DEIONIZED WATER QUALITY

Protection from Gold Cavity Corrosion

All Lee Laser Series 600 and Series 800 Nd:YAG lasers use a primary cooling system which contains recirculating water to remove laser-lamp generated heat from the laser head. Because the laser lamp is fully immersed in the flooded cavity, the water must be electrically **non-conductive** so that electrical current (especially the high voltage ignition pulse) will pass through the lamp and not through the water. For this reason, the water must be **deionized** to remove electrically conducting ions from it.

We use components in the primary cooling system which are essentially inert (plastics, stainless steel, etc.), so that they do not react readily with the deionized water. However, because some components are not totally inert, very slight interaction with the water can occur. This interaction may be prevented by removal of excess oxygen from the water. The Lee Laser **deionization filter** contains an agent to remove excess oxygen from the water.

Ultra-Pure Water Can Be Corrosive

However, it is sometimes possible for highly deionized water still to be corrosive. This can occur because ultra-pure water is an extremely "hungry" reagent in that it voraciously attracts ions from metallic surfaces with which it has contact. Ultra-pure deionized water will interact to varying degrees with all metallic parts in the primary cooling system, including the gold plated reflective elliptical cavity which contains the arc lamp and YAG laser rod. Over a period of time, the gold may become highly tarnished and lose much of its reflective quality. Eventually, it must be replaced.

In some manufacturing plants, highly deionized water is available with resistivity up to 18 megohm-cm. This kind of ultra-pure water will clearly attack metallic components in the cooling system and ***must not be used***. The ideal resistivity range for cooling system water is 1-3 megohm-cm. At this level, the electrolytic level is low enough to be a poor electrical conductor while high enough to prevent corrosive attack.

To prevent corrosion in the primary cooling system, avoid the use of highly deionized, ultra-pure water. Lee Laser recommends that **only steam distilled water should be used in the cooling system.** The distillation process will provide the proper level of deionization and remove most bacteria from the water as well. The water tank must remain capped at all times and the DI filter changed at recommended three-month intervals to maintain low oxygen content in the water, as well as proper deionization. With periodic filter replacement, there is no need to change the DI water.