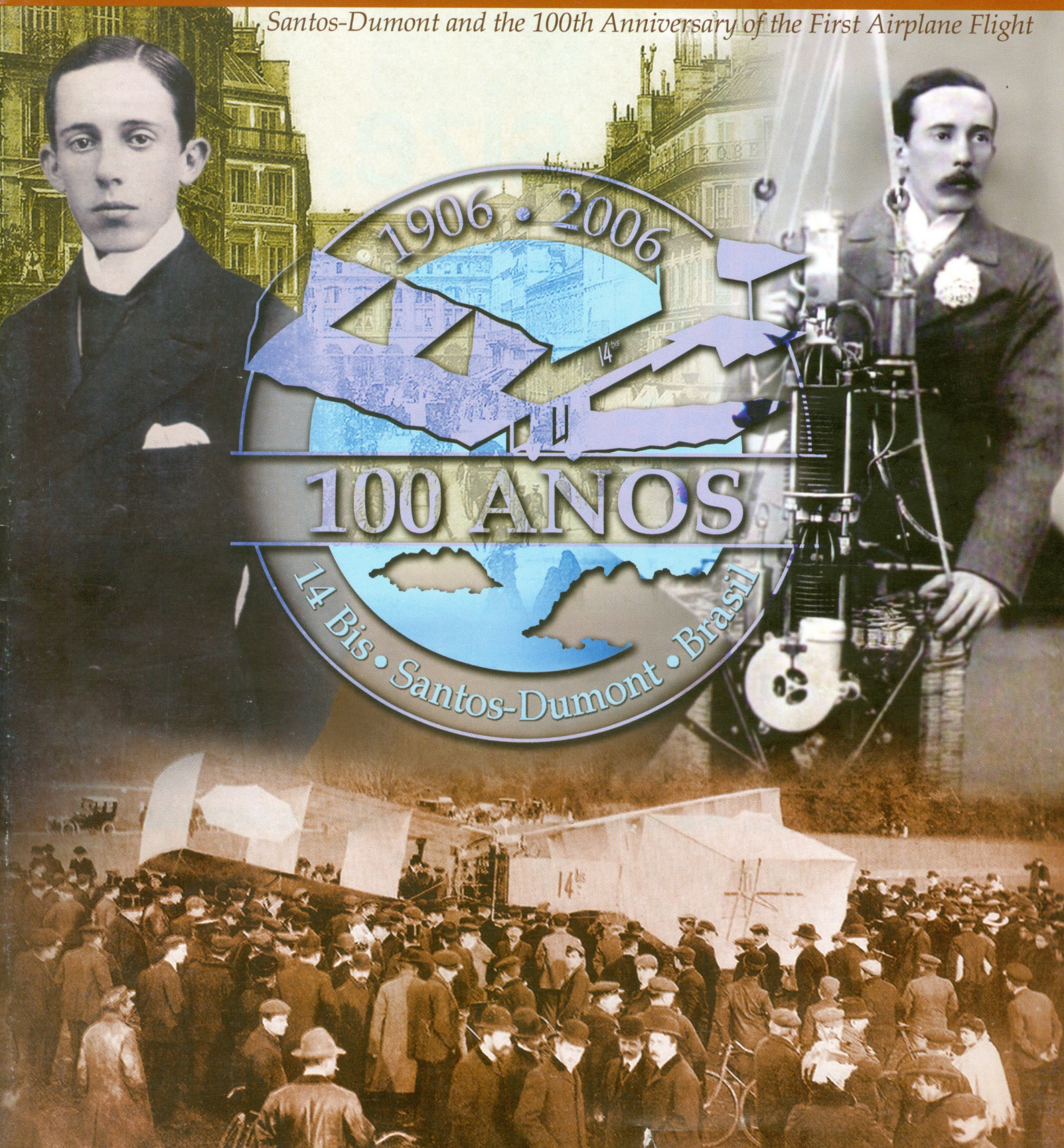
... and then there was flight

" the father of aviation "

Santos-Dumont and the 100th Anniversary of the First Airplane Flight



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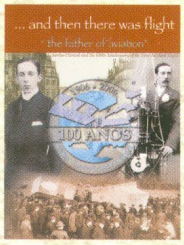

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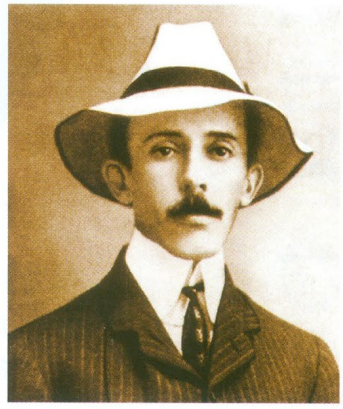
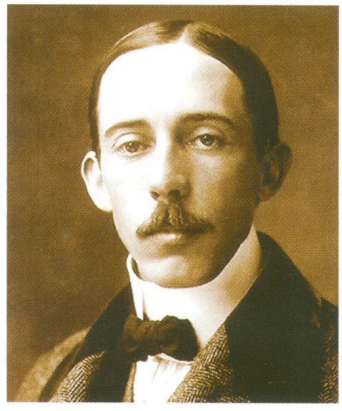
A Century of Flight



A Passion for Innovation

A Quest for Success



A Man of the Moment

A Vision of Peace & Humanity

"Santos-Dumont brought together all necessary virtues to transform society. He fulfilled the ideal of a scientist, a researcher and a pioneer. He had a vision of the future, but kept a stronghold on his commitment to the society to which he belonged. He was a scientist because Science caused him to overflow with energy, and allowed him to realize all sorts of ambitions. His insistence in the conviction that man could fly was a clear demonstration of optimism and will power. For him, aviation equaled conquering unity, integration and peace. He dared to walk on paths no one had ever been on.

Failed experiments and miscalculations could upset him but they did not take away from his ability to reinvent the means required for realizing a dream that was not only his but was shared by all humanity.

To praise his work and to highlight his qualities as a human being means to promote ideals and to point the new generations in a safe direction, and also to leave to the world in general, and Brazil in particular, a legacy of perseverance, knowledge, idealism, courage and entrepreneurship."

Luiz Inácio Lula da Silva
President of the Federative Republic of Brazil

Extract from the President's speech given at the centennial commemoration ceremony of the 14 Bis flight
Santos-Dumont – Minas Gerais , July 26th, 2006

"Santos-Dumont reuniu todas as virtudes necessárias para transformar a sociedade. Cumpriu o ideal do cientista, do pesquisador e do desbravador. Tinha visão do futuro, mas mantinha seu olhar firme no compromisso com a sociedade à qual pertencia.

Era um cientista porque a Ciência o fazia transbordar de energia e lhe permitia realizar toda sorte de ambições. Sua insistência, na certeza de que o homem podia voar, era uma clara demonstração do otimismo, da vontade. Para ele, a aviação seria uma conquista para a união, a integração e a paz. Ele arriscou os passos por caminhos que ninguém havia percorrido.

Experimentos fracassados e erros de cálculos poderiam transtorná-lo, mas não barravam sua capacidade de reinventar os meios necessários para a realização de um sonho que não era só seu, mas de toda a humanidade.

Enaltecer o seu trabalho e divulgar suas qualidades de ser humano significa mostrar caminhos e apontar uma direção segura às novas gerações e, também, deixar ao mundo em geral e ao Brasil, em particular, um legado de perseverança, de conhecimento, de idealismo, de coragem e de capacidade de empreender."

Luiz Inácio Lula da Silva
Presidente da República Federativa do Brasil

Texto extraído do Discurso do Presidente da República, na cerimônia comemorativa do Centenário do Vôo do 14 Bis
Santos-Dumont – MG, 26 de julho de 2006

Santos-Dumont and France

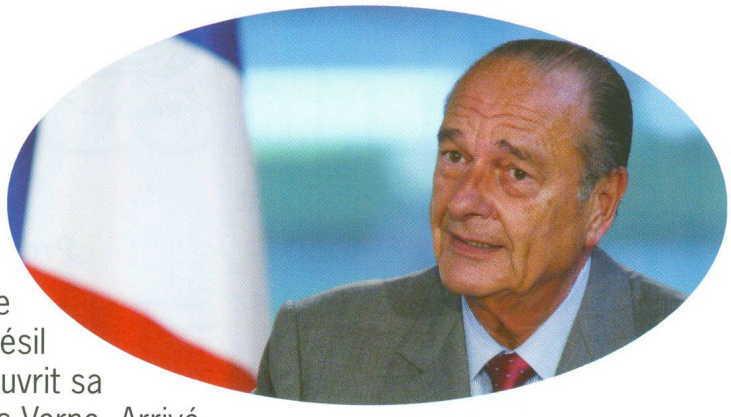
France is all the more attached to the memory of Santos-Dumont because of his own very close ties to France. Born in Brazil but of French origin, he discovered his calling in the works of Jules Verne. At the age of 19 he arrived in France, where he spent the better part of his active life. It was the birthplace of his innovations and achievements; notably, the inaugural flight whose hundredth anniversary we celebrate this year. Santos-Dumont found in the nation's technological and industrial flowering of the time an environment favourable to his work, as well as the support, not only of the specialists, but also of the general public, who had made of him a popular hero.

Endowed with the courage to take any risk necessary, Santos-Dumont was a visionary, particularly as regards the transition from lighter-than-air to heavier-than-air flying machines. He was also an experimenter who, as of 1898, proved the possibility of controlled flight, and we have him to thank for the creation of numerous models of aeroplanes which have become the stuff of legend, from the famous 14-bis to the Demoiselle.

Santos-Dumont felt that aviation should have an exclusively civil function. He believed that it would promote peace and the progress of civilization. Not only a technical man, but also a reflective one, he left us with the following quote, which speaks to the heart of all those who love aviation: "I have done what I could, I have not always succeeded, I have made mistakes, but I have persevered and it is to aviation that I owe the happiness in my life."

France honoured Santos-Dumont during his lifetime, naming him Commander of the Legion of Honour and erecting a monument to him which was inaugurated in his presence on 13 October 1913. He is remembered by France with admiration and gratitude, a feeling shared by a concordant Brazil, but also, I am sure, by all those who today participate in and benefit from the world of aviation. It is pioneers such as Santos-Dumont who transformed what had long been a dream of humankind into this wonderful tool which redefines borders, establishes contact among peoples, and expands the realm of possibility throughout the world.

Jacques Chirac
President of the French Republic



Santos-Dumont et la France

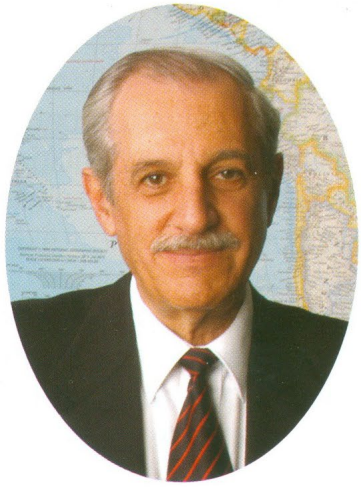
La France est d'autant plus attachée au souvenir de Santos-Dumont qu'il fut lui-même très lié à la France. Né au Brésil mais d'origine française, il découvrit sa vocation dans la lecture de Jules Verne. Arrivé en France à l'âge de 19 ans, il y passa l'essentiel de sa vie active et y réalisa ses innovations et exploits, notamment le vol inaugural dont nous célébrons cette année le centenaire. Il trouva dans une France en pleine effervescence technologique et industrielle un terrain favorable ainsi que le soutien, non seulement des spécialistes, mais aussi de l'opinion publique qui fit de lui un héros populaire.

D'un courage à prendre tous les risques, Santos-Dumont fut aussi un visionnaire, notamment dans la transition du plus léger au plus lourd que l'air, et également un expérimentateur, qui prouva dès 1898 la possibilité du vol contrôlé. On lui doit de nombreux modèles d'avions entrés dans la légende, du fameux « 14-bis » à la « Demoiselle ».

Santos-Dumont estimait que l'aviation devait avoir un usage uniquement civil. Il pensait qu'elle favoriserait la paix et le progrès de la civilisation. Homme de technique mais aussi de réflexion, il nous a laissé cette devise qui parle au cœur de tous ceux qui aiment l'aviation : « J'ai fait ce que j'ai pu, je n'ai pas toujours réussi, j'ai fait des erreurs, mais j'ai persévéré et c'est à l'aviation que je dois le bonheur de ma vie ». La France avait honoré Santos-Dumont de son vivant, le nommant commandeur de la Légion d'honneur et lui dressant un monument qui fut inauguré en sa présence le 13 octobre 1913. Elle conserve avec admiration et gratitude son souvenir, qu'elle partage avec le Brésil ami, mais aussi, j'en suis sûr, avec tous ceux qui sont aujourd'hui les acteurs et les bénéficiaires du transport aérien. Ce sont des pionniers comme Santos-Dumont qui ont fait d'un vieux rêve de l'humanité ce merveilleux outil qui repousse les frontières, met les peuples en contact et élargit partout les portes du possible.

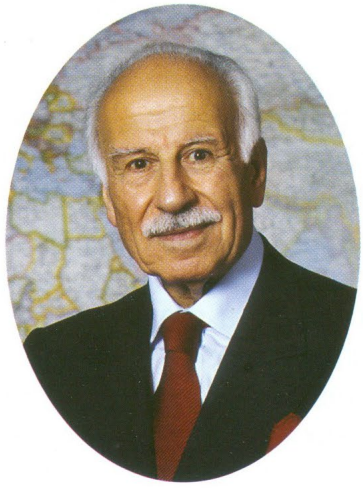
Jacques Chirac
Président de la République française

Message from the President of the Council of ICAO Mr. Roberto Kobeh González



I have spent much of my career on the operational side of aviation and marvel at the mechanical aptitude and prowess of Alberto Santos-Dumont. At the same time, I admire the tremendous passion and imagination of this aviation pioneer who, with fellow novice airmen, brought the world into an entirely new dimension that would ultimately transform our daily lives. The conquest of the air would teach us an invaluable lesson, that our own limitations are not the proper measure of limitations. This paradigm would serve us well in addressing the immense challenges of the 21st century, in terms of aviation and the world at large.

Message from the Former President of the Council of ICAO Dr. Assad Kotaite



Alberto Santos-Dumont's sensitivity was one of his defining qualities. The aircraft he invented were not objects, they were his heart and soul. He was devastated when the offspring of his inventions were used for military purposes during "the war to end all wars" and would have taken much comfort in the preamble to the Chicago Convention of 1944 which recognized the power of civil aviation to create and preserve friendship among nations and people of the world. He was a practical dreamer whose legacy lives on in what has become the safest and most efficient mode of mass transportation ever created.

A Century of Flight

"I was the only man who really had the right to the title of aeronaut for I had flown every type of flying machine." – Santos-Dumont 1909

On the afternoon of October 23, 1906, a modest young Brazilian named Alberto Santos-Dumont proved to the world that it was possible for a human to fly. He secured his place in history with the first documented flight in a heavier-than-air-machine and set the stage for a new era of technology, a new world of communication and a new transportation industry.

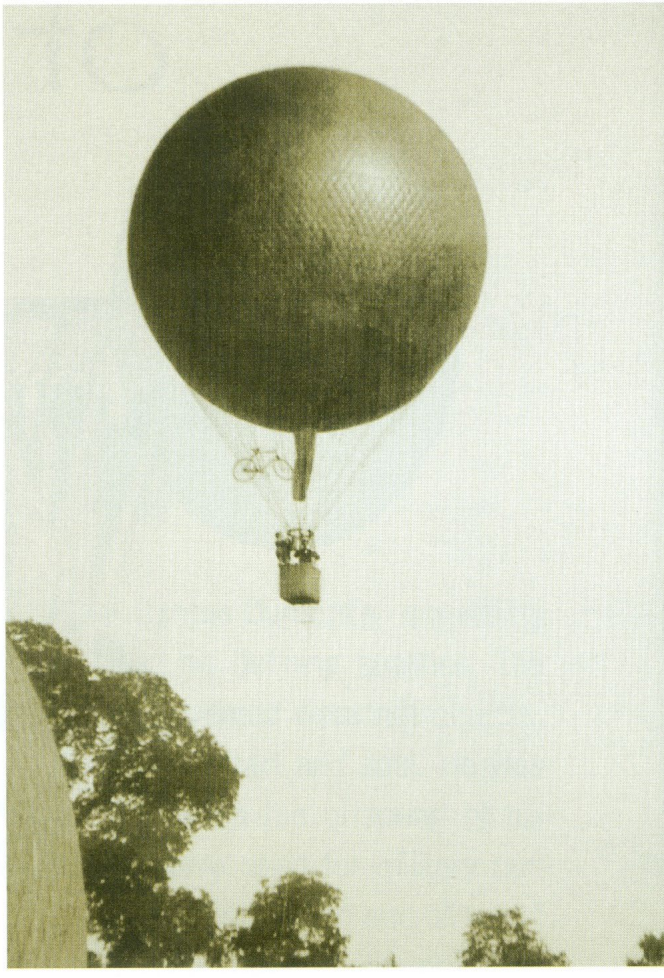
A century has passed since Santos-Dumont took his first steps towards aviation immortality, but the impact of his many achievements still resonates today and few areas of modern aviation are untouched by his innovations, his resolve and his milestones in flight.

Between 1898 and 1910, Santos-Dumont dedicated his efforts to building airships and airplanes with a vision of sustained and reliable flight. His heritage was Brazilian, his funding was a legacy from his father and his apprenticeship was in Paris at the turn of the century.

Over the course of 12 years, Santos-Dumont learned about, designed, built, tested, flew, repaired - and even crashed - all manner of airborne machines. Between the years 1898 and 1910, he designed and produced, on average, a new mechanical invention every six months. By any aviation industry standard at any time, it was a remarkable level of creativity and productivity.

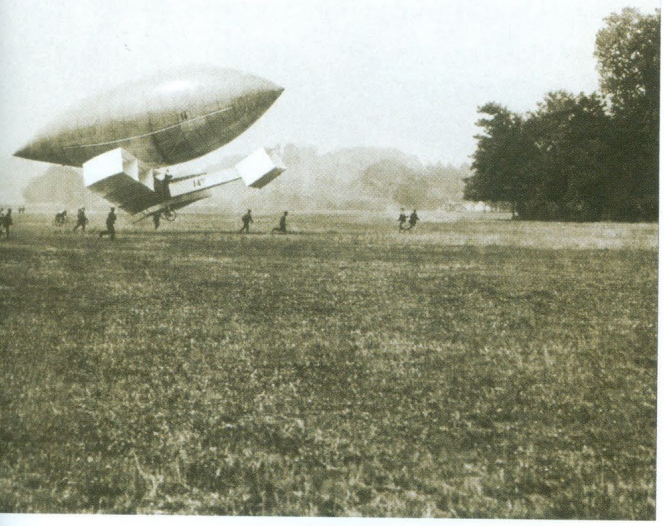
He started with the cutting edge technology of the day: spherical balloons.

Using new materials, new designs, new technology and new piloting skills, Santos-Dumont soon mastered the art of successful balloon making and successful balloon flying. His first balloon, named "Brasil", was ultralight, manageable, compact and easy to navigate. A series of balloons followed, numbered sequentially, reflecting the methodical approach to continual improvement which was the hallmark of Santos-Dumont's approach to aviation.



His first major accomplishment came about as a result of a challenge and a prize. Both came from a wealthy patron of the arts and keen airship enthusiast - Henri Deutsch de la Meurthe.

In April 1900, Deutsch de la Meurthe announced the creation of a 100,000 franc prize for the first airship to take off from



Saint-Cloud in Paris, circle the Eiffel Tower and return to the starting point within 30 minutes.

Within just two years, Santos-Dumont had devised the technology and skills to meet the challenge. After three airships and four crashes (including a spectacular incident on the roof of the Hotel Trocadero), Santos-Dumont was ready to make history.

On October 19, 1901, Santos-Dumont became the first person to fly an airship on a circular circuit from Auteuil Hippodrome to the Eiffel Tower, a distance of slightly more than 11 km, in under 30 minutes. Cheered on by enthusiastic crowds, the flight lasted 29 minutes and 30 seconds and earned Santos-Dumont the coveted Deutsch Prize.

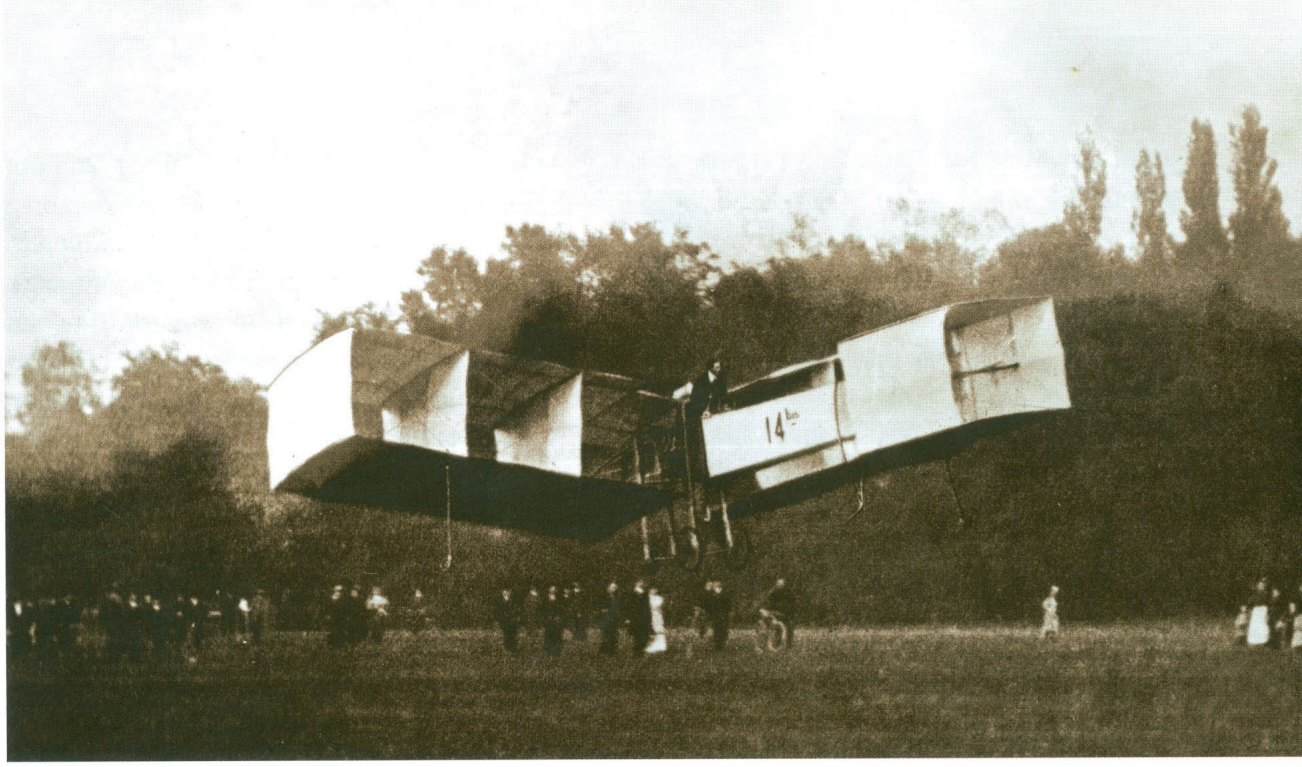
"En route to the Eiffel Tower, not once did I look at the roofs of Paris," said Santos-Dumont after the historic flight. "I floated on a sea of white and blue and saw nothing but my objective."

But Santos-Dumont was not content to just win prizes. His objective was the development of practical and reliable machines for air transportation.

In 1903, Santos-Dumont began work on three new airships: No. 7 for racing, No. 9 for short commutes and No. 10 for carrying between 16 and 20 passengers. In this way, he became one of the first aviation pioneers to recognize the true potential of air travel – not just for daring inventors but for different market segments and for mass transportation. It was, in essence, a forward-thinking business model for future aircraft manufacturers.

Inevitably Santos-Dumont turned his attention to the challenge of heavier-than-air machines, incorporating his vast experience with balloons as a basis for innovative design and technology in airplanes.

In the summer of 1906, Santos-Dumont began testing an airplane known as "14-bis". With a span of 12 metres and a total length of 10 metres, this biplane weighed only 210 kilograms – including the pilot's body weight. The airplane was powered by a 50 hp engine (modified from an original 24 hp engine).



It was a machine designed to achieve the first verified flight in a heavier-than-air machine and win the Archdeacon Cup prize of 3,000 francs for a flight covering a minimum distance of 25 metres.

On October 23, 1906 at 8.30 am, a small crowd gathered at the Bagatelle training field in Paris. There was a technical problem – and a delay. Santos-Dumont, impeccably dressed for the occasion in a pin-striped suit, red tie and panama hat, explained to the crowd that the shaft pins of the motor and rudder connecting gear were loose. He assured the crowd that he would be back in the afternoon. It was 4pm before the aircraft was finally ready. The small white airplane rolled quickly along the grass, rose three metres, made a lazy circle to the left and landed safely on the grass.

It was a total distance 60 metres, less than the width of a football pitch, but a huge step towards establishing aviation as a viable means of transportation. In the process, Santos-Dumont established a record as the first man in a heavier-than-air machine to leave the ground exclusively by his own means and accomplish a flight.

The flight of Santos-Dumont was fully documented and witnessed in Paris by recognized aviation authorities. The airplane left the ground exclusively by its own means (as opposed to being launched by external mechanisms, with strong favourable winds or from high ground). Newspapers of the day in Europe and the Americas reported the details of the exploit and heralded the conquest of the air.

It was a milestone which complemented the work and contributions of other pioneers of the time like Louis Blériot, the Wright Brothers, Captain Ferber, Gabriel Voisin, Henri Farman, Ernest Archdeacon and others. While there has been much debate over the timeline and details of the achievements of the Wright Brothers versus Santos-Dumont, there is ample room in the history books to recognize the achievements of all pioneers. It is clear that their collective efforts were integral to history of aviation and the successful development of flight.

At a banquet in honour of Santos-Dumont, Ernest Archdeacon captured the sentiments of the world and the impact of the event.

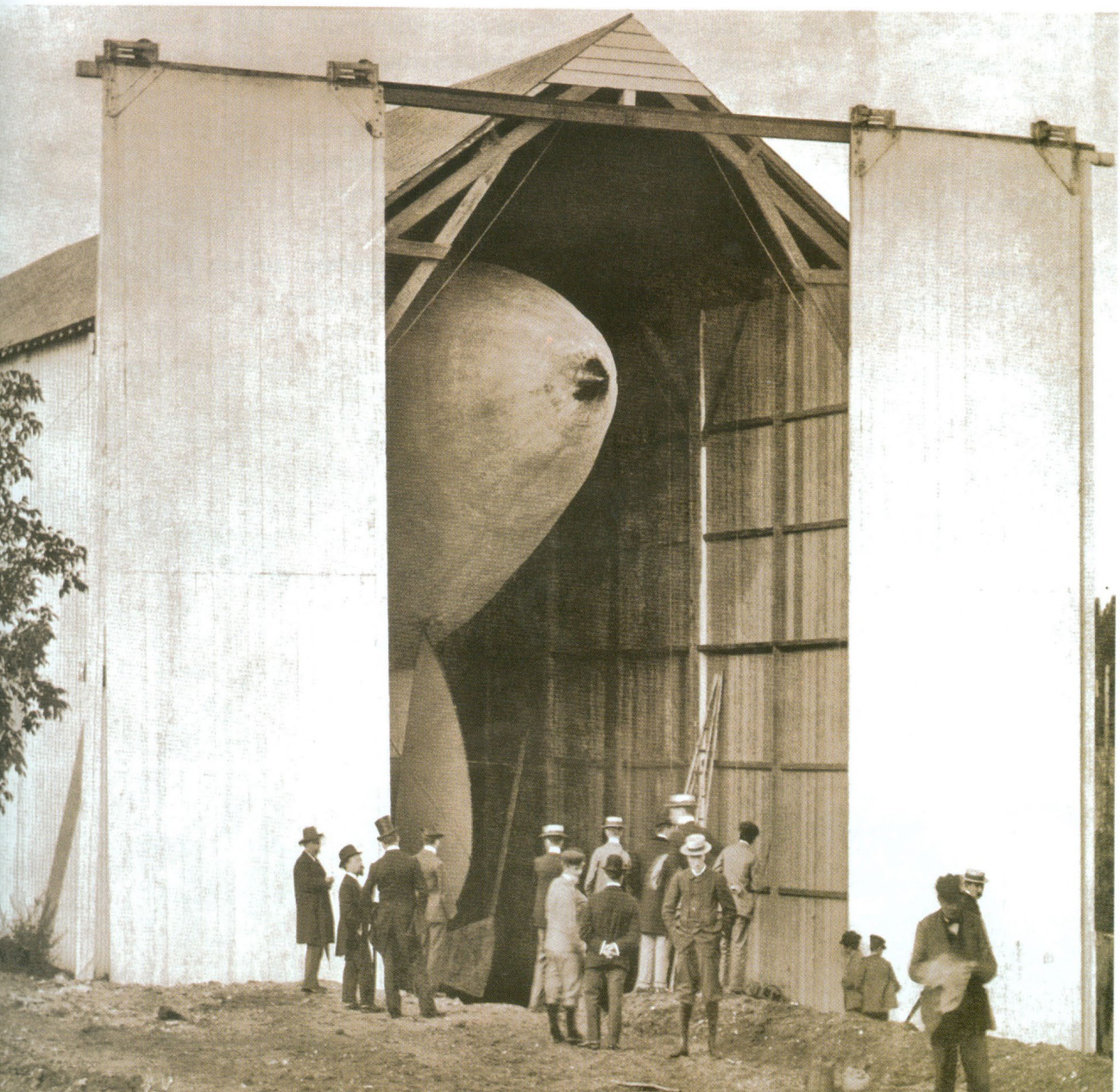
"He (Santos-Dumont) has just carried out, not in secret nor before hypothetical and complacent witnesses, but in full light of day and before a multitude of people, a superb flight of 60 metres, at three metres above the ground, which constitutes a decisive fact in the history of aviation," he said.

