

## Early Aviation A Self-Guided Exhibition Tour

### Introduction to this Guide

Early Aviation is the first of many thematic sections in the Museum's open-concept Main Exhibition Hall. As with all areas of the Main Exhibition Hall, Early Aviation is a self-directed experience. This guide provides a directed path for clarity.

As you enter the Main Exhibition Hall, the Admission Desk will be to your right, and the cafeteria to your left. As you move forward, slightly to your left you will pass the entrance to the Museum's tall cylindrical Hall of Tribute. The first exhibit you will encounter is a four-sided square structure, with a rotating airplane on top. Content in this space explores the *Silver Dart*: Canada's first airplane. To the right, there is a series of free-standing display cases, and a curved wall. The themes of Imagining Flight and Experimentation are presented along this wall. Beyond the wall, you will encounter early examples of aircraft with supporting information panels. This portion of the display is surrounded by a very low barrier—as are most of the Museum's thematic sections. Panels are located just inside the barrier, close to the edge, so that they can be read without crossing the barrier.

This guide includes all exhibition texts, from the main panels to artifact details. Unless otherwise stated, texts in this guide are transcripts of the exhibition panels. This guide also includes descriptions of artifacts and significant images. Please note that the locations of artifacts and panels within the Museum are subject to change, so positions may not be exactly as indicated in this guide. Please do not hesitate to ask our friendly staff for assistance. We hope that you enjoy your visit.

### Part 1: The Silver Dart and the Aerial Experiment Association

**Directions:** Begin your visit in front of the square structure with the rotating airplane mentioned above. This is the most common starting point for visitors. The structure's front panel introduces the *Silver Dart*: Canada's first airplane. There is a long display case along the front of the wall, roughly at waist height. Note that, from this location, the neighbouring First World War section is immediately to your left. For the sake of clarity, this tour will focus only on the Early Aviation area.

(Wall)

The Aerial Experiment Association Silver Dart

The First Powered Airplane to Fly in Canada

The *Silver Dart* was designed and piloted by Canadian J.A.D. McCurdy, a member of the Aerial Experiment Association (A.E.A.). The aircraft's name was inspired by the silvery balloon silk that covered its wings. The *Silver Dart* was constructed in Hammondsport, New York, where it was first flown by the A.E.A. in December 1908. The craft was then transported to Baddeck, Nova Scotia, where the group's founder, Alexander Graham Bell, had a summer home. The *Silver Dart* made its famed flight over Baddeck Bay on February 23, 1909.

Image: Several men push a fragile biplane along the surface of a frozen lake. Caption: Moving the Silver Dart into position for takeoff.

Image: A map of Nova Scotia, indicating the location of this historic flight. Caption: Baddeck Bay, Nova Scotia, February 23, 1909.

Image: The *Silver Dart* flies several metres above the ice. The pilot can be seen, seated in the middle. In the background, assistants trail after the aircraft on ice skates. Caption: The *Silver Dart* makes history as the first powered aircraft to fly in Canada.

Image: A cut-out portrait of a serious-looking young man, wearing a suit jacket, white shirt with rounded collar, and tie. Caption: J.A.D. McCurdy, designer and pilot of the Silver Dart.

Artifact (rotating above): Aerial Experiment Association Aerodrome No.4, Silver Dart (reproduction). Royal Canadian Air Force, Trenton, Ontario, 1958. Description: The Silver Dart is a delicate-looking biplane. It is called a “biplane” because it has upper and lower wings. Its open, uncovered frame is made from wood, metal and bamboo. Tension wires provide additional support. The earliest airplanes, like this one, had exposed structures and open cockpits. The upper and lower wings, covered in silky light-grey fabric, have movable triangular surfaces at each tip. A pair of horizontal surfaces sit at the front of the airplane—these are often mistaken for the tail. A simple vertical rudder sits at the back. All of these elements, moved by exposed wires, were used to control the aircraft’s movement. The engine, and its rear-facing propeller, were located behind the pilot’s seat.

About this Artifact:

The reproduction on display was built by Royal Canadian Air Force members, led by Lionel G. McCaffrey, to mark the 50<sup>th</sup> anniversary of the Silver Dart’s historic flight at Baddeck Bay. The reproduction was damaged, but not destroyed, after a hard landing at the celebration. The Museum acquired the aircraft in 1960. The original *Silver Dart* crashed in Petawawa, Ontario, in August 1909.

Specifications:

Wing Span: 14.96 m (49 ft. 1 in.). Length: 12 m (39 ft. 4 in.). Height: 2.92 m (9 ft. 7 in.). Weight when empty: 277 kg (611 lbs.). Weight when loaded: 390 kg (860 lbs.). Cruising Speed: 69 km/h (43 mph). Max Speed: 69 km/h (43 mph). Service Ceiling: unknown. Rate of Climb: unknown. Range: unknown. Power Plant: Continental A-65, 4-cylinder air-cooled horizontally-opposed engine, 65 hp.

(Display Case)

Artifact: Original *Silver Dart* Propeller. Maker: J.A.D. McCurdy, Baddeck, Nova Scotia, 1908. Description: A wooden propeller, about 6 feet long, used during a flight of the *Silver Dart*.

