ROYAL CANADIAN ARMY CADETS

RED STAR

INSTRUCTIONAL GUIDE

SECTION 7

EO M221.07 – USE SECTION EQUIPMENT

Total Time: 60 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-702/PG-001, Chapter 4. Specific uses for said resources are identified throughout the Instructional Guide within the TP for which they are required.

Review the lesson content and become familiar with the material prior to delivering the lesson.

Divide cadets into groups as resources allow.

Coleman stoves and lanterns will be fuelled prior to this lesson.

Obtain logs for cadets to chop and saw.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

An interactive lecture was chosen for TP1 and TP3 to introduce the safe handling of section equipment when participating in a weekend bivouac FTX.

Demonstration and performance was chosen for TP2, TP4 and TP5 as it allows the instructor to explain and demonstrate the uses of section equipment while providing an opportunity for the cadets to operate this equipment under supervision.

INTRODUCTION

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet shall be expected to use section equipment to include lighting and extinguishing a two-burner stove and a dual-mantle lantern. Cadets are also expected to employ safe tool use.

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IMPORTANCE

It is important for cadets to know how to use section equipment to prevent accidents and injuries, and to increase the life of equipment.

Teaching point 1 **Identify the Characteristics of the Two-burner Stove**

Time: 5 min Method: Interactive Lecture



The Coleman two-burner stove Model M425F710C was used in the production of this lesson. However, instructors may substitute another stove when conducting this lesson.

CHARACTERISTICS

The following are characteristics of the Coleman two-burner stove:

- It is capable of operating with a clean, smokeless flame.
- The flame can be quickly extinguished.
- It is easily ignited in cold weather.
- It does not rattle when packed.
- It is easy to refuel.
- It has no noxious odours.
- Fuel in the tank will not spill when being carried in any position.
- It cools off quickly.
- It is easily cleaned and repaired.

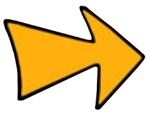
Operational Temperature

The Coleman two-burner stove, when shielded from the wind, can be used in temperatures as low as -52° C.

Fuel Type

The stove uses naphtha.

Parts and Accessories



The diagram provided is for part identification, not disassembly purposes.

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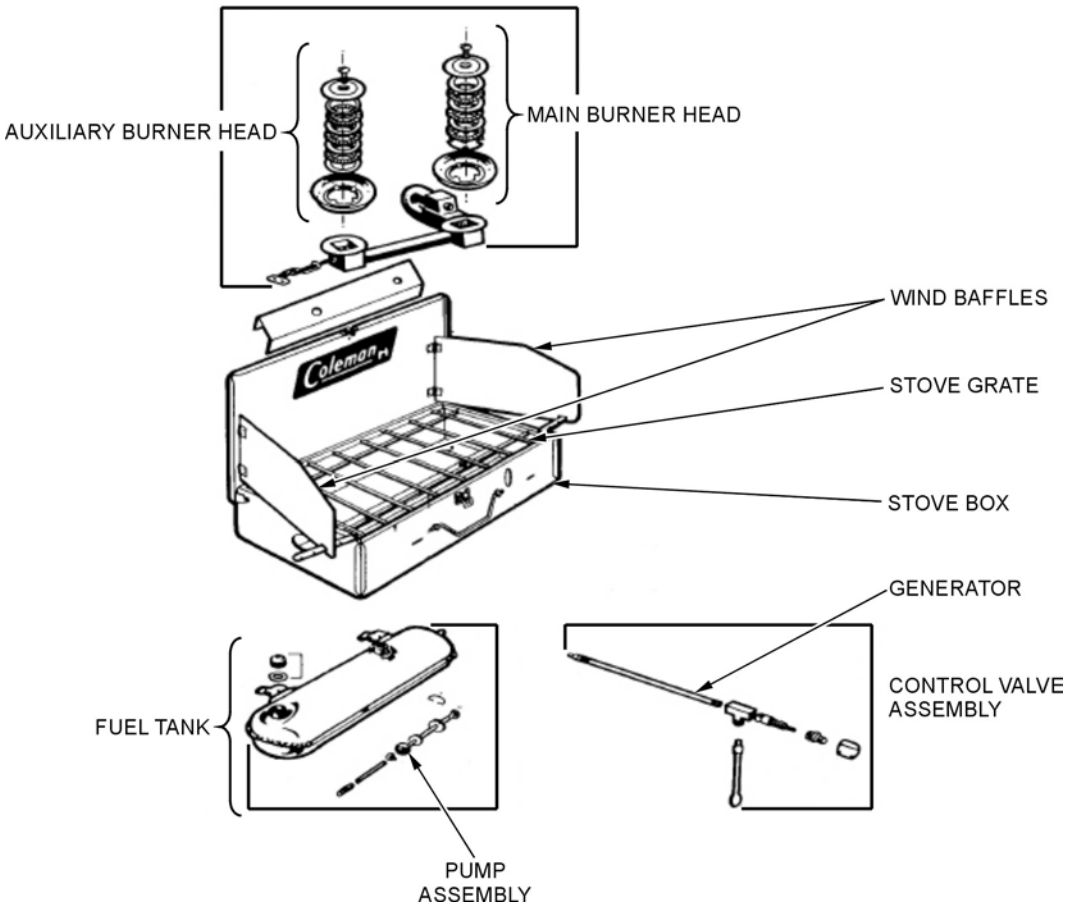

