate	8 Hz	RS232 / GPIB	GPIB
Backlight	ON	GPIB Addr.	12
Contrast	▼ ◐ ▲	Baud Rate	N.A.
Video Mode	STD	Flow Ctrl	N.A.
Exit			

3. Press ENTER, then use the up/down arrow keys to select a GPIB address between 1 and 30.
4. Press ENTER to confirm your choice.

Setting Baud Rate

The baud rate is a parameter related to RS-232 communication. It determines the speed at which data is sent between the unit and a computer, in bits per second (bps).

To change the baud rate for your remote communications:

1. Press the Setup button.
2. Use the up/down or left/right arrow keys to select **Baud Rate**. The current setting is displayed.

Refresh Rate	8 Hz	RS232 / GPIB	RS232
Backlight	ON	GPIB Addr.	N.A.
Contrast	▼ ◐ ▲	Baud Rate	19200
Video Mode	STD	Flow Ctrl	Soft
Exit			

3. Press ENTER, then use the up/down arrow keys to select the baud rate. You can select 1200, 2400, 4800, 9600 or 19200 bps.
4. Press ENTER to confirm.

Setting Flow Control

The flow control parameter applies only to RS-232 communication. This parameter determines the type of serial communication used.

Choose *Soft* if you want the speed of data transmission to match the speed at which the device can process it. This enables the computer and the ASE Broadband Light Source to stop each other from transmitting by sending a control character (Xoff). They will also be able to restart the transmission by sending another control character (Xon). This is known as a "*software handshake*", a procedure requiring a special cable.

To set a flow control:

1. Press the Setup button.
2. Use the up/down or left/right arrow keys to select **Flow Ctrl**. The current setting is displayed.

Refresh Rate	8 Hz	RS232 / GPIB	RS232
Backlight	ON	GPIB Addr.	N.A.
Contrast	▼◐▲	Baud Rate	19200
Video Mode	STD	Flow Ctrl	Soft
Exit			

3. Press ENTER, then use the up/down arrow keys to select the type of flow you want. "*None*" means no flow control. "*Soft*" allows the unit or computer controlling it, to turn the data transmission on or off.
4. Press ENTER to confirm.

Communication Parameters

Note: *EOS means "End of String." EOI means "End or Identify."*

For GPIB Communication	
Terminate Read on EOS	Yes
Set EOI with EOS on Writes	Yes
Type of compare on EOS	8 bits
EOS byte	0Ah
Send EOI at end of Writes	Yes
GPIB primary address	See *Setting GPIB Address* on page 28
GPIB secondary address	None

For RS-232 Communication	
EOS bytes	0Ah
Baud rate	1200/2400/4800/9600/ 19200 bps
Parity	None
Data bits	8 bits
Stop bits	1 bit
Flow control	Software (Xon/Xoff) or None
Activation	See *Setting Remote Command Mode* on page 27

Standard Status Data Structure

The four tables below give information on the common Status and Enable registers as defined by IEEE 488.2.

The diagram displayed on page 35 is a useful aid in understanding the general commands and how a service request (SRQ) is generated.

➤ Standard Event Status Register (ESR)

Bits	Mnemonics	Bit Value
7	Power On	128
6	Not used	0
5	Command Error	32
4	Execution Error	16
3	Device Dependent Error	8
2	Query Error	4
1	Not used	0
0	Operation Complete	1

➤ Standard Event Status Enable Register (ESE)

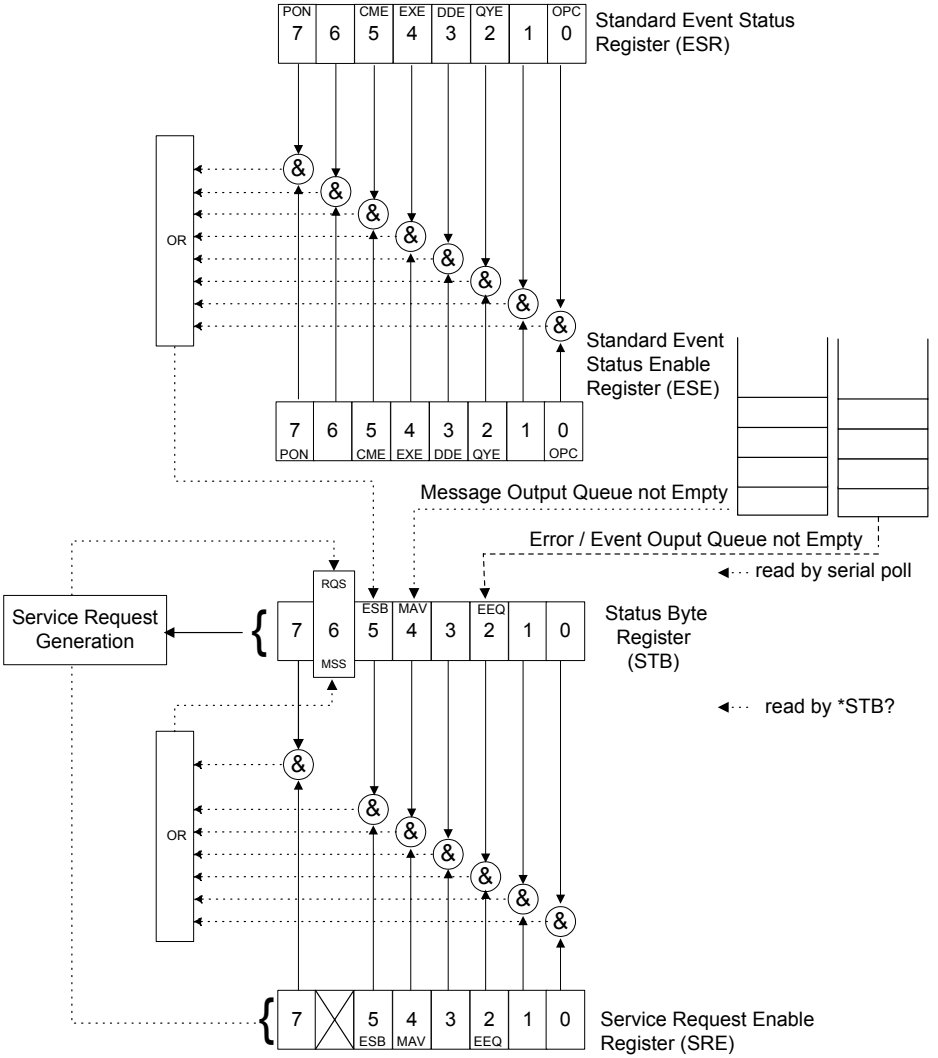
Bits	Mnemonics	Bit Value
7	Power on	128
6	Not used	0
5	Command error	32
4	Execution error	16
3	Device dependent error	8
2	Query error	4
1	Not used	0
0	Operation complete	1

