

## TECH INFO

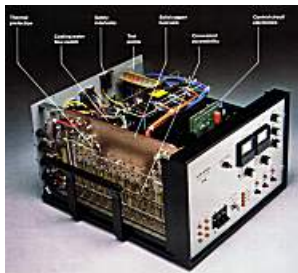
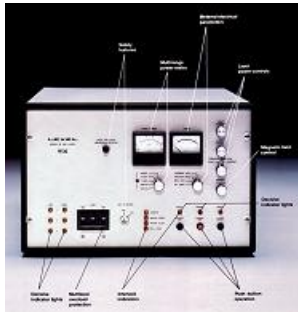
# FEATURES OF LEXEL LASERS: POWER SUPPLY

The power supply provides all of the excitation energy and electronic circuitry necessary to operate, monitor and control the laser. The Lexel power supply was designed to provide maximum reliability, freedom from component failure and troublesome maintenance. One major design objective was to eliminate power transistor failures that notoriously plague other power supply designs.

We have selected conservatively-rated components, provided substantial heat removal improvements, and introduced innovative control, protective and safety systems. Water hoses were eliminated from inside the power supply. All components were placed for easy access and marked for clear identification. Advanced new circuits were provided for power stabilization. The resulting approach has proven to be completely successful.

The Lexel ion laser power supply is **the most reliable yet developed**, providing a degree of convenience, flexibility and safety unmatched in the industry.

The layout of controls, indicators and meters on the front panel gives maximum operating convenience and control plus clear indication of the performance of the laser. The major design features associated with the power supply control panel are shown in the photo above, and are described below. (To view a close-up picture of the exterior of a Lexel power supply, click on the photo above. To view details of the inside of the power supply, click on the photo at right.)



### Push-button operation

We exclusively use push-button main power control on all our power supplies.

It is quick, positive and the safest type of power control for ion lasers. Push the POWER ON button and the laser is energized. After an automatic 20-second delay for the plasma tube cathode to warm up, push the LASER START button to ionize the plasma tube, and the laser is in full operation. At any time a push of the POWER OFF button will de-energize the laser.

The push buttons operate the main line contactor in conjunction with the interlock circuit. The momentary opening of any interlock or protective circuit in the interlock chain will immediately open the line contactor de-energizing the laser just as positively as pushing the POWER OFF button. The laser cannot "accidentally" restart on its own. The interlock must re-close and the POWER ON button must be pushed to turn the laser on again. The laser operator has complete and positive control of the laser's operating condition.

The push-button type control circuit also can permit remote turn on and turn off of the laser from the user's remote control relays or interlock switches.

### Decisive indicator lights

The meaning of the indicator lights on Lexel lasers is clear and unambiguous. When an indicator light is ON, the circuit is ON and OK. If the light is OFF that part of the circuit is OFF or open. Indicator lights are provided to show the condition of the incoming AC line, each of the main fuses, and the interlock chain. Indicators also show when the power is on and when the laser is ready to start.

### Interlock indicators

Lexel lasers are fully interlocked to prevent operation under conditions that could damage the laser or present an electrical or optical hazard. Only when all of the interlocks are closed will the INTLK indicator come on and allow the laser to be energized. Model 95 Series power supplies have additional indicators which show the condition of each individual interlock in the

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interlock chain.

## Metered electrical parameters

All Lexel power supplies have a panel-mounted meter which allows continuous monitoring of the LASER CURRENT or the transistor REGULATOR VOLTAGE. The operative condition of the plasma tube and the regulator circuit are instantly available. The Model 95 series also provides switch positions for measuring the tube voltage and the AC control voltage.

## Laser power controls

The output power of the laser is set by adjusting the current level through the plasma tube. This can be done in Current or Light Control mode.

n *Current regulation* allows direct control of the current through the plasma tube via an external source. The current control circuit holds the laser current at the precise level selected regardless of line voltage fluctuations.

n *Light regulation* provides the ultimate in laser output stabilization. A small portion of the light is sampled within the laser and compared to a reference signal in a differential circuit that automatically adjust the laser current to maintain a constant output.

The LIGHT CONTROL knob is a 5-turn precision potentiometer which permits the exact power level to be set and maintained. This feature also allows for the light level to be modulated externally with a  $\pm 10$  volt signal.

## Multirange power meter

The output power of the laser can be continuously monitored using the panel mounted power meter. The range of the meter can be switched to accurately measure power levels from the full capability of the laser to very low levels.

## Safety features

**Safety is one of the most important aspects of Lexel's design.** Protective features have been designed into the power supply to prevent accidental exposure to areas of high voltage. An electrical safety interlock de-energizes the high voltage if the cover is removed. Areas inside the power supply that are connected directly to the AC line are covered with additional protective shielding or labeled with the appropriate warning. Electrical test jacks are provided so that the major electrical parameters can be safely measured.

Lexel lasers comply with all applicable laser safety standards as prescribed by the U.S. FDA Center for Devices and Radiological Health (CDRH) Laser Products Performance Standards. Two of these CDRH features are shown on the power supply control panel.

n The KEY CONTROL can be used to prevent the laser from being operated by unauthorized personnel. If the key is removed, the laser will immediately turn off. It can not be re-energized unless the key is replaced and turned to the ON position.

n The LASER RADIATION EMISSION INDICATOR is illuminated when the power supply is turned on. It provides a prominent visual signal for at least 20 seconds prior to the start of laser operation and as long as the laser remains energized.

## Magnetic field control

The magnetic field provided by the electromagnet surrounding the plasma tube has been computer designed to provide the optimum performance on the major wavelengths provided by Lexel lasers. Occasionally, laser users have applications which require changing the magnetic field for the weak 472.7 nm and 465.8 nm blue lines. The optional Variable Magnetic Field will provide this control.

## Multilevel overload protection

Lexel lasers are protected from over-current or overvoltage damage by **four levels of overload protection**. Each level protects against a progressively more serious condition.

1. A current limit circuit prevents the laser current from exceeding a fixed safe limit under normal operation. The laser cannot be operated at a level that would damage any component.
2. If a large line voltage surge or component malfunction were to cause the laser current to exceed the fixed limit, an overcurrent trip circuit will open the line contactor and de-energize the laser.

3. A more severe overload will cause the fast-acting diode protective fuses to blow, removing the AC voltage from the rectifiers.
4. The LINE circuit breaker serves as the final level of overload protection completely removing all AC voltage from the power supply components in case of a major short circuit. Lexel lasers respond to overloads by shutting off, not blowing up.

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**CAMBRIDGE LASERS LABORATORIES, INC.**  
**LEXEL LASER**

853 Brown Road · Fremont CA 94539

510-651-0110 tel · 510-651-1690 fax

E-mail to: [info@lexellaser.com](mailto:info@lexellaser.com)

Website support: [webmaster@lexellaser.com](mailto:webmaster@lexellaser.com)

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