CAO GROUP, INC. LIMITED WARRANTY

The CAO Group, Inc. (CAO) guarantees that the Precise™ LTM 5 Watt Soft Tissue Diode Laser will be free from manufacturing defects for two (2) years from the date of purchase. Should the unit be found to be defective, CAO will repair defects or replace the unit, at the discretion of CAO, at no cost to the customer. This warranty shall not cover damage or defect caused by misuse, accident, improper handling or actions contrary to those indicated in this manual, regardless of the date of purchase. This warranty applies solely to the original purchaser and is not transferable.
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Power Density - A measure of exposure of the power in Watts delivered per square millimeter or square centimeter.

Pulsed (ua) - A temporal emission of laser energy that is distributed among periods where the laser is actively emitting (on) and periods of no emission (off). The time period when the laser is not emitting energy (off) is referred to as period of thermal relaxation and is designed to allow the tissue to cool between bursts of energy.

Quantum - The smallest unit of measure for radiant (light) energy.

Radiant Energy - The vertical component of electromagnetic waves as they travel through space. It is measured in Joules or milliJoules.

Spontaneous Emission - An external source of radiant energy from a power supply stimulates the unstable electron to return to a more stable energy level by emitting an additional photon.

Velocity - The rate of speed of an electromagnetic wave as it travels through space.

Watt - The measure of power is Watts. As used in lasers, 1 Joule per second is equal to 1 Watt.

SECTION 11: REFERENCES ON LASER DENTISTRY


BREDIX® is a registered trademark of Young Dental Manufacturing, LLC.

CDE® is a registered trademark of the Johnson & Johnson Corporation.
## Precise™ LTM Laser Specifications

### Laser Specifications

**Weight**: 4.9 lbs

**Dimensions**
- in inches: 7.6” x 8.8” x 8.75”
- in mm: 193 x 224 x 216

**Laser Classification**
- Laser Diode: Class 4 Laser Device (Per IEC 60825)

**Wavelength**
- Laser: 810 nm ± 20 nm

**Laser Aperture**
- Disposable: 20 (per box)

**Handpiece Tips**
- Autoclavable: 1

**Fiber Delivery**
- Retractable: 400 microns

**Fiber Diameter**
- Cartridge: approx. 20 ft (6 meters)

**Fiber Material**
- Quartz/Silica

**Delivery System Specifications**

**Quartz/Silica Fiber**
- 1 Cartridge - approx. 20 ft (6 meters)

**Fiber Diameter**
- 400 microns

**Fiber Delivery**
- Non-Autoclavable: 1

**Handpiece**
- Autoclavable: 1

**Handpiece Tips**
- Disposable: 20 (per box)

**Laser Aperture**
- YES

### Ordering Information

**Accessories**
- Package of (20) Disposable Handpiece Tips: Straight 002-00181
- Package of (20) Disposable Handpiece Tips: Angled 002-00182
- 20’ Fiber Cartridge Replacement 002-00206
- Protective Glasses - Sport 002-00011
- Protective Glasses - Solid 002-00020
- Danger Laser in Use Signage 002-00034
- Handpiece - Autoclavable 002-00203
- Fiber Cleaver 002-00204

**Indications for Use**

The Precise™ LTM is approved for use by properly trained and licensed dental professionals (as applicable) for use in the removal of lesions, excision, incision, vaporization, ablation, hemorrhage, photoagulation, gingivectomy, frenectomy, operculectomy, contouring, biopsy, trenching, ulcer care, abscess care, sulcular debridement, soft tissue curettage, and removal of inflamed edematous tissue on soft tissue in the oral cavity.

### Warranty

- Laser: 2 Years Parts and Labor
- Fiber and Cartridge: 90 Days Parts and Labor

### Thank you for purchasing the Precise™ LTM 5 Watt Soft Tissue Diode Laser. CAO Group (CAO) has been manufacturing diode lasers for nearly a decade and we proud of our record of quality, performance, and safety. Today, the diode laser has become the standard of care in addressing the common soft tissue issues dental professionals must address every day. CAO diode lasers are used to create beautiful soft tissue that complements the radiant smile created for your patients; to quickly and safely control bleeding and provide room for impression material; to relieve pain and discomfort from aphthous ulcers; and for a wide range of other procedures that make dental visits easier, faster, and better.

With a Precise™ LTM Diode Laser you will find that soft tissue procedures are performed more quickly and easily and that your patients will also be more comfortable and tissue will heal more quickly compared to other typically used methods (e.g., scalpel, electrosurgery). Based on reports from many dentists and dental hygienists, we believe that you too will quickly achieve these same benefits.

To help speed your comfort and familiarity with using your Precise LTM laser, CAO has put together three different training tools that are available to you at no charge.

