OPERATING INSTRUCTIONS

1. Switch the instrument on.
2. Push the slide bar in front of the lazer unit until the beam is visible in the mirror.
3. Connect the stereo output to the audio input of the lazergram. The beam should vibrate with music and should reflect from the mirror onto a wall at 45° angle.
4. For additional information, consult the enclosed manual for lazer unit. Note the strictures regarding tube life on Page 4.

INSTRUCTIONS FOR USING

METROLOGIC LASERS

ML-600	0.5 mW	TEMoo	mode BRH	Class II
ML-620	0.9 mW	TEMoo	mode BRH	Class II
ML-650	2.2 mW	TEMoo	mode BRH	Class IIIb
ML-940	3.5 mW	TEMoo	mode BRH	Class IIIb
ML-921	5.0 mW	HOR	mode BRH	Class IIIb

Is anything missing or unclear? Your suggestions will help us improve these instructions before final typesetting and printing.

Metrologic Instruments, Inc.; 143 Harding Ave.; Bellmawr, NJ 08030
609-933-0100 • CABLE: METROLOG BLMR • TELEX: 83-4694

L A S E R S A F E T Y

Personal Safety

Metrologic lasers emit visible red light. Invisible, exotic, or otherwise harmful radiations are not emitted. (On special orders, Metrologic will produce helium-neon lasers which emit an infra-red beam at either the 1150 or 3390 nanometer wavelengths. These lasers are appropriately marked.)

Metrologic lasers should not be confused with the powerful lasers intended for burning, cutting, and drilling. Even though the power of Metrologic lasers is low, the beam should be treated with caution and common sense because it is intense and concentrated. The greatest potential for harm with Metrologic lasers is to the eyes. Treat Metrologic lasers as you treat sunlight. Just as you would not stare into the sun or at its bright reflections, do not stare directly into a laser beam or at its bright reflections.

Electrical Safety

Lasers employ high voltage similar to that of small television receivers. Capacitors within the power supply retain the potentially dangerous voltage for periods after the input current has ceased. To protect the user Metrologic seals the laser housing. This should not be opened by users. If the housing is opened, Federal government safety requirements are defeated, the user is exposed to high voltage, and Metrologic's warranty is voided.

Safety Standards

The Bureau of Radiological Health (BRH) of the Food and Drug Administration has established safety regulations for laser manufacturers. These regulations classify lasers by power and specify labeling and mechanical requirements. Metrologic lasers

conform fully with the BRH specifications according to their power classification.

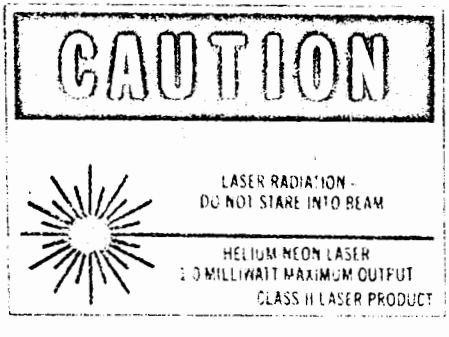
Class II lasers may not exceed 1 mW power and must contain a pilot lamp and a mechanical beam attenuator.

Class IIIb lasers may not exceed 0.5 watt and must contain pilot lamp, mechanical beam attenuator, a key-operated power switch, connector for optional remote control operation, and an appropriate time delay between the activation of the pilot lamp and the beginning of lasing action.

Appropriate BRH warning logos are shown below. For further information contact the Bureau of Radiological Health, Rockville, MD 20852.

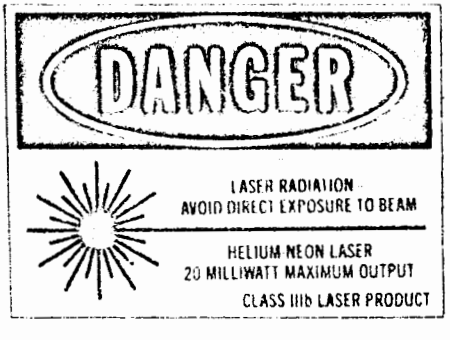
Class II

ML-600 0.5 mW, TEMoo mode
ML-620 0.9 mW, TEMoo mode



Class IIIb

ML-650 2.2 mW, TEMoo mode
ML-940 3.5 mW, TEMoo mode
ML-921 5.0 mW, HOR mode



O P E R A T I N G C O N D I T I O N S

Input Voltage

The input voltage range of each laser is clearly marked on a label affixed to the bottom of the laser housing. The laser is designed to function at either 105-125 volts AC or 210-250 volts AC. Operation of the laser outside of these limits damages the laser and voids Metrologic's warranty.

Environmental Limits

Metrologic lasers are designed to operate at temperatures ranging from -20° to +50°C, at altitudes to 3000 meters, and at humidity to 99%. The lasers are not waterproofed for operation outdoors. Where the laser will be exposed to weather conditions, Metrologic's battery operated 12 volt DC cylindrical lasers should be used.

Tube Life

Metrologic lasers are guaranteed for two years from date of shipment. When used regularly, the typical tube lifetime is three years or more. When used infrequently, a significantly reduced tube lifetime may sometimes occur. Long periods of disuse should be avoided. Minimum use should consist of several hours of continuous operation each month.

Unlike many light sources, the laser may be operated continuously without reducing its life expectancy. Likewise, switching the laser on and off frequently should have little effect on the total tube life.

L A S E R O P E R A T I O N

Beam Controls

The only moving parts at the front end of the laser are the adjustable accessory mount and the beam attenuator.

The adjustable accessory mount (except ML-600) is a ring with 3/4"-32 female threads and 1 1/4"-32 male threads. The accessory mount is held in place by means of three Allen-type socket screws which may be tightened or loosened with a #2 Allen or hex wrench. When the screws are loosened, the accessory mount can be positioned to center optics with respect to the beam.