**Directions:** Move around the corner to your right for the next text panel.

(Wall)

Description: Located to the right of the main text, this panel features photos of each member of the A.E.A. Alexander Graham Bell, the group’s founder, is prominent at the top. Mabel Bell, although not technically a member of the group, is included in a coloured sidebar on the right for added emphasis.

The Aerial Experiment Association

Alexander Graham Bell founded the Aerial Experiment Association (A.E.A.) in 1907. This team of Canadian and American pioneers worked together to advance their understanding of flight. Each member of the A.E.A. designed one aircraft and consulted in the design of others. Although the A.E.A. disbanded in 1909, its members had a lasting impact on the development of aviation in North America.

Images: A photograph of each person is featured in a circle, with captions underneath.

Alexander Graham Bell (1847–1922). The well-known founder of the Aerial Experiment Association. Born: Edinburgh, Scotland. Died: Baddeck, Nova Scotia.

J.A.D. McCurdy (1886–1961). The first person to fly a powered aircraft in Canada. Born: Baddeck, Nova Scotia. Died: Montreal, Quebec.

Frederick Walker “Casey” Baldwin (1882–1948). The first Canadian to pilot a powered aircraft. Born: Toronto, Ontario. Died: Baddeck, Nova Scotia.

Glenn Hammond Curtiss (1878–1930). One of North America’s greatest engine experts. Born: Hammondsport, New York. Died: Buffalo, New York.

Lieutenant Thomas Etholen Selfridge (1882–1908). The U.S. military’s leading aviation authority. Born: San Francisco, California. Died: Fort Myer, Virginia.

Mabel Hubbard Bell (1857–1923). Forming the A.E.A. was her idea—and she provided the financing. Born: Cambridge, Massachusetts. Died: Chevy Chase, Maryland.

**Directions:** Move around the corner to your right for the next text panel.

(Wall)

Aerial Experiment Association

Bell’s Dream Team Takes to the Sky

The Aerial Experiment Association (A.E.A.) was founded by Alexander Graham Bell in 1907. Powered flight had already been achieved, but it was still very new. A.E.A. members believed that they could make significant contributions to the field of aviation by combining their unique skills.

Image: A group of men, standing together. Captions: A.E.A. members, from left to right: Casey Baldwin, Thomas Selfridge, Glenn Curtiss, Alexander Graham Bell, and J.A.D. McCurdy. A.E.A. members designed and built several airplanes: the *Red Wing*, the *White Wing*, the *June Bug*, the *Silver Dart*, and the *Cygnets*.

Image: Two men stand in a field, facing away from the camera. They are looking at a large circular structure made of two connected disks, flying above them in the sky. Caption: Alexander Graham Bell’s aviation experiments focused primarily on kites. Constructing Bell’s designs created jobs in Baddeck, Nova Scotia.

Image: A candid photograph of Alexander and Mabel Bell as seniors, holding hands and facing the camera. Caption: Mabel lost her hearing as a young child. She worked with several tutors over the years, including Alexander. They married in 1877.

Image: An early biplane, similar to the *Silver Dart*, sits on a frozen waterway. Caption: The A.E.A. *Red Wing*, designed by Lieutenant Thomas Selfridge. Glenn Curtiss is seated at the controls. Hammondsport, New York, 1907.

Image: A woman in a long Victorian dress looks skyward. She is holding a measuring gauge connected to a kite’s cable, while another woman looks on. Captions: Flying an experimental kite, September 1903. Mabel Hubbard Bell loved science and technology. She often played a hands-on role in her husband’s experiments.

Image: A group of men stands in an open wooden boat. A long rectangular structure, made of inner triangles, is attached to the rear of the boat. Caption: Thomas Selfridge in Bell’s experimental kite, the *Cygnets I*, in December 1907.

Image: A young man in a tweed cap sits at the controls of an airplane. The image highlights the simple wooden steering wheel, engine, and intricate cabling that controlled the aircraft. Captions: J.A.D. McCurdy at the controls of the A.E.A. *Silver Dart*. Hammondsport, New York, 1908. Nova Scotian J.A.D. McCurdy was friends with Alexander Graham Bell. McCurdy often assisted with Bell’s projects before the A.E.A. was formed.

Image: A man, flanked by two assistants, sits at the controls of an early biplane. Caption: Glenn Curtiss at the controls of the A.E.A. *June Bug*. Hammondsport, New York, July 1908.

Image: A photo of the well-known Wright Flyer in a field. Captions: Orville Wright prepares to demonstrate an

airplane to the American military, with Thomas Selfridge as his passenger. Fort Myer, Virginia, September 1908. In 1908, Orville Wright crashed his airplane during a demonstration. His passenger, Thomas Selfridge, was killed. Selfridge's death was the first recorded fatality in a heavier-than-air craft.

Image: A man in a suit and white cap stands holding an engine. Captions: Glenn Curtiss posing with one of his airplane engines. Baddeck, Nova Scotia, 1907. Glenn Curtiss was one of America's leading engine builders. He learned his craft converting bicycles into motorcycles at his shop in Hammondsport, New York.

