

CHAPTER 12
PO 130 – PARTICIPATE IN AVIATION ACTIVITIES



ROYAL CANADIAN AIR CADETS

LEVEL ONE

INSTRUCTIONAL GUIDE



SECTION 1

EO M130.01 – IDENTIFY AIRCRAFT AS MILITARY, CIVILIAN AND CADET

Total Time:

60 min

INTRODUCTION

PRE-LESSON INSTRUCTIONS

A complete list of resources needed for the instruction of this EO is located at Chapter 2 of the QSP. Specific uses for said stores are identified throughout the Instructional Guide, within the teaching point for which they are required.

Prior to instructing this lesson the instructor shall:

- review the lesson content, and become familiar with the material;
- review the slide presentation found in Annex A to incorporate the visuals with the delivery of the material;
- set-up equipment for visual presentation; and
- prepare matching cards as described in the activity of TP4.



The training aids for this EO can be presented in a number of ways, depending on the resources available at the squadron. This equipment may include a computer and projector for a PowerPoint presentation, an overhead projector for overheads or preparation of posters.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

The interactive lecture method was chosen as it allows the instructor to make a semi-formal presentation of the material where the cadets can participate by asking or responding to questions and commenting on the material. For this lesson, this method is most effective as it matches well the taxonomic level of the material and is age-appropriate by virtue of its participatory nature.

The small group activity was selected to allow for maximum participation in the learning process. It is an interactive way to illustrate and substantiate the lesson material in a concrete manner.

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet shall identify examples of military, civilian and cadet aircraft.

IMPORTANCE

Basic aircraft identification creates a base of understanding for further aviation topics. It adds value to additional aviation activities such as aerodrome tours, air shows and familiarization flying. It also fosters an interest in the military and civilian aviation communities by introducing cadets to aircraft commonly found in those communities.

Teaching Point 1

Identify Types of Canadian Military Aircraft

Time: 9 min

Method: Interactive Lecture

CANADIAN MILITARY AIRCRAFT

Military aircraft are used for a wide variety of tasks. These tasks include training, transport, maritime patrol, defence and search and rescue. Most military aircraft are painted flat grey or camouflage for low visibility. Those high visibility planes used for Search and Rescue (SAR) work are painted bright yellow and red.

CT-114 TUTOR

The CT-114 Tutor may be the most well known aircraft flown by the Canadian Forces (CF). It is the plane flown in the Snowbirds air demonstration squadron. The Tutor was used as a training aircraft from 1971 until 2000. It was designed and built in Canada. The Tutor has a single jet engine, low wings and a T-tail.



http://www.airforce.forces.gc.ca/today5_e.asp

Figure 12-1-1 CT-114 Tutor

CC-115 BUFFALO

The CC-115 Buffalo is mainly used for SAR operations. It has short take-off and landing (STOL) capability, which is ideal for rough landing strips. It is able to fly in almost any weather. The Buffalo is painted a highly visible yellow. It has two turboprop engines, high wings and a T-tail.



http://www.airforce.forces.gc.ca/today5_e.asp

Figure 12-1-2 CC-115 Buffalo

CC-130 HERCULES

The CC-130 Hercules is one of the most multi-purpose transport planes. It is used to airlift troops, equipment and cargo. It is also used in SAR operations and in air-to-air refuelling of fighters. With its rear cargo ramp, rugged landing gear, good short-field performance and high ground clearance of engines/propellers, the C-130 is designed to operate from unimproved airstrips in active military areas. The Hercules has four turboprop engines, high wings and a distinctively large tail.



http://www.airforce.forces.gc.ca/today5_e.asp

Figure 12-1-3 CC-130 Hercules

CC-150 A310 POLARIS

The CC-150 Polaris is the military version of a popular civilian commercial airliner, the Airbus A310-300. The main role of the Polaris is long-range transport of personnel and equipment. It can transport up to 194 passengers or 32 000 kg of cargo. The CC-150 is a wide-body, two engine turbojet with low wings.



http://www.airforce.forces.gc.ca/today5_e.asp

Figure 12-1-4 CC-150 Polaris

CP-140 AURORA

The CP-140 Aurora is a maritime patrol aircraft. It carries special sensing equipment aboard so it can detect and monitor boats and submarines. The prominent tail boom is the most obvious feature of this aircraft. It has four turboprop engines and low wings.



http://www.airforce.forces.gc.ca/today5_e.asp

Figure 12-1-5 CP-140 Aurora

CF-18 HORNET

The CF-18 Hornet is a high-performance twin-engine jet fighter that can perform air-to-air combat or ground-attack roles. The most visible difference of the CF version of this aircraft is a paint scheme incorporating a “spoof” canopy on the underside of the front fuselage. This “spoof” canopy is used to confuse an opponent in

the heat of a dogfight as to “which side is up”. The distinctive angled twin vertical fins on the tail most easily identify the CF-18.



http://www.airforce.forces.gc.ca/today5_e.asp

Figure 12-1-6 CF-18 Hornet

CH-146 GRIFFON

The CH-146 Griffon is Canada's Utility Transport Tactical Helicopter (UTTH). It performs a wide variety of roles that include airlift of equipment and personnel, command and liaison flights, surveillance and reconnaissance, casualty evacuation, logistic transport, search and rescue, counter-drug operations and domestic relief operations. The Griffon has a four-blade main rotor and landing skids. It has a camouflage paint scheme.



http://www.airforce.forces.gc.ca/today5_e.asp

Figure 12-1-7 CH-146 Griffon

CH-149 CORMORANT

The CH-149 Cormorant is a SAR helicopter. It has three powerful engines that drive a five-bladed rotor. Its ice protection system allows it to operate in continuous icy conditions. It is also able to withstand high winds. These features make it ideal for Canada's demanding geography and climate. The Cormorant has rear-ramp access and a large amount of cabin space. It can carry 12 stretchers or a load of 5000 kg. Unlike the Griffon, the Cormorant has retractable landing gear and is painted bright yellow.



http://www.airforce.forces.gc.ca/today5_e.asp

Figure 12-1-8 CH-149 Cormorant

CONFIRMATION OF TEACHING POINT 1

QUESTIONS

- Q1. What type of aircraft is this? (Show CC-130 Hercules)
- Q2. What type of aircraft is this? (Show CT-114 Tutor)

Q3. What type of aircraft is this? (Show CH-146 Griffon)

ANTICIPATED ANSWERS

- A1. Military, CC-130 Hercules.
- A2. Military, CT-114 Tutor.
- A3. Military, CH-146 Griffon.

Teaching Point 2

Identify Civilian Aircraft

Time: 8 min

Method: Interactive Lecture

CIVILIAN AIRCRAFT

Civilian aircraft are used in a wide variety of roles including recreational, training, and transportation of people and cargo. Civilian aircraft have a wide range of paint schemes and use more colors than military aircraft. These aircraft are seen at civilian aerodromes.

CESSNA 172

The Cessna 172 is commonly used for primary flight training and familiarization flying. It is a four seat aircraft that has high wings, tricycle landing gear and a single propeller.



<http://www.airliners.net/search/photo.search?id=277285>

Figure 12-1-9 Cessna 172

PIPER PA-28 CHEROKEE

Another popular recreational and training aircraft is the Piper PA-28 Cherokee. This aircraft has low wings, tricycle landing gear and a single propeller.



<http://www.airliners.net/search/photo.search?id=246912>

Figure 12-1-10 Piper PA-28

BOEING 737

The Boeing 737 is one of the world's most popular commercial jet transport aircraft. It is a short to medium range airplane. It can carry 85 to 189 passengers, depending on the model. The Boeing 737 is flown by airlines including WestJet. The Boeing 737 has a low-wing configuration and tricycle landing gear, like most commercial transport planes. It has two turbofan jet engines mounted under the wings.



<http://www.airliners.net>

Figure 12-1-11 Boeing 737

AIRBUS A320

The Airbus A320 is a very popular commercial jet transport aircraft. It can carry 100 to 220 passengers, depending on the model. The Airbus 320 also has a low-wing configuration, nose gear, and two turbofan jet engines mounted under the wings. The biggest difference between the Airbus and the Boeing 737 is the technology in the cockpit. Airbus uses computer technology to a greater extent than Boeing. Air Canada flies the Airbus A320, and several other Airbus models.



<http://www.airliners.net/search/photo.search?id=313545>

Figure 12-1-12 Airbus A320

CONFIRMATION OF TEACHING POINT 2

QUESTIONS

- Q1. What type of aircraft is this? (Show Piper PA-28)
- Q2. What type of aircraft is this? (Show Boeing 737)
- Q3. What type of aircraft is this? (Show Cessna 172)

ANTICIPATED ANSWERS

- A1. Civilian, Piper PA-28.
- A2. Civilian, Boeing 737.
- A3. Civilian, Cessna 172.

Teaching Point 3**Identify Cadet Aircraft**

Time: 5 min

Method: Interactive Lecture

CADET AIRCRAFT

Cadet aircraft are used for training and familiarization flying. They are usually painted bright yellow and blue. (The term “cadet aircraft” is intended to mean aircraft currently owned by the Cadet Program and does not include other aircraft cadets may use on Power Flying Scholarships (Cessnas, Katanas, etc.).)

SGS 233A GLIDER

The Schweizer SGS 233A is the glider used by the Air Cadet Program for training and familiarization flying. It is a sturdy, two-place glider, with high wings. It can be launched by auto-tow, winch or tow-plane.



<http://www.aircadetleague.com/manitoba/Gliding.html>

Figure 12-1-13 SGS 233A Glider

BELLANCA SCOUT

The Bellanca Scout is one of the types of tow-planes used in the Air Cadet Gliding Program. It is a two-place tandem (front and back seating, instead of side by side), high wing, tail-dragger aircraft.



<http://www.aircadetleague.com/manitoba/Gliding.html>

Figure 12-1-14 Bellanca Scout

L19 BIRD DOG

The L19 Bird Dog is another tow-plane used in the Air Cadet Gliding Program. Like the Scout, the Bird Dog is a two-place tandem, high wing, tail-dragger aircraft. However, the L19 has a rear window, and more of a bend to the fuselage than the Scout.



Figure 12-1-15 L19 Bird Dog

Teaching Point 4**Participate in an Aircraft Identification Activity**

Time: 30 min

Method: Activity

ACTIVITY**OBJECTIVE**

This activity is designed to allow the cadets to practice identifying military, civilian and cadet aircraft by participating in a memory matching game.

RESOURCES

One set of aircraft identification matching cards per group.

ACTIVITY LAYOUT

If the class has six or fewer cadets, conduct the activity as one group.

1. Divide cadets into groups of four or less.
2. Each group will get one set of aircraft identification matching cards found in Annex B. The cards should be laid out in a six by five grid, face down.
3. The first cadet will turn two cards over.
 - If it is not a match, the cards are turned back face down, and it becomes another cadet's turn.
 - If it is a match, the cadet must identify the match.
 - If the cadet is unable to identify the match, the cards are turned back over and the turn passes to the next cadet.
 - If the cadet is unable to identify the match, the cards are turned back over and the turn passes to the next cadet.
 - If the cadet identifies the match, the cadet keeps the two cards, and takes another turn.
4. The game can be repeated as time allows, mixing-up the groups.

SAFETY

N/A.

INSTRUCTOR GUIDELINES

- Circulate among the groups to supervise and assist as necessary.
- Answer questions the cadets have about the activity.
- Ensure cadets are able to correctly identify the matching pairs before removing them from the grid.
- Offer encouragement and confirm success as the groups progress through their games.

CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.



Cadets can keep a log of airplanes they see, and identify them according to the categories discussed in this lesson.

METHOD OF EVALUATION

There is no formal assessment of this EO.

CLOSING STATEMENT

Aircraft identification is a fun way of getting involved in aviation. Cadets can apply this knowledge during aviation field trips, familiarization flying and any time they see aircraft.

INSTRUCTOR NOTES/REMARKS

N/A.

REFERENCES

A3-007 Canadian Forces (2006). Retrieved 25 March 2006, from http://www.airforce.forces.gc.ca/today5_e.asp.

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ROYAL CANADIAN AIR CADETS

LEVEL ONE

INSTRUCTIONAL GUIDE



SECTION 2

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

Total Time:

30 min

INTRODUCTION

PRE-LESSON INSTRUCTIONS

A complete list of resources needed for the instruction of this EO is located at Chapter 2 of the QSP. Specific uses for said stores are identified throughout the Instructional Guide, within the teaching point for which they are required.

Prior to instructing this lesson the instructor shall:

- review the lesson content, and become familiar with the material; and
- prepare the puzzle envelopes, as outlined in the activity guidelines.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

The interactive lecture method was chosen as it allows the instructor to make a semi-formal presentation of the material where the cadets can participate by asking or responding to questions and commenting on the material. For this lesson, this method is most effective as it matches well the taxonomic level of the material and is age-appropriate by virtue of its participatory nature.

The small group activities were selected to allow for maximum participation in the learning process. It is an interactive way to illustrate and substantiate the lesson material in a concrete manner.

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet shall be expected to describe the five main components of an airplane, to include:

- fuselage;
- wings;
- empennage;
- landing gear; and

- propulsion system.

IMPORTANCE

A basic understanding of the components of an airplane will provide a foundation for further aviation topics. It will create a familiarity with airplanes that will contribute to the cadets' appreciation of the familiarization of flying and aviation tour experiences.



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

Teaching Point 1

Define Aircraft and Airplane

Time: 2 min

Method: Interactive Lecture

DEFINITIONS

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. (Electronic code of federal regulations Title 14: Aeronautics and Space, Section 1.1)

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). (*From the Ground Up: Millennium Edition*, p. 9)

CONFIRMATION OF TEACHING POINT 1

QUESTIONS

- Q1. Is a helicopter an aircraft or an airplane? Why?
- Q2. Is a floatplane an aircraft or an airplane? Why?
- Q3. Is a glider an aircraft or an airplane? Why?

ANTICIPATED ANSWERS

- A1. Aircraft – its lift producing surfaces (the rotors) do not stay fixed during flight.
- A2. Airplane – it meets the full definition criteria.
- A3. Aircraft – it is not power-driven.



The following activity should be conducted prior to TP2 as an introduction to TP2 to TP6.

ACTIVITY

Time: 2 min

OBJECTIVE

This activity is designed to familiarize the cadet with the five main components of an airplane.

RESOURCES

One envelope per four cadets containing basic airplane component puzzle pieces found in Annex C.

ACTIVITY LAYOUT

1. Divide the class into groups of four or less. Cadets will work in the same groups for all the puzzle activities.
2. Each group will be given an envelope that contains a complete set of puzzle pieces.
3. The groups will have one minute to put together the puzzle.

SAFETY

N/A.

INSTRUCTOR GUIDELINES

- To prepare this activity, the puzzle page found in Annex C should be glued to cardstock and the puzzle pieces cut out. Prepare one puzzle for each group.
- Confirm the puzzles are assembled correctly before carrying on with TP3.
- Assist cadets if they are having difficulty completing the activity in the allotted time.
- The cadets will use this basic puzzle as a reference as they assemble the component puzzles throughout the lesson.

