THE FLIGHT OF THE *SILVER DART*

Introduction

Focus
This *News in Review* story commemorates one of the significant events in Canadian history: the first powered flight. During the following century, that breakthrough helped to bring Canadians together and to transform this country, which has the second-largest landmass in the world. This story looks at the men responsible for the initial triumph of the *Silver Dart*, and those who planned its commemoration in 2009. It also follows the story of Canadian flight through its first 100 years.

Further Research
To learn more about Canada's astronauts, consider a visit to the Canadian Space Agency's official Web site at www.space.gc.ca.

On February 23, 2009, Canada celebrated 100 years of aviation history. On that date in 1909 a biplane (two-winged aircraft) called the *Silver Dart* was towed by horses onto a frozen lake near Baddeck, Nova Scotia. A young engineer named Douglas McCurdy sat on a plank at the airplane's primitive controls. Before a crowd of cheering watchers, McCurdy piloted the plane on a short flight of slightly more than a kilometre. Canada had entered the age of powered flight, and Canadians embraced it with enthusiasm.

A country the size of Canada is exactly the kind of place where powered flight could flourish. In both peace and war, Canada has had an illustrious history in the air. Canadian pilots played central roles in both World Wars, and pilots and air crews from across the Commonwealth received their training here. Flight training for NATO and allied forces continues in Canada to this day.

Canadian airmen returning from the First World War drove the peacetime development of the civilian air industry in Canada. Some became the first transporters of airmail. Others became the bush pilots who opened services to isolated areas of the country. Some became the surveyors and mappers of areas of Canada rarely visited before. Others involved themselves in aircraft design, manufacture, and testing. Still others helped develop Canada's first national airline, Trans-Canada Airlines, now known as Air Canada.

In the 21st century, Canada continues to be an important centre for the aerospace industry. One Canadian company, Bombardier, is currently the third-largest manufacturer of civilian aircraft in the world. As well, the aerospace industry has made enormous contributions to the exploration of space. One contribution, the Canadarm, is a prominent part of every space shuttle mission. Several Canadian astronauts have played important roles in some of those missions.

Thus, it seemed very appropriate when Aerial Experiment Association 2005, the group that built a replica of the *Silver Dart*, chose astronaut Bjarni Tryggvason as the pilot for the 100th anniversary flight. A man who had flown on the fastest and most sophisticated flying machine ever developed would now pilot one of the slowest and most primitive.

Because of adverse weather conditions, the anniversary flight actually took place a day early, on February 22. Nevertheless, it was an enormous success and a glorious reminder of Canada's aviation history.

Pre-Viewing Activity

Have you ever seriously considered what life in Canada would be like without travel by air? Air travel has had an enormous impact on all of us, even if we rarely or never get on a plane. After all, planes carry plenty of things besides people.

Take a few minutes before you watch the video and make a list of some of the ways in which your life would be different if airplanes did not exist. There might be favourite foods that you would never get to eat, or activities that wouldn't take place, or friends or family that you might never get to see. The number of ways in which air travel has an impact on your lifestyle may surprise you.

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Video Review

As you watch the video, answer the questions in the spaces provided.

1. What famous Canadian airplane was used by bush pilots to open the Canadian interior? _____
2. Where in Canada is the village of Baddeck located? _____
3. What is the name of the famous inventor who lived in Baddeck?

   _____
4. What type of equipment did Bell use for his first aviation experiments?

   _____
5. Who financed Alexander Graham Bell's aviation work and recruited some of his assistants?

   _____
6. What name did Bell's group of developers call themselves?

   _____
7. Where were the AEA's first airplanes built and flown?

   _____
8. What is the reason that Douglas McCurdy believes Bell wanted to fly one of his airplanes in Baddeck?

   _____
9. How long did the flight of the *Silver Dart* last? _____
10. In 1959 a group tried to recreate the flight of the *Silver Dart*. How did the re-creation go?

