

**EXTENSION TO THE ED-AMP EDUCATOR KIT TO ALLOW THE USER TO PERFORM ADDITIONAL EXPERIMENTS IN LASERS**



**MAIN FEATURES AND BENEFITS:**

- When used as an extension to the ED-AMP kit, provides all fibre optic hardware required to perform the experimental investigation
- Extensive literature support including: student and instructor's manuals with exercises, solutions & sample results
- Detailed lecture notes, tutorial examples and solutions to assist with the development of courses
- Saves significant course, literature and hardware development effort

**THE EXPERIMENTAL INVESTIGATION\* ADDRESSES:**

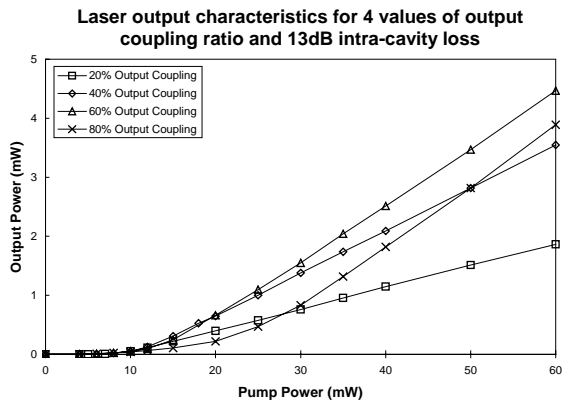
- Full gain characteristics of the Erbium doped fibre (EDF) gain medium
- Construction of a fibre ring laser
- Measurement of lasing threshold
- Measurement of slope efficiency
- Effect of intra-cavity loss on the slope efficiency and threshold
- Influence of output coupling ratio on slope efficiency and threshold
- Laser dynamics: relaxation oscillations, excitation lifetime, laser onset time

\* Full details of the experiments and equipment specifications are provided overleaf

## Laboratory Exercises

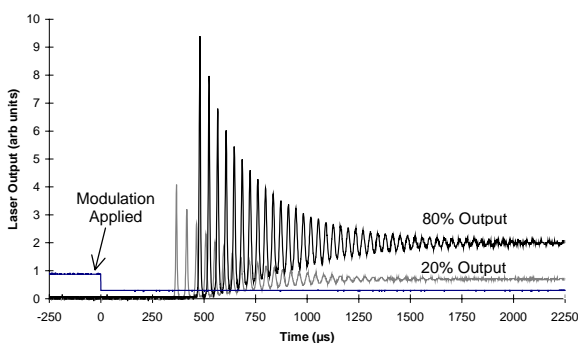
The LASE module enables students to consolidate their knowledge and understanding and to gain practical experience in the investigation of optical amplification and lasers. The experiments include:

- Measurement of output power and gain of the EDF amplifier over a large range of input signal levels for several fixed pump levels. This enables investigation of small signal gain, large signal gain and gain saturation (See ED-AMP data sheet for full details of the optical amplifier investigation).
- Construction and operation of an EDF ring laser



- Measurement of laser output power and gain as a function of pump power for various levels of intra-cavity loss.
- Measurement of laser output power and gain as a function of pump power for various values of the output coupling ratio.
- Investigation of slope efficiency and threshold as a function of intra-cavity loss.

**Relaxation oscillation for two cavity configurations: 80% output (20% feedback) and 20% output (80% feedback) under identical pumping conditions**



- Examination of slope efficiency and threshold as a function of output coupling ratio.
- Measurement of relaxation oscillations and laser onset time delay as a function of different pump powers, levels of intra cavity loss and output coupling ratios.
- Investigation of the square of the relaxation oscillation frequency versus pump power in order to derive the excitation lifetime.

## Product Description

The OPTOSCI LASE module is an extension of OPTOSCI's ED-AMP educator kit. It uses the erbium doped fibre amplifier and interrogation unit employed in ED-AMP (see ED-AMP data sheet for full details) with the addition of the following equipment:

- A set of FC/APC connectorised feedback couplers to alter the output coupling ratio.
- An FC/APC connectorised in-line external variable attenuator to simulate intracavity loss.
- An FC/APC connectorised bandpass filter ( $\lambda_c \approx 1550\text{nm}$ ) to stabilise the laser operating wavelength and to suppress ASE power.
- All of the necessary fibre cable patchcords and adaptors to enable connection between the various units of the system.

In addition, a comprehensive literature package accompanies each kit:

- A set of student laboratory manuals describing the background theory and experimental procedure, with associated exercises to encourage the student to discuss the implications of their results.
- A complete instructor's manual dealing with all aspects of using the equipment and providing sample results for the experiments and exercises.
- Extensive lecture notes on lasers and their applications.
- A comprehensive set of tutorial examples and their solutions.

### Additional required equipment:-

- OPTOSCI ED-AMP educator kit.
- Signal/Function generator capable of a 0 to 5V square wave output of 100-200Hz.
- A two channel laboratory oscilloscope.

### Accessories

- Laser safety spectacles with OD3+ at 1550nm are available directly from OPTOSCI.

### Full ED-LASE Educator Kit

- A fully independent ED-LASE Principles of Lasers educator kit is also available (see ED-LASE datasheet for full details)

## Ordering Information

**LASE Lasers Module**

**SPECS Laser Safety Specs OD3+ 1550nm**

**ED-AMP Erbium Doped Fibre Amplifiers**

Since OPTOSCI are committed to continuously improving the design and performance characteristics of our products, these specifications are subject to change without notice.

Date: 05 October 2004