Less than one month later, Santos-Dumont won a prize offered by the Aéro-Club de France for the first aircraft to take off under its own power and cover a distance of 100 metres. On November 12, 1906, Santos-Dumont took off once again in his trusty 14-bis and registered a distance of 220 metres and a flight time of 22 seconds.

He won the Aéro-Club prize and established the first official record in aviation.

Over the course of his career, Santos-Dumont recorded many other milestones and aviation firsts which have, in one way or another, shaped the development of modern aviation:

First hangar. Santos-Dumont built what is considered to be the first hangar in the world. At 30 metres long, 11 metres high and 7 metres wide, it was a practical facility to store and work on airships – and avoided the inconvenience (and cost) of deflating his airship after a flight. For the entrance, he



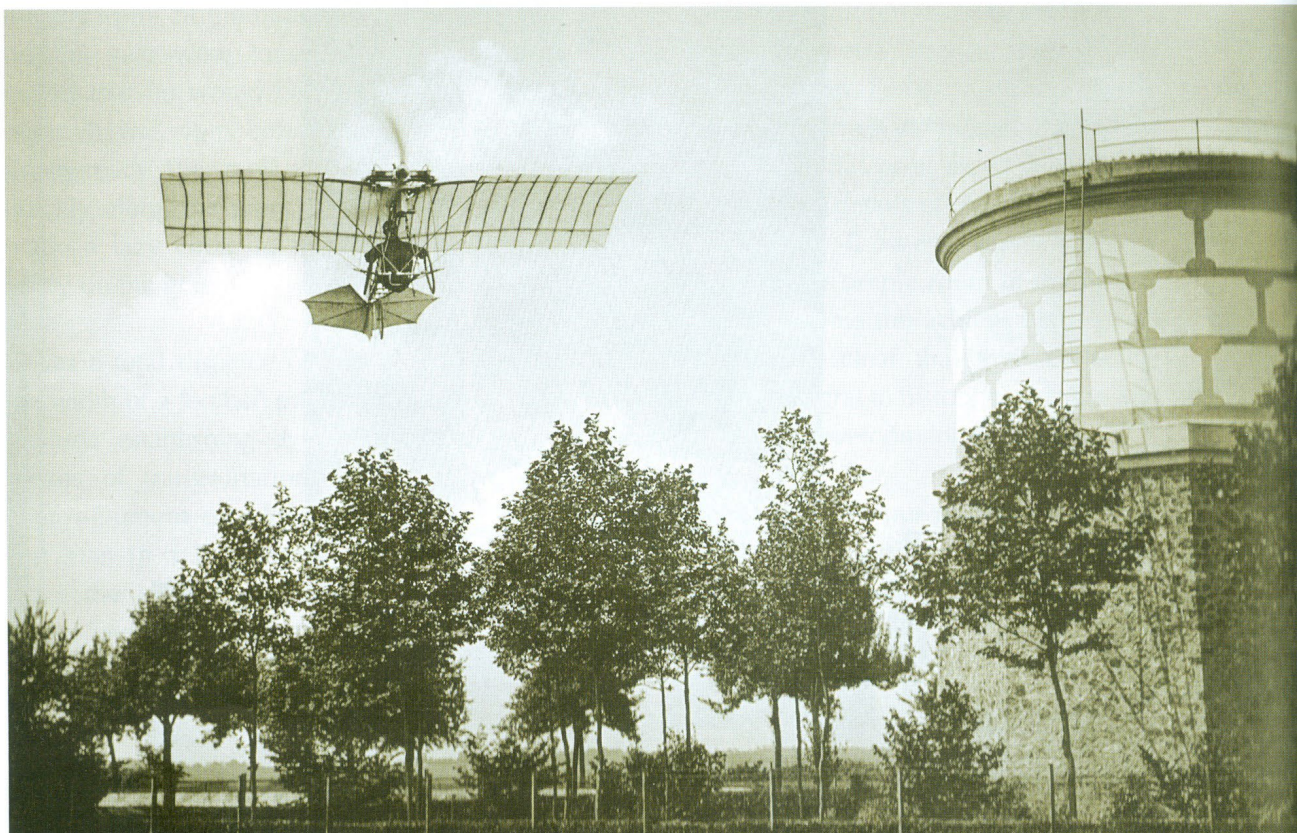
designed an immense double door with wheels that rolled on rails. The builders said it wouldn't work. It worked perfectly. In fact, the basic design of today's hangars has not changed substantially since Santos-Dumont's first facility in 1899.

First flight simulator. A penchant for constant testing and experimentation led Santos-Dumont to devise what may have been the first flight simulator. While trying to determine the best flight conditions for his 14-bis aircraft, he suspended the plane from a steel cable fastened between one post and other higher post. A donkey was employed to pull the airplane up to the highest point where it could then glide downwards. Over the course of several donkey-assisted tests, Santos-Dumont was able to find the centre of gravity and the equilibrium of the airplane. He also conducted simulations inside the hangar with the 14-bis secured by cables and the engine operating. Over the course of these tests, he was able to collect data which proved invaluable for actual flying.

First ailerons. The 14-bis was equipped with two stabilizers, each located at the extreme

end of each wing to make the airplane more stable and controllable in flight. Known as ailerons, these movable wing flaps have become a fundamental part of an aircraft. The ailerons on the 14-bis were operated by cables, but since Santos-Dumont's hands were already fully occupied controlling the direction of the airplane, the aileron cables were fastened to inserts that were sewn into his jacket at the shoulder level. By moving his body, he would adjust to the position that would offer the most stability. Observers from the ground were often perplexed by the wild gyrations of Santos-Dumont as he piloted his airplane.

First serial production aircraft. Built by Santos-Dumont, The Demoiselle was a deli-



cate, tiny monoplane with a wingspan of just 5.6 metres, a length of only 8 metres and a weight of about 118 kilograms – including the pilot. This ultralight airplane was ultra-successful. Santos-Dumont himself set a speed record of 96 kph on one 8 km flight in 1909. After Santos-Dumont ended his flights on the Demoiselle, it was disassembled and exhibited at an aviation fair in Paris, offered for sale by the Clément Bayard factory for 7,500 francs. Some time later, the same factory launched a modified Demoiselle for sale and a total of 50 planes were built. They sold for 5,000 francs each and became very popular – the first serial production aircraft.

First wristwatch. Santos-Dumont's influence extended to many spheres of technology – and fashion — in Paris at the turn of the century. After winning the Deutsch prize, he enjoyed a celebratory dinner at Maxim's in the company of the famous jeweler, Louis Cartier. Santos-Dumont is said to have complained to Cartier that he was unable to check his pocket watch during the flight because both his hands were fully occupied with steering the airship. Some time later Santos-Dumont received a gift from his friend: a watch which could be worn on the wrist. The "Santos-Dumont" became one of the most popular watches of Maison Cartier.

Flight Time: Santos-Dumont Chronology

1873
Born in Cabangu (Minas Gerais) Brazil.

1892
Arrives in Paris to pursue his studies

1898
Flight of "Brasil", Santos-Dumont's first balloon.

1901
Wins the Deutsch de La Meurthe prize for a record-setting flight around the Eiffel Tower in his airship No. 6.

1906
Wins the Archdeacon Cup with a flight of 60 metres in 14 bis, first recorded heavier-than-air flight. Establishes the first aviation records for speed and distance.

1907
Launches his successful "Demoiselle" aircraft, one of his most famous aircraft which achieved a speed of 96 kph in 1909 and later became the first serial production aircraft

1910
Decides to retire after 12 successful years of designing, building and flying airships and airplanes.

1932
Makes an appeal to the League of Nations to restrict the use of aviation technology as an instrument of war.

1932
Alberto Santos-Dumont dies at the age of 59 in Guarujá, São Paulo, Brazil.

source: Aéro-Club de France website

A Passion for Innovation

"It has never been done, but that is the distinctive sign of all innovations!" – Santos-Dumont 1905

Alberto Santos-Dumont used lightweight Japanese silk to make aerial balloons. It had never been done before. He used internal combustion engines to drive his airships. It had never been done before. He developed rubber shock absorbers and stabilizing ailerons for his aircraft. It had never been done before.

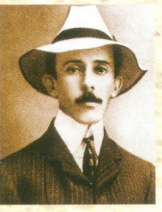
From his very first conversation with a balloon maker to his last flight in an airplane, Santos-Dumont challenged the status quo. He was an innovator by nature, constantly proposing new ideas, new materials and new technology for flying machines.

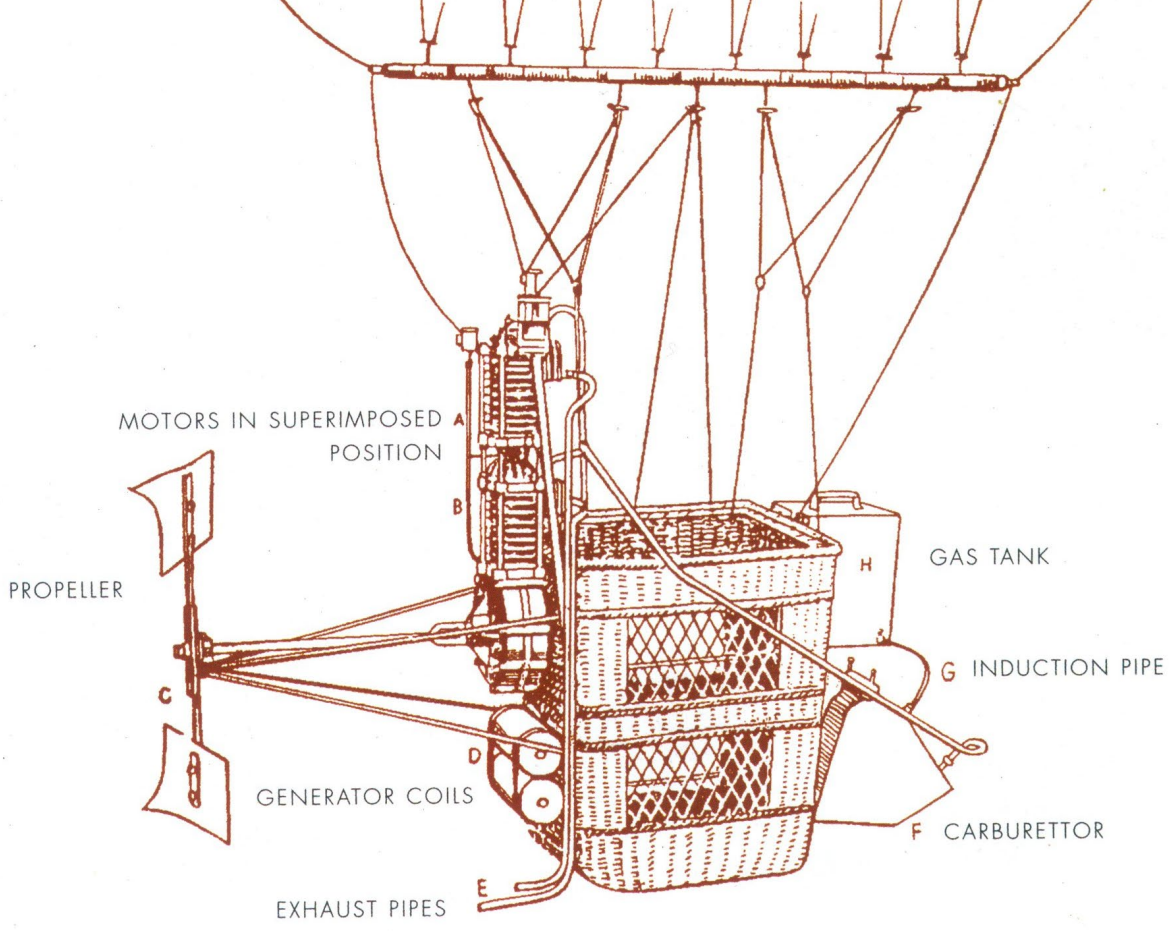
His first meetings in Paris, in 1898, with the established balloon makers of the time, set the tone and the pace for Santos-Dumont's fresh approach to flight. He proposed some big changes to conventional balloon design and technology.

He designed one of the smallest, lightest balloons of the time. He replaced heavier Chinese silk with lighter and stronger Japanese silk. He increased the length of suspension lines between the balloon and the basket so that the basket would be well below the centre of gravity. As a result, Santos-Dumont's first balloon, Brasil, proved manageable and easy to navigate. It was a sign of things to come.

His next major challenge was powered flight.

When Santos-Dumont began his balloon flights, no-one had succeeded in steering a balloon. Balloonists were subject to the caprice of the wind and weather – it was next to impossible to go from point A to point B, except by sheer luck.



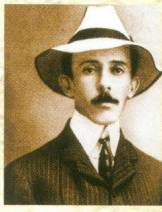


The solution was a motor. Other inventors experimented with steam and electric motors, Santos-Dumont decided upon the internal combustion engine. Skeptics were alarmed at the combination of an internal combustion engine with a hydrogen-filled dirigible, but Santos-Dumont's innovative design kept the engine (and pilot) suspended well below the gas-filled balloon. This became the foundation of his next airship: Santos-Dumont No.1. In 1898, Santos-Dumont took to the skies with the ability to control his flight using a combination of propeller, rudder, ballast and guide ropes. Only once over the course of many flights did the engine pose a serious fire hazard. Over Paris in the summer of 1903, an engine backfired, but the resulting fire was quickly extinguished by Santos-Dumont – using his panama hat.

As Santos-Dumont progressed in his thinking, his sequentially-numbered airships reflected ever more refinements and constant innovation. A large facility was necessary to store his airships without the need to deflate and inflate them. This necessitated the first hangar. The challenge of the Deutsch prize required speed and maneuverability. This required a new design and new engine and some "out-of-the-basket" thinking as the traditional balloonist's wicker basket was replaced with a bicycle frame from which the pilot controlled the engine and rudder. This produced the basis for airship No. 4. An accident in Monaco led him to divide the gas envelope of his airship into compartments separated by vertical walls of unvarnished silk. This still allowed gas to completely fill the envelope but the compartments were

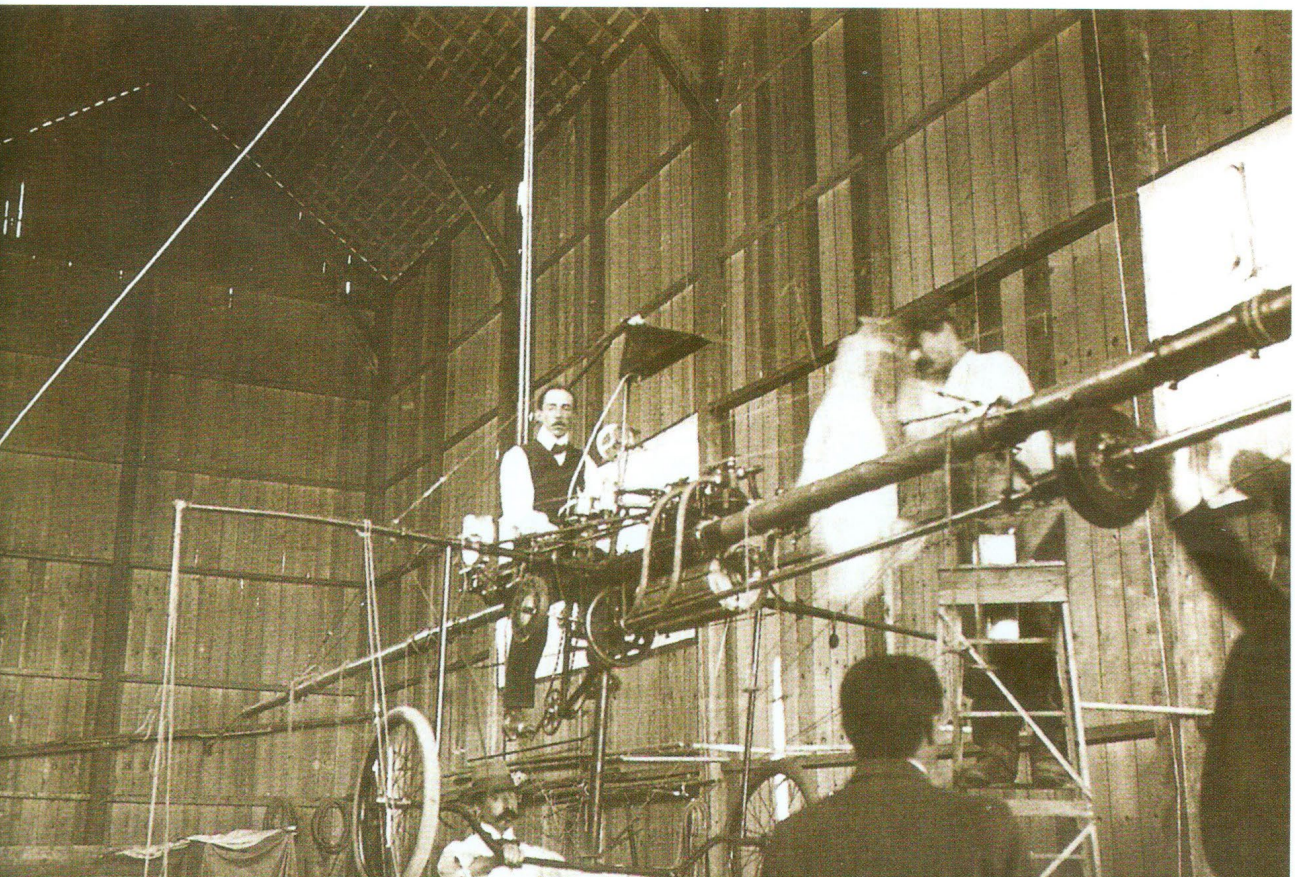
able to moderate the effects of a gas leak, maintaining the stability of the airship in an emergency.

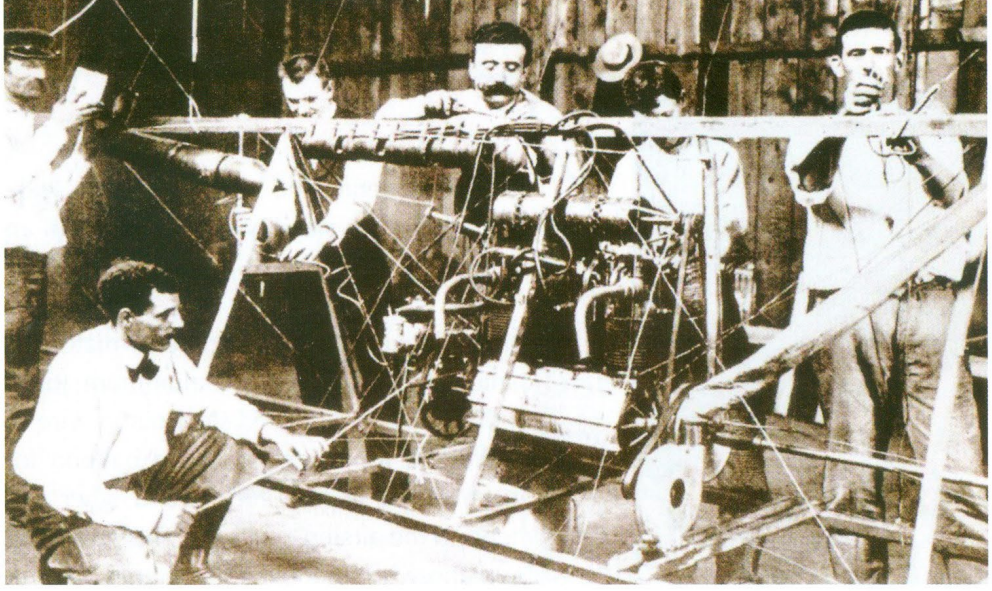
On the lookout for new and better materials, Santos-Dumont employed aluminum joints in the fuselage and used steel piano wire to replace all rope rigging on the balloon for attaching the engine, rudder and other elements to the airship envelope. This early "fly-by-piano-wire" innovation offered greater strength and less drag on the airship. All these changes contributed to the development of subsequent airships culminating in the success of airship No. 6 in winning the Deutsch prize in 1901.



In 1903, Santos-Dumont came up with the idea of building three different airships to serve different markets for air transport: No. 7 for racing, No. 9 for leisure and No. 10 for passenger transport.

When Santos-Dumont turned his attention to the challenge of heavier-than-air machines, the Brazilian innovator was at his finest.



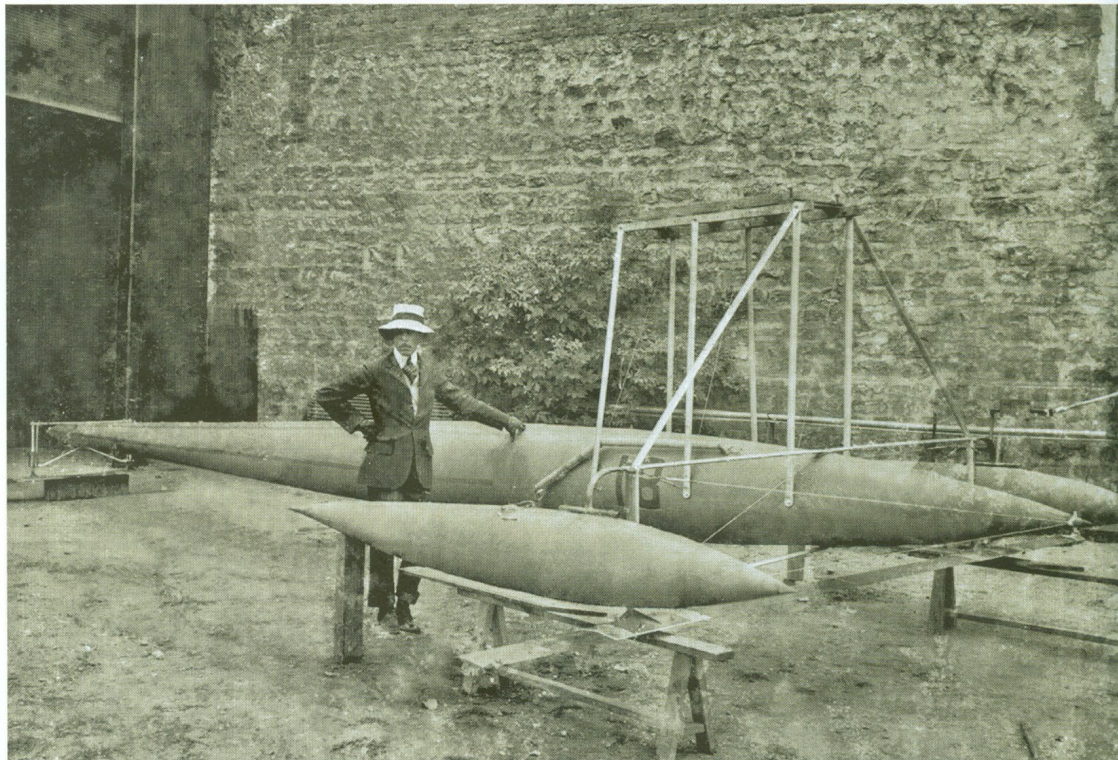


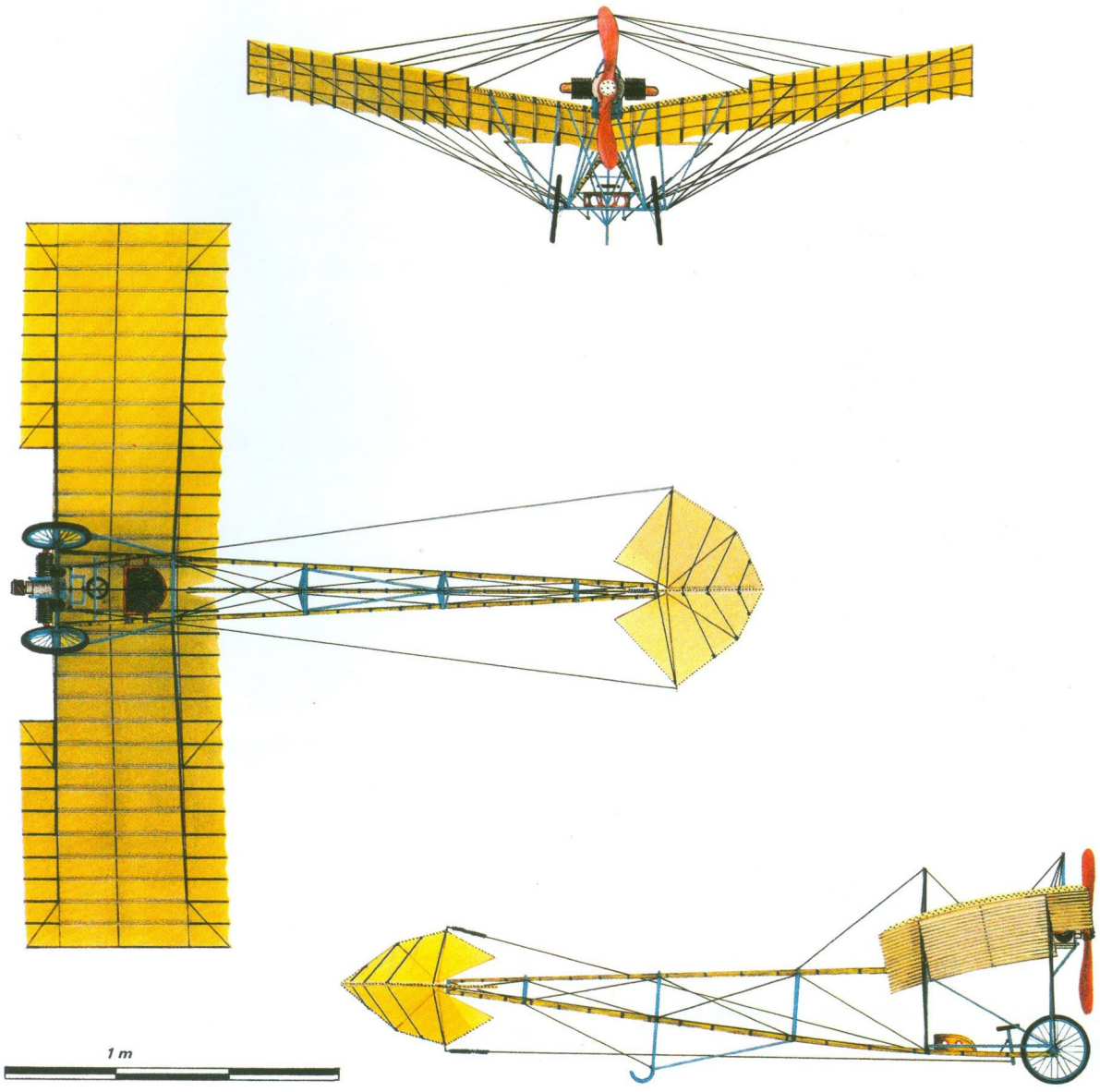
In the early 1900's Santos-Dumont observed that most flying machines of the day were enormous with small motors and moved slowly through the air. This was diametrically opposed to his ideas. He developed small motors to be used on airframes with lightweight construction and simplicity of design. His engines boasted many innovative technical advances in areas like carburetor and magneto construction. A rigorous approach to testing and continual improvement led Santos-Dumont to use a rudimentary flight simulator on the ground to perfect his history-making 14-bis aircraft.

Even during these days of experimental flights, Santos-Dumont was conscious of good flying techniques and the importance of safety. He developed the concept of an artificial horizon (the altitude of the airplane relative to the ground) and was a firm believer in the pilot's pre-flight inspection or check list (walk-around) as it is known by today's pilots.

"An aviator must go through a list of questions so that nothing may be overlooked," he once said.

In response to a bet, Santos-Dumont built a hydroplane with the objective of reaching a





speed of 100 km per hour on water. The resulting vessel was tested on the Seine where the inventor got very wet but did not succeed in reaching the desired speed. He lost the bet.

Perhaps the masterpiece of innovation was Santos-Dumont's Demoiselle, a perfect combination of design and technology, form and function, elegance and élan. It was the fall of 1907. With an eye on the Grand Prix d'Aviation (to be awarded for the first 1 km flight in a closed circuit), Santos-Dumont built a small monoplane in just 15 days. It was a classic, bringing together everything he had learned over the years. The plane was 8 metres long with a 5 metre wingspan. Materials included bamboo, silk and piano wire. He designed a 20 hp engine. The complete plane weighed 106 kg. Although he did not win the prize, Santos-Dumont continued to modify the Demoiselle adding more and more powerful engines and structural improvements (including a major advance-

First & Foremost: Santos-Dumont Aviation Milestones

First roundtrip in an airship from St. Cloud to Eiffel Tower (11,000 metres)

First steerable balloon using an internal combustion engine

First recorded heavier-than-air powered flight (1906)

World's first documented aviation records for distance (220m), duration (21.2 sec) and speed (41.2 kph).

World's first hangar (30m long, 11m high, 7m wide)

World's first ailerons (stabilizers) developed for the 14-bis

World's first flight simulator, (using winches and gears to let the 14-bis roll downhill, while he learned how to control the plane).

World's first serial production airplane ("Demoiselle")

ment in fuselage construction). The Demoiselle eventually became the first serial production aircraft with a production run of 50 planes.

The innovative mind of Santos-Dumont was clearly focused on flight but, at the same time, he did not restrict all his ideas to flying. He designed and made a kind of crossbow which could be used by lifeguards on the shore to propel life preservers out to people drowning in the sea. He developed portable jet packs for Swiss skiers climbing mountains. Equipped with light, 0.5 hp engines, these devices tested well in the Swiss Alps. His observations about the inconvenience of pocket watches led Louis Cartier to develop the first wristwatch.

Over the years, the number of inventions and innovations of Santos-Dumont continued to increase. He brought dozens upon dozens of beneficial changes to the world of aviation, a legacy which he ensured was open and accessible to every pilot, designer, manufacturer and engineer in the world. For that reason, he never applied for a single patent on any of his inventions. ✈

Message from the Air Force Commander of Brazil Lieutenant-Brigadier Luiz Carlos da Silva Bueno

AN IDEALISTIC INVENTOR

At the end of the 19th century, the sky was a great unknown ocean, soon to be discovered by the daring spirit of the inventors who searched a machine heavier than air capable to take off on its own, without any external assistance.

Among many important names, one in particular is the reason of great pride and admiration for us: the Brazilian Alberto Santos Dumont, who from September to November 1906, flew three times on board of his 14-Bis, solving once and for all the enigma of flying and the mystery that prevented men to take off to the sky.

This year, we are celebrating the centennial of the 14-Bis flight, and it takes only a look around to confirm what Santos Dumont said in 1905:

.... "There are those who ridicule my forecasts on the future of aircrafts. However, those who live on will see..."

Message from the Representative of Brazil on the Council of ICAO Pedro Bittencourt de Almeida

On the 100th anniversary of Alberto Santos-Dumont's first flight, I would like to invite members of the international aviation community to join me and all Brazilians to pay tribute to this remarkable inventor, aviator, humanitarian and pioneer, for his character and his many achievements and contributions to the development of the modern aviation. He shall be remembered as a great contributor to the history of humankind. The innovations of Santos-Dumont and his unwavering belief in the peaceful development of civil aviation are a legacy which Brazilians are proud to share with the world. His vision remains a guiding force for all of us who share a passion for an innovative, peaceful and global aviation industry in the 21st century.

A Quest for Success

"I am very pleased with what I have been able to accomplish." – Santos-Dumont, 1909

It's tempting to think of early aviators as those 'magnificent men in their flying machines' – carefree daredevils in goggles and scarves. The reality was much different. Early flight was risky, expensive and dangerous business. Accidents were common, equipment was often untried and experience was limited.

Flying was not for the faint of heart.

Into this turbulent world entered Alberto Santos-Dumont. He was born in Brazil on July 20, 1873 on a small plantation, Cabangu, high on the Mantiqueira mountain range in the Minas Gerais region. His father, Henrique Dumont, was an engineer by training and eventually became a coffee plantation owner. Like his father, Alberto was fascinated by technology and machinery. He read Jules Verne and learned about the Montgolfier brothers. He became fascinated by balloons and flight. On a visit to Paris in 1891, he tried to arrange for a balloon flight – but it was too expensive. He visited the Peugeot factory and bought his first automobile.

Back home in his native Brazil, the idea of flight continued to preoccupy Santos-Dumont. He was undaunted by the perils of flying and the dangers of aviation. In March 1898, at the age of 24, he arrived back in Paris to pursue his dream. His father had encouraged the young man to leave Brazil and travel to France – with his blessing and his financial backing. Santos-Dumont studied with private tutors and learned the skills and knowledge which, in turn, nurtured his passion for flight.

Santos-Dumont was determined to succeed as an aeronaut.

He faced adversity in a number of ways, from a number of sources. From the established authorities on balloons and ballooning, he faced resistance, skepticism and indifference. He avoided professional balloonists of the day with their preconceived ideas about flight and went directly to the builders. He found craftsmen and manufacturers in Paris who were open to new ideas and new ways of solving the problems of flight.

To develop the technology of balloon and airplanes, he worked with explosive gases and motors. To pilot his balloons and airplanes, he put himself at great risk from mishaps on the ground, technical problems and crashes.

And there were many crashes.

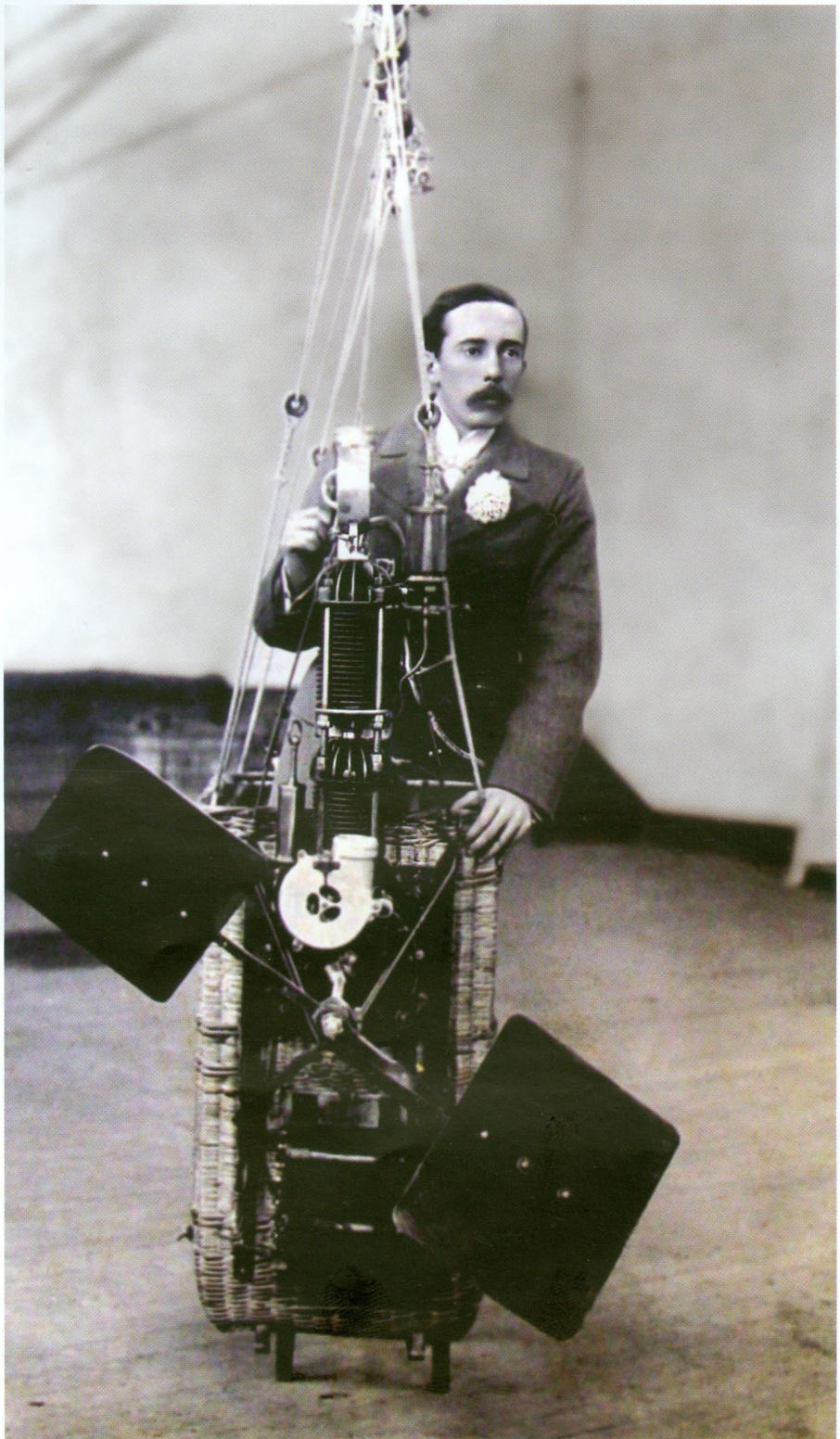
In 1899, while piloting his airship No. 2, heavy winds and rain created a cooling effect which made the hydrogen contract and caused the airship to fold. He was just above the tree line and realized that a crash was inevitable. With great presence of mind and fast action, Santos-Dumont climbed out of the basket and up onto the ropes of the airship rigging – just before the basket crashed to the ground.

In 1901, he was testing No. 5 with a trip around the Eiffel Tower. All went well when, suddenly, the engine stopped completely and the balloon drifted out of control until it crashed against a walnut tree in Rothschild Park. Another test with No. 5 resulted in a

serious gas leak which caused stability and control problems. His airship crashed on the roof of the Hotel Trocadero. He was still in the basket, fastened to the keel – and suspended 15 metres above the ground when Paris firemen came to his rescue. Despite the setback, that same evening Santos-Dumont gave his manufacturer instructions and sketches for the construction of No. 6.

"I've always faced accidents of this type very philosophically," he said after a second crash at Rothschild Park. "I see in them a sort of guarantee against other more terrible ones."

Perseverance and determination generated progress. He needed somewhere to store his airships, so he built a hangar. He needed a source of hydrogen so he built his own man-



ufacturing apparatus where he could combine sulfuric acid with iron filings to produce the required gas. To meet the challenge of aviation prizes, Santos-Dumont often worked non-stop. To prepare for the Deutsch prize, he made major modifications to his airship No. 4, installed a new engine, added a new section to the gas bag and enlarged the hangar – all in 14 days.

While testing No. 4 in the cold autumn air, he caught pneumonia. While recovering in Nice, he designed a new fuselage, the basis for airship No. 5.

Heavier-than-air flights proved to be even more of a challenge, but that simply fuelled Santos-Dumont's resolve and determination. Inevitably, there were more setbacks and more crashes. In one alarming incident in 1906, the Brazilian was flying his 14-bis while a crowd of spectators watched. The wind and weather conditions caused the plane to climb suddenly and his speed dropped, creating the potential for a stall. Wanting to avoid hitting the spectators at all costs, Santos-Dumont turned to the right, cut the ignition and went to the ground where he knew he could avoid the crowd. The right wing touched the ground before the landing gear, but the airplane came to a stop safely, with no serious damage.

Perhaps the most remarkable testament to the determination and perseverance of Santos-Dumont is the sequential series of flying machines that he designed and flew over the course of his 12-year career. His cata-

logue of air machines totaled 22 (not including his first balloon, Brasil) - from the first numbered airship (No. 1) until the last Demoiselle airplane he designed and flew (No. 22). Each machine brought successive improvements, 22 incremental steps towards his lifelong dream and singular passion: flight.

"The inventor does not jump, he evolves," said Santos-Dumont. "I started by making myself a free balloon pilot and only afterwards took up the problem of its dirigibility. I became a good aeronaut managing my dirigibles; for many years I studied the oil motor in detail and only when I verified that its state of perfection was sufficient for flying purposes did I take up the problem of heavier than air."

Santos-Dumont: Man of the Media

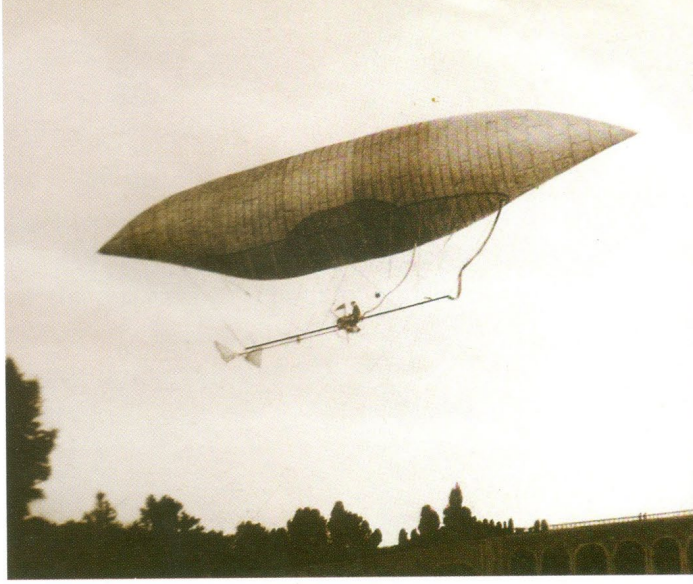
"FLY, FLY, FLY!... SANTOS-DUMONT, IN AN AIRPLANE, YESTERDAY MADE A FLIGHT OF 220 METRES" — (La Nation, November 13, 1906)

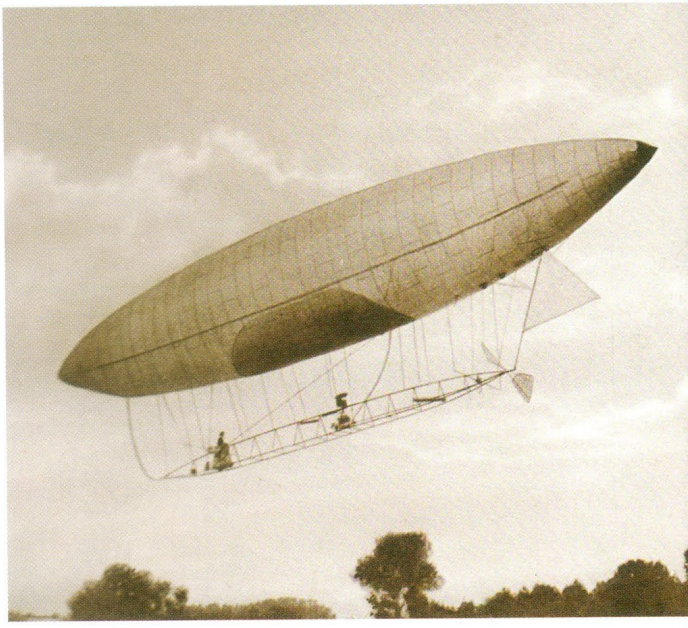
"When the names of many of those who have occupied outstanding positions in the world have been forgotten, there will be a name which will remain in our memory, that of Santos-Dumont" — (The Times, London, 26 November 1901)

"The most popular toys in Paris at the end of 1901 were reproductions of Santos-Dumont's balloons..." — (New York Herald, 22 December 1901)

"THE FIRST FLIGHT OF A MACHINE HEAVIER THAN AIR..."
— (The Illustrated London News, November 3, 1906)

"I had just sat down on the terrace of a café and was enjoying an iced orangeade. All of a sudden I was shaken with surprise on seeing an airship come down right in front of me... the airship was just above my knees and Mr. Santos-Dumont got out." – (L'Illustration, July 4, 1903)



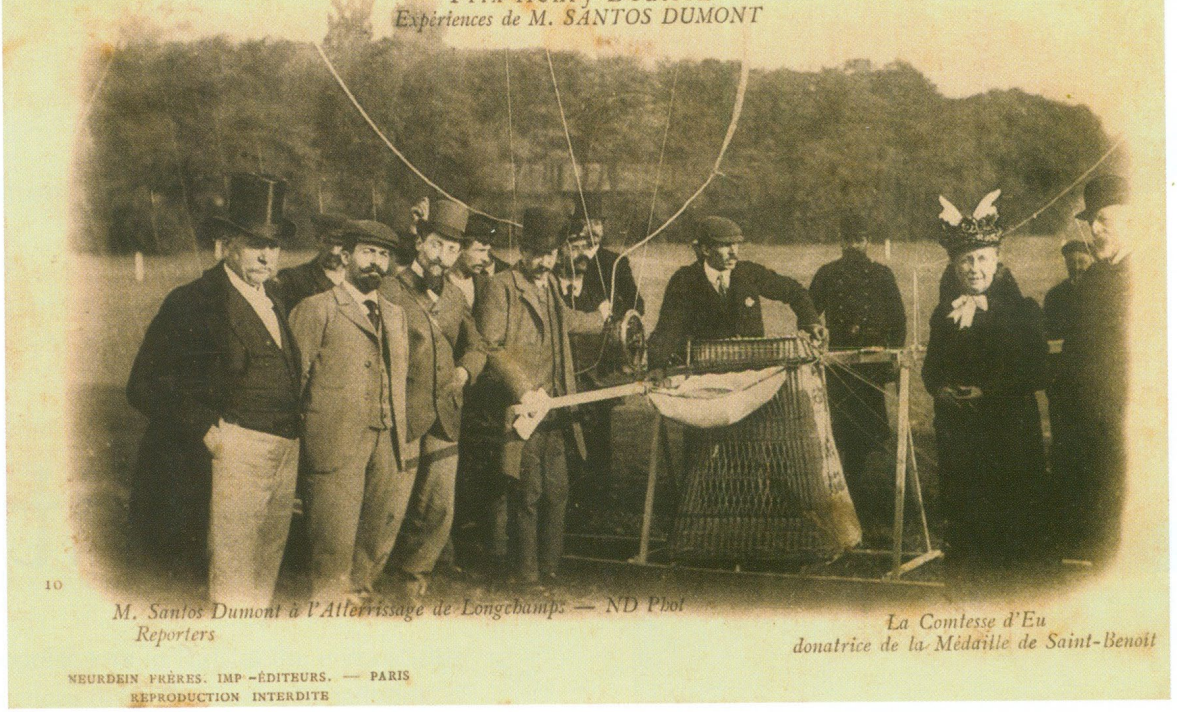


His friend and colleague, Ernest Archdeacon, paid him the ultimate compliment at a banquet in Paris after Santos-Dumont recorded the first heavier-than-air flight in 1906.

"It is true that he [Santos-Dumont] always escapes danger due to his prodigious capacity, accompanied by incomparable cold-bloodedness," said Archdeacon. He went on to say that Santos-Dumont "is a man who wants what he wants with incomparable tenacity and who furthermore experiments until he succeeds – and he did succeed!" ✈

A Man of the Moment

"En route to the Eiffel Tower, not once did I look at the roofs of Paris" - Santos-Dumont 1901



In Paris, in the year 1900, there was an explosion of new ideas in culture and science. At the Exposition Universelle, millions of visitors gathered to see innovations like motion pictures and the first escalator. It was the debut of the Paris Métro. The Summer Olympics in Paris included female athletes, for the first time. Sarah Bernhardt was on the stage. Absinthe was the drink of choice in cafés and bars.

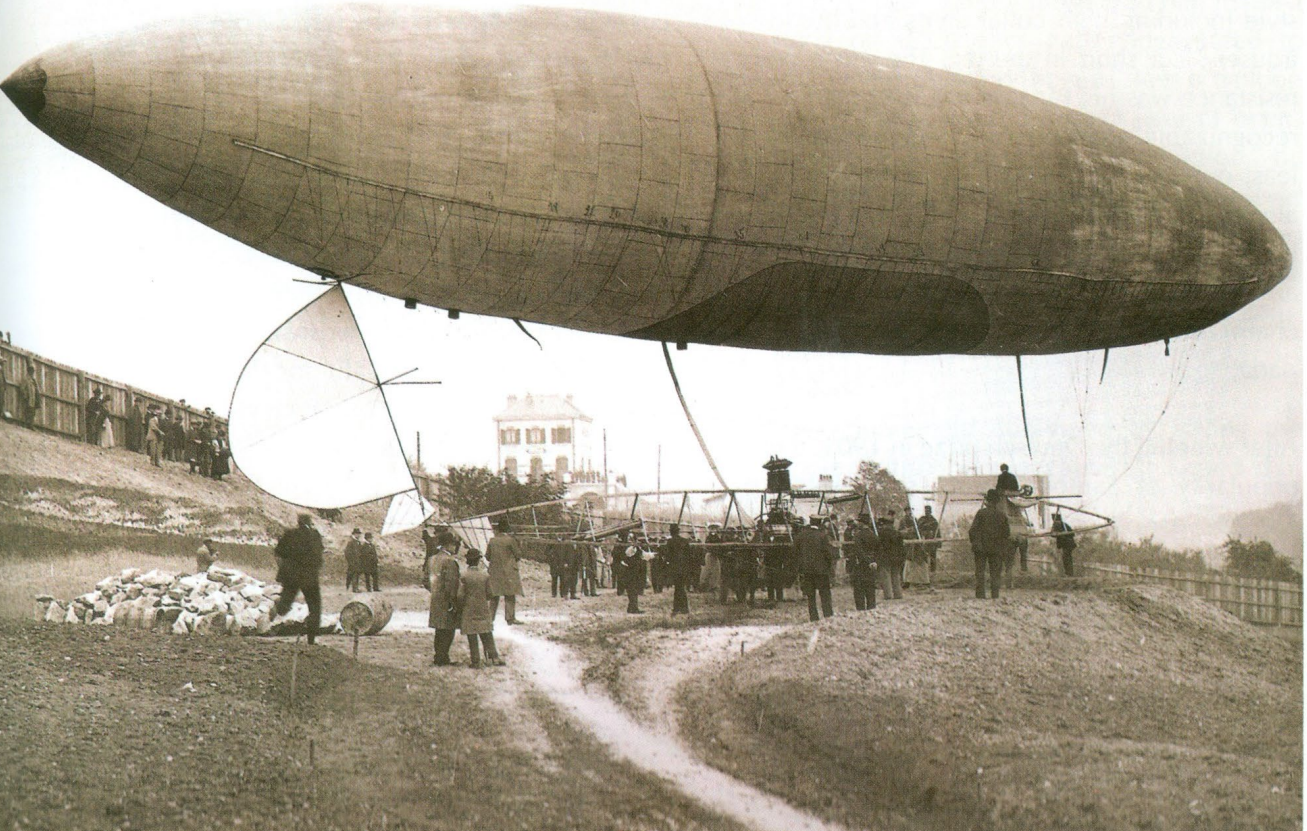
This epoch served as the backdrop for the career and achievements of Alberto Santos-Dumont and he enjoyed – in every sense – a very high profile in the City of Light and around the world.

Santos-Dumont was an early member of the pioneering Aéro-Club de France, a society dedicated to the development of flight and the first of its kind in the world. The Club included such notable members as: Henry de la Vaulx, Gustave Eiffel, Ernest Archdeacon, Paul Tissandier and others. The organization bought a piece of land in Saint-Cloud, just west of the city, for the use of its members and it was here that crowds of onlookers would often assemble to watch Santos-Dumont's flights in dirigibles and airplanes.

It was Santos-Dumont's flight around the Eiffel Tower that established the Brazilian aeronaut as a "bona fide" celebrity in Paris. On July 12, 1901, he flew his Airship No. 6 from the Longchamps Hippodrome around the Eiffel Tower and returned to Longchamps where crowds of spectators were waiting.

After this extraordinary exploit, Santos-Dumont became the talk of the town.

He was an unusual celebrity, modest and unassuming. He stood only 1.52 metres tall and, through rigorous dieting, ensured that his weight remained under 50 kg – the ideal size and weight for an aeronaut in the early days of flight.



"An aviator can't afford to be very heavy," he used to say.

His brown hair was parted in the middle and rubbed with an aromatic pommade. He became known for his distinctive fashion style including high collar shirts and broad trousers, cut short in the leg. The pièce de résistance was his Panama hat, an instantly-recognizable accessory which he used, on at least one occasion, to put out a fire on his airship. To reporters, onlookers and the public, he was always polite and respectful with an easy, informal manner, good nature and charm. In Brazil, one would simply say: *simpatia.*

After winning the Deutsch prize in 1901, the popularity of Santos-Dumont skyrocketed. The 28- year-old aeronaut was now a household name. His proud Brazilian heritage was a source of fascination for admirers. His caricature appeared in Vanity Fair magazine. People talked about his fashion, his daring exploits and his views about air travel. He accepted invitations to banquets and dinners. He became the inspiration for plays, children's games, candies, postcards and circus acts. The stores in Paris sold thousands of toy balloons with the words "Santos-Dumont" written on the side. The "Santos-Dumont" veil became the "must have" fashion accessory of the season. It was a ladies' hat with a veil, adorned with velvet appliqués in the shape of Santos-Dumont's dirigible. And, of course, there was the Santos-Dumont inspired wristwatch, made by Maison Cartier especially for the aviator which later became one of the most popular models sold by the exclusive Paris jeweler.

For everyone, Santos-Dumont became an icon of the modern age, a symbol of new technology, new possibilities and man's abil-

ity to fly. His hangar, house and, of course, balloons and airplanes, were photographed for countless newspapers and reporters sought out interviews with him on all kinds of subjects.

Soon his fame spread beyond the boundaries of Paris, throughout Europe, the Americas and his native Brazil.

The Brazilian government sent Santos-Dumont a prize of 100 contos of reis, granted by a unanimous vote of the National Congress. In a message of thanks to the President, Santos-Dumont wrote: "I thank your Excellency for this prize which will encourage me to work with all my ability for the glory of Brazil."

In 1901, the Aero-Club of London named Santos-Dumont as its first honorary member. He was invited to attend a banquet in his

honour in London where Lord Dundonald, who presided at the event, praised the Brazilian's achievements.

"For the past century those who had made a study of aeronautics had endeavoured to solve the problem of how to steer a balloon against the wind and a great deal of brain-power has been devoted to its solution," he told attendees at the banquet. "Many clever men had endeavoured to solve it, but it had been left to Mr. Santos-Dumont to illustrate by his remarkable and daring feat the solution of the problems."

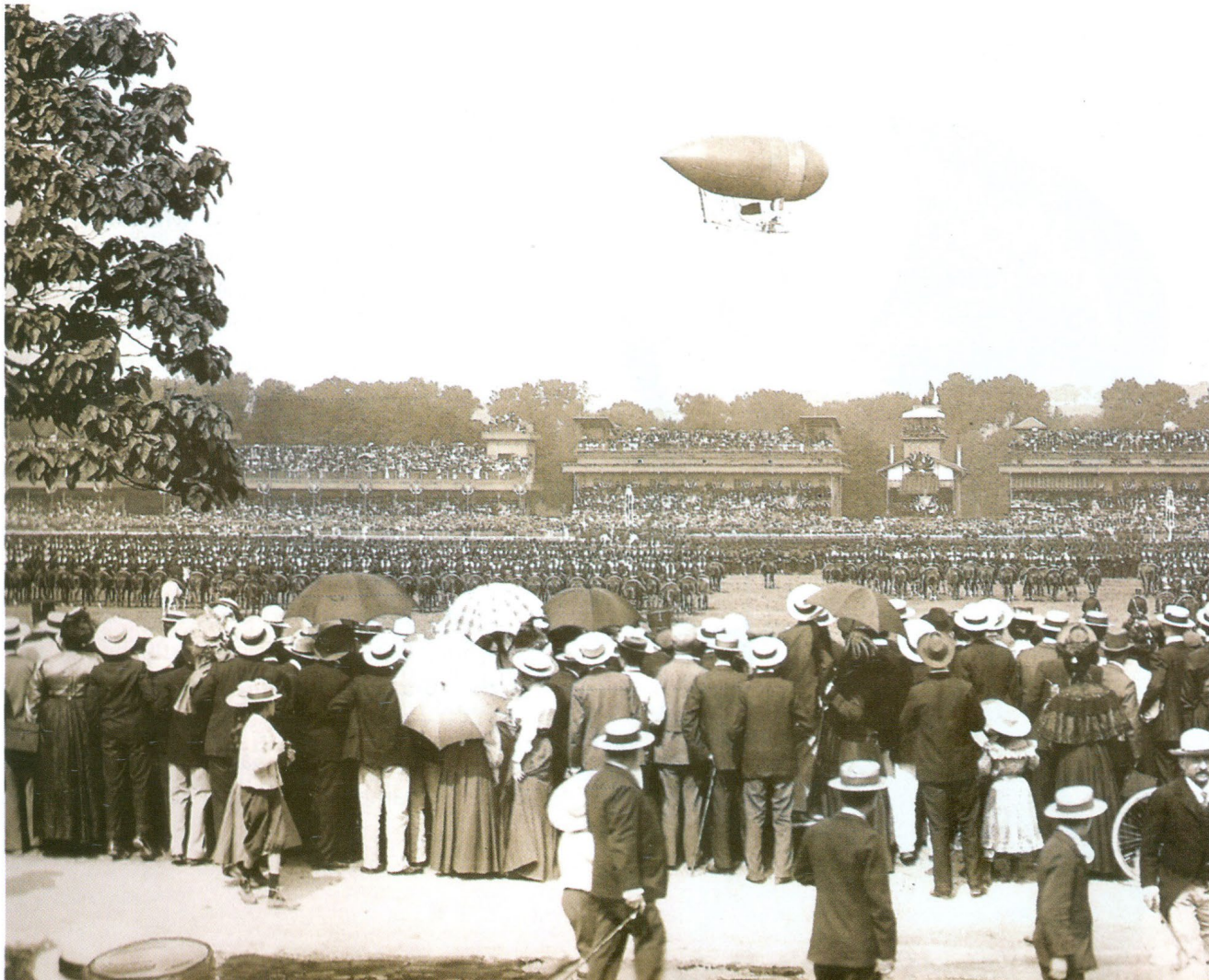
Lord Dundonald continued by saying the whole British people earnestly hoped that the Brazilian's future efforts might be crowned with the success he so richly deserved. In 1902, Santos-Dumont continued to garner international acclaim. He trav-

eled to New York to meet Thomas Edison and was received at the White House by President Theodore Roosevelt.

With each successive airship, Santos-Dumont produced a highly-visible reminder of his ongoing work for all to see in the Parisian skies. In this respect, the Santos-Dumont No. 9 became the most popular of his dirigibles. The Brazilian aviator was dubbed "petit Santos" by the people of the city and they instantly recognized his airship above the streets and avenues of Paris. In fact, the Brazilian's daily routine could often be identified by the location of his airship. Santos-Dumont used No. 9 for a variety of errands and city commutes. He would take his airship to attend the races, fly over the Bois de Boulogne or even drop in to Maxim's for dinner. At night, Parisians could often see No. 9 "parked" outside the Brazilian's home on the Champs-Elysées.

One reporter for the journal "L'Illustration" wrote about an unusual encounter with Santos-Dumont at a café one afternoon. The reporter, André Fagel, was surprised by the arrival of none-other-than Santos-Dumont himself in his airship, hovering a few feet above the ground. In a newspaper article, he described the scene:

"Whole crowds of people rush forward and wildly acclaim the great Brazilian aviator: they like courage and sportsmanship," wrote Fagel. "Mr. Santos-Dumont asks me to excuse him for having startled me. He then called for a drink, got on board of his airship again and went gliding into space."



The next day, the same journalist ran into Santos-Dumont at the Bois de Boulogne.

"For a few minutes all traffic was held up as far as the Arc de Triomphe," he wrote. "The nursemaids taking children out for an airing in the Champs-Elysées became nervous. What was the matter? Was it a riot? Had the King of England returned to Paris? No, it was Mr. Santos-Dumont on another of his aerial promenades."

In October 1906, after Santos-Dumont's historic airplane flight, the media went wild.

Paris newspapers featured large front-page headlines describing the event and hailing the conquest of the air. Newspapers across Europe echoed the sentiments. Less than a month later, the Brazilian aviator made news again with his second flight, a record-setting 220 metre flight at Bagatelle in Paris.

"FLY, FLY, FLY!.. SANTOS-DUMONT, IN AN AIRPLANE, YESTERDAY MADE A FLIGHT OF 220 METRES" said the front page of La Nation in large print. It was a sign of the times.

In fact, throughout his aeronautic career, Santos-Dumont was never far from the headlines.

On one flight, Santos-Dumont and his airplane simply disappeared, It happened on a rainy day in front of the usual crowd of curious spectators assembled to watch his flights. Santos-Dumont took off from Saint-Cyr in his trusty Demoiselle airplane. Everything seemed normal but then he simply disap-

Santos-Dumont...by the numbers

3,000 francs: The cost of inflating Santos-Dumont's Airship No. 7 with hydrogen gas in 1902.

4,000 francs: The value of the "Encouragement Prize" which Santos-Dumont received in 1900 from the Aéro-Club de France after his work on Airship No. 4.

100,000 francs: Value of the Deutsch Prize won by Santos-Dumont for his round trip flight in airship No. 6 from Saint Cloud to the Eiffel Tower.

0 francs: The amount of Deutsch Prize money which Santos-Dumont kept for himself (he gave half to his coworkers and half to the poor of Paris)

155.40 francs: total paid by Santos-Dumont in damages and fines after his airship No. 5 crashed into a property in Paris in 1901 and damaged some tiles on the roof

5,000 francs: Cost of a factory-built, serial production version of Santos-Dumont's famous Demoiselle airplane

$3,400 (US): Approximate cost in 2006 of a Cartier "Santos" Men's Watch in polished stainless steel with locking clasp bracelet, black Roman numeral dial and precision quartz movement.

peared. Mechanics and onlookers waited patiently but there was no sign of man or machine. Soon the word was out on the streets of Paris that the brave Brazilian was missing. Everyone was looking for signs of the aviator. The "Le Matin" newspaper of the following day carried the headline: "Santos-Dumont disappears in airplane".

The next day, his mechanics discovered that the airplane had made an 18 km flight in 16 minutes and landed at the Chateau d'Aion owned by Count de Galard. The pilot had landed safely, shared a pleasant dinner with the Count and enjoyed a restful night's sleep in one of the Chateau bedrooms. ✈

A Vision of Peace & Humanity

"We shall become stronger in the bonds of understanding and friendship" – Santos-Dumont 1915

For Alberto Santos-Dumont, airships and planes were much more than flying machines — they were instruments for communication, understanding and peace. When he arrived in Paris to study in 1892, Santos-Dumont brought with him a fundamental respect for his fellow man and a strong belief in science as a mechanism for peaceful progress. Perhaps it was a product of his family upbringing or his academic studies or his quintessential Brazilian perspective which equipped him with the qualities of generosity, cooperation and tolerance - the hallmarks of his life and work.

In 1900, he received the "Encouragement Prize" from the Aéro-Club de France after his impressive work on Airship No. 4. On receiving the 4,000 franc prize, Santos-Dumont promptly donated the money to the creation of a new prize designed to encourage other aviators. It was called The Santos-Dumont Prize and would be granted to any member of the Aero-Club (except Santos-Dumont himself) who started from St. Cloud, flew around the Eiffel Tower and returned to the starting point without touching down.

This remarkable generosity of spirit marked the career of Santos-Dumont. He conciously never sought patents for his inventions and made plans of his airship and airplanes freely available to anyone. He manifested a genuine desire to share the development of aviation with others and sought every opportunity to kindle an interest and enthusiasm in air travel.

Upon winning the Deutsch Prize in 1901, Santos-Dumont gave away the 100,000 franc first prize. He gave half to his coworkers and half was distributed to the poor of Paris, with priority to those workers in financial difficulties who had been obliged to pawn their tools.

In 1906, he won two Aero Club prizes: the 100 franc prize for a flight of 60 metres and a prize of 1,500 francs for a flight of 100 metres. He gave the winnings to his mechanics.

Once Santos-Dumont recognized the inevitable link between aviation development and military interests, he worked tirelessly to warn people about the potential dangers of war waged in the air.

As early as 1903, the Minister of War for France took an interest in Santos-Dumont and his flying machines. In a thought-provoking book, published in 1904, Santos-Dumont discussed the possibility of using aerial balloons for scouting the movements

of enemy armies. He also described other applications of aviation including the possibility of airships being deployed over the water to destroy submarines and drop bombs.

At the same time, Santos-Dumont championed an alternative path for aviation. He became an outspoken advocate of the benefits of an aviation industry developed for the pursuit of peace, commerce and communication. Over the course of his life, he wrote two books about his predictions and hopes for the future of aviation and air travel.

The February 15, 1905 issue of the Parisian magazine "Je Sais Tout" featured a long article by Santos-Dumont outlining his predictions for the future and his fervent hope for aviation as a force for peace and development.

"What will you say about me if I state that it is quite possible to reach the North Pole in a dirigible balloon?" he wrote.

In his 1918 book , *O que eu vi, o que nós veremos (What I saw, what we shall see)*, Santos-Dumont speculated about a positive future for aviation.

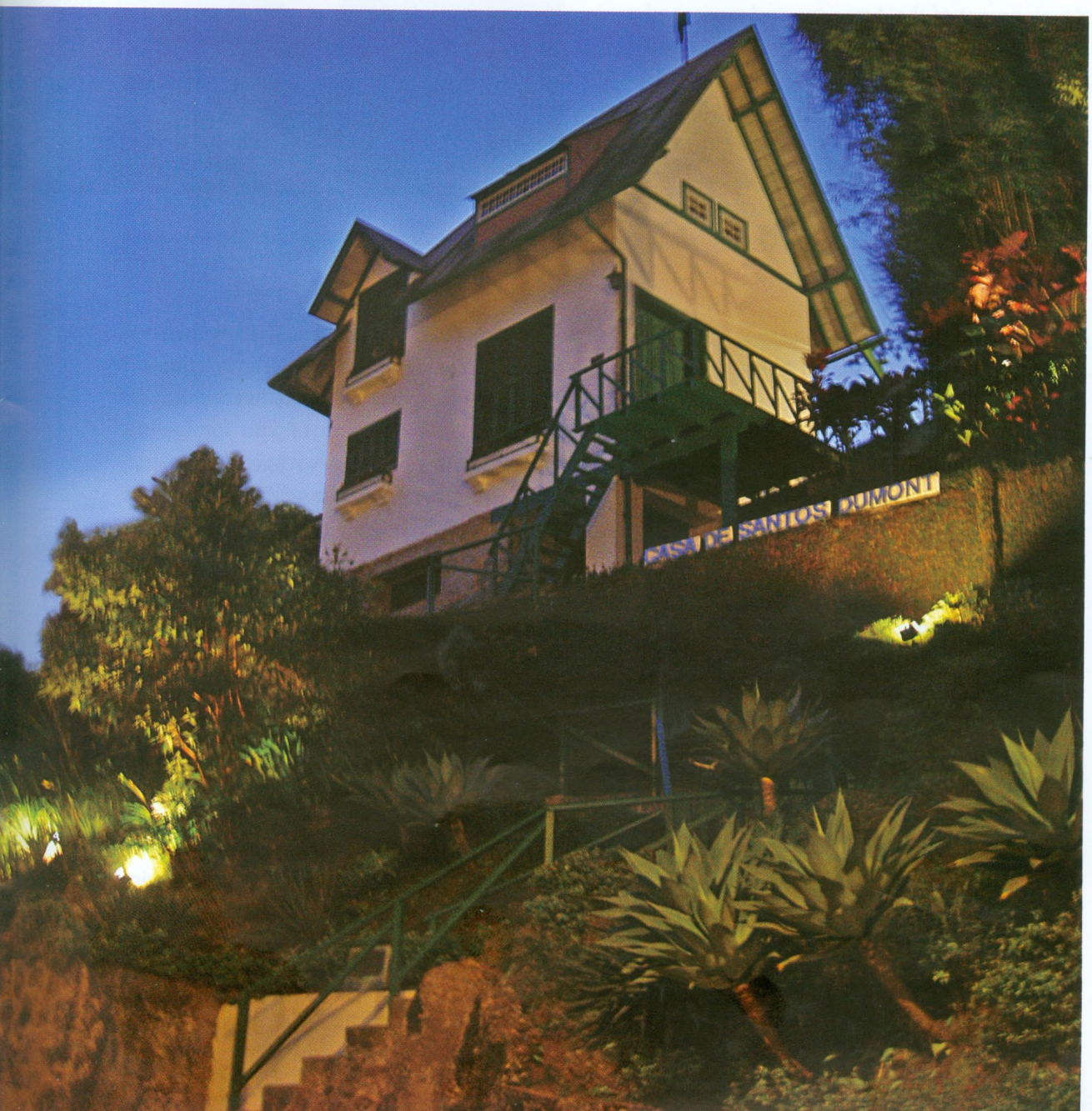
"Perhaps there will be airplane yachts with great wings which will enable them, with the aid of powerful motors, to fly in space.... And we will habituate ourselves so quickly to those innovations that the day is not far distant when aerial omnibuses will transport tourists and business men from Paris to St. Petersburg, and you and I will take our places in same just as naturally as our grandfathers took their seats in the first railway train."

At the end of 1909, aviation was literally taking off as a viable industry and Santos-Dumont was making his final flight plans. With the monoplane, Demoiselle, he ended his flying career, a career which had taken its toll on the Brazilian pioneer through a number of crashes and close calls. He announced to his friends and colleagues that he intended to retire as an aeronaut.

At the start of World War I, Santos-Dumont was dismayed to see that his predictions and fears about aviation in war were all coming true. In Europe, the airplane was being employed for observation, directing battles and the movements of troops and attacking the enemy.

In spite of all these ominous events, Santos-Dumont continued to emphasize the peaceful development of air travel, becoming an ardent ambassador for civil aviation.

"If the airplane...has shown itself to be so useful in wartime, how much more useful must it not be in time of peace?" he wrote in *"O que eu vi, o que nós veremos"*. "...with all this progress why should not planes be employed in the service of furthering commercial and political relations between dif-



ferent countries of the world which would reap the benefit of then incalculable advantages to be thus accrued? Why not use such an ingenious machine... for the benefit of humanity?

"...with time and distance annihilated, the commercial relations so long deterred will spontaneously develop. We shall have facilities for prompt communication. We shall get into closer contact. We shall become stronger in the bonds of understanding and friendship."

Santos-Dumont saw a particularly important role for aviation in the social and economic development of the Americas and envisaged aviation as the means to "a permanent bond of union between the Americas."

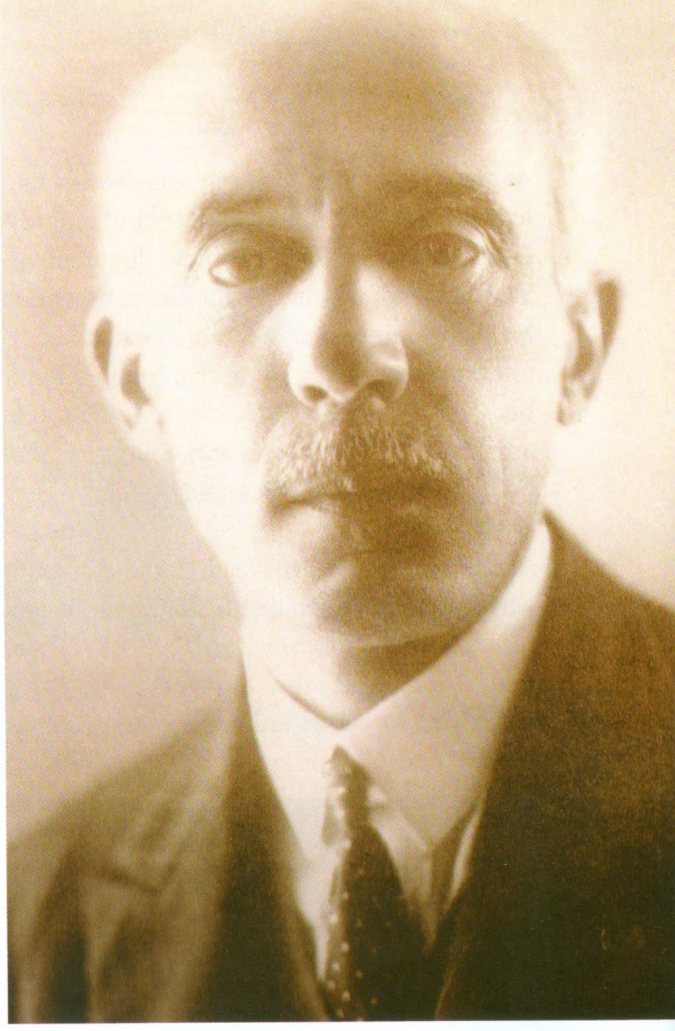
His words – and his vision - were well received in many countries throughout the Americas. He received wide recognition in the United States, Chile, Argentina and, of course, his native Brazil.

At a landmark event in Santiago, Chile in 1916, Santos-Dumont was a delegate of the Aero Club of America to the Pan American Conference of Aeronautics.

It was here that he made one of his most eloquent speeches in support of a peaceful mission for aviation and he repeated his core belief that modern aviation would bridge the divide among peoples on the continents.

"I am sure the present obstacles of time and distance will be overcome," he said. "The most isolated cities will be placed in contact with the world."

Santos-Dumont greeted every milestone in aviation with the same supportive sentiment. When French aviators Dieudonne Costes and Joseph Lebrix arrived in Paris on their second round-the-world flight, Santos-Dumont greeted the French flyers with the message: "I thank both of you for having, through your triumphal voyage, demonstrated to the peoples of the earth the peaceful grandeur of aviation."



In 1917, Santos-Dumont returned to Brazil welcomed as "the celebrated Brazilian aeronaut." He encouraged the development of aviation infrastructure in his own country including adequate airports, aviation training and a homegrown aviation industry expertise to serve current and future generations

"My most intense desire is to see real flying schools in Brazil. To see the airplane flying over our immense regions..." he wrote.

Santos-Dumont retired to a very interesting and peculiar house called "Encantada" (enchanted house) wich was designed by himself, built on the Morro do Encanto at Petropolis, a summer resort in the mountains of Rio de Janeiro.

In 1926, he wrote a letter to a Representative of Brazil to the League of Nations requesting the limitation of armaments.

"Those who like myself were the humble of pioneers of the conquests of the air, thought more about creating new means for the pacifist expansion of the peoples, than of giving them new arms of combat," he wrote.

He even offered a prize of 10,000 francs for the best work on the interdiction of flying machines as an arm of combat and bombing purposes. By now, his health was getting worse. He still traveled and shuffled among towns in Switzerland and France. Tired and restless, he finally returned to Brazil to stay in 1931.

Santos-Dumont died on July 23, 1932 at Guaruja in Santos in the state of São Paulo. He was 59 years old.

By an act of the Federal Government of Brazil, Santos-Dumont holds the honorific rank of Air Marshall and is Patron of the Brazilian Air Force. On July 4, 1936, the President of Brazil created "The Aviator's Day", celebrated every year on October 23rd to honour the memory of Santos-Dumont and the anniversary of his first official flight in a heavier-than-air machine.

In Brasilia, on the 26th of July 2006, the Brazilian President honoured Alberto Santos-Dumont by adding his name to the country's book of heroes at the Panteão da Liberdade e da Democracia. ✈

Hommage to a Brazilian Hero

1905 – Awarded Knight of the Legion of Honour of France (subsequently promoted to rank of Commander and Grand Officer)

1922 – Al Mérito (Chile)

1923 – Commendator of the Ordem Militar de Santiago of the Sword. (Portugal)

1924 – Grand Officer of the Order of Leopold (Belgium)

1932 (posthumous) – Peruvian Cross of Aviation (Peru)

1932 – the government of Minas Gerais changed the name of the city of Palmira to Santos-Dumont

1936 – President of Brazil created "Aviator's Day" in honour of Santos-Dumont, to be celebrated every year on October 23rd.

1947 – The Brazilian Government created the Santos-Dumont Medal of Merit, awarded to distinguished Air Force officers as well as deserving civil and military personnel.

1971 – Alberto Santos-Dumont was proclaimed "Patron of the Brazilian Air Force" by the Brazilian government.

2006 – The Government of Brazil honours Santos-Dumont by officially adding his name to the country's book of heroes.

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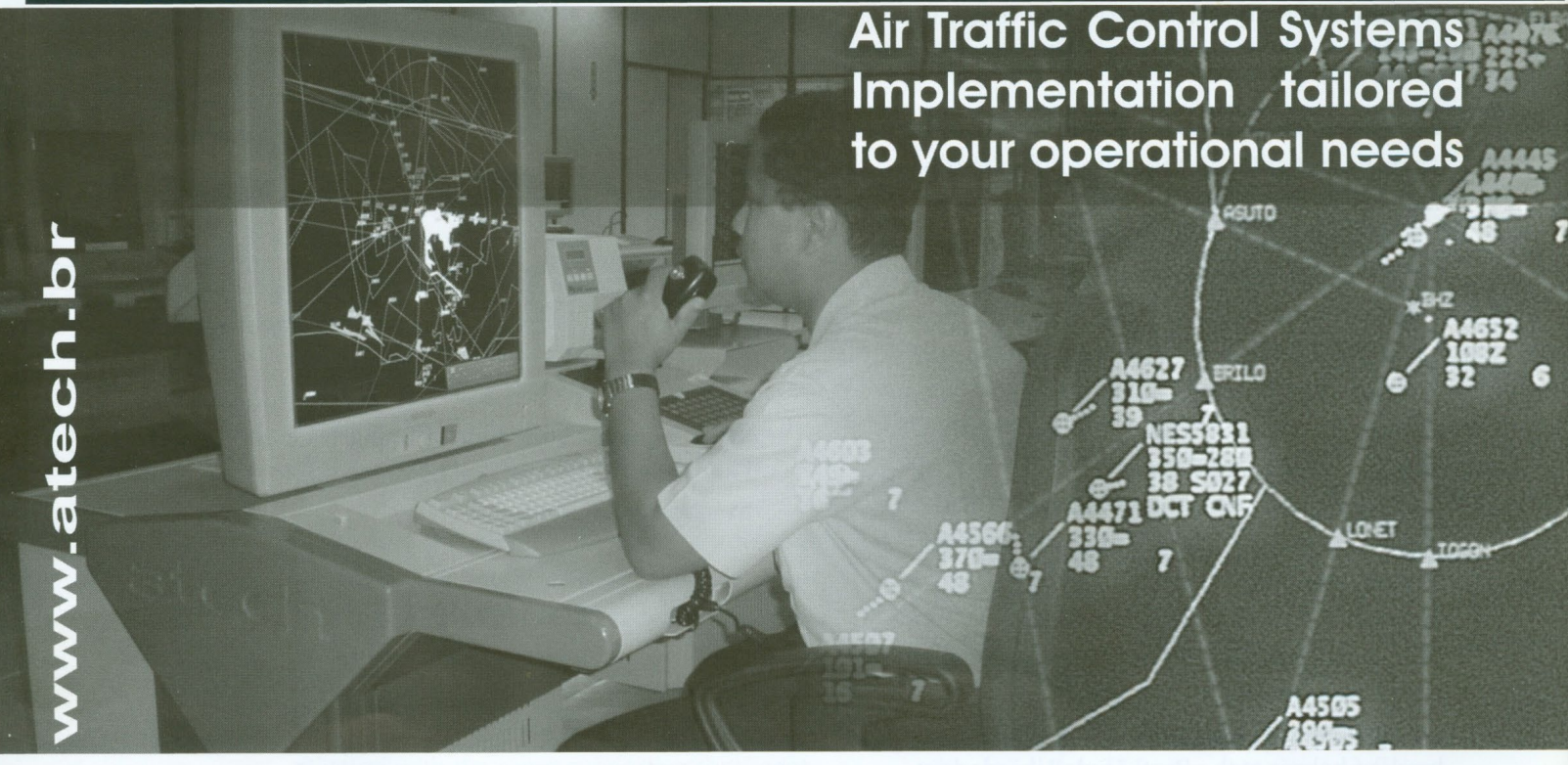

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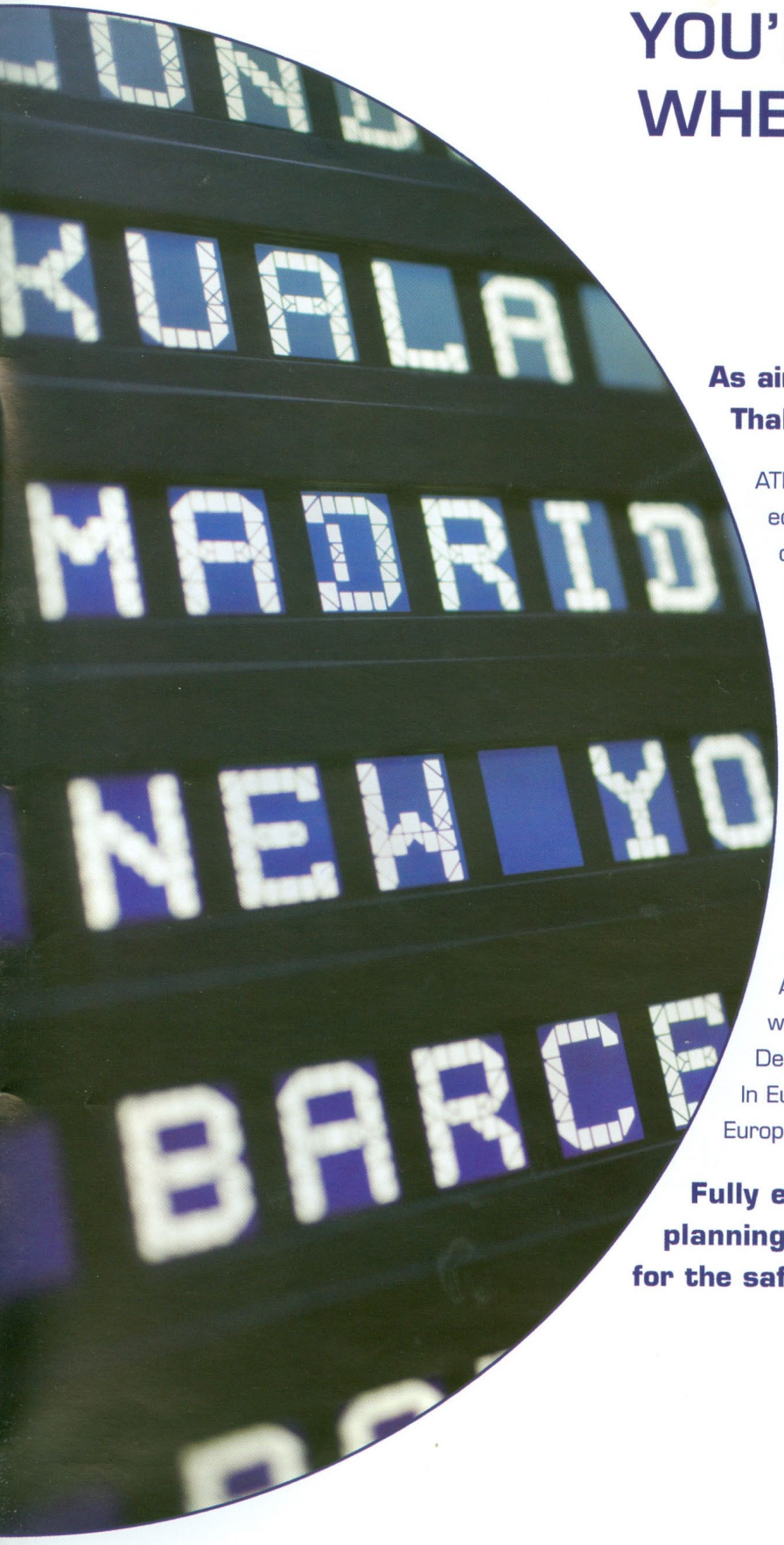

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