1. **Introduction to Easier Soft Tissue Management with the Precise™ LTM** - this online course is designed to help you and your team understand the benefits of using the Precise laser, how it operates, how to use it to better manage soft tissue, how and where to begin using the Precise LTM.
2. **In-office hands-on training when convenient. Our sales professionals will conduct an in-office hands-on review of the Precise LTM and overview its use as well as train your staff on its easy operation.**
3. **CAO Full-Day Training Making Tissue Management Easier, Faster and Better** – this full day hands-on course is offered at our world headquarters in West Jordan, Utah near Salt Lake City and provides an in-depth hands-on review of benefits of incorporating Precise diode lasers into your practice. The course is taught by respected dental educators who have an in-depth understanding of the extensive benefits diode lasers can provide your practice and includes eight (8) hours of CE credit. These full-day courses are offered throughout the year and enable participants to take advantage of Utah’s beautiful natural wonders.

**REMINDER**

Always test the laser outside the mouth before using it on a patient. The doctor or hygienist, the patient, and any staff member present in the operatory should be wearing the appropriate safety eyewear whenever the laser is being operated. Strict adherence to protocols for safe laser use is essential.

---

**SECTION 1: INTRODUCTION**

Thank you for purchasing the Precise™ LTM 5 Watt Soft Tissue Diode Laser. CAO Group (CAO) has been manufacturing diode lasers for nearly a decade and we proud of our record of quality, performance, and safety. Today, the diode laser has become the standard of care in addressing the common soft tissue issues dental professionals must address every day. CAO diode lasers are used to create beautiful soft tissue that complements the radiant smile created for your patients; to quickly and safely control bleeding and provide room for impression material; to relieve pain and discomfort from aphthous ulcers; and for a wide range of other procedures that make dental visits easier, faster, and better.

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**REMINDER**

Always test the laser outside the mouth before using it on a patient. The doctor or hygienist, the patient, and any staff member present in the operatory should be wearing the appropriate safety eyewear whenever the laser is being operated. Strict adherence to protocols for safe laser use is essential.
The contents of the shipping container should include:

1. Precise™ LTM Unit
2. 20’ Fiber Cartridge
3. Fiber Cleaver
4. Fiber Stripper Tool
5. Package of (20) Disposable Handpiece Tips - Straight
6. Package of (20) Disposable Handpiece Tips - 60°
7. Handpiece - Autoclavable
8. Wireless Foot Pedal
9. 9 Volt Lithium Battery
10. Power Cord
11. Power Supply
12. Protective Glasses - Sport
13. Protective Glasses - Solid
15. Precise™ LTM Chairside Guide
16. Danger - Laser in Use Signage
17. Precise™ LTM Laser Key
18. Power Cord Locking Hub

**SECTION 2: BEFORE OPERATING YOUR LASER**

### 2.1 REMOVING THE LASER FROM THE PACKAGING

Please do not attempt to unpack the laser and install the various components without reading this section first. If you are unsure about any aspect of the packaging, call your authorized dealer representative for assistance. Though highly unlikely, you may need to return the laser for service or repair and the shipping container you received with your laser has been especially designed to transport the laser.

**LASER ASSEMBLY INSTRUCTIONS SUMMARY**

1. Attach the laser’s power cord and place the plug into the wall receptacle.
2. Install foot pedal battery. (See Section 2.2.3)
3. Attach remote interlock, if desired (not required).
4. Check the laser stop button to see that it has been pressed.
5. Turn on the power switch on the back of the unit. **NOTE:** When the power cord is plugged in, the power switch is turned on, and the laser stop is released, the key will turn the unit on.
6. Place the key into the key switch receptacle and turn the key to the right (clockwise). The control console should light up.

### 2.2 ASSEMBLING THE LASER

Each of the following items should be inspected, inserted into the appropriate receptacle, and when applicable, locked using the locking hub.

1. Laser stop button
2. Power switch
3. Remote interlock connector
4. Power supply receptacle
5. Magnetic handpiece holder
6. Power/fan switch
7. Fiber aperture
8. Fiber extend
9. Fiber retract
10. Program setting indicator
11. Adjustable aiming beam
12. Laser on indicator
13. Ready indicator
14. Continuous mode
15. Pulse mode
16. Working beam setting
17. Control panel

### LED DISPLAY AND CONTROL PANEL

1. Laser on indicator
2. Ready indicator
3. Continuous mode
4. Pulse mode
5. Working beam setting
6. Program setting indicator
7. Adjustable aiming beam

### POWER INCREASE / DECREASE

Press and hold to increase or decrease output setting. Use the Power Increase or Decrease key to adjust power settings from 0.5 to 3.0 Watts. Hold the desired key to rapidly change the value.

### RECOMMENDED SEPARATION DISTANCES BETWEEN PORTABLE AND MOBILE RF COMMUNICATIONS EQUIPMENT AND THE PRECISE™ LTM LASER

The Precise™ LTM laser is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Precise LTM laser can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Precise LTM laser as recommended below, according to the maximum output power of the communications equipment.

