

**LINE-SELECTABLE
HELIUM-NEON LASER SYSTEM
USER'S GUIDE TO OPERATION**

Research Electro-Optics
5505 Airport Boulevard
Boulder, CO 80301
Phone: (303) 938-1960
Fax: (303) 447-3279

LAP-038
Revision C
DCO #: 868
03/15/2004

PREFACE

This User's Guide is designed to assist you in the daily operation and maintenance of your new Helium-Neon (He-Ne) laser system. The information contained within this User's Guide should answer most of your questions concerning the use and operation of this laser system.

This guide contains six sections:

Section I: Provides information on unpacking your laser system.

Section II: Provides important safety information for operating your laser system.

Section III: Provides some general information and basic operating procedures for your Tunable Laser system.

Section IV: Describes procedures for basic troubleshooting and cleaning of your laser system.

Section V: Gives information concerning the warranty of your laser system. It also provides instructions for returning the laser for service.

Section VI: Provides the specifications for your laser system.

SECTION I UNPACKING

This section describes:

- how to unpack and inspect your laser system
- what is included in your shipment

NOTE: PLEASE KEEP ALL PACKING MATERIALS FROM YOUR SHIPMENT IN CASE YOU NEED TO RETURN ANYTHING!!

UNPACKING

- 1) Carefully remove the Tunable Laser system from the shipping container.
- 2) Inspect the Tunable Laser system for any obvious damage as follows:
 - Check for any physical damage, such as dents or scratches, to the housing.
 - Gently turn laser system upside down, listening for any noise coming from inside the housing. When doing this, make sure the keys are not knocking against the housing.
 - Check that the two adjustment knobs located on the rear panel are not loose.
 - Verify that the two keys are not bent or broken. One should be stored in a safe place in case one key is accidentally lost or broken.
 - Check the remote interlock connector to ensure it is secure.
 - Check the input power cord for any damage, such as cuts or a damaged plug.
- 3) Verify that the laser is of the correct input voltage for your use by checking the serial number tag that is attached to the top of the housing. The fourth line indicates the required input voltage (115V or 230V).
- 4) If anything listed above is missing or damaged, please notify REO immediately! See Section V for warranty and return information.

NOTE: PLEASE KEEP ALL PACKING MATERIALS FROM YOUR SHIPMENT IN CASE YOU NEED TO RETURN ANYTHING!!

SHIPPING INVENTORY

The equipment included in this shipment should match the packing slip attached to the box. Matching the serial number is an accurate way to check. If the shipment is incomplete or if an incorrect item was shipped to you, please notify REO immediately. See Section V for further information on returning the unit.

SECTION II

SAFETY INFORMATION

The laser described in this User's Guide has visible light power. This laser is safe to operate provided that the user complies with all safety warnings. It is recommended that all personnel who will operate or be in the vicinity of the laser during operation read and be familiar with this manual as well as be made aware of the following safety warnings.

- Never look directly into the laser light source or at scattering laser light from reflective surfaces. Laser light is hazardous to the eyes. Never sight down the beam into the source.
- Install the laser so that the laser beam is not at eye level.
- Whenever the laser is operating and the beam is not in use, block the beam with the shutter on the output aperture. Avoid direct exposure to the laser beam.
- As a precaution against accidental exposure to either the laser beam or its reflection, operators should wear laser safety glasses designed for this type of laser.
- High voltage is present at all times when the key switch on the control box is in the "on" position.
- Ensure that the laser head is securely connected to the power supply. To prevent faulty operation be sure that the male connector is fully seated in the back of the power supply.
- The power cord and plug are provided with a ground line. To avoid possible shock ensure that the plug is properly connected to a ground point at the electrical connection.
- Do not attempt to open the sealed laser housing or the power supply. The power supply and laser are not user accessible and service operations inside the enclosure must only be performed by authorized and trained personnel. Opening the laser or power supply will result in loss of warranty.
- Do not perform any operating or maintenance procedure that is not described in the user's manual.
- Do not operate this product if the cover has been removed.
- This product is for indoor use only. To prevent potential fire or shock hazard, do not expose the unit to any source of excessive moisture.
- Operating this product in the presence of flammable gases or fumes is extremely hazardous.
- Disconnect power cord before replacing fuses.
- Clean laser head and power supply with dry, soft cloth. Do not use liquids

CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. Avoid unnecessary exposure to laser or collateral radiation that exceeds the accessible emission limits listed in the safety regulation guidelines 21 CFR Subchapter J 1040.10 and 1040.11. This federal regulation is administered by the National Center for Devices and Radiological Health under the Food and Drug Administration.

SECTION II SAFETY INFORMATION (continued)

Each REO Helium-Neon laser system that is certified to be in compliance with the CDRH regulations, is equipped with a key-switch, remote interlock connector, laser radiation emission indicator, time delay relay (built into the power supply), a beam attenuator (or shutter, located in

SECTION II

SAFETY INFORMATION (CONTINUED)

the front bezel of the laser housing), and all appropriate warning labels. To ensure continued compliance, verify on an annual basis or, if the product has been subjected to adverse environmental conditions such as fire, flood, mechanical mishandling, or solvent spillage that your systems' safety features listed above are available and operational.



CE COMPLIANCE

For European customers who require a CE approved laser system, REO certifies that our laser heads and lab power supplies meet the appropriate CE requirements. In order for the CE regulations to be met, all REO lab power supplies must be used with an input line cord with a length of less than 3 meters. The factory included line cord has a length of approximately 2 meters. Other cords may be used, but they must have a length of no longer than 3 meters in order for the laser system to remain CE compliant.

SECTION III INFORMATION and OPERATION

This section:

- provides some general information on your laser system
- describes how to operate your laser system

GENERAL INFORMATION

The Research Electro-Optics Tunable Laser system comes packaged in an aluminum housing which contains all of the components of the system. The housing is equipped with a sliding beam attenuator (or shutter) mounted to the front panel. The shutter assembly has four each 4-40 Unified National Course Thread (UNC) holes to secure the optional accessory mounting ring. The ring (part number 30646), which is available for purchase from REO, incorporates 1" diameter, 32 threads-per-inch (TPI) female threads. The rear panel of the laser system contains

SECTION III

INFORMATION and OPERATION (continued)

the key-switch, remote interlock connector, fuse access, the color adjustment knobs, and a three-foot long power cord for connecting to either 115 VAC or 230 VAC input power.

OPERATION

- 1) Connect the Tunable Laser system power cord to the appropriate power source.
- 2) Open the slide shutter on the front panel.
- 3) Turn the laser on by turning the key-switch to the "ON" position.
- 4) Once the laser is lasing, use both of the color adjustment knobs to optimize the output power. If the laser fails to operate correctly, refer to Section III for some basic troubleshooting steps.

CAUTION: THE USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE (FDA CAUTION STATEMENT 21 CFR 1040.10(h)(1)(IV)). IT WILL ALSO VOID YOUR WARRANTY.

UNAUTHORIZED MODIFICATIONS TO THE LASER OR POWER SUPPLY MAY CAUSE IRREVERSIBLE DAMAGE TO THE SYSTEM, AS WELL AS RESULT IN POSSIBLE HAZARDOUS RADIATION EXPOSURE. THESE MODIFICATIONS WILL ALSO VOID ALL WARRANTIES. REPAIRS TO SUCH MODIFIED EQUIPMENT WILL BE CHARGED AT THE CURRENT REPAIR RATE, PLUS THE COST OF ANY REQUIRED PARTS.

SECTION IV BASIC TROUBLESHOOTING

The He-Ne laser is very simple to operate and maintain. Once power is applied to the laser, it should emit a beam of light within 3-5 seconds. If it does not, here are a few quick checks you can perform to troubleshoot your laser system.

NOTE: DO NOT LOOK DIRECTLY INTO THE LASER, EVEN IF NO VISIBLE LIGHT IS BEING EMITTED.

