



Objective:

The objective of this workshop guide is for the Scout Leader and/or Scout youth to be able to describe and demonstrate safe assembly and lighting of a Lantern.

To obtain your permit, you will need to demonstrate knowledge of general Lantern safety guidelines AND safe operation of the Camp lanterns that your scout group uses.

How do Lanterns Operate?

All white gas (Naphtha or camp fuel) lanterns operate the same way. Flammable fuel is stored in a vessel where it is pressurized and released through a tube generator that allows the fuel to vaporize before it reaches the mantle. The fuel is then passed through a burner where it is mixed with oxygen and collected in a cloth mantle. An ignition source is applied close to the mantle which ignites the fuel vapor which in turn created a luminescent glow which provides light.

The mantle starts life as a woven ceramic impregnated cloth. The addition of ceramic helps radiate heat as visible light from a flame. The ceramic must be "burned out" with a match prior to its first use. When lit, the mantle glows incandescently. For protection from the high temperatures produced and to stabilize the airflow, a cylindrical glass shield called the *globe* or *chimney* is placed around the mantle(s).

Types of Lanterns

There are three common types of lanterns used in Scouting, **Pressurized liquid fuel**, **Gas Canister** and **Candle**. The Pressurized liquid and Gas Canister lanterns are commonly used in Scouting and each requires its own specific instructions for use.

Pressurized liquid fuel Lanterns: These lanterns require fuel to be placed in a tank and then pressurized via a small hand pump. Typical fuels for these lanterns include white Gas (Naphtha) and unleaded auto Gasoline.



Gas Canister Lanterns: These lanterns use fuel which is pressurized in prepackaged tanks. The fuel tanks have a single screw connection which mates with the lantern. On connection, the gas is released and held in check via the fuel flow control knob. Common fuels include Propane and butane and gaining more prevalence Powermax® fuel which is a mix of Butane and Propane.



Candle Lanterns



Candle lanterns are small, lightweight and require small candles and hence throw out far less light. These lanterns are very similar to the larger lanterns in that they have a handle, glass shield and the fuel is a candle (paraffin and/or bees wax) with a catch basin for spilled wax.

All of the above lanterns are to be used in well ventilated conditions, away from flammable materials, especially never inside nylon tents." (*Risk of carbon monoxide poisoning*).

GENERAL LANTERN USE AND SAFETY GUIDELINES

Check your Lantern

- Prior to use, ensure that you have the instructions on how to use your lantern and/or are familiar with how to safely assemble and start it up.
- Ensure that all of the parts to your lantern are present.
- Never use a lantern with a cracked glass shield as there is risk that the glass may break in your hands.
- USE THE CORRECT FUEL for your lantern. NEVER MIX FUELS on single fuel appliances.
- Always make sure that a suitable first aid kit is present





Transportation

For Pressurized Liquid Fuel lanterns, never transport a lantern with fuel in the tank.

- Always carry the fuel in an approved fuel tank AND NOT in anything that looks similar to any food container or a water bottle

For Gas Cartridge lanterns never transport with the gas canister attached.

- Keep the fuel tank away from any heat or ignition source.
- Transport lanterns in an environment where they will not be shaken or impacted by any other sharp instrument as this may break the glass shield and/or break the mantles. *Consider using a rigid container if available from the manufacturer, and/or padding for the glass shield."*

Fuel Storage and Safe Campsite Layout

- Always store the fuel for your lantern away from your cooking and food locations
- Whether you have a Gas Cartridge or Liquid fuel lantern, always refuel the lantern tank or replace the canister away from your cooking and food storage areas
- Ensure that there are no ignition sources in your fuel storage area

Filling the fuel tank on a Lantern

Pressurized liquid fuel Lanterns

- Use a fuel filter when filling a lantern, as the filter will reduce sediment which could clog the lantern and cause it to burn erratically
- A lantern gets hot when it is used. As the fuel tank is an integral part of a lantern so allow the lantern to cool before refueling.
- Inspect the lantern after filling the tank. Never use a lantern if there is a fuel leak
- To avoid overfilling, keep the lantern level. Stick to the recommended levels. Ensure about 1/3 tank is left as air otherwise the lantern won't pressurize properly and it will burn erratically.
- Tighten the fuel cap securely as this avoids spillage as you carry the lantern
- Clear up all spillage

Gas Cartridge Lanterns

- Check the fuel level before you connect the canister to the lantern
 - *You may have to judge this by weight*
- Screw the canister to the lantern and ensure that it makes a tight seal.
- Use extreme caution when replacing a gas canister on a lantern while it is hot.

Lantern Mantles



The mantle on your lantern is simply a meshed fabric that has been coated with several chemicals that allow it to fluoresce when lit. The mantles need to be burned to pale grey color and not have any holes in them prior to use. If there are holes in the mantles they need to be replaced as fuel vapor 'pop' on ignition leak during operation and the lamp will not burn evenly.



If you have to replace a mantle, follow this procedure:

1. Remove the lantern cap and remove the glass shield.
2. Remove the broken mantle - including the draw-string and dispose of the mantle ashes in an environmentally friendly fashion.
3. Slip a new mantle on the gas pipe and tie securely with the draw-string and trim
 - *Consider purchasing mantles with metal clips which are easier to use*
4. Light a match and hold to the bottom of the mantle. The mantle will ignite and smolder for a few moments as the chemicals in the cloth burn. Ensure that the whole mantle is completely burned to ash.
 - ***DO NOT INHALE SMOKE OR FUMES FROM THE MANTLE***
5. *Reassemble the lantern.*





Lighting the Lantern

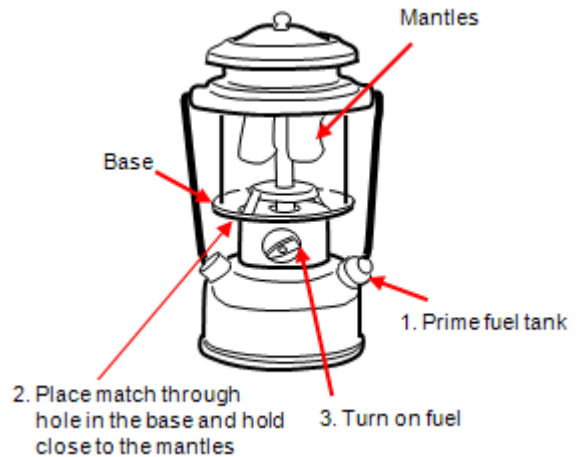
Environment

- Never light a lantern inside your tent. Ever. Not even in the tent porch.
 - Tents are remarkably flammable.*
- Ensure that there is at plenty of air space around your lantern
 - If you don't ignite the fuel vapor immediately, it can build up in the glass shield and a small ball of flame can erupt.*
 - It is good practice to light the lantern away from your cooking area.*
- Ensure that your lantern is positioned on a flat and secure base

Ignition Procedures Lanterns

Pressurized Liquid Fuel lanterns

- Prime the fuel tank by pumping the correct number of times
 - If this is not done, the lantern may burn erratically due to incorrect fuel pressure*
- Prior to ignition, check the mantles are in good shape and identify the holes in the base of the lantern
- Do not stand / or lean over the burner when you attempt to light the fuel (in case of flare up)
- Strike a match, put it through the hole in the base and position near the burner prior to turning on the fuel
 - A long match or taper is best suited for this activity as often the gap from base to mantle is longer than a regular match length. A spark igniter can be used, but this can get in the way of tying new mantles.*
- Slowly turn on the fuel - so that the fuel vapor is slowly released
 - If fuel is released too quickly it can blow out the flame or generate a large ball of gas which ignites in a ball of fire. If this happens, the person jumps back, forgetting to turn the gas off, creating further build up of gas and a future problem.*
- When the mantle catches fire slowly increase the fuel flow to help the lantern burn brighter
 - Too fast...and the flow of fuel vapor may overwhelm the flame and extinguish it.*
- If the fuel vapor ignites and then goes out
 - Turn off the fuel to stop a large build up of fuel vapor*
 - Wait a few moments to allow the fuel vapor to disperse if it does not ignite the fuel first time*
 - Repeat previous steps*
- Fuel Flare up.** On ignition the flame may sometime flares up with a 'pop'. If this is happens turn the fuel knob to reduce fuel flow



