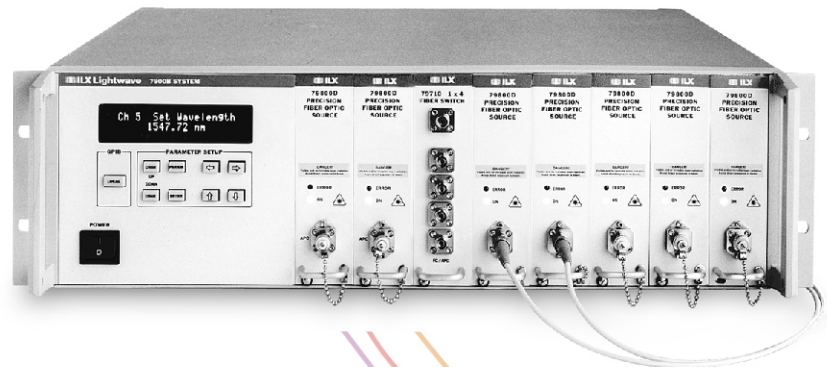


User's Guide

Multi-Channel Fiber Optic Test System FOM-7900B

also includes:

FOS-79800E Fiber Optic Source Module
FOS-79710 1 x 4 Fiber Optic Switch Module
DPM-79810 Dual Power Meter Module



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CHAPTER 4 FOS-79800E MODULE

Refer to CHAPTER 2 System Overview for installation instructions.

CAUTION: Do not insert or remove any module while the FOM-7900B is powered up. This could damage the module and/or mainframe. Be sure the module is properly installed before applying power to the FOM-7900B.



CAUTION: The Fiber Optic Source Module is a static sensitive device. Installing or removing any module from the FOM-7900B System should take place at an ESD protected workbench. The operator should be properly earth grounded.



The 79800E Source Modules with version 6.1 or higher firmware should be used in the FOM-7900B Mainframes running version 3.4 or higher firmware. Each module provides a stable laser source at a user specified maximum power and center wavelength.

Annual factory calibration is recommended for best performance of the FOS-79800E Source Modules.

FOS-79800E SPECIFICATIONS

A list of wavelength and power levels for source modules is shown in Table 4-1. Performance specifications for the series of FOS-79800E Precision Fiber Optic Source Modules are shown in Table 4-2. In keeping with our commitment to continuing improvement, ILX Lightwave Corporation reserves the right to change specifications without notice or liability for such changes.

Table 4-1 DFB Source Modules

MODULE	CENTER WAVELENGTH	MAXIMUM POWER LEVEL	STABILITY
FOS-79800E/315C1	1527.98–1564.26nm (C-band)	9–10mW	note ¹
FOS-79800E/315L1	1564.27–1610nm (L-band)	9–10mW	note ¹
FOS-79800E/315C2	1527.98–1564.26nm (C-band)	> 10 up to 20mW	note ¹
FOS-79800E/315L2	1564.27–1610nm (L-band)	> 10 up to 20mW	note ¹
FOS-79800E/315S	1475–1527.97nm (S-band)	9–20mW	note ¹
FOS-79800E/315EL	1610.01–1625nm (Extended L-band)	9–20mW	note ¹
FOS-79800E/SERV	1310, 1480, 1510, 1625 ±5nm (Service Channels)	9–20mW	note ²
FOS-79800E/CUST	Customer supplied lasers, non-standard product		
FOS-79800E/000	Special product for non-standard wavelength		

1. After 1-hour warm-up (typical). Some modules may require longer warm-up time.
For short-term stability, assume ambient temperature constant within ±0.1°C.
For long-term stability, assume ambient temperature constant within ±1°C.
2. After warm-up of up to 6 hours. For short-term stability, assume ambient temperature constant within ±0.1°C.
For long-term stability, assume ambient temperature constant within ±1°C.

Table 4-2 79800E Performance Specifications

OUTPUT POWER	SPECIFICATION
Level at full power ¹	Refer to Table 4-1
Stability ²	
15 minutes (spec)	<0.005dB rms
(typical)	<0.002dB rms
24 hours	±0.03dB
Attenuation	
Calibrated range	10dB
Full range (typical)	15dB
Accuracy ³	±0.1dB
Wavelength	SPECIFICATION
Available center λ	Refer to Table 4-1
Resolution	1 pm
Accuracy	±50 pm
Stability	
15 minutes	±3pm
24 hours	±5pm
Tuning range	±0.85nm
Spectral width	
Coherence control OFF	<30MHz
Coherence control ON	1 GHz (typical) ⁴
General	SPECIFICATION
Side mode suppression ⁵	>40dB (>45dB typical)
Signal to background ⁶	>30dB
Optical isolation	>30dB
RIN ⁷	-145dB/Hz
Modulation frequency ⁸	1–500 kHz
Optical connector ⁹	FC/APC
Operating temperature	15°C–35°C
SSE50 Option	SPECIFICATION
Signal/Spontaneous Emission (within ±100nm of center wavelength)	>50dB

1. User specified maximum power level.

2. After 1-hour warm-up (typical). Some modules may require longer warm-up time.

For short-term stability, assume ambient temperature constant within ±0.1°C.