Image: A group of people surround an early airplane in a field. Caption: The A.E.A. *White Wing* ready for take-off. Hammondsport, New York, May 1908

**Directions:** Turn 90 degrees to your left, and move forward a few paces. Turn 45 degrees to your right, and move a short distance further. Here, facing the previous wall showcasing members of the A.E.A., you will find a series of display cases featuring artifacts related to the A.E.A.

(Display Case)

Artifact: Tetrahedral Kite. Maker: Alexander Graham Bell, Baddeck, Nova Scotia, ca 1902-1908. Description: This kite is rectangular in shape. Its inner structure is composed of connected tetrahedron-shaped cells. Two sides of each inner cell have a faded burgundy cloth covering. Caption: Alexander Graham Bell invented the tetrahedral kite in 1902. He constructed many examples, such as this one, during the course of his research.

Image: A massive tetrahedral kite, using the same construction pattern as the kite on display. A person sits at the controls. The overall structure, which supports thousands of small tetrahedral cells, rests on a thin undercarriage. Caption: The *Cygnets II* was designed by Alexander Graham Bell in 1909. This piloted kite could not get off the ground—the engine provided insufficient power.

(Display Case)

Artifact: Original *Silver Dart* Engine. Maker: Glenn H. Curtiss, Hammondsport, New York, 1908. Caption: This 40-hp engine, designed by Glenn Curtiss, powered the first flight in Canada. It was later fitted onto a small boat, which sank in shallow water in Nova Scotia. The engine was salvaged because of its historical significance.

## Part 2: Imagining Flight

**Directions:** Beyond these display cases, and to the right, there is a curved wall. Proceed to the far righthand side of this curved wall. In this section, information clusters are presented from right to left, rather than left to right. For this first portion, we have kept the information in its original right-to-left order.

(Wall)

### Mythology and Spirituality

Legends, folktales, and spiritual teachings from around the world feature gods and mythical creatures that soar above the earth. Many cultures have imagined flight as a spiritual, divine, mystical, or magical ability—a symbol of freedom and power. Human flight, once presumed impossible, was sometimes featured in cautionary tales about excessive pride and disobedience. People had yet to envision their own place in the sky.

#### Garuda, Hindu Mythology (India)

Garuda is a majestic birdlike creature. Lord Vishnu made Garuda immortal, and helped save Garuda's mother from slavery. In return, Garuda agreed to carry Vishnu on his back when needed.

Image: Illustration of Garuda—a golden figure with a bird's head and giant wings—flying above the water, carrying

a luminous blue figure on his back. A woman in the water below raises her arms. Caption: Krishna, an incarnation of Lord Vishnu, rides Garuda as he saves a devotee from the Ocean of Birth and Death.

#### Baba Yaga, Slavic Folklore

Baba Yaga is a common figure in Eastern European stories. She lives deep in the woods, in a house that stands on two giant chicken legs. While she is often portrayed as a wicked witch, Baba Yaga sometimes uses her magic to help those who show courage.

Image: Illustration of a scowling woman with wisps of long white hair. She stands in the forest, wearing a ragged, patched dress. Caption: Baba Yaga is a frightful sight as she flies through the woods in a mortar, wielding a pestle. Illustration of Baba Yaga from “Vasilisa the Beautiful,” by Alexander Afanasyev, 1899. Illustrator: Ivan Bilibin (1876–1942)

#### Daedalus and Icarus, Greek Mythology

Daedalus was determined to fly to freedom. He had been imprisoned, with his son Icarus by King Minos of Crete. Daedalus constructed wings from wax and feathers—warning his son not to fly close to the Sun. They took to the sky, escaping imprisonment, but Icarus was overcome by the thrill of flight. As he soared higher and higher, his wings melted, and he fell into the sea.

Image: A painting depicting Daedalus and Icarus soaring over a coastal landscape wearing handmade wings. Caption: Thrilled by the experience of flight, Icarus disobeys his father and falls from the sky. *The Fall of Icarus*, 1636. Peter Paul Rubens (1577–1640), 27 x 27 cm. Oil on wood.

#### The Raven, Aboriginal Mythology

Many Aboriginal cultures in North America feature Raven as an important mythological creature. Raven is a complex trickster figure. He has many vices, but often manages to help mankind—if only by accident. Raven is frequently found in creation stories.

Image: A traditional illustration of Raven in human form, next to a box. The Sun is prominent in the background. Caption: This image depicts the Haida story of how light came into the Universe. Raven is stealing the Sun from the Sky Chief, who keeps the glowing sphere locked in a treasure box. *Raven Stealing the Sun*, 1974. Vernon Stephens (1949–), 66.2 x 50.9 cm. Ink on paper.

#### La Chasse-galerie, French-Canadian Folktale

*La Chasse-galerie* is a folktale about a crew of voyageurs who make a deal with the Devil. They fly their canoe through the air to spend New Year’s Eve in Montreal with their wives and girlfriends 500 kilometres away. Throughout their journey, the crew must struggle to meet the Devil’s conditions—or he will take their souls!