<table>
<thead>
<tr>
<th>Transmitter Range (MHz)</th>
<th>150 kHz to 80 MHz</th>
<th>80 MHz to 800 MHz</th>
<th>800 MHz to 2.5 GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separation Distance (m)</td>
<td>0.12</td>
<td>0.12</td>
<td>0.23</td>
</tr>
<tr>
<td>0.1</td>
<td>0.37</td>
<td>0.37</td>
<td>0.74</td>
</tr>
<tr>
<td>0.1</td>
<td>1.17</td>
<td>1.17</td>
<td>2.33</td>
</tr>
<tr>
<td>10</td>
<td>3.49</td>
<td>3.49</td>
<td>7.39</td>
</tr>
<tr>
<td>100</td>
<td>11.67</td>
<td>11.67</td>
<td>23.33</td>
</tr>
</tbody>
</table>

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

\[
d = \frac{3.5}{\sqrt{P}}
\]

**NOTE:** At 80 MHz and 800 MHz, the higher frequency range applies.

**NOTE 2:** These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

**NOTE 3:** Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

The Precise™ LTM laser is intended for use in the electromagnetic environment specified below. The customer or the user of the Precise LTM laser should assure that it is used in such an environment.

**NOTE 1:** A1 80 MHz and 800 MHz, the frequency range applies.

**NOTE 2:** These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

**NOTE 3:** Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.
The Precise™ LTM 5 Watt Soft Tissue Diode Laser needs special precautions regarding the EMC and needs to be installed and put into service according the EMC information provided in this manual.

Portable and mobile RF communications equipment can affect the Precise LTM. The use of accessories, transducers, and cables other than those specified by the manufacturer, CAO Group may result in increased emissions or decreased immunity of the Precise LTM. The Precise LTM should not be used adjacent to or stacked with other equipment and if adjacent or stacked use is necessary, the Precise LTM should be observed to verify normal operation in the configuration in which it will be used.

### Guidance and Manufacturer’s Declaration - Electromagnetic Emissions

<table>
<thead>
<tr>
<th>Test</th>
<th>Compliance</th>
<th>Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF emissions</td>
<td>± 2 kV for power supply lines</td>
<td>± 1 kV for input/output lines</td>
</tr>
<tr>
<td>Surge</td>
<td>± 1 kV differential mode</td>
<td>± 1 kV differential mode</td>
</tr>
<tr>
<td>Voltage dips, interruptions and voltage</td>
<td>± 5% (±5% dip in UT) for 0.5 cycle</td>
<td>± 5% (±5% dip in UT) for 0.5 cycle</td>
</tr>
<tr>
<td>Magnetic field</td>
<td>3 A/m</td>
<td>3 A/m</td>
</tr>
</tbody>
</table>

The Precise LTM is intended for use in an electromagnetic environment specified below. The customer or the user of the Precise LTM should assure that it is used in such an environment.

### Emissions Test Compliances

<table>
<thead>
<tr>
<th>Source</th>
<th>Compliance</th>
<th>Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 60601</td>
<td>± 6 kV contact</td>
<td>± 6 kV contact</td>
</tr>
<tr>
<td>CISPR 11</td>
<td>± 8 kV air</td>
<td>± 8 kV air</td>
</tr>
<tr>
<td>CISPR 11</td>
<td>± 2 kV for power supply lines</td>
<td>± 1 kV for input/output lines</td>
</tr>
<tr>
<td>IEC 61000-4</td>
<td>± 1 kV differential mode</td>
<td>± 1 kV differential mode</td>
</tr>
<tr>
<td>IEC 61000-4</td>
<td>± 2 kV common mode</td>
<td>± 2 kV common mode</td>
</tr>
<tr>
<td>IEC 61000-4</td>
<td>± 5% (±5% dip in UT) for 0.5 cycle</td>
<td>± 5% (±5% dip in UT) for 0.5 cycle</td>
</tr>
<tr>
<td>IEC 60601</td>
<td>3 A/m</td>
<td>3 A/m</td>
</tr>
</tbody>
</table>

### Precise™ LTM Remote Interlock

The Precise™ LTM laser is equipped with a Remote Interlock Jack. The Remote Interlock Jack is provided so that a clinician may install the laser in a dedicated laser treatment room such that the laser will be interlocked with the entrance door of the room. In such an interlocked installation, the laser would shut off anytime the door is opened, hypothetically, to protect the person’s eyes who is entering the room. It is recognized that such installation is not facilitated nor required in many operators or clinics. To that end, the Remote Interlock is available to any practitioner that requires it. The Remote Interlock Jack is located and clearly labeled on the rear of the laser. The interlock jack is wired in the normally closed position of the door. No further action is required to operate the laser without the interlock loop. If the interlock loop is desired you may purchase the loop from a local electronics store. You need only to connect the local electronics store that you require a mini (1/8”) phono jack wired into a normally open momentary switch and select the switch design that best suits your needs. To install the loop, install the switch on the door and simply plug the miniphone jack into the Remote Interlock Jack on the rear of the laser.