For long-term stability, assume ambient temperature constant within ±1°C.

3. Defined as: $\Delta P_{\text{meas}} - \Delta P_{\text{set}}$ from maximum power to 5dB down.
4. Other linewidths available.
5. Measured at output connector, set to maximum power.
6. $\pm 100\text{nm}$ about center wavelength.
7. Measured at output connector. Use angled connector patchcords to minimize noise.
8. Modulation depth 100%, duty cycle 50%, rear panel TTL level input. Some rising edge ring above 100kHz. See FOM-7900B System Mainframe specifications for more information.
9. Other connector types available. Some specifications may be degraded. Also available:
PANDA PM fiber aligned to slow axis.

Table 4-3 Module General Specifications

GENERAL SPECIFICATION	
Operating Temperature	+15° C to +35° C
Storage Temperature	-40° C to +70° C
Humidity	< 90% relative humidity, non-condensing
Module Dimensions (H, W, D)	12.8 x 3.5 x 29.0cm (5 x 1.4 x 11.4in)
Weight	0.5kg (1.1lb)

SS-810 SOURCE SHUTTER OPTION

The SS-810 source shutter is a thermally stabilized optical 1x1 switch which is used to block the light from the laser in the FOS-79800E Source Module. When the shutter is shut, light is blocked but the laser remains on. The shutter can be controlled through both the front panel and the GPIB interface.

Table 4-4 SS-810 Source Shutter Specifications

SS-810 SOURCE SHUTTER SPECIFICATIONS	
Power stability 24 hr. 25±1° C	<±0.07 dB
Power stability 15 min 25±1° C	< 0.005 (rms)
Wavelength stability 24 hr @ 34±1° C	<±0.005nm
Minimum switch cycle speed	>40 msec
Shutter ON/OFF power repeatability	± 0.05dB

FOS-79800E SOURCE MODULE PARAMETER MENU

For FOM-7900B system commands refer to Mainframe Parameter Menu, on page 3-4.

The FOS-79800E Precision Fiber Optic Source Module menu is shown in Table 4-5. A selection is made by repeatedly pressing the PARAM key until the desired parameter is displayed.

Table 4-5 FOS-79800E Parameter Menu

79800E Ver 6.1
Output
Source Shutter (OPEN/SHUT)
Set Level (dBm)
Set Wavelength (nm)
Cal Mode ¹
Cal Level
Cal Wavelength
Default Cal
<i>User Mode</i> ²
ERROR ³

1. Pressing ENTER at this parameter passes control to the secondary menu.
2. Pressing ENTER at this parameter passes control back to the main menu.
3. Error messages are displayed only when an error condition exists in the module.

Module Identification

CH3 79800E SN XXXX
FiberOptic Src 6.1

This parameter displays the model number, module serial number and the firmware version. The parameter is not adjustable. The arrow keys and ENTER are disabled.

Output ON/OFF

CH 1	OUTPUT
<u>ON</u>	

Use this parameter to turn the laser output on or off. Use the UP or DOWN arrow keys to select ON or OFF. Then press the ENTER key to implement the change. The green LED on the front of the module indicates the presence of light. The green LED will only illuminate if the Output is ON and the Shutter is OPEN.

Source Shutter OPEN/SHUT

CH 1	SOURCE SHUTTER
<u>OPEN</u>	

Use this parameter to open or shut the Source Shutter. Use the UP or DOWN arrow keys to select OPEN or SHUT. Then press the ENTER key to implement the change. The green LED on the front of the module indicates the presence of light. The green LED will only illuminate if the Output is ON and the Shutter is OPEN. This parameter is displayed only when the shutter option has been detected in the module.

Set Power Level

CH 1	SET LEVEL
<u>+1.23</u> DBM	

Use this parameter to set the output power in dBm. The number displayed on the bottom line indicates the present power level. Use the LEFT and RIGHT arrow keys to move the cursor and the UP and DOWN arrow keys to adjust the level. Then press the ENTER key to implement the change.

Set Wavelength

CH 1	SET WAVELENGTH
1552.456 NM	

Use this parameter to set the wavelength in nanometers. The number displayed on the bottom line indicates the present wavelength setting. Use the LEFT and RIGHT arrow keys to move the cursor and the UP and DOWN arrow keys to adjust the wavelength. Allow time for wavelength to stabilize after resetting.

User Calibration

CH 1	CAL MODE
(PRESS ENTER)	

Press the ENTER key to proceed to the secondary menu structure specific to the field calibration of the FOS-79800E Fiber Optic Source Module.

