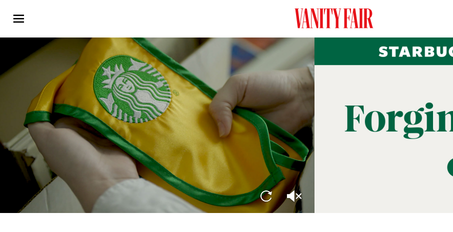
VANITY FAIR SIGN IN Subscribe



Get unlimited access to *Vanity Fair*, plus a free tote!
Subscribe now ›

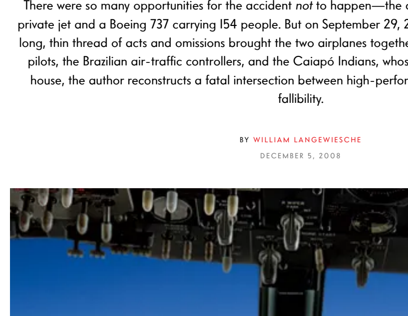
TRAGEDY JANUARY 2009 ISSUE

The Devil at 37,000 Feet

There were so many opportunities for the accident *not* to happen—the collision between a Legacy 600 private jet and a Boeing 737 carrying 154 people. But on September 29, 2006, high above the Amazon, a long, thin thread of acts and omissions brought the two airplanes together. From the vantage point of the pilots, the Brazilian air-traffic controllers, and the Caiapó Indians, whose rain forest became a charnel house, the author reconstructs a fatal intersection between high-performance technology and human fallibility.

BY WILLIAM LANGEWIESCHE

DECEMBER 5, 2008



SAVE

What were the odds? There were so many chances for the accident not to occur—so many ways to break the chain that led to it—that a crash investigator later told me it seemed the Devil himself was at play. The men responsible were American pilots and Brazilian air-traffic controllers working the high-altitude jet routes above the Amazon basin in central Brazil. If these were not the sharpest guys around, they were ordinary for the type, until then functional enough, and not so stupid that stupidity alone can explain the disaster that they brought about. It was Friday, September 29, 2006, toward the end of the dry season in northern Mato Grosso State, where the Amazon jungle reaches south along the broad, brown Xingu River. The sky that afternoon was pale and hot. Dolphins swam in the river, as they always have. Turtles lazed on the banks. On the rough dirt road that cuts for hundreds of miles through the forests and clearings, a few vehicles crept along as usual, boiling the dust in second gear and drifting clouds of it across the occasional settlements. The road has a federal designation, BR-80, but it is less a road than a track. It leads from nowhere to the same. During the rainy season it becomes nearly impassable. The settlers who followed it into the jungle call themselves the Forgotten Ones. Those who feel superior to the Indians nearby seem nonetheless resigned to low ambitions in life. When strangers drive by, the settlers pause to watch. This and television pass for entertainment. Otherwise most days go by like all the others. September 29 was a day like those, too. There were no strangers on the ground that I know of. If there was any sense of urgency, it was in the late afternoon, when the few drivers within range of the Xingu River crossing began pushing to make the final ferry, at sundown.

House of War, December 2008

City of Fear, April 2007

ADVERTISEMENT
Ad Search War Records by Name
MyHeritage™

Rules of Engagement, November 2006

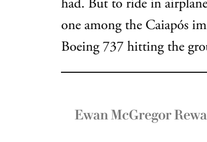
More …

The crossing is in the heart of Caiapó Indian territory, a large and densely forested reserve. The ferry is a barge side-tied to a small tugboat piloted by taciturn Indians. The ferry operation is their only source of income beyond government handouts. The main village is nearby. About 300 Caiapós live there in airy thatch-roofed huts that are tidier than the squalid shacks of the Forgotten Ones. They paint their bodies with geometric designs, but wear Western clothes on top. Some have a penchant for camouflage shirts. Some stretch their lower lips around lip plates. It is an impractical fashion, which makes spitting hard. The men call themselves "warriors," which must do something for their pride. They are hunters and fishermen who go disappearing into the jungle for days at a time. The women stay home, where they tend to the children and village chores. The village is noisy because of all the comings and goings, the babies who cry, and the constant din of chickens. But on the afternoon of September 29, about a minute before five p.m., two women who had gone into the silence by a stream to wash heard a single roll of heavy thunder. The thunder was strange because the sky was clear. The women returned to the village and reported what they had heard.

In the aftermath the press made much of this Caiapó group, describing them as people close to nature and therefore pure, and with experience so limited to their traditional ways that they understand airplanes as distant iron birds. The reality is more complex. I counted five satellite television dishes in the village, and, out beyond an imposing schoolhouse, found a groomed dirt runway long enough to accommodate high-performance turboprops. The Caiapós certainly know what airplanes are. In fact their leader, a heavyset man named Megaron, sometimes gets around on government-paid chartered ones, and several years ago was flown to New York by the musician Sting to join a campaign for the preservation of Indian lands. Sitting in a council space in the shade of trees, Megaron described his arrival in New York to me—looking out his window and seeing other airplanes in flight, and then watching them land, one after the other, just minutes apart. He had been impressed by the performance of New York Air Traffic Control. So much for the "iron bird" part of the story. Nonetheless, it is true that the Caiapós are not sold on modernity as it is typically defined. They have not, for instance, been Christianized or persuaded to abandon their traditional beliefs, which include the proximity of a parallel world "on the other side," roamed by the souls of the sudden-dead, with whom only a shaman can talk. Was it possible that the thunder had escaped from there? In some sense it had. But to ride in airplanes is not to have them foremost in mind. No one among the Caiapós imagined that the thunder was the sound of a Boeing 737 hitting the ground.

WATCH NOW:

Ewan McGregor Rewatches Obi-Wan Kenobi, Trainspotting & More



The same bewilderment afflicted others within earshot of the impact. To the west of Caiapó territory, at the headquarters of a 21,000-head cattle ranch called Fazenda Jarinã, many of the employees heard the thunder and could make nothing of it. The manager of Fazenda Jarinã is a small, lonely man named Ademir Riebero, who told me he knew that the north-south traffic between Manaus and Brasília passes high overhead, and that at night you can hear the airplanes and see their lights. On the evening of September 29, however, when he heard talk of the unexplained thunder, he did not wonder if one had crashed. To me he said, "We just couldn't imagine it could happen here. Only in São Paulo or places like that." Indeed, the airplanes that passed overhead were in the least critical phase of flight, cruising high and straight through the cold clean sky, unstressed, and organically resistant to almost any error their crews might make. But then Riebero received a radiophone call from an official he knew, who said, "Ademir, there is a Gol airplane that has disappeared, and it seems to have gone down near you." Gol is a discount airline named after the drawn-out victory cry in soccer—G-O-O-O-O-L!!! Riebero switched on the television news and saw a map labeled Jarinã on the screen. It was odd how this authenticated the situation in his mind. From the lack of reports from the outstations, he surmised that the airplane had not crashed on the ranch's holdings. But given the size and density of the bordering jungle, it was not surprising that an entire Boeing could have disappeared.