Image: A painting of a dozen men in a large canoe, suspended high over a moonlit landscape. The devil is pulling the canoe from the front while the men paddle. One man has his face obscured by an upended bottle as they drink. Caption: A crew of French-Canadian voyageurs flies through the air in an enchanted canoe to celebrate New Year’s Eve with their sweethearts far away. *La Chasse-galerie* (The Flying Canoe), 1906. Henri Julien (1852–1908), 53.5 x 66.5 cm. Oil on canvas

#### Video: *The Legend of the Flying Canoe* (excerpt)

This animated clip recounts one young man’s harrowing journey aboard the Flying Canoe. Robert Doucet, 1996. Courtesy of the National Film Board of Canada.

**Directions:** Move several paces to the left, along the curve of the wall, to the next grouping of information. The material that follows appears within a large black circle on the wall. This grouping also includes a display case and a video monitor.

(Wall)

### Flying to Fictional Lands

Before human flight was a reality, it was a common theme in literature—particularly in early science fiction. Authors imagined flight as a way to explore the far reaches of Earth, and beyond. Science fiction provided a way for authors to satirize their societies' flaws by critiquing these same qualities in imaginary civilizations.

Cyrano de Bergerac (1619–1655)

*L'Autre Monde ou les États et Empires de la Lune* (Comical History of the States and Empires of the Moon), 1657.

Cyrano de Bergerac was one of the first science fiction writers. His self-titled character attempts to fly to the Moon by tying bottles of dew around his waist. The Sun's rays heat the dew, and an "attraction" lifts him into the sky. He doesn't reach the Moon on his first try—he lands instead in New France, where he devises a more successful plan.

Image: Blue-toned illustration of a man, wearing historical clothing and a tricorne hat, flying into the air with bottles tied around his waist.

Jules Verne (1828–1905)

*Robur le Conquérant* (Robur the Conqueror), 1886

This novel was written before airplanes were a reality. Robur creates a large battery-powered flying ship called the *Albatross*. He tries to convince a group of balloon and airship enthusiasts that heavier-than-air machines hold the key to human flight—not balloons or dirigibles. When the group rejects his theory, Robur kidnaps a few members and flies them around the world in his flying ship.

Image: Illustration of a sea-faring ship, rigged with multiple propellers and rotors, flying through a vast cloud cover.

Video: *Le Voyage dans la Lune* (A Trip to the Moon) (excerpt), Georges Méliès, 1902.

Description: This well-known silent film is played on a continual loop in this display. Scenes show the creation and use of a giant cannon to propel a ship onto the Moon. The ship strikes "The Man in the Moon" in the eye when it lands. Upon arrival, the explorers encounter the Moon's inhabitants. The explorers eventually flee to their ship, and fall back to Earth.

H.G. Wells (1866–1946)

*The First Men in the Moon*, 1901

Reclusive physicist Mr. Cavor develops "Cavorite," a material that negates gravity. He builds a spherical ship and convinces Mr. Bedford, a businessman, to join him on a journey to the Moon. Together, they encounter a civilization of insect-like creatures that they call "Selenites."

(Display Case)

Artifact: Cavorite Sphere Model. Maker: eModel Airplanes. Manila, Philippines, 2014. Description: A reconstruction of the spherical flying ship described in H.G. Wells' novel. It is metallic gold in colour, with simulated rivetted panels. Cylindrical flat-topped spines protrude from its surface.

### Part 3: Experimentation

**Directions:** Move several paces to your left, along the curve of the wall, to the next grouping of information. The material that follows appears along a section of wall with a black background. Again, key clusters of content read right to left. This guide presents the main groupings in order as you move from right to left, but the information reads from left to right within each grouping.

(Wall)

#### Early Ideas and Experiments

The first people to imagine human flight as a real possibility pursued their ideas in many different ways.

Throughout history, people from all walks of life have built wing-like structures, strapped them to their bodies, and leapt from high places. As there are few surviving records, the exploits of tower jumpers are often steeped in folklore.

Image: The first of four images, contained within circles, highlighting early experimenters. Here, a cartoon drawing shows a bearded man, wearing a crown and wings, soaring above a castle. Caption: King Bladud, Ninth century B.C.E., England. According to legend, King Bladud ruled the ancient Britons. He is said to have died in a failed tower jump, believing the gods had given him the gift of flight.

Image: A cartoon drawing of a man suspended from a winged flying device, with a tower visible in the background. Caption: Abbas Ibn Firnas, ca 872, Emirate of Cordoba (now part of Spain). Firnas was a Muslim scientist who reportedly built a glider. After a hard landing, Firnas realized that a glider would need a tail for control.

Image: Drawing of a monk, with a traditional bowl cut and long robe, strapped to a giant diamond-shaped kite. Caption: Eilmer of Malmesbury, ca 1000, England. Eilmer is said to have glided about 60 metres (200 feet) with wings strapped to his hands and feet. Remarkably, although he broke his legs, he survived the experience.

Image: Drawing of a man, wearing a feathered suit, with giant wings attached to his body. Caption: John Damian, 1509, Scotland. Research suggests that Damian, an Italian alchemist, may have achieved a glide of nearly 800 metres (roughly half a mile). His life was saved when he landed in a pile of dung.

Far more information survives about great thinkers, such as Leonardo da Vinci, who explored human flight through models, drawings and writings.

Image: A drawing, from a medieval print, of a man with a long white beard and hooded robe, looking down at a book. Caption: Roger Bacon, 1250, England. Many believe that Bacon, a Franciscan friar, was the first to explore human flight from a scientific perspective.

Image: Drawing of a man, wearing an upward sloping hat. Caption: Francesco Lana de Terzi, ca 1670, Italy. This Jesuit priest and professor designed an airship, but never built it. He believed that God would never allow such a “dangerous” machine to succeed.

(Display Case)

Artifact: Model of de Terzi’s Airship. Maker: Bill Arnold, Ottawa, Ontario, ca 1986. Description: This model looks like a sailing ship, rigged as a hot-air balloon. Four fixed copper balloons float above the vessel, with a white sail in the centre. Two figures sit in the vessel.

(Wall)

Images: Above, a famous self-portrait drawn by Leonardo da Vinci. He is depicted with long white hair and beard, wrinkled face, and heavy dark eyebrows. Below, there is a drawing by da Vinci of an ornithopter (centuries before a successful ornithopter was ever built). Captions: Leonardo da Vinci, ca 1512. Leonardo da Vinci sketched flying machines well before they were invented. The image below depicts an ornithopter—a human-powered machine with flapping wings. Leonardo da Vinci (Late fifteenth century), Italy.

**Directions:** Move several paces to the left, along the curve of the wall, to the next content grouping. As before, within the grouping itself, the content is presented left to right in this guide.

(Wall)

### Lighter-than-air Flying Machines

The first hot-air balloons, invented in 1780s France, captured the public imagination. Balloons had practical uses

such as research and military observation, but they were primarily used for recreation: leisure flights, races and stunt-flying. Hot air, hydrogen, helium, and coal gas can be used to provide lift for “lighter-than-air” flight.

Balloons have two major limitations: they cannot be reliably steered, and don’t have their own sources of propulsion. In time, other lighter-than-air vessels evolved to address these challenges.

Image: A vast airship tethered only a few feet above the ground, surrounded by onlookers wearing suits and long dresses. Caption: A crowd gathers around an airship at Calgary's Dominion Exhibition in July 1908.

Image: Illustration showing a hot-air balloon flying over a vast forest. Caption: In 1859, American balloonists John LaMountain and John Haddock were carried off course by a storm. They landed in the wilderness north of Ottawa.

Image: Close-cropped image of a woman, suspended from a giant balloon. Caption: A female aeronaut parachutes from a hot-air balloon. Daring balloon and parachute stunts were popular during the late 1800s and early 1900s.

The Montgolfier brothers invented the hot-air balloon.

Images: Illustrated portraits of the Montgolfier brothers, and a drawing of their ornate balloon. Above left: Joseph-Michel Montgolfier (1740–1810). Below left: Jacques-Étienne Montgolfier (1745–1799). Right: Illustration of an ornate balloon, decorated with intricate motifs including fleurs-de-lys, acanthus leaves, swags and tassels.

What is lighter-than-air flight?

If a balloon is filled with a gas that is less dense than the surrounding air, it will rise. Flying machines that rely on this principle, such as balloons and airships, are called “lighter-than-air” craft. Lighter-than-air craft can be filled with low-density gases such as hydrogen and helium. They can also be filled with hot air—heat makes the air expand, reducing its density.

**Directions:** Turn 180 degrees and move a few paces. In this general area you will find a free-standing display case. It is close to the ones you encountered earlier with the kite and engine.

(Display Case)

Artifact: Model of the Montgolfier Bros. Balloon. Maker: Aeronautical & General Model Makers Ltd. Hounslow, England, ca 1972. Description: This large model shows a hot-air balloon floating above a raised stage. The balloon is sky blue, painted with gold figures and highlights, and adorned with red garlands. Drawings of Joseph-Michel Montgolfier (left) and Jacques-Étienne (right) bracket the caption text. Caption: The Montgolfier brothers invented the hot-air balloon. This model depicts the ornate balloon that they demonstrated for Louis XVI in Paris, France in 1783.

**Directions:** Return to your previous position at the curved wall, and move several paces to the left.

(Wall)

Racing to Build the First Successful Airplane

Many innovators viewed human flight as a series of technical challenges to be overcome through experimentation.

Valuing both theory and practice, these pioneers used kites, gliders and wind tunnels to test their ideas. By 1903, while they had yet to achieve more than a “hop,” over thirty powered experimental aircraft had been constructed worldwide.

Images: Circular inset portrait of a man wearing a long robe and posing as if standing and writing in a book. Larger image of a wooden structure, from which a winged object is being launched. Captions: Samuel Pierpont Langley, 1834–1906, United States. While serving as head of the Smithsonian Institution, Langley came close to achieving



piloted, powered flight. The U.S. War Department supported his work with a \$50,000 grant. Langley had great success working with models. This image shows his Aerodrome No. 5 taking off from its launching apparatus.

Images: Circular inset portrait of an older man with a distinctive wide moustache. Larger image of a bat-shaped flying machine with two propellers, on display in an elaborate hall, surrounded by plants. Captions: Clément Ader. 1845–1925, France. Ader built two flying machines. His first, the *Éole*, managed a “hop” but was impossible to control. Ader’s work attracted the attention of the French military in the 1890s. Ader’s *Avion III* on display in 1909 at the Exposition internationale de locomotion aérienne in Paris, France.