Calibrate Power Level

CH 1	CAL LEVEL
+1.55 DBM	

The Cal Level feature can be used when the measured output power does not match the front panel setting or to compensate for losses induced by patch cords. Use the steps below to enter a Power User Calibration. This calibration generates a single point offset that is applied to all future power levels.

1. Connect an optical power meter to the end of a fiber optic patch cord. Program the power meter to the wavelength of the FOS-79800E Precision Fiber Optic Source. Zero the power meter.
2. Set the FOS-79800E Precision Fiber Optic Source Module to a level near that of the test application. Turn the source on.
3. Proceed to the Cal Level display.
4. Give the system one hour to warm up and stabilize. Measure the output power with the power meter. Then use the LEFT and RIGHT arrow keys to move the cursor and the UP and DOWN arrow keys to enter the measured power from the power meter. Then press the ENTER key.

Calibrate Wavelength

CH 1	CAL WAVELENGTH
1554.001 NM	

The Cal Wavelength feature can be used when the measured wavelength does not match the front panel setting. Use the steps below to enter a Wavelength User Calibration. The cal generates a single point offset that is applied to all future wavelength settings.

1. Connect a wavelength meter to the end of a fiber optic patch cord.
2. Set the FOS-79800E Fiber Optic Source Module to a wavelength near that of the test application. Turn the source on.
3. Proceed to the Cal Wavelength display.
4. Give the "system" 1 hour to warm up and stabilize. Measure the wavelength with the wavelength meter. Then use the LEFT and RIGHT arrow keys to move the cursor and the UP and DOWN arrow keys to enter the measured wavelength from the meter. Then press the ENTER key.

Reset User Calibration

CH 1	DEFAULT CAL
(PRESS ENTER)	

Press ENTER at this display to remove the effects of the User Calibration(s). The User Calibration is an offset that is applied to all power and wavelength settings. Resetting the calibration returns these offsets to 0.00 dB and 0.000 nm.

Return to Main Menu

CH 1	USER MODE
(PRESS ENTER)	

Press the ENTER key to return to the main menu structure.

Error Display

CH 1 **ERROR**
501 - CASE TEMP ERROR

This parameter is displayed only when an error condition has been detected within the module. The parameter cannot be modified and the arrow keys and the ENTER key are disabled. Error messages are defined in CHAPTER 12 of this manual.

EXTERNAL TRIGGER

The FOS-79800E Fiber Optic Source Module does not support external triggering.

ERROR INDICATOR

When an error is detected within the FOS-79800E Module the red LED on the front of the module blinks. To view a description of the error press the PARAM key repeatedly until the ****ERROR**** screen is displayed. Error messages are displayed until the error causing condition is remedied. Error messages are also described in CHAPTER 12 Error Messages.

ON INDICATOR

When light is present at the output connector the green LED is on. This indicates that both the Laser is energized and the Source Shutter option is open. The default condition for the modules is laser not energized and shutter open. This configuration has been adopted to maintain consistency between modules with and without the source shutter option.

MODULATION

It is possible to modulate the laser output of the FOS-79800E. Control of the modulation is provided in the **Ch All** menu structure. Refer to CHAPTER 3 FOM-7900B Mainframe Operation for more detail. Modulation applies to all source modules simultaneously.

COHERENCE CONTROL

In single mode fiber applications, light from narrow linewidth sources will remain coherent even after travelling long distances. This coherence can cause interference between reflective surfaces such as FC/PC interfaces downstream from the optical source. This interference is most noticeably seen as power instability. The coherence control feature of the FOS-79800E broadens the linewidth of the laser, thus decreasing the coherence length and minimizing the associated interference effects. The coherence control feature also minimizes the nonlinear effects seen in fiber optic systems due to Brillouin scattering.

The Coherence Control is turned **ON** or **OFF** within the **Ch All** menu structure.

Table 4-6 FOS-79800E Module Commands

COMMAND NAME	# PARAMETERS EXPECTED	DESCRIPTION
CAL:LEVEL	##.##	Sets the Power User Calibration.
CAL:RESET	##.##	Resets the User Calibration.
CAL:WAVE	####.###	Sets the Wavelength User Calibration.
ERRor?	NONE	Returns an error code. (See CHAPTER 12)
IDN?	NONE	Returns a string that identifies the module.
LEVEL	±##.##	Sets the output power level.
LEVEL?	NONE	Returns the output power level.
OUT	#	Turns the output on and off.
OUT?	NONE	Returns the ON/OFF status of the laser.
SHUTPRES?	NONE	Returns the presence of the shutter option
SHUTTER	ON/OFF or 1/0	Opens (ON) and closes (OFF) the shutter
SHUTTER?	NONE	Returns the state of the shutter
WAVE	####.###	Sets the wavelength.
WAVE?	NONE	Returns the wavelength setting.
WAVEMAX?	NONE	Returns the maximum wavelength setting.
WAVEMIN?	NONE	Returns the minimum wavelength setting.