



## ***Laser Safety Information***

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The Ranger Laser Counter is built to meet Federal Standards for laser products under DHEW/BRH 21 CFR 1040.10. It utilizes a 2mW (milliwatt) helium-neon laser which is classified as a 111b laser product. The 111b classification applies to laser products having an output of from 1 to 500 mW. The Ranger Laser Counter is therefore at the very low end of the 111b classification.

The laser manufacturer is required by law to include labeling for a 111b product with a specific logo which states:

**“DANGER- LASER RADIATION- AVOID DIRECT EXPOSURE TO BEAM”**

The radiation referred to is the laser beam itself. Eye damage can result from directly looking into the laser beam or into a reflection of it from a mirror-like surface. Reflection of the laser beam from a mat surface, such as a newspaper, does not normally constitute a hazard.

The following comments regarding Safety Rules for Class III lasers are excerpted from the Laser Safety Guide published by the Laser Institute of America of Toledo, Ohio.

### **SAFETY RULES FOR CLASS III LASERS**

- Although these “Medium-Power” lasers usually present a serious potential for eye injury resulting from intra-beam viewing, they generally do not represent a diffuse reflection hazard, a skin hazard for momentary unintentional exposure, or a fire hazard; hence, control measures are concentrated on eliminating the possibility of intra-beam viewing by:
  - Never aiming a laser beam at a person's eye.
  - Using proper safety eyewear if there is a chance that the beam or a hazardous specular (mirror-like) reflection will expose the eyes.
  - Permitting only experienced personnel to operate the laser and not leaving an operable laser unattended if there is a chance that an unauthorized user may attempt to use it. A keyswitch should be used. A warning light or buzzer should indicate when the laser is operating.
  - Enclosing as much of the beam path as possible.
  - Avoid placing the unprotected eye along or near the beam axis as attempted in some alignment procedures, since the chance of hazardous specular reflections is greatest in this area.
  - Terminating the primary and secondary beams if possible at the end of their useful paths.
  - Using beam shutters and laser output filters to reduce the beam power to less hazardous levels when the full output power is not required.
  - Assuring that any spectators are not potentially exposed to a hazardous condition.
  - Attempting to keep laser beam paths above or well below either sitting or standing position eye level.
  - Attempting to operate the laser only in well-controlled area, for example, within a closed room with covered or filtered windows and controlled access.
  - Not permitting tracking of non-target vehicles or aircraft if the laser is used outdoors.
  - Labeling lasers with appropriate Class III danger statements and placarding hazardous areas with danger signs if personnel can be exposed.
  - Mounting the laser on a firm support to assure that the beam travels along the intended path.
  - Assuring that individuals do not look directly into a laser beam with optical instruments unless an adequate protective filter is present within the optical train.
  - Eliminating unnecessary specular surfaces from the vicinity of the laser beam path, or avoid aiming at such surfaces.

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The Ranger Laser itself includes a number of safety features to help minimize the hazards which exist from inadvertent exposure to the laser beam. They are as follows:

### **LASER POWER KEY-LOCK SWITCH**

This switch is mounted on the Power Supply Module. It is used to control 120V power to the entire laser energizing circuit. The key can be removed only when the switch is in the "OFF" position, and kept in the possession of personnel working in the vicinity of the laser

### **BEAM ATTENUATOR**

This is a beam blocking device installed in the nose of the Ranger. Normally, the laser beam passes through a slot cut in a cylinder. By loosening a set screw and using an Allen wrench to turn the attenuator 90 degrees, the laser beam is blocked by the cylinder before it can exit the enclosure.

### **INTERLOCK PLUG**

This plug is mounted on the Power Supply Module, and is provided for those application where, for reasons of safety, the laser must be turned off whenever the interlock circuit is opened. A jumper is normally installed in the plug. When this plug is removed, or the circuit opened, the 12VDC is prevented from energizing the laser's high voltage circuit.

### **INDICATOR LAMP**

One lamp is mounted on the Power Supply Module; the other is on the panel cover of the sensor. These lamps will come "ON" when power is applied to the laser's high voltage power supply.

### **HIGH VOLTAGE POWER SUPPLY DELAY**

The High Voltage Power Supply contains circuitry to ensure that the power will not be applied to the laser unit 3 to 5 seconds have elapsed from the time that power is applied to the indicator lamps. This is to ensure that the indicator lamps give a minimum 3 second warning prior to laser light being emitted.

### **INSTALLATION**

The effective range of the sensor extends out approximately 1.5 inches from the bottom of the skis. Within this distance the beam will pass through the product flow area and continue to the photocell. For safety and technical purposes, the beam is physically blocked before it can exit and enter areas accessible to personnel.