➤ Status Byte Register (STB)

Bits	Mnemonics	Bit Value
7	Not used	0
6	Request service / Master summary status	64
5	Event summary bit	32
4	Message available	16
3	Not used	0
2	Error / Event queue	4
1	Not used	0
0	Not used	0

➤ Service Request Enable Register (SRE)

Bits	Mnemonics	Bit Value
7	Not used	0
6	Reserved	0
5	Event status byte	32
4	Message available	16
3	Not used	0
2	Error / Event queue	4
1	Not used	0
0	Not used	0


PON 7
6
CME 5
EXE 4
DDE 3
QYE 2
1
OPC 0
Standard Event Status Register (ESR)
OR
Standard Event Status Enable Register (ESE)
7 PON
6
5 CME
4 EXE
3 DDE
2 QYE
1
0 OPC
Message Output Queue not Empty
Error / Event Ouput Queue not Empty
read by serial poll
Service Request Generation
RQS
MSS
ESB 5
MAV 4
3
EEQ 2
1
0
Status Byte Register (STB)
read by *STB?
OR
7
5 ESB
4 MAV
3
2 EEQ
1
0
Service Request Enable Register (SRE)

An SRQ is forced when a bit in the Status Byte register goes from 0 to 1 and the corresponding SRE mask bit is set. If an SRQ is forced, the RQS bit is set to 1 and will remain there until read by a serial poll –even if the reason or condition causing the service request no longer exists. Similarly, if a serial poll reads the RQS, it is reset to 0, whether or not the condition causing the service request still exists.

Command Structure

The GPIB and RS-232 commands follow the guidelines determined by the Standard Commands for Programmable Instruments (SCPI) consortium. For example, the following command syntax is used to activate or deactivate the source.

SOUR:POW[:STAT]<wsp><Boolean>

- SOUR, POW and STAT are keywords that define the function of the command.
- [ ] indicates that a keyword or parameter is optional.
- <wsp> indicates that a space is required ("wsp" stands for "white space").
- <Boolean> indicates the command parameter.
- Keywords must be separated by a colon.

To enter commands or queries you must use either the full word for the command, or the three- or four-letter shortcut. Commands are not case-sensitive, however spelling errors will cancel the command or query.

The command or query can be written using only shortcuts, only full words, or a combination of both.

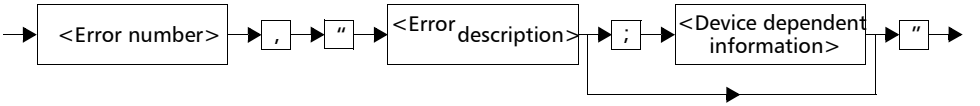
Other command syntax elements are:

- The comma, which is used to separate values in a command or query.
- The semi-colon, which is used to separate commands or queries, when you send more than one at a time

Note: *It is recommended that you retrieve the response immediately after each query.*

Error Messages Format

System and device specific errors are managed by the FLS-2300B ASE Broadband Light Source. The generic format for error messages is illustrated in the following figure.



As shown in the above figure, the message contains three parts:

- Error number
- Error description
- Eevice dependent information

All error messages are stacked in a FIFO buffer. When there is at least one message in the buffer, bit 2 of the Status Byte Register is set to 1. Use the SYST:ERR? command to read the most recent message. The error message buffer is initialized when starting the ASE Broadband Light Source, when executing the *CLS command, or by reading the last message stored in the buffer.

- Error messages ending in a negative number are SCPI-based errors.

7 Maintenance

To help ensure long, trouble-free operation:

- Always clean fiber-optic connectors before using them.
- Keep the unit free of dust.
- Clean the unit casing and front panel with a cloth slightly dampened with water.
- Store unit at room temperature in a clean and dry area. Keep the unit out of direct sunlight.
- Avoid high humidity or significant temperature fluctuations.
- Avoid unnecessary shocks and vibrations.
- If any liquids are spilled on or into the unit, turn off the power immediately and let the unit dry completely.

WARNING

Use of controls, adjustments and procedures for operation and maintenance other than those specified herein may result in hazardous radiation exposure.

Cleaning EUI Connectors

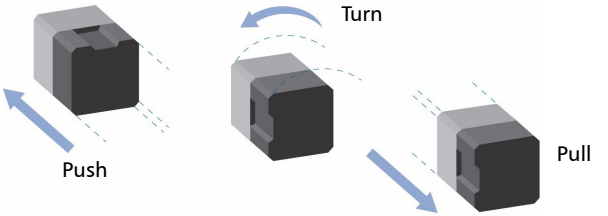
Regular cleaning of EUI connectors will help maintain optimum performance. There is no need to disassemble the unit.

IMPORTANT

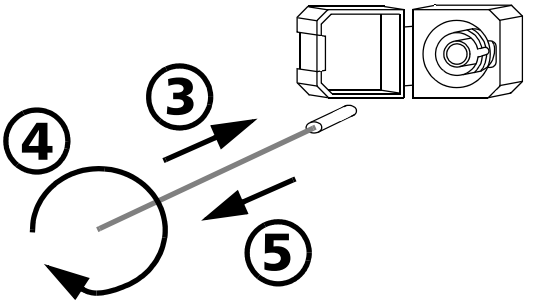
If any damage occurs to internal connectors, the module casing will have to be opened and a new calibration will be required.

To clean EUI connectors:

1. Remove the EUI from the instrument to expose the connector baseplate and ferrule.



2. Moisten a 2.5 mm cleaning tip provided by EXFO with *one drop* of isopropyl alcohol (alcohol may leave traces if used abundantly).
3. Slowly insert the cleaning tip into the EUI adapter until it comes out on the other side (a slow clockwise rotating movement may help).



4. Gently turn the cleaning tip one full turn, then continue to turn as you withdraw it.

5. Repeat steps 3 to 4 with a dry cleaning tip.

Note: *Make sure you don't touch the soft end of the cleaning tip.*

6. Clean the ferrule in the connector port as follows:

   6a. Deposit *one drop* of isopropyl alcohol on a lint-free wiping cloth.

