Balloon Museum Tour Docent Guide
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1) Main exhibit hall – Introduction

The front of the museum (Balloon inflation)
The floor "Mankind's dream of flight"
Leonardo da Vinci

- **In the 15th century, Leonardo da Vinci created several flying machine designs,**
  - **but they were unworkable due to the limitations of contemporary knowledge.**
  - **Leonardo da Vinci said,**
    "Once you have tasted flight, you will forever walk the earth with your eyes turned skyward".

2) Early Ballooning History

The first written documentation of the use of hot air balloons was in China in 300 BC.
Small rice paper and bamboo frame balloons were heated with a candle or small flammable wax cell and sent aloft as signaling devices.
There is no evidence in China of manned balloon flights.

Now called "Kongming Balloons" or "Sky Lanterns", these small hot air balloons are sent aloft for good luck and huge festivals all over Asia and feature mass launchings.

In 1709, August 8 : Brazilian-Portuguese priest Gusmão made a presentation of a hot air balloon in Lisbon, in front of King John V and the Portuguese court. It was a small paper balloon that flew some 4

meters in the air. (Indoor demonstration only). 1720 he made the first tethered manned balloon ride.

3) Flying Machines

Early Experiments

- **Joseph Montgolfier first contemplated building flying machines as early as 1777 when he observed laundry drying over a fire incidentally forming pockets that billowed upwards.**
- **Joseph made his first definitive experiments in November 1782 while living in the city of Avignon, France.**
- **He believed that contained within the smoke was a special gas, which he called "Montgolfier Gas", with a special property he called "Levity".**
- **On June 4, 1783 (233 years ago) the Montgolfier brothers built a balloon made of silk and lined with paper that was 33 feet in diameter and launched it — with nobody aboard — from the marketplace in Annonay, France.**
- **The balloon rose 5,200-6,600 feet, stayed aloft for 10 minutes and traveled more than a mile.**
  - **I always wanted to understand how they measured that height.**

Demonstration Flight

- **Word of their success quickly spread.**
- **A demonstration for King Louis XVI (16th X=10, V = 5, I=1)was planned.**

- **A balloon made of wallpaper about 30 feet in diameter was constructed of taffeta and coated with a varnish of alum for fireproofing.**
- **The balloon was decorated with golden flourishes, zodiac signs, and suns.**

First Passengers Flight

- **King Louis XVI decreed that before any men flew, the balloon should be tested.**

Note: Just like the US Space program - if it was safe for man

- **The king proposed a test using prisoners but the idea of prisoners being in the limelight was unacceptable.**
- **The Montgolfier's suspended a basket balloon containing a sheep, a duck, and a rooster.**
    - **A scientifically sound idea.**
        - **Sheep's physiology like a human's**
        - **The high-flying duck was unlikely to be harmed, so it was used as a control.**
        - **The rooster did not fly at high altitudes.**
    - **The flight lasted 15 minutes, safe for humans.**
    - **Records show that the sheep life was spared.'**
        - **Lived on the grounds at the Palace of Versailles**

Longer Flights using onboard heat

- **Using an onboard fire with wood and other materials to keep the fire going**
- **A bucket of water and sponge on a stick to control the embers on the envelope**

First Gas Balloon Flight - 1783

With the news from Annonay, French inventor Jacques-Alexandre-César Charles, who knew that hydrogen was lighter than the hot-air smoke used by the Montgolfier's, realized that all he had to do to succeed was to make his balloon experiment on a larger scale. The first air race was on. On August 27, 1783, Charles launched an unmanned varnished-silk hydrogen balloon from Paris. It was attacked and destroyed by local villagers when it landed near Gonesse some 9 miles to the northeast.

Note: When iron filings react with sulfuric acid, a chemical reaction occurs where the iron dissolves in the acid, producing hydrogen gas and iron sulfate (ferrous sulfate) as the primary products; the balanced chemical equation for this reaction is: $Fe (s) + H_2SO_4 (aq) \rightarrow FeSO_4 (aq) + H_2 (g)$.

Note: In 2025 it will have been 123 years since the first airplane flew…

4) Medals, Medallions, and Pins

In 1891 **Balloon Stunt Woman in France. Miss Marie Merton held onto a wooden ring without ropes or safety harness as she floated down from a hot air balloon to the ground. See Poster at International Balloon Museum, Albuquerque, New Mexico.**

- **Many plates, cards and pictures were made highlighting ballooning in the 1890's.**
- **Using the basket to take pictures**

5) Crossing the English Channel

Jean-Pierre Blanchard and John Jeffries were the first people to cross the English Channel in a balloon on January 7, 1785. The flight took about 2.5 hours and began in Dover, England and ended in Guines, France.

How did the flight happen?

- **The two men prepared for the flight after a week of planning.**
- **They flew a kite and a small balloon before launching.**
- **They threw ballast, food, and equipment overboard to keep the balloon airborne.**
- **They landed safely in France.**

Another Story: People knew at that time that if they let a balloon loose, it would go up and move around, but they did not understand wind currents. So, they

equated the air currents to the current in a river. If they threw a stick in the water. the current would move the stick. So, they built a gondola in the shape of a boat. added ores and a rudder and thought they would be able to row through the sky. (Not the way works.)
The upside to this theory, they were trying to cross the English Channel and thought the worst that could happen is they would land in water and row across the channel.