B-GG-302-002/FP-001, Basic Cold Weather Training: Arctic and Sub-arctic Operations (Vol. 2) (p. 2-75)

Figure 1 Parts of the Coleman Two-burner Stove

Stove Box. This is the container in which the burners are stored along with the fuel tank and generator.

Control Valve Assembly. This consists of the valve wheel, nut and body. Its function is to regulate the flow of pressurized fuel from the fuel tank through the generator to the burner head.

Main Burner Head. The main burner head is located on the right of the stove and consists of a burner cap and a small screw with a series of burner rings. The entire assembly sits in a large burner bowl. The main burner control knob is located on the valve and generator assembly.

Auxiliary Burner Head. The auxiliary burner head is located on the left of the stove and consists of a burner cap and small screw along with a series of small burner rings. The entire assembly sits in a small burner bowl. The auxiliary burner control is located on the left side of the stove box.

Pump Assembly. The pump assembly is fitted into the tank and is held in place by a pump cap clip.

Fuel Tank. The fuel tank is red in colour. This tank is only intended to be filled to three quarters full, allowing air in for pressurization. The tank fits on the front of the stove box when in use, and is stored inside the stove box.

Wind Baffles. The wind baffles shelter the burners from wind.

Stove Grate. The stove grate supports pot sets.

Generator. The generator supplies fuel to the burners. Fuel passing through the generator is heated by the main burner.

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Precautions

Hazards are few if precautions are taken. Follow these few simple rules:

- Never leave the stove unattended.
- Do not use a stove as a heating device or in enclosed spaces such as buildings, tents or caves.
- Never remove the fuel tank or loosen the filler cap on the fuel tank while the stove is in operation.
- Always fill and light the stove outside in a well ventilated area, away from open flame, heat and combustibles.
- Use only naphtha fuel.
- Store away from open flame or excessive heat.
- Always ensure wind baffles and lid supports are securely positioned before lighting the stove.
- Before transporting or storing, ensure the stove is cool. Loosen the filler cap to release air pressure and retighten. Turn the control knob off.
- If the stove catches light, turn off the fuel supply, close the wind baffles and drop the stove lid.
- When using the stove ensure a fire extinguisher is available.



It is important to stress to cadets that stoves and lanterns must not be used in enclosed spaces such as buildings and tents. The burning of naphtha and other fuels results in the release of carbon monoxide. Carbon monoxide binds with haemoglobin 200 to 250 times better than oxygen, and disrupts almost all physiologic and neurologic systems, even in fairly low concentrations. Because the gas is heavier than air, it pools in the low ground of tents and caves where outdoor enthusiasts sleep, and will not go away – for days even – unless it's forced out by a strong, persistent direct draft of cold air at the height of the pooled gas. Preventing the problem in the first place requires a similarly active draft – at the stove or lantern or below, not at the top of the tent or cave as was once thought. According to one recent research study, asphyxiation in tenting situations kills three times as many people yearly as mountaineering does. Other research has linked even moderate exposure to carbon monoxide to significant long-term effects, including depressed mood, apathy, disorientation, irritability and amnesia – several of which occur in 100 per cent of individuals exposed and can be measure years after the initial exposure. Risks also increase in higher altitudes.