IMPORTANT

Isopropyl alcohol may leave residues if used abundantly or left to evaporate (about 10 seconds).

Avoid contact between the tip of the bottle and the wiping cloth, and dry the surface quickly.

   6b. Gently wipe the connector and ferrule.

   6c. With a dry lint-free wiping cloth, gently wipe the same surfaces to ensure that the connector and ferrule are perfectly dry.

   6d. Verify connector surface with a portable fiber-optic microscope (e.g., EXFO's FOMS) or fiber inspection probe (e.g., EXFO's FIP).

WARNING

Verifying the surface of the connector WHILE THE UNIT IS ACTIVE WILL result in permanent eye damage.

7. Put the EUI back onto the instrument (push and turn clockwise).

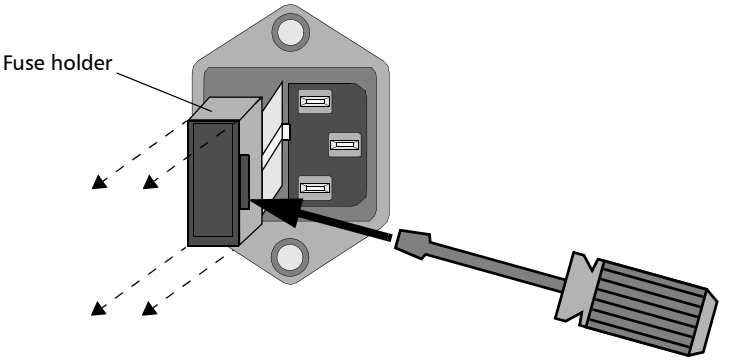
8. Throw out cleaning tips and wiping cloths after one use.

Replacing Fuses

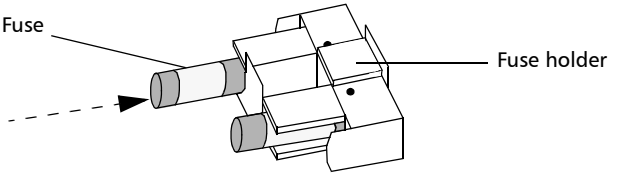
The FLS-2300B ASE Broadband Light Source contains two F2.0L250V-type fuses (IEC, 5 mm x 20 mm (0.197 in x 0.787 in), fast-acting, low breaking capacity, 250 V). The fuse holder is located at the back of the ASE Broadband Light Source, just beside the power inlet.

To replace a fuse:

1. Turn off the unit and unplug the power cord.
2. Using a flat-head screwdriver as a lever, pull out the fuse holder.



3. Check and replace the fuses, as necessary.
4. Insert the new fuses into the fuse holder.



5. Make sure the fuses are placed firmly in the holder prior to reinsertion.
6. Firmly push the fuse holder back into place.

Recalibrating the Unit

Manufacturing and service center calibrations are based on the ISO/IEC 17025 Standard, which states that calibration documents must not contain a recommended calibration interval, unless this has been previously agreed upon with the customer.

Validity of specifications depends on operating conditions. For example, the calibration validity period can be longer or shorter depending on the intensity of use, environmental conditions and unit maintenance. You should determine the adequate calibration interval for your unit according to your accuracy requirements.

Under normal use, EXFO recommends calibrating your unit every year.

Upgrading the Embedded Software

To upgrade the ASE Broadband Light Source embedded software, you will need to obtain the upgrade files from EXFO's Technical Support Group. You will also need a null-modem cable.

IMPORTANT

You may upgrade software in DOS, Windows 3.1, Windows 9x, or Windows 2000. With some notebook computers, you may need to be in a DOS environment. If problems occur, contact EXFO.

To upgrade the embedded software:

1. Turn off the ASE Broadband Light Source.
2. Connect a null-modem cable to the ASE Broadband Light Source RS-232 port and to an unused serial communication port on your PC.
3. On your PC's hard disk, create a folder named "Test" (C:\Test).
4. Unzip or copy the upgrade files into the newly created folder.

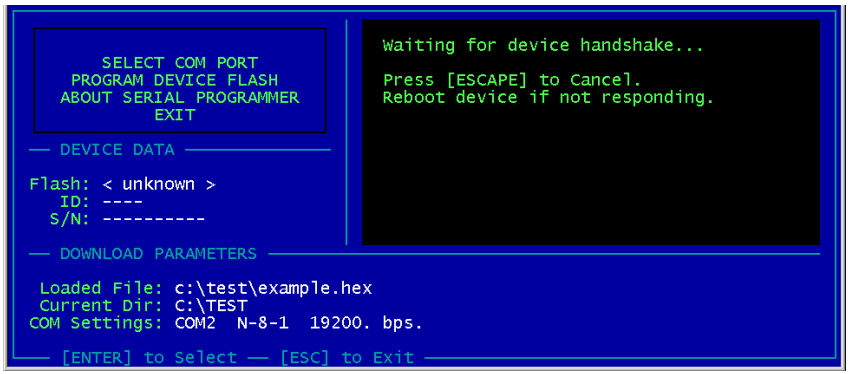
5. If the software upgrade is performed in Windows 98, you must restart your PC in DOS mode before launching the upgrade program. In other cases, simply exit to DOS.

6. Go to the "C:\Test" folder and launch the upgrade program by typing the following line (spaces are required between parameters):

   Lo0006.exe /C:2 /F:c:\test\filename.hex /S:19200

   Parameters can be decoded as follows:

   - /C: serial port number (COM2 in the above example)
   - /F: file to copy on your unit (replace "filename" with the actual name of the .hex file on your hard disk)
   - /S: PC-to-unit transfer speed (if "19200" does not work, try "56700")



7. When the **Waiting for device handshake** message appears, turn on the ASE Broadband Light Source.

   The unit display remains off, the unit beeps once and the upgrade program starts automatically. A progress bar on the PC screen indicates the upgrade status. Once the software upgrade is complete, the **Reboot device for self-test** message appears.

8. If the software upgrade was performed in Windows 2000, an error message is displayed: "*LO0006 NTVDM has encountered a System Error. The parameter is incorrect. Choose 'Close' to terminate the application.*". Click on **Close** to hide the dialog box.

9. Turn the ASE Broadband Light Source off, and then on again.

   Some units will display the new version number at start-up, otherwise press the up and right arrow keys together while the unit is turned on.

Recycling and Disposal (Applies to European Union Only)

Recycle or dispose of your product (including electric and electronic accessories) properly, in accordance with local regulations. Do not dispose of it in ordinary garbage receptacles.