### 2.2.4 Disposable Fiber Cartridge

When it comes time to install a new cartridge, carefully remove the new fiber cartridge from the packing.
1. Turn system off. To replace the fiber cartridge, make sure the fiber is removed from the handpiece and the fiber is fully retracted into the cartridge.

2. Carefully pull out the old cartridge sideways away from the laser until the cartridge is fully removed.

3. Reconnect into the cartridge body to disconnect the optical fiber. This is done by unscrewing counterclockwise the connector from the housing, then pulling the connector straight out. Set the old cartridge aside.

4. Position the new cartridge adjacent to the open bay. Carefully remove the dust cap from the end of the connector. CAUTION: Do not touch the end of the connector with your fingers or with any object. Insert the connector into the port.

5. Push on the connector while screwing clockwise. Give the laser until the cartridge is fully removed.

6. Press the Extend and Retract buttons to ensure the laser will not turn on. If the laser stop switch is in the “out” position, you should test the switch again by depressing it (See Troubleshooting Section). If the laser cannot be activated, all attachments, keys and switches to see that they are securely installed. If it is not, then remove the cartridge and confirm that the fiber connector is securely attached.

2.5 Laser Stop Switch

Before you can activate the laser, you must first check to see if the laser shutter switch is locked in the “in” or “out” position. The switch is the red button located on the top of the laser. Engage the switch by pressing it. The button must be in “in” to operate. The display on the control panel should now be lit. To interrupt laser emissions in an emergency, depress the button again to the “out” position. If you find that the display is still not operational, check all attachments, keys and switches to see that they are securely installed and that you have an active wall plug for electricity. (See Troubleshooting Section). If the laser cannot be activated, please contact your authorized distributor who can help you troubleshoot. If the control panel does light up when you enable the laser stop, you should test the switch again by depressing it to turn the laser off. If a laser stop switch is in the “out” position, the laser will not turn on.

1.5 METERING REQUIREMENTS
In order to assure the safe use of the laser in your facility, please check to make sure that the proposed location has the following:

2.3.1 Power Requirements
110-120 VAC ± 10 % at 60 Hz, 1.5 Amps
Frequency Range: 45 - 63 Hz
9 Volt Lithium battery

2.3.2 Heating, Ventilation, and Humidity
The room where the laser is used should have good cooling and heating system so that the laser can be operated within the optimum range of 20 - 25ºC (68 - 77ºF). Avoid storing or transporting the laser in temperatures below 0º Celsius (32º F). Operating and storage humidity should be 5-95% RH.

2.3.3 Lighting
Overhead lighting and/or dental unit light should provide enough illumination to allow good operator vision when activating the laser intra-orally.

2.3.4 Combustible Chemicals and Gases
All gases that are combustible or support combustion and are used in the operatory area where the laser is in use must be turned off and ventilated during the procedure. Cleaning supplies or other flammable chemical compounds should be stored in an area away from the surgical site in order to avoid possible combustion.

2.3.5 High Speed Vacuum Systems
Plume evacuation is a priority when vaporizing tissues. The clinician or operator, and their chair-side assistants should keep themselves and the patient safe by using a high volume vacuum system and high filtration masks that are suitable for virus and bacterial control.

2.3.6 Access and Visual
Access to the treatment area should allow the dental team to restrict entry while the laser is in use. There should be a Danger Laser In Use Safety Sign placed in a designated area adjacent to the entry into the treatment area. See Figure 40 on page 13.

SECTION 3: OPERATING YOUR LASER

3.0 SAFETY CONSIDERATIONS BEFORE USING YOUR LASER
The safe use of the Precise™ LTM is the responsibility of the entire dental team including the doctor and the Laser Safety Officer (LSO) appointed from the dental office team. Protocols for the safe use of lasers have been developed by a combination of medical and dental professionals working in concert with educators at the university level, scientific research, laser manufacturers, trade and dental professionals have had to develop protocols and guidelines for using the laser on oral soft tissues. Sound judgment and the concern for patient safety should be the basis of all laser care. The following entities have influence over laser use.

3.0.1 In-Office Safety Issues
• Lighting & Ventilation: Always use the Precise™ LTM in a well lit and ventilated area. Make certain that chemicals or gases capable of supporting or causing combustion are not present when using the laser. Use high volume vacuum to remove the laser “plume” and provide a high filtration masks for all personnel.