CONFIRMATION OF TEACHING POINT 1

QUESTIONS

Q1. What is the lowest operational temperature of the Coleman stove?

Q2. What type of fuel is used in the Coleman stove?

Q3. What are three precautions to take when operating the Coleman stove?

ANTICIPATED ANSWERS

A1. When shielded from the wind, it can be used in temperatures as low as -52 °C.

A2. The Coleman stove uses naphtha.

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A3. Three precautions to take when operating the Coleman stove are:

- Do not use the stove as a heater.
- Never remove or loosen the filler cap on the fuel tank while the stove is in operation.
- Never leave the stove unattended.
- Always fill and light the stove outside, away from open flame, heat and combustibles.
- Never remove the fuel tank while the stove is in operation.
- Use only naphtha fuel.
- Store away from open flame or excessive heat.
- Always ensure wind baffles and lid supports are securely positioned before lighting the stove.
- Do not use in dining tents.
- Before transporting or storing, ensure the stove is cool. Loosen the filler cap to release air pressure and retighten. Turn the control knob off.

Teaching point 2 **Explain, Demonstrate and Have the Cadets Operate a Two-burner Stove**

Time: 15 min Method: Demonstration and Performance



For this skill lesson, it is recommended that instruction take the following format:

(1) Explain and demonstrate the complete skill while cadets observe.

(2) Explain and demonstrate each step required to complete the skill. Monitor cadets as they imitate each step.

(3) Monitor the cadets' performance as they practice the complete skill.

Note: Assistant instructors may be employed to monitor cadet performance.

ASSEMBLY

To assemble the Coleman stove:

1. Unlatch and open the stove (Figure 2).

2. Open and secure the wind baffles (Figure 3).

3. Lift the grate and remove the fuel tank (Figure 4).

4. Install the fuel tank. Ensure the generator passes through the large hole in the front of the stove and is inserted into the opening in the mixing chamber above the burner. Insert hanger brackets on the tank into the slots located on the front of the stove case (Figure 4).

5. Secure the safety chain (Figure 5).

6. Close the grate (Figure 6).

7. Ensure the auxiliary burner valve is in the closed position (Figure 7).

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D Cdts 3, 2007, Ottawa, ON: Department of National Defence

Figure 2 Closed Stove



D Cdts 3, 2007, Ottawa, ON: Department of National Defence

Figure 3 Wind Baffles



D Cdts 3, 2007, Ottawa, ON: Department of National Defence

Figure 4 Installing the Fuel Tank

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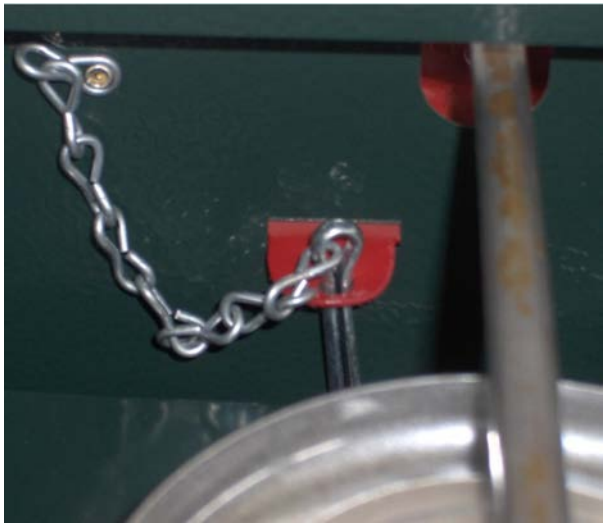

D Cdts 3, 2007, Ottawa, ON:Department of National Defence

Figure 5 Securing the Safety Chain



D Cdts 3, 2007, Ottawa, ON:Department of National Defence

Figure 6 Closed Grate



D Cdts 3, 2007, Ottawa, ON: Department of National Defence

Figure 7 Auxiliary Burner Control

LIGHTING AND EXTINGUISHING THE COLEMAN STOVE



The Coleman stove fuel tank should have been fuelled previous to this lesson, however, the fuel tank will have to be pressurized through pumping.