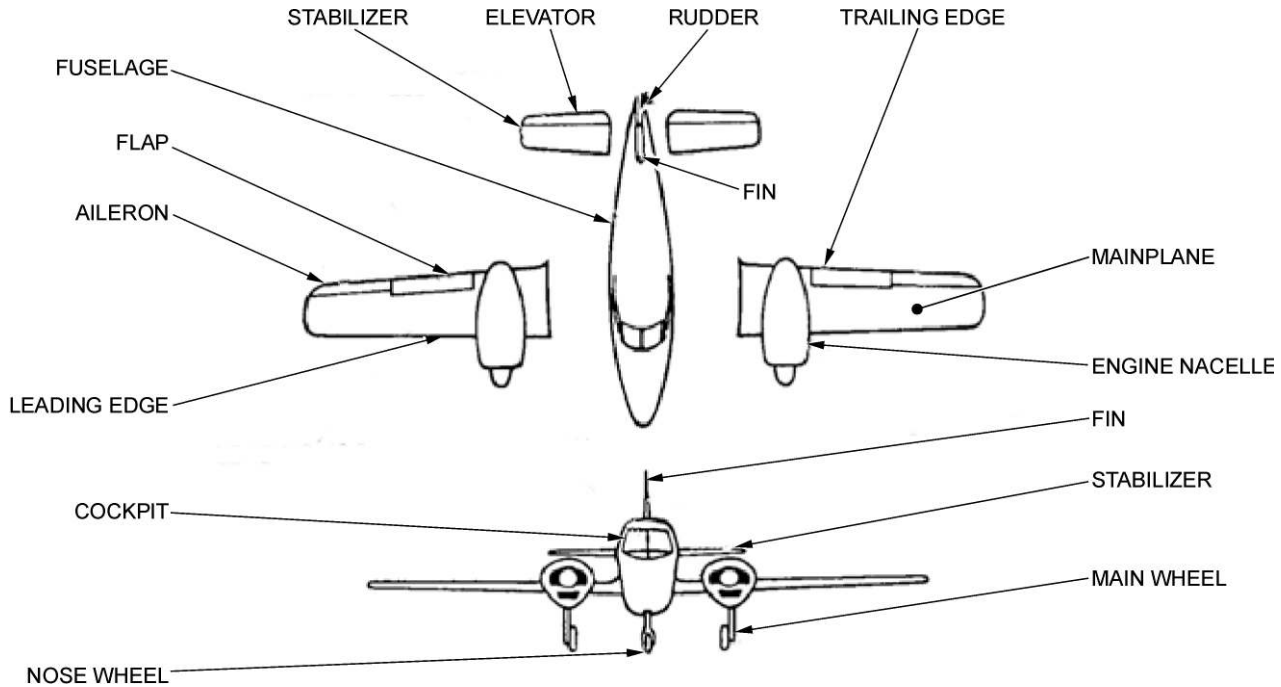
Teaching Point 2**Describe the Fuselage**

Time: 3 min

Method: Interactive Lecture

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.



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Figure 12-2-1 Airplane Components

Teaching Point 3

Describe the Wings

Time: 5 min

Method: Interactive Lecture

WINGS

The fuselage is fitted with a wing on both sides. 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 surfaces 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.



See Figure 12-2-1 to reference the location of these parts.

ACTIVITY

Time: 2 min

OBJECTIVE

This activity is designed to familiarize the cadet with the fuselage and wings.

RESOURCES

One envelope per four cadets containing fuselage and wing puzzle pieces found in Annex D.

ACTIVITY LAYOUT

1. Have cadets complete this activity in the same groups as the previous activity.
2. Give each group an envelope that contains fuselage and wing puzzle pieces.
3. The groups will have one minute to assemble these pieces.

SAFETY

N/A.

INSTRUCTOR GUIDELINES

- To prepare this activity, the puzzle pages found in Annex D should be glued to cardstock and the puzzle pieces cut out. Prepare one puzzle for each group.
- Confirm the puzzles are assembled correctly before carrying on with TP3.
- Assist cadets if they are having difficulty completing the activity in the allotted time.

Teaching Point 4

Describe the Empennage

Time: 6 min

Method: Interactive Lecture

EMPENNAGE

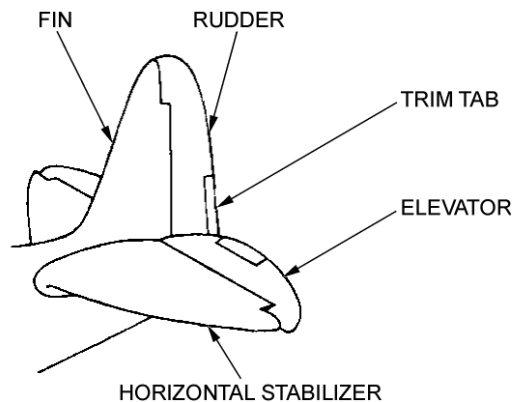
The empennage refers to the whole tail section of a plane. It includes the horizontal stabilizer, elevator, vertical stabilizer, and rudder.

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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Figure 12-2-2 Empennage

ACTIVITY

Time: 1 min

OBJECTIVE

This activity is designed to familiarize the cadet with the empennage.

RESOURCES

One envelope per four cadets containing empennage puzzle pieces found in Annex E.

ACTIVITY LAYOUT

1. Have cadets complete this activity in the same groups as the previous activity.
2. Give each group an envelope that contains empennage puzzle pieces.
3. The groups will have one minute to assemble these pieces.

SAFETY

N/A.

INSTRUCTOR GUIDELINES

- To prepare this activity, the puzzle pages found in Annex E should be glued to cardstock and the puzzle pieces cut out. Prepare one puzzle for each group.
- Confirm the puzzles are assembled correctly before carrying on with TP3.
- Assist cadets if they are having difficulty completing the activity in the allotted time.
- This puzzle will attach to the puzzle from TP2.

Teaching Point 5**Describe the Landing Gear**

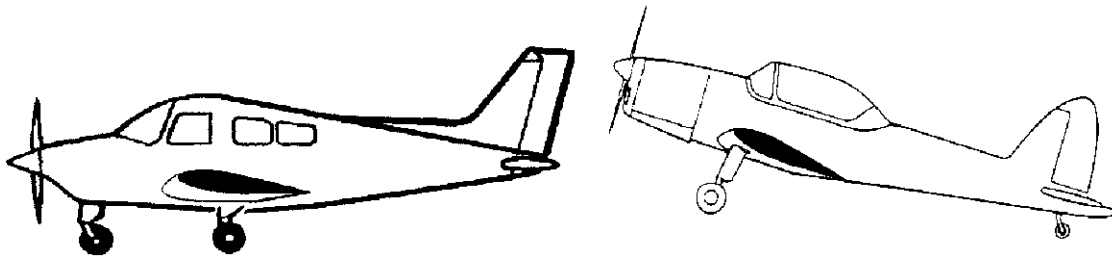
Time: 3 min

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.



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Figure 12-2-3 Nose Gear vs Tail Gear

Teaching Point 6**Describe the Propulsion System**

Time: 3 min

Method: Interactive Lecture

PROPULSION SYSTEM

Power is produced by an internal combustion engine (the same as a car) with a two or three blade 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 activity is designed to familiarize the cadet with the landing gear and propulsion system.

RESOURCES

One envelope per four cadets containing landing gear and propulsion system puzzle pieces found in Annex F.

ACTIVITY LAYOUT

1. Have cadets complete this activity in the same groups as the previous activity.

2. Give each group an envelope that contains empennage puzzle pieces.
3. The groups will have one minute to assemble these pieces.

SAFETY

N/A.

INSTRUCTOR GUIDELINES

- To prepare this activity, the puzzle pages found in Annex E should be glued to cardstock and the puzzle pieces cut out. Prepare one puzzle for each group.
- Confirm the puzzles are assembled correctly before carrying on with conclusion.
- Assist cadets if they are having difficulty completing the activity in the allotted time.
- This puzzle will attach to the puzzle from TP3.

CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

There is no formal assessment of this EO.

CLOSING STATEMENT

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

INSTRUCTOR NOTES/REMARKS

N/A.

REFERENCES

- A3-001 A-CR-CCP-263/PT-001 *From the Ground Up: Millennium Edition (28th Edition)*. (2000). Ottawa, ON: Aviation Publishers.
- C3-023 Electronic Code of Federal Regulations Title 14: *Aeronautics and Space*, Section 1.1 (2005). Retrieved 25 April 2006, from www.ecfr.gpoaccess.gov.



ROYAL CANADIAN AIR CADETS

LEVEL ONE

INSTRUCTIONAL GUIDE



SECTION 3

EO M130.03 – CONSTRUCT A MODEL AIRPLANE

Total Time:

60 min

INTRODUCTION

PRE-LESSON INSTRUCTIONS

A complete list of resourced needed for the instruction of this EO is located at Chapter 2 of the QSP. Specific uses for said stores are identified throughout the Instructional Guide, within the teaching point for which they are required.

Prior to instructing this lesson the instructor shall:

- review the lesson content, and become familiar with the material;
- prepare a completed model airplane;
- collect model material, to include:
 - pre-printed paper model template;
 - thumbtacks (one per cadet); and
 - one inch binder clips (one per cadet); and
- collect model building tools, to include:
 - scissors (one pair per cadet);
 - glue sticks (one stick per two cadets); and
 - markers (to be shared by all cadets).

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

The activity was selected to allow for maximum participation in the learning process. It is an interactive way to illustrate and substantiate the material taught in EO M130.02 (Section 2).

The group discussion method was chosen to allow the cadets to share their knowledge, opinions, and feelings about the subject matter while still allowing the instructor to control the direction of the discussion. The instructor must ensure that points not brought forth by the class are presented. If the instructor follows the Instructional Guide, including the questions posed, this will allow the cadets to express, in their own words, what they learned from this lesson and how they may apply the information.

REVIEW

The pertinent review for this lesson will include:

- describe the fuselage (EO M130.02 [Section 2] TP2);
- describe the wings (EO M130.02 [Section 2] TP3);
- describe the empennage (EO M130.02 [Section 2] TP4);
- describe the landing gear (EO M130.02 [Section 2] TP5); and
- describe the propulsion system (EO M130.02 [Section 2] TP6).

OBJECTIVES

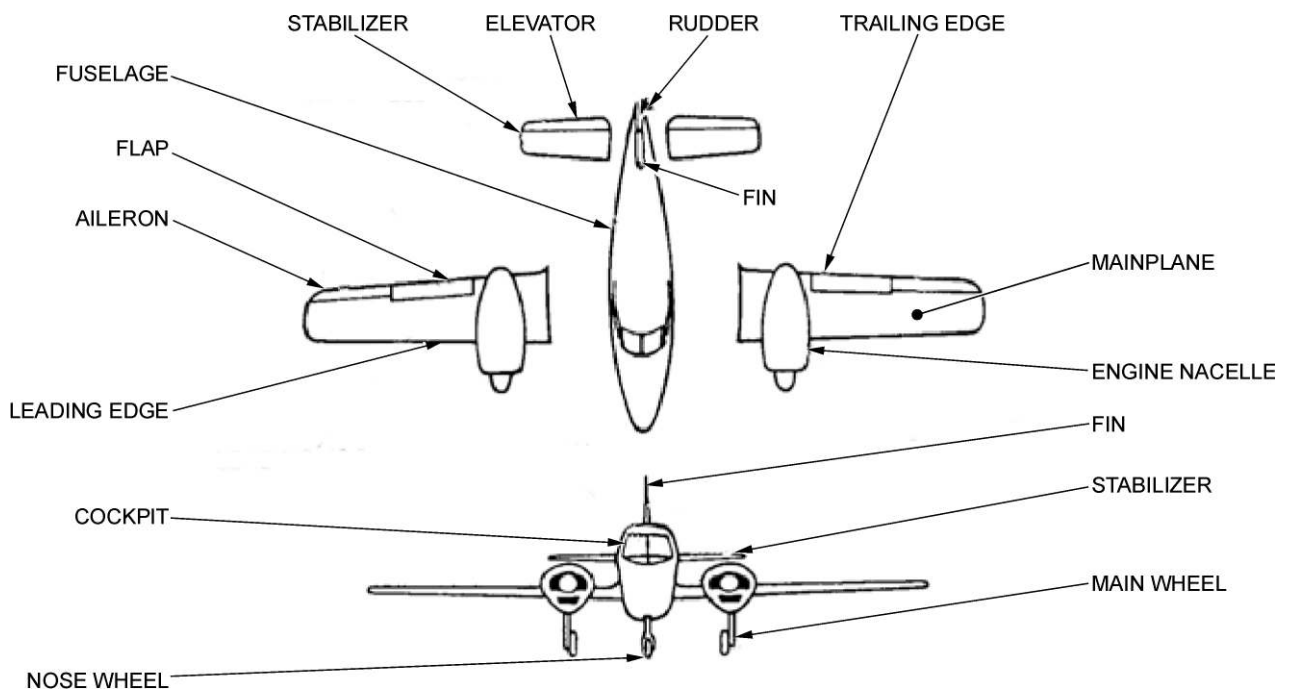
By the end of this lesson the cadet shall be expected to construct a model airplane, that will have the following components:

- fuselage (cockpit);
- wings (ailerons, flaps, leading edge, trailing edge, wing root, wing tip);
- empennage (horizontal stabilizer, vertical stabilizer, rudder, elevators);
- landing gear; and
- propulsion system (propeller, cowling).

IMPORTANCE

Cadets have learned to identify the components of an airplane. This knowledge will be useful during familiarization flights, hangar visits, and other aviation EOs. Being able to construct an airplane model provides cadets a method of confirming their knowledge of airplane components.

BACKGROUND KNOWLEDGE



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Figure 12-3-1 Airplane Components

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.

WINGS

The fuselage is fitted with a wing on both sides. 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 wing tip. 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 surfaces that are hinged to the trailing edge of each wing, close to the wing root. 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.

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.

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.

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 – CONSTRUCT A MODEL AIRPLANE

Time: 45 min

OBJECTIVE

The objective of this activity is to confirm the cadets' comprehension of the information taught during EO M130.02 (Section 2). Cadets are to use their knowledge of components of an airplane and the materials provided to construct a model airplane.



The purpose of this model is to incorporate the major components as discussed in EO M130.02 (Section 2), NOT to build a flying model. With the propeller and landing gear attached, this model will be too heavy to fly. The assembly time provided in this lesson does not allow sufficient drying time to produce an airworthy model. Aerodynamic features of assembly have been omitted for simplicity.

RESOURCES

- Paper model templates (one per cadet).

- Instruction sheet found in Annex G (one per cadet).
- Thumbtacks (one per cadet).
- One inch binder clips (one per cadet).
- Scissors (one pair per cadet).
- Glue sticks (one stick per two cadets).
- Markers (to be shared by all cadets).