SECTION 6: SERVICING

6.0 WARRANTY
The Precise™ LTM Diode Laser is warranted against defective materials and workmanship for a period of two (2) years from the date of purchase, and will be repaired or replaced at CAO’s discretion, if returned prepaid to our facility. This warranty does not cover damage to the Precise LTM Diode Laser unit or components caused by accident, misuse or being tampered with. This warranty does not include labor, postage or delivery charges. This warranty does not apply to the external finish of the console, handpiece, fiber, power cord, foot pedal. CAO Group, Inc. reserves the right to make changes in design or modify such previously manufactured products.

6.1 REPAIRS & RETURNS
Should the laser fail to operate correctly and your local dealer representative is unable to assist you, please call CAO Group, Inc. Customer Service at (877) 236-4408 to obtain a Return Material Authorization (RMA) number for shipping purposes. Please insure that the RMA number is clearly marked on the box used to return the laser. Please clearly state the reasons for return. Send returns to: CAO GROUP, INC. 4628 West Skyhawk Drive, West Jordan, UT 84084-4401 U.S.A.

CAUTION: Do not attempt to remove the cover from the laser chassis for the purpose of repairing the laser. Serious injury from an electrical shock or laser radiation could occur. Removing the cover on the laser chassis will void the warranty.

CAUTION: Use of controls or adjustments or performance of other tasks than those specified herein may result in hazardous laser radiation exposure.

SECTION 7: TROUBLESHOOTING

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>CORRECTIVE ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser has no response, fan is off.</td>
<td>Check that the power cord is securely plugged into the back of the unit. See page 4.</td>
</tr>
<tr>
<td>Laser has no response, but fan is on.</td>
<td>Check that the power switch on the back panel is turned to the on (1) position. Make sure the key is inserted into the switch, and the key is turned on. See page 4 and 5.</td>
</tr>
<tr>
<td>Laser has power but no LED display.</td>
<td>• Check to make sure that the fiber cartridge is securely engaged. See page 11-12. • Laser stop switch engaged. • Remote interlock engaged.</td>
</tr>
<tr>
<td>Laser has power but no output.</td>
<td>Check the battery in the wireless foot pedal. See page 5.</td>
</tr>
<tr>
<td>Measured power output on a power meter is different from the LED display.</td>
<td>Remove the fiber cartridge and check if the fiber connector is attached. See page 11-12.</td>
</tr>
<tr>
<td>Fiber does not move from the cartridge.</td>
<td>Make sure the fiber cartridge is seated properly, and not out of fiber. See page 7, 9, 11-12.</td>
</tr>
<tr>
<td>Air “Er” message appears with system alert beep.</td>
<td>To attempt to clear an error message, turn the laser system off and wait for 5 minutes. Turn laser back on. If beep stops, the unit was able to make operational adjustments and the laser should perform its function. If the beep continues, the laser must be sent in for adjustment. Make note of error code. (6.1 Repairs &amp; Returns to CAO Group, Inc.) See page 15.</td>
</tr>
<tr>
<td>Audible beep on Laser will not stop when foot pedal is depressed.</td>
<td>Turn laser off for 5 minutes. Turn laser back on. If beep stops, the unit was able to make operational adjustments and the laser should perform its function. If the beep continues, the laser must be sent in for adjustment. (6.1 Repairs &amp; Returns to CAO Group, Inc.) See page 15.</td>
</tr>
<tr>
<td>Wireless foot pedal does not activate laser.</td>
<td>Replace 9 Volt battery. If the pedal still fails to activate the laser with new battery, refer to section 2.2.3 for Wireless Foot Pedal Installation. Make sure there is no metal tabs, chairs or surfaces between the pedal and the laser. Try repositioning the pedal to a different location or rotating it slightly on the floor.</td>
</tr>
</tbody>
</table>
5.3.11 Not indicated for patients taking Accutane (Isotretinoin) currently or within the last 6 months.

5.3.12 Use of this device is not recommended for patients who suffer from light-induced seizures.

5.3.13 Use of this device on pregnant women has not been studied. Avoid usage on pregnant women.

5.3.14 Do not use this device for procedures other than those prescribed in this manual. See Section 9.

5.3.15 Make sure the disposable tip is fully seated onto the needlepiece before continuing with the procedure.

5.4 NOMINAL OCULAR HAZARD DISTANCE (NOHD)

The NOHD is the distance beyond which the exposure, during normal operation, is not to exceed the appropriate Maximum Permissible Exposure (MPE). The NOHD for persons wearing safety glasses is 5 inches (12.7 cm). The Nominal Hazard Zone (NHZ) is the area where, the laser source within, which exposure levels exceeds the MPE (which is the highest level of laser radiation to which a person may be exposed without hazardous effects or adverse biological changes in the eyes or skin). The outer limit of the NHZ is the NOHD. Eye Protection within the NHZ is mandatory. [See Table 1 below]

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed in a commercial environment, this equipment can cause harmful interference to radio communications. Therefore, it is recommended to use a distance of 2 inches from the operator to the eyewear.

Table 1: Nominal Ocular Hazard Distance (NOHD) for various viewing conditions while wearing eye protection.

<table>
<thead>
<tr>
<th>Source of Radiation</th>
<th>NOHD (inches)</th>
<th>NOHD (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber Optic Devices</td>
<td>154/392</td>
<td>1.54/3/92</td>
</tr>
<tr>
<td>Reflection from Tissue</td>
<td>0.006/0.12</td>
<td>0.0004/0.012</td>
</tr>
</tbody>
</table>

**SOURCE OF RADIATION**

<table>
<thead>
<tr>
<th>MPE (mw/cm²)</th>
<th>DIVERGENCE ANGLE (DEGREES)</th>
<th>No Eyewear (inches/cm)</th>
<th>With Eyewear (OD=6) (inches/cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.66</td>
<td>9</td>
<td>154/392</td>
<td>1.54/392</td>
</tr>
<tr>
<td>1.66</td>
<td>N/A</td>
<td>0.006/0.12</td>
<td>0.0004/0.012</td>
</tr>
</tbody>
</table>

Table 1: Nominal Ocular Hazard Distance (NOHD) for various viewing conditions while wearing eye protection.


Reference Coefficient of Tissue = 0.018

5.3.16 All personnel who are involved with the laser preparation and use.

5.3.17 The LSO is responsible for the training of all personnel who are involved with the laser preparation and use.

5.3.18 The LSO shall ensure that the operator and staff attend laser courses taught by qualified laser educators. Ongoing reviews of laser safety procedures should be a part of normal office routine.

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3.0.4 OSHA and its Provisions
Worker safety is the responsibility of the employer and is regulated by OSHA (Occupational Safety and Health Administration), a division of the U.S. Department of Labor. OSHA has issued no specific standard for safe use of lasers but recognizes ANSI standard Z136.1 as a source for ensuring safety with respect to medical lasers. For more information see OSHA Technical Manual (TED 1-0,15A) Section II, Chapter 6, 1999. CADO Group, Inc. recommends implementation of a Laser Safety Program for the safety of your patients and office staff in connection with the use of the Precise™ LTM 5 Watt Soft Tissue Diode Laser.

3.0.5 Statutory License
Usually, states or provinces do not have a specific licensure requirement for use of a laser by a dentist. Most states require hygienists to attend licensure training that includes both a lecture and hands-on training. Prior to using the laser, the hygiene applicants are required to pass a proficiency test for certification. These courses are usually taught by members of the Academy of Laser Dentistry that possess instructor credentials. Check with your state licensing board regarding the applicable requirements for using lasers in dentistry.

3.0.6 Wireless Technology
In order to promote efficient use of the radio spectrum in various global markets the United States Federal Communications Commission (U.S. FCC) and other international government agencies have developed technical standards for devices that are capable of emitting radiofrequency energy when in use – such as wireless devices. These products need to receive certain identification numbers in accordance with the Commission Equipment Authorization rules prior to marketing in U.S. markets. The Code of Federal Regulations, Title 47 (47 CFR) Part 15 covers the rules for the operation of unintentional, intentional or incidental radiators. Any electrical or electronic devices incorporating a digital circuitry and operating with an oscillating or clock speed of greater than 9 kHz requires approval to this rule. There are various types of FCC Part 15 approvals, depending on the nature of the product and its intended function. For example, in Canada, IC-RRS 210 (Radio Standards Specification) sets out the requirements for license exempt low-power intentional radiators. This standard is very closely harmonized in terms of permitted frequencies, types of operation, and other technical requirements to the FCC requirements, but a separate certification application is required for Canada. In the European Community, compliance with several safety directives and testing to EN 300 328, EN 60950 and EN 301 489 is required for these types of device. The manufacturer is required to provide a Declaration of Conformity as evidence of its compliance with the various regulatory requirements.

3.0.7 Precise™ LTM Wireless Frequency
The 2.4GHz frequency is very popular for networks and other wireless devices that share similar technology like Bluetooth® cell phones, Wi-Fi® devices, wireless networks, cordless phones, CAD/CAM machines, wireless video senders, even microwave ovens. The nature of spread-spectrum modulation in the 2.4 GHz frequency means that a multitude of devices can co-exist in the same 2.4 GHz spectrum (as should be obvious, since many devices use 2.4 GHz and operate well on a daily basis). Bluetooth and Wi-Fi® devices use multiple channels, receiving data reliably out of noise in the 2.4 GHz spectrum. They will hop around strong interference, and quickly re-trry for uninterrupted operation – and can even avoid channels or areas of the band in use by other devices by adaptive hopping. Since the Precise™ LTM wireless transmitters have a much lower power output, it is highly unlikely that they would “interfere” with higher-power devices. Even if this was possible, the higher power devices would quickly switch to another channel to achieve uninterrupted operation. The Precise™ LTM wireless receiver uses an entirely different protocol, and therefore, cannot receive data from Bluetooth or Wi-Fi® devices. The converse is also true; their protocol methods are incompatible. Precise™ LTM diode laser wireless technology is electronically cabled. Each pedal and Precise™ LTM diode laser share a UNIQUE SERIAL NUMBER INTERLOCK protocol for reliable operation:
- A Precise™ LTM pedal communicates with only one Precise™ LTM diode laser; there is 2-way electronic code which must be verified for every transmission and acknowledge. The pedal and laser unit are interlocked to only each other’s electronic codes.
- If data from another Precise™ LTM pedal is ever received, embedded verification measures ensure that it is always ignored and discarded.
- If data were ever received from another wireless device with a compatible protocol scheme (2.4 GHz frequency), it would immediately be discarded in the same way.

3.0.8 American National Standards Institute (ANSI) - Safety Standards
ANSI is a non-governmental, non-profit agency that has established guidelines and protocols for the use of lasers and other electro-optics. The provisions of ANSI Z136.3 outlines standards for lasers used in dentistry and the assessment of laser risks. ANSI also establishes guidelines for safety eyewear and classifies all lasers based on their potential for damage to eyes or tissue. See page 14 for NOHD requirements.

3.1 STARTUP AND SYSTEM CHECK

3.1.1 Selecting the Treatment Center
The laser should be placed in an area with good ventilation and lighting. The electrical service required is a 110 Volt A/C outlet - 60 Hz. The area where the laser is placed should be free of standing water. Combustible gases or those that support combustion should be turned off and all flammable materials or chemical stored in the area should be removed.

3.1.2 Checking the Foot Pedal Installation
It is recommended to use a 9 Volt Lithium battery to power the cordless foot pedal. This battery has been tested to last for over 100 hours of foot pedal operation. Note: A 9 Volt Alkaline battery may be used, however the battery may not be tested to last for over 100 hours of foot pedal operation.

3.2.1.4 Checking the Foot Pedal Installation
It is recommended to use a 9 Volt Lithium battery to power the cordless foot pedal. This battery has been tested to last for over 100 hours of foot pedal operation. Note: A 9 Volt Alkaline battery may be used, however the battery may not be tested to last for over 100 hours of foot pedal operation.

3.3.2 Foot Pedal Power Supply
The foot pedal features a built-in rechargeable battery that is electronically coded. Each pedal and Precise™ LTM diode laser share a UNIQUE SERIAL NUMBER INTERLOCK protocol for reliable operation:
- A Precise™ LTM pedal communicates with only one Precise™ LTM diode laser; there is 2-way electronic code which must be verified for every transmission and acknowledge. The pedal and laser unit are interlocked to only each other’s electronic codes.
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about 2-3" of fiber extends out of the handpiece. Firmly tighten the Fiber Locking Cap so that the fiber is held securely in place. Now the fiber can be prepared for lasing (Section 4.1.4). The Precise™ LTM uses an autoclavable stainless steel handpiece that should be sterilized after every patient. Clean the handpiece with warm soapy water; rinse thoroughly; place in an autoclavable bag, place in a sterilizing bag, and autoclave accordingly. 

Adjusting the intensity of the aiming beam has no effect on the power output. The laser must be turned off and allowed to sit for 5 minutes and turned on again. If the laser then boots without beeping, the microprocessor has been able to make operational adjustments and the unit will perform its functions. If, upon restart, the unit continues to beep, the unit will need to be sent in for adjustment by CAG Group Inc., Service Department. We suggest that your practice establish a procedure to track the number of hours of use the instrument has been able to make operational adjustments and the unit will be shut off automatically after a set number of hours.

Also see section 6.0 on page 15.

4.1 LASER MAINTENANCE

4.1.1 Laser Chassis Disinfection

The exterior of the laser should be cleaned using a liquid disinfectant similar to BIREX® or CIDEX®. Do not spray the disinfectant directly on the chassis. Apply with a gauze sponge or wipe. Do not use abrasive materials to clean the chassis. Place a barrier material similar to cellophane over the control panel and LED screen prior to treating the next patient.

4.1.2 Calibration

The Precise™ LTM Laser uses solid-state circuitry to continuously monitor the power output and adjusts the power supplied to the laser module to keep the output consistent with the user defined settings. If output levels are more than ±20% of the set value, the unit is designed to shut down power to the laser, and an audible alarm will sound. If this happens, the unit should be turned off and allowed to sit for 5 minutes and turned on again. If the laser then boots without beeping, the microprocessor has been able to make operational adjustments and the unit will perform its functions. If, upon restart, the unit continues to beep, the unit will need to be sent to be repaired by CAG Group Inc., Service Department. We suggest that your practice establish an internal calibration program for your laser.

Recalibration is recommended once a year as per manufacturer's recommendation. A gauze sponge moistened with 70% alcohol is recommended for all cleaning and disinfection. Do not use abrasives or solvent-based cleaners for cleaning the laser. Do not use liquid disinfectants such as BIREX® or CIDEX® to clean the laser.

Additionally, the tip can transfer heat up the shaft of the fiber and down the fiber cartridge. The disposable tips can be shaped to provide the clinician two (2) degrees of freedom to adjust the fiber tip for different applications. If you have reached the desired wattage, turn off the laser and set the output power to a lower value, the unit is designed to shut down power to the laser, and an audible alarm will sound. If this happens, the unit should be turned off and allowed to sit for 5 minutes and turned on again. If the laser then boots without beeping, the microprocessor has been able to make operational adjustments and the unit will perform its functions. If, upon restart, the unit continues to beep, the unit will need to be sent in for adjustment by CAG Group Inc., Service Department. We suggest that your practice establish a procedure to track the number of hours of use the instrument has been able to make operational adjustments and the unit will be shut off automatically after a set number of hours.

Also see section 6.0 on page 15.
pulse lasting for 0.05-0.06 seconds. The duty cycle is set at 50% so you will have 1 energy pulse with a period of rest with no energy between each pulse. If the laser is producing energy at 1 pulse per second for 0.05-0.06 seconds per pulse, you will be producing energy for a total of 0.3-0.36 seconds. The result will be an average energy per second that will be 50% of what you have set the laser for. Therefore, when using pulsed energy, you will have to adjust your power upward in order to achieve the same rate of energy as the same power set at 100%. Two Watts of Pulsed Nd:YAG energy will be the same average power output as 1 Watt.

Remove your foot from the foot pedal and use a clear 2 x 2 gauze moistened with water to remove debris from the fiber tip. Do not use flammable liquids to wet the sponge. Place the laser in Standby mode by turning "Off" until you are ready to start another procedure.

Tissue Responses to Laser Energy: Maximum results will be achieved by regulating the power and the speed that the operator moves the fiber tip. Tissue chatting is an undesirable after effect of too much power or the tip moving too slowly.

Always use the least amount of power necessary to complete your procedure. The ideal tissue response will show little or no discoloration after lasering and there will be less residual damage and faster healing. Avoid penetrating or damaging the periodontal ligament and do not use the laser periosteal bone. Because the laser energy is attracted to melanin and hemoglobin, power must be reduced when treating patients with darker skin tone. Always begin lasering with the lowest power you can use to remove or modify the target tissues. Avoid damage to the gingival sulcus by moving the fiber tip quickly and using low power settings.

Check to make sure you have a good cleave of the fiber so that no sharding is present on the tip. A shard may act as a miniature scalpel and damage the small blood vessels, thus preventing hemostasis and coagulation.

4.0 DISPOSABLE FIBER CARTRIDGE

The fiber cartridge is a removable assembly with a plug in capability that provides power for the internal retraction device. This cartridge is disposable after all fiber has been used. This cartridge is autoclavable.

4.0.1 Replacing the Fiber Cartridge

A white mark on the fiber indicates 6” of fiber remaining on the cartridge. At this point, a new fiber cartridge should be ordered. When the cartridge is empty, it should be removed from the laser aperture and gently removed. Slowly slide the cartridge out to the left using the dovetail as a guide. The fiber cartridge can be thrown away.

Note: Retain the fiber end cap. DO NOT discard the end cap.

4.0.2 Fiber Preparation

Using the EXTEND button on the control panel, press the button to extend (toward the front of the laser) the fiber. Extend 3 - 4” of fiber and feed through the fiber and feed until you can see the blackened area. The fiber should extend about 1” beyond the distal end of the handles so that you can see the fiber tip and place the disposables tip.

Do not continue to use the fiber tip once you have observed that the tip has a blackened appearance that is greater in length than 2 - 4 mm from the previous cleave spot. The protein debris of gingival tissue accumulates on the tip during surgery and retains extreme heat that can cause rapid tip deterioration and subsequent breakage. This is especially important when using the laser for periodontal pocket debridement. During surgery, clean the tip often using a 2 x 2 gauze sponge moistened with water. Do not use alcohol or other combustible liquids to moisten the 2 x 2 gauze sponge and do not use the sponge while the tip is hot. Always use a cold disinfectant solution like BAXID® or CIDEK® to wipe off the fiber jacket before retracting the fiber. The fiber can be advanced or retracted by using the retract and extend buttons on the front control panel.

The fiber cartridge is a removable assembly with a plug in capability that provides power for the internal retraction device. This cartridge is disposable after all fiber has been used. This cartridge is autoclavable. The fiber cartridge contains approximately 20” of fiber and is wound onto a spool. The fiber itself has three components:

- **Jacket**
- **Cladding**
- **400 micron quartz/silica fiber**

4.0.3 Jacket

This protective cover for the fiber system and usually made of a synthetic material that is clear or white in color. There can be other colors used but there are no standardized color systems to denote the diameter of the fiber or its use.