Pumping the Fuel Tank

1. Make sure the control knob is in the OFF position.
2. Turn the pump rod two full turns counterclock wise.

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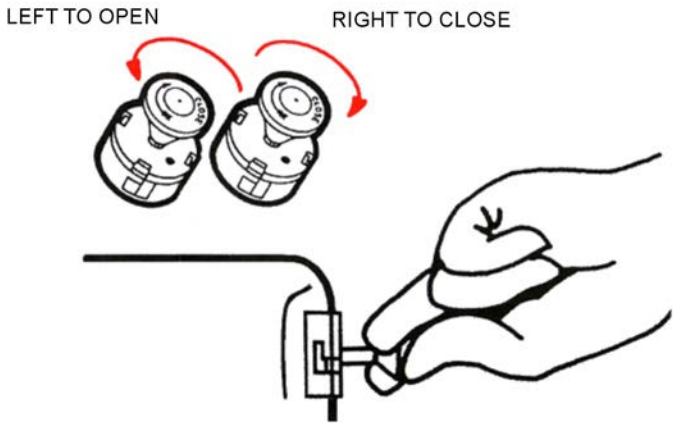
3. Place the thumb over the air vent of the pump rod handle.
4. Pump thirty to forty full strokes to pressurize the fuel tank.
5. Turn the pump rod clockwise until it is closed tight.



Coleman Camp Stove Model M425F710C Instructions for use, by The Canadian Coleman Co., Mississauga, ON

Figure 8 Pumping the Fuel Tank

Lighting the Main Burner

During colder conditions, it may be necessary to warm the generator prior to lighting. This can be accomplished by applying a small amount of fuel to the main burner directly and lighting it with a match. The burning fuel will heat the generator, heating the fuel inside and facilitating the lighting of the burner. When the generate is not adequately heated it is possible for liquid fuel to pool in the stove which is very dangerous.

1. Ensure the auxiliary valve is in the closed position and the tank is pumped.
2. Do not lean over the stove while lighting.
3. Hold a lit match near the master burner.
4. Turn the instant light lever up to light.
5. Turn the control knob to the LIGHT position or setting.
6. Monitor the flame.
7. When the flame turns blue in colour (approximately one minute), turn the instant light lever down and turn the control knob to the desired heat setting (HI – LO).

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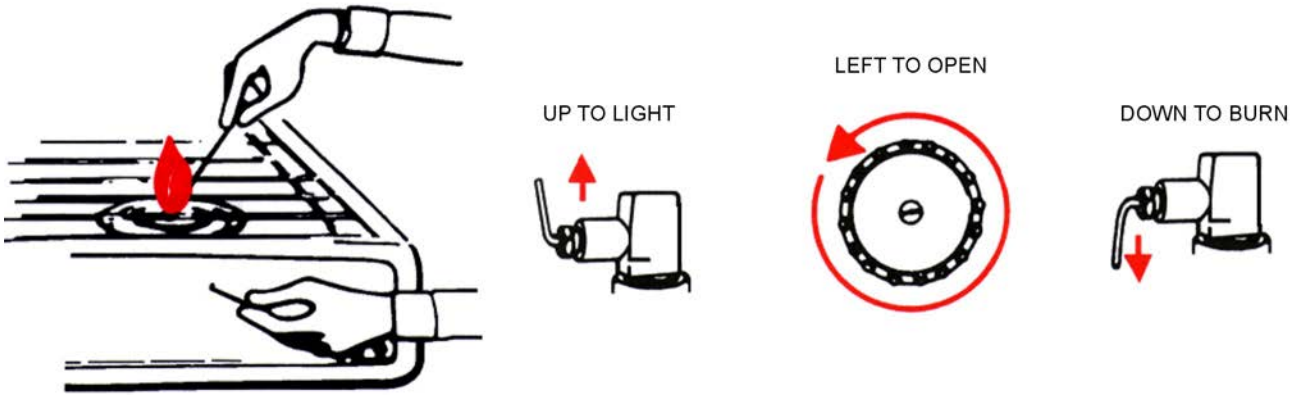

Coleman Camp Stove Model M425F710C Instructions for use, by The Canadian Coleman Co., Mississauga, ON

Figure 9 Lighting the Main Burner

Should the stove fail to light or the match goes out before ignition, turn the control knob to the OFF position and wait two minutes before attempting to light the stove again.

Lighting the Auxiliary Burner

1. After the main burner has been lit, the auxiliary burner may be lit.

2. Hold a match to the auxiliary burner. Open the auxiliary valve located on the side of the stove box, next to the burner (the main burner may require adjustment after lighting the auxiliary burner).

Extinguishing the Burner

1. Close the auxiliary burner valve.

2. Remove cookware from the stove and turn the instant light lever up to LIGHT position and let burn for one minute. This cleans heavier parts of fuel from the generator.

3. Turn the control knob clockwise to the OFF position and close firmly.

A small flame on the main burner will continue to burn for a few minutes, until the fuel empties from the generator.

STORING THE COLEMAN STOVE AFTER USE

To store the Coleman stove:

1. Allow the stove to cool before packing.

2. Ensure the stove is clean and any dirt, matches, etc. are emptied from the stove box.

3. Ensure the auxiliary burner valve is in the closed position.

4. Open the grate.

5. Remove the safety chain.

6. Uninstall the fuel tank and remove it from the generator.

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7. Place the fuel tank inside the stove box.
8. Close the grate.
9. Close and fold in the wind baffles.
10. Close the cover and latch the box.
11. Store the stove in a cool, dry location.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS

Q1. How is the Coleman stove assembled?

Q2. How many pumps pressurize a fuel tank?

Q3. What is the first step in extinguishing the Coleman stove?

ANTICIPATED ANSWERS

A1. To assemble the Coleman stove complete the following steps:

(1) Unlatch and open the stove.

(2) Open and secure the wind baffles.

(3) Lift the grate and remove fuel tank.

(4) Install the fuel tank. Ensure that the generator passes through the large hole in the front of the stove and is inserted into the opening in the mixing chamber above the burner. Insert hanger brackets on the tank into the slots located on the front of the stove case.

(5) Secure the safety chain.

(6) Close the grate.

(7) Ensure auxiliary burner valve is in the closed position.

A2. Pump thirty to forty full strokes to pressurize a fuel tank.

A3. The first step in extinguishing the Coleman stove is close the auxiliary burner valve.

Teaching point 3 **Identify the Characteristics of the Dual-mantle Lantern**

Time: 5 min Method: Interactive Lecture

CHARACTERISTICS

Coleman lanterns are designed to burn naphtha—a very flammable liquid fuel. This fuel is pressurized in a tank attached to the unit, heated in a generator and then burned as a gas. For best results, keep lanterns clean and in good working condition.

The characteristics of the dual-mantle Coleman lantern include:

- a weight of 2.25 kg (5 lbs); and
- a 1 L fuel tank capacity which allows 7 hours of burn time on HIGH and 14 hours on LOW.

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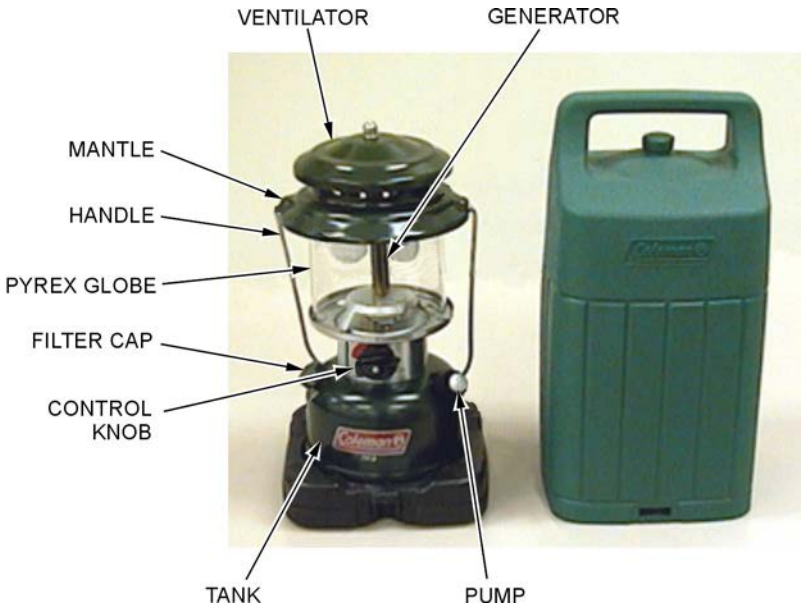
Parts and Accessories



D Cdts 3, 2007, Ottawa, ON: Department of National Defence

Figure 10 Coleman Dual-mantle Lantern

Ventilator. Allows for heat and exhaust to evacuate the lantern.

Generator. Provides pressurized fuel to the mantle.

Mantle. Emits a bright light by the burning naphtha fuel.

Handle. Allows the user to carry or hang the lantern.

Pyrex Globe. Protects the mantle from foreign debris. The globe also reduces the amount of oxygen entering the lantern.

Filter Cap. Seals the fuel tank.

Control Knob. Controls the amount of fuel entering the generator, controlling the brightness of the lantern.

Tank. Is a fuel storage reservoir.

Pump. Pumps air into the fuel tank, pressurizing the tank.

Precautions

Hazards are few when precautions are taken. In addition to the precautions taken with stoves caution must be taken to ensure that lantern mantles with holes in them are replaced prior to use.

CONFIRMATION OF TEACHING POINT 3

QUESTIONS

Q1. What is the fuel capacity of the dual-mantle tank?

Q2. Where should the lantern be used?

Q3. What is the purpose of the handle?

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ANTICIPATED ANSWERS

A1. The dual-mantle lantern fuel tank holds 1 L.

A2. The lantern should be used in ventilated or open areas.

A3. The handle allows the user to carry or hang the lantern.

Teaching point 4 — **Explain, Demonstrate and Have the Cadets Practice Operating the Dual-mantle Lantern**

Time: 10 min — Method: Demonstration and Performance



For this skill lesson, it is recommended that instruction take the following format:

(1) Explain and demonstrate the complete skill while cadets observe.

(2) Explain and demonstrate each step required to complete the skill. Monitor cadets as they emulate each step.

(3) Monitor the cadets' performance as they practice the complete skill.

Note: Assistant instructors may be employed to monitor cadet performance.

ASSEMBLY

The lantern does not require assembly or disassembly except replacing the mantles. Before operating the lantern, the cadet should verify that the handle is in place and that the screw on top of the ventilator is tight.

LIGHTING AND EXTINGUISHING THE COLEMAN DUAL-MANTLE LANTERN



The lantern should have been fuelled previous to this lesson; however, the lantern will have to be pressurized through pumping. When a mantle is replaced it should be burned prior to use. By burning the mantle, the mantle shrinks down in size ensuring that combustion of the fuel takes place at the mantle. When the mantle is not burned prior to use fuel can leak out of the mantle prior to combustion.

Pumping the Fuel Tank

1. Make sure the control knob is in the OFF position.
2. Turn the pump rod two full turns counterclockwise.
3. Place the thumb over the air vent of the pump rod handle.
4. Pump thirty to forty full strokes to pressurize the fuel tank.
5. Turn the pump rod to clockwise until it is closed tight.

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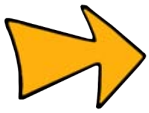
Lighting the Lantern



Do not position the hands or head above the lantern when lighting. Mantles are very fragile and shall be avoided when using a match to light the lantern.

1. Insert a lit match through the hole in the bottom of the burner frame.
2. Turn the control knob to the LIGHT position.
3. When the mantle burns bright white, turn the control knob to the ON position.
4. Add more air pressure to the tank. Air pressure may be added while the lantern is in operation. Good air pressure is important for maximum light output.

Extinguishing the Lantern

1. Turn the control knob to the OFF position.
2. Allow the remaining fuel to burn off.

STORING THE LANTERN AFTER USE

To store the Coleman lantern:

1. Ensure the lantern is cool.
2. Wipe and clean away any dirt.
3. Drain the fuel into a fuel storage container.
4. Place in a cool, dry location.

CONFIRMATION OF TEACHING POINT 4

QUESTIONS

Q1. How many pumps pressurize a lantern fuel tank?

Q2. Where is the match inserted to light the lantern?

Q3. How is a lantern extinguished?

ANTICIPATED ANSWERS

A1. Pump thirty to forty full strokes to pressurize a lantern fuel tank.

A2. Insert a lit match through the hole in the bottom of the burner frame.

A3. To extinguish, turn the control knob to the OFF position and allow the lantern to burn off the remaining fuel.

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Teaching point 5 **Explain, Demonstrate and Have the Cadets Practice Safely Handling of Field Tools**

Time: 15 min Method: Demonstration and Performance



For this skill lesson, it is recommended that instruction take the following format:

(1) Explain and demonstrate the complete skill while cadets observe.

(2) Explain and demonstrate each step required to complete the skill. Monitor cadets as they imitate each step.

(3) Monitor the cadets' performance as they practice the complete skill.

Note: Assistant instructors may be employed to monitor cadet performance.



When using tools, everyone should:

- Store tools in a secure place. Never leave them lying around or touching the ground.
- Always use the right tool for the job.
- Follow the safety procedures for using the equipment.
- Keep the edges and blades sharp and handles tight.
- Clean and lightly oil steel parts before storage.

AXE

Before using an axe, the tightness of the handle should be checked. If it is loose, the wedge needs to be driven further down or a new wedge should be made using hardwood. The handle must not be cracked or split.

Determining Sharpness

The axe blade should be sharp. If it is not, it can be dangerous, as it will not bite/cut properly and will tend to glance/skip off the wood being cut. Greater force will be required to use it, sacrificing control. A file is best for removing burrs (chips) on the axe blade, and a whetstone for sharpening the edge.

Holding

The axe should be carried by holding it by the handle just below the head, the cutting edge in front and pointing slightly away from the person.

Before storing, the axe should be carefully cleaned and put back in its sheath. When outdoors, the axe can also be driven into the dry stump of a dead tree when not in use.

Chopping Angle

To maximize chopping, cuts should be made at angles of 45 degrees. At angles less than 45 degrees, the axe can deflect off the tree. This can be very dangerous. At angles greater than 45 degrees, the axe will be ineffective as the blade will not chip away pieces of wood but just insert itself into the tree.

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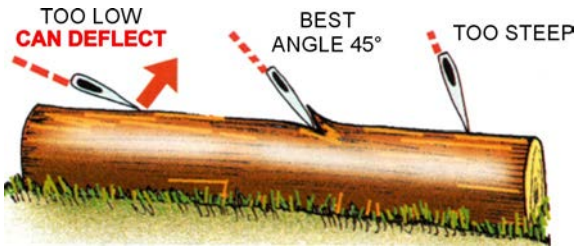

Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 409)

Figure 11 Chopping Angle

Direction of Fall

When using an axe to cut a tree:

1. Plan an escape route in case the tree falls toward you. Beware of hornets or wasp's nests.
2. Check that the axe is sharp and the head is secure on the handle.
3. Set up a safe distance from other people.
4. Remove any branches and nearby shrubs that can deflect the axe.
5. Secure footing.
6. Swing with short, smooth strokes. This will keep one on target.
7. Cuts are most efficient at 45 degree angles and easily eject wood chips.
8. Check the direction of lean.
9. Carefully cut until the tree is ready to fall. When the tree falls and other people are present, yell TIMBER!

The first cut should be made on the side of the tree facing the direction of the desired fall. This is often decided by the lean of the tree. The cut should not be more than halfway through the tree. The back cut commences slightly above and opposite the first cut. Both cuts should be at 45 degree angles.

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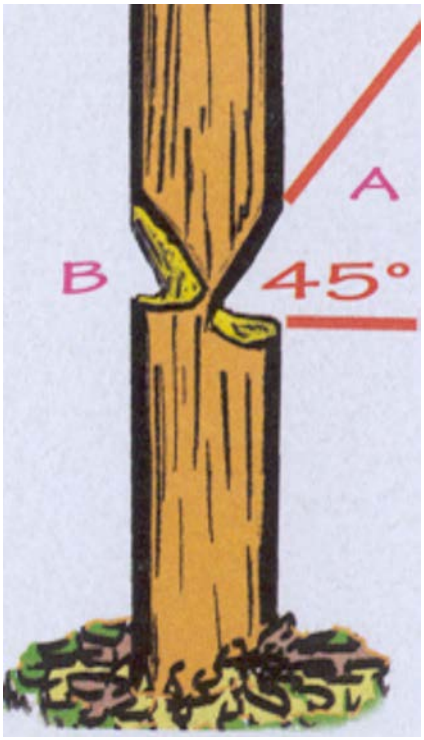


Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 496)

Figure 12 Direction of Fall

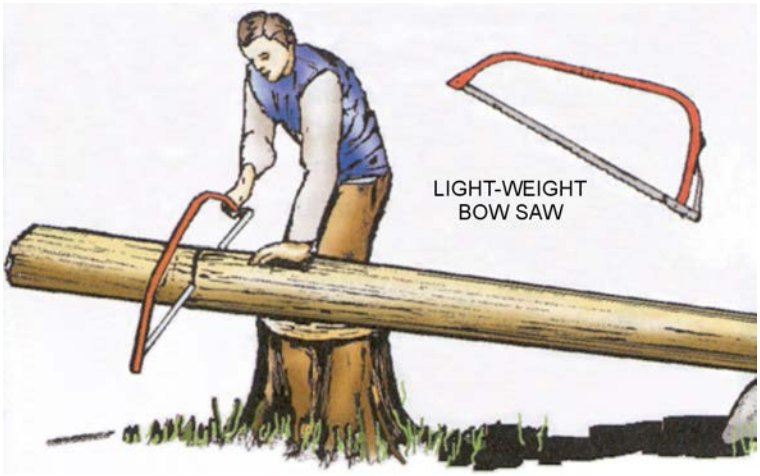
BOW SAW

Holding and Cutting a Log

When using a bow saw to cut wood:

1. Use steady strokes without excessive weight on the blade.

2. Ensure the wood is secured by using a log support. This will help prevent the saw from getting pinched by the log, allowing the weight of the cut end to open the cut (Figure 12).



Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 500)

Figure 13 Cutting a Log

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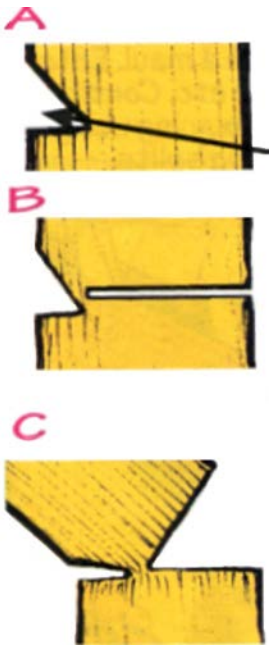
Direction of Fall

When using a bow saw to cut a tree:

3. Chop a notch with an axe in the direction the tree is to fall. This is called a bridge.

4. Saw on the opposite side of the tree from the notch, one or two inches above the lower surface of the notch (see Figure 14). This is very important because if sawn below the notch, the tree can kick back, pinch the blade and may go out of control.

5. Withdraw the saw when the tree starts to fall. The tree will fall with the help of the bridge.



Tawrell, P., Camping and Wilderness Survival, Leonard Paul Tawrell (p. 500)

Figure 14 Cutting a Tree With a Saw

ACTIVITY

Time: 10 min

OBJECTIVE

The objective of this activity is to practice chopping and sawing a log.

RESOURCES

- Logs for cadets to chop and saw;
- 1 axe per group; and
- 1 bow saw per group.

ACTIVITY LAYOUT

N/A.

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ACTIVITY INSTRUCTIONS

1. Divide cadets into groups of no more than five.
2. Cadets will cut and saw a log of wood using an axe and a bow saw.
3. Every cadet will be given an opportunity to cut and saw.

SAFETY

Cadets will be directly supervised by an instructor employing safe tool handling at all times.

CONFIRMATION OF TEACHING POINT 5

QUESTIONS

Q1. What should be checked on an axe before using it?

Q2. What angle will maximize the chop of an axe?

Q3. What type of strokes should be used when sawing?

ANTICIPATED ANSWERS

A1. Before using an axe, the tightness of the handle should be checked. The handle must not be cracked or split and the axe blade should be sharp.

A2. A 45 degree angle will maximize the chop of an axe.

A3. Use steady strokes without excessive weight on the blade.

END OF LESSON CONFIRMATION

QUESTIONS

Q1. What should be oiled on an axe after use?

Q2. What is the lowest operational temperature of the Coleman Stove?

Q3. Why do cadets not use Coleman Stoves or Lanterns in an enclosed space?

ANTICIPATED ANSWERS

A1. The steel head on an axe should be oiled after use.

A2. When shielded from the wind, the lowest operational temperature of a Coleman stove is -52° C.

A3. Stoves and Lanterns produce carbon monoxide which binds with haemoglobin resulting in effects such as depressed mood, apathy, disorientation, irritability, amnesia and even death.

CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.

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METHOD OF EVALUATION

N/A.

CLOSING STATEMENT

During a weekend bivouac FTX, everyone will use tools to construct portions of the bivouac site. It is key to know how to use the tools and equipment provided, as it will help ensure everyone's safety and will help keep the tools in good condition.

INSTRUCTOR NOTES/REMARKS

Fire extinguishers shall be located within 15 m of operating stoves and lanterns.

REFERENCES

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