Aviation innovators were working tirelessly by the late 1800s, hoping to be first to achieve controlled powered flight.

Image: Portrait of an older man with a raised collar. Caption: Sir George Cayley, 1773–1857), England. Sir George Cayley’s work shaped modern understandings of flight. He was the first to recognize that lift, propulsion, and control were three separate requirements for flight.

Image: Portrait of a man with dark hair and a beard, wearing a suit. Caption: Otto Lilienthal, 1848–1896, Germany. Otto Lilienthal was well known for his work with gliders. He made more than 2,000 flights before his accidental death in 1896.

(Display Case)

Artifact: Model of Cayley’s Governable Parachute Glider. Maker unknown, ca 1965. Description: This small boat-like glider has a large, leaf-shaped surface overhead on two struts, which serves as a wing. The rear strut supports a small tail, and a second tail is set on a steering oar. Caption: Cayley’s piloted glider took to the sky in 1852. His experiments involved unpowered flying machines—no existing engine could have lifted his craft.

Artifact: Model of a Lilienthal Glider. Maker unknown, ca 1965. Description: Lilienthal’s Glider follows a biplane design with a small tail rudder. The pilot is suspended from a reinforced section in the middle of the lower wing. Caption: Lilienthal's lower body would dangle beneath as he piloted his glider. He would steer by shifting his weight, and would land with his feet.

**Directions:** To your left, there is a small wall segment perpendicular to the curved wall. Move around this corner to the last segment of wall-based content. The low ankle-height barrier begins here. There is a free-standing display case close behind you.

(Wall)

The Wright Brothers Make History

December 1903, Kitty Hawk, North Carolina. Orville and Wilbur Wright became the first to make a sustained controlled flight in a powered airplane.

Image: A biplane taking flight, only a few feet off the ground, as a person in the background looks on. Caption: An iconic image—the first powered, sustained and controlled flight. On December 17, 1903, Wilbur pilots the *Flyer I* as Orville follows alongside.

The Wright brothers conducted exhaustive experiments with kites, gliders, models and a wind tunnel. They identified errors in others’ calculations, and adjusted their own design accordingly. The Wrights were unique because they envisioned their aircraft as a series of interdependent systems that included the pilot.

Images: Photographic portraits of Orville Wright (1871–1948), above, and Wilbur Wright (1867–1912), below.

Image: A man lies face-down at the controls of a biplane, with his head sticking out in front. Caption: In this

photograph, Wilbur Wright pilots the brothers' 1901 glider. The Wrights understood that a pilot's knowledge and skill were just as important as aircraft design.

Image: Two men stand at opposite ends of a glider's wings, each holding a tether line and watching the aircraft as it flies several metres overhead. Caption: The Wright brothers "kiting" their 1902 glider to test how design changes altered its stability in flight.

Image: A biplane in flight, several metres off the ground, heading away from the camera. Caption: In 1905, the Wrights developed the first practical airplane: the Flyer III. This aircraft could fly for extended periods of time.

(Display Case)

Artifact: Model of a Wright Flyer I. Maker: Mastermodels Ltd. Harrow, England, ca 1962. Caption: The Wright Flyer I, built in 1903, served as the basis for later Wright designs. It featured wing warping for lateral balance, a moveable rudder for directional control, and an elevator to control pitch. Description: The model on display is a biplane with the pilot lying face-down in the middle of the lower wing, operating the controls. The aircraft engine was housed to the pilot's right. Two rear-facing propellers were connected and powered via fan belts. To the front is a set of elevators and to the rear a set of rudders. A portion of the frame underneath the aircraft serves as a landing skid.

#### **Part 4: Aircraft on Display**

**Directions:** While facing the display case, move to your left out of the recessed area. Following the curve of the low black barrier, you will eventually come to a tall backlit panel (located inside the barrier). This is the first of many thematic panels located within the Museum's aircraft groupings.

(Text Panel)

##### **The Industry Takes Off**

With early airplane flights making headlines in 1908 and 1909, wealthy sportsmen began to demand their own aircraft. In Europe and the United States, airplane makers such as Blériot and Curtiss launched companies to fill this niche. In Canada, J.A.D. McCurdy and Casey Baldwin's Canadian Aerodrome Company built the Hubbard II—Canada's first commercially-produced aircraft. The First World War highlighted the airplane's many practical uses, sparking a Canadian industry.

Image: Close-up of a young woman in a pilot's jacket, goggles and cap, at the controls of an airplane. Caption: Stinson Aviation Company—American aviator Katherine Stinson co-founded the Stinson Aviation Company with her mother. They rented and sold airplanes to a growing market of aviation enthusiasts.

Image: A man in a heavy apron faces the camera while working at a low bench. He is framed by the structure of a half-built biplane. Caption: Wright Company—The Wrights manufactured versions of their successful Wright Flyer for commercial sale. While they frequently improved their design, they were surpassed by more innovative airplane makers. Wright Brothers Factory, 1910.

Image: Hand-drawn diagram showing how cables can adjust the angle of an aircraft's wings. Caption: This 1912 Wright brothers diagram illustrates the principle of wing warping. The Wrights used this sketch as they fought to uphold their patents in court. These lawsuits are often called the Wright Patent Wars.