The beam attenuator, required by BRH, is a metal slide-bar located on the accessory mount at the front of the laser. When pushed in one direction, the attenuator will block the beam. When pushed in the other, the attenuator will permit the beam to pass.

Power Controls

The power controls are located at the rear of the laser housing. They include a power switch, a pilot lamp, and a remote connector (some models).

The power switch has two positions: ON and OFF. If the power switch is key activated, the key can be removed only in the OFF position. (Replacement keys: order number 60-162; $1.00 each.)

The pilot lamp indicates that power is being supplied to the laser. For Class II lasers the pilot lamp and laser beam will come on simultaneously. For Class IIIb lasers the pilot lamp will turn on before lasing begins. If the beam cannot be seen when the pilot lamp in ON, check to see whether the beam attenuator is blocking the beam. Do not position the eyes in the beam path.

The remote connector (some models) will accept an optional cable assembly which enables the power supply to be turned on and off from a distance. When the cable assembly is not being used, the remote connector serves as a fuse holder. Either the fuse (3AG, 1 amp) or the cable must be in place for the laser to operate. (A remote cable assembly consisting of an ON/OFF switch on a 10-foot cable is available: order no. 60-164, $15.00.)

Mounting

A 1/4"-20 threaded mounting socket (not available on ML-600) is centered at the bottom of the laser housing. By means of this socket the laser may be mounted on optics benches or a photographic tripod. The laser may be positioned at any angle.

Operating Instructions

- Point the laser toward a wall or other dull surface. Neither the beam nor its bright reflections should be directed toward anyone's eyes.
- Plug the three-wire power cord into a grounded outlet of the proper voltage. See the label on the bottom of the laser housing for the correct voltage range.
- Turn the POWER switch to ON.
- Look for the beam on the wall toward which it is pointed. The beam will not be visible as it travels through the air, unless particulate matter such as dust is present to scatter the light.
- If no output is seen, slide the beam attenuator at the front of the laser head so that it no longer blocks the beam.

Troubleshooting directions follow.

T R O U B L E S H O O T I N G

The pilot lamp does not light.

Apparently, the power supply is not receiving power.

- Are the plug and electrical circuit functioning properly?
- (Class IIIb) Is the fuse in the remote connector good? If the fuse is missing, the laser will not operate.
- (Class IIIb) If the REMOTE cable is being used, is it functioning properly?

The laser blinks on and off.

If the line voltage is insufficient, the laser will fail to complete its starting cycle and will blink repeatedly. Operation with power outside of these limits damages the laser and voids Metrologic's warranty.

- The label on the bottom of the power supply housing indicates the proper input voltage: 105-125 volts AC, 210-250 volts AC, or 11-17 volts DC. The laser is not warranted for operation outside of the specified limits.

The tube lights with a red glow, but no beam can be seen.

If the laser tube is glowing with a red-orange color, but no laser beam is being emitted, the laser mirrors or capillary tube may be out-of-alignment. The laser should be returned for tube replacement.

The tube lights with a bluish glow, but no beam can be seen.

If the laser tube is glowing with a bluish color, air has probably entered the tube and adulterated the near vacuum helium-neon medium. Occasionally, several hours of operation will restore the lasing function temporarily. The laser should be returned for tube replacement.

The laser housing is excessively hot to the touch.

Metrologic lasers become quite warm during prolonged operation. None should become too hot to hold in the bare hand. If the laser becomes excessively warm, a loose connection or a defective circuit component is the most likely cause. Equipment which heats excessively should be returned to Metrologic for servicing.

More than one spot can be seen.

Most lasers—including those rated TEMoo—exhibit both a primary spot and secondary spot of light when the beam is viewed from short distances. When the laser light emerges from the exit mirror, it passes two glass surfaces. Internal reflections between these two surfaces produce secondary rays, which, unlike the primary beam, are highly divergent. When the beam is viewed at a distance of several meters any secondary spots should be invisible or indistinct. Only the primary spot should be prominent.

W A R R A N T Y, S E R V I C E, A N D R E P A I R

Metrologic lasers are guaranteed against failure due to materials and workmanship for two years from the date of original shipment (date of invoice).

Neither the laser head nor the power supply is warranted against failure due to mishandling or electrical abuse. Replacement or repair will be made only after failure analysis at the factory.

The laser housing should not be opened by the user since this defeats the protective safety requirements of the Federal Government, exposes the user to high voltage, and voids the warranty.

If the laser requires repairs under warranty, it will be repaired and returned via United Parcel Service or Parcel Post without charge. However, if return delivery is made outside of the United States or if the customer requires a special carrier, the customer must pay the cost of return transportation.

If the laser requires out-of-warranty repairs, an estimate will be provided if the repair costs will exceed $20.00. The cost of return shipments for lasers repaired out-of-warranty is paid by the customer.

When out-of-warranty tube replacement is desired, users may wish to expedite delivery by providing "tube replacement authorization" in advance and without requiring an estimate. Under "tube replacement authorization" the tube will be replaced at the current tube price as long as no additional repairs exceeding $20.00 are necessary. If additional repairs are required, the customer will be advised before the work is begun. New tubes installed by Metrologic will be warranted for two years.

When returning equipment for repair, please enclose a statement concerning the nature of the problem and, if possible, the original purchase order number or approximate purchase date.

Repairs are made at Metrologic's factory in Bellmawr, New Jersey. Metrologic's overseas distributors also provide service facilities.

Lasers returned to Metrologic's factory for either warranty or out-of-warranty repairs must be sent fully insured and with shipping charges prepaid to:

Metrologic Instruments, Inc.
143 Harding Avenue
Bellmawr, New Jersey 08030