    _____
11. How many attempts did it take in 2009 at Baddeck to get the *Silver Dart* airborne? _____
12. What is the name of the Canadian company that is the world's third-largest manufacturer of civilian aircraft? _____
13. A Canadian airplane, not built for over 20 years, is about to make a comeback. What is that plane called? _____

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History of the Silver Dart

Further Research
A 1949 interview with J.A.D. McCurdy is available from the CBC Archives at archives.cbc.ca/science_technology/aeronautics/clips/2424/. YouTube (www.youtube.com) has clips from the anniversary flight, along with other associated items (search for "Silver Dart").

Quote
"It feels great. I've flown the fastest thing in the world. I've flown the slowest thing in the world. I've flown the newest thing, I've flown the oldest thing." – Bjarni Tryggvason, *Hamilton Spectator*, February 7, 2009

Baddeck, Nova Scotia, is a small community in the heart of Cape Breton Island. Baddeck is now best known as a resort community, the centre of access to the beautiful Bras d'Or lakes. It was already a well-known resort in 1909 when the lake became the runway for Canada's first powered aircraft flight.

Baddeck was the Canadian home of one of the world's greatest inventors, Alexander Graham Bell. Already famous as the inventor of the telephone, Bell had become interested in the possibility of human flight.

Bell's initial experiments involved giant kites. His kite designs were featured in *Scientific American*, then (as now) a leading popular scientific magazine. Bell continued working on his kites until 1907. The last one—a huge contraption called *Cygnet*—actually flew, with a passenger, 51 metres above Bras d'Or Lake. It was not self-powered but was pulled behind a steam launch.

However, the successful flight of the Wright brothers' airplane in 1903 changed the way in which inventors looked at human flight. The Wright brothers' flight was unique in that it was powered, controlled, and sustained: powered by an engine, controlled by a pilot, and sustained for a distance.

Encouraged—and financed—by his wife, Mabel, Bell founded the Aerial Experiment Association (AEA) in October 1907. This brought together a group of Canadian and American engineers who would compete for an annual trophy awarded by the Aero Club of America to the inventors of heavier-than-air flying machines.

Working in the United States, the AEA was soon successful in its airplane design. Their first aircraft, the *Red Wing*, made its pilot, Casey Baldwin, the first Canadian to pilot an airplane. Their second plane, the *June Bug*, won the second annual Aero Club trophy.

For Canadians, however, the *Silver Dart* will always be Bell's greatest airplane. Bell, born a Scot who later became an American, loved his British roots and his Canadian home in Cape Breton. Determined to fly an aircraft in British airspace, he shipped the AEA's latest creation to Baddeck for its first flight.

That aircraft was the *Silver Dart*, the plane that made the first heavier-than-air flight in Canada, on February 23, 1909. Piloted by J. A. Douglas McCurdy (soon to become Canada's first licensed pilot), the *Silver Dart* flew about 1.2 kilometres, rising nine metres above the frozen lake. Its speed was 65 kilometres per hour.

The *Silver Dart* went on to set records and win prizes. On March 10, 1909—less than a month after its first flight—the plane won another trophy as the first plane in North America to fly a mile (1.6 kilometres). Piloted by McCurdy, the *Silver Dart* flew not just one mile, but 20 miles (32 kilometres). It later became the first plane to carry a passenger as well as a pilot.

The *Silver Dart* was eventually destroyed in an accident, when McCurdy crash-landed after demonstrating the plane to officers of the Canadian Army.

100 Years Later

In 2005, a group of 25 aviation fans founded the Aerial Experiment Association 2005. Their objective was to build a replica of the *Silver Dart* and fly it at Baddeck on the 100th anniversary of the first flight: February 23, 2009.

Fascinating Facts
The replica's specifications include:
- Weight: 500 kilograms
- Wingspan: 14.7 metres
- Height: 3 metres
- Length: 10 metres
- Engine: 65 horsepower V-8 (the original was about 45 horsepower V-8

The group, based in Welland, Ontario, found six sponsors and raised $35 000 to build the plane, as near a replica as modern materials and safety measures would allow. For example, the "balloon cloth" used on the original, which gave the plane its silver colour and its name, was replaced with nylon. Dirt-bike wheels were used for the landing gear. Safety requirements meant that brakes and rudder pedals needed to be installed. A proper seat for the pilot was also added. For the first flight, McCurdy sat on a wooden plank. The 2009 version weighed about 113 kilograms more than the original plane. It took 6 000 hours of volunteer labour to build.

This time the designated pilot was Canadian astronaut Bjarni Tryggvason. He first flew the finished plane at the airport in Hamilton, Ontario—a test flight that permitted the engineers to tweak the plane's performance before the actual centennial flight. The plane's builders did not want a repeat of the 1959 commemoration, when the replica crashed on landing.

This time it was the weather that refused to co-operate. With the forecast threatening blizzard conditions for February 23, Tryggvason successfully—on his second attempt—took to the air on the 22nd. The plane made a total of four successful flights. It was a wise move; the weather did force the cancellation of the commemoration on the 23rd.

The replica of the *Silver Dart* is expected to have a permanent home at the innovation centre at the Alexander Graham Bell National Historic Site (www.pc.gc.ca/lhn-nhs/ns/grahambell/index_e.asp) in Baddeck.

Inquiry

1. Name the two planes that preceded the *Silver Dart* at Baddeck.
2. What happened later to the *Silver Dart*?
3. Who flew the re-creation of the McCurdy flight of 1909?

THE FLIGHT OF THE *SILVER DART*

J.A.D. McCurdy

Further Research
A fascinating illustrated McCurdy archive is available online at www.gov.ns.ca/nsarm/virtual/mccurdy/results.asp?Search=.

Fascinating Fact
How Bell and McCurdy's father met is an interesting story. Evidently Bell dropped by the newspaper office while the senior McCurdy was trying to fix his office telephone. Bell offered to repair it. Once he had done so, he introduced himself to McCurdy—as the telephone's inventor!

John Alexander Douglas McCurdy (who usually went by the name Douglas) is one of the most important pioneers of Canadian aviation. His accomplishments went far beyond his being the first person to pilot an airplane in Canada.

Douglas McCurdy was born in Baddeck, Nova Scotia, on August 2, 1886. His father was a newspaper editor who was acquainted with Alexander Graham Bell. Bell befriended young Douglas, who often visited the Bell estate and helped with some of Bell's experiments with kites.

McCurdy was educated in Toronto at St. Andrews College and the University of Toronto, graduating with a degree in mining engineering. But his first love was aeronautics, and in 1907 he was back in Baddeck with Bell. There he became one of the members of the Aerial Experimental Association (AEA), the group that went on to design several successful aircraft, including the *Silver Dart*.

The Pilot

McCurdy quickly became the main pilot for the AEA as they designed and built new aircraft. By the time of the *Silver Dart*'s first flight in 1909, McCurdy had already made at least 200 short flights at the AEA's U.S. location. The success of the *Silver Dart* made him a Canadian hero. Future accomplishments made him even more famous. These included:

- The first flight longer than a mile (1.6 kilometres). This was a 20-mile (32 kilometre) round trip in the *Silver Dart* made less than a month after the first Canadian flight.
- The first licensed Canadian pilot (1910).
- The first pilot to transmit by wireless to Earth while in flight (1910): "Another chapter in aerial achievement is recorded in the sending of this wireless message from an aeroplane in flight."
- The first pilot to fly a figure eight.
- The first pilot to fly a flying boat (a plane designed to take off and land on water).
- The world biplane speed record (1910).
- The first flight over the ocean, from Key West, Florida, to Havana, Cuba (1911). His plane crashed at sea less than 20 kilometres from its destination. He flew 145 kilometres in less than two hours.