This equipment was sold after August 13, 2005 (as identified by the black rectangle).

- Unless otherwise noted in a separate agreement between EXFO and a customer, distributor or commercial partner, EXFO will cover costs related to the collection, treatment, recovery and disposal of end-of-lifecycle waste generated by electronic equipment introduced after August 13, 2005 to an European Union member state with legislation regarding Directive 2002/96/EC.
- Except for reasons of safety or environmental benefit, equipment manufactured by EXFO, under its brand name, is generally designed to facilitate dismantling and reclamation.

For complete recycling/disposal procedures and contact information, visit the EXFO Web site at www.exfo.com/recycle.

8 Troubleshooting

ASE Broadband Light Source Error Messages

Warning/Error Number	Description	Recommended Action
-11	Module reset error: The nulling was not performed correctly.	Restart your unit to solve the problem.
-12	Wrong module ID: The module returns the wrong ID.	Call EXFO for assistance.
-20	Module communication error: Communication error with the module.	Restart your unit to solve the problem.
-25	Checksum error: Checksum error while reading the module's FIFO.	Restart your unit to solve the problem.
-30	Command not accepted: The command that caused the warning will be lost. The unit may continue with the program even if the command was not performed.	If problem persists, call EXFO for assistance.
-31	Module setting error: One of the settings sent to the unit is wrong.	Review your command before sending it again.
-32	Action currently in progress: You cannot send a command while the unit is already active.	Wait until the unit is done before sending the command.
-34	Command overflow: Too many commands were sent to the unit at a time.	Wait until the unit is done before sending more commands.

Warning/Error Number	Description	Recommended Action
-40	FIFO not ready for reading: The unit's FIFO is not ready for reading. Commands sent will be ignored.	If problem persists, call EXFO for assistance.
-60	Laser over-current: A problem occurred with the current going to the laser.	Call EXFO for assistance.
-64	EEPROM error: The EEPROM was not detected.	Call EXFO for assistance.
-65	EEPROM checksum error: A checksum error was detected by the unit.	Call EXFO for assistance.
-68	Temperature error: The operating temperature of the unit is from 10 °C to 40 °C (50 °F to 104 °F).	Make sure the ambient temperature remains within the specified temperature range.
-69	FPGA problem: An FPGA problem was detected.	Call EXFO for assistance.
-73	Supply voltage error: Internal voltage values are out of the operation range.	Call EXFO for assistance.
-74	Laser pump failure: A problem occurred in the output (optical) power of the laser pump.	Call EXFO for assistance.
-75	Laser temperature problem: Laser temperature is out of the operation range.	Make sure the ambient temperature remains within the specified temperature range.

Warning/Error Number	Description	Recommended Action
-76	Thermo-electric cooler over-current: A problem occurred with the current going to the thermo-electric cooler.	Call EXFO for assistance.
-79	EEPROM access error: A problem occurred when accessing the EEPROM memory (read or write).	Call EXFO for assistance.
100	No more room in the command pipe: A command could not be added to the command pipe.	If problem persists, call EXFO for assistance.
101	Timeout error: The command request was not performed in the set time amount.	Call EXFO for assistance.
102	Runtime error: The command was not performed by the unit due to a runtime error.	Call EXFO for assistance.
103	Invalid response: A command has triggered an invalid response from the unit.	Call EXFO for assistance.
200	Decompression error: An error occurred while decompressing the software.	Call EXFO for assistance.
32244	Floating exception: There is an overflow while running a command.	Restart your unit to solve the problem.
32245	Stack overflow: Not enough RAM to run the command.	Restart your unit to solve the problem.

Warning/Error Number	Description	Recommended Action
32246	Abort called in firmware: The unit used a command which it is not intended to.	Restart your unit to solve the problem.
32300	Heap overflow: Not enough space in the heap.	Restart your unit to solve the problem.
32301 32302	Malloc overflow: Not enough RAM to run the command.	Restart your unit to solve the problem.
32303	Divide by zero: The unit attempted to perform a division by zero, which gives an infinite answer.	Restart your unit to solve the problem.
32304	Array boundary error: A table index is outside the boundaries set by the array.	Restart your unit to solve the problem.
32305	Invalid Opcode: The unit did not recognize the binary code.	Restart your unit to solve the problem.

GPIB Troubleshooting

Problem	Probable Cause	Solution
Unable to communicate with ASE Broadband Light Source (no response from *IDN? command).	Incorrect communication type selected.	Select the correct communication type: RS-232 or GPIB.
	Incorrect communication parameters.	Check the communication parameters: bus address, baud rate, flow control, etc., as required.
	Incorrect termination characters.	Synchronize termination characters between the GPIB controller and the SCPI manager.
	Poor bus connection.	Ensure the functionning of the controller card and make sure that the bus cable is properly connected.
	Improper configuration.	Verify that the GPIB interface is properly configured.
Receive “Undefined header” error.	Incorrect command syntax.	Verify and correct syntax.
Unstable communication.	Incorrect termination character.	Synchronize termination characters between the GPIB controller and the SCPI manager.

Finding Information on the EXFO Web Site

The EXFO Web site provides answers to frequently asked questions (FAQs) regarding the use of your FLS-2300B ASE Broadband Light Source.

To access FAQs:

1. Type http://www.exfo.com in your Internet browser.
2. Click on the **Support** tab.
3. Click on **FAQs** and follow the on-screen instructions. You will be given a list of questions pertaining to your subject.

The EXFO Web site also provides the product's most recent technical specifications.

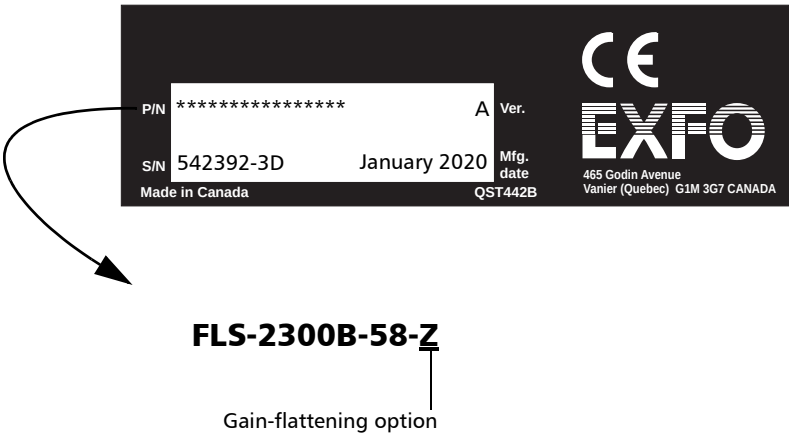
Contacting the Technical Support Group

To obtain after-sales service or technical support for this product, contact EXFO at one of the following numbers. The Technical Support Group is available to take your calls from Monday to Friday, 7:30 a.m. to 8:00 p.m. (Eastern Time in North America).