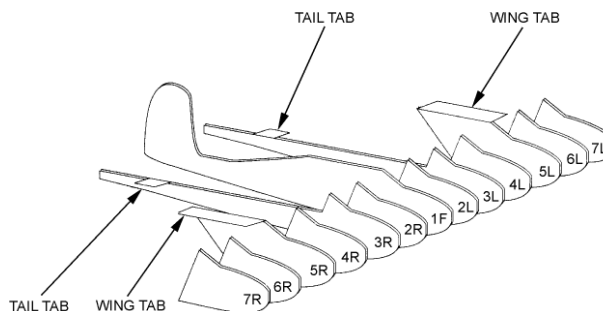
The instructor should have a completed paper model for demonstration/confirmation purposes.

ACTIVITY LAYOUT



Cadets are to complete the models on their own by following the instruction sheets provided in Annex G.

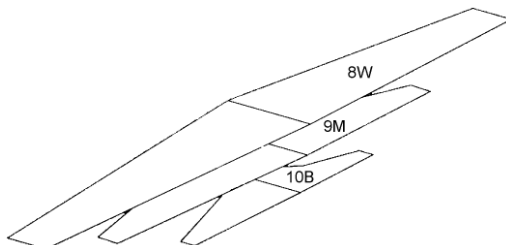
- Each cadet will construct their own model airplane. The materials for each model include:
 - a template;
 - a thumbtack; and
 - a one inch binder clip.
- Each cadet will also need to use scissors, a glue stick, and markers. Provide cadets with the instructions sheet provided in Annex G. The instructions include the following steps:
 1. Cut out all the airplane pieces. Cadets must be careful not to mix their pieces with others around them.
 2. To assemble the fuselage, glue pieces 1F through 7R and 7L to build-up fuselage layers, carefully aligning parts. Ensure that the entire contacting surface of a smaller piece being fastened to a larger one is completely covered with glue.



Adapted From Fabulous Paper Gliders

Figure 12-3-2 Fuselage Assembly

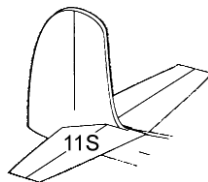
3. To assemble the wings, glue 9M to the bottom of wing part 8W. Then glue 10B to the bottom of 9M. Make sure the wing parts are aligned along the centre line. Fold down the wing tabs on the fuselage, and apply glue to them. Fasten the wing assembly to the fuselage.



Adapted From Fabulous Paper Gliders

Figure 12-3-3 Wing Assembly

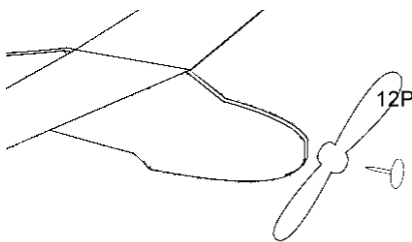
4. To assemble the tail, fold down the tail tabs on the fuselage, and apply glue to them. Fasten the horizontal stabilizer 11S to the fuselage.



Adapted From Fabulous Paper Gliders

Figure 12-3-4 Tail Assembly

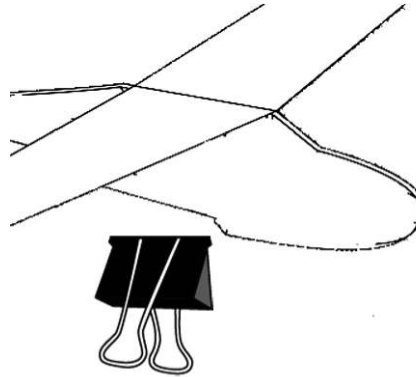
5. To attach the propeller, pierce the centre of 12P with the thumbtack, and push the thumbtack into the centre of the fuselage assembly.



Adapted From Fabulous Paper Gliders

Figure 12-3-5 Propeller Assembly

6. To attach the landing gear, clip the binder clip to the bottom of the fuselage, underneath the wings.



Adapted From Fabulous Paper Gliders

Figure 12-3-6 Landing Gear Assembly

7. Color the model as desired.
8. Clean-up, discarding all scrap paper and returning materials to the instructor.

SAFETY

Care should be taken when handling the thumbtacks, scissors, and glue.

INSTRUCTOR GUIDELINES

- Supervise the cadets' work to ensure that they are following the instructions provided.
- While supervising and assisting as needed, ask cadets to identify parts of the airplane.
- Ensure cadets identify the leading and trailing edges of the wings and attach the wings facing the correct direction.
- Once the activity has been completed, examine the model airplanes to ensure that all of the components are assembled correctly.
- After this activity has been completed, carry on with the reflection/questioning stage.
- Ask other instructors to assist in supervising the activity and assisting in answering questions.

REFLECTION

Time: 5 min

GROUP DISCUSSION



Instructor shall ensure that all lesson objectives are drawn out towards the end of the reflection stage.

DISCUSSION QUESTIONS



TIPS FOR ANSWERING/FACILITATING DISCUSSION

- Ask questions that help facilitate discussion; in other words, avoid questions with yes or no answers.
- Prepare questions ahead of time.
- Be flexible (you are not bound to only the prepared questions).
- Encourage cadets to participate by using praise such as “great idea” or “excellent response, can anyone add to that?”.
- Try to involve everyone by directing questions to non-participants.

SUGGESTED QUESTIONS

- Q1. What did you learn about airplane parts from this activity?
- Q2. How did this activity help you understand airplanes better?

CONCLUSION

REVIEW



Review the components of an airplane with the following questions, using the model created by the cadets as a training aid. Point out the various components of an airplane discussed in the previous class. Below are some questions that can supplement this review.

SUGGESTED QUESTIONS

- Q1. What is the purpose of the landing gear?
- Q2. Where are the ailerons located?
- Q3. What movement does the rudder produce?
- Q4. What is the purpose of the cowling?

SUGGESTED ANSWERS

- A1. The landing gear supports the aircraft when it is on the ground and absorbs the shock of landing.
- A2. Ailerons are hinged to the trailing edge of each wing, close to the wing tip.
- A3. The rudder controls the movement called yaw. Yaw is the side-to-side movement of the aircraft.
- A4. The cowling encloses the engine and streamlines the airplane to reduce drag. The cowling provides cooling of the engine by ducting cool air around the engine.

MAIN TEACHING POINTS

- TP1. Describe the components of an airplane.



Instructors shall reinforce those answers and comments discussed during reflection, but must ensure that the main teaching points have been covered. Any main teaching point not brought out during the guided discussion shall be inserted during review.

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

There is no formal assessment of this EO.

CLOSING STATEMENT

Model building is an excellent opportunity to apply theoretical knowledge. Being able to identify and describe the main components of an airplane will allow cadets to more actively participate in further aviation topics.

INSTRUCTOR NOTES/REMARKS

N/A.

REFERENCES

- A3-001 A-CR-CCP-263/PT-001, *From the Ground Up: Millennium Edition (2000)*. Ottawa, ON: Aviation Publishers Co. Limited.
- C3-017 (ISBN 1-895569-23-0) Schmidt, N. (1998). *Fabulous Paper Gliders*. Sterling Publishing: New York, NY.

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ROYAL CANADIAN AIR CADETS

LEVEL ONE

INSTRUCTIONAL GUIDE



SECTION 4

EO M130.04 – WATCH *ON CANADIAN WINGS* VIDEO

Total Time:

30 min

INTRODUCTION

PRE-LESSON INSTRUCTIONS

A complete list of resources needed for the instruction of this EO is located at Chapter 2 of the QSP. Specific uses for said stores are identified throughout the Instructional Guide, within the teaching point for which they are required.



This mandatory period consists of one of the videos. The remainder of the videos may be viewed during complementary periods.

Prior to instructing this lesson the instructor is required to:

- review the lesson content, and become familiar with the material;
- prepare a suitable classroom area;
- prepare a TV/VCR for video viewing; and
- obtain the tape entitled *On Canadian Wings*.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

The group discussion method was chosen to allow the cadets to share their knowledge, opinions, and feelings about the subject matter while still allowing the instructor to control the direction of the discussion. The instructor must ensure that points not brought forth by the class are presented. If the instructor follows the Instructional Guide, including the questions posed, this will allow the cadets to express, in their own words, what they learned from this lesson and how they may apply the information.

REVIEW

N/A.

OBJECTIVES

By the end of this lesson the cadet shall be expected to be familiar with Canadian aviation history by participating in a discussion on episodes from the film *On Canadian Wings*.

IMPORTANCE

Discovering Canadian aviation history will give cadets a better understanding of the current role of aviation in Canada. Knowledge gained in this lesson will assist in stimulating an interest in the air element of the Canadian Forces.

BACKGROUND KNOWLEDGE

EPISODE: CANADA'S FIRST FLIGHT

The shaky flights of flying machines sow the seeds for military aviation. Soon hundreds of Canadian flying cadets are showing dash in their biplanes. Canada's first aircrews are on their way to war.

Length (00:13:26)

EPISODE: AERIAL WARFARE

Canadian aircrews serve in fighter squadrons at Dunkirk and go into action against German Zeppelins, seaplanes and U-boats. Canadian flying aces like Major Billy Bishop, Major Raymond Collishaw and Major Billy Barker become household names.

Length (00:12:22)

EPISODE: THE BIRTH OF A NATIONAL AIR FORCE

With little fanfare, the RCAF comes into being on 1 April 1924. As war clouds loom over Europe, the new Air Force is on active service. The RCAF grows to the fourth largest Air Force of the allied nations.

Length (00:11:58)

EPISODE: THE AERODROME OF DEMOCRACY

Canadian squadrons see sustained combat in The Battle of Britain and help to keep the sea lanes from Canada to England open. RCAF schools across Canada train more than 150 000 Commonwealth air and groundcrews.

Length (00:12:48)

EPISODE: SOME OF THE FEW

Flying aces F/L Buzz Beurling, Wing Commander Johnnie Johnson and F/L D.E. Hornell are immortalized with a string of spectacular wartime successes.

Length (00:12:22)

EPISODE: BOMBS OVER EUROPE

The famous No. 6 Bomber Group is formed as the bomber offensive heats up over Europe. S/L Ian Bazalgette and P/O Andrew Mynarski earn Victoria Crosses.

Length (00:12:55)

EPISODE: FAST TIMES FOR THE GOLDEN JETS

Canadian aircrews are again involved in combat over Korea. The Golden Hawks formation flying team of F86 Sabres – the Spitfires of the jet age, dazzle audiences around the world.

Length (00:12:37)

EPISODE: A TIME OF TRANSITION

Canada develops the Avro Arrow – a supersonic jet fighter that could outfly anything in the world. The Diefenbaker government mysteriously cancels the project and destroys all drawing and prototypes.

Length (00:11:57)

EPISODE: THERE SHALL BE WINGS

Canada's Air Force support NATO and UN operations in the Balkans, the Middle East, Africa, Central America and Haiti, and humanitarian relief worldwide.

Length (00:13:00)

REFLECTION

Time: 10 min

Method: Group Discussion

GROUP DISCUSSION

Instructor shall ensure that all lesson objectives are drawn out towards the end of the reflection stage.

DISCUSSION QUESTIONS**TIPS FOR ANSWERING/FACILITATING DISCUSSION**

- Ask questions that help facilitate discussion; in other words, avoid questions with yes or no answers.
- Prepare questions ahead of time.
- Be flexible (you are not bound to only the prepared questions).
- Encourage cadets to participate by using praise such as “great idea” or “excellent response, can anyone add to that?”.
- Try to involve everyone by directing questions to non-participants.

SUGGESTED QUESTIONS AND ANTICIPATED ANSWERS:***Canada's First Flight***

- Q1. Who were the founding members of the Aerial Experimental Association?
- Q2. What was the name of the aircraft they initially used?
- Q3. In which year did the first aviation policy appear?
- Q4. How many people were members of the Canadian aviation corps?
- A1. Alexander Graham Bell, J.A.D. McCurdy, Casey Bothman.
- A2. The Silver Dart.

A3. 1907.

A4. 3 people.

Aerial Warfare

Q1. How long did the strategic bombing campaign last?

Q2. How many Zeppelins were destroyed during WWI? How many by Canadians?

Q3. Who was Billy Bishop and what did he do?

A1. 1 year.

A2. 12 destroyed, 6 of them by Canadians.

A3. Billy Bishop was one of the first Canadian aviation aces. He had 72 confirmed victories and was decorated with the Victoria Cross.

The Birth of a National Air Force

Q1. What major event occurred in 1920?

Q2. What was the goal of military aviation at that time?

Q3. Where was the largest pilot training camp situated?

Q4. In 1937 the RCAF was given a very precise mandate, what was that mandate?

A1. The CAF was dismantled.

A2. Cartography, medical evacuations, ice patrols, surveillance and fighting forest fires.

A3. Borden, Ontario.

A4. To defend Canadian airspace.

The Aerodrome of Democracy

Q1. What was Canada's role at the beginning of WWII?

Q2. Most of the pilots were trained on which aircraft?

Q3. How many squadrons were initially based in Halifax?

Q4. How many U-boats did the RCAF sink?

A1. Canada was an immense centre of pilot training for the Commonwealth nations.

A2. Tiger moth.

A3. 5.

A4. 27.

Some of the Few

Q1. Name the ace of Canadian aces during WWII?

Q2. Which Canadian squadron was victorious over the most enemy aircraft in 1944 and how many aircraft did they shoot down?

Q3. Name the two new types of aircraft used by Canada as the end of the war approached.

A1. Buzz Beurling.

A2. 418 squadron with 103 confirmed victories.

A3. Mustang, Typhoon, Mosquito.

Bombs over Europe

Q1. What was the first Canadian bomber squadron and when was it created?

Q2. Which bombers did Canadians use?

Q3. Who was the commander of the first all Canadian squadron in Great Britain?

A1. 405 squadron was formed in April 1941.

A2. Wellington, Halifax, Lancaster, Liberator, and Mosquito.

A3. Johnny Fauquier.

Fast Times for the Golden Jets

Q1. In 1948, Canada acquired numerous aircraft. What were they and how many were acquired?

Q2. Canada was divided, due to resources, into several search and rescue regions. How many regions and how many aircraft were assigned to this task?

Q3. What was the name of the aircraft and the training base used in the formation of the first military aviation demonstration team?

Q4. Canada began the construction of its own all Canadian aircraft. What was its name?

A1. 85 Vampires.

A2. 5 regions and 34 aircraft.

A3. Blue Devils, Vampire, St-Hubert (QC).

A4. CF-100 Canuck.

A Time of Transition

Q1. What aircraft was supposed to replace the CF-100?

Q2. Following the failure of the Avro Arrow, which aircraft did Canada buy?

Q3. What major event occurred in 1968?

Q4. New aircraft appeared during this period. Name at least three of them.

A1. The Avro Arrow.

A2. CF-101 Voodoo.

A3. The unification of the three branches of the Canadian Forces.

A4. Caribou, Buffalo, Hercules, Tutor, Dassault Falcon, Sea King, CF-5 Freedom Fighter.