Because of vision problems, McCurdy piloted a plane for the last time in 1916. But while he himself was not flying, he made it possible for hundreds of others to do so. In 1915, with the support of the British government, he opened the Curtiss Aviation School. It trained more than 600 pilots to fly in the First World War for the Royal Air Force (Canada did not get its own air force until 1922).

The Businessman

After retiring as a pilot, McCurdy managed Curtiss Aeroplanes and Motors Ltd., a company that built two-seater training planes. In 1928 he created his own company, Reed Aircraft. This company eventually merged to form Curtiss-Reed Aircraft Ltd. McCurdy was its president until the beginning of the Second World War.

During the war McCurdy was in Ottawa as the Assistant Director General of the Aircraft Production Board, Department of Munitions and Supply. As such, he oversaw most of Canada's aircraft production during the war.

After the war, McCurdy became president of another airplane company,

Montreal Aircraft Industries Ltd. In 1947 he was appointed Lieutenant Governor of Nova Scotia, the province where he had made his most famous flight.

Douglas McCurdy received many awards during his lifetime. Two of the most important awards were presented in 1959, the 50th anniversary of the flight of the *Silver Dart*. The Minister of Defence gave him the honorary rank of Air Commodore in the Royal Canadian Air Force, recognizing his outstanding 50-year contribution to Canadian aviation. As well, the Canadian Aeronautics and Space Institute (CASI – www.casi.ca) gave him the McKee Trophy, their most prestigious award, for his outstanding achievements in aerospace. CASI had already created a McCurdy Award (1953), which it continues to present for outstanding achievement in the art, science and engineering related to aeronautics and space research.

Douglas McCurdy died on June 25, 1961. He was buried at Baddeck.

To Consider

In your view, what was Douglas McCurdy's most important contribution to aviation in Canada? Why?

THE FLIGHT OF THE *SILVER DART*

Baddeck's Great Inventor

Quote

"The inventor is a man who looks around upon the world and is not contented with things as they are. He wants to improve whatever he sees, he wants to benefit the world; he is haunted by an idea. The spirit of invention possesses him, seeking materialization."
— Alexander Graham Bell, quoted in the *Dictionary of Canadian Biography* (DCB), online at www.biographi.ca/009004-119.01-e.php?&id_nbr=7894&interval=25&&PHPSESSID=en1itee8tvrmoueehpq1ra3rp5. The DCB is the source for much of the information in this article.

Definition

A *patent* is a form of copyright that gives the owner of an invention control over its use. Patents are usually granted by government agencies.

Alexander Graham Bell is remembered by most people as the inventor of the telephone. The patent for the telephone, however, was only one of 30 patents that Bell received during a lifetime of inventing. It was certainly his most profitable invention, financing much of his other research.

The Breakthrough

Bell's first invention was made at the age of 11 in his native Scotland. When a friend's father suggested that he find something useful to do instead of just hanging around the local mill, he did. He developed a process to remove the husks from grain, using wire brushes on rotating paddles placed in an already existing machine.

Bell's family moved to Brantford, Ontario, in 1871. Bell was soon dividing his time between Brantford and Boston, Massachusetts. By 1872 he had opened his own school for the deaf in Boston.

Bell always saw himself first, by profession, as a teacher of the deaf. He was an expert in speech physiology and specialized in teaching the deaf how to speak.

At the same time, Bell was fascinated with the idea of transmitting sound—especially speech—over wires. As early as 1874 he had developed the method that he would use for the telephone. He filed for a patent two years later. This first telephone patent is believed to be the most valuable patent in the history of invention. It meant financial independence for Bell, so that he could devote his attention to his many interests.