Technical Support Group
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
support@exfo.com

To accelerate the process, please have information such as the name and the serial number (see the product identification label—an example is shown below), as well as a description of your problem, close at hand.



Transportation

Maintain a temperature range within specifications when transporting the unit. Transportation damage can occur from improper handling. The following steps are recommended to minimize the possibility of damage:

- Pack the unit in its original packing material when shipping.
- Avoid high humidity or large temperature fluctuations.
- Keep the unit out of direct sunlight.
- Avoid unnecessary shock and vibration.

9 Warranty

General Information

EXFO Electro-Optical Engineering Inc. (EXFO) warrants this equipment against defects in material and workmanship for a period of one year two years from the date of original shipment. EXFO also warrants that this equipment will meet applicable specifications under normal use.

During the warranty period, EXFO will, at its discretion, repair, replace, or issue credit for any defective product, as well as verify and adjust the product free of charge should the equipment need to be repaired or if the original calibration is erroneous. If the equipment is sent back for verification of calibration during the warranty period and found to meet all published specifications, EXFO will charge standard calibration fees.

IMPORTANT

The warranty can become null and void if:

- **unit has been tampered with, repaired, or worked upon by unauthorized individuals or non-EXFO personnel.**
- **warranty sticker has been removed.**
- **case screws, other than those specified in this guide, have been removed.**
- **case has been opened, other than as explained in this guide.**
- **unit serial number has been altered, erased, or removed.**
- **unit has been misused, neglected, or damaged by accident.**

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL EXFO BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Liability

EXFO shall not be liable for damages resulting from the use of the product, nor shall be responsible for any failure in the performance of other items to which the product is connected or the operation of any system of which the product may be a part.

EXFO shall not be liable for damages resulting from improper usage or unauthorized modification of the product, its accompanying accessories and software.

Exclusions

EXFO reserves the right to make changes in the design or construction of any of its products at any time without incurring obligation to make any changes whatsoever on units purchased. Accessories, including but not limited to fuses, pilot lamps, batteries and universal interfaces (EUI) used with EXFO products are not covered by this warranty.

This warranty excludes failure resulting from: improper use or installation, normal wear and tear, accident, abuse, neglect, fire, water, lightning or other acts of nature, causes external to the product or other factors beyond EXFO's control.

IMPORTANT

EXFO will charge a fee for replacing optical connectors that were damaged due to misuse or bad cleaning.

Certification

EXFO certifies that this equipment met its published specifications at the time of shipment from the factory.

Service and Repairs

EXFO commits to providing product service and repair for five years following the date of purchase.

To send any equipment for service or repair:

1. Call one of EXFO's authorized service centers (see *EXFO Service Centers Worldwide* on page 58). Support personnel will determine if the equipment requires service, repair, or calibration.
2. If equipment must be returned to EXFO or an authorized service center, support personnel will issue a Return Merchandise Authorization (RMA) number and provide an address for return.
3. If possible, back up your data before sending the unit for repair.
4. Pack the equipment in its original shipping material. Be sure to include a statement or report fully detailing the defect and the conditions under which it was observed.
5. Return the equipment, prepaid, to the address given to you by support personnel. Be sure to write the RMA number on the shipping slip. *EXFO will refuse and return any package that does not bear an RMA number.*

Note: *A test setup fee will apply to any returned unit that, after test, is found to meet the applicable specifications.*

After repair, the equipment will be returned with a repair report. If the equipment is not under warranty, you will be invoiced for the cost appearing on this report. EXFO will pay return-to-customer shipping costs for equipment under warranty. Shipping insurance is at your expense.

Routine recalibration is not included in any of the warranty plans. Since calibrations/verifications are not covered by the basic or extended warranties, you may elect to purchase FlexCare Calibration/Verification Packages for a definite period of time. Contact an authorized service center (see *EXFO Service Centers Worldwide* on page 58).

EXFO Service Centers Worldwide

If your product requires servicing, contact your nearest authorized service center.

EXFO Headquarters Service Center
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
quebec.service@exfo.com

EXFO Europe Service Center
Le Dynasteur
10/12, rue Andras Beck
92366 Meudon la Forêt Cedex
FRANCE

Tel.: +33.1.40.83.85.85
Fax: +33.1.40.83.04.42
europe.service@exfo.com

EXFO China Service Center/ Beijing OSIC
Beijing New Century Hotel
Office Tower, Room 1754-1755
No. 6 Southern Capital Gym Road
Beijing 100044
P. R. CHINA

Tel.: +86 (10) 6849 2738
Fax: +86 (10) 6849 2662
beijing.service@exfo.com

A Technical Specifications

IMPORTANT

The following technical specifications can change without notice. The information presented in this section is provided as a reference only. To obtain this product's most recent technical specifications, visit the EXFO Web site at *www.exfo.com* *www.corningcablesystems.com*.

		Without gain-flattening option	With gain-flattening option
Spectral density (dBm/nm)		≥ −8 from 1530 nm to 1600 nm	≥ −10 from 1530 nm to 1600 nm
		≥ −14 from 1525 nm to 1610 nm	≥ −15 from 1525 nm to 1610 nm
		≥ −25 from 1520 nm to 1615 nm	≥ −26 from 1520 nm to 1615 nm
Total output power (dBm)		≥ 14	≥ 12
Spectral density stability (dB/nm)	15 min	± 0.04 (1520 nm to 1560 nm)	± 0.04 (1520 nm to 1560 nm)
Total power stability[2] (dB)	1 hour	± 0.01 (Δ = 0.02)	± 0.01 (Δ = 0.02)
Spectral flatness (dB)		Δ ≤ 3.5 typical (1537 nm to 1600 nm)	Δ ≤ 3 (1530 nm to 1600 nm)
DOP		< 2 % typical (1530 nm to 1600 nm) over 0.15 nm band	

GENERAL SPECIFICATIONS

Output connector	FC/APC	
Dimensions (H x W x D)	11.7 cm x 22.2 cm x 33.3 cm	(4 5/8 in x 8 3/4 in x 13 1/8 in)
Weight	3.2 kg	(7 lb)
Operating temperature	10 °C to 40 °C	(50 °F to 104 °F)
Storage temperature	−40 °C to 70 °C	(−40 °F to 158°F)
Output fiber	SMF-28	

NOTES

1. At 23 °C ± 0.5 °C (73 °F ± 32 °F), after a two-hour warmup.
2. The total power stability is expressed as ± half the difference between the maximum and minimum values measured during the period.

B Remote Control Commands

IEEE 488.2 Commands—Quick Reference

The ASE Broadband Light Source recognizes the required commands identified in IEEE 488.2. The table below summarizes these commands.

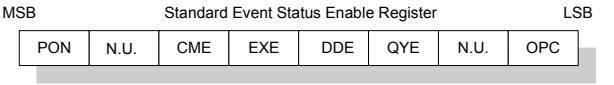
Command	Function
*CLS	Clear status command
*ESE	Standard event status enable command
*ESE?	Standard event status enable query
*ESR?	Standard event status register query
*IDN?	Identification query
*LOK[a]	Set Remote Lockout programming state
*LOK?[a]	Remote Lockout programming state query
*OPC	Operation complete command
*OPC?	Operation complete query
*REM[a]	Set Remote programming state
*RST	Reset command
*SRE	Service request enable command
*SRE?	Service request enable query
*STB?	Read status byte query
*TST?	Self-test query
*WAI	Wait for pending operations to be completed

a. This command can only be used with RS-232 communication.

IEEE 488.2 Commands—Description

	*CLS
Description	The *CLS command clears the Standard Event Status Register and the Error/Event Queue.
Syntax	*CLS
Parameter(s)	None

	*ESE
Description	The *ESE command sets the Standard Event Status Enable Register bits, as defined in the table below. This register contains a mask value for the bits to be enabled in the Standard Event Status Register.



Syntax	*ESE<wsp><RegisterValue>
Parameter(s)	*RegisterValue:* The program data syntax for <RegisterValue> is defined as a <DECIMAL NUMERIC PROGRAM DATA> element. The <RegisterValue>, expressed in base 2, represents the bit values of the Standard Event Status Enable Register.

*ESE

The table below shows the contents of this register.

Bit	Weight	Meaning
PON	128	Power ON Enable
N.U.	64	Not used
CMD	32	CoMmanD Error Enable
EXE	16	Execution Error Enable
DDE	8	Device Dependent Error Enable
QRY	4	QueRry Error Enable
N.U.	2	Not used
OPC	1	Operation Complete Enable

A value of 1 in the Enable Register enables the corresponding bit in the Status Register, a value of 0 disables the bit. The value of the <RegisterValue> shall be in the range of 0 through 255.

Example(s)

*ESE 25
where 25 = (bit EXE, bit DDE and bit OPC)

*ESE 0
clears the content of the Standard Event Status Enable register

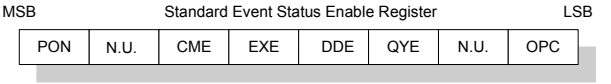
See Also

*ESE?
*ESR?

*ESE?

Description

The *ESE? query allows the programmer to determine the current contents of the Standard Event Status Enable Register. See the contents of this register below.



Syntax

*ESE?

Parameter(s)

None

Response Syntax

<RegisterValue>

*ESE?

Response(s)

RegisterValue:

The response data syntax for <RegisterValue> is defined as a <NR1 NUMERIC RESPONSE DATA> element.

The <RegisterValue> ranges from 0 through 255.

The <RegisterValue> value expressed in base 2 (binary) represents the bit values of the Standard Event Status Enable register. See below.

Bit	Weight	Meaning
PON	128	Power ON Enable
N.U.	64	Not used
CMD	32	CoMmanD Error Enable
EXE	16	Execution Error Enable
DDE	8	Device Dependent Error Enable
QRY	4	QueRry Error Enable
N.U.	2	Not used
OPC	1	Operation Complete Enable

Example(s)

*ESE? returns 133
where 133 = (bit PON, bit QYE and bit OPC)

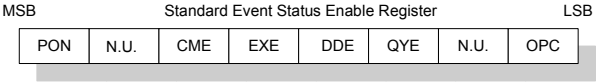
See Also

*ESE
*ESR?

*ESR?

Description

The *ESR? query allows the programmer to determine the current contents of the Standard Event Status Register. Reading the Standard Event Status Register clears it. See the contents of this register below.



Syntax

*ESR?

Parameter(s)

None

Response Syntax

<RegisterValue>

*ESR?

Response(s)

RegisterValue:

The response data syntax for <RegisterValue> is defined as a <NR1 NUMERIC RESPONSE DATA> element.

The <RegisterValue> ranges from 0 through 255.

The <RegisterValue> value expressed in base 2 (binary) represents the bit values of the Standard Event Status register. See below.

Bit	Weight	Meaning
PON	128	Power ON Enable
N.U.	64	Not used
CMD	32	CoMmanD Error Enable
EXE	16	Execution Error Enable
DDE	8	Device Dependent Error Enable
QRY	4	QueRry Error Enable
N.U.	2	Not used
OPC	1	Operation Complete Enable

Example(s)

*ESR? returns 33
where 33 = (bit CME and bit OPC)

See Also

*ESE
*ESE?

*IDN?	
Description	The intent of the *IDN? query is for the unique identification of devices over the system interface.
Syntax	*IDN?
Response(s)	“EXFO E.-O. Engineering,FLS-2300B,xxxxxxxxxx, 2.0r0”, where – xxxxxxxx is the serial number – 2.0r0 is the Firmware level.

*LOK	
Description	This command is used to set the Remote Lockout programming state.
Syntax	*LOK<wsp><LockoutState>
Parameter(s)	*LockoutState:* The program data syntax for <LockoutState> is defined as a <Boolean Program Data> element. The <LockoutState>special forms ON and OFF are accepted on input for increased readibility. ON corresponds to 1 and OFF to 0. The <LockoutState> parameter is the new lockout state of the ASE Broadband Light Source: “0”- Removing the Lockout state of the source. “1”- Enabling the Lockout state of the source.

	*LOK
Example(s)	*LOK 1
Notes	This command can only be used when working with RS-232 communication.
See Also	*LOK?

	*LOK?
Description	This query returns the Remote Lockout programming state indicating if the ASE Broadband Light Source has been locked out by a remote application.
Syntax	*LOK?
Parameter(s)	None
Response Syntax	<LockoutState>
Response	*LockoutState:* The response data syntax for <LockoutState> is defined as an <NR1 NUMERIC RESPONSE DATA> element. The <LockoutState> response corresponds to the remote lockout state of the ASE Broadband Light Source: "0"- The source is unlocked. "1"- The source is locked.
Example(s)	*LOK? returns 1
Notes	This command can only be used when working with RS-232 communication.
See Also	*LOK

*OPC

Description	The *OPC command allows synchronization between the instrument and an external controller. The *OPC command causes the instrument to set bit 0 (Operation Complete) in the Standard Event Status Register to the TRUE (logic 1) state when the instrument completes all pending operations. Detection of the Operation Complete message can be accomplished by continuous polling of the Standard Event Status Register using the *ESR? common query command. However, using a service request eliminates the need to poll the Standard Event Status Register thereby freeing the controller to do other useful work.
Syntax	*OPC
Parameter(s)	None
See Also	*OPC? *WAI

	***OPC?**
Description	The *OPC? query allows synchronization between the instrument and an external controller by reading the Output Queue or by waiting for a service request on the Message Available (MAV) bit in the Status Byte Register. The *OPC? query causes the instrument to place an ASCII character, 1, into its Output Queue when the device completes all pending operations. A consequence of this action is that the MAV bit in the Status Byte Register is set to state 1.
Syntax	*OPC?
Parameter(s)	None
Response Syntax	<Acknowledge>
Response(s)	*Acknowledge:* The response data syntax for <Acknowledge> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Acknowledge> response is a single ASCII-encoded byte corresponding to 1. The receipt of an <Acknowledge> response indicates that all pending selected device operations have been completed.
Example(s)	*OPC? Return 1
See Also	*OPC *WAI

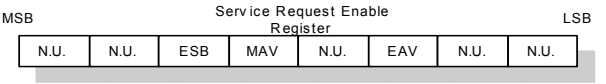
*REM	
Description	This command is used to set the Remote programming state that determines if the source will be controlled locally or remotely.
Syntax	*REM<wsp><RemoteState>
Parameter(s)	*RemoteState:* The program syntax data for <RemoteState> is defined as a <Boolean Program Data> element. The <RemoteState> special forms ON and OFF are accepted on input for increased readibility. ON corresponds to 1 and OFF to 0. The <RemoteState> parameter is the new remote state of the ASE Broadband Light Source: “0”- to set Local state. “1”- to set Remote state.
Example(s)	*REM 1
Notes	This command can only be used with RS-232 communication.

	*RST
Description	The *RST command performs a device reset. This command is the third reset level in a three-level reset strategy. The Reset command shall do the following: a) Sets the device-specific functions to a known state that is independent of the past-use history of the device. b) Forces the device into OCIS state (Operation complete Command Idle State). c) Forces the device into OQIS state (Operation complete Query Idle State). The Reset command explicitly DOES NOT affect the following: a) The state of the Communication interface. b) The Output Queue. c) Any Event Enable Register setting, including the Standard Event Status Enable Register setting. d) Any Event Register setting, including the Standard Event Status Register settings. e) Calibration data that affects device specifications. f) The Service Request Enable Register setting.
Syntax	*RST
Parameter(s)	None

*SRE

Description

The *SRE command sets the Service Request Enable Register bits. See the contents of this register below. This register contains a mask value to enable the bits in the Status Byte Register.



Syntax

*SRE<wsp><RegisterValue>

Parameter(s)

RegisterValue:

The program data syntax for <RegisterValue> is defined as a <DECIMAL NUMERIC PROGRAM DATA> element.

The <RegisterValue> value ranges from 0 through 255.

The <RegisterValue>, expressed in base 2 (binary), represents the bit values of the Service Request Enable Register.

*SRE

See the contents of this register below.

Bit	Weight	Meaning
N.U.	128	Not used
N.U.	64	Not used
ESB	32	Event Summary Bit Enable
MAV	16	Message AVailable Enable
N.U.	8	Not used
EAV	4	Error / Event AVailable Enable
N.U.	2	Not used
N.U.	1	Not used

A bit value of zero shall indicate a disabled condition.

Example(s)

*SRE 52
where 52 = (bit ESB, bit MAV and bit EAV)

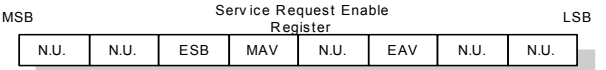
See Also

*SRE?
*STB?

*SRE?

Description

The *SRE? query allows the programmer to determine the current contents of the Service Request Enable Register. See the contents of this register below.



Bit	Weight	Meaning
N.U.	128	Not used
N.U.	64	Not used
ESB	32	Event Summary Bit Enable
MAV	16	Message AVailable Enable
N.U.	8	Not used
EAV	4	Error / Event AVailable Enable
N.U.	2	Not used
N.U.	1	Not used

Syntax *SRE?

Parameter(s) None

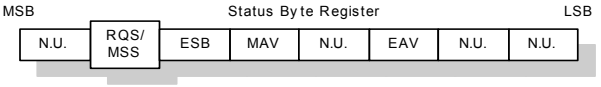
Response Syntax <RegisterValue>

*SRE?	
Response(s)	*RegisterValue:* The response data syntax for <RegisterValue> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <RegisterValue> ranges from 0 through 255. When converted to binary (base 2), the <RegisterValue> represents the current bit values of the Service Request Enable Register.
Example(s)	*SRE Return 32 (bit ESB)
See Also	*SRE *STB?

*STB?

Description

The *STB? query allows the programmer to read the status byte and Master Summary Status bit. See the content of this register below.



Syntax

*STB?

Parameter(s)

None

Response Syntax

<RegisterValue>

*STB?

Response(s)

RegisterValue:

The response data syntax for <RegisterValue> is defined as a <NR1 NUMERIC RESPONSE DATA> element.

The <RegisterValue> ranges from 0 through 255.

The <RegisterValue> value, expressed in base 2 (binary) represents the bit values of the Status Byte Register. See the contents of this register below.

Bit	Weight	Meaning
N.U.	128	Not used
RQS/ MSS	64	ReQuest Service (read by serial polling)/MaSter Summary bit (read by *STB?)
ESB	32	Event Summary Bit Enable
MAV	16	Message AVailable Enable
N.U.	8	Not used
EAV	4	Error / Event AVailable Enable
N.U.	2	Not used
N.U.	1	Not used

Example(s)

*STB? Return 68
where 68 = (bit MSS and bit EAV)

See Also

*SRE
*SRE?

