

Adventure on a Hot Air Balloon



The wind is starting to blow stronger, and when you're riding in a basket under a hot air balloon, just 400 feet above ground, that's not necessarily a good thing. Keith Rodriguez looks to the horizon and squints. He had planned to take off from Scioto Downs, a horse racetrack south of Columbus, Ohio, fly a few miles north, and land his balloon in a barren cornfield next to his pickup truck.

Then the wind changed. Instead of a light breeze from the south, now Rodriguez's bright red balloon is getting hit by stronger, colder winds headed west. He has plenty of propane fuel in his tank—he probably could ride the wind halfway to Pennsylvania. But that would be dangerous. Rodriguez's choice of landing sites just became very limited. As the balloon switches direction and floats east, everything below becomes a wide carpet of suburban sprawl—big-box stores, major highways, and strip malls. Beyond the stores lie forests.

The only factor in Rodriguez's favor is that it's early, just after 7 a.m. The highways are filling up with people driving to work, but otherwise the morning is quiet and still.

"Oh boy," Rodriguez thinks. "If I don't land, like now, this could get bad."

The balloon has no propeller or engine, so Rodriguez can't change direction on his own—he's entirely dependent on the wind. The only thing he controls is altitude. He does this by changing the properties of two invisible gases: air and propane. Sitting on the floor of the wicker gondola are three tanks of propane, compressed to its liquid form. The tanks are connected via black rubber hoses to two burners overhead. Each burner is nearly as big as Rodriguez's head.

Rodriguez turns a knob on one side of the burners. This releases propane from a tank into the heating coil, where it is ignited by a pilot light. This heats the propane from a liquid into a gas. The gas catches fire, and flames leap two feet high into the balloon.

The balloon rises. Rodriguez has a plan in mind. The flame heats the air inside the nylon balloon. This works on a simple principle: hot air is lighter than cold air. One cubic foot of air

weighs about an ounce. If you heat that air by 100 degrees, its weight drops by about 7 grams. So every foot of heated air inside Rodriguez's balloon can lift about 7 grams. Just by himself, Rodriguez weighs 170 pounds, which equals 77,110 grams. That means he needs about 11,015 cubic feet of hot air just to raise his own body off the ground. This is why hot air balloons are so big—they must trap tremendous amounts of heated air. Rodriguez's balloon is a common size, trapping about 100,000 square feet of air. The balloon is 90 feet tall and 65 feet wide.

As Rodriguez gives his short burst of flame, the air inside swirls in complicated, invisible patterns. Little of it escapes out the hole in the bottom—instead, it cools off gradually by coming into contact with the surrounding air outside the balloon's thin nylon wall. As this happens, the balloon gradually sinks. To drop altitude more quickly, Rodriguez can pull a cord attached to a parachute valve at the very top of the balloon. Since the hottest air sits at the top, this releases the balloon's most buoyant air and increases the speed of descent.

Rodriguez gives the cord a short pull, and the gondola drops.

"I don't have an altimeter, and I can't really see anything happening inside the balloon," Rodriguez thinks. "I have to pilot by feel."

Pushed by the wind, the balloon is flying quickly now. It's floating over the back wall of a Wal-Mart when Rodriguez grabs hold of the parachute valve cord and gives it a long, hard tug. The balloon drops. Quickly. The hot air balloon is sinking, but still flying forward.

It looks as though it's about to slam into the edge of Wal-Mart's roof but it sails over it, with only about 15 feet to spare. Still, Rodriguez does not let go of the cord. He drops and drops, right between the light poles of the nearly empty parking lot. Just a few feet above the ground, Rodriguez releases the parachute cord, turns the knob above his head and fires both burners. The steep descent slows. The gondola touches lightly against the asphalt, and then drags to a stop. There are only two people in the parking lot, standing near the entrance to the store. They look toward the balloon, their eyes and mouths open wide in shock.

"That was a little closer than I expected," Rodriguez says to himself, laughing. "I really needed to land quick."