ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL FOUR

INSTRUCTIONAL GUIDE

SECTION 5

EO C431.03 – FLY A RADIO-CONTROLLED AIRCRAFT

Total Time: 90 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-804/PG-001, *Proficiency Level Four Qualification Standard and Plan*, 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.

Construct and / or assemble a radio-controlled aircraft for use by cadets.

Charge multiple batteries for use with radio-controlled aircraft.

Assistant instructors are required for this lesson.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

A practical activity was chosen for this lesson as it is an interactive way to introduce the cadets to flying a radio-controlled aircraft in a safe and controlled environment. This activity contributes to the development of skills and knowledge in a fun and challenging setting.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have flown a radio-controlled aircraft.

IMPORTANCE

It is important for cadets to fly a radio-controlled aircraft as it provides an opportunity to apply the principles of flight in a fun and practical way.

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Teaching point 1 **IAW the instructions supplied with the radio-controlled aircraft and the Model Aeronautics Association of Canada (MAAC) safety code, have the cadet fly a radio-controlled aircraft.**

Time: 80 min Method: Practical Activity

BACKGROUND KNOWLEDGE

Radio-Controlled Aircraft

Radio-controlled aircraft are more complicated and expensive than free-flight gliders or rubber-powered airplanes. They are an exciting way to apply the principles of flight in a practical way. They can be scratch-built from plans, built from kits, assembled from almost-ready-to-fly (ARF) kits, or assembled from ready-to-fly (RTF) packages.

Small, light-weight, electric-powered helicopters are also a viable alternative to a conventional radio-controlled airplane. They are available in different sizes in RTF packages and can be flown indoors in smaller spaces than required by an airplane. Most micro-helicopters on the market use counter-rotating main rotors that make a stable, easy-to-hover helicopter.



The Blade CX Series (CX, CX2, CX3 and MCX), from E-Flite are among the most popular entry-level helicopters. They come in an RTF package and include a radio transmitter-receiver combination that allows multiple aircraft to operate at the same time without interference.

Figures 1 and 2 show the Blade CX2 and Blade MCX, respectively.

When learning to operate a radio-controlled helicopter, it is recommended that a training gear set is attached to the landing skids to reduce rollovers as shown in Figure 3.

Ensure that there is an ample supply of spare parts (blades, shafts, and heads) available to repair any damages caused by a crash.

Having multiple batteries available (a minimum of three per helicopter) minimizes the time spent waiting while batteries are recharging.

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Note. From "Horizon Hobby", E-Flite Blade CX2. Retrieved November 5, 2008, from http://www.horizonhobby.com/Products/Gallery.aspx?ProdID=EFLH1250&Index=0

Figure 1 Blade CX2



Note. From "Horizon Hobby", E-Flite Blade MCX. Retrieved November 5, 2008, from http://www.horizonhobby.com/Products/Gallery.aspx?ProdID=EFLH2200&Index=4

Figure 2 Blade MCX

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Verify against the official publication.



Note. From "Elite Models", Blade CX2. Retrieved November 5, 2008, from http:// www.elitemodelsonline.co.uk/Products/Helicopters/Helicopters+Spares/E-Flite/Blade+CX2

Figure 3 Blade CX2 With Training Gear Installed



A radio-controlled airplane can be built easily and quickly from common materials such as corrugated plastic (commonly used for signs) and polyvinyl chloride (PVC) downspout. These simple plastic airplane designs (SPADs) are inexpensive and durable.

Information and free plans for SPADs can be found at http://www.spadtothebone.com

The Debonair is designed to be used as a trainer and is shown at Figure 4.



Note. Created by Director Cadets 3, 2008, Ottawa, ON: Department of National Defence.

Figure 4 SPAD Debonair

RTF packages (containing an airframe, engine or motor, radio gear, and hardware) can be assembled in a few hours and generally contain almost everything needed to go flying except for field items such as:

- glue,
- starting equipment, and
- fuel / batteries.

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Figure 5 and 6 shows examples of an RTF aircraft suitable for first-time fliers. The Vapor Bind-N-Fly model also comes as the Vapor RTF model which includes the radio transmitter and is for indoor flying only.



Note. From "Hangar 9", Alpha 40 DSM2 RTF. Retrieved November 5, 2008, from http://www.hangar-9.com/Products/Default.aspx?ProdID=HAN4400

Figure 5 Alpha 40 DSM2 RTF



Note. Created by Director Cadets 3, 2008, Ottawa, ON: Department of National Defence.

Figure 6 Vapor Bind-N-Fly

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Computer simulators for radio-controlled aircraft are available and can be used to provide training in a safe and controlled environment without having to worry about the cost and time associated with repairing an aircraft after a crash.

Most of the simulators available come with a "transmitter" that is almost identical to the ones used for real radio-controlled aircraft that plug into the computer through a USB port, and a set of CDs / DVDs to install the program.

Testimonials from many people indicate the number and severity of crashes are reduced by spending time on the simulator prior to flying the radio-controlled aircraft. Additionally, most simulators have many different radio-controlled aircraft included, which allows the pilot to experiment with various aircraft types.



Popular radio-controlled aircraft simulators include:

- RealFlight (Knife Edge Software), and
- FS One (Hangar 9).

ACTIVITY

OBJECTIVE

The objective of this activity is to have the cadets fly a radio-controlled aircraft.

RESOURCES



If an aircraft has to be constructed before flying, complete by:

- setting up a desk or table for each cadet (or group of cadets);
- placing the required construction and / or assembly tools and materials on the tables;
- showing a completed model aircraft to the cadets;
- describing the parts and components of the model aircraft to the cadets; and
- having the cadets construct and / or assemble the model aircraft IAW the plans and / or instructions.

- Radio-controlled aircraft,
- Starting equipment,
- Fuel / batteries,
- Battery charger, and
- Transmitter.

ACTIVITY LAYOUT

Large indoor area (eg, gymnasium or drill hall) or a large outdoor area for flying a radio-controlled aircraft IAW regulations and safety guidelines set out by Model Aeronautics Association of Canada (MAAC).

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ACTIVITY INSTRUCTIONS

1. Demonstrate to the cadets how to fly the radio-controlled aircraft to include:
   a. taking off;
   b. flying a circuit; and
   c. landing.
2. Have the cadets fly the radio-controlled aircraft IAW the plans and / or the instructions.

SAFETY

Assistant instructors will monitor the cadets to ensure they are following the instructor's directions and using all equipment safely.



All radio-controlled aircraft activities shall be conducted IAW the regulations and safety guidelines set out by MAAC.

Flying a radio-controlled aircraft should not be attempted without assistance from an experienced radio-controlled aircraft pilot. A list of MAAC sanctioned clubs can be found at http://www.maac.ca/clubs/maac_clubs_map.php.

CONFIRMATION OF TEACHING POINT 1

The cadets' participation in this activity will serve as the confirmation of this TP.

END OF LESSON CONFIRMATION

The cadets' participation in flying a radio-controlled aircraft will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING / PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Flying a radio-controlled aircraft is a fun and challenging way to apply the principles of flight.

INSTRUCTOR NOTES / REMARKS

It is recommended that the three periods required for this EO be scheduled consecutively.

The radio-controlled aircraft can be flown individually or in small groups of two to four cadets.

Assistant instructors are required for this lesson.

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Suitable model aircraft may be chosen from the following:

- Blade CX2 / CX3 (radio-controlled electric helicopter),
- Blade MCX (radio-controlled electric helicopter),
- SPAD Debonair (radio-controlled airplane),
- Alpha 40 DSM2 RTF (radio-controlled airplane),
- Vapor Bind-N-Fly / RTF(radio-controlled airplane), and / or
- an alternate choice (or choices) selected by the squadron.

The helicopter being selected should have the counter-rotating rotor system with a 2.4 GHz radio transmitter.

Radio-controlled aircraft simulators such as RealFlight (Knife Edge Software) or FS One (Hangar 9) that run on a personal computer can also be used.

REFERENCES

C3-303 Model *Aeronautics Association of Canada Safety Code*. (2008). Retrieved February 5, 2009, from http://www.maac.ca/docs/2007/maac_safety_code_v008sept30_08_english.pdf

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