*TST?

Description	This query returns a binary value indicating the test results.
Syntax	*TST?
Response	*Result:* The response data syntax for <Result> is defined as a <NR1 NUMERIC RESPONSE DATA> element. A decimal value indicating the sum of all corresponding errors: “0”–No errors “1”–N/A “2”–Supply voltage error: “4”–N/A “8”–N/A “16”–Laser temperature problem: “32”–Thermo-electric cooler over-current: “64”–N/A “128”–EEPROM access error: “256”–EEPROM checksum error: “512”–EEPROM error: “1024”–FPGA problem: “2048”–Temperature error: “4096”–SPI communication problem “8192”–PLL unlock

	*WAI
Description	The *WAI command shall prevent the device from executing any further commands or queries until the no-operation-pending flag becomes TRUE.
Syntax	*WAI
Parameter(s)	None
Example(s)	*WAI
See Also	*OPC *OPC?

Product-Specific Commands—Quick Reference

The table below summarizes commands specific to the ASE Broadband Light Source.

Command			Parameter/ Response	Description
DISP	BRIG		<numeric_value> |MINimum| MAXimum	Turn backlight on or off
	BRIG?		(0|1)	Backlight on or off?
SOUR	POW	STAT	0|1 |ON|OFF	Turn source on or off
		STAT?	(0|1)	Source active?
		PROT	(0|1)	Interlock open?
SYST	ERR?		Error code	Next error from error queue?
	VERS?		Current version	Identification string?

Product-Specific Commands-Description

DISPlay:BRIGhtness

Description	This command turns the backlight of the unit on or off.
Syntax	DISP:BRIG<wsp><numeric_value>|MINimum|MAXimum
Parameters	A numeric parameter: "1"–turns the backlight on "0"–turns the backlight off
Example	DISP:BRIG 1 DISPLAY:BRIGHTNESS 0

DISPlay:BRIGhtness?

Description	This command returns the state of the backlight.
Syntax	DISP:BRIG?
Response	A numeric value: "1"-the backlight is on "0"-the backlight is off
Example	DISP:BRIG? 1

SOURce:POWer[:STATe]

Description	This command turns on or off the source. When the source is on, the red LED on the front of the module illuminates.
Syntax	SOUR:POW[:STAT]<wsp><boolean>|ON|OFF
Parameters	A boolean parameter: "1"–turns the source on "0"–turns the source off
Example	SOUR:POW:STAT 1 (turns the source on.) SOURCE:POWER 0 (turns the source off.)

SOURce:POWer:STATe?

Description	This query returns a value indicating the state of the optical source (on or off).
Syntax	SOUR:POW:STAT?
Response	A boolean value: "1"–the source is on "0"–the source is off
Example	SOUR:POW:STAT? 1

SOURce:POWer:PROTection:TRIPped?

Description This query returns the state of the interlock circuit (including the interlock connector and the source key protection). As soon as it is opened, the protection circuit prevents the source from emitting (the source was on) or from being turned on (the source was off).

Syntax SOUR:POW:PROT:TRIP?

Response A boolean value:

"1"–the protection is open (Source cannot be turned on without closing the protection.)

"0"–the protection is closed (Normal operating state)

Example SOUR:POW:PROT:TRIP? 0

SYSTem:ERRor?

Description This command returns the next error in the error queue. When an error is generated, an error number is sent to the error queue. The error queue is accessed with the SYST:ERR? query.

Syntax SYST:ERR?

Response See *SCPI-Based Errors* on page 89.

SYSTem:VERSion?

Description	This query reads the ASE Broadband Light Source identification string.
Syntax	SYST:VERS?
Response	“EXFO E.-O. Eng. FLS-2300B vx.xx”xxxxxxxx xxxxxxx, where xxxxxxxx xxxxxxx is the serial number and vx.xx is the current product version.
Note	This query returns the same response as the *IDN? query.

C SCPI-Based Errors

Error Number	Description	Probable Cause
-100	“Command error”	A command error has occurred. This is the generic syntax error for devices that cannot detect more specific errors.
-104	“Data type error”	The parser recognized a data element different than the one allowed.
-108	“Parameter not allowed”	More parameters were received than expected for the header.
-109	“Missing parameter”	Fewer parameters were received than expected for the header.
-113	“Undefined header”	The header is syntactically correct, but it is undefined for this specific device.
-130	“Suffix error”	An error occurred while parsing a suffix.
-131	“Invalid suffix”	The suffix does not follow the appropriate syntax or it is inappropriate for this device.
-138	“Suffix not allowed”	A suffix was encountered after a numeric element which does not allow suffixes.
-200	“Execution error”	An execution error occurred. This is the generic syntax error for devices that cannot detect more specific errors.
-222	“Data out of range”	A legal program data element was parsed but could not be executed because the interpreted value was outside the legal range as defined by the device.

Error Number	Description	Probable Cause
-224	“Illegal parameter value”	An exact value from a list of possibilities was expected.
-300	“Device-specific error”	A device-dependent error occurred. This is the generic syntax error for devices that cannot detect more specific errors.
-321	“Out of memory”	An internal operation needed more memory than was available.
-350	“Queue overflow”	A specific code entered into the queue in lieu of the code that caused the error. This code indicates that there is no room in the queue and an error occurred but was not recorded.
-365	“Time out error”	This is a generic device-dependent error.
-400	“Query error”	A query error occurred. This is the generic syntax error for devices that cannot detect more specific errors.

Index

F

G

H

I

K

L

M

S

T

U

V

W

X

P/N: 1043103

www.exfo.com · info@exfo.com

CORPORATE HEADQUARTERS	400 Godin Avenue	Quebec (Quebec) G1M 2K2 CANADA Tel.: 1 418 683-0211 · Fax: 1 418 683-2170
EXFO AMERICA	3701 Plano Parkway, Suite 160	Plano TX, 75075 USA Tel.: 1 972 907-1505 ·
EXFO EUROPE	Le Dynasteur 10/12, rue Andras Beck	92366 Meudon la Forêt Cedex FRANCE Tel.: +33.1.40.83.85.85 · Fax: +33.1.40.83.04.42
EXFO ASIA-PACIFIC	151 Chin Swee Road #03-29, Manhattan House	SINGAPORE 169876 Tel.: +65 6333 8241 · Fax: +65 6333 8242
TOLL-FREE	(USA and Canada)	1 800 663-3936

Printed in Canada (2006-06)

EXPERTISE REACHING OUT