Because there was no safe way to carry fire onboard a hot air balloon, gas balloons became a "Rage" in Europe. Hot Air Ballooning became popular in the early 1970s.

6) Félix Nadar

In 1858, Nadae became the first person to take aerial photographs. This was done using the wet plate collodion process, and since the plates had to be prepared and developed (a process that required a chemically neutral setting) while the basket was aloft, Nadar experienced imaging problems as gas escaped from his balloons. After Nadar invented a gas-proof cotton cover and draped it over his balloon baskets, he was able to capture stable images. He also pioneered the use of artificial lighting in photography, working in the catacombs of Paris. He was thus the first person to photograph from the air with his balloons, as well as the first to photograph underground, in the Catacombs of Paris.

Note: Offer to take pictures of the people on the tour.

7)Ed Yost

Forever Pushing the Envelope

Paul Edward (Ed) Yost {June 30, 1919- May 27, 2007) was the American inventor of the modem hot air balloon and is referred to as the "Father of the Modem Day Hot-Air Balloon.

In the 1950s, Yost's own interests turned toward reviving the lost practice of manned hot-air ballooning. This technology had first been invented in France in the late 18th century by pioneers led by the Montgolfier brothers, but under the Montgolfier system, the balloon's air was heated by a ground fire prior to the balloon being released. The inherent danger of this type of balloon flight led to the system being abandoned when hydrogen and later helium became available.

One of Yost's key engineering insights was that a hot-air balloon could be made to carry its own fuel. The invention of light burners fueled by bottled propane made it possible for the balloonist to reheat the air inside the balloon for a longer flight. Yost's invention improved modern hot-air balloons into semi-maneuverable aircraft. Yost patented further refinements he made to the hot-air balloon, including nonporous synthetic fabrics, maneuvering vents, and deflation systems for landing. Yost also designed the distinctive "teardrop" shape of the hot air balloon envelope itself. **Oct 22, 1960**

8) What Makes a Hot Air Ballon Fly

Hot air balloons fly because hot air rises, which creates a lift. This is based on the scientific principle of buoyancy.

Modern hot air balloons use propane in the burner to heat the air. The propane is stored in cylinders which are kept in the balloon basket, along with the passengers and the pilot. The propane is highly compressed in canisters and flows to the burner in liquid form. When the pilot starts the burner up, the propane flows to it and is ignited by a pilot light. As the flame burns, it heats up the metal in the surrounding tubing and when the tubing becomes hot it heats the propane flowing through it. This process changes the propane from a liquid to a gas before it is ignited. Gas makes for a more powerful flame and an overall more efficient fuel consumption.

Note: Yost, along with Don Piccard, crossed the English Channel in a hot air balloon 1963.

How it works

- **A burner heats the air inside the balloon.**
  - **The heated air molecules spread out, making the air less dense.**
  - **The less dense hot air rises, pushing the balloon up with it.**
- **Adjusting altitude**
  - **The pilot can control the altitude of the balloon by adjusting the temperature of the air inside. To go up, the pilot heats the air, and to go down, the pilot cools the air.**
- **Steering**

- **The balloon travels with the wind, but the pilot can use the changing air currents to steer the balloon. The pilot can also use turning vents to rotate the balloon.**

- **The volume of a hot air balloon depends on its shape and dimensions. A typical hot air balloon has an envelope size of about 90,000 cubic feet and 60 ft high which can carry 2 to 3 people. Most Tear drop balloons are 60 - 80 ft high, RC balloons are 20 ft high.**

- **Types of Burner Functions**

Pilot Light

Integrated into every burner is a reliable pilot light with built-in ignition. Purpose-designed to be reliable with low maintenance.

Main Burner

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Whisper Burner

The whisper burner, standard on all burners, is great for showing off a balloon on night (Balloon Glow) tethers. But more importantly, this powerful auxiliary burner (80% as powerful as the main burner) is a quiet way to float by people and livestock without disturbing them. Think of this as your Good Neighbor valve.

Who Makes Hot Air Balloons

Cameron Balloons - Cameron Balloons U.S. is a wholly American-owned manufacturer of hot air balloons, based in Ann Arbor, Michigan.