There Shall be Wings

- Q1. In which year was the aerial command group formed?
- Q2. In which year did the first CF-18 (CF-188 Hornet) arrive in Canada?
- Q3. How many Canadian CF-18s were sent to serve during the Gulf War?
- A1. 1975.
- A2. 1981.
- A3. 24.



Other questions and answers will develop throughout the reflection stage. The discussion should not be limited to only those suggested.

CONCLUSION

REVIEW

Upon completion of the guided discussion the instructor will conclude by summarizing the discussion to ensure that all teaching points have been covered. The instructor must also take this opportunity to explain how the cadet will apply this knowledge and/or skill in the future.



Instructors shall reinforce those answers and comments discussed during reflection, but must ensure that the main teaching points have been covered. Any main teaching points not brought out during the guided discussion shall be inserted during review.

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

There is no formal assessment of this EO.

CLOSING STATEMENT

Discovering Canadian aviation history will give cadets a better understanding of the current role of aviation in Canada. Knowledge gained in this lesson will assist in stimulating an interest in the air element of the Canadian Forces.

INSTRUCTOR NOTES/REMARKS

N/A.

REFERENCES

C3-039 Squires, C. (1999). *On Canadian Wings* [Series]. Winnipeg, MB: PWGSC.



ROYAL CANADIAN AIR CADETS

LEVEL ONE

INSTRUCTIONAL GUIDE



SECTION 5

EO C130.01 – PARTICIPATE IN A WALK-AROUND AIRCRAFT INSPECTION

Total Time:	30 min
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INTRODUCTION

PRE-LESSON INSTRUCTIONS

This EO can be coordinated with familiarization flying or a local aerodrome tour.

A complete list of resourced needed for the instruction of this EO is located at Chapter 2 of the QSP. Specific uses for said stores are identified throughout the Instructional Guide, within the teaching point for which they are required.

Prior to instructing this lesson the instructor shall:

- review the lesson content, and become familiar with the material;
- ensure access to a single engine, non-high performance airplane; and
- arrange for one qualified pilot per 10 cadets (maximum group size) to conduct the inspection.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

The small group activity was selected to allow for maximum participation in the learning process. It is an interactive way to illustrate and substantiate the lesson material in a concrete manner.

The group discussion method was chosen to allow the cadets to share their knowledge, opinions, and feelings about the subject matter while still allowing the instructor to control the direction of the discussion. The instructor must ensure that points not brought forth by the class are presented. If the instructor follows the Instructional Guide, including the questions posed, this will allow the cadets to express, in their own words, what they learned from this lesson and how they may apply the information.

REVIEW

The pertinent review for this lesson will include:

- describe the fuselage (EO M130.02 [Section 2] TP2);
- describe the wings (EO M130.02 [Section 2] TP3);
- describe the empennage (EO M130.02 [Section 2] TP4);
- describe the landing gear (EO M130.02 [Section 2] TP5); and

- describe the propulsion system (EO M130.02 [Section 2] TP6).

OBJECTIVES

By the end of this lesson the cadet shall have participated in an aircraft walk-around inspection.

IMPORTANCE

Carefully inspecting an airplane before flight is one way the pilot ensures that the airplane is operational and safe. The walk-around inspection is an opportunity to apply knowledge of major airplane components. It is an excellent introduction to the culture of safety that surrounds aviation.

BACKGROUND KNOWLEDGE



This information is representative only. Always refer to and follow the recommendations of the manufacturer in carrying out any inspections and procedures. Individual models of airplanes may have special procedures and inspection guidelines that will vary from the information given in this guide.

GENERAL

Flight safety includes the possession of knowledge, using common sense, and self-discipline. Thorough inspections and following established procedures allows a pilot to ensure that important safety considerations are not overlooked. One of these practices is conducting a walk-around inspection of the aircraft before a flight. The purpose of the walk-around is to notice any damage or condition that may pose a safety hazard to the flight. A walk-around can identify problems early in the flight preparation process, so that changes can be made if necessary (minor repairs, changing aircraft, etc.). If any damage is noticed, it should be brought to the attention of an aircraft maintenance engineer, and noted in the aircraft's technical logbook. It is ultimately the pilot's decision whether an aircraft is in condition to fly. It is always better to make a decision on the side of safety, than to be caught in a potentially dangerous situation while flying.

CABIN

Before beginning the external inspection of the airplane, there are some preparatory things to be done inside the cabin.

Control locks should be removed. The control lock is a device that makes the control column/yolk immobile, so that the control surfaces (ailerons and elevators) do not move in the wind.

The pilot should ensure that the ignition is off, to avoid an unintended engine start.

The master switch controls power to the electrical systems in the airplane. The master switch should be turned on to supply power to the fuel gauges and the flaps. The fuel level indicated on the fuel gauges should be noted. This indicated level will be cross-checked with a visual check of the actual fuel levels. The flaps should be fully lowered. The master switch should then be turned off to avoid draining the battery.

WINGS

Aircraft that are parked outside overnight are usually tied down to anchors beneath the wings and tail. The wing tie-downs should be removed from the airplane. There may be external control locks placed over the ailerons to prevent movement. These should be removed.

The flap sliders should be inspected to ensure secure attachment and minimal "play" or unwanted freedom of movement.

The aileron attachment points should be inspected to ensure security. The ailerons should be moved through their full range of motion to confirm correct and free movement.

All wing surfaces, the leading edge, and the trailing edge should be checked for dents, tears, cracks, wrinkles, bulges or missing rivets.

A small amount of fuel should be drained from the fuel tank drain valve and visually checked to see if there is any water or sediment in the fuel. Water will appear as bubbles at the bottom of the cup as water is heavier than fuel. The fuel should also be checked to see that it is the correct fuel grade. Different grades of fuel are different colours. One hundred low-lead is the fuel grade most commonly used in light aircraft, and is coloured blue.

The fuel levels should be visually confirmed by removing the fuel cap and using a dipstick. The fuel cap must be properly secured after checking the fuel.

The Pitot tube is connected to the instruments in the cockpit. In order for it to work properly, it must be clear of obstructions.

FUSELAGE

The baggage compartment should be checked to see if there is anything stored there that may be required for the flight, such as a survival kit. Knowing what is on board the airplane is important for calculating the weight and balance.

All fuselage surfaces should be checked for dents, tears, cracks, wrinkles, bulges or missing rivets.

The static port is connected to the instruments in the cockpit. In order for it to work properly, it must be clear of obstructions.

EMPENNAGE

If the aircraft is tied down, the tie-downs from the tail must be removed. External control locks should be removed.

All empennage surfaces should be checked for dents, tears, cracks, wrinkles, bulges or missing rivets.

The rudder and elevator attachment points should be inspected to ensure security. The rudder and elevator should be moved through their full ranges of motion to confirm correct and free movement.

LANDING GEAR

Wheel chocks are used to keep the airplane from rolling while parked. They should be removed.

The wheels and brakes should be checked to ensure there is no excessive wear or fluid leaks.

The tires should be checked to ensure they are properly inflated and there are no signs of excessive wear or damage.

ENGINE

Extra caution should always be exercised around the propeller arc. The propeller should be checked for damage or evidence of a propeller strike. This could indicate damage to the engine.

The openings to the cowling should be checked for obstructions, particularly bird or animal nests.

The oil level is checked with a dipstick, and should be within the prescribed limits. The cap and dipstick must be secured after checking the oil.

A small amount of fuel should be drained from the main fuel strainer to clear any water or sediment that may have accumulated.

ACTIVITY

Time: 20 min



This activity should be conducted by a qualified pilot for safety reasons. If the pilot is not a squadron instructor, have a squadron instructor supervise the inspection.

OBJECTIVE

This activity is designed to familiarize the cadet with the procedures of a walk-around aircraft inspection.

RESOURCES

- single engine, non-high performance airplane.
- operator's manual inspection checklist for the particular aircraft type.
- fuel dipstick.
- fuel drain cup.

ACTIVITY LAYOUT

1. This activity should be conducted in groups of ten or less cadets. All cadets must be briefed on the safety guidelines before beginning the inspection.
2. If there is more than one group inspecting one plane, they should start at opposite points (i.e., opposite wings, or nose and tail).
3. The cadets should be guided through a complete walk-around inspection. The instructor/pilot should cover all of the relevant information provided in the background information section.

SAFETY

- Caution should always be exercised around the propeller arc.
- Cadets must be told what they can and cannot touch, and where they can and cannot go.
- Only the aircraft involved in the lesson should be touched.

INSTRUCTOR GUIDELINES

- The instructor/pilot should supervise the inspection to:
 - ensure all cadets actively participate;
 - correct inappropriate aircraft handling; and
 - ask cadets questions.
- The cadets should be involved in the inspection, handling objects and the aircraft wherever appropriate.

REFLECTION

Time: 5 min



Instructor shall ensure that all lesson objectives are drawn out towards the end of the reflection stage.

DISCUSSION QUESTIONS



TIPS FOR ANSWERING/FACILITATING DISCUSSION

- Ask questions that help facilitate discussion; in other words, avoid questions with yes or no answers.
- Prepare questions ahead of time.
- Be flexible (you are not bound to only the prepared questions).
- Encourage cadets to participate by using praise such as “great idea” or “excellent response, can anyone add to that?”.
- Try to involve everyone by directing questions to non-participants.

SUGGESTED QUESTIONS

- Q1. Why is it important to conduct a walk-around inspection?
- Q2. What would you do if you noticed damage to the airplane?
- Q3. How would you change the walk-around procedure if you were in a hurry to go flying? (You wouldn't! Procedures, checklists, and inspections are too important!)

CONCLUSION

HOMework/READING/PRACTICE

N/A.

METHOD OF EVALUATION

There is no formal assessment of this EO.

CLOSING STATEMENT

The walk-around inspection is one of the procedures followed to ensure the safety of a flight. Carefully following procedures like this on every flight is very important to ensure nothing is overlooked. Participating in a walk-around inspection is an excellent way for cadets to apply their knowledge of airplane components.

INSTRUCTOR NOTES/REMARKS

N/A.

REFERENCES

- A3-001 A-CR-CCP-263/PT-001, *From the Ground Up: Millennium Edition (28th Edition)*. (2000). Ottawa, ON: Aviation Publishers.



ROYAL CANADIAN AIR CADETS

LEVEL ONE

INSTRUCTIONAL GUIDE



SECTION 6

EO C130.02 – IDENTIFY INTERNATIONAL AIRCRAFT

Total Time:

30 min

INTRODUCTION

PRE-LESSON INSTRUCTIONS

A complete list of resources needed for the instruction of this EO is located at Chapter 2 of the QSP. Specific uses for said stores are identified throughout the Instructional Guide, within the teaching point for which they are required.

Prior to instructing this lesson the instructor is required to:

- review the lesson content, and become familiar with the material;
- prepare a suitable classroom area; and
- prepare puzzle activity for the end of lesson confirmation.

PRE-LESSON ASSIGNMENT

N/A.

APPROACH

The interactive lecture method was chosen as it allows the instructor to make a semi-formal presentation of the material where the cadets can participate by asking or responding to questions and commenting on the material. For this lesson, this method is most effective as it matches well the taxonomic level of the material and is age-appropriate by virtue of its participatory nature.

REVIEW

The pertinent review for this lesson may include an overview of military, civilian and cadet aircraft.

OBJECTIVES

By the end of this lesson the cadet shall be expected to identify the following aircraft:

- Lockheed-Martin F/A -22A Raptor;
- Fairchild Republic A-10 Thunderbolt II;
- Lockheed F-117A Nighthawk;
- Boeing B-52 Stratofortress;
- Eurofighter EF-2000 Typhoon;

- Sepecat Jaguar GR3;
- Mikoyan-Gurevich MiG-29; and
- Antonov AN-124-100.

IMPORTANCE

Being able to identify international aircraft will support the aim of stimulating an interest in the aviation community. Cadets will be able to use this knowledge when visiting an aerodrome, at a local air show, or while attending a CSTC.

Teaching Point 1

Describe American Aircraft

Time: 12 min

Method: Interactive Lecture

F/A-22A RAPTOR

The F/A-22A Raptor is the United States Air Force's (USAF) newest fighter aircraft. Its combination of stealth, supercruise, manoeuvrability and integrated avionics represents an exceptional leap in war fighting capabilities. Its primary role is air dominance. The Raptor performs both air-to-air and air-to-ground missions. Also, it produces more thrust than any current fighter. The combination of the increased thrust and its unique aerodynamic design allows the aircraft to cruise at supersonic speeds without using afterburner. The Raptor is manufactured by Lockheed Martin and is powered by two Pratt & Whitney F119-PW-100 turbofan engines with afterburners.



United States Air Force Website, <http://www.af.mil>

Figure 12-6-1 F/A-22A Raptor



United States Air Force Website, <http://www.af.mil>

Figure 12-6-2 F/A-22A Raptor

A-10 THUNDERBOLT II

The A-10 Thunderbolt II is the first USAF aircraft specially designed for close air support of ground forces. The A-10 can be used against all ground targets including tanks and other armoured vehicles. Its wide combat radius and short takeoff and landing capability permit operations in and out of locations near front lines. The Thunderbolt is distinguished by its 30 millimetres GAU-8/A Gatling gun. This weapon is mounted on the nose, can fire 3900 rounds per minute and can defeat an array of armoured vehicles. The A-10 is manufactured by Fairchild Republic Company and is powered by two General Electric TF34-GE-100 turbofans mounted high on the rear of the aircraft.



United States Air Force Website, <http://www.af.mil>

Figure 12-6-3 A-10 Thunderbolt II



United States Air Force Website, <http://www.af.mil>

Figure 12-6-4 A-10 Thunderbolt II

F-117A NIGHTHAWK

The F-117A Nighthawk is the world's first operational aircraft designed to use low observable stealth technology. This technology allows the aircraft to not be easily detected by radar. This precision strike aircraft penetrates high threat airspace and uses laser-guided weapons systems against critical targets. The Nighthawk created a revolution in military warfare by incorporating low observable technology into operational aircraft. It has a sleek design that allows for its stealth technology to be very effective. The F-117A is manufactured by Lockheed Martin and is powered by two GE F404 non-afterburning engines.



United States Air Force Website, <http://www.af.mil>

Figure 12-6-5 F-117A Nighthawk



United States Air Force Website, <http://www.af.mil>

Figure 12-6-6 F-117A Nighthawk

B-52 STRATOFORTRESS

The B-52 is a long-range heavy bomber that can perform a variety of missions. The bomber is capable of flying at high subsonic speeds at altitudes up to 50 000 feet. It can carry nuclear or precision-guided weapons. The B-52 is a large aircraft with a length of 159 feet 4 inches and a wingspan that measures 185 feet. The Stratofortress is manufactured by Boeing Military Airplane Company and is powered by eight Pratt & Whitney TF33-P-3/103 turbofan engines.



United States Air Force Website, <http://www.af.mil>

Figure 12-6-7 B-52 Stratofortress



United States Air Force Website, <http://www.af.mil>

Figure 12-6-8 B-52 Stratofortress

CONFIRMATION OF TEACHING POINT 1

QUESTIONS

- Q1. How long is the wingspan of the B-52 Stratofortress?
- Q2. What is distinctive about the A-10 Thunderbolt II?
- Q3. What type of weapons systems does the F-117A Nighthawk use against critical targets?

ANTICIPATED ANSWERS

- A1. 185 feet.
- A2. The nose mounted 30 millimetres Gatling gun.
- A3. Laser guided.

Teaching Point 2

Time: 6 min

Identify British Aircraft

Method: Interactive Lecture

EF-2000 TYPHOON

The Typhoon is an agile, single seat, multi-role aircraft optimized for high altitude supersonic air combat. It is also capable of operating at lower levels in an air-to-ground role. Its low weight and high thrust means it can reach 36 000 feet in less than two minutes from a standing start. The engine intake is mounted on the bottom of the fuselage. A tall sharply swept tail is at the rear of the fuselage with twin-engine pipes directly below. The Typhoon is manufactured by Eurofighter and is powered by two Eurojet EJ200 turbofan engines.



Royal Air Force image Website, <http://www.defenceimages.mod.uk>

Figure 12-6-9 EF-2000 Typhoon



Royal Air Force image Website, <http://www.defenceimages.mod.uk>

Figure 12-6-10 EF-2000 Typhoon



Royal Air Force image Website, <http://www.defenceimages.mod.uk>

Figure 12-6-11 EF-2000 Typhoon

JAGUAR GR3

The Jaguar is a dual-role advanced operational trainer and tactical support aircraft. It is a fighter-bomber that is capable of using 1000 pound general-purpose bombs that are guided to their targets by lasers. The Jaguar has a long sleek fuselage with a large swept tail fin and rudder. It has short-span swept wings that are mounted on top of the fuselage. The internal jet engines have intakes on either side of the fuselage behind the cockpit. The raised bubble canopy is set above the sharply pointed nose. The Jaguar is manufactured by Sepecat and is powered by two Rolls-Royce Adour turbofan engines.



Airliners.net, <http://www.airliners.net>

Figure 12-6-12 Jaguar GR3



Airliners.net, <http://www.airliners.net>

Figure 12-6-13 Jaguar GR3

CONFIRMATION OF TEACHING POINT 2

QUESTIONS

- Q1. Where is the Typhoon's sharply swept tail located?
- Q2. Where is the engine intake mounted on the Typhoon?
- Q3. Where is the canopy located on the GR3 Jaguar?

ANTICIPATED ANSWERS

- A1. At the rear of the upper fuselage.
- A2. On the underside of the fuselage.
- A3. Above the sharply pointed nose.

Teaching Point 3

Time: 6 min

Identify Russian AircraftMethod: Interactive Lecture

MIG-29 FULCRUM

The MiG-29 Fulcrum is an all weather, single seat fighter interceptor flown by the Russian Air Force. The MiG-29's wings are swept back and tapered with square tips. It is equipped with twin jet engines mounted low and to the sides of the fuselage. Diagonal shaped air intakes give the aircraft a box like appearance. The fuselage is made of a long, thin, slender body. The MiG-29 is manufactured by the Moscow Air Production Organization and is powered by two Klimov/Sarkisov RD-33 turbofans.



Airliners.net, <http://www.airliners.net>

Figure 12-6-14 MiG-29 Fulcrum

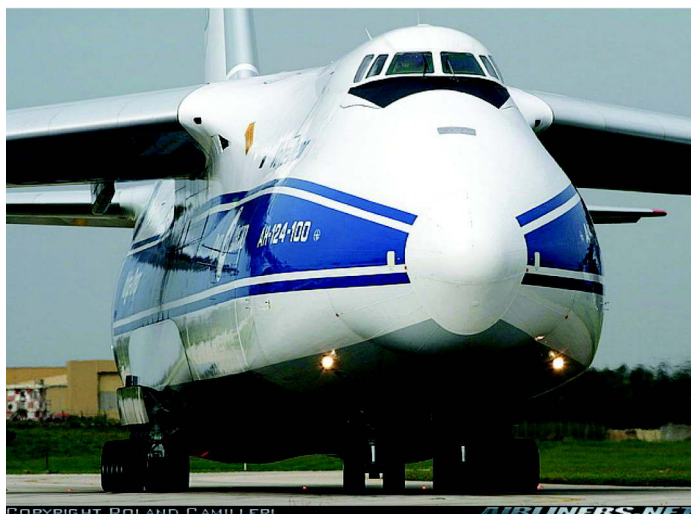


Airliners.net, <http://www.airliners.net>

Figure 12-6-15 MiG-29 Fulcrum

ANTONOV AN-124-100

The Antonov AN-124-100 is a civil certified long-range commercial freighter. It is widely used for the carriage of outsize and very heavy pieces of air cargo that other aircraft cannot accommodate. Pieces of cargo have included the space launcher, satellites, helicopters, large wheeled vehicles and a 109 tonne locomotive. The AN-124 has the largest payload and the largest interior of any airplane in the world. It features a double deck fuselage layout with the upper deck containing the cockpit and personnel compartments. The lower deck is a massive pressurized cargo compartment. The AN-124 is manufactured by O.K. Antonov and is powered by four D-18T Series 3 engines.



Airliners.net, <http://www.airliners.net>

Figure 12-6-16 Antonov AN-124-100



Airliners.net, <http://www.airliners.net>

Figure 12-6-17 Antonov AN-124-100

CONFIRMATION OF TEACHING POINT 3

QUESTIONS

- Q1. How are the MiG-29 Fulcrum's wings shaped?
- Q2. Name one of the large pieces of cargo the AN-124 has carried.
- Q3. What is the MiG-29's fuselage made of?

ANTICIPATED ANSWERS

- A1. Swept back and tapered with square tips.
- A2. The space launcher, satellites, helicopters, large wheeled vehicles and a 109 tonne locomotive.
- A3. A long, thin, slender body.

END OF LESSON CONFIRMATION

ACTIVITY

Time: 5 min

OBJECTIVE

The objective of this activity is to have cadets construct puzzles of international aircraft. This will confirm the teaching points delivered in this lesson.

RESOURCES

- Puzzles.

- Envelopes.
- Scotch tape.

ACTIVITY LAYOUT

- Prior to the lesson, the instructor shall write several characteristics or facts about the eight aircraft discussed in this lesson on the back of the corresponding picture attached at Annex I.
- Cut each picture into a separate puzzle.
- Place two puzzles into each envelope.
- Divide cadets into small groups.
- Distribute an envelope to each group.
- Direct cadets to remove the puzzles from the envelope and complete them.
- When cadets have successfully completed both puzzles, have them tape the pieces together to form two complete pictures.
- Have each group identify both aircraft and present the characteristics printed on the back of each picture to the remainder of the class.

SAFETY

N/A.

INSTRUCTOR GUIDELINES

- Effectively supervise the activity.
- Ensure cadets complete this activity within the time allotted.

CONCLUSION

HOMEWORK/READING/PRACTICE

N/A.

METHOD OF EVALUATION

There is no formal assessment of this EO.

CLOSING STATEMENT

Cadets have identified American, British and Russian aircraft. Being able to identify these aircraft will support the aim of stimulating an interest in the aviation community. Cadets will be able to use this knowledge when visiting an aerodrome, when at a local air show, or while attending CSTC Training.

INSTRUCTOR NOTES/REMARKS

N/A.

REFERENCES

C3-009 United States Air Force. (2006). Retrieved 21 March 2006, from <http://www.af.mil/factsheets.asp>.

- C3-010 Royal Air Force. (2006). Retrieved 20 March 2006, from <http://www.raf.mod.uk/equipment.html>.
- C3-011 Federation of American Scientists. (2006) Retrieved 21 March 2006, from <http://www.fas.org/nuke/guide/russia/airdef/mig-29.htm>.
- C3-012 Antonov Airlines. (2006). Retrieved 21 March 2006, from <http://www.antonovairlines.co.uk/antonov/military-logistics/antonov-124.asp>.

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AIRCRAFT IDENTIFICATION ACTIVITY

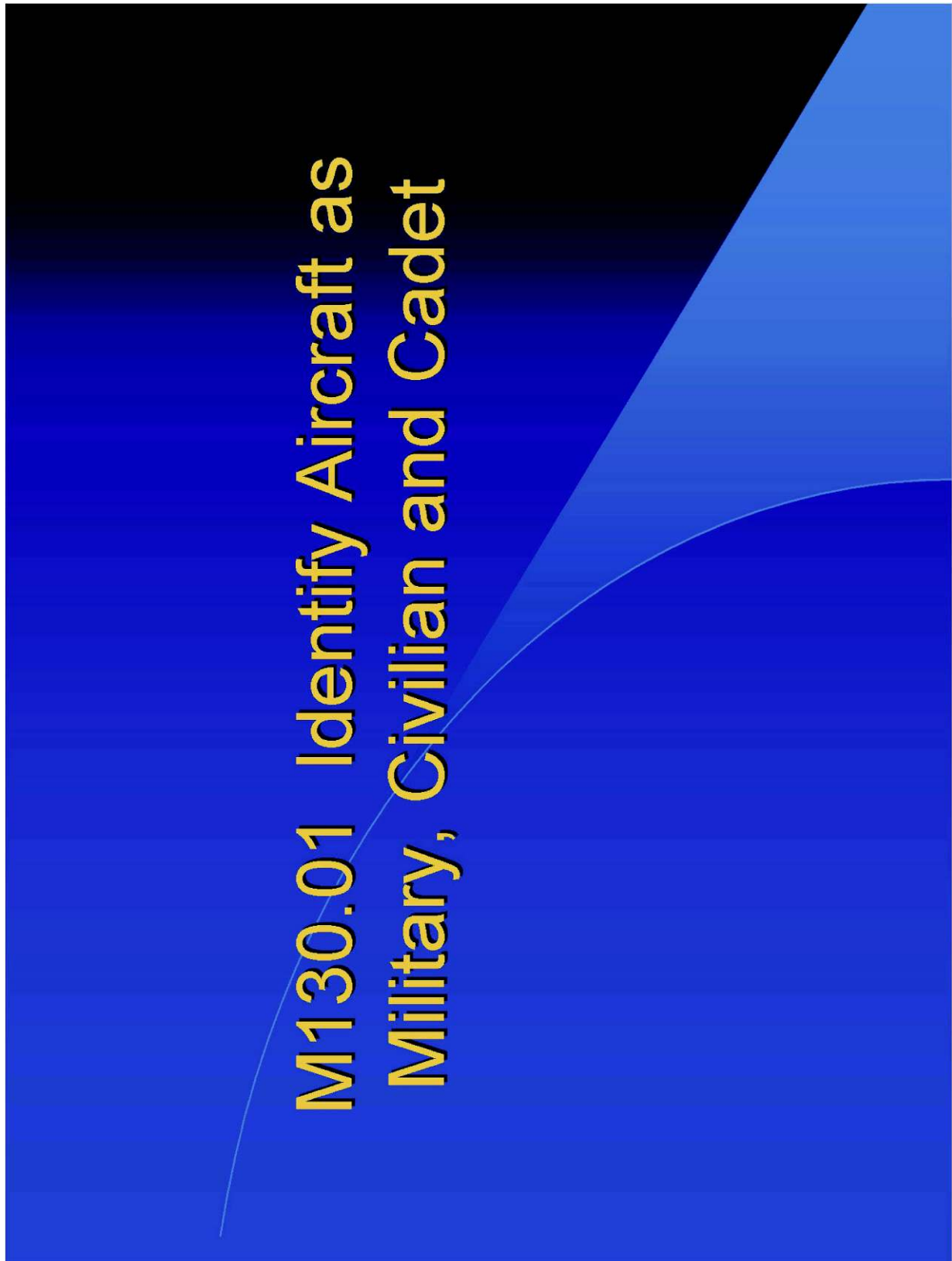


Figure 12A-1 Slide No. 1



Figure 12A-2 Slide No. 2



Figure 12A-3 Slide No. 3



Figure 12A-4 Slide No. 4



Figure 12A-5 Slide No. 5



Figure 12A-6 Slide No. 6



Figure 12A-7 Slide No. 7



Figure 12A-8 Slide No. 8

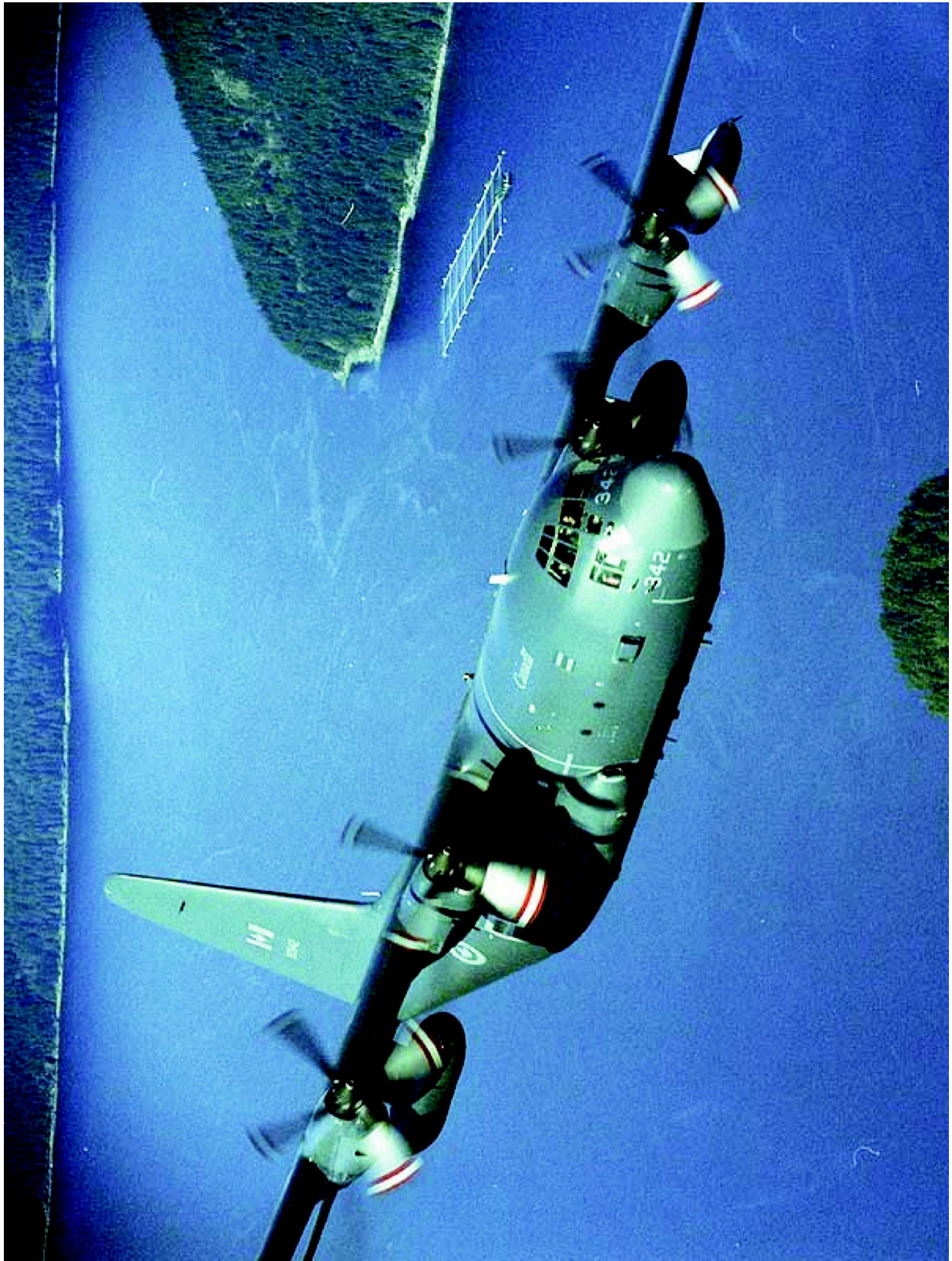


Figure 12A-9 Slide No. 9



Figure 12A-10 Slide No. 10



Figure 12A-11 Slide No. 11



Figure 12A-12 Slide No. 12



Figure 12A-13 Slide No. 13



Figure 12A-14 Slide No. 14



Figure 12A-15 Slide No. 15



Figure 12A-16 Slide No. 16



Figure 12A-17 Slide No. 17



Figure 12A-18 Slide No. 18



Figure 12A-19 Slide No. 19



Figure 12A-20 Slide No. 20



Figure 12A-21 Slide No. 21



Figure 12A-22 Slide No. 22



Figure 12A-23 Slide No. 23



Figure 12A-24 Slide No. 24



Figure 12A-25 Slide No. 25



Figure 12A-26 Slide No. 26

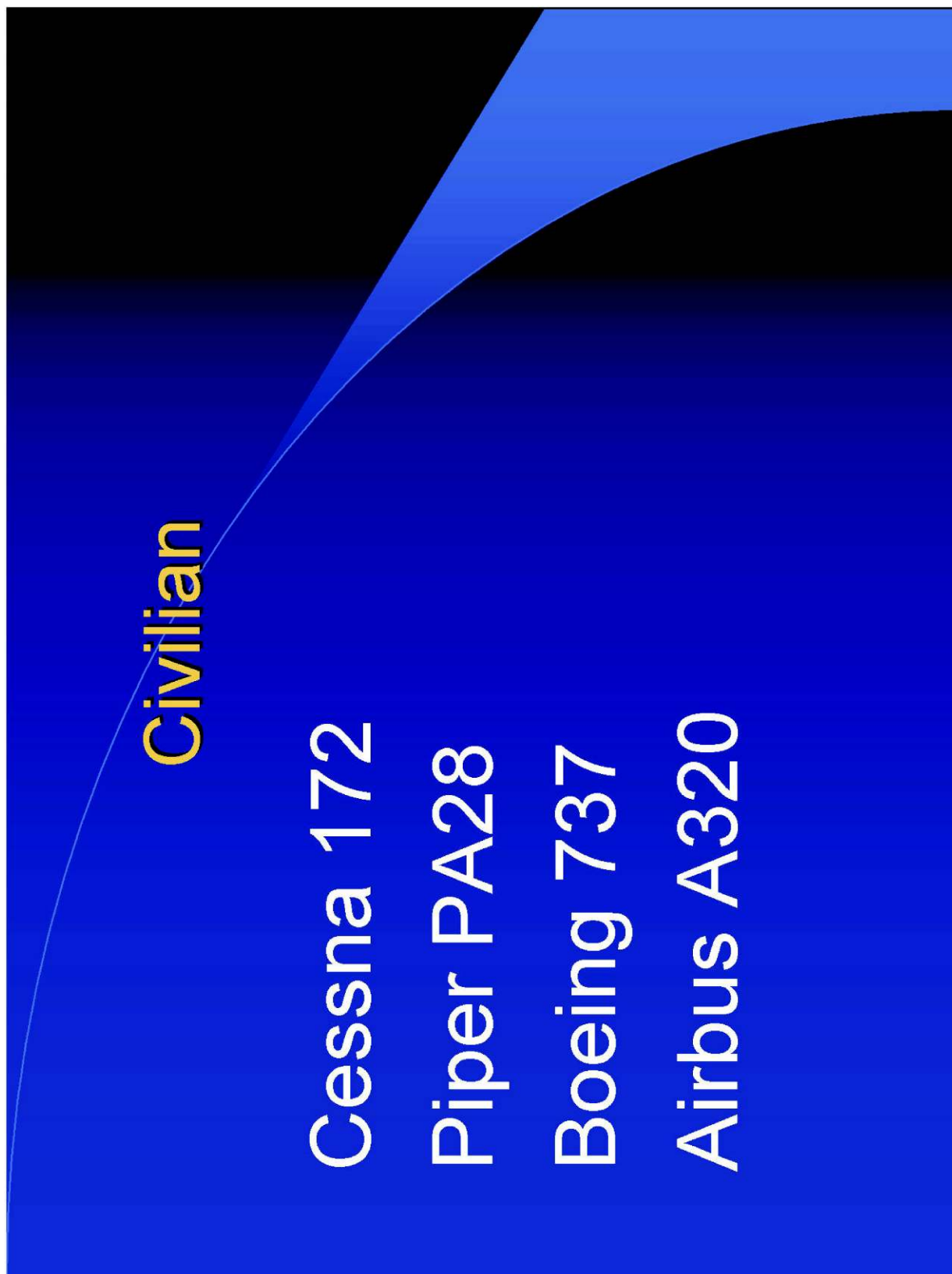


Figure 12A-27 Slide No. 27



Figure 12A-28 Slide No. 28



Figure 12A-29 Slide No. 29



Figure 12A-30 Slide No. 30



Figure 12A-31 Slide No. 31



Figure 12A-32 Slide No. 32



Figure 12A-33 Slide No. 33



Figure 12A-34 Slide No. 34



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Figure 12A-35 Slide No. 35

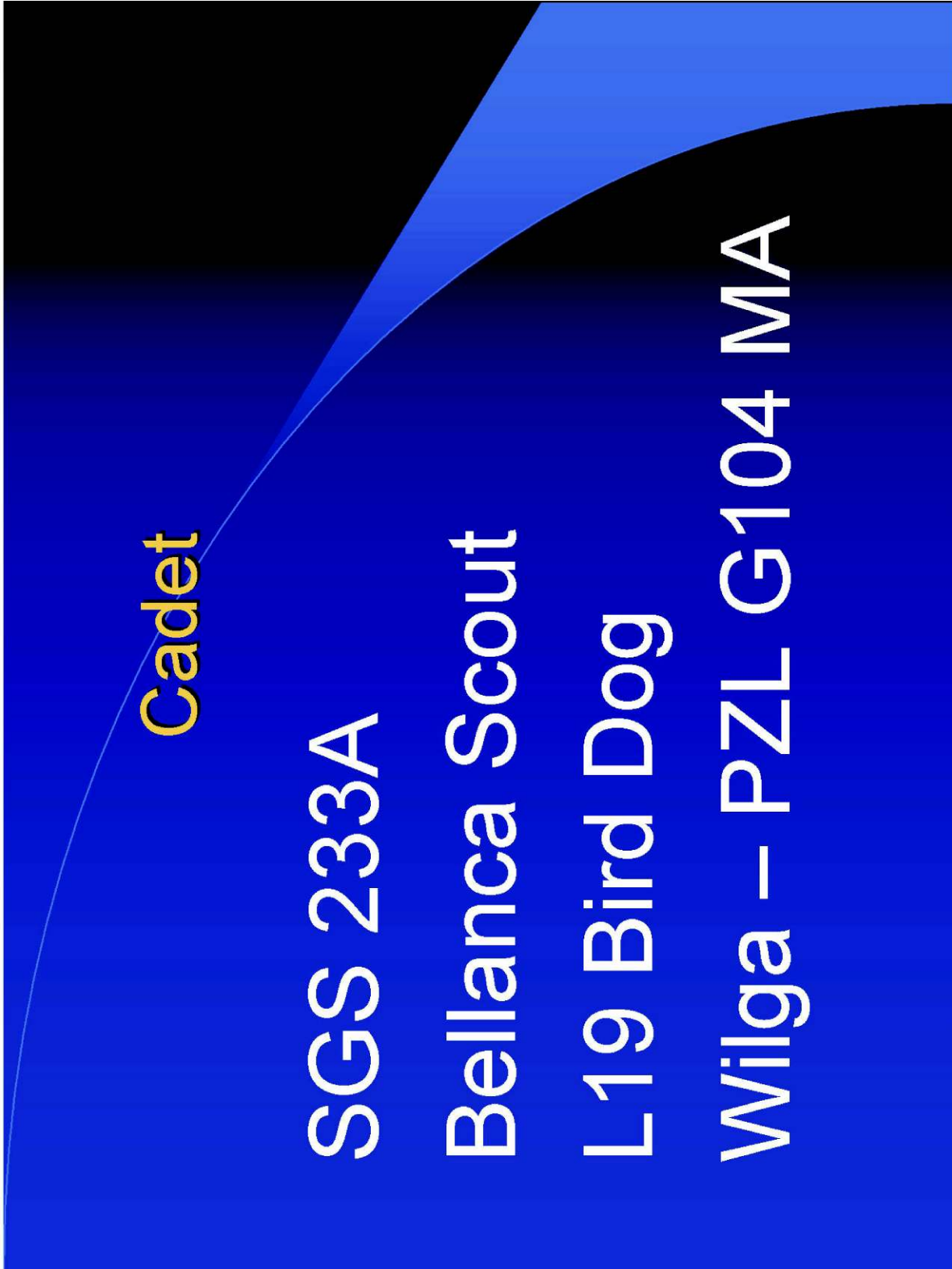


Figure 12A-36 Slide No. 36

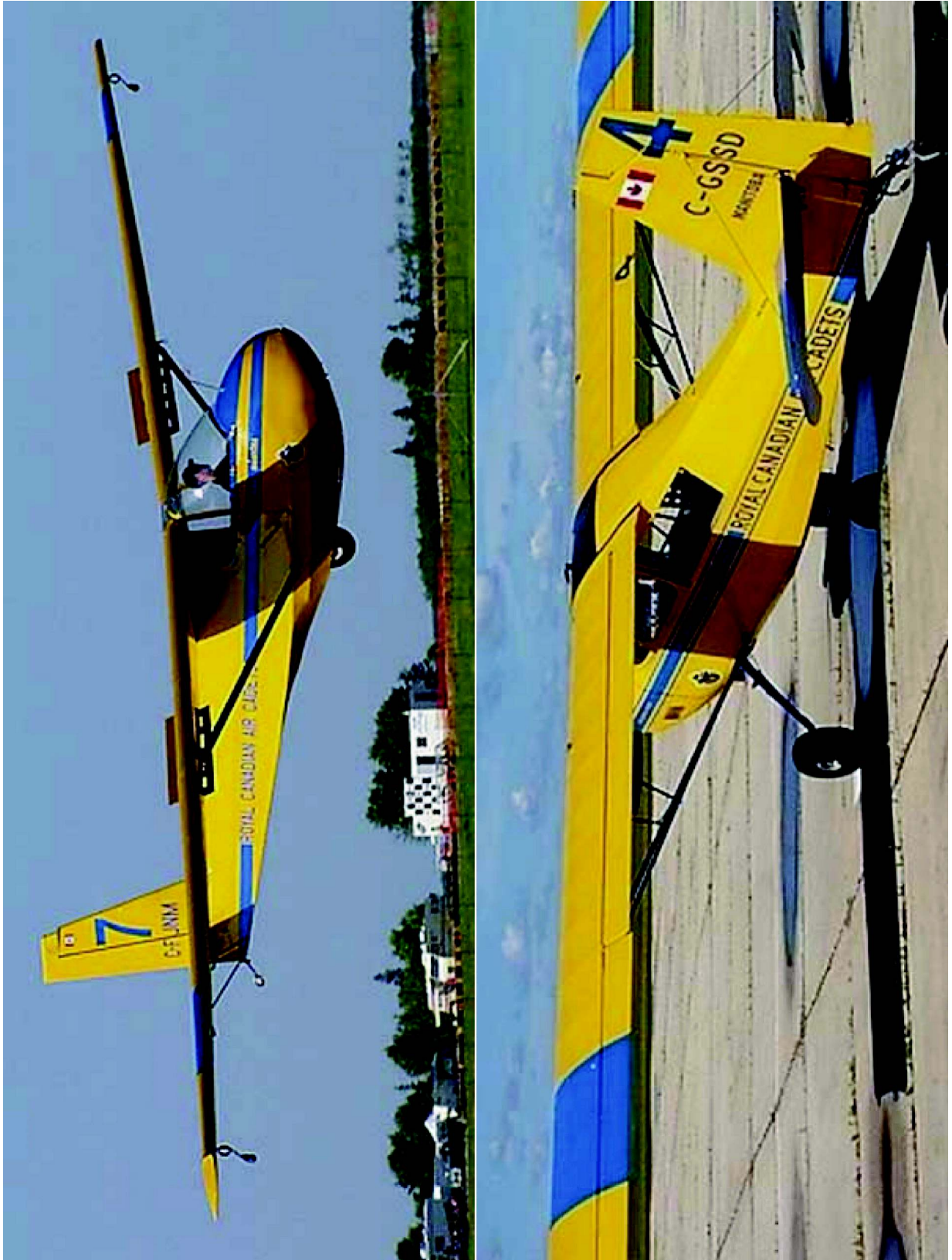


Figure 12A-37 Slide No. 37



Figure 12A-38 Slide No. 38

AIRCRAFT PICTURES



Figure 12B-1 Slide No. 1



Figure 12B-2 Slide No. 2



Figure 12B-3 Slide No. 3



Figure 12B-4 Slide No. 4



Figure 12B-5 Slide No. 5



Figure 12B-6 Slide No. 6



Figure 12B-7 Slide No. 7



Figure 12B-8 Slide No. 8



Figure 12B-9 Slide No. 9



Figure 12B-10 Slide No. 10



Figure 12B-11 Slide No. 11



Figure 12B-12 Slide No. 12



Figure 12B-13 Slide No. 13



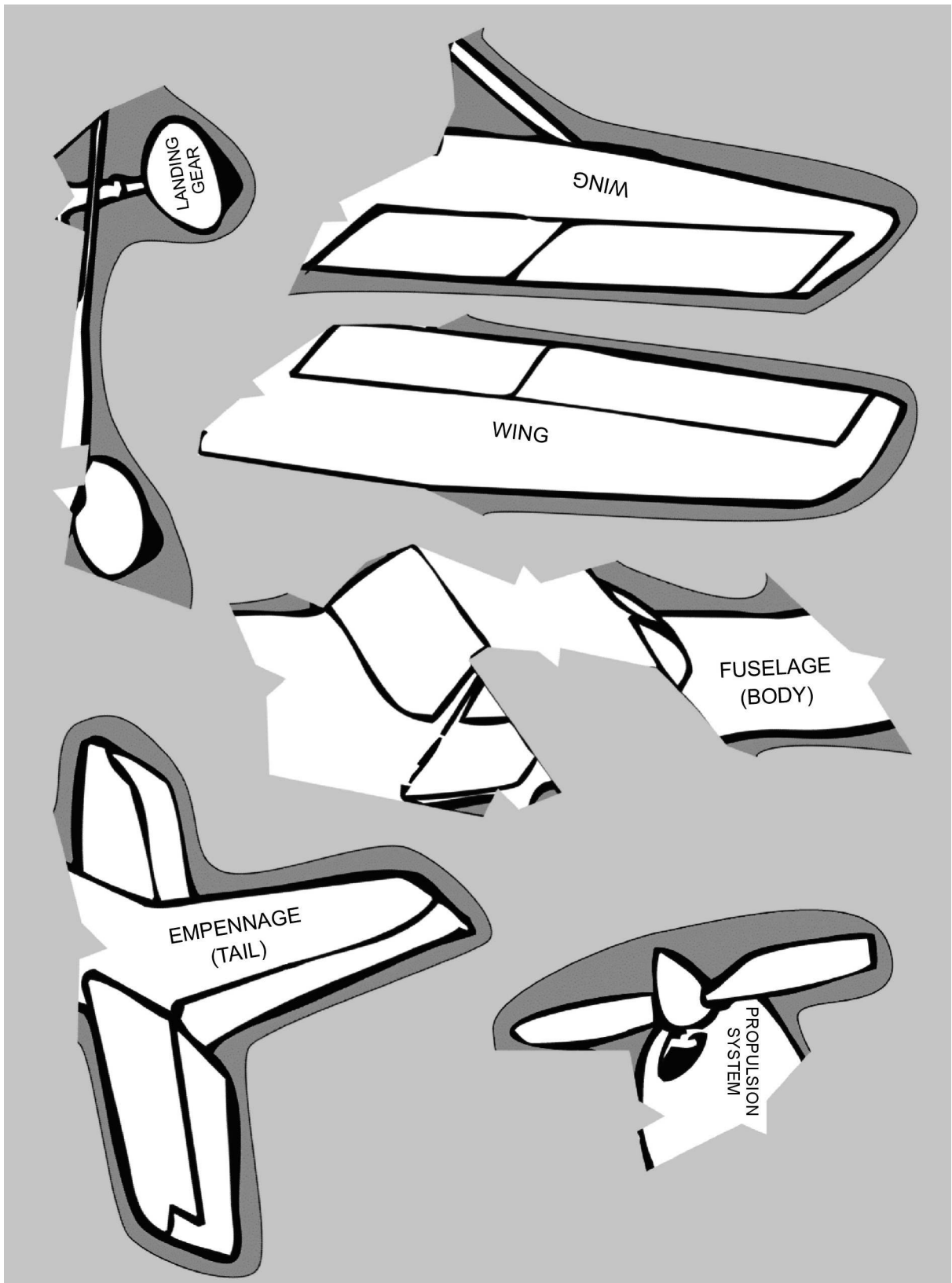
Figure 12B-14 Slide No. 14



Figure 12B-15 Slide No. 15

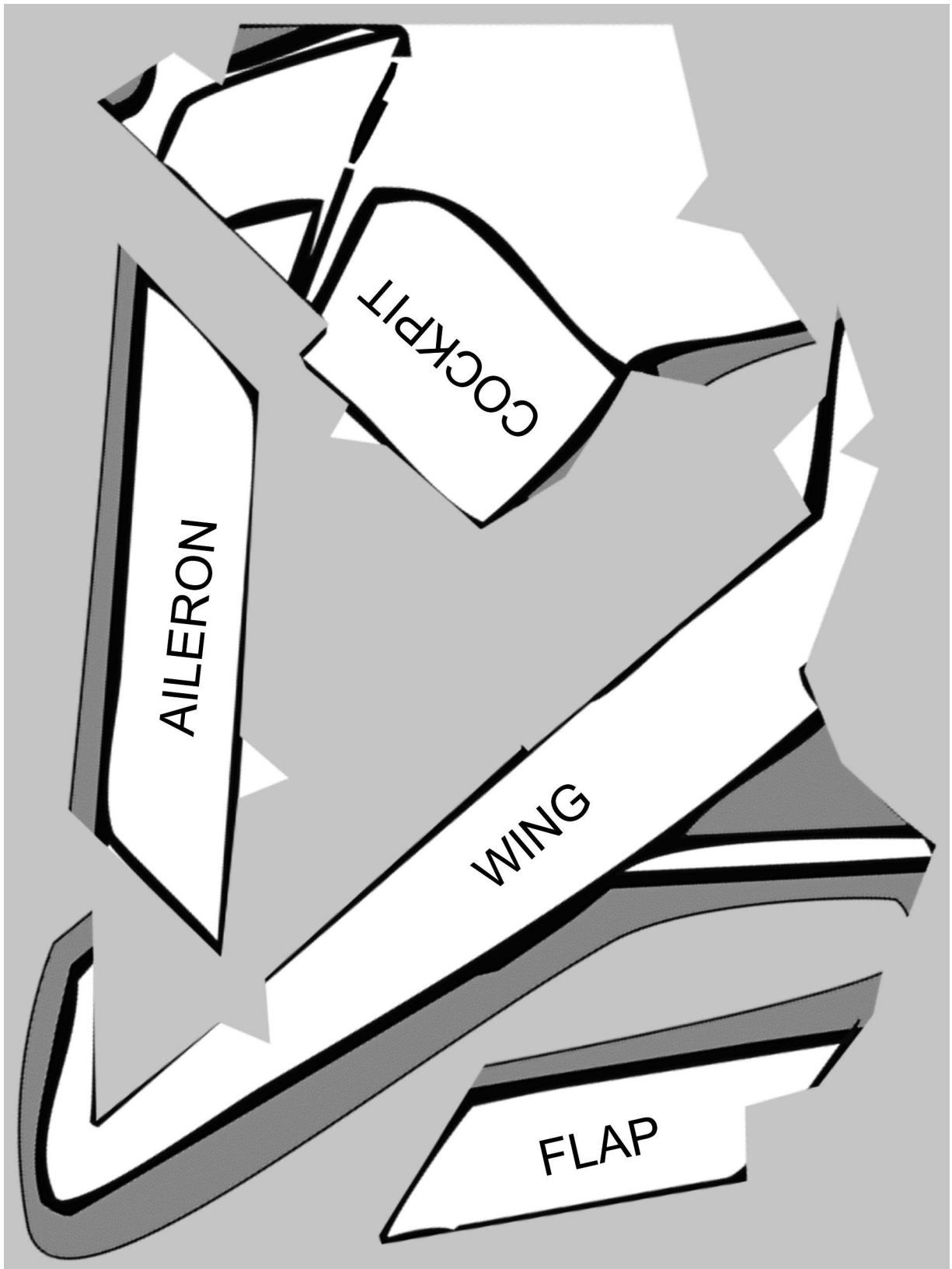
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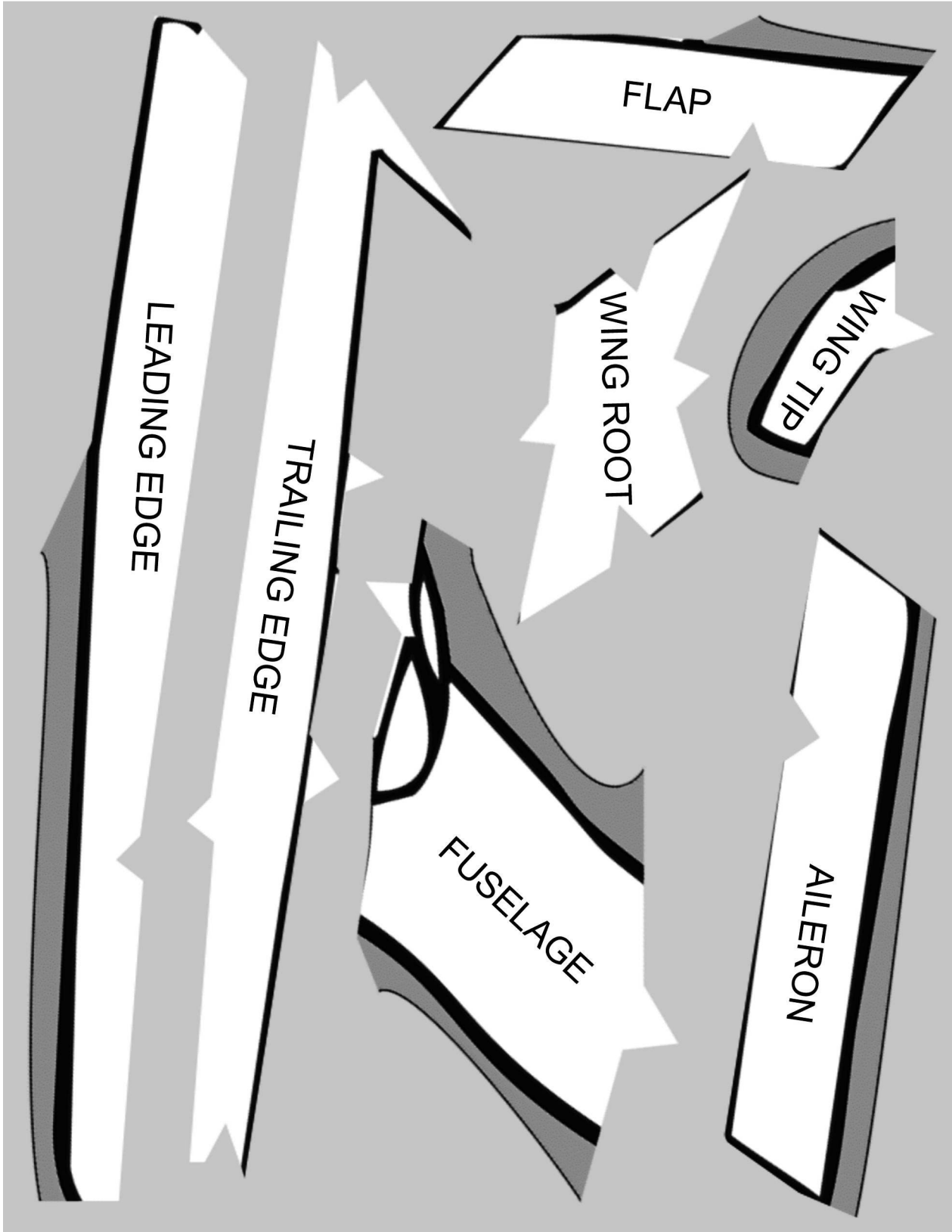
MAIN COMPONENTS OF AN AIRPLANE PUZZLE



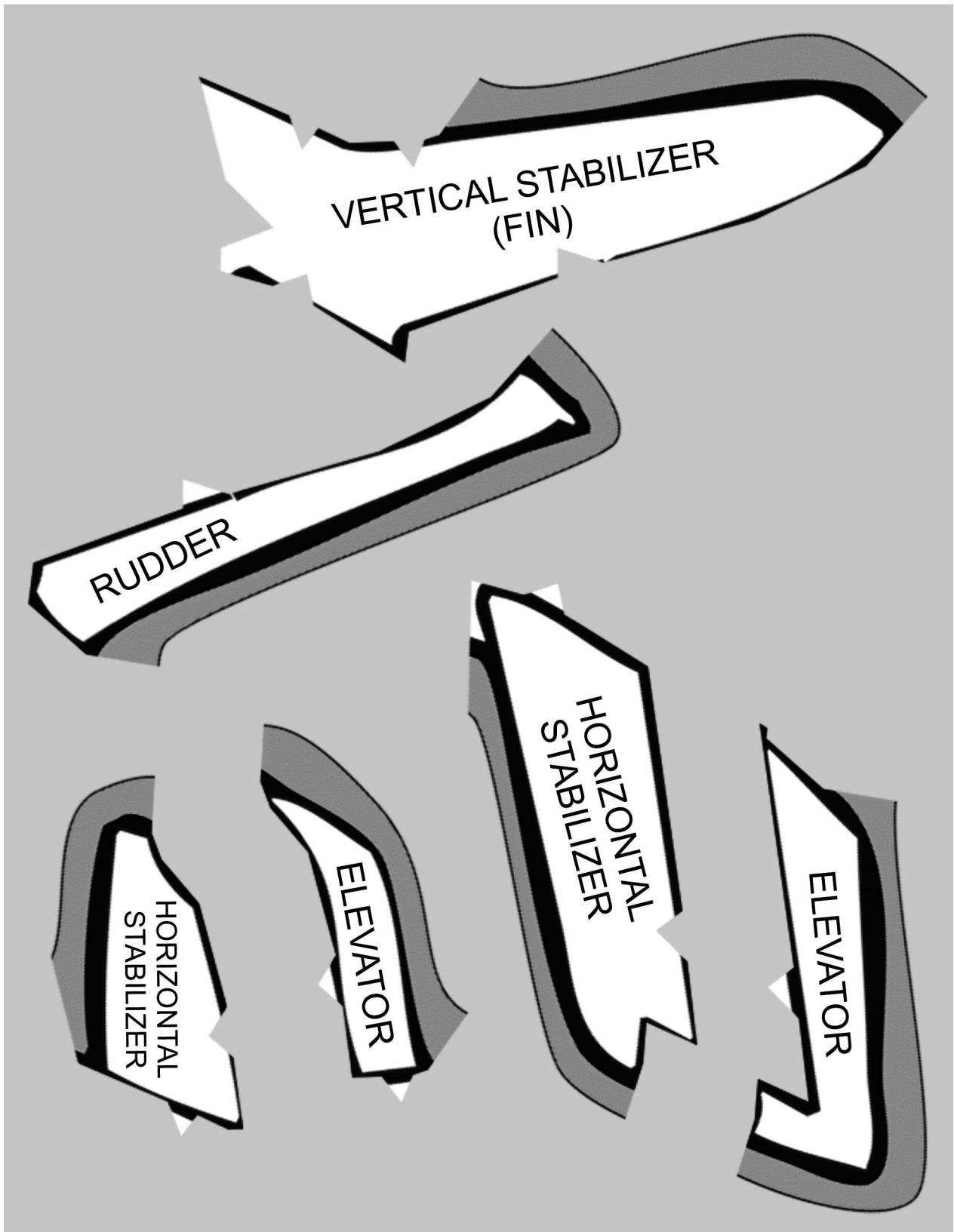
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FUSELAGE AND WING PUZZLE



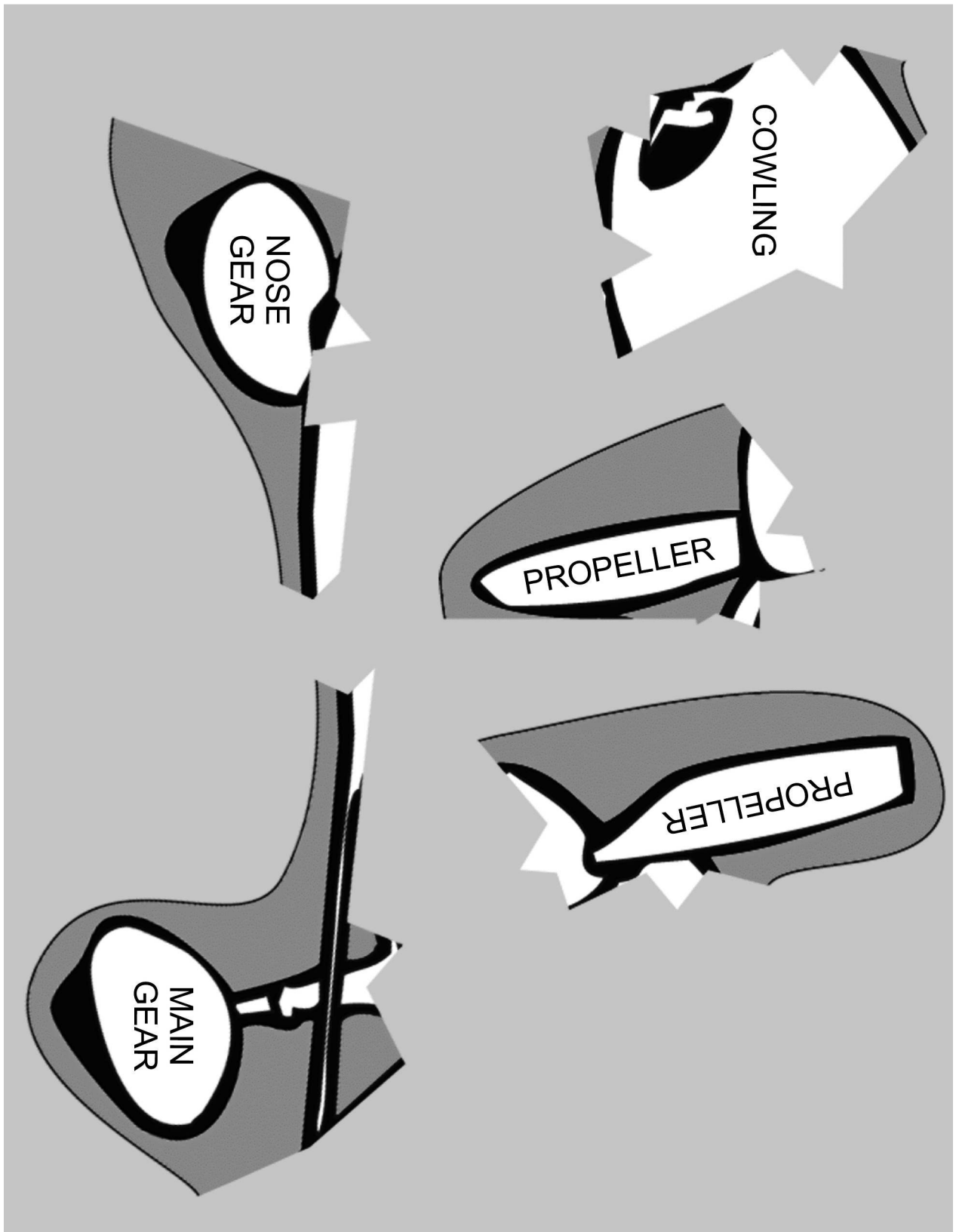


EMPENNAGE PUZZLE



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LANDING GEAR AND PROPULSION SYSTEM PUZZLE



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PAPER MODEL ASSEMBLY INSTRUCTIONS

1. Cut out all the airplane pieces. Be careful not to mix your pieces with others.

2. Glue pieces 1F through 7R and 7L to build-up fuselage layers, carefully aligning parts. Ensure that the entire contacting surface of a smaller piece being fastened to a larger one is completely covered with glue.

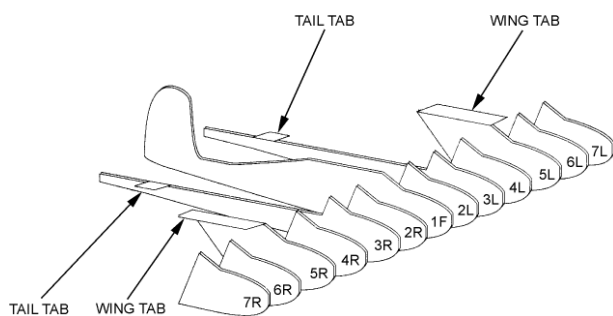


Figure 12G-1 Fuselage Assembly

3. To assemble the wings, glue 9M to the bottom of wing part 8W. Then glue 10B to the bottom of 9M. Make sure the wing parts are aligned along the centre line. Fold down the wing tabs on the fuselage, and apply glue to them. Fasten the wing assembly to the fuselage.

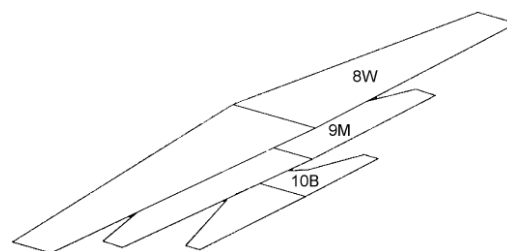


Figure 12G-2 Wing Assembly

4. To assemble the tail, fold down the tail tabs on the fuselage, and apply glue to them. Fasten the horizontal stabilizer 11S to the fuselage.

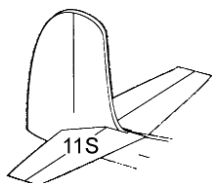


Figure 12G-3 Tail Assembly

5. To attach the propeller, pierce the centre of 12P with the thumbtack, and push the thumbtack into the centre of the fuselage assembly.

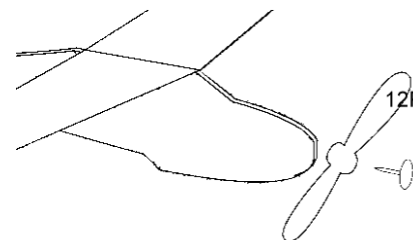


Figure 12G-4 Propeller Assembly

6. To attach the landing gear, clip the binder clip to the bottom of the fuselage, underneath the wings.

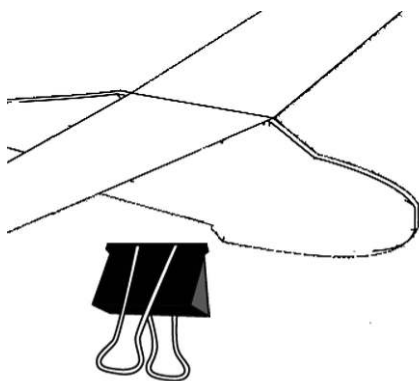


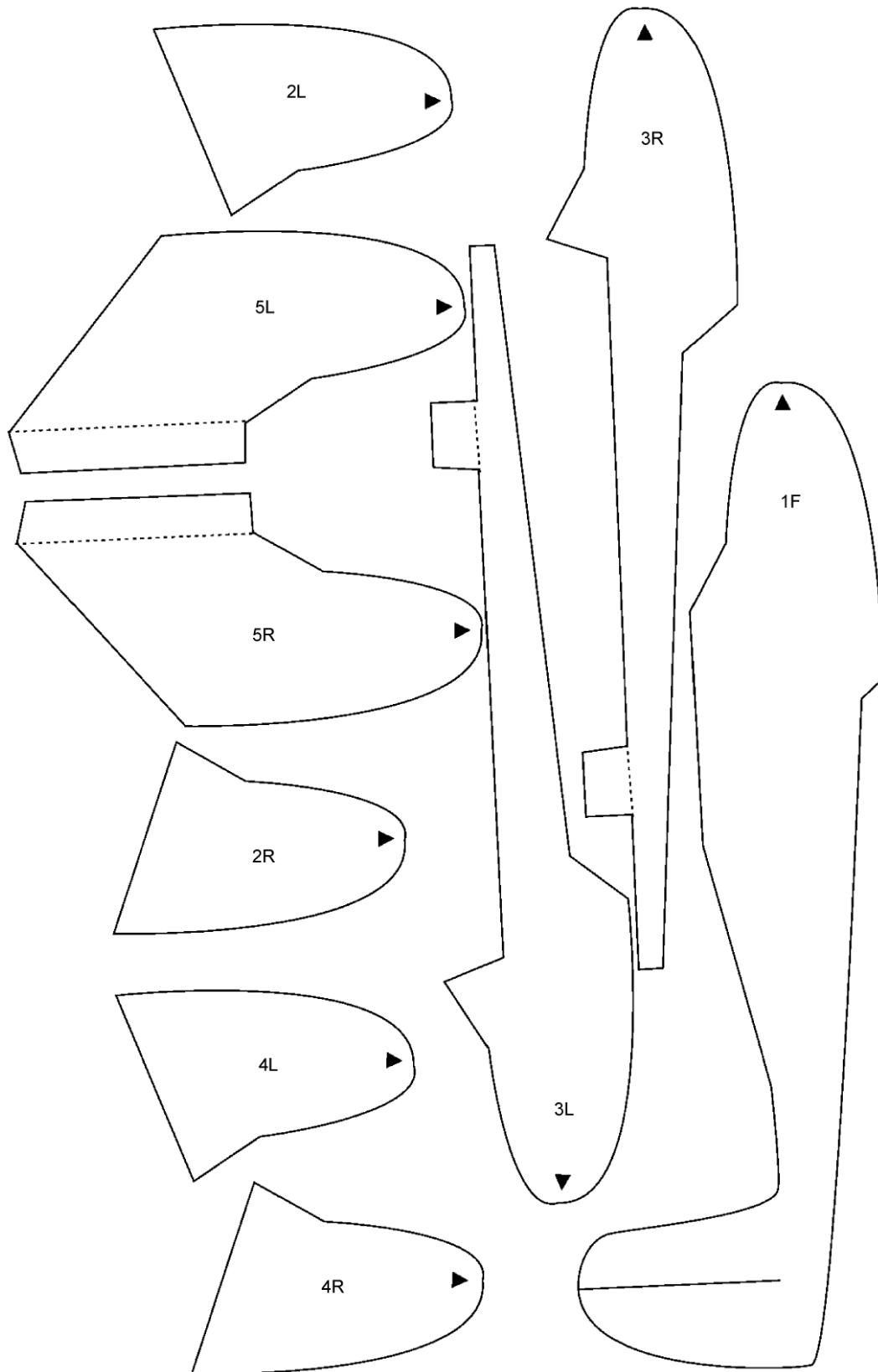
Figure 12G-5 Landing Gear Assembly

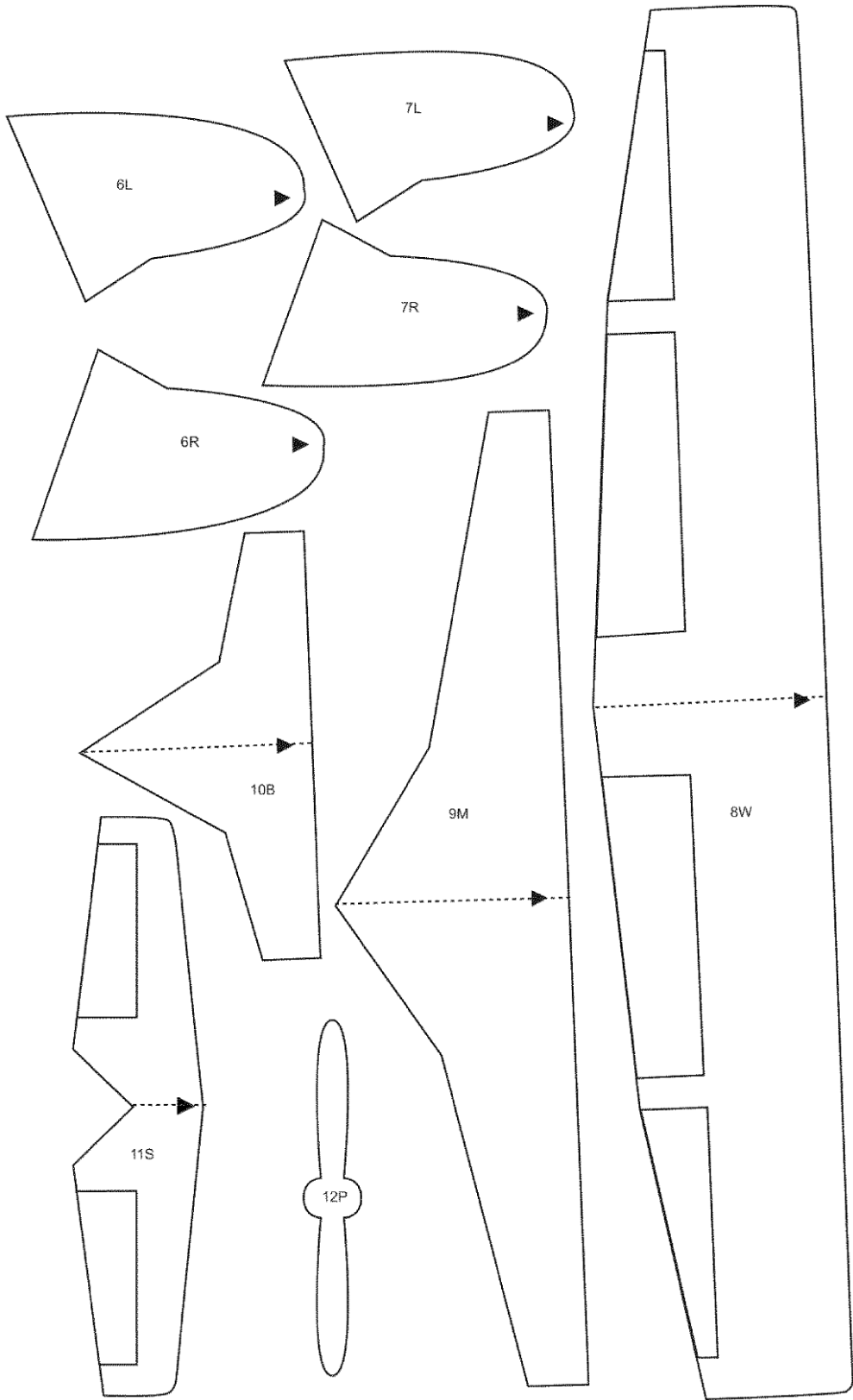
7. Color the model as desired.

Instructions and diagrams adapted from *Fabulous Paper Gliders*.

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PAPER MODEL AIRPLANE PARTS





AMERICAN, BRITISH AND RUSSIAN AIRCRAFT PICTURES













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