Gas Canister lanterns

Gas Canister lanterns contain fuel that is already at correct pressure. There are two types of gas canister lanterns, those that require manual ignition and those that come with pre-ignition. In the case of manual ignition, follow the same steps outlined for Pressurized fuel lanterns. For lanterns that come with pre-ignition (sometimes called "Instastart" ignition) - all you need to do is turn the fuel knob and a spark is automatically provided.

Brightness

To achieve the most luminescent light, adjust the fuel knob on your lantern. With Gas Canister lanterns, the pressure is maintained throughout, however with pressurized fuel lanterns, the lantern will need pressurizing at frequent intervals.



DANGERS WITH LANTERNS

TREAT LANTERNS WITH GREAT RESPECT. Lanterns get very hot (300 Deg C) when running. It is easy to see a lantern which is running as it makes noise and has illumination. A lantern that has just been turned off will not be so easy to determine if it is hot - so exercise great caution when touching a lantern otherwise you may incur a burn that requires hospital treatment.

Keep your distance

Always place a lantern in an area where there is relatively little traffic. Where possible, use a lantern holder as this will place the lantern out of harm's way yet provide sufficient illumination.

Lantern Cap

The cap is directly above the mantles where the fuel vapor is burnt. The cap gets very hot (Over 150 Deg C). NEVER PICK UP A LANTERN BY THE CAP.

Lantern Handle

Always leave the handle down position. Hot air rises and this will heat the handle. If you pick up the lantern with a heated handle the shock will cause you to drop the lantern which may further cause danger from fuel vapor leakage onto the mantles and shards of glass as the shield may break.

Glass Shield

Never touch the glass shield. The glass protects the mantles from the outside elements and helps provide a constantly heated environment in which to burn fuel. The glass shield will reach over 200 Deg C.

Fuel Type

Know your lantern. Check the labeling for the fuel that you can use. NEVER substitute another fuel on single fuel type appliances.



Packing up your Lantern

- A lantern should only be packed away when it has cooled down and can be touched by a bare hand.
 - Turn the knob on the lantern to OFF.
 - Allow the lantern to cool down. It may take between 5 to 15 minutes for the glass and metal component to cool down - so plan this time into your agenda.
 - Remove the fuel tank from the lantern when the lantern has cooled down

Pressurized liquid fuel lanterns

- Take the lantern away from your camp area to the fuel storage area and depressurize it. Point the fuel tank away from you and others when you release the pressure as there may be a slight spray of fuel on depressurization.
- Fuel degrades when it comes into contact with air, so empty the fuel back into an approved fuel container.

Gas Cartridge lanterns

Unscrew the canister quickly in order to not let too much gas escape

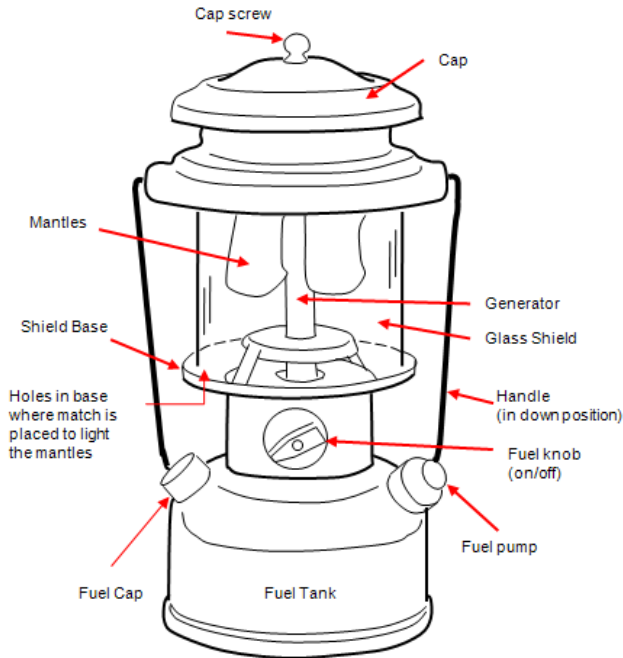
Lantern Fuels

For liquid fuel lanterns, ENSURE THAT YOU KNOW WHAT FUEL YOUR LANTERN USES. As different fuels burn at different temperatures, you could easily melt or clog your lantern with residue leading to a highly dangerous situation.

For gas canister lanterns, stick with propane or butane as these fuels also burn at different temperatures. Colman has now introduced Powermax® which is a hybrid fuel made from both Propane and Butane fuel. Check your lantern to see if can use Powermax®.



ANATOMY OF A TYPICAL PRESSURIZED FUEL LANTERN



Fill tank with fuel and screw fuel cap tight. Locate fuel pump. Note the arrow and the direction that it points. Turn the fuel pump head in the opposite direction to loosen the pump head. Note the hole in the fuel pump head. Air is drawn through the hole as a means of equalizing pressure in the fuel tank

Example: Pressurizing the Lantern

<p>STEP 1 Using two fingers slide the fuel pump outward to its fullest extent. DO NOT COVER THE HOLE IN THE FUEL PUMP as this will create negative air pressure and the pump will slide back into the tank Judge whether the fuel pump slides smoothly or not. If the pump does not slide smoothly, it may need to be oiled or cleaned.</p>	
<p>STEP 2 Grip the pump head firmly and then place your thumb over the hole in the pump head.</p>	
<p>STEP 3 Keep your thumb tight over the hole in the pump head and push the pump backwards. This represents one full pump. Repeat the pumping progress (STEP 2 and STEP 3) until you have pumped the recommended number of times as defined by your instruction manual. With the pump head fully retracted and your thumb over the hole turn the pump in the direction of the arrow to close the fuel valve. The lantern is now primed and ready for ignition.</p>	



PERMIT DEMONSTRATION

In the presence of your instructor, perform the following:

Questions to be answered

1. State the main components of a liquid fuel lantern
 - a. *Fuel tank, pump*
 - b. *Generator*
 - c. *Mantles*
 - d. *Glass shield*

2. State the precautions that should be taken when fueling a liquid fuel lantern
 - a. *Fuel in an area distant from your cooking/eating area*
 - b. *Fill the fuel tank to the correct level (filter / do not over fill / clear up spilt fuel / ensure tank does not leak)*
 - c. *Prime the lantern correctly*
 - d. *Never refuel the lantern when it is hot*

3. State the precautions for igniting a lantern (*for lanterns that require manual ignition*)
 - a. *Light match and place match inside the glass shield*
 - b. *Turn on fuel slowly until you hear the hiss of escaping fuel vapor*
 - c. *When the fuel burns in the mantle burns, adjust fuel flow and pressure to turn the flame blue*

4. What equipment should always be present when using a lantern?
 - a. *Suitable first aid kit*

Demonstration

Due to the wide variety of lanterns used by scouts in all seasons, all lantern demonstrations should be performed on the lanterns that your scout group uses

- Demonstrate how to setup and add fuel to a lantern
- Demonstrate how to replace a mantle and prepare it for use
- Demonstrate how to safely light a lantern
- Demonstrate how to safely carry a lantern
- Demonstrate how to turn off and pack away a lantern