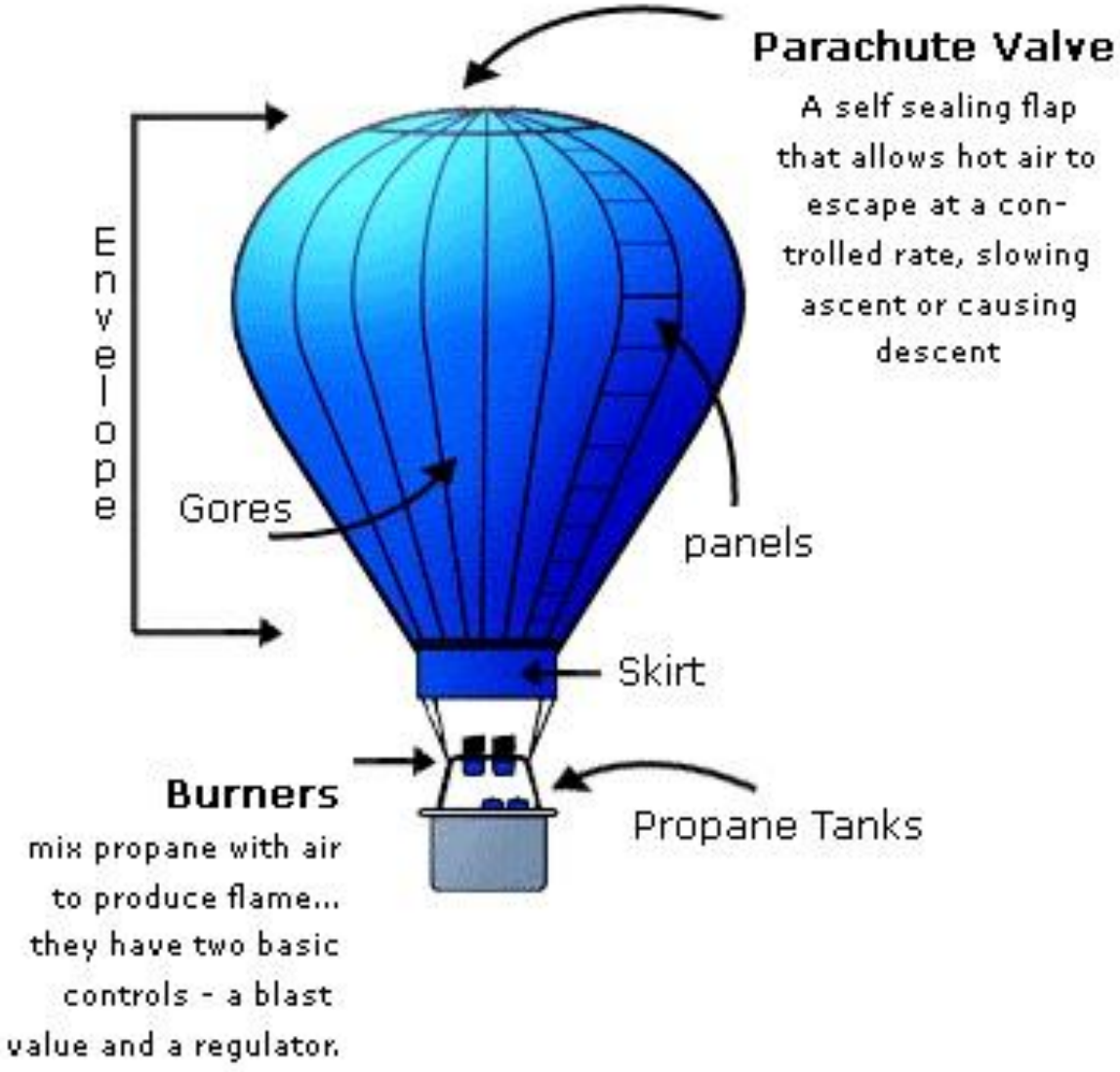
Lindstrand Balloons - Lindstrand Balloons US hot air balloon manufacturer for sport, commercial and ride operations. Their balloon factory is in Galena, Illinois.

Kubicek Balloons - Czech manufacturer of hot-air balloons.

UltraMagic Balloons - Spanish builder of hot air balloons and special shapes. Have U.S. type certification and importer.

Firefly Balloons - Firefly Balloons manufactures hot air balloons for sport and competition, passenger rides, and marketing programs. Factory in Statesville, North Carolina.

Head Balloons - Head Balloons builds custom, hand-crafted, FAA approved hot air balloons. Each balloon is individually custom made to your design.



Instruments used on Hot Air Balloons

- ***Altitude - altimeter***
- ***Outside air temperature***
- ***Envelope temperature***
- ***Rate of ascent/climb - variometer***
- ***Balloon radio – Air Traffic/Chase Crew***
- ***I-pad/phone - display tracking***

9) Gas Balloons

Notes:

Pure Gas balloons are currently using hydrogen because of the cost and the lack of availability of helium.

European gas balloons have mostly been hydrogen for as long as I can remember.

It was just us Americans that flew with helium until the price got too high.

But right now, the price for hydrogen has also gotten very high and so very little gas ballooning is happening here in the states.

Rozière balloons must use helium, or they could go boom.

There are two types of gas balloons: traditional, or "straight gas," and Rozière. They are so different that each has its own separate category for claiming records. Within these categories, gas balloons are further distinguished by the size of the balloon.

Balloons that have flown around the world (the Breitling Orbiter 3 and Spirit of Freedom) are not traditional "gas" balloons, but instead, "Rozière" balloons that use both helium and hot air. At night when helium cools and a Rozière balloon begins to descend, propane burners are used to warm the envelope gas and keep the balloon aloft. A large supply of propane Is required to extend the range to global distances.

Traditional "straight" gas balloons like the "Double Eagle II - Atlantic; Double V - Pacific) and "Two

Eagles" use only helium or hydrogen for lift: there are no burners. At night, and other times, the pilot can drop sand (carried in bags) or water "ballast" overboard to maintain altitude or to climb. About 10% of the balloon system's weight might be dropped each night to maintain altitude.

In the daytime, both gas and Rozière systems are warmed by the sun and begin to climb as the gas expands. Some of the expanding gas must be released through a valve at the top of the system to keep it from going too high. Going too high will cause an excessive amount of gas to vent out of the envelope and will decrease the number of days the balloon can stay aloft.

The art and science of straight gas ballooning require a delicate balance of ballasting and valving to maneuver the balloon into the best winds to navigate to the desired destination.

Unlike the propane-fueled hybrid balloons called "Rozière" that circled the earth in recent years. traditional "straight gas" balloons are the stuff of legend.

As featured in Michael Todd's film Around the World in 80 Days, old-fashioned "gas" balloons, filled only with gas and without the benefit of burners, pit man against the elements at a very basic level, with just bags of sand and a healthy dash of boldness as the "fuel."

Gas balloons are not cheap. Depending on the manufacturer and the size, new gas balloon systems can cost in the upper five figures. A hydrogen "fill" in the U.S. for a balloon the size of those flown in the America's Challenge can cost about $1,200 for a single (albeit multi-day flight in parts of Europe the cost for hydrogen is much less. Then there is the

associated equipment, a chase vehicle, and expenses for pilots and chase crew.

Each balloon has a crew of two, a pilot and a co-pilot. Although the titles might suggest otherwise, in practice on most teams the pilots fully share the responsibilities of the flight and are often equally skilled.

Space pilots and balloon pilots travel at vastly different speeds, but both will tell you the same thing: the most frequently asked question is "how do you go to the bathroom up there?" Resisting the temptation to say, "the same way you do down here," the teams tell us they carry a bucket or other porta-potty type conveyance to facilitate their daily business - and they. try to keep that business to a minimum.

10) Long Distance Races

American Challenge & Gorden Bennett Gas balloon races. The winner is determined by who flew the longest distance. No prize, except for a trophy and bragging rights. (in both the American Challenge & Gorden Bennett Races).

American Challenge - sponsored by the balloon fiesta association, held yearly during and at the Albuquerque Balloon fiesta.

The America's Challenge is one of two distance races for gas balloons in the world. The other is the Coupe Aéronautique Gordon Bennett, the world's oldest air race, founded in 1906. The America's Challenge was founded by the Albuquerque International Balloon Fiesta in 1995 to provide a consistent American venue for gas ballooning. The results of the America's Challenge event are used as a qualifier for US teams to enter the Gordon Bennett.

The duration record for the America's Challenge of 70 hours 51 minutes was set in 2011 by David Hempieman-Adams of Great Britain and Jon Mason of Australia (mixed nationality teams are allowed in the America's Challenge). Fights of 60 hours are not unusual. However, the world duration record for 1,000 cubic meter balloons is an astounding 92 hours, set by Germany's Wilhelm Eimers (a frequent America's Challenge competitor) in the 1995 Coupe Gordon Bennett.

Gorden Bennett gas balloon race, (Gorden Bennett is an international balloon race which is hosted by the winning country - 2years ago. Albuquerque last hosted the Gorden Bennett race in 2023. The US DID

NOT. win the Gorden Bennett race in 2021, Switzerland did, but Switzerland declined to host the event in 2023, (Switzerland hosted in 2022}), so the US was able to host the event. Germany hosted the Gorden Bennett race in 2024.

11) Hall of Fame Ballooning

- **Zanussi**
  - **Original**
  - **Pure Gas Balloon**
  - **Atlantic Crossing**

In 1978 the attempt to make the Atlantic crossing by balloon ended when bad weather and a tear in the envelope, forced the helium balloon down after a 2,000-mile flight from Canada. The balloon landed in Newfoundland. The Zanussi traveled 2074 miles in 76.4 hours.

- **Double Eagle II**
  - **Replica**
  - **Pure Gas balloon**
  - **Atlantic Crossing**

The Original housed at the Smithsonian), piloted by Ben Abruzzo, Maxie Anderson and Larry Newman, became the first balloon to cross the Atlantic Ocean when it landed on August 17th in Miserey near Paris, 137 hours and 6 minutes after leaving Presque Isle, Maine.

The 3,100-mile flight from Presque Isle, Maine. Lift-off was at 8:42 p m on August 11. Their helium-filled balloon, the Double Eagle II, was 112 feet high, 65 feet in diameter, and had a capacity of 160,000 cubic feet. Abruzzo, Anderson, and Newman rode in a 15 x 7 x 4 1/2-foot gondola named The Spirit of Albuquerque, equipped with a twin-hulled catamaran that would float in case of an emergency water landing.

It can be regarded as a successful crossing at the point that the Double Eagle II crossed the Irish coast, on the evening of 16 August, an event that Shannon Airport notified the crew about when it happened. Newman originally intended to hag glide from the balloon to a landing, while Anderson and Abruzzo continued to fly, but the hang-glider had to be dropped as ballast earlier on 16 August. 'While flying over Franc, they heard by radio that authorities had closed Le Bourget Airfield, where Charles Lindbergh had landed. for them. The crew declined the offer. They were running out of ballast, and it would be too risky (to themselves and anyone below) to pass over the suburbs of Paris. They landed in a field of barley, owned by Roger and Rachel Coquerel, in Misery, 60 mi (97 k) northwest of Paris. Television images showed a highway nearby, its shoulders and outer lanes crowded with stopped cars, people sweeping across the farm field to the landing spot. The gondola was protected, but most of the envelope, logs and charts were stolen by souvenir hunters.

- **Double Eagle V**
    - **Original**
    - **Pure Gas balloon**
    - **Pacific Crossing**

The first balloon to make a successful crossing of the Pacific Ocean. It launched from Nagashima, Japan on November 10, 1981, and land in Mendocino National Forest in California 84 hours and 31 minutes later, traveling a record 5,768 miles. The helium-filled Double Eagle V spent four days crossing the Pacific before the balloon, weighed down by ice and buffeted by a storm, crash-landed in northern California, ending the 6,000-mile flight. No one was hurt.

- **Two Eagles**
  - **Original**
  - **Pure Gas balloon**
  - **Pacific Crossing**

The Two Eagles Balloon is a custom balloon designed to break world records. A January 2015 launch from Japan toward North America has officially broken two world records as validated by the Fédération Aéronautique Internationale.

The balloon was developed by a crew which included members of Steve Fossett's Spirit of Freedom balloon crew. The balloon was initially developed for a 2005 and later 2008 flight attempt by Troy Bradley using the name Celestial Eagle with a crew including Tim Cole, Bert Padelt and John Kugler. The launch 2008 attempt from Japan was canceled due to weather that would have placed the balloon in storms off California and jet streams which may have altered path to Alaska.

The 100 kg Kevlar-Carbon fiber capsule was built by Composite Tooling in Albuquerque, New Mexico. The 7ftx5ft capsule carries 10,000 lb. in ballast. The gondola is outfitted with a wide-angle GoPro camera.

The unpressurized cockpit requires pilots to use supplemental oxygen above 12,000 ft altitude. The insulated gondola temperature is expected to have an operating temperature of 50 degrees F. Members of the Cognitive Engineering Research Institute in Mesa,

Arizona, will study fatigue effects during the record-attempting flight.

To slow down landing, ropes will be dropped into the ocean to create drag prior to a planned landing on a sand dune. Lower sections of the gondola can be flooded with water for stability in a water landing.

January 25, 2015 - Pilots Troy Bradley of the United States and Leonid Tiukhtyaev of Russia launch from Saga Prefecture, Japan on a record setting attempt. The initial planned route sets a landing spot in Canada. The Anderson-Abruzzo Albuquerque International Balloon Museum is used as mission control for the attempt.

January 2015 - The Two Eagles Balloon broke the unofficial world record for distance traveled in a gas balloon, exceeding 5,260 miles set by the Double Eagle V. 29 January 2015 - The planned landing location shifts to Baja, Mexico.

January 30, 2015 - The unofficial record for time aloft in a gas balloon of 137 hours, 5 minutes and 50 seconds set in 1978 by the Double Eagle II is exceeded by the Two Eagles Balloon team. The Two Eagles crew landed the balloon in the ocean four miles off the Baja coast on 31 January 2015.

The time aloft was six days, 160 hours and 37 minutes with 6,656 miles traveled. July 15, 2015 - FAI ratifies record attempts. Official time aloft is 160 h 34 min, distance is 10,711.6 km.

- **Breitling Orbiter 3**
    - **Replica**
    - **Rozière**

The first balloon to fly around the world 11011-srop, piloted by Bertrand Piccard and Brian Jones. Designed and built by Cameron Balloons, of Bristol England, Breitling Orbiter 3 stood 180 ft (55 m) tall when inflated completely. The propane gas that fueled its six burners weas contained in 28 titanium cylinders mounted in two rows along the sides of the gondola. Concerned about fuel consumption. The team added four additional propane containers prior to launch, these additions proved necessary to complete the trip. The Breitling Orbiter 3 held the record for the longest distance un-refueled flight (25,360 mi (40,813 1a)) of any aircraft in aviation history until the 2006 flight of
The Virgin Atlantic G1obalFler(25,766 miles) It still holds the record for the longest duration un-refueled flight (19 days, 21 hours and 47 minutes

Note: Before the successful transatlantic balloon flight of Double Eagle II in 1978, there were 17 unsuccessful attempts to cross the Atlantic Ocean in a balloon, resulting in the deaths of at least seven balloonists.

- **JULES VERNE/KITTY HAWK**
  - **Original**
  - **Pure Gas balloon**
  - **First known as the Kitty Hawk**

KITTY HAWK - San Francisco, California, to Ste. Felicite, Quebec, Canada. May 8-12, 1980, 3,313 miles, 100 hours. New distance record and first successful crossing of North American Continent.

As the Kitty Hawk:

In 1980, the Kitty Hawk, a balloon piloted by Maxie Anderson and his son Kris completed the first nonstop transcontinental balloon crossing of North America.

The 11-story-high helium balloon was launched from Fort Baker, an Army base near San Francisco, California and traveled 2,828 miles nonstop in 99 hours and 54 minutes it landed in Grosse Roches, Quebec, near the mouth of the St. Lawrence River.

Originally, the balloon was supposed to land nearly 1,100 miles south of the Quebec meadow in Kitty Hawk, North Carolina. The journey included the forced climb over a thunderstorm in Wyoming, a sprint from South Dakota to Maine and counted in the end with the help of a Canadian military helicopter that was called in to create enough wind for the Kitty Hawk to clear the trees on which the 100-foot long drag ropes got entangled at the landing site.

As the Jules Verne
With Don Ida, Maxie Anderson launched the balloon Jules Verne from Luxor, Egypt on January 11, 1981, traveling 4,316 kilometers (2,682 mi), and landing in Hansa, India 48 hours later.

Luxor, Egypt, to Hansi, India. February 12-14, 1981, 2,829 miles, 48 hours. First around the world attempt forced down because of a leaky valve.

Rapid City, South Dakota to Midland, Ontario, Canada. November 7-8, 1982, 1,162 miles, 16 hours. Forced down because of leaks.

- **Silver Fox**
  - **Original**
  - **Pure Gas balloon**

The Silver Fox gas balloon was designed and built by Ed Yost in 1976. Yost Attempted a solo crossing of the Atlantic Ocean in the balloon setting 13 aviation records for distance traveled and time aloft. He flew for 107 hours and 37 minutes, covering 2,740 miles before crashing into the sea 200 miles east of the Azores. (1,100 miles short of his goal).

12) Museum's Name

The Museum is named after Ben Abruso and Maxie Anderson

Ben Abruzzo

Successful businessman, co-builder of the Sandia Peak Tramway, and an early member of the Albuquerque ballooning community, Ben Abruzzo was a competitor who pushed the limits of balloon flight. He began flying balloons in the early 1970s and flew in the Balloon Fiesta through most of its first decade. But Ben is best known for his record setting, pioneering crossings of the Atlantic and Pacific Oceans. The historic *Double Eagle II* crossing of the Atlantic, with co-pilots Maxie Anderson and Larry Newman, focused worldwide attention on Albuquerque resulting in increased interest in ballooning as sport. In 1981, Ben, with teammates Larry Newman, Ron Clark, and Rocky Aoki, made the first successful balloon flight across the Pacific in *Double Eagle V*. In 1979, with Maxie Anderson, Ben won the first long-distance gas balloon race (the "Friends of Gordon Bennett") held in North America since World War II. His honors include the Diplome Montgolfier, ballooning's most prestigious recognition, along with a slew of world records and a host of other aviation awards. Ben died in an aircraft accident in 1985.

Maxie Anderson

In 1971, Sid Cutter joined with eight friends to form Albuquerque's first balloon club, the Albuquerque Aerostat Ascension Association (AAAA), today py is the world's largest local balloon organization). One of those friends was Maxie Anderson, a real estate developer and president of a mining company. Maxie soon co-owned his first balloon with Ben Abruzzo, but

both men were by nature adventurers, always looking for the next challenge. In 1977, inspired by Ed Yost's attempt to fly across the Atlantic, Maxie and Ben took up the challenge. Their first try ended in disaster – they were lucky to survive – but their 1978 Atlantic crossing, with Larry Newman as a third crew member, made history. Eighteen months later, Maxie and his son Kris completed the first successful non-stop balloon crossing of North America. Maxie then became the first balloonist to seriously pursue flying around the world by balloon, in the process becoming the first (with co-pilot Don Ida) to successfully cross the Indian Ocean by balloon. Maxie and Don were killed in a gas balloon accident in Europe in 1983 while flying in as non-competitors in the Coupe Gordon Bennett.

Abruzzo also owned the Sandia Tram, which were very instrumental in starting Recreational Hot Air Ballooning in Albuquerque (and helped expand it internationally. Their families started the museum you are standing in in their memory. The city of Albuquerque finished the museum project and now runs the museum.

13) Additional Tour stations

A) Balloons in War

Fu-Go (wind ships)

- **Japan attacked mainland US during WW2. Bombs were found as far east as Michigan. (See display map), Bombs were delivered by balloon and landed when the hydrogen gas balloon lost its lift.**

- **On November 3, 1944, Japan released fusen bakudan, or balloon bombs, into the Pacific jet stream. A typical balloon was equipped with five bombs. including a 33- pound antipersonnel device and 4 incendiary bombs. The balloon bombs were intended to cause damage and spread panic in the continental United States. The balloons would claim six American fives on May 5, 1945, but they were widely considered a military failure.**
- **On Saturday, May 5, 1945, three days before the end of World War II in Europe and just three months before the Japanese surrendered, spinning shards of metal ripped into the tall pine trees, burrowing holes into bark and tearing needles from branches outside the tiny logging community of Bly. Oregon. The nerve-shattering echo of an exploding bomb rolled across the mountain landscape. When it. was over, a lone figure- Archie Mitchell, a young clergyman-stood over six bodies, minister's pregnant wife and 5 children barely into their teens, who were out for a picnic.**
- **The Japanese set a production goal of 10.000 balloons. Due to wartime shortages, only 300**

balloons of rubberized silk were crafted; the rest were made of paper. School children were drafted to paste together balloons in seven factories around Tokyo. When pumped full of hydrogen, the spheres grew to 33 feet in diameter. Each balloon was wrapped in a cloth band from which hung a set of 50-foot shroud lines to carry its ordnance and instruments. To launch the weapons in masse. the Japanese selected three sites on the island of Honshu. Each launch procedure required 30 personnel, and it took half an hour to complete. With good weather, several hundred balloons could be launched each day.

- Japan halted the operation in April 1945
- Even today, unrecovered balloon bombs are thought to dot the North American landscape. The bombs are slowly disintegrating with time but are still potentially lethal. To date, approximately three hundred of these aged weapons have been found. As late as 1992, a balloon bomb was recovered in Jackson County, Oregon, about one hundred miles west of Bly, Oregon.
- Japan did not have the materials to make a gas balloon envelope, so they had schoolgirls make the bailee with mulberry paper and potato starch paste.
- Point out a map where these balloons have been found.

B) Balloon Fiesta

- **1000 balloons in the year 2000**
- **Regular and Special shapes**
- **Launch Officials (Zebras)**
- **Launch in rows depending on wind direction**

C) The GeoDome Portal

- **With WorldViewer as the content engine, this portal showcases footage of the Albuquerque International Balloon Fiesta**
  - **allowing visitors to experience the world's largest hot air ballooning event.**
  - **This customized version of the GeoDome Portal, the screen is scaled up to 4m in diameter.**
  - **A platform base houses the OmniFocus 300 series projection system, with 4K resolution and a brightness upgrade to 9,000 lumens.**
  - **The folded lens design lets customers orient the projector horizontally.**
  - **With the lens placed behind the base of the touchscreen kiosk, the installation technology "disappears", and visitors are immersed in the content.**

D) Joseph William Kittinger

In 1955, Dr. Stapp recruited Kittinger as a test pilot for Project Man-high, which used balloons capable of high-altitude flight and a pressurized gondola (the capsule suspended from the balloon) to study cosmic rays and to determine if humans were physically and psychologically capable of extended travel at space-like altitudes. The Air Force felt that a high-altitude balloon flight was the best way to conduct these studies since aircraft could only remain at the edge of the atmosphere for periods of time that were too short to provide useful data. Using a two-million cubic-foot about the same as the Goodyear blimp, (202,000 and 297,500 cu ft} 172-f00t diameter balloon and a cramped aluminum alloy capsule manufactured by Winzen Research of Minneapolis, Minnesota, Kittinger made the first Man-high ascent on June 2, 1957 in South Saint Paol, Minnesota. He remained aloft for almost seven hours as the balloon climbed to 96,000 feet. Data from his flight and two later Man-high flights were used in NASA's Project Mercury.

He held the world record for the highest skydive 102,800 feet (31.3 km} from 1960 until 2012. He passed out during the freefall and only regained consciousness when his third parachute automatically deployed.

In 1984, Colonel Joseph Kittinger became the first person to successfully cross the Atlantic Ocean solo in a gas balloon, flying from Caribou, Maine to Montenotte, Italy,

covering a distance of 3,543 miles in 86 hours, marking a significant achievement in ballooning history; this feat was accomplished in a balloon named "Rosie O'Grady".
Key points about Kittinger's Atlantic balloon crossing:

- **First solo crossing: Kittinger was the first person to fly solo across the Atlantic in a balloon.**
- **Balloon name: The balloon he used was called "Rosie O'Grady".**
- **Distance and duration: The flight covered 3,543 miles in 86 hours.**
- **He launched from Caribou, Maine, and landed in Montenotte, Italy.**

E) The Weather Lab

The Weather Lab explores the relationship between weather and people.

- **The exhibit includes weather pods, artifacts, and interactive touch screens.**
- **In the weather lab can be found:**
  - **Precipitation Pod: Learn about rain, hail, snow, sleet, and freezing rain.**
  - **Sun Pod: Learn about the sun.**
  - **Wind Pod: Learn about the wind.**
  - **Clouds Pod: Learn about clouds.**
  - **Storms: Learn about storms**
  - **Space weather: Learn about space weather.**
  - **Seasons: Learn about seasons**
  - **Climate: Learn about climate**
  - **Satellites: Learn about satellites**

- **The Albuquerque Box**

Show how the box works and that it is unique. That is why Albuquerque has become the INTERNATIONAL BALLOONING CAPITAL OF THE WORLD.

F) Artic Air Exhibit

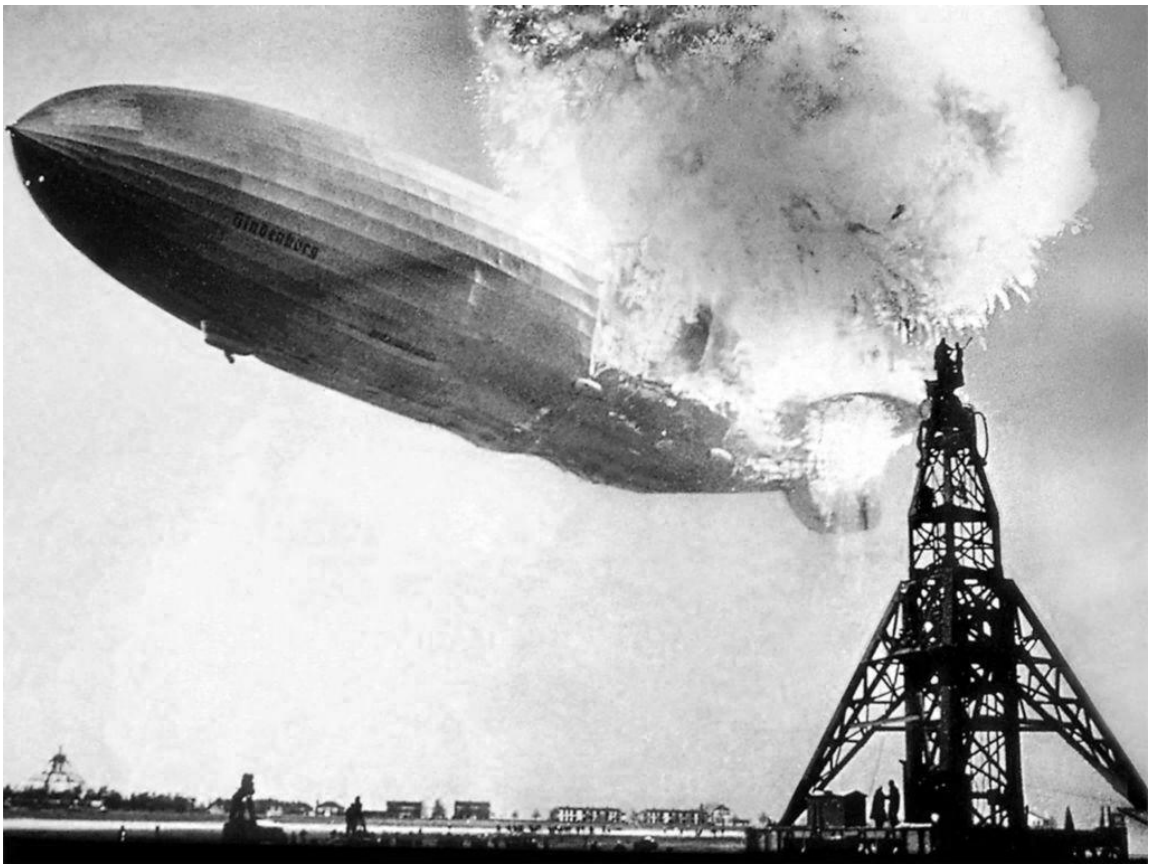
- **When the bold flight of S.A. Andrée began on July 11, 1897, no one had yet reached the North Pole.**
- **There had been other attempts, all unsuccessful, but this expedition intended to fly there by balloon from Danes Island, an icy outpost at the top of the world.**
- **His balloon, which was named Örnen (Eagle), and the expedition was well equipped and supported by technology that was innovative or state-of-the-art for the time.**
- **Andrée had also designed, tested, and installed a combination of balloon steering systems – sails and guide ropes – that were intended to influence their direction and altitude.**

G) Focusing Beyond Ballooning

Various pictures of the men and women of ballooning in the Albuquerque Area.

H) Dirigibles

The Hindenburg was actually designed to use helium but the gas, mostly supplied by the US, had been placed on an embargo in 1936 (US Helium Embargo and the Hindenburg - HOI - Historical Events). Although Germany may have been able to obtain the gas through wavier, the cost of 200k cubic meters would have been prohibitively expensive. Hydrogen gas was very simple to manufacture and had the benefit of more lifting power per volume of gas.
The obvious problem comes into play with safety: think a hydrogen party balloon and candles on a birthday cake…



H) Federation Aéronautique Internationale Ballooning Commission International Hall of Fame

The World Air Sports Federation's International Ballooning Commission, or Comité International d'Aérostation, founded the Hall of Fame in 1994 to honor those who have made significant contributions to ballooning and airships, including those who have excelled in business, history, design, engineering, competitions, and record-setting. The Balloon Museum has been home to the International Ballooning Hall of Fame since 2011.

The Balloonist's Pray

The winds have welcomed you with softness.
The sun has blessed you with its warm hands.
You have flown so high and so well, that God has joined you in laughter,
and set you gently back again into the loving arms of Mother Earth.
Amen…