ROYAL CANADIAN AIR CADETS

PROFICIENCY LEVEL ONE

INSTRUCTIONAL GUIDE

SECTION 2

EO M130.02 – DESCRIBE THE MAIN COMPONENTS OF AN AIRPLANE

Total Time: 30 min

PREPARATION

PRE-LESSON INSTRUCTIONS

Resources needed for the delivery of this lesson are listed in the lesson specification located in A-CR-CCP-801/PG-001, *Proficiency Level One 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.

Create enough puzzle envelopes for each group with puzzle pieces as outlined at Attachments A to D. It is recommended that the cards be printed on heavy stock (450 g/m^2 / 120 lb) paper.

PRE-LESSON ASSIGNMENT

Nil.

APPROACH

An interactive lecture was chosen for this lesson as it allows the cadets to identify and describe the major components of an airplane and it generates interest in the subject.

INTRODUCTION

REVIEW

Nil.

OBJECTIVES

By the end of this lesson the cadet shall have described the main components of an airplane.

IMPORTANCE

A basic understanding of the components of an airplane provides a foundation for further aviation learning. It creates a familiarity that contributes to the cadets' appreciation of the familiarization flying and aviation tour experiences.

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Before starting the class, split the cadets into groups as described in the activities. This allows for the class to be conducted within time limits.

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Teaching point 1 **Define aircraft and airplane. Describe the fuselage.**

Time: 5 min Method: Interactive Lecture

DEFINITIONS

Aircraft

“An aircraft is a device that is used or intended to be used for flight in the air. Some examples of aircraft are hot air balloons, blimps, gliders, planes, helicopters, and hang-gliders.”

Aviation Safety Board, 2007.

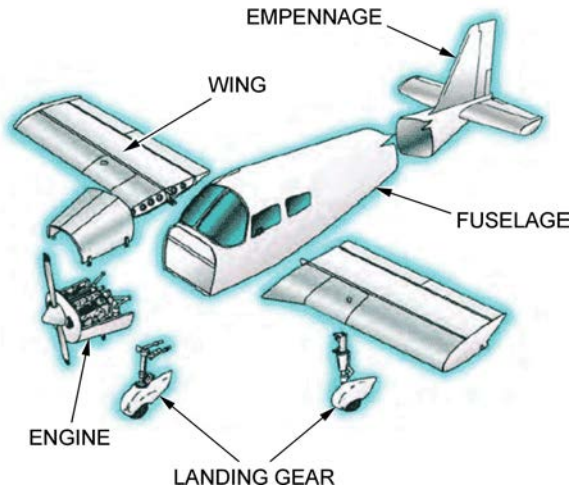
Airplane

“An airplane is a power-driven, heavier-than-air aircraft deriving its lift in flight from aerodynamic reactions (lift) on surfaces that remain fixed under given conditions of flight (wings).”

MacDonald, 2006.

FUSELAGE

The fuselage is the body of the aircraft, designed to accommodate the crew, passengers and cargo. The cockpit or crew flight deck is the part of the fuselage where the pilot and flight crew operate the aircraft. The fuselage is the structural body to which the wings, the tail section, landing gear and (in most small aircraft) the engine are attached.



Note: From Free Online Private Pilot Ground School. (2007). Private Pilot Ground School. Retrieved December 14, 2011 from http://www.free-online-private-pilot-ground-school.com/aircraft-structure.html

Figure 1 Airplane Components

ACTIVITY

Time: 1 min

OBJECTIVE

This objective of this activity is to familiarize the cadet with the five components of an airplane.

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RESOURCES

Basic Airplane Component Puzzle Pieces, one set per group.

ACTIVITY LAYOUT

Divide the class into groups of four or less. Cadets will work in the same groups for all the puzzle activities.

ACTIVITY INSTRUCTIONS

1. Provide each group with an envelope of puzzle pieces.
2. Give the groups one minute to put together the puzzle.

SAFETY

Nil.

INSTRUCTOR GUIDELINES

- Confirm the puzzles are assembled correctly.
- Assist cadets experiencing difficulty with the activity.

CONFIRMATION OF TEACHING POINT 1

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

Teaching point 2 **Describe the wings.**

Time: 5 min Method: Interactive Lecture



See Figure 1 – Airplane components to reference the location of these parts.

WINGS

The fuselage is fitted with a wing on each side. The primary purpose of the wings is to support the aircraft in flight by producing lift.

The **wing root** is where the wing meets the fuselage.

The **wing tip** is the part farthest from the fuselage.

The **leading edge** is the front edge of the wing running from wing root to wing tip. The trailing edge is the back edge of the wing running from wing root to wing tip.

Ailerons are moveable surfaces that are hinged to the trailing edge of each wing, close to the wingtip. The ailerons control roll. Roll is the banking of the aircraft to the left and the right. The ailerons move in opposite directions to each other.

Flaps are moveable surface that are hinged to the trailing edge of each wing, closer to the wing root than the ailerons. They can be used during landing and take-off to provide more controlled flight at slower airspeeds. Flaps are operated with a lever or hand-wheel in the cockpit.

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ACTIVITY

Time: 1 min

OBJECTIVE

The objective of this activity is to familiarize the cadet with the fuselage and wings.

RESOURCES

Fuselage and Wing Puzzle Pieces, one set per group.

ACTIVITY LAYOUT

Cadets will work in the same groups as the previous puzzle activity.

ACTIVITY INSTRUCTIONS

1. Provide each group with an envelope of puzzle pieces.
2. Give the groups one minute to put together the puzzle.

SAFETY

Nil.

INSTRUCTOR GUIDELINES

- Confirm the puzzles are assembled correctly.
- Assist cadets experiencing difficulty with the activity.

CONFIRMATION OF TEACHING POINT 2

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

Teaching point 3 **Describe the empennage.**

Time: 5 min Method: Interactive Lecture

EMPENNAGE

The empennage refers to the whole tail section of a plane. It includes the horizontal stabilizer, elevator, vertical stabilizer, and rudder.

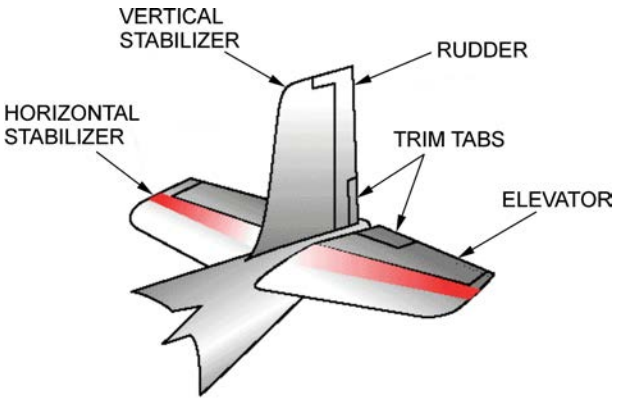
The **horizontal stabilizer** is at the back of the aircraft, and helps keep the aircraft stable as it flies through the air. The horizontal stabilizer does not move.

The **elevator** is hinged to the horizontal stabilizer and is operated by moving the control column forward and backward. The elevator controls pitch. Pitch is the up and down movement of the aircraft's nose.

The **vertical stabilizer**, also called the fin, is an upright surface on the empennage. It helps keep the aircraft stable as it flies through the air. The vertical stabilizer does not move.

The **rudder** is hinged to the fin and is operated by the rudder pedals in the cockpit. The rudder controls yaw. Yaw is the side-to-side movement of the aircraft.

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Note: From Free Online Private Pilot Ground School. (2007). Private Pilot Ground School. Retrieved December 14, 2011 from http://www.free-online-private-pilot-ground-school.com/aircraft-structure.html

Figure 2 Empennage Components

ACTIVITY

Time: 1 min

OBJECTIVE

The objective of this activity is to familiarize the cadet with the empennage.

RESOURCES

Empennage Puzzle Pieces, one set per group.

ACTIVITY LAYOUT

Cadets will work in the same groups as the previous puzzle activity.

ACTIVITY INSTRUCTIONS

1. Provide each group with an envelope of puzzle pieces.
2. Give the groups one minute to put together the puzzle.

SAFETY

Nil.

INSTRUCTOR GUIDELINES

- Confirm the puzzles are assembled correctly.
- Assist cadets experiencing difficulty with the activity.
- This puzzle will attach to the puzzle from TP2.

CONFIRMATION OF TEACHING POINT 3

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

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Teaching point 4 **Describe the landing gear.**

Time: 5 min Method: Interactive Lecture

LANDING GEAR

Landing gear on an airplane is like the tires on a car. The landing gear supports the aircraft when it is on the ground and absorbs the shock of landing. All aircraft have their landing gear under the main part of the fuselage or wings. Landing gear can be fixed or retractable. Fixed gear is attached to the airplane in a permanent position. Retractable gear can fold up into the wings or the fuselage.

There are two main landing gear configurations. Both configurations have the main wheels or main gear toward the middle of the aircraft. In a nose wheel configuration (also called tricycle) there is another wheel or gear under the nose. In a tail wheel configuration (also called conventional or tail dragger) there is another wheel or gear under the tail.



Note: From Bush-Planes.com. Best bush planes: flying. Retrieved December 14, 2011 from http://www.bush-planes.com/index.html

Figure 3 Nose Gear v. Tail Gear

CONFIRMATION OF TEACHING POINT 4

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

Teaching point 5 **Describe the propulsion system.**

Time: 5 min Method: Interactive Lecture

PROPULSION SYSTEM

Power is produced by an internal combustion engine (the same as a car) with a two or three bladed propeller or a gas turbine (jet) engine. A jet can be used to power a propeller – this is called a turboprop engine.

The cowling (also called the nacelle) is like the hood of a car. It encloses the engine and streamlines the airplane to reduce drag. The cowling provides cooling of the engine by ducting cool air around the engine.

ACTIVITY

Time: 1 min

OBJECTIVE

This objective of this activity is to familiarize the cadet with the landing gear and propulsion system.

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RESOURCES

Landing Gear and Propulsion System Puzzle Pieces, one set per group.

ACTIVITY LAYOUT

Cadets will work in the same groups as the previous puzzle activity.

ACTIVITY INSTRUCTIONS

1. Provide each group with an envelope of puzzle pieces.
2. Give the groups one minute to assemble the puzzle.

SAFETY

Nil.

INSTRUCTOR GUIDELINES

- Confirm the puzzles are assembled correctly.
- Assist cadets experiencing difficulty with the activity.
- This puzzle will attach to the puzzle from TP3.

CONFIRMATION OF TEACHING POINT 5

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

END OF LESSON CONFIRMATION

The cadets' participation in the activities will serve as the confirmation of this lesson.

CONCLUSION

HOMEWORK / READING/PRACTICE

Nil.

METHOD OF EVALUATION

Nil.

CLOSING STATEMENT

Being able to describe the main components of an airplane gives the cadets the knowledge needed to appreciate and successfully participate in further aviation lessons.

INSTRUCTOR NOTES / REMARKS

Nil.

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