POWER SUPPLY

- 1) Is it plugged into and receiving the correct input voltage? Check this by looking at the fourth line of the serial number tag that is attached to the top of the housing. This line will indicate which input voltage the system is wired for (115 VAC or 230 VAC).
- 2) Is the remote plug, located on the rear panel of the Tunable housing, installed? (Or is that circuit complete?)
- 3) Is the fuse serviceable? (It is located behind the gray circle.)
- 4) Does the emissions indicator light illuminate when the key-switch is turned to the "ON" position?

LASER AND LASER ALIGNMENT

- 1) Is the shutter open? (See Section II, Step 1 for instructions.)
- 2) Is the laser system properly aligned? Check the alignment by performing the following steps:
 - A) On the rear panel of the Tunable housing, align the white lines on the adjustment knobs (the Color Selector and Transverse Adjustment knobs) with the white lines on the rear panel. Slowly move the Color Selector knob back and forth approximately one-half of a complete turn, looking for a flash of light. Fine tune using the Transverse Adjustment knob.
 - B) If the laser is still not lasing, further adjustment is necessary. Turn the Color Selector knob fully CLOCKWISE until the knob bottoms out. Then turn it COUNTERCLOCKWISE _____ turns. The white lines should be lined up with each other. Turn the Transverse Adjustment knob CLOCKWISE until the knob bottoms out. Then turn it COUNTERCLOCKWISE _____ turns. The white lines should be lined up with each other.
 - C) If the laser still fails to lase, please refer to Section V for warranty and return information.

**NOTE: These adjustment values are for Tunable Laser system
_____ only!!!**

SECTION V WARRANTY INFORMATION

WARRANTY POLICY

REO lasers and power supplies are warranted to be free from defects in materials and workmanship for a period of 12 months from the date of the initial shipment. This warranty does not extend to damage caused by negligent or improper handling in use, storage, or transportation, nor for products from which the original identification markings or labels have been removed, defaced, or altered.

Special contracts or contracts for non-standard products may have modified terms of warranty and, in such cases, the terms as stated in the individual contract must be signed by the duly authorized officer of REO and will supersede the standard terms. REO reserves the right to change our warranty policy without any prior notice. Please contact REO directly with any questions pertaining to your warranty.

REO will make the final determination as to the cause or existence of the defect and, at our discretion, repair or replace the products that prove to be defective during the warranty period. Products replaced under warranty will be warranted only for the balance of the warranty period of the originally supplied equipment. Additionally, any purchased replacement parts, i.e. laser tubes, power supply modules, etc., are warranted for a six-month (6) period.

This warranty extends only to the original purchaser of the equipment from REO, and is not transferable. The purchaser must notify REO within 15 days of first noticing the defect and promptly return the defective product before the expiration of the warranty period. Products returned from persons not employed by the original purchaser will not be evaluated without prior consent from the original buyer.

Products believed by the purchaser to be defective shall be returned to REO. Transportation, insurance, duties, etc., are to be paid by the purchaser. Repaired or replaced products will be returned to the purchaser by REO, F.O.B. city of destination, domestic as well as foreign territories. REO will not be responsible for any duties, levies, taxes, etc., on returned items.

WARRANTY PROCEDURE

Review the terms of your purchase and the date of shipment to determine the validity of your warranty claim. Warranty claims should only be made for products that are within the terms of the warranty policy. However, out-of-warranty items may be returned for evaluation at no charge.

Prior to returning any unit for repair or evaluation, please contact REO either by phone at (303) 938-1960 or by fax at (303) 447-3279 to obtain authorization to return the unit in the form of a Return Authorization number. This number is valid for a set period of time; 30 days for domestic customers, 45 days for foreign customers. If the unit is not received within this time frame, the authorization number will be closed out and you will need to call to obtain a new authorization number. For returns in foreign countries where representation is present, please contact your distributor. For customers in the U.S.A. and countries where distributorships and/or representation is not available, all claims and correspondence should be addressed to:

Research Electro-Optics
Attn: Laser Service Department
5505 Airport Boulevard
Boulder, Colorado 80301
Ref: Return Authorization Number

Please be prepared to furnish the following information when requesting an authorization number:

- a. Product model number and serial number
- b. Date of shipment/purchase
- c. Brief description of problem/failure
- d. Name and phone number of contact person at your organization.

Obtain REO instructions for transportation and packaging, and ship the product (freight and insurance prepaid) with the proper documentation containing the authorization number and the information specified above. Please ensure the authorization number is visible on the front of the shipping container.

REO will advise the purchaser of its evaluation results at the earliest possible time. Providing complete information as requested will help to expedite this process. For products outside of their warranty period, an evaluation will be made at no charge and a cost estimate for repair/replacement will be issued. Only after receiving authorization (in the form of a Purchase Order) will any repair/replacement work be performed. Charges for repair work will be billed at the current repair rate (available upon request from REO) plus the cost of any additional required parts. Repair work will be warranted for a period of 6 months from the date of shipment.

SECTION VI LASER SPECIFICATIONS

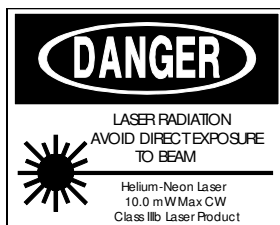
The following pages contain detailed information concerning your Tunable Laser system. Please feel free to contact the laser department at REO if you have any questions concerning your laser system. REO can be reached at (303) 938-1960 or by fax at (303) 447-3279.

TECHNICAL DATA **R-30603** **5 LINE TUNABLE HELIUM-NEON LASER SYSTEM**

Wavelength	633/612/604/594/543 nm
Minimum Output Power	4.0/ 2.5/ 0.5/ 0.6/ 0.3 mW
Power 3 Seconds After Turn-On	> 75%
Polarization	Linear > 500:1
Mode Structure	TEM ₀₀ > 99%
Beam Diameter	0.77/ 0.76/ 0.75/ 0.74/ 0.71 mm
Beam Divergence	1.05/ 1.03/ 1.02/ 1.02/ 0.97 mrad
Longitudinal Mode Spacing	428 MHz
Beam Drift After 20 Minute Warm-Up	< 0.2mrad
Long Term Beam Drift	< 0.05mrad
Noise (30 Hz - 10 MHz)	< 1% rms
Input Voltage	230VAC
Starting Voltage	< 10 kVDC
Operating Voltage	2200 VDC
Series Resistors in Housing	94 K Ω
Operating Current	5.25 mA
Shock	15 g for 11 msec
Weight	5000 grams
Dimensions	
Length	450.8 \pm 2.0 mm (18.00 \pm 0.08")
Height	100.0 \pm 1.0 mm (3.94 \pm 0.04")
Width	120.7 \pm 1.0 mm (4.75 \pm 0.04")
Maximum Output Power	10.0 mW
CDRH Classification	IIIb
CE Classification	3B
Power Supply is Self-Contained	

ENVIRONMENTAL SPECIFICATIONS

	<u>Operating</u>	<u>Non-Operating</u>
Temperature	-20 - +70° C	-40 - +80° C
Humidity	\leq 80%	\leq 95%
Altitude	0-3,000 meters	0-6,000 meters



Research Electro Optics, Inc.
5505 Airport Boulevard Boulder, Colorado 80301
 Phone - (303) 938-1960 Fax - (303) 447-3279

Newport Addendum to REO Laser User Documentation

The information in this document supersedes information contained in the Research Electro Optics, Inc. documentation supplied with your laser.

NOTE

The REO Model 3xxxx-Series lasers are intended for use in an industrial laboratory environment. Use of these products in other environments, such as residential, may result in electromagnetic compatibility difficulties due to conducted as well as radiated disturbances.

NOTE

The REO Model 3xxxx-Series lasers are designed to operate in a controlled electromagnetic environment; i.e., where R.F. transmitters such as mobile telephones may not be used in close proximity.

WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)



This symbol on the product or on its packaging indicates that this product must not be disposed of with regular waste. Instead, it is the user responsibility to dispose of waste equipment according to the local laws. The separate collection and recycling of the waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For information about where the user can drop off the waste equipment for recycling, please contact your local Newport Corporation representative.

EUROPEAN UNION CE MARK



The presence of the CE Mark on a product means that this instrument has been designed, tested and certified compliant to all applicable European Union (CE) regulations and recommendations.

Newport Addendum to REO Laser User Documentation

EU Declaration of Conformity

We declare that the accompanying product, identified with the **CE** mark, complies with requirements of the Electromagnetic Compatibility Directive, 2004/108/EC and the Low Voltage Directive 2006/95/EC.

Model Numbers: 3xxxx Series Non-Stabilized HeNe LASERs

Year **CE mark affixed:** 2012

Type of Equipment: Electrical equipment for measurement, control and laboratory use in industrial locations.

Manufacturer: Research Electro-Optics, Inc
5505 Airport Blvd.
Boulder, CO., 80301
United States of America

Importer: Newport Corporation
1791 Deere Avenue
Irvine, CA 92606
United States of America

Standards Applied:

Compliance was demonstrated to the following standards to the extent applicable:

BS EN61326-1: 2006 “Electrical equipment for measurement, control and laboratory use – EMC requirements” (Laboratory)

This equipment meets the CISPR 11:2009+A1:2010 Class A Group 1 radiated and conducted emission limits.

BS EN 61010-1:2010, “Safety requirements for electrical equipment for measurement, control and laboratory use”.



Brian P. Turner
Laser Process Engineer
Research Electro-Optics, Inc.
5505 Airport Blvd, Boulder, CO 80301 USA



Mark Carroll
Sr. Director, Instruments Business
Newport Corporation
1791 Deere Ave, Irvine, CA 92606 USA

Newport Addendum to REO Laser User Documentation

Confidentiality & Proprietary Rights

Reservation of Title:

The Newport programs and all materials furnished or produced in connection with them ("Related Materials") contain trade secrets of Newport and are for use only in the manner expressly permitted. Newport claims and reserves all rights and benefits afforded under law in the Programs provided by Newport Corporation.

Newport shall retain full ownership of Intellectual Property Rights in and to all development, process, align or assembly technologies developed and other derivative work that may be developed by Newport. Customer shall not challenge, or cause any third party to challenge the rights of Newport.

Preservation of Secrecy and Confidentiality and Restrictions to Access:

Customer shall protect the Newport Programs and Related Materials as trade secrets of Newport, and shall devote its best efforts to ensure that all its personnel protect the Newport Programs as trade secrets of Newport Corporation. Customer shall not at any time disclose Newport's trade secrets to any other person, firm, organization, or employee that does not need (consistent with Customer's right of use hereunder) to obtain access to the Newport Programs and Related Materials. These restrictions shall not apply to information (1) generally known to the public or obtainable from public sources; (2) readily apparent from the keyboard operations, visual display, or output reports of the Programs; 3) previously in the possession of Customer or subsequently developed or acquired without reliance on the Newport Programs; or (4) approved by Newport for release without restriction.

Trademarks

The Newport logo is a registered trademark of Newport Corporation in Austria, Barbados, Benelux, Canada, the People's Republic of China, Denmark, France, Germany, Great Britain, Ireland, Japan, the Republic of Korea, Spain, Sweden, and the United States. Newport is a registered trademark of Newport Corporation in Austria, Barbados, Benelux, the People's Republic of China, Denmark, France, Germany, Ireland, Japan, the Republic of Korea, Spain, and Sweden.

Service Information

This section contains information regarding factory service for the source. The user should not attempt any maintenance or service of the system or optional equipment beyond the procedures outlined in this manual. Any problem that cannot be resolved should be referred to Newport Corporation.