Image: A person stands by the far side of an airplane, which sits in a wintry landscape. Caption: Canadian Aerodrome Company—The Canadian Aerodrome Company built the Hubbard II for American Gardiner Greene Hubbard II. This was the only airplane ever sold by the company.

**Directions:** If you turn 90 degrees to your left and move a few paces while following the curve of the low barrier, you will come to an information panel for an aircraft displayed to the right. This type of “console” panel recurs throughout the Museum, presenting information related specifically to an aircraft on display.

(Text Panel)

#### Blériot XI: Making Headlines and Sparking an Industry

The Blériot XI was designed in 1908 by French engineers Louis Blériot and Raymond Saulnier. When Blériot made the first airplane flight across the English Channel in 1909, it sparked a flurry of interest—and purchase orders. By 1913, Blériot had set up factories in France, Italy, and England, and had built over 800 Blériot XI airplanes. Some companies constructed Blériot airplanes under licence. Others copied the successful design when creating their own aircraft.

Image: An open hall with several aircraft in various states of construction. Wings, wooden frames, and other components are visible in the workspace. Caption: The assembly room where the Museum's Blériot XI was built. California Aero Manufacturing and Supply Company, San Francisco, 1911.

Image: Spectators watch in amazement as Jacques de Lesseps flies overhead in a Blériot XI. Toronto, Ontario, 1910.

Image: Preparing a Blériot XI for the 1909 air show in Reims, France.

Image: An airplane parked in a field. The surrounding crowd includes the pilot, speaking with a man in a trench coat, and police officers with traditional rounded helmets. Caption: Louis Blériot shortly after his historic crossing of the English Channel. Dover, England, 1909

Artifact: Blériot XI, California Aero Manufacturing and Supply Company. San Francisco, California, 1911.

Description: The aircraft on display consists of only the original wooden frame; the wings are missing their fabric covering. The Blériot XI is a monoplane, meaning that it has one wing on each side. It has a single engine, with a propeller in the nose. Exposed wires connected to the wings and tail allowed the pilot to control the aircraft in flight.

#### About this Artifact:

John W. Hamilton constructed this Blériot XI in 1911. The American engineer built his airplane at the California Aero Manufacturing and Supply Company workshop in San Francisco. It was put into storage that same year, following a series of accidents. The Museum purchased this near-complete Blériot XI in 1971. This aircraft has a unique water-cooled engine, and a modified tail.

#### Specifications:

Wing Span: 8.69 m (28 ft. 6 in.). Length: 7.68 m (25 ft. 2½ in.). Height: 2.54 m (8 ft. 4 in.). Weight when empty: 240 kg (529 lbs.). Weight when loaded: unknown. Cruising Speed: 90 km/h (56 mph). Max Speed: 100 km/h (62 mph). Service Ceiling: unknown. Rate of Climb: unknown. Range: 300 km (186 mi.). Power Plant: Elbridge Aero Special, 4-cylinder water-cooled inline engine, 60 hp.

**Directions:** Continue to the left, following the black barrier, until you encounter the next upright thematic panel.

(Text Panel)

#### Early Air Shows

##### Curious Canadians See Airplanes in Action

Canada's first air shows took place in 1910. They were held in major cities like Toronto and Montreal. Aircraft makers showed off their machines, and merchants sold products and souvenirs to the crowds gathered. By 1912, smaller shows were becoming common, often coinciding with county fairs. Powered flight was still in its infancy—

airplanes were often grounded by weather or mechanical failure, and accidents were common. Still, spectators marvelled at this new technology.

Image: A biplane flies several metres above a large crowd. Horse-drawn carts and automobiles are visible in the crowd. Caption: Smaller towns across Canada eventually hosted air shows. Niagara Air Meet, 1910

Image: People are gathered around several aircraft on display in a field. In the foreground, a pilot speaks with some spectators. Caption: The First Air Show in Canada. Montreal Air Meet, June 1910.

Image: Hugh Robinson flies over the Edmonton fairgrounds in his Curtiss bi-plane. April, 1911.

**Directions:** Continue following the barrier, until you come to the next console panel.

(Text Panel)

**Borel-Morane: Innovating to Improve Performance**

In 1910, brothers Gabriel and Albert Borel, along with Léon Morane, co-founded an aircraft company. They were joined a month later by Raymond Saulnier, who had previously worked with Louis Blériot. This new company's first aircraft, the Borel-Morane, strongly resembled the Blériot XI, but it was lighter, faster, and more powerful. They received orders from many sources, including armed forces that were hoping to put aircraft to practical use.

Image: A painting on the cover of the newspaper *Le Petit Parisien* depicts an eagle looking down at a pilot flying over a mountain landscape. Caption: Jules Védrines, a popular French aviator, was well-known for racing his Borel-Morane. He told a famous story about how an eagle "scrutinized" him during the Paris-Madrid race of 1911.

Image: An airplane after crash-landing, nose first and tail straight up, surrounded by a crowd. Caption: George Mestach crashed at the 1912 Winnipeg Exhibition—no one was seriously injured. Winnipeg, 1912.

Image: A postcard featuring a Borel-Morane in the centre, and a pilot mail-carrier to the right. Caption: This postcard incorrectly celebrates George Mestach's "first" airmail delivery. Earle Ovington made an earlier U.S. delivery in September of 1911.

**Artifact:** Borel-Morane, Société anonyme des aéroplanes Morane-Borel-Saulnier. Paris, France, 1911. Description: This aircraft is a wooden-framed monoplane. Its star-shaped rotary engine sits on a display stand in front of the aircraft's nose. Exposed wires connected to the wings and tail allowed the pilot to control the aircraft in flight. The fabric covering the wings and tail surfaces is worn and cracked. Bicycle-style wheels allowed for taxiing, take-off and landing.

**About this Artifact:**

This is the world's only surviving Borel-Morane. Belgian pilot Georges Mestach made several exhibition flights in this aircraft in Canada and the United States between 1911 and 1913. An American pilot purchased the aircraft in 1914, and his family kept it in storage until 2002, when it was acquired by the Museum.

**Specifications:**

Wing Span: 9.1 m (29 ft. 10 in.). Length: 7 m (22 ft. 11½ in.). Height: 2.6 m (8 ft. 6½ in.). Weight when empty: 250 kg (551 lbs.). Weight when loaded: 320 kg (705 lbs.). Cruising Speed: 90 km/h (56 mph). Max Speed: 115 km/h (71 mph). Service Ceiling: unknown. Rate of Climb: unknown. Range: unknown. Power Plant: Gnome Omega, 7-cylinder air-cooled rotary engine, 50 hp.

**Directions:** Continue along the barrier until you reach the next upright thematic panel—the final panel in this section of the Museum.

(Text Panel)

### Putting Aircraft to Practical Use

Initially aviation was seen as a leisure activity or sport—and only a privileged few in the early 1900s had the time or money for such pastimes. Europe's major powers and the United States were first to support aviation industries, seeing potential for mail delivery and military use. At this time, Canada's economy was still based on agriculture and natural resources. Aircraft were only put to practical, non-military use in Canada towards the end of the First World War.

Image: Several men pose with an early aircraft. Caption: A group poses with Captain Brian Peck before he pilots Canada's first airmail flight from Montreal to Toronto. June 24, 1918.

Image: A long tubular airship tethered above a building with two towers. Caption: The Hansa passenger airship carried over 8,200 people on nearly 400 flights. Zeppelin LZ 13 Hansa. Potsdam, Germany, 1912.

**Directions:** Continuing a little further, you will encounter the final aircraft console panel in this section of the Museum.

(Text Panel)

### McDowall Monoplane: A Canadian Enthusiast “Hops” into History

Robert McDowall was a civil engineer and land surveyor in Owen Sound, Ontario. He was inspired to build his own aircraft after seeing flying machines while visiting England and France. Over the course of several winters, McDowall spent his free time constructing this monoplane in a local carriage shop. Like many aircraft built by enthusiasts at this time, McDowall's monoplane never truly took to the air—although it did make a few successful “hops.”

Image: Portrait of a man wearing a tie and round spectacles. Caption: Robert McDowall—Designer and maker of the McDowall Monoplane.

Image: Two men pose in front of an early airplane. A third man looks on in the background. Caption: Robert McDowall (right) and assistant Webster Butchard pose with the Monoplane. Near Owen Sound, Ontario, ca 1915.

Image: Two men, on either side of a wingless aircraft body, stand in the snow. The aircraft's wheels have been replaced with skis. Caption: The McDowall Monoplane, without its wings, was sometimes used as an ice scooter. Near Durham, Ontario, early 1920s.

Artifact: McDowall Monoplane. Robert McDowall, Owen Sound, Ontario, 1915. Description: This aircraft features an open wooden frame with restored fabric-covered wings. The aircraft has a fan-shaped engine in the nose, with a wooden truss over the top featuring tension wires to support the wings. The wings have a pronounced curve. Metal bracing is visible, screwed and bolted throughout the frame's construction. Bicycle-style wheels allow for taxiing, take-off and landing.

About this Artifact:

In the early 1920s, after a period of storage, the McDowall Monoplane served as an ice scooter. Beyond this quirky use, the aircraft spent most of its early life in storage. In 1958, it was acquired by a collector who hung it from the rafters of his hangar. The Museum purchased the McDowall Monoplane in 1967, and restored it for public viewing.

Specifications:

Wing Span: 8.41 m (27 ft. 7 in.). Length: 6.6 m (21 ft. 8 in.). Height: 2.29 m (7 ft. 6 in.). Weight when empty: unknown. Weight when loaded: unknown. Power Plant: Anzani, 3-cylinder air-cooled fan engine, 25 hp.

**Directions:** You are now on the far southern side of the Early Aviation area. The Temporary Exhibition Area is directly behind you. Content in that area changes frequently. If you would like to visit other areas of the Museum,

turn to your right and go back into the Main Exhibition Hall. The First World War section is to the north of the Early Aviation area, while the Second World War area is located to the east. If you would like to return to the Museum lobby, continue moving to your left. This will bring you to the far side of the cylindrical Hall of Tribute, and back to the far side of the Admission Desk.

We hope you have enjoyed your tour of the Early Aviation section of the Museum.