Later that night, with more radiophone calls coming in, Riebero heard that workers at the neighboring farm had seen an airplane fall. These are the only known eyewitnesses to the accident. The farm where they live and work is small compared with Fazenda Jarinã, but large nonetheless. As something of a plaything it is luxurious and extremely well kept. It belongs to a 24-year-old man in São Paulo, to whom it was gifted by his grandfather. Being rich can be especially pleasant in Brazil—and the Amazon, let's face it, looks better after it is cut down. The workers were laying a new brick wall when they heard a roar and spotted the Boeing perhaps a dozen miles to the east. It was pointed straight down and seemed to be wobbling and trailing a cloud. At that distance the airplane looked just a few inches long. It disappeared over a tree line and into the forests beyond. No dust or smoke rose into the sky. Some seconds later came the thunder. The workers ran to find their boss, who hurried to a radio and made the first call. That night people at the farm had a hard time sleeping.

Riebero had a long night as well. The Brazilian Air Force called asking to use Fazenda Jarinã for rescue and recovery operations once the airplane was found. Riebero acquiesced because the ranch had the facilities to handle a crowd. God willing, the crowd would include survivors. At 11 p.m. a four-engine Hercules lumbered overhead and began searching through the darkness to the east, ultimately without success: the Boeing's emergency locator transmitter had apparently failed, because no homing signal was received. The air force kept calling Riebero to keep him abreast. Riebero finally switched off the radiophone to catch some rest. He got up at dawn. For a while the morning was calm, but at 8:30 another Hercules flew low overhead, equipped with a magnetometer of use in detecting metal masses. At nine a.m., Riebero heard that the wreckage had been found.

It lay in heavy forest on Caiapó territory, and was almost impossible to see from above. Air-force helicopters began to settle onto the ranch's soccer field. A rescue team went out, rappelled down to the crash site, and came back with the news that there would be no survivors. The scene was grim. One hundred and fifty-four people had died. They were innocent men, women, and children. People are insignificant blips on the scale of history, but these had not died peacefully, as one might wish. They had endured a period of absolute terror, and had been torn apart by the force of the impact. It was the worst accident in Brazil's long aviation history.

The recovery operation began with the clearing of a helipad in the forest. When word came to the Caiapós that the Boeing lay on their land, Megaron mobilized 22 men—warriors all—and drove to Fazenda Jarinã, where they launched two aluminum boats into the Jarinã River and set off downstream, a full day's travel to the site. The Caiapós wanted to help. Their shaman was with them. The heavens had rained ruin into their trees. They did not believe that people are insignificant blips in history. They believed that in a parallel world in the forest 154 tortured souls were crying out for tending.

The Takeoff

A thousand miles to the south on the afternoon of September 29, a few hours before the Boeing's impact, two American pilots were preparing to fly home in a brand-new business jet made by the Brazilian manufacturer Embraer. The airplane stood gleaming in the sunshine at the Embraer plant in São José dos Campos, near São Paulo. It was a Legacy 600, an imposing $25 million beauty capable of accommodating 13 passengers in luxury at 41,000 feet, at more than 500 miles an hour, and, with a reduced passenger load, of flying 3,700 miles between stops. The Legacy occupies a position toward the high end of private jets—among airplanes like Gulfstreams, Challengers, and Falcons—which by political, ethical, and environmental measures are abhorrent creations, but which nonetheless are masterworks of personal transportation. The Legacy weighs 50,000 pounds fully loaded, and is powered by twin Rolls-Royce turbofan engines mounted aft against the fuselage, delivering a total of 16,000 pounds of thrust at a price to the atmosphere and global oil reserves of about 300 gallons an hour. It has a high T-tail and thin swept-back wings which span 69 feet and turn upward at the tips into graceful winglets—six-foot vertical extensions meant to tame the airflow and improve efficiency (entirely in relative terms). It has a cockpit with the latest in electronics and instrumentation, including a Flight Management System computer, ultra-accurate G.P.S. receivers, strong radios, a superb autopilot, and the ultimate in onboard collision-avoidance devices. It has a cabin equipped with a full galley (personal flight attendant suggested), an entertainment system, a satellite phone, a large lavatory, and three distinct seating areas, including one in the back that can be converted into a private bedroom. If you insist on treating yourself really well, and at considerable cost, flying in a Legacy comes highly recommended.

Read Alex Shoumatoff on another Amazon tragedy, The Gasping Forest, May 2007. *Photograph by Jonas Karlsson.*

This one had been bought by a Long Island–based aircraft-management company called ExcelAire, which planned to charter it out as a global air taxi. It had been given an American registration, N600XL, which in radio phonetics would become November Six Hundred X-ray Lima. The "XL" referred to ExcelAire. Over the days preceding the homeward flight, four company employees had inspected the airplane before consummating the purchase. The employees included two ExcelAire vice presidents and the flight crew—the captain, Joseph Lepore, aged 42, and his co-pilot, Jan Paul Paladino, aged 34. Lepore had a reputation for being a pleasant man who had always wanted only to fly; Paladino was said to be more articulate and perhaps to have a quicker mind. Neither pilot spoke Portuguese or demonstrated much enthusiasm for Brazil beyond the standard stuff about Rio de Janeiro. Judging from the cockpit voice recordings captured by the Legacy's black box and later recovered by investigators, their English was New York–accented—and no less so when they enunciated for the locals. In the recordings, they didn't enunciate often. But so what—English is aviation's lingua franca, controllers everywhere are required to speak it to non-native pilots, air-traffic procedures are much the same globally, and Lepore and Paladino had signed on to fly airplanes, not wander around contemplating cultural nuances.

These were the same pilots later pilloried in the press for having dropped off the radar to stunt-fly over the Amazon—an accusation that was ridiculous from the start and was soon disproved by the records of their flight. Lepore and Paladino were not the joyriding type. In fact, quite the opposite. Beneath their cockpit banter, they come across in the voice recordings as almost childishly dutiful toward their superiors and their job. In that sense they represented the industry ideal. They were also experienced pilots and officially qualified to handle an airplane of this kind. In the United States they had recently completed Legacy training at FlightSafety International, the world's best-known private-jet flight school, where they had demonstrated proficiency in the various check-box categories. FlightSafety training is classroom- and simulator-based. It is also stilted and formalistic—designed to impress bureaucracies as much as to impart knowledge to pilots—and is therefore less useful than it pretends to be. It is not, however, without value, and ExcelAire had gone still further, arranging for both men to fly a Legacy twice before sending them off to Brazil for the purchase. Additionally, during the inspection-and-acceptance process in São José dos Campos, they had test-flown the new airplane under the guidance of Embraer factory pilots and engineers, who had briefed them on the cockpit systems and provided practical tips. Furthermore, the co-pilot, Paladino, had previously flown a similar Embraer regional jet during a stint at American Airlines. And these jets are easy to fly. There was no reason to doubt that Lepore and Paladino would bring N600XL safely home.

It was not a fun stay in Brazil. São José dos Campos is a dull town, and there were repeated delays as the ExcelAire team found small problems with the airplane, and Embraer technicians struggled to resolve them. Particularly difficult was a problem with flickering L.E.D. cabin lights, which nearly caused the purchase to fall through. Embraer treated the Americans well, and insisted on sending a staffer along for the first leg of the homeward flight, apparently to ease their exit from the country. Things didn't work out that way, but the plan was to fly 1,725 miles north to Manaus, where they would spend the night in a good hotel and take a boat ride on the Amazon, before heading to the United States later in the day. Also along for the flight was Embraer's North American sales representative Henry Yandle and a New York Times contributor named Joe Sharkey, who writes a business-travel column for the newspaper and was doing a story for a U.S. magazine called Business Jet Traveler. Sharkey was the outsider among them, and potentially an influential one. It was unusual to have invited him on a maiden voyage with a freshly trained crew. But this was to be a rare run without a client aboard, or the shyness that typically accompanies the use of such airplanes.

Embraer and ExcelAire welcomed the publicity. A description of the Legacy in Business Jet Traveler might help persuade someone to buy or charter one. It was hard to know what Sharkey could write of genuine content—that riding in a Legacy is comfortable? That the cabin offers legroom, desk space, and a walk-in luggage compartment? That the cabin lighting does not flicker? At $25 million it had better not. Anyway, Sharkey seemed a decent sort, and unlikely to delve into the airplane's dark side—the fuel burn per passenger-mile, the expense to company shareholders, the disproportionate use of public resources like air-traffic control and landing slots. No, it was a safe bet that Business Jet Traveler would not be publishing that. Nonetheless, Sharkey's presence placed additional pressure on the pilots as they taxied the unfamiliar airplane toward the runway.

~~$2.50~~ $1/mo for 1 year + a free tote.
Subscribe Now ›

It was just before three p.m. on Friday, September 29. Embraer had submitted a computer-generated flight plan to Air Traffic Control for the run north to Manaus. Flight plans are trip requests, or advance notices of an imminent flight. This one was for a routing that would take N600XL over Brasília, where, after a slight left turn, an airway would lead the airplane 1,200 miles to Manaus. That airway is called UZ6. It passes over Caiapó Indian territory and Fazenda Jarinã, but of course the flight-planning computer did not know this, or even of the Amazon's existence. On the basis of forecasted winds and the Legacy's performance, it requested a climb to 37,000 feet, or Flight Level 370, an altitude appropriate for the initial direction of flight. Until Brasília, that direction was slightly to the east side of magnetic north. Airplanes cruising on such easterly headings are usually assigned "odd" altitudes (35,000, 37,000, 39,000), while airplanes cruising on westerly headings are given "even" altitudes (36,000, 38,000, 40,000). This is basic stuff, the vertical equivalent of drive-on-the-right highway rules. Virtuoso air-traffic controllers sometimes allow exceptions to be made when traffic is light (and exceptions are systemic along certain one-way routes), but generally these cruising rules dictate the altitudes at which airplanes fly worldwide. The flight-planning computer knew it, and since the airway to Manaus required a westerly turn over Brasília, it proposed a descent to 36,000 feet at that point.

Lepore and Paladino had a printout of the flight plan in the cockpit, with the route highlighted in yellow, and the altitudes shown. But a flight plan is merely a proposal, and it becomes something of an artifact after Air Traffic Control mulls it over and issues a formal clearance into controlled airspace, assigning a route and altitude according to its own needs. Afterward the original flight plan becomes operational only in narrow circumstances related to communications failure. Lepore and Paladino received their clearance by radio from the control tower at São José dos Campos prior to taxiing. The local controller spoke the bare minimum of English. Lepore and Paladino eventually gleaned the essential: they were cleared to Manaus via a standard departure procedure and then the flight-plan route, at an initial cruising altitude of 37,000 feet. They were assigned a unique transponder code, which they set. The transponder is a radio beacon which responds to Air Traffic Control radar, enhancing the display on the controllers' screens and automatically transmitting the aircraft's altitude in flight. Like most of the Legacy's electronics, this one was made by the American company Honeywell. At 2:51 p.m., with Lepore in the left seat and at the controls, N600XL accelerated smoothly down the runway and lifted off. I presume that Sharkey was pleased. He was embarking on a trip in the style of a latter-day pasha. Neither he nor the pilots could have known that at the same time, in the humble world 1,725 miles to the north, the ordinary passengers of Gol Flight 1907 were crowded around the gate at the airline terminal in Manaus, preparing to board a Boeing 737 for their flight south.

Failure to Communicate

The Legacy's cockpit voice recordings are closed loops two hours long. The one recovered from N600XL opens 42 minutes into the flight like a curtain rising on a scene of normalcy, but with the Devil lurking just out of sight. It was 3:33 in the afternoon. The airplane was cruising on autopilot, about 150 miles south of Brasília, at the assigned altitude of 37,000 feet. Paladino, as co-pilot, was working the radio, checking into a new Air Traffic Control sector. The sector was a subdivision within Brasília Center's airspace. Brasília Center is a radar facility that controls traffic across a huge expanse of central Brazil, approximately to the northern boundary of Mato Grosso State. Paladino keyed a transmitter and said, "N600XL level, Flight Level 370." The controller's response was garbled and incomprehensible. Paladino tried again, and this time the controller's transmission was only slightly more clear. Lepore said, "I think he just said 'radar contact.'" Paladino took the captain on faith and radioed, "Roger, radar contact." To Lepore he added, "I have no idea what the hell he said." Lepore made no comment. Radio communications in cruise are largely routine, the necessary exchange had occurred, and pilots don't tend to get excited. Back home in the United States they might have pushed the issue, alerted the controller to the poor quality of his transmissions, and tried to get him to switch to a better frequency or a closer antenna. They did none of that here. Was it cultural arrogance? Probably not. Was it linguistic timidity? Possibly, and perhaps compounded by the mental inertia that can lull pilots in flight. All was well for now, but in retrospect the crew's lack of follow-up was not a good sign.

To pass the time, they explored the airplane's Flight Management System and the related flat-panel displays, as well as a stand-alone laptop computer loaded with Legacy flight-planning software provided

laptop computer loaded with Legacy flight-planning software provided by the Embraer factory. Paladino had the laptop. A passenger came forward. It may have been Sharkey, because he asked about the altitude as if he couldn't simply read the instrument panel, as one would expect the others to have done. Whoever it was, Paladino greeted him with an overbright tone. "Hello! How ya doin'?"

"Good. You?"

"Very good. We're just, ah, playin'. Trying to get used to the airplane."

"She's flying nice, no?"

The use of the feminine was awkward, but Paladino went along. "Yeah! She's flying real nice!"

They spoke about the weather, which for the moment was nice, too. The passenger left. Paladino got back to poking at the laptop. Speaking of the screen, he said, "Aw shit, I lost it … "

Lepore said, "What's the matter?"

Paladino said, "I lost a page. Where'd it go? I musta hit something."

Lepore said, "Aw, it's all right."

With nothing better to do, Lepore and Paladino kept fiddling with the computer. There was little reason to look outside. The earth lay far below as an irrelevant concern, and the surrounding sky was huge. Traffic at those altitudes was under radar control, and though other airplanes could be heard on the radio, the Legacy's collision-avoidance system would warn of any that might stray near should the controllers make a mistake. That was the nature of the flight then under way. The cockpit was a cocoon. Lepore and Paladino were operating an inherently simple jet that had been stuffed with electronic capabilities—most of them nested, and therefore hidden from immediate view. The nesting of flight information, much of it non-essential, is a development now several decades old and somewhat out of control. It is driven on the one hand by market pressures to create clean cockpit displays, and on the other hand by the technical possibilities offered to overly enthusiastic designers and engineers. The problem for pilots is the idiosyncratic architecture of the systems that are created, the need to fathom the logic that has been applied, and the reliance on manuals laced with invented terminology to which practitioners are expected to submit their minds. In principle a pilot with sufficient time and patience can figure it all out in advance, but such pilots are rare, and Lepore and Paladino were not among them. They were stick-and-rudder men, confident in their control of the jet itself and comfortable with the first rule of aerial navigation, which is to point the airplane in the right direction and let it fly. In the Legacy, with its refined autopilot and its navigational systems, they had no problem doing that. The record shows that they remained at exactly 37,000 feet along the perfect centerline of the route they had been assigned. Meanwhile, they set about learning the airplane, as pilots must, through trial and error and practical use.

The North American sales rep, Henry Yandle, came forward to visit. He had a hail-fellow manner that some passengers adopt in the company of pilots. Radio transmissions can be heard in the background, most in Portuguese, some from other airplanes, some from Air Traffic Control. Yandle emphasized the need to give Sharkey a good flight. Eventually he said, "All right. How much longer, guys?"

Lepore said, "Aw shit, good question," and laughed.

Paladino said, "It's fair enough."

Yandle said, "We were wondering because … "

Lepore apologized. "We didn't have it loaded up till after we got up here."

Paladino may have tried to pull up a clock. Speaking of the flight-planned duration, he said, "It's three hours and twenty-three minutes from takeoff, so it's gonna be, uh … "

Lepore said, "Hour and … " He began to finger his keypad, hoping to extract the answer from the Flight Management System. He said, "Still working out the kinks on how to work this stuff. This F.M.S." It now seems sad and even tragic, the reach for automation by these working pilots, their button-pushing response. They must have known at what time they had taken off. They had been in the air for 45 minutes, give or take. The winds were not significant. With an additional 10 minutes tacked on for arrival turns, this meant they probably had about two hours and 45 minutes to go. It was the simplest sort of mental calculation and would have been accurate enough.

Yandle tried to let it slide. He said, "Not a problem." But the question had been raised. Duty Time, Block Time, Local Time, Push Time, Release Time, Time Off, Time en Route, Time of Arrival, Fuel-Remaining Time, Void Time, Expect-This-or-That Time. There is also Coordinated Universal Time, called Zulu Time, which rolls nicely off the tongue.

Lepore said, "Where's the one that gives us Total Time?"

Paladino said, "The Current, right?"

"Current" is the one you get from an ordinary watch. Lepore said, "Landing—that ain't it." He kept fingering the keypad. "The arrival, the arrival, the arrival." He wasn't giving up on the quest.

But it was Paladino who had success. He said, "Here we go! Two hours and forty-seven minutes." He had unearthed Time Remaining.

Yandle said, "Two forty-seven." The electronics had made it official.

And so it went. This was an interval which might have been better spent in quiet concentration on the flight, but in private jets you don't shut the door on the passengers. Yandle was a colleague, and Sharkey was important. The conversation continued as Lepore and Paladino tried to pull up weather information on the Flight Management System. They had a hard time finding it. They had similar trouble with the laptop. Their uncertainties were not to their discredit, and did not mean that they were reckless even to be flying that airplane, as has since been claimed. In retrospect they were perhaps too active in the cockpit. However, in this they were not alone. The best pilots are masters of minimalism who rely less on the equipment and more on their brains, but such pilots are rare.

Airplane salesmen are different, because they profit from the add-ons. Yandle returned to the cabin and his guest. Alone in the cockpit, Lepore and Paladino kept fussing with the buttons as they approached the turn point over Brasília. The controller gave them a frequency change as they entered a new Brasília Center sector. That sector is large, stretching nearly 500 miles north to the edge of Brasília's airspace, just beyond the Caiapós' skies, where Manaus assumes control. In the new sector the first frequency was 125.05 megahertz, which normally would be functional for about the next 250 miles. Paladino acknowledged the handoff, set the new frequency, and checked in with a standard call. "Brasília, N600XL, level, Flight Level 370. Good afternoon." The controller's response was fast and strong. He said, "N600XL, squawk ident. Radar surveillance." Paladino answered, "Roger." Though the airplane had the entire large sector still to traverse, and all the radios were fine, this was the crew's last full exchange with Brasília Center.

Air-traffic control in Brazil is a military function for historical reasons, none of them good. In the new sector, the controller on duty was an air-force sergeant, aged 38, named Jomarcelo Fernandes dos Santos. His instruction to the Legacy to "squawk ident" was a request for the crew to push a button associated with the transponder, which would highlight the airplane's electronic symbol on the control-room console, making it easier for dos Santos to distinguish N600XL from other targets in flight. Why dos Santos felt the need is not clear, since the sector was particularly quiet at the time. In any event, high above Brasília, Paladino briefly neglected to comply. When he caught his error, he said, "Oh fuck, I forgot to do that." The ident button was on the Radio Management Unit, a control screen for the radios and transponder. Paladino pushed it. Belatedly, Lepore said, "ID's right there." Paladino said, "I think I did it, yeah." Then he said, "I think you see that … " He didn't finish the thought. He said, "Oh shit!" On the same device, the communications frequency had suddenly disappeared. But Paladino knew the number. He said, "Twenty-five-oh-five. That's why I write it down." It was a good practice. Despite what engineers may think, there is no cockpit tool as solid as a pen. Paladino reset the frequency. Lepore said, "Yeah." Between the two men a subtle change was under way, and Paladino was ascending.

Together they got back to the electronic maze, trying to calculate landing distance at Manaus, and takeoff performance for the following day. In the midst of this, the Legacy arrived over Brasília and was turned by the autopilot to track the airway, UZ6, on a course 24 degrees to the west of north. The Current Time was 3:55 p.m.

The pilots made no mention of the turn that the airplane had just made. That in itself is not surprising. But the Legacy was now cruising at 37,000 feet, in contradiction to the convention that would have shifted it to an "even" flight level in the new direction. This was not illegal—and operationally it did not matter that the original flight plan had proposed a descent here to 36,000 feet. Indeed, the rules are very clear. Lepore and Paladino had been assigned 37,000 feet, and barring an emergency they were obligated to remain there until Air Traffic Control approved a change. There had been no such instruction. They may have assumed that with so little traffic in the air the controller was doing them a favor and allowing an exception, as sometimes occurs in the United States. They certainly knew that they were in radio and radar contact with Brasília Center, and that their transponder was transmitting their altitude and showing it accurately on the radar screens. Nonetheless, 1,200 miles of airway now lay straight ahead—a long stretch to fly against convention—and it is odd that they did not comment on the unusual flight level or bother to verify it with the controller, all the more so in a Latin-American system that felt loose to them and that they had reason to distrust. Their failure to speak up may never be fully explained. But it seems to have been a human thing, a slap-your-head lapse of the sort that invites the familiar question "How could I have been so dumb?"

A Raw Metal Mass

Explanations are harder for the performance of Sergeant dos Santos. His tasks as a high-altitude controller were similar to those faced by Internet gamers, but significantly slower and less complex, and although the consequences of his errors were potentially grave, the dimensions of the airspace overhead provided him with large margins for safety, even discounting cockpit-based collision-avoidance systems and the fact that some pilots do still look outside. In the United States a controller doing simulation research once mentioned to me the difficulty of directing two airplanes into each other even if you try. I answered that I was not surprised. Even the largest airplanes are small, and the starting point of collision avoidance has traditionally been a reality known as the theory of "the big sky." Dos Santos may not have thought about it as such, but his actions indicate a faith that airplanes left alone just naturally don't collide.

He sat at an electronic display that was as crisp and capable as any in the world. When the Legacy first checked in, just south of Brasília, it appeared on the screen as an encircled cross indicating an enhanced transponder return, with a vector line showing its direction of flight and a data block displaying its call sign and two altitudes. The first altitude was the transponder's report of the Legacy's current altitude, 37,000 feet, which Paladino had just confirmed by radio. It was followed by an equal sign (=) indicating a functioning transponder in level flight. This in turn was followed by the second displayed altitude, whose function is unique to the Brazilian system and operationally awkward. Elsewhere in the world that second altitude is the flight level to which an airplane has been cleared, a number entered manually by controllers when they call for a descent or climb. In Brazil it may be the same, but if no manual entry has been performed, automation takes over and the second altitude displayed becomes the one proposed by the original (archival) flight plan for the segment of the route. Dos Santos must have known of the distinction. He was a working controller, and the nature of the second altitude is not difficult to understand. Nonetheless, on this particular day he seems to have become confused. When N600XL first entered his sector, just south of Brasília, the two altitudes were the same, both showing 37,000 feet with the equal sign between them, and the nature of the second altitude did not matter. But five minutes later, when the Legacy crossed overhead Brasília and turned left to track the airway, the second altitude display automatically switched to 36,000 feet, the original flight plan's proposal, and a conventional level for the new direction of flight. Apparently dos Santos took this to mean that the Legacy had been instructed to descend, though he was the controller in charge and had made no such request. Mysteriously, he then ignored the indicator of the Legacy's actual altitude—the transponder return, which showed the airplane still level at 37,000 feet. Against solid indications to the contrary, he believed that the Legacy had descended to 36,000 feet.

I have tried to understand why. It may be that dos Santos would have so expected the Legacy pilots to speak up about flying at a nonstandard altitude that their radio silence got him to believe they were doing the conventional thing. But as errors go, this one was more than a head slapper. Furthermore, it was sustained, and it turned out to be contagious.

For 50 miles beyond Brasília, the symbol for the Legacy showed a clear transponder return at 37,000 feet, and dos Santos did nothing about it. Then the Devil stepped onto the stage. It happened at 4:02 p.m., when the Legacy's transponder stopped transmitting. The loss was apparent in two ways on dos Santos's screen: the circle surrounding the cross that marked the airplane's position disappeared, and the sign between the two displayed flight levels (FL370 and FL360) changed from an equal sign to a "Z." The Legacy now existed as an unenhanced "primary" target, a raw metal mass reflecting radar beams, with no altitude-reporting capacity. In the militarized environment of Brasília Center, however, an air-force radar kicked in with a crude height-finding function intended to help fighter jets intercept hostile intruders who would naturally try to penetrate Mother Brazil with their transponders turned off. Because the Legacy was still close to the radar dish on the ground, the height finder was able to calculate the altitude correctly, and briefly showed it on the screen as 37,000 feet. Be that as it may, the loss of the transponder should have been no big deal. Indeed, transponder failures are fairly routine, and because they normally elicit a reaction from controllers (generally a request to the pilots to reboot the unit), this one might have gotten the two sides at least to talk. The transponder problem would have been sorted out, and with it the question of altitude. Dos Santos, however, did not bother to call. It is as if he never noticed that the transponder had quit.

Fifteen minutes later dos Santos went off duty. His replacement was another sergeant, aged 27, named Lucivando Tibúrcio de Alencar. Dos Santos briefed him on the sector's traffic, including a Legacy headed for Manaus—at Flight Level 360, he said. By then the Legacy was about 150 miles past Brasília, still within effective communication distance on the frequency assigned, but moving beyond the accuracy range of the military height-finding radar, which began to show the airplane's altitude erroneously—coincidentally first at 36,000 feet, and then at variations so large that the Legacy would have had to zoom wildly to achieve them. This explains the later reports that the pilots had been stunting. Belatedly, de Alencar realized that the Legacy showed as a "primary" target only, unenhanced by transponder and altitude reporting—but at soonest this appears to have been a full 10 minutes after he came on duty, when he bothered for the first time to make a call. It was 4:27 p.m., about a half-hour shy of Caiapó territory. The Legacy by then had flown for 36 minutes since the last communication with Air Traffic Control, and for fully 25 minutes since the transponder had failed. It was roughly 250 miles north of Brasília, and already beyond the range of reliable two-way communication on the assigned frequency. When de Alencar called, the Legacy did not answer, because the transmission was not heard in the cockpit. De Alencar called again, to the same effect.

One might expect that de Alencar would have risen to the occasion. He now knew that he had a jet without a transponder, unresponsive to the radio, that was flying fast toward the boundary of his electronic vision and moving against possible opposing traffic as yet unseen. Closing speeds between jets in cruise may exceed 1,000 miles an hour, which can make a speck glimpsed in the distance very quickly fill the windshield. Admittedly, de Alencar believed that N600XL was at 36,000 feet, and that any opposing traffic would be 1,000 feet higher or lower—but even if correct, these were self-evidently unverified assumptions. Furthermore, until recent years a 2,000-foot vertical separation was the minimum considered safe between airplanes at those altitudes, and though a 1,000-foot separation is now the norm, it is based on the mandatory use of a new generation of precision equipment, including advanced autopilots and altimeters, and closely calibrated transponders. Until communications with the Legacy could be re-established, and the transponder problem resolved, N600XL for all its expense and elaboration was a rogue airplane, precisely flown but inadequately equipped for the tight tolerances of the airspace. There was no reason for panic, but by procedure and common sense de Alencar should have consulted with the Manaus sector, which adjoined his airspace ahead, and made a special effort to keep any traffic there far away. Instead, over the next 26 minutes he did little but call five times to the Legacy, in the unhurried hope that the crew might hear him and answer. All but the last call were on the same line-of-sight frequency that had already proved unavailing. De Alencar could have tried to relay a message through other airplanes in flight—this would have been normal—but perhaps because of the language barrier he did not. Through much of that time he had another controller by his side to assist him. Toward the end, as the Legacy approached the limits of Brasília's airspace, the assistant called Manaus and advised a controller there that the airplane was coming at him at 36,000 feet. He neglected to mention that there had been no communications for 500 miles, and that by the way the Legacy's transponder had failed. It was nearly five p.m. Gol Flight 1907 was speeding steadily south. Unseen in the jungle below, two Caiapó women had gone down to a stream to wash.

"*Calma!*"

Back to 50 miles north of Brasília—and back nearly an hour in time, to the moment of the Legacy's transponder failure. At that time, the transponder did not power off but switched from "Altitude" to "Standby." It did this either by itself or because one of the pilots unknowingly pushed a button. Though both are possible, and the latter seems likely, the distinction does not really matter. Pilots no less than controllers are expected to notice such events. Far to the north and near Manaus, the southbound Boeing had just leveled at 37,000 feet. In the northbound Legacy at the very same altitude, and on the very same flight path, Lepore and Paladino were alone in the cockpit, continuing to plan the next day's trip, and relying on electronic elaborations for help.

Co-pilot Paladino said, "Naw, we can do 48, eight eight four."

Captain Lepore said, "If we do, uh … A.T.O.? That's basically, uh, full fuel, isn't it?"

At that moment, 4:02 p.m., the transponder quit. No chime sounded in the cockpit. Instead, a small warning silently appeared on each of the two Radio Management Units, showing an abbreviation for "Standby." The understated warnings must have made good sense to Honeywell's engineers, who inhabit offices in Arizona, but they were not helpful to the pilots far away in flight, who were drowning in their products. For the next 500 miles the "Standby" warnings remained in view but unseen. The pilots were occupied with other things: their automated flight-performance calculations, fraternal visits from the passengers in the cabin, offers of water and soft drinks. The runway at Manaus was a particular concern—it had been shortened because of construction. At one point Lepore said, "We can do the landing, all right. Just have to get on it." He was not acutely worried. He laughed wryly. "Nothin' like banging the first flight of the friggin' airplane."

Bang it, prang it, really fuck it up. But first you have to screw the pooch in your mind. Paladino matched Lepore's tone. He said, "We couldn't get a nice long runway, you know? You get stuck in a fucking place in the middle of the Amazon Unknown." He glanced out at the brown-green expanses below. He said, "Aw, beautiful. But it don't look so Amazonish."

Lepore said, "Nah, it doesn't either."

It didn't because it wasn't yet. Later, for a while, it still wouldn't, because that part of the forest has been cut down. Aw, beautiful. A few clouds floated ahead. Paladino considered a turn to smooth the ride. He said, "I guess we'll have to deviate." It was a proposition. He thought again. He said, "Aw, maybe we'll be all right." They were doing 500 miles an hour. It seemed slow because the clouds were large, and they could see them far ahead. Lepore said, "Aw, probably will." He dropped something on the cockpit floor. "Aw, goddamn it."

Navigational precision poses dangers not immediately apparent. In the Legacy, it was based on three systems. The first was an ultra-accurate altimeter, capable of measuring the atmosphere with such finesse that at Flight Level 370 it could distinguish the Legacy's altitude within perhaps five feet. The second was almost as accurate. It was the airplane's satellite-based G.P.S. receiver, a positioning system that kept track of the airplane's geographic location within a distance of half of its wingspan, and that, linked to a navigational database, defined the assigned airway with equal precision. The third was an autopilot that flew better than its human masters, and, however mindlessly, worked with the altimeter and G.P.S. to keep the airplane spot-on. Such capability is relatively new. Until recently, head-on airplanes mistakenly assigned the same altitude and route by Air Traffic Control would almost certainly have passed some distance apart, due to the navigation slop inherent in their systems. But this is no longer true. The problem for the Legacy was that the Boeing coming at them on the same assigned flight path had equipment that was every bit as precise.

Paladino referred to a high-altitude navigational chart. It was made of paper as strong as money. He said, "In case we lose radios, we have a bunch of frequencies we can use." The radios occasionally sounded with exchanges between the controllers and other airplanes. Slowly, however, a change occurred. As the Legacy sailed beyond the range of the antenna on the ground, eventually the controller's side of the transmissions could no longer be heard. Lepore and Paladino did not wake up to this as they might have in the United States, perhaps because they discounted Portuguese and did not realize that the transmissions they continued to hear were one-sided affairs, exclusively from other pilots in flight. At the start of this unknown condition of communications loss—about when de Alencar made his unsuccessful first call—Paladino pulled out a new digital camera and started to play with it. He said, "I don't know how to get video on this thing." It was as if the Legacy's systems had not been confusing enough.

Lepore said, "Press the video button. No, I don't know."

"Where would that be?"

"I don't know. Hold on." Lepore took the camera. A minute of silence went by, broken by an aircraft transmission in Portuguese. Lepore said, "It's probably one of these, on the rotators."

"Yeah. You'd think. Right?"

Lepore said, "I'm not sure. I don't … don't know if you can with this camera. I mean, gotta be something with setting up here … "

"Yeah."

"But I don't know which one. You'd have to probably read the manual, see which setting it would be."

Paladino had the camera again. He said, "I'm afraid to read anything else right now."

"Yeah, well that's fine. Don't do. Yeah, just shut it off."

It was good advice. But with their attention again focused on the cockpit, the pilots still did not notice that the transponder was on Standby. Another warning they missed was a small sign saying tcas off, shown at the bottom of each pilot's Primary Flight Display, the screens they would have referenced for basic flight control had the autopilot not by law been handling that chore. tcas stands for Traffic Collision Avoidance System. It is a nested safety device independent of Air Traffic Control that converses electronically with other airplanes in flight, and in the case of imminent collision alerts the pilots of both

flight, and in the case of imminent collision alerts the pilots of both airplanes and negotiates a solution—typically instructing one crew to descend and the other to climb. It is required equipment in almost all airliners and jets, and is considered to be so reliable that its instructions supersede those of air-traffic controllers. It works, however, only between airplanes with active transponders. In the Legacy cockpit, therefore, the tcas necessarily dropped out when the transponder switched to Standby. Again, there were no warning chimes. But as a consequence the Legacy was now flying blind to the presence of other airplanes, and was itself invisible to their otherwise functional tcas displays.

Lepore said he needed to use the toilet. He twisted out of his seat, saying, "How the fuck do I get back?" and left the cockpit. He must have been waylaid by the passengers, because he was gone for almost 17 minutes. During that time Paladino had some peace. The jet was fast approaching the limits of Brasília's airspace. Two transmissions came over the radio, both from distant airplanes in Portuguese. Paladino spoke once to himself. He said, "Fuck did I put my glasses?" For long minutes afterward the radio was silent. Paladino must finally have wondered why, because at last he attempted to raise Air Traffic Control. On the frequency 125.05 he radioed twice, "Brasília, N600XL." When he got no reply, he began to "shop" the other frequencies listed on the navigation chart, systematically giving each frequency two tries, for a total of 12 calls over a period of five minutes. It is now known that none of the calls got through to de Alencar, and for a variety of reasons, including that some receivers were simply switched off at Brasília Center, and that by a vicious fluke at least two of Paladino's calls were blocked by other airplanes transmitting at the same time.

By chance, Paladino's attempts to raise Air Traffic Control left the Legacy's radio on a frequency which de Alencar then used for his final attempt to get through. As a result, de Alencar's voice suddenly came across the Legacy's radio, instructing the flight to check in with Amazonia Center, the facility at Manaus. De Alencar radioed, "N600XL, Brasília blind. Contact Amazonia Center, 123.32. If unable, ah, 126.45. N600XL." His English was accented but clear enough—or almost. The record shows that three minutes remained. If Paladino had fully understood the call, he would have switched to Manaus's frequency and checked in with a routine report of the Legacy's altitude. It is possible that the Manaus controller, who had been working the Gol flight at 37,000 feet and had just handed it off to Brasília, would have had the reflexes and skills to turn the Legacy, or get it immediately to descend or climb. But Paladino did not wholly hear the new frequency. He responded to de Alencar, "No, just trying to reach you. I'm sorry, what was the first frequency for N600XL? 1-2-3.… I didn't get the last two … " There was no answer. Paladino tried several more times, but without success. Lepore returned to the cockpit and strapped himself in. He said "Sorry," about his absence. Paladino explained the trouble they seemed to be having with radio communications. They began experimenting with frequencies, expecting eventually to raise Manaus.

Maybe a minute remained. The Boeing was approaching fast from about 30 miles away. As a narrow head-on silhouette it would have been hard to spot had the Legacy pilots been looking outside. Furthermore, because of illusions associated with the curvature of the earth, the oncoming airplane would have appeared to be significantly higher until the last few seconds before impact. For the Boeing pilots, spotting the Legacy would have been harder still. The captain was one of Gol's most seasoned men, a line instructor named Decio Chaves Jr., who at age 44 had logged 14,900 hours in flight, nearly a third of them in the latest 737s. His co-pilot was Thiago Jordao Cruso, aged 29, an advanced apprentice with 3,850 hours. The 737 they were flying was fresh from Boeing's production line and had been in service with Gol for merely two weeks. The flight south so far had been routine, with the airplane cruising on autopilot, at all times exactly where it was supposed to be. The pilots spent much of the flight looking through photographs of their colleagues and friends. About 10 minutes before the end, a flight attendant entered the cockpit for a flirtatious chat. She asked them if they had seen a video of Brazilian model Daniela Cicarelli having sex on a beach. One of the pilots said, "Love, come here. Can you bring something like that for us?" They laughed. As she was leaving, the pilot called out, "Come back, my love!" Soon afterward the controller in Manaus gave them a frequency change to Brasília Center and instructed them to delay checking in until they got to a certain waypoint a few minutes ahead. The pilots switched to the new frequency and, in an odd twist to the story, heard de Alencar's last broadcast to the Legacy—clearly audible on the Boeing's cockpit voice recording—because the controller had shotgunned it across multiple frequencies simultaneously. The Boeing's pilots did not, however, hear the Legacy's requests for clarification, which Paladino made across a frequency that they were not on. It would not have mattered anyway. The Boeing's tcas was clear. The pilots had no reason to suspect that the Legacy was near. They continued to look at pictures. There was one of a pilot named Bruno, of a marathon, of a waterfall, and of a *quati*—a funny four-legged creature that had torn into some bags.

The Legacy came streaking at the Boeing about 30 feet to the left of the fuselage and 2 feet lower. The displacement was infinitesimal on the scale of the sky, and a measure of impressive navigational precision. The Legacy's winglet acted like a vertically held knife, slicing through the Boeing's left wing about halfway out and severing the wing's internal spar. The outboard section of the wing whipped upward, stripping skin as it went, then separated entirely, spiraling over the fuselage and demolishing much of the Boeing's tail. In the Boeing's cockpit the sequence sounded like a car crash. Instantly the Boeing twisted out of control, corkscrewing violently to the left and pitching straight down into a rotating vertical dive. The cockpit filled with alarms—an urgent klaxon and a robotic voice insistently warning, *Bank angle! Bank angle! Bank angle!,* as if the crew might need the advice. Back in the cabin the passengers screamed and shouted. The pilots reacted as one might expect, fighting desperately to regain control. They probably did not know what had gone wrong. They certainly never mentioned it. What is unusual is that they also did not swear. Ten seconds into the dive, one of them did cry "*Aye!,*" but the other urged him to stay calm. "*Calma!*" he said, and seconds later he said it again. If pilots must die in an airplane, all would choose to finish so well. Of course these two knew they were gone, but they did what they could, even extending the landing gear to slow the dive. The gesture was hopeless. Twenty-two seconds into the plunge the airplane's over-speed warning came on with a rattle that continued to the end. Forces inside the airplane rapidly grew until, 30 seconds into the dive, they exceeded four Gs—the gravity-load threshold beyond which some passengers must have begun to black out as the forces drained blood from their minds. Maybe they were the lucky ones or maybe it didn't matter. In the cockpit the pilots kept trying to fly, struggling with the controls and exchanging a few words which are impossible to discern over the bedlam of alarms. Forty-five seconds into the dive came another "*Aye!*" Seven seconds later, at 7,000 feet, the Boeing broke into three parts, which plummeted in formation into the forest below.

A One-Man Show

In the Legacy the collision sounded like a snap. Lepore grunted as if he had been punched in the gut. The airplane rolled left, and the autopilot disengaged with a robotic warning and three chimes. Lepore grabbed the controls. He said, "What the hell was that?" He sounded swamped in adrenaline. Paladino for his part sounded pumped up for the game. He said, "All right, just fly the airplane, dude! Just fly the airplane!" He checked the cabin pressurization. He said, "It's not … We don't have explosive decompression." He may have thought that Lepore was shaky, or that on the basis of his own greater experience with that category of jet he perhaps should take over. He said, "You want me to fly it, dude? You want me to fly it?" Lepore did not hear the question, or he chose not to answer. The Legacy was badly out of whack, insisting on rolling to the left, and requiring Lepore to hold the controls a half-throw to the right just to maintain wings-level flight. He was handling the airplane well enough. But he was extremely anxious. He said, "What—we got fucking hit?"

Paladino said, "I dunno, dude. Lemme fly it."

Lepore acquiesced. Paladino then not only took the controls but assumed command. This passed unsaid between the two men. Paladino was decisive. Lepore had not completely folded, but under the stress his mental processes had slowed. Paladino said, "All right, declare an emergency," and Lepore hesitated over the most basic frequency known. He asked, "What is it, twenty-one five?" Paladino said, "Yeah, twenty-one five." That exchange placed Paladino firmly in charge. He said, "Whatever the fuck that was … we have to get down."

Lepore said, "Go!" A passenger came to the cockpit and said, "You know we lost a winglet?" Lepore said, "Did we? Where the fuck did he come from?" To the passengers back in the cabin Paladino said, "All right, we're going down! We're declaring an emergency! Sit down!" Breathing heavily into his microphone, Lepore made the first emergency call to Air Traffic Control. There was no response. Paladino pulled the throttles back and pushed the airplane into a descent. The left winglet had torn away, leaving a jagged stump, the left wing had bent upward, and along its upper surface some of the skin was separating from the internal structure. The passengers could see the heavily deflected aileron necessary to maintain control. What they could not see was that the Legacy's tail had been hit as well.

From the cockpit none of this damage was in view, but the pilots knew that the airplane was badly wounded and might at any moment die. They needed to land as soon as possible, but to do that they had to descend to low altitudes, where if they were not careful with airspeeds the thicker air might tear the plane apart. Paladino said, "Want to keep the speeds low." But he also knew that if he got too slow he might lose the ability to control the roll. Someone whispered "Fuck it!" into a microphone. At that very moment the Boeing hit the ground unseen somewhere behind and below. Paladino pushed a button on the Flight Management System and found that the nearest airport lay 100 miles ahead. The airport was identified by its four-letter code, SBCC, whatever that meant. For all they knew it was a jungle strip of the sort that missionaries use, and completely inadequate for a Legacy. They needed more information, like field elevation and runway length. Paladino said, "I got the nearest airport right there. Look that up if you want." Looking it up might have been possible electronically, but they did not know how. Somewhere they had paper charts that might contain the information. Breathing hard, Lepore asked, "It was books on your side?" Paladino said, "Yeah, no, yeah, I got it." Lepore reached again for the controls, saying, "I got the … " Paladino wouldn't have it. He said, "Let me just fly the thing, dude, 'cause I just think … "

Lepore said, "Where the fuck did he come from?"

Paladino said, "Did we hit somebody? Did you see that? Did you see something?"

Lepore was hesitant. "I thought I saw … I looked up … " He made another Mayday call, but remained behind the game. Struggling to look up information about the nearest airport, he said, "What is it … S?"

Paladino answered, "S-B-C-C. We'll just go direct to it."

"I don't know if it's big enough."

Paladino said, "I know. We'll just fly. We'll find out. Trying to contact these fuckers. They won't answer the radio."

Lepore said, "S … B … C … C?"

Paladino said, "Yeah." Somebody gasped. Apparently Paladino had scanned the displays. He said, "Dude! [Do] you have the tcas on?"

Lepore said, "Yes, the tcas is off." There are two ways to understand the reversal in his answer—either that he was fumbling his words or that right after "Yes" he finally noticed the warnings on the cockpit displays, showing that the tcas was off and the transponder was on Standby. From his intonation on the recordings it is impossible to tell. But far away on Air Traffic Control screens, at that moment, the airplane's transponder suddenly reappeared.

In the cockpit, the implications of an inoperative tcas would have been obvious: the airplane would have been electronically invisible to other airplanes in flight, and would itself have been blind. For 10 seconds neither pilot spoke. Then Paladino said, "All right, just keep an eye out for traffic. I'll do that, I'll do that, I'll do that. I got that."

Read Alex Shoumatoff on another Amazon tragedy, The Gasping Forest, May 2007. *Photograph by Jonas Karlsson.*

The descent was a one-man show. It lasted about 20 minutes. While Paladino flew the airplane, Lepore struggled with the charts, trying to find information about the airport ahead. He never came up with much, except that SBCC is the identifying code for an airport called Cachimbo. He said, "I wish I had a fucking thing that I knew." He was frustrated and probably embarrassed. He had ceded a command which could not now be reclaimed. He continued to participate, but Paladino for his part kept taking over tasks that Lepore could have done. There was something overreaching about this behavior, as if Paladino had been waiting years to show his mettle, and would not now be denied. He was worried about dying—as much as anyone aboard. But he was a soldier with a battlefield promotion, and engaged in the fight of his life. On the recordings his exhilaration is clear.

A dangerous landing lay ahead. There was no telling what the extension of flaps and wheels would do. The control forces already were high, and Paladino was afraid to relieve them with trim. When he tried to slow below 230 miles an hour, he had a harder time maintaining wings-level flight, and had to accelerate again. This was bad. They descended through 10,000 feet. The salesman Henry Yandle came forward and stood by to help. At high altitude a passing Boeing 747 cargo flight had answered the Mayday call and was talking to Air Traffic Control on the Legacy's behalf, trying to extract information about Cachimbo. Paladino felt the control forces getting heavier. He sent Yandle back to see if the wing was coming apart.

Lepore said, "We may just need to get on the ground." He meant, no matter what kind of runway they found, or if they found none. A forest landing would likely kill the pilots, but might allow some passengers to survive. He said, "I hate to say this."

Paladino answered with a clipped, soldierly "I understand that."

Cachimbo lay 21 miles ahead. Paladino had accelerated to 275 miles an hour and was trying to slow. Speed control was difficult, perhaps because of damage to the tail. The air below 10,000 was Amazonish—thick with smoke from forests being fired to clear the land. Paladino was fighting to raise the nose. "I'm not sure if I can get this thing slow, I have to be honest with you. So I'm gonna have to come in fast." Lepore said, "Come in fast, and we'll just do what we can." He seemed to be better now. Yandle returned with news that the damage did not seem to be spreading.

They spotted the airport ahead, a slash in the landscape, discernible to the practiced eye. As they approached they saw that it was a single paved runway and apparently long, oriented at a sharp angle to their direction of flight. The question of why such a runway exists in the middle of the jungle did not arise. But it is a military field, built by the air force for its own reasons and maintained complete with a control tower, however rarely it is used.

The stricken Legacy overflew Cachimbo high and fast just as the 747 provided it with a frequency with which to contact distant Manaus. This led Lepore into a wasteful exchange with an irrelevant controller, who at least finally provided the frequency for the Cachimbo control tower. Sitting in his glass booth, presiