

WHERE
Dreams
TAKE FLIGHT



Setting New Gas Balloon Distance and Duration Records

BY DICK BROWN FOR THE AIBF HERITAGE COMMITTEE

On January 31, 2015, Albuquerque balloon pilot Troy Bradley and Moscow balloon pilot Leonid Tiukhtyaev flew their Two Eagles gas balloon from Saga, Japan to a watery landing four miles off the coast of Baja California, Mexico, setting new national and world gas balloon records for duration — six days, 16 hours and 34 minutes — and distance — 6,656 miles.

For months and months, Troy and Leonid had been planning to launch from Japan in a helium balloon named in honor of the two historic Double Eagle balloons, the transatlantic Double Eagle II and the transpacific Double Eagle V.

TWO-PART GOAL: While many of today's long-distance and globe-circling flights have used a Rozière hybrid system of helium and hot



Troy Bradley and Leonid Tiukhtyaev in Two Eagles capsule. (Photo by Tami Bradley)

air, the goal for the Two Eagles aeronauts was to use a traditional gas balloon to set absolute records for duration and distance. Simply stated, the pilots planned to break the 1978 Double Eagle II duration record of five days, 17 hours and six minutes — a record set by Albuquerque

balloonists Ben Abruzzo, Maxie Anderson and Larry Newman. That record had stood for 37 years as the longest duration manned gas balloon flight. Secondly, the pilots planned to break the 1981 Double Eagle V distance record of 5,208 miles, set by Ben Abruzzo, Rocky Aoki, Ron Clark and Larry Newman.

MISSION CONTROL: The City's Anderson-Abruzzo Albuquerque International Balloon Museum, location of the original Double Eagle V and replica Double Eagle II gondolas, served as the 24-hour project Command Center. With satellite communications, state-of-the-art electronics and big screen monitors, the center also served as a living Mission Control exhibit where museum visitors during normal hours could observe in real-time the progress of the historic flight. Albuquerque Mayor Richard Berry recognized the excellent opportunity



offered by the museum to showcase a long-distance gas balloon flight. Accordingly, museum admission was free for the duration of the Two Eagles flight.

THE PILOTS: A transpacific flight had long been a dream of Troy Bradley. Adding Leonid as a second pilot moved the dream to reality. Troy explains, "It was my hope that through a joint venture we could work together as a team of citizens of two nations that shared their talents to insure success."

Leonid Tiukhtyaev is a highly accomplished hot air and gas balloon pilot. Flying since 1996, he is the only lighter-than-air pilot in the world to have flown hot air, gas, and Rozière balloons and airships. He is the President of the Balloon Federation of Russia, and has participated in many long-distance gas balloon races in the United States and Europe.

Troy Bradley, who regularly flies hot air balloons in his hometown of Albuquerque, also has an impressive resume. He holds a multitude of ballooning records in various classes and categories — 58 at last count. In fact, with more than 6,400 hours aloft, he is the first person in history to set records in gas, hot air and Rozière hybrid balloons. His many awards include two Montgolfier Diplomes, the Fédération Aéronautique Internationale's highest honor for exceptional achievement in sport ballooning. It is the FAI that ratifies all aviation records, including distance, duration and altitude records in ballooning.

THE SCOOP ON GAS BALLOONS: A lighter-than-air gas such as helium or hydrogen provides the lift for a gas balloon. Two Eagles used helium as the lifting gas and carried sand as ballast. Both are expendable so the trick is to make them last as long as possible — as in all the way across the Pacific.

The combination of helium and sand ballast could be considered fuel to be used along an aerial highway with no refueling stations. The balloon loses gas in the course of the flight as the sun heats the envelope and the gas



THE TWO EAGLES
BALLOON HAD A
VOLUME OF 350,000
CUBIC FEET, THREE
OR FOUR TIMES
THE AVERAGE HOT
AIR BALLOON, AND
CARRIED NEARLY FIVE
TONS OF BALLAST
IN 40-POUND
COLOR-CODED
SANDBAGS THAT
HUNG OUTBOARD
OF THE CAPSULE OR
GONDOLA.

expands. To prevent over-pressuring, gas bleeds through the balloon's filler tubes and an open appendix at the bottom of the envelope. But there is one advantage to solar heating — the pilots get a "free ride" to a higher altitude without having to expend precious ballast. The balloon also loses gas when the pilots valve off gas to adjust altitude. To go down, the pilots release gas by opening a valve at the top of the balloon; to go up, they jettison ballast. Loss of gas and ballast impacts flight duration and, therefore distance. As in hot air balloons, wind direction and speed varies with altitude, and so the pilots "maneuver" to find winds that take them where they want to go.

THE BALLOON: The Two Eagles balloon had a volume of 350,000 cubic feet, three or four times the average hot air balloon, and carried nearly five tons of ballast in 40-pound color-coded sandbags that hung outboard of the capsule or gondola. The capsule measured seven feet long, four and a half feet wide and five feet high, and had a bubble hatch that could be opened so that the six-foot pilots could stretch their legs. The capsule was constructed of a carbon-fiber composite and was not pressurized.

WEATHER WINDOW: The two aeronauts know that flying a traditional gas balloon across the Pacific is far more complicated than flying a hot air balloon from Balloon Fiesta Park. The key is having a top-notch meteorologist on the team. For this flight, it was Luc Trullemans, one of the world's premier meteorologists for aviation distance and duration record attempts. Along with Dr. Steve Shope, Mission Control Director and Tim Cole, Flight Director, the pilots had direct access to experts in selecting the ideal weather window that would propel the balloon from Asia to North America.

But it is not quite that simple. The challenge is to find the right conditions for all phases of the flight. This means near-calm winds for inflation and launch and light winds for landing safely. On the contrary, at altitude, high speed winds are a must



Inspecting the balloon rigging. (Photo courtesy of Two Eagles Team)

for a Pacific transit of five to seven days. Such a window occurs between frontal systems associated with low pressure systems moving under the jetstream. Often there is a waiting game at the launch site, in this case, the City of Saga, north of Nagasaki in southern Japan, and 600 miles south of Vladivostok, Russia. Incidentally, the Saga International Balloon Fiesta organization will be hosting the 22nd World Hot Air Balloon Championships in 2016.

THE WAITING GAME: In early January, favorable weather was forecast over the North Pacific and it seemed like all systems were go. The launch team would have about 24 hours notice in which to fill the balloon, rig the ballast, check all electronic tracking and communication systems, and load 10 days of provisions before the pilots could begin their transpacific flight. As the weather continued to look good, the ground support team began staging equipment at the launch site and the flight support team prepared to man Mission

Control. The balloon was laid out for inflation. It looked like conditions were such that the balloon's track would first be over Japan, giving the pilots time to check the balloon's performance before venturing out over water. The predicted trajectory would pass north of the Hawaiian Islands about three days into the flight, with landfall in North America two or three days later. But conditions changed and a temporary delay turned into a stand-down when wind speeds dropped. While weather conditions were ideal in the transit from Japan to Hawaii, the outlook from Hawaii eastward was much more uncertain. The track beyond Hawaii featured slower winds and a northward swing to the Pacific Northwest, with rain possible during the latter stages of the flight. Under those conditions, the trip would take nine to ten days, pushing the balloon to its design limits and leaving no margin for error. Consequently, a weather hold was put in effect as Mission Control continued to study weather models to determine the next opportunity for a launch and a safe flight.

Liftoff: Two Eagles embarks on its historic transpacific flight. (Photo by Al Nels)

DELAYS CONTINUE: By the afternoon of January 12th, Steve Shope reported that he was cautiously optimistic that Two Eagles would be able to lift off within the next 24 hours. But after sudden unexpected changes in the weather, launch plans were again scrubbed. Rain and threatening winds were expected at the launch site so the ground crew packed up the balloon. With clouds hanging over the Japanese and the Pacific Northwest coasts, it was the right call. Such delays are not uncommon when attempting long-distance balloon flights, since the flight trajectory can be affected by weather spanning distances of several thousand miles. Indeed, weather conditions remained unfavorable for another week. The pilots and their launch team remained on station in Japan and a skeleton crew remained on station at Mission Control. By January 21st, a developing weather pattern showed signs of promise for a transpacific flight. Finally, Two Eagles was a "go" for launch on January 24th.

THE LAUNCH: As Troy and Leonid worked in the capsule preparing for launch, live streaming from the launch site became available at the Two Eagles website. After about four hours, the balloon was filled to about 60% of capacity. The liftoff weight would be about 14,000 pounds. Meantime, at a press conference hosted by Albuquerque Mayor Richard Berry, Steve Shope told the media and guests that inflation was complete and the team was going through its final checks prior to launch. After a "textbook" inflation in



the wee hours of January 24th (25th in Japan), the pilots waved goodbye to family and friends and climbed into their capsule. As is tradition, the national anthems of the pilots' home countries, as well as the anthem of the host country, were played as the balloon rose slowly into the night sky to the cheers of spectators and support crew on both sides of the Pacific.

THE FLIGHT OVER JAPAN: The balloon reached an initial altitude of 18,000 feet and a speed of 50 mph. The pilots spent the time over land making sure all systems were operating correctly and that the balloon was ready to head out to sea.

Near sundown, the balloon passed within 20 miles of snow-capped Mt. Fuji. Traveling over 60 mph, the pilots had a great view of Tokyo at night. The balloon crossed over the coastal city of Kashima, northeast of Tokyo, at 21,000 feet about 4:00 am MST or 8:00 pm JST (Japan Standard Time). Albuquerque is 16 hours behind Saga. Troy and Leonid thanked Japan's Civil Aviation Bureau and air traffic controllers for their extraordinary help and cooperation while the balloon traveled through Japanese airspace. They also thanked the dozens of volunteers who helped with the launch and the citizens of Saga for their outstanding hospitality during the weeks of flight preparation. The Two Eagles balloon then swung eastward and began its long voyage to North America.

CAMPING ABOVE THE PACIFIC:

After many intense hours of maneuvering over Japan, the pilots settled into a routine that alternated pilot duties and rest periods. Troy compares the journey to a camping trip in the sky. The capsule was about the size of a medium-sized tent, which left little room to move around. Since they were flying at an altitude of at least 15,000 feet, they stayed on oxygen and bundled up to cope with 50-degree temperatures inside the capsule. They had sleeping bags, a small onboard heater and a simple toilet. As for food, they had freeze-dried meals, fresh fruit, beef jerky



Crossing mountains of Japan; note 12,000-ft. Mt. Fuji in the background. (Photo by Troy Bradley)



The blue Pacific; note red container which holds drinking water. (Photo by Troy Bradley)

and energy bars, along with plenty of water to stay hydrated. They also had a small stove for occasional hot meals. Troy shared photos taken from their capsule via social media. Some showed the sun peeking over the Earth's curvature, others showed spotty clouds over a deep blue ocean two miles below their feet.

THE TRAJECTORY: By sunrise (25th MST, 26th JST), the pilots had been aloft one full day and, having traveled nearly 1,200 miles, were more than a fifth of the way towards their goal. After cruising between 15,000 and 16,000 feet for most of the night,

they increased altitude to above 18,000 feet. By mid-afternoon on the 26th, the balloon had traveled more than 2,500 miles and was still headed due east, averaging 50 mph. Troy radioed Mission Control that they could not report a better flight, adding they were getting plenty of sleep, eating well, drinking fluids and even taking some down time to watch a movie. The balloon passed the 3,600-mile mark during the night. The pilots witnessed another glorious Pacific sunrise from about



A straight-up view of the balloon and rigging while tracking north of Hawaii. (Photo by Troy Bradley)

16,500 feet. They passed about 50 miles north of Midway Atoll at the western extremity of the long chain of Hawaiian Islands. Just where they might make landfall on the mainland was literally “up in the air” because a high-pressure trough had developed off the West Coast and presented the pilots with two trajectory options. They could catch winds to take them south, where they would likely cross Mexico’s Baja peninsula or they could catch winds to take them on a preferred northern route, likely crossing somewhere around the US-Canada border.

PERSONAL BESTS: Troy and Leonid continued to be upbeat about their progress. Troy called it the most comfortable gas balloon flight he had ever made. But more than that, both pilots set new “personal bests” for distance on a gas balloon flight. Leonid’s previous longest flight was 1,552 miles, set in the 17th annual America’s Challenge race in 2012, when he flew with co-pilot Wilhelm Eimers of Germany from Albuquerque to Elkton, Virginia. Troy crossed the Atlantic with the late Richard Abruzzo from Bangor, Maine to Morocco during the Chrysler Transatlantic Challenge in 1992, traveling 3,318 miles in 144 hours. By the evening of the 27th, Two Eagles had flown 4,220 miles. It was also Leonid’s longest flight in terms of duration. His 2012 America’s Challenge flight was 61 hours, and the Two Eagles team had already been aloft for more than 78 hours. With Russian translators in Mission Control, an interview was conducted with Leonid for broadcast in Moscow.

BACK TO THE TRAJECTORY: As night fell northeast of Hawaii, the decision was made to follow a trajectory to the northeast. By mid-afternoon on the 28th, the balloon was 800 miles north-northwest of Honolulu, clipping along about 80 mph at an altitude of 17,300 feet toward a possible landing in

Canada. Mission Control began to visualize crossing British Columbia’s Vancouver Island, continuing inland over the Canadian Rockies and then dropping south into Montana or North Dakota. But then the speed slowed considerably as the balloon picked up calmer winds associated with a high pressure ridge along the West Coast. The team was still more than 45 hours from setting a new world gas balloon duration record. By the evening of the 28th, it was apparent that the balloon was tracking more toward California and approaching the high pressure ridge — a roadblock that would force a change of direction. With a change in altitude on the 29th, the balloon began tracking south towards Baja California.

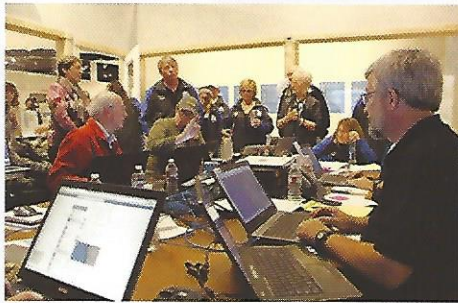
NEW WORLD RECORDS: Before becoming official, distances and times must be ratified first by the National Aeronautic Association (NAA), then by the FAI. At 2:53 pm MST on January 29th, the Two Eagles balloon passed the 5,209-

mile mark on its transpacific journey. This eclipsed the distance flown by Double Eagle V in 1981. Per FAI rules, an established record must be exceeded by at least 1% of the previous distance. At 5:16 pm MST, Two Eagles passed through the 5,260-mile mark, achieving the distance required to establish new absolute gas balloon records. The next morning, January 30th, the balloon beat what many consider to be the “holy grail” of ballooning achievements, the 137-hour duration record set in 1978 by Double Eagle II.

By the morning of the 30th, Two Eagles had been in the air nearly 155 hours and was extending its distance record, having traveled more than 6,500 miles. Meantime, a crew of volunteers and mission members, including Mayor Berry, traveled to the Baja to witness the balloon’s landing and to help with recovery operations.



Saga-Baja transpacific trajectory. White portions of trajectory represent daytime, dark portions represent nighttime. (Graphic by Tim Baggett)



Mission Control during the landing off the Baja coast. Dr. Steve Shope, Mission Control Director, is standing near center. (Photo by Kim Vesely, Mission Control Media Relations)

THE LANDING AND RECOVERY:

While everyone was elated about the record accomplishments, they still remained focused on the most important objective of all — a safe landing. The balloon continued to move south along the coasts of Alta and Baja California. Finally, it was time to land. Winds at the lower levels turned parallel to the coast, which made it more prudent for the

pilots to execute a water landing, acceptable under FAI rules. They made a controlled descent to a gentle landing about four miles off the southern Baja coast near the tiny community of La Poza Grande. The landing occurred at 7:01 am MST on January 31st, 160 hours and 34 minutes into the mission, covering a distance of 6,656 miles (10,711.6 km).

Troy and Leonid's historic flight established new world gas balloon distance and duration records in the AA-13, AA-14 and AA-15 FAI categories. The FAI formally ratified the records on July 15, 2015. Incidentally, at landing, the pilots had only seven bags of ballast left!

With six new world records, Troy increases his tally to 64. He and Leonid were picked up by a fishing boat and taken ashore. They arrived safely in Puerto San Carlos, Mexico, south of La Poza Grande. The entire balloon envelope and capsule were recovered.

CONCLUSION: This successful project would not have been possible without the assistance of incredibly dedicated volunteers in Japan; an international recovery network on standby in USA, Canada and Mexico; air traffic controllers in Japan; local authorities in Mexico; the City of Albuquerque and the Anderson-Abruzzo Albuquerque International Balloon Museum; and the team of professionals in weather forecasting, gas balloon flight operations, science and technology, and media relations at Mission Control.



Retrieving the capsule and envelope after splash-down at sunrise. (Photo by Dave Matthews)