Other Inventions

Bell's subsequent inventions and research activities include:

- The audiometer, used to measure hearing ability. The unit of measuring sound and electric signals was named the decibel in his honour.
- The graphophone, a machine that recorded and played sound using reusable wax cylinders. Bell always wished he had devoted more attention to phonographic devices. But it was Thomas Edison who developed the first phonograph.
- The financing of a laboratory in Washington, D.C., to promote research and invention to benefit the deaf.
- A metal detector that used sound waves to detect a bullet in the body. He developed this in hopes of saving the life of U.S. President James Garfield, who was shot by an assassin. Garfield died, but the invention is recognized as an early type of ultrasound.
- A vacuum jacket that acted as an early form of iron lung to assist breathing. Bell invented this after the death of his son from respiratory failure.
- The presidency of the National Geographic Society, from its founding in 1888 until 1903. Bell was always interested in geographical exploration. His interest in photography led directly to the establishment of the ever-popular *National Geographic* magazine.

Beginning in 1885, Bell divided his time between Washington and Baddeck, Nova Scotia, where he built himself a large estate. Here he conducted genetic research and experimented with eugenics—selective breeding—with sheep. Bell is credited, in his genetic research on deafness, with producing the most useful study of human heredity in the 19th century. At Baddeck he also performed some of Canada's earliest experiments with x-rays.

In 1881 Bell began his experiments with flight. Over the next 31 years he and his fellow enthusiasts conducted more than 1 200 flight-related experiments. Most of these, especially the kite experiments, took place at Baddeck. The flight of the *Silver Dart* was only one of those many experiments.

By 1912, Bell had moved on to a new enthusiasm: the hydrofoil, developed for rapid travel over water. In 1919, one of Bell's hydrofoils set a world record of 114.04 kilometres per hour—a record that would not be broken until 1929.

Bell was also a visionary. In a 1917 scientific paper he predicted that burning fossil fuels would lead to a "sort of greenhouse effect" and global warming if the burning continued unchecked.

Bell died on August 2, 1922. During his funeral, the Bell system was briefly shut down, and every phone in North America was silent. He was buried in Baddeck, on a hill, overlooking the bay.

Analysis

In your view, what was Alexander Graham Bell's greatest achievement? Why?

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Timeline: Canadian Aviation

Further Research
Much more inclusive timelines are available online at www.canadiancentennialofflight.ca/en/history.php, and www.canadiangeographic.ca/Magazine/so00/aviation_history.asp. A timeline of Canadian military air history is available at www.airforce.forces.gc.ca/site/hist/origin_e.asp.

Canada's century of aviation history has been a proud one, with many outstanding achievements. Here is a very selective list of 11, taken from only the first 50 years of powered flight in Canada.

1909 The *Silver Dart* flies Canada's first powered heavier-than-air flight.

1915 The Curtiss JN-3 aircraft is the first production plane to be built in Canada. It became the standard trainer for the Royal Naval Air Service in the First World War. In total, 104 were built, 18 of them in Canada at a Toronto factory. It was the forerunner of the JN-4 "Jenny," the first mass-produced plane and one of the most popular of all time. (For more information on the JN-3, see www.canadiancentennialofflight.ca/en/canadasAircraftLegacy_CurtissJN-3.php.)

1918 Canada becomes a centre of aviation activity when 22 000 Canadian pilots and air support crew return from Europe after the First World War. Canada made a huge contribution to the war effort in every area of aviation, even though it had no air force of its own. One of the greatest fighter aces of the war, Billy Bishop, was Canadian. (For more information on Canada's war effort, see www.airforce.forces.gc.ca/site/hist/ww_1_e.asp.)

1918 Captain Brian Peck, a war pilot, makes the first official airmail run in Canadian history, from Montreal to Toronto. He carried 120 letters with special stamps marked "Inaugural Service via aerial mail – Montreal 23.6.18." But, because of a rainstorm, he didn't actually fly until June 24. Less than three weeks later, on July 9, Katherine Stinson becomes the first woman to deliver airmail on a flight in Western Canada. (For more information on the first airmail flight, see www.mysteriesofcanada.com/Canada/first_airmail_flight.htm.)

1919 On June 14, the first successful direct trans-Atlantic flight leaves St. John's, Newfoundland, for Cliften, Ireland. The pilots were two British airmen, John Alcock and Arthur Whitten Brown, flying a Vickers Vimy bomber. The 3 040 kilometre flight takes 16 hours and 27 minutes. The plane crashes on landing, but the men are uninjured. Alcock and Brown won a large prize that had been offered for the first flight by the *Daily Mail* newspaper. They were also soon knighted by King George V. (For more information on Alcock and Brown, see www.absoluteastronomy.com/topics/Alcock_and_Brown.)

1920-1924 Recognizing the contribution of Canadians to the air war in the First World War, Canada establishes its own Canadian Air Force. King George V names it the Royal Canadian Air Force in 1924. (For more information on the beginnings of the Air Force, see www.airforce.forces.gc.ca/site/hist/inter_war_e.asp.)

1928 Eileen Vollick becomes the first woman in Canada to receive a private pilot's licence. Vollick was born in Wiarton, Ontario, and trained to fly in Hamilton. She was so short that she had to sit on pillows to see out of the windows of her trainer. But she proved to be an accomplished pilot who flew in both Canada and the United States.

(For Vollick's personal recounting of her flying experiences, see www.owensoundsuntimes.com/ArticleDisplay.aspx?e=1145293&auth=EILEEN M. VOLLICK.)

1937 The Canadian government creates Trans-Canada Airlines (as a subsidiary of Canadian National Railway!). The company is intended to provide air service to all regions of Canada and has two passenger aircraft and a biplane for surveying new routes. Its first regular service from Vancouver to Montreal begins on April 1, 1939. Trans-Canada is renamed Air Canada in 1965. (For a first-person oral account of the first Vancouver to Ottawa flight on Trans-Canada, see http://archives.cbc.ca/lifestyle/travel/clips/8671/.)

1940-1945 During the Second World War, Canada becomes the home of the British Commonwealth Air Training Program. Over 131 500 students are trained here from Canada, Britain, Australia, and New Zealand; 50 000 of them are pilots. (For more information on the program see www.lancastermuseum.ca/bcatp.html.)

1949 The Canadian Avro C-102 becomes the second commercial passenger jetliner to fly (the first, a British de Havilland Comet, beats it by only two weeks). The plane is built under contract from the government, but never goes into production. The project is cancelled so that the company can concentrate on producing CF-100 fighter planes. (For more on Avro's aircraft, see www.canadiancentennialofflight.ca/airforce/hist/history_Avro_Canada_e.php.)

1952 Jan Zurakowski, chief test pilot for Avro, breaks the sound barrier for the first time in Canada. Engineers had told Zurakowski that his CF-100 probably could not withstand the forces generated by supersonic speed. He puts the plane into a dive and aims it at the building where the company's engineers are discussing that very prospect. The resulting sonic boom settles the argument. (For more on Zurakowski, see www.geocities.com/buckeyepa/JZurakowski.html.)

Follow-up

There are many highlights in the second half of Canada's century of flight. Using the suggested timeline Web sites—and any other sources you discover—make a list of five events or developments between 1960 and 2009 that you feel are especially significant in Canada's aerospace history. Be prepared to justify the reasons for your choices when you share them with your classmates.

THE FLIGHT OF THE *SILVER DART*

Activity: Model Airplane Project

This activity gives you what could be a once-in-a-lifetime opportunity: to design your own airplane.

What would your personal airplane look like? Would it be a flashy racing plane? A sports model that could take off and land anywhere? A compact, fuel-efficient green machine?

Prepare a visual presentation of your ideal airplane as either a model or a poster drawing. Include all the features you feel would be needed to make your personal aircraft uniquely yours.

If you are interested in learning more about aeronautics and aircraft design, you might enjoy visiting the NASA Quest Web site at http://quest.arc.nasa.gov/aero/background/. Especially interesting is the video on the Hyper-X aircraft, "The Process Involved in Aircraft Design," at www.nasa.gov/audience/foreducators/topnav/materials/listbytype/The_Process_Involved_in_Aircraft_Design_prt.htm.

Notes: