

HISTORY OF BALLOON FLIGHT

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(In collaboration with Daniel Olsen)

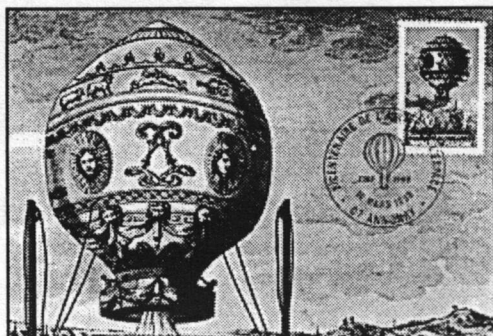
On June 4, 1783, the Montgolfier brothers Jacques Etienne and Joseph, French paper manufacturers, filled a bag 33 ft in diameter with smoke from a straw and wool fire and saw it rise 1500 ft above Annonay, near Lyons (see: *Figure 1*). Scientists soon realised that the heated air made the balloon rise. Air expands when heated so that a given volume weighs less than the same volume of cold air. The average molecular weight of air is 29. Any gas that is lighter than this can be used to inflate a balloon. The lightest of all known gases is hydrogen, with a molecular weight of 2. Next to hydrogen helium, with a molecular weight of 4, is the lightest gas and has the advantage of being noncombustible. Mixed with air it does not explode. Formerly a rare and expensive gas, helium was isolated from natural gases in the 20th century.

The impression created by the Montgolfiers' experiment was tremendous and two months later in August 1783 Jacques Charles a physicist released a hydrogen-filled balloon from Paris (see: *Figure 2*). The first manned free balloon flight was made on Nov. 21, 1783 by Jean-Francois Pilatre de Rozier (see: *Figure 3*) & Francois Laurent, Marquis d'Arlandes. They reached a height of 3000 feet, as they soared over Paris for about 25 minutes. On Jan. 7, 1785 Jean Pierre Blanchard (who later made the first US free flight on Jan. 9, 1793 at Philadelphia) and J. Jeffries, a US physician, crossed the English Channel from Dover, England to France, 12 mi. inland from Calais.

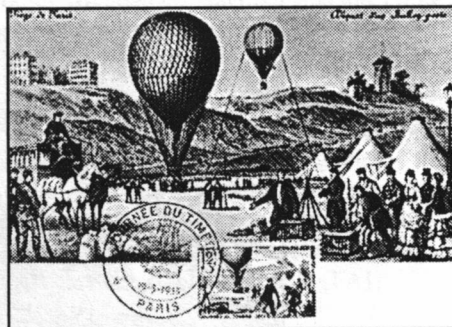
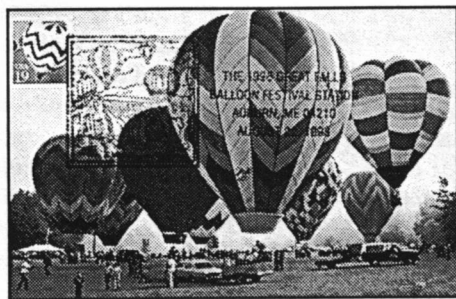
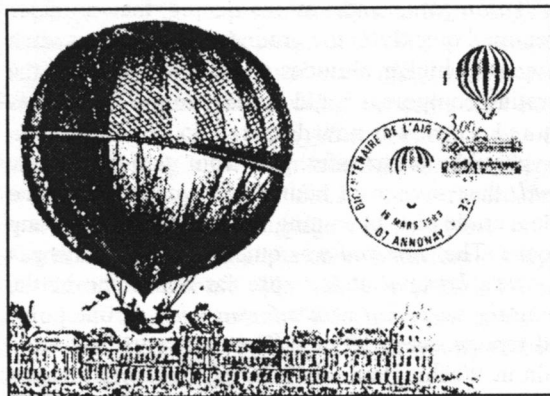
In June 1785 Pilatre de Rozier and P.A. Romain attempted to cross the Channel from France to England. Pilatre introduced a new idea to control his altitude, the use of a hot-air cylinder attached beneath the gas bag. The device functioned for only half an hour. Then the hydrogen caught fire, and both men plunged to their death. The first balloon flight across the Alps, from Marseilles, France to Turin, Italy was achieved in Sept. 1849 by Francois Arban. In the States one of the amazing early long distance flights was that of John Wise who in 1859 flew from St. Louis, Mo. to Henderson, N.Y., a distance of more than 800 miles in less than 20 hours.

From the beginning, the military use of balloons was envisioned. Benjamin Franklin, in Paris at the time of the first ascents of the Montgolfier balloons,

Figure 1: 1st Hot Air Balloon Flight, by Montgolfier bros. on June 4, 1783 at Annonay. Issue: Mar. 19, 1983 for bicentenary of First Balloon Flights. Cancel: First Day, Annonay (place of event), concordant (triplee).



Clockwise fr Left. *Figure 2: 2nd Flight by a Hydrogen Balloon*, by Jacques Charles over Paris. Issue and Cancel same as in Figure 1. *Figure 3: Pilatre de Rozier (1756-85)*. On card: He ignites hydrogen as he exhales. On stamp: De Rozier & Montgolfier balloon with which he made the First Manned Free Balloon Flight on Nov. 21, 1783. De Rozier died in June 1785, while attempting to cross the Channel. Issue: June 4, 1936 for 150 death anniversary. Cancel: July 22, 1937, Metz (birthplace), regular. *Figure 5: Balloons carrying Mail*, during the siege of Paris in 1870; lifting off from St. Pierre square in Montmartre Paris. Issue: March 19, 1955 for "Stamp Day". Cancel: First Day, Paris (place of event), concordant (triplee). *Figure 9: Ballooning as Sport* has become an annual event in many US locations. Issue: May 17, '91 for Sport Ballooning. Cancel: Aug. 22, '98, Auburn ME, concordant (triplee).



prophetically wrote *"This Method of filling the Balloon with hot Air is cheap and expeditious, and it is supposed, may be sufficient for certain purposes, such as elevating an Engineer to take a View of an Enemy's Army, Works, etc., conveying Intelligence into or out of a besieged Town giving Signals to distant Places, or the like."* Military observation balloons, that is captive balloons fastened to the ground by long cables, were actually used as early as 1794 and again during the American Civil War (1861-65) by both the Union and the Confederate armies.

During the Civil War in the spring of 1862, Thaddeus Lowe was the chief aeronaut in McClellan's army, in its march up the James River to the Confederate capital at Richmond, VA. The performance of Lowe's balloons was one the few cheering developments during McClellan's unsuccessful bid to capture Richmond. At the battle of Fair Oaks, on May 31st and June 1st, 1862, Lowe's aerial observations stave off a crushing Union defeat. On May 31st, Lowe on board the *Washington*, hovering high above the front lines and scanning for signs of enemy movements, he spotted a large concentration of Confederate troops massing for attack. His warnings, tapped out from his balloon, alerted headquarters in time to send reinforcements to hold the line. On June 1st, Lowe went aloft in the *Washington*, once more. Seeing that a major engagement was about to begin, he returned quickly to the ground, intending to switch to the larger balloon *Intrepid* and ascent to higher altitudes for a better view of the action below. However his gas-generating equipment could not inflate the *Intrepid* as rapidly as the needs of the battle required. Lowe was now desperate to be aloft, it then occurred to him that it might be possible to transfer gas from the inadequate *Constitution* to the half-filled *Intrepid*, thus saving an hour that *"would be worth a million dollars a minute."* Lowe made a crude pipe by cutting the bottom of a cooking pot and thus connected the two balloons. The *Intrepid* was quickly inflated with gas transferred from the *Constitution*. Lowe's *Intrepid* at last rose far above the battle, (see: Figure 4) and soon was *"keeping the wires hot with information."* At one point during the fighting, Lowe dispatched reports every 15 min. These observations were relayed to a worried President Lincoln in Washington, who was gratified when Lowe finally reported that the Confederate forces had turned back toward Richmond.

Figure 4. The *Intrepid* hydrogen gas balloon used during the American Civil War on June 1st, 1862 at Fair Oaks, VA near Richmond, by Th. Lowe for aerial observations in favor of the Union Army. The *Intrepid*'s gondola was emblazoned stars and stripes, so that Union troops would not fire by mistake. Issue: March 31, 1983. Cancel: First Day, regular, Richmond VA, place of the event.



In the Franco-Prussian War of 1870-71, during the siege of Paris, balloons had a strategic importance. They took out tons of mail and carrier pigeons, which in turn brought news back to Paris. The balloons also flew members of the French government into unoccupied parts of France (see: *Figure 5*, on page 9).

The most important modern aspect of the free balloon lies in its contribution to meteorology and other sciences, notably the study of cosmic rays. Investigation of the upper atmosphere by unmanned balloons, called *pilot balloons* came into use in 1893. The pilot balloons were the forerunner of the *sounding balloon*, which carries scientific equipment and recording devices. A French meteorologist Leon Teisserenc de Bort discovered the stratosphere by means of sounding balloons. Other scientists made intensive studies of cosmic rays during the 1920's and early 1930's by means of sounding balloons.

August Piccard, a Swiss scientist, professor of physics in Belgium became interested in cosmic-ray study, and he modified the balloon by constructing a pressurised cabin, so that he could take an effective physics laboratory to the stratosphere. On March 27, 1931 A. Piccard with his assistant Paul Kipfer launched their balloon with the pressurised cabin from Augsburg, Germany and they became the first to reach the stratosphere at 51 775 ft. altitude (see: *Figure 6*, on page 12). A. Piccard reports: "The sky is beautiful - almost black". "It is bluish purple ten times darker than on earth, but it still is not quite dark enough to see the stars."

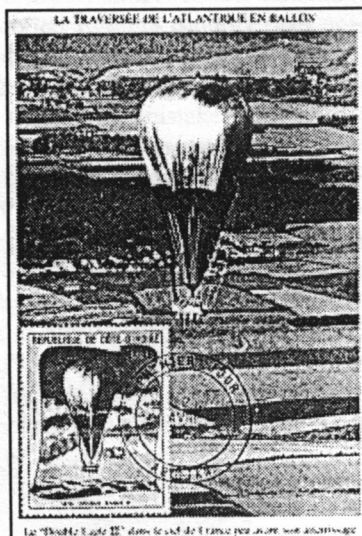
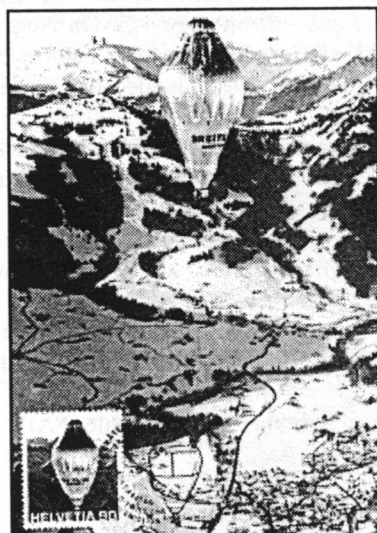
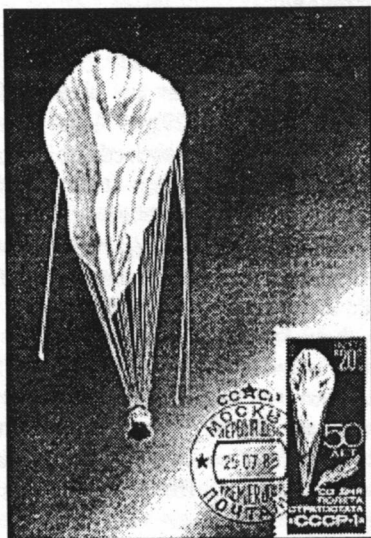
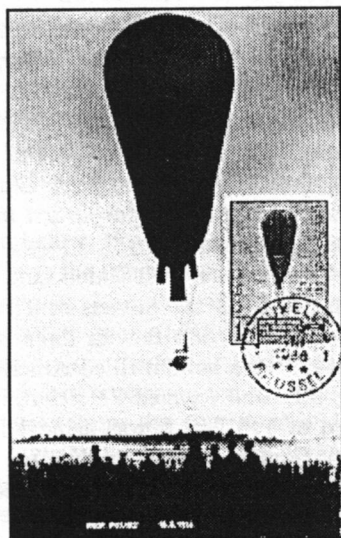
Auguste Piccard's achievement set off a race between the Soviet Union and the States in setting a new altitude record. On Sept. 30, 1933 the Soviets sent from Moscow their *Stratostat U.S.S.R. I* to a record breaking 60 680 ft with three men aboard (see: *Figure 7*, on page 12). On Nov. 11, 1935 the helium-filled American balloon *Explorer II* was launched from Rapid City, S.D. and reached 72 395 ft, also with three men aboard. The absolute altitude record of 113 740 ft was achieved on May 4, 1961 by Comdr. Malcolm Ross and Lt. Comdr. Victor Prather on the *Strato-Lab V* launched from a US Navy ship in the Gulf of Mexico. This record stood for nearly four decades.

The first to cross the Atlantic Ocean were Maxie Anderson, Ben Abruzzo, and Larry Newman on their *Double Eagle II* balloon (see: *Figure 8*, on page 12). On Aug. 12, 1978 they lifted off from Presque Isle, Maine and after surfing ahead of a storm front they succeeded in crossing the Atlantic and on Aug. 17, 1978 landed in France, at Miserey near Paris.

Almost the same crew of Ben Abruzzo, Larry Newman and Ron Clark were the first to cross the Pacific Ocean on their *Double Eagle V* balloon from Nagashima, Japan to Covelo, California from Nov. 10 to 12, 1981.

Interest in ballooning as a sport has greatly increased in recent years, spurred by the development of balloons made of new lightweight materials and equipped with propane gas burners. Balloon races, particularly "spot-landing races," gained in popularity and became annual events in several locations (see: *Figure 9*, on page 9). When races or individual events are held under sanctioned conditions, the duration, distance, and altitude are recorded through the National Aeronautics Association (NAA), the US representative of the Federation Aeronautique Internationale (FAI).

Clockwise fr Left. *Figure 6: August Piccard's Balloon.* He was a Swiss scientist working in Belgium. He & assistant P. Kipler made the 1st Manned Flight into the Stratosphere on May 27, 1931. Issue: Nov. 26, 1932 marking A. Piccard's 1st & 2nd Flights into Stratosphere. Cancel: Aug. 29, 1936, Brussels, regular. *Figure 7: Stratostat U.S.S.R. I Balloon* Altitude Record reaching a height of 60 680 ft on Sept. 30, 1933. Issue: July 25, 1983 for the 50 anniver. of *Stratostat U.S.S.R. I*'s Flight. Cancel: First Day, Moscow, special. *Figure 8: Double Eagle II* just before its landing in France, after having crossed the Atlantic. Issue: Apr. 2, 1983. Cancel: First Day, Abidjan, Ivory Coast. *Figure 10: Breitling Orbiter 3 Balloon* of Bertrand Piccard & Brian Jones, as it lifts off from Chateau d'Oex. Issue: March 24, 1999 only 4 days after it landed in Egypt. Cancel: First Day, Chateau d'Oex (place of event), concordant (triplee)



On March 1, 1999 the *Breitling Orbiter 3* balloon of the Swiss adventurer Bertrand Piccard (grandson of Auguste Piccard) and Brian Jones of Bristol, Great Britain took off from the village of Chateau d'Oex in the Bernese Alps of Switzerland (see: *Figure 10*, on page 12), and succeeded in accomplishing the impossible, being the first to complete the round-the-world nonstop flight, in a little less than 20 days.

The *Breitling Orbiter 3* balloon lifted off on March 1 at 9 a.m. from Chateau d'Oex flying Southwest over the Alps, and having a spectacular view of the Matterhorn and Mont Blanc. By evening it reached the Mediterranean over Cote d'Azur. Late on March 3 it passed over Almeria, Spain and on March 3 it reached Morocco and Mauritania and then turned East. On March 4 it flew over the Sahara desert, and on March 5 over southern Egypt and Sudan. On March 6, it flew over Saudi Arabia, and on March 7 over the Arabian sea. Then on March 8 over northern India, south of the Himalayas, always assisted from afar by a support team of Swiss air traffic controllers.

On March 9, after nine days in the air, the *Breitling* entered China, just south of the 26th parallel, as per China's flyover authorisation. At one point, *Breitling* drifted just 25 miles short of the restricted area and was requested to prepare for an emergency landing by the Chinese authorities. Happily the winds changed and *Breitling* was back on track. The crossing of China lasted 15 hours and on March 10 it entered the Pacific Ocean. Captains Piccard & Jones, following the advice of their support team from Switzerland, had to give up on the preferred northern Pacific route and had to follow a southern route toward the equator, where a jet stream was expected to form. On the same day in the afternoon *Breitling* flew past the Mariana Trench, the deepest area on earth, where 39 years earlier Bertrand Piccard's father Jacques, rode his bathyscaph to a depth of 35 800 feet. On March 13 the balloon passes the half-way mark near the Marshall Islands.

After a long journey of six days across the Pacific Ocean, the balloon reached southern Mexico on March 17, but was ejected from the jet stream and was flying the wrong way towards Venezuela. Their support team asked them to fly as high as possible, and at 35000 ft they managed to get into a jet stream and to turn toward Northeast, and after flying over Jamaica, they were back on track. On March 18, *Breitling* was flying over the Atlantic Ocean with only 4 fuel tanks left out of 32.

During the night of March 19 they reached the coast of Africa over Mauritania, having broken the duration record of 17 days, 17 h. and 41min. by Elson & Prescott. On March 20, Piccard and Jones crossed the finish line at 9 27' longitude, becoming the first balloonists to circle the globe nonstop. On March 21, after 19 days, 21h. and 47min. and 28 430 miles (45 755 km) Bertrand Piccard and Brian Jones landed safely in the Egyptian desert at 5.54 a.m. local time, and thus entered the history records.

Bertrand Piccard's family has thus succeeded in setting the following records. Grandfather August Piccard broke first the balloon altitude record in 1932. Father Jacques Piccard broke the depth record in 1960; and Bertrand Piccard the nonstop round-the-world balloon flight record in 1999.