

CARBIDE CAPLAMP

Model 115C

Manufactured by
J.K. Dey and Sons
Calcutta, India

Exclusively for
Inner Mountain Outfitters

5715 Lee-Jackson Highway
Greenville, VA 24440-1852
540.377.2690 imo@caves.org
<http://www.caves.org/imo>



OPERATING PRINCIPLE

Calcium carbide (CaC_2) is a manufactured product and resembles chunks of rock. When combined with water (H_2O), a chemical reaction produces acetylene gas (C_2H_2), which is highly flammable. For lighting purposes, this gas is forced through a small orifice and the emitted stream of gas is lit to produce a clear, bright flame. At higher pressures, and mixed with additional oxygen, acetylene is also used for welding. In a caplamp, however, gas production is low and is regulated by adjusting the amount of water added. A caplamp is vented to prevent over-pressurization. The byproduct of acetylene production is calcium hydroxide ($\text{Ca}(\text{OH})_2$), or slaked lime, which is very basic and is used by water treatment plants for softening water. It resembles a soft gray-white powder (or if too much water is added, a gray-white gooey paste). This residue should be disposed of properly, as it can harm cave life or animals that may try to eat it.

FIRING THE LAMP

1. Remove the lamp bottom and fill it **only halfway** with Miners Grade (pea-size) carbide. The carbide will expand when water is added, so it is important not to add too much, as this can make the bottom difficult to remove later.
2. Make sure the water regulator knob is tightened in the full clockwise position. Unscrew the water door on the top of the lamp and fill the upper tank with clean water; replace the cap. Note that the water door has a “keeper” to prevent its loss, and a hole to let air in, so the water can flow out the bottom of the tank.
3. While observing the water valve (on the bottom of the water tank), slowly open the water regulator by turning the knob counterclockwise for a one-quarter turn. See how the water drips out; you want to adjust it so that there is one drip every 1-2 seconds.
4. Now quickly replace the carbide tank and tighten it securely. You will see a cloud of gas already being produced. Let the internal pressure build up for 15-30 seconds before proceeding.
5. Cup your palm over the reflector and hold it for a few seconds; then draw your hand across the striker to produce a spark and ignite the gas coming out of the jet. If the pressure has built up, you will hear a “pop” and a flame will appear at the jet.
6. After allowing gas production to stabilize, adjust the flame to the desired length by turning the water regulator. If you want the lamp to burn for a long time, adjust to a $\frac{1}{4}$ ” to $\frac{1}{2}$ ”; for optimum brightness, adjust the flame to 1-1 $\frac{1}{2}$ ”. Your lamp should burn for 3-5 hours, depending on the flame size. The carbide load will outlast the water supply, so after an hour or two, you should check and refill the water tank. The lamp operates best with a full tank of water, and an occasional shake may improve gas production.

7. When the flame shrinks to ¼” or less, even with plenty of water, the carbide is spent. It is best to cut off the water and extinguish the flame at this point, as a small flame will leave a carbon residue and possibly clog the jet. Be sure there is ample ventilation, as some gas will still be present. If the water is left on too long, the spent carbide residue, instead of being a gray powder, will become a gray sludge that is difficult to remove.

8. Dispose of the carbide residue by dumping it into a plastic bag. Be careful not to damage the threads on the lamp bottom by banging it on a hard surface, and be careful not to lose the rubber gasket in the process. Use a blunt tool to remove any residue that will not shake out. Empty the water tank, and rinse and dry the entire lamp. Proper cleaning will ensure your lamp performs better and lasts longer.

TROUBLESHOOTING

Clogged Tip – Carbon may build up inside the gas jet, and is easily removed by reaming the orifice with a thin wire. Telephone wire is about the right diameter, as is an unwound guitar string, or you may purchase a tip cleaning brush. It is best not to remove the jet unless it is to be replaced, but it can be unscrewed and checked from the rear against a light to ensure the orifice is clear.

Gas bubbles out through the water tank – This means gas is being produced too fast for the jet, or the jet is clogged. Reduce the water drip, and/or check the jet.

MAINTENANCE

The lamp should be thoroughly cleaned after each use. To remove stubborn carbide residue, soaking in vinegar is effective. To restore luster to the brass finish, use a brass cleaner and soft cloth. The reflector may be polished using your finger and some toothpaste (a mild abrasive), but avoid harsh abrasives, which may scratch it.

Check the water valve periodically, as lime in the water may build up a residue. Unscrew the water knob until it comes out (be careful not to lose the tensioning spring), and then remove the water dripper (under the lamp body) by unscrewing it. Flush these parts with water, or soak in vinegar, to remove foreign matter.

The striker flint, when exhausted, may be replaced with a standard lighter flint. The flint spring can be stretched to increase tension and produce a bigger spark.

Always ensure the rubber gasket on the lamp bottom remains clean and smooth, as a good seal is required to prevent gas leakage.

ADDITIONAL INFORMATION

For additional information on the operation, care, and maintenance of carbide lamps, go to

www.caves.org/imo/pdf/carbide

<http://www.caves.org/member/mfraley/intro.htm>

<http://wasg.iinet.net.au/clamps.html>

<http://groups.yahoo.com/group/caplamps/>

SPARE/REPAIR PARTS

A complete line of repair parts and spares for the MINEX Model 115C, and supplies of calcium carbide, are available at our website:

<http://www.caves.org/imo>

or call us at **540.377.2690**

Additional copies of these instructions may be found at: www.caves.org/imo/pdf/minex