FLYING THE BAG

BY THOMAS B. HAINES

The collective weirdness of the day's flying experience finally catches up with me when things slow down and, then, quite literally stop. At first I smile and then start to laugh. This is just *too* strange. We're stopped—hovering—at 1,000 feet msl. Just behind us is the Tappan Zee Bridge; ahead, the New York City skyline. Below, the enormous shadow of the Fuji blimp sits motionless on the surface of the Hudson River until a speedboat rips it in two with its wake. People along the shore pause and peer up at us. ■ To an airplane pilot the sensation of being motionless while airborne is quite disconcerting. Sure, helicopters hover, but not without a lot of work on the pilot's part. Once settled into a hover, the blimp may drift a bit, demanding a little correction, but things happen slowly here—sometimes frustratingly so. ■ The day starts with a preflight briefing by Martha King. She and her husband, John, are backup pilots for the blimp. When the blimp is assigned to cover an event for an extended period of time, they will show up and act as relief pilots. This time the blimp will spend some

PHOTOGRAPHY BY MIKE FIZER

Blimp wrestler for a day

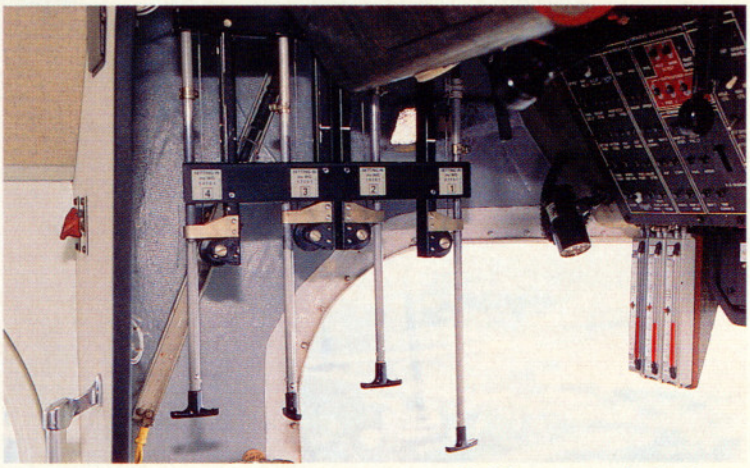
two weeks tracing an oval above the National Tennis Center in Flushing, New York, while providing a platform for television coverage of the U.S. Open. Fuji provides the blimp and video crew to the television networks. In exchange for the unique air-to-ground shots from the blimp, the network agrees to broadcast the occasional shot of the blimp. Fuji also gets to have its green, red, and white ship over downtown New York City day after day, emblazoning its logo onto the minds of millions of commuters who pass below, not to mention the thousands of airline passengers who whiz by the site on short final for La Guardia Airport.

The Kings are holders of every category and class of pilot and flight instructor certificate possible, and owners of King Schools. Through their video ground school courses they have educated an entire generation of pilots. They are consummate instructors, as soon becomes obvious when Martha starts the preflight briefing. By the time she's done, I actually understand how the blimp flies and how you can fill or empty the fore or aft *ballonet* (pronounced "bal-eh-nay") to move the center of buoyancy and thus cause the blimp to climb or descend. There are no conventional trim tabs. They would be useless as the blimp slows to a near stop for landings. Instead, you open or close valves that pump air into or out of the ballonets. (See "How to Fly a Blimp," p 74.)

As I soon discover, though, understanding something and putting the knowledge into practice are two quite different things.

Slow and not so steady

En route from the Westchester County Airport in White Plains, New York, to the tennis club, I stand behind pilot John King and copilot John McHugh and watch in amazement as King first turns the yoke completely to the left and then, as the blimp begins to respond with agonizing slowness, he immediately wracks the yoke completely to the right. The nose starts to bob up; he responds by dramatically forcing the yoke forward to the stop and then quickly yanks it into his lap. "You don't need to go to the gym for an aerobics session after flying this thing all day," he quips over his shoulder as the blimp soldiers on at a mere 35 knots. Redline on the airspeed indicator is 50 kts.



The blimp comes equipped with an IFR Bendix/King panel, including weather radar (top). The four plungers beside the pilot's head (above) control ballonet valves. Gauges over the pilot's head measure envelope pressure in inches of water. The overhead panel includes FAR Part 25-required engine fire annunciators.

Soon it's my turn behind the yoke, and I discover that King isn't hamming it up for the camera. It really is work and it really does take complete flight control deflections to keep this helium-filled beast pointed where you want it to go. Turning the yoke left and right moves the enormous rudder, located 80 or so feet behind the pilot. Fore and aft yoke movement operates the elevators. The control surfaces are fabric covered. All of the control linkages are via cables and pulleys; no sissy hydraulics here.

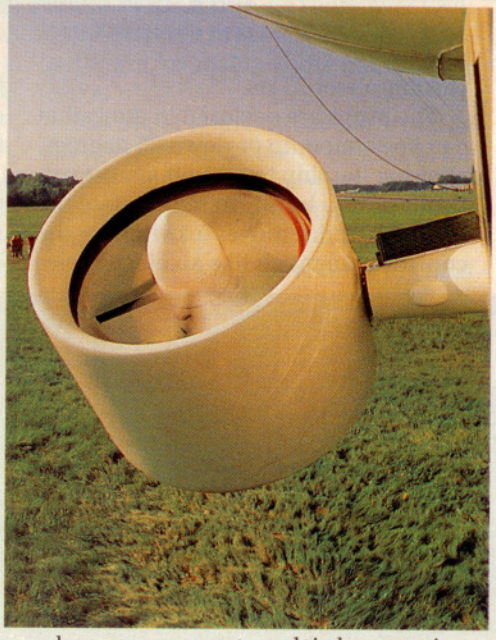
N602SK was built by Airship Industries in 1989. It is a Skyship Model 600, the largest the company ever built before it went out of business in the early 1990s. Seeing the great promotional benefits of the ship, Fuji formed Skyship Management Corporation, which operates N602SK and two other smaller blimps. N602SK is certified to FAR Part 25 standards and requires two pilots.

The pilots sit at the front of a 38-foot gondola that seats eight passengers for promotional flights. When the crew is providing television coverage, the interior is stripped down to seat a maximum of about four, though many missions are conducted with just the two pilots and one cameraman aboard.

The cameraman sits in a passenger seat with a control board in front of him.

Using two joysticks, he can manipulate the video camera that is suspended on a cable through the floor of the gondola. The camera is fitted to a gyrostabilized mount that dampens any vibrations, providing amazingly sharp images.

A flip of a yoke switch causes the ducted props to rotate up or down, allowing the blimp to hover and to take off and land almost vertically.



The cabin seats are right out of the first-class section of an airliner. Likewise, the aft lavatory might be from a Boeing. In a ship with 16 hours' endurance, the lavatory is no luxury. About a third of the ship's 1,800 flight hours a year are spent motoring Fuji dealers and distributors and their guests on VIP flights, so the restroom brings a certain level of civility to the ship for the customers, as well.

A 16-hour endurance may seem excessive, until you consider the 35-knot cruise speed and the crew's preference for landing with a 4-hour reserve. If you need to divert for weather, the 4 hours of gas will get you only about 140 nm, assuming no headwind, and even then you'll have to wait until the ground crew arrives at the alternate, because you can't land a blimp by yourself. The ship is equipped for IFR flight, but the crew doesn't fly much in instrument meteorological conditions. "You can imagine the reaction from a busy tower when we request multiple practice approaches," McHugh says. "We're talking about tying up their approach for an entire afternoon."

Dance of the ballonets

We reach the tennis club and begin circling it while the cameraman starts sending video down to the network via a microwave link. I'm getting the hang of it by now, sensing every movement of the 194-foot blimp. Though it's about two-thirds the length of a football field, it is far more reactive to the wind than any windsock. I can anticipate the necessary control inputs and make them early, before the blimp begins to drift.

Nonetheless, on the northeast side of the tennis center there's a large parking lot that generates lots of thermals—and every time we pass over it, up, up we go. I'm too timid with the four long handles next to my head. If I could only remember which one to pull to vent some air from the rear ballonet, I could shift the center of buoyancy aft and lower the nose. Alternatively, I could pull one of the other valves, pump some more air into the front ballonet, and cause the nose to lower, keeping us at the correct altitude of 1,400 feet. Of course, by the time I've thought this all through, we're beyond the parking lot and the ship has settled down again.

There's more to it than just flying circles over the event, especially when covering a tennis match. Remember where your shadow is, because you don't want it to pass over the courts and distract the players; likewise, manage your power carefully so that the changing engine noise doesn't cause some player to flub a serve.

The power comes from a pair of 255-horsepower turbocharged Porsche 930 engines driving five-blade constant-speed propellers. Power is managed by

Pilots John and Martha King (above) provide relief to the staff pilots during long stopovers. The crew (left) includes pilots, mechanics, and ground handlers. The crew does everything from routine truck and blimp maintenance to constant monitoring of the ship's envelope pressure.

a single-lever control. At a cruise setting of about 25 inches of manifold pressure, the engines turn at 3,200 rpm, but through a reduction gear the props spin at a more sedate 1,600 rpm. At that setting the ship will indicate about 35 knots and burn a total of about 9 gallons per hour of avgas. Over an event the power will most likely be reduced to 18 to 20 inches and 1,500 rpm, yielding about 23 kts.

The props are enclosed in ducts that can be rotated up or down 85 degrees, allowing the ship to take off almost vertically and to hover. To manipulate the ducts, the pilot moves a switch on the control yoke much like an electric elevator control. A push forward causes the ducts to turn down, directing thrust up and pushing the blimp down. Flip the switch backward and the ducts rotate up from horizontal, causing the blimp to go up. To hover, turn into the wind and slow until the forward motion stops; then rotate the ducts up and use power to keep the blimp from sinking.

According to McHugh, N602SK is one of only 15 blimps in the world; nine of those are in the United States. Rated airship pilots are almost as rare: 200 world-

How to fly a blimp

The fabric of our lives

Blimp pilots love this neat trick that scares the daylights out of airplane pilots. After takeoff, pitch the nose up about 30 degrees. Then, when you get about 200 feet above the ground, pull the throttles quickly back to idle. Airplane pilots just know that they are about to die. They want to push the nose down frantically to maintain flying speed. The seasoned blimp pilot gets his amusement by watching the airplane pilot.

Actually, it's just a demonstration of how blimps fly. While airplanes get their lift from aerodynamics, blimps get almost all of their lift from buoyancy. Equal volumes of any gas at equal pressure and temperature will always have the same number of molecules. Since the helium molecules in the envelope of a blimp weigh less than the molecules in the air they displace, the blimp is buoyant and wants to float in the air. On this demonstration the blimp will just gradually slow to a stop and float there. Since blimps don't always fly at the exact weight for neutral buoyancy, it may begin to drift up or down slowly, and it will certainly drift with the wind. Depending on where the weight is located in relation to the lifting gas, it might also tend to hang nose up or nose down.

Now here's the complicated part about flying a blimp. It's the air system. To understand the primary reason blimps need an air system, think about what happens when you release a toy helium balloon. Since the helium weighs less than the air it displaces, the balloon is buoyant and rises to a higher altitude. Of course, as all pilots know, there is less air pressure at higher altitudes, and the balloon expands, increasing its volume. Since the balloon has expanded, the helium it contains is less dense, but the balloon also displaces an expanded volume of less dense air, so the buoyancy is the same. The balloon continues to rise and expand until it pops. Obviously this scenario in a blimp might make the passengers uncomfortable.

Blimp envelopes are made of polyester fiber, which doesn't stretch, so there must be some latitude to allow the helium volume to expand and contract with altitude changes. That latitude is provided in the form of collapsible air bags, called ballonets, inside the helium envelope.

wide. To earn a commercial airship certificate, for example, a candidate would need to have 50 hours total airship time, 10 hours of night and instrument flight, and 10 hours cross-country. As McHugh, chief pilot for Skyship Management Services, relates, it's easy to earn the cross-country time at the blimp's leisurely cruise speeds. Takeoffs and landings prove to be the most challenging elements to learn, as most instruction is done on the job with a rated pilot because of the blimp's high operating costs. With typical day-long missions, that means little time for takeoff and landing practice.

Take the long way home

With our tennis match coverage complete for the day, we head back to White Plains via a circuitous route over Central Park. When you are flying a giant billboard, exposure is the name of the game.

We make a left down the Hudson River, circle the Statue of Liberty in the golden light of late afternoon, and then meander across Manhattan and up the Hudson.

After practicing some hovering near the Tappan Zee Bridge, I point the behemoth toward White Plains. As we approach the airport, a dozen members of the 24-person crew have formed a large "V" in a grassy area between the runways. The pointed end of the V points into the wind. I maneuver the ship to enter the V, with the intent of touching down just short of the point man. After some ponderous maneuvering, we eventually touch down. For a little more practice, I add power and yank the yoke back for a touch-and-go, a new experience for the logbook. Next time around it's a full stop.

As we touch down, the ground crew

As the blimp climbs to higher altitudes and the helium expands, air vents out of the ballonets, allowing them to become smaller and smaller. At some altitude the ballonets will become empty and the blimp can go no higher without venting helium. This altitude is called the *pressure height* of the blimp. As the blimp goes back down, air is pumped back into the ballonets.

The ballonets also help the pilot to keep the proper pressure on the envelope so that it will maintain its shape and strength. Management of this pressure is one of a blimp pilot's most important jobs. Too much pressure and expensive helium will be lost as the safety valve vents it overboard to prevent envelope damage. Too little pressure and the hundreds of feet of cable for the aerodynamic control surfaces could become slack and come off their pulleys, and the front of the blimp could cave in and be damaged at higher speeds.

A blimp pilot controls the envelope pressure by pumping air into the ballonets. Scoops just behind the propellers provide the primary source of air to the ballonets. The airflow is controlled by the pilot with dampers. At slow speeds and low power settings, there isn't enough airflow from the propellers to do the job, so electric fans can be used instead. As the blimp is descending to lower altitudes and higher pressures, the pilot must be careful to make sure that sufficient air is being supplied to the ballonets to maintain envelope pressure. As the blimp climbs to higher altitudes and lower pressures, the pilot must ensure that enough air is being vented out of the ballonets. The Fuji Skyship has two vents for each ballonet, which can be controlled by the pilot.

As if all of this weren't complicated enough, the air system does even more. In an airplane, the trim is aerodynamic. It works only when air is moving over the controls. That's no problem because an airplane won't be flying unless air is moving over the controls. On the other hand, a blimp can come to a complete stop, and it does so every time it lands. In this case aerodynamic trim just doesn't work, so blimps don't even have it. Instead, the ballonets are used to keep the aircraft in static trim. The word *static* is used to indicate that the aircraft won't be out of limits, nose up or nose down, even when the aircraft is in a static or still condition. You could simply move weights around inside the gondola to keep the aircraft in trim, but this would be cumbersome and inelegant. The easy way to do this is to vent air out of one ballonet and pump air into another. This moves the helium around and changes the center of buoyancy. As a pilot, the easy way to visualize what you are doing is to think in terms of pumping air, which is heavier than helium, back and forth.

The next time you see a blimp on television, remember that while it looks slow and ponderous on the outside, there's plenty of action going on in the cockpit. *—John King*

grabs the railings along the sides of the gondola and the ropes hanging off the nose.

The blimp's arrival looks something like a cross between the circus that is coming to town and a well-tuned orchestra. Dressed in red shirts, the crew scurries to lash the ship to the mast truck, all the while throwing bags of lead shot off and on the blimp to make it heavy enough to stay put, but not so heavy that it sits heavily on its sole landing gear under the gondola.

Plush seats and huge windows make for a first-class ride. At 35 knots and 1,000 feet, Rand-McNally is apparently preferable to Jepp data.

Amid a flurry of hand signals and a couple of shouts, the ship is soon moored to the truck, free to track in a circle around it and into the gentle breeze—the world's largest windsock.

In a sense, the blimp is like a child that never grows up. From the day the envelope is first inflated until the day 8 to 10 years later when it's time to replace the fabric, the ship must be supervised day and night, 365 days a year. A crew member constantly monitors the envelope's pressure, adjusting it to prevent the fabric from becoming too taut or too limp. Likewise, temperatures must be monitored and adjusted for. Besides the ground handlers and pilots, the crew consists of a team of mechanics who maintain the blimp and seven ground vehicles. Like modern-day barnstormers, the crew roves the country, moving from event to event, their gentle giant of a blimp never far overhead. □