ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL TWO

INSTRUCTIONAL GUIDE

SECTION 1

EO M290.01 – CONSTRUCT, LIGHT, MAINTAIN, AND EXTINGUISH A SIGNAL FIRE

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-802/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.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

An interactive lecture was chosen for TP1 and TP2 to present basic material and give direction on emergency signal fires.

Demonstration and performance was chosen for TP3 and TP4 as it allows the instructor to explain and demonstrate preparing a signal fire while providing an opportunity for the cadets to practice this skill under supervision.

INTRODUCTION

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet shall be expected to construct a luminous cone fire, apply fire safety principles and to light, maintain, and extinguish a signal fire.

IMPORTANCE

It is important for cadets to safely construct, light, maintain, and extinguish a signal fire. Signal fires will alert rescuers to your location if lost or injured.

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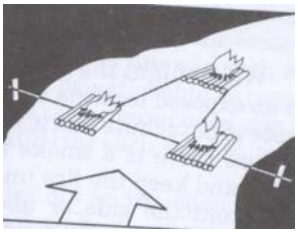
Teaching point 1 **Determine Types of Emergency Signal Fires**

Time: 5 min Method: Interactive Lecture

EMERGENCY SIGNAL FIRES

Three Fire Triangle Pattern

- Three fires is the internationally recognized distress signal. Ideally they should be placed in a triangle at equal distances apart, an arrangement which also makes them easier to feed with fuel. If that is not possible, any grouping will serve, provided that the fires are clearly separated. However, if fuel is scarce, or if you are too badly injured or too weak from hunger to maintain several fires, use only your campfire.



Wiseman, J., The SAS Survival Handbook, HarperCollins Publishers (p. 505)

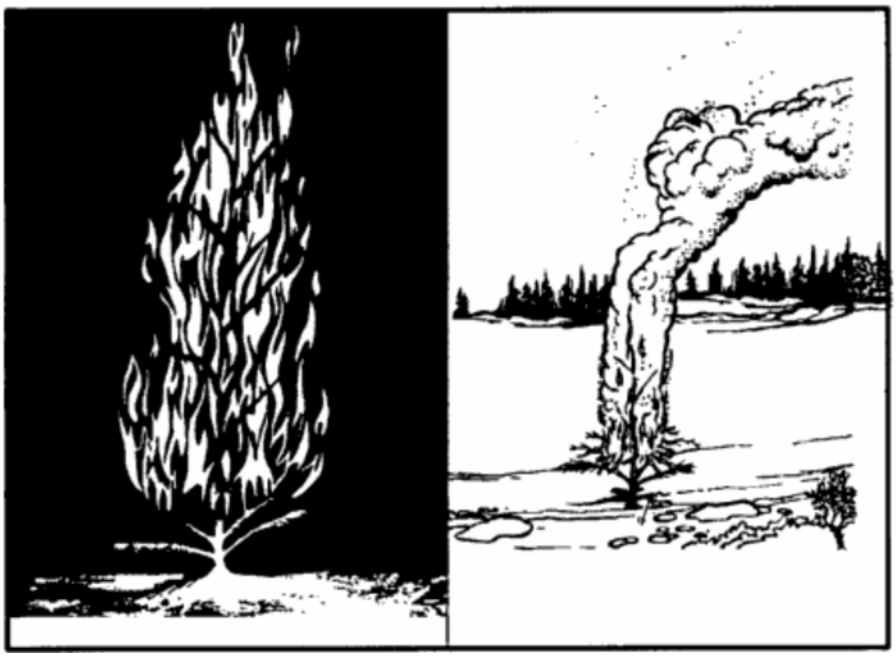
Figure 1 Three Fire Triangle Pattern

A Torch Tree

- Small isolated trees make excellent fire signals. Build a fire between the boughs. Place dry wood in the lower branches and ignite it so that the flames flare up and ignite the foliage. Before the primary tree is consumed, cut and add more small green trees to the fire to produce more smoke. If a tree is dead, start a fire at its base. It will burn for a long time, leaving you free to attend to other signals.

Always select an isolated tree so that you do not start a forest fire and endanger yourself or others.

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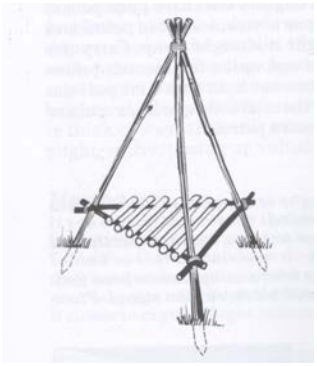
"Signalling Techniques", Wilderness Survival. Copyright 2007 by Jalic Inc. Retrieved 12 March 2007, from http://www.wilderness-survival.net/chpt19.php

Figure 2 A Torch Tree

A Luminous Cone Fire

- On a clear and open site, make a tripod with a platform to support a fire. The platform keeps the tinder off damp ground and you can store more firewood beneath it. Use a covering of evergreen boughs to keep the cone dry; they will burn brightly and give off good smoke. Cover the complete cone with brightly coloured material when the fire is not lit. This will not only keep the fire dry and ready to burn, but the material itself will be noticeable during the day, the material itself my attract attention. Take off the bright coloured material when you ignite the fire.

Keep these tripods well maintained, ensuring that wood is dry enough to light at a moment's notice and that the supply is not poached for other uses. Drive the pole ends into the ground to prevent tipping over in strong winds.



Wiseman, J., The SAS Survival Handbook, HarperCollins Publishers (p. 506)

Figure 3 A Luminous Cone Fire

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CONFIRMATION OF TEACHING POINT 1

QUESTIONS

Q1. Name three types of emergency signal fires.

Q2. What is a consideration when building a torch tree signal fire?

Q3. What is the internationally recognized distress signal?

ANTICIPATED ANSWERS

A1. A three fire triangle pattern, a torch tree, and a luminous cone fire.

A2. Always select an isolated tree so that you do not start a forest fire and endanger yourself and others.

A3. Three fires.

Teaching point 2 **Identify a Location To Be Seen From the Air**

Time: 5 min Method: Interactive Lecture

LOCATIONS FOR A SIGNAL FIRE WHICH CAN BE SEEN FROM THE AIR

Elevated Ground. Choose the highest points of terrain for light signals.

Highly Visible. Find a natural clearing or edge of a stream where you can build fires that the foliage will not hide.

Fuel Source

- Being in an area where there are readily available fuel sources for the signal fire would be highly beneficial.
- Some examples of fuel sources include:
  - dry, standing wood, and dry, dead branches;
  - dry inside (heart) of fallen tree trunks and branches;
  - green wood that is finely split;
  - dry grasses twisted into bunches;
  - peat dry enough to burn;
  - dried animal dung;
  - animal fats;
  - coal, oil shale, or oil laying on the surface; and
  - rubber, plastic or heavy oil to produce thick black smoke.

CONFIRMATION OF TEACHING POINT 2

QUESTIONS

Q1. Is high terrain or low terrain best for choosing a location for a signal fire?

Q2. What is a highly visible location?

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Q3. What are some examples of fuel sources?

ANTICIPATED ANSWERS

A1. The highest point of terrain is the best location.

A2. A natural clearing or edge of a stream.

A3. Dry, standing wood, and dry, dead branches; dry inside (heart) of fallen tree trunks and branches; green wood that is finely split; dry grasses twisted into bunches; peat dry enough to burn; dried animal dung; coal, oil shale, or oil laying on the surface; and rubber, plastic or heavy oil to produce thick black smoke.

Teaching point 3 — **Demonstrate and Have Cadets Collect Combustible Materials and Construct a Luminous Cone Signal Fire**

Time: 20 min — Method: Demonstration and Performance

COMBUSTIBLE MATERIALS



Examples of combustible materials include birch bark, dry grass, fine wood shavings, bird down, waxed paper and cotton fluff from clothing.



The instructor shall construct a luminous cone fire previous to the cadets' arrival for demonstration purposes.

PREPARING TO BUILD A FIRE

1. **Selecting and Preparing Tinder**

   a. Tinder is any kind of material that a minimum amount of heat will ignite.

   b. Good tinder needs only a spark to set it ablaze.

   c. Birch bark, dry grass, fine wood shavings, bird down, waxed paper and cotton fluff from clothing all make good tinder.

   d. Tinder must be dry.

   e. It is a good idea to carry tinder in a waterproof container.

2. **Selecting and Preparing Kindling**

   a. Kindling is the wood used to raise flames from the tinder so larger, less combustible materials can be burned.

   b. The best kindling consists of small, dry twigs and small pieces of soft wood.

   c. Kindling should not be collected straight from the earth because it is usually damp. It should be gathered from standing deadwood.

3. **Selecting and Preparing Fuel**

   a. Fuel is anything that will burn in the fire.

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b. Dry wood from standing trees should be used to get fires going.

c. Once the fire is established, greener and damp wood may be used.

d. Hardwoods include hickory, beech, maple and oak. These hardwoods burn well, give off heat, and last a long time as coals.

e. The fire can be maintained for a long period of time using hardwoods.

f. Softwoods burn very quickly and give off sparks. They can be used when lighting the fire.

g. Softwoods include cedar, alder, hemlock, spruce, pine, chestnut and willow.

h. After the fire is burning steadily, fuel that is three to four times the size of the kindling can be added.

ACTIVITY

Time: 15 min

OBJECTIVE

The objective of this activity is to have cadets build a luminous cone fire in groups of no more than 15.

RESOURCES

- String,
- Wood,
- Boughs,
- Tinder, and
- Kindling.

ACTIVITY LAYOUT

The area must be previously selected and the appropriate authorities must be notified. The area should be in an open space where there is no chance of spreading the fire to other trees or flammable sources.

ACTIVITY INSTRUCTIONS

Working as a member of a group of no more than 15, the cadets shall gather wood, green boughs (if available), tinder, and kindling to build the luminous cone fire. Each group shall construct a luminous cone fire according to the following steps:

1. Make a tripod to support a fire.
2. Using the string, lash the top of the tripod together and the side supports together.
3. Ensure pole ends are driven into the ground to prevent tipping.
4. Make a platform to hold the tinder, kindling and fuel.
5. Place tinder and kindling in the centre of the platform.
6. Ensure tinder and kindling are placed together in a fashion that will ignite the cone.
7. Ensure there is sufficient ventilation allowing oxygen to feed the fire when lit.
8. A fire will suffocate if there is too much fuel.

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9. Cover with green boughs (if available) to keep the cone dry.

10. Ensure there is a heat and smoke outlet at the top of the cone.



The instructor will ensure that all the cadets in the group participate in the activity. The questions in the confirmation of TP3 should be asked as the instructor moves from one group to the next.

SAFETY

Cadets will be supervised during the construction of the luminous cone fire.

CONFIRMATION OF TEACHING POINT 3

QUESTIONS

Q1. What holds the tinder and kindling in the centre of the tripod?

Q2. What do you use to keep the cone dry?

Q3. What prevents the tripod from tipping?

ANTICIPATED ANSWERS

A1. A platform.

A2. Green boughs.

A3. Ensure pole ends are driven into the ground to prevent tipping.

Teaching point 4 — **Explain, Demonstrate, and Have the Cadets Practice Lighting, Maintaining, and Extinguishing One Signal Fire**

Time: 20 min — Method: Demonstration and Performance

ACTIVITY

OBJECTIVE

The objective of this activity is to have the cadets practice lighting, maintaining and extinguishing one signal fire.

RESOURCES

- String,
- Matches,
- Wood/kindling/tinder,
- Water,
- Fire extinguishing equipment, and
- Shovel.

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ACTIVITY LAYOUT

Provide each group of cadets with a match to light the signal fire.

ACTIVITY INSTRUCTIONS



The instructor will review lighting a fire, maintaining a fire and extinguishing a fire.

LIGHTING A FIRE

1. **Lighting Using a Match**

   a. Matches are the easiest way to start a fire.

   b. They produce a flame instantly when struck against a striking pad.

   c. The biggest problem with matches is that in windy or wet conditions they may not be useful.

   d. They will not ignite if the striking pad becomes wet or worn.

   e. The matches should be packed in waterproof containers so that they cannot rub or rattle together and accidentally ignite.

   f. Waterproof matches are the most effective kind to include in a survival kit.

MAINTAINING AND EXTINGUISHING A FIRE

1. **Maintaining a Fire**

   a. A fire should never be left unattended.

   b. It takes only seconds for a fire to begin burning out of control.

   c. Immediately after a fire has been started, it requires a modest amount of wood to build up heat.

   d. The fire requires very little wood to keep it burning once a good amount of wood is built up.

   e. Too much wood should not be put on the fire at once as it may smother the fire.

   f. Suitably sized wood should only be put on the fire (e.g. less than 45 cm).

   g. The fire must have proper ventilation so that oxygen may feed the fire.

   h. A fire is only to be built to a controllable size.

2. **Extinguish a Fire**

   a. Water is the easiest way to put out a fire.

   b. Water should be dumped on the fire until it results in no heat emanating from the centre.

   c. All of the sparks are to be out prior to decamping. The fire is to be smothered completely with wet earth or sand.

SAFETY

Ensure all safety precautions are taken when the cadets are lighting, maintaining and extinguishing the fires.

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CONFIRMATION OF TEACHING POINT 4

QUESTIONS

Q1. What is fuel?

Q2. What is the purpose of kindling?

Q3. Name two of the methods of extinguishing a fire.

ANTICIPATED ANSWERS

A1. Fuel is anything that burns (wood, oil, animal fats, etc.).

A2. Kindling is the wood used to raise flames from the tinder so that larger, less combustible materials can be burned.

A3. The ways to extinguish a fire are with water, wet earth, or wet sand.

END OF LESSON CONFIRMATION

The cadets' participation in TPs 3 and 4 will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

N/A.

CLOSING STATEMENT

Safety is a key concern when dealing with fire. Principles of fire safety must be applied before beginning the steps in lighting a fire. Knowing how to construct a signal fire in a survival situation is important as a signal fire will help attract help to the survival location.

INSTRUCTOR NOTES/REMARKS

- The instructor shall demonstrate lighting the first of the prepared signal fires.
- Additional supervision is required during the lighting of the signal fires. Fire safety equipment shall also be present.
- Appropriate authorities (e.g. local police, forestry service, and/or airport authority) shall be notified of the lighting of the signal fires to include: squadron contact name, squadron contact number, location including grid reference, estimated time of lighting, and the duration the fire is expected to be lit.

REFERENCES

C2-016 (ISBN 0-517-88783-5) Curtis, R. (1998). *The Backpacker's Field Manual: A Comprehensive Guide to Mastering Backcountry Skills.* New York, NY: Three Rivers Press.

C2-042 (ISBN 0-7566-0946-1) Berger, K. (2005). *Backpacking and Hiking.* New York, NY: DK Publishing, Inc.

Unofficial convenience copy of A-CR-CCP-802/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-802-PF-001/A-CR-CCP-802-PF-001.pdf.
Verify against the official publication.

C3-002 (ISBN 0-00-653140-7) Wiseman, J. (1999). *The SAS Survival Handbook.* Hammersmith, London: HarperCollins Publishers.

C3-003 (ISBN 1-896713-00-9) Tawrell, P. (1996). *Camping and Wilderness Survival: The Ultimate Outdoors Book.* Green Valley, ON: Falcon Distribution.

C3-118 Wilderness Survival. (2007). *Signalling Techniques.* Retrieved 12 March 2007, from http://www.wilderness-survival.net/chpt19.php.

Unofficial convenience copy of A-CR-CCP-802/PF-001, cached 2026-11-08 from https://app.cadets.gc.ca/cadet-publications/A-CR-CCP-802-PF-001/A-CR-CCP-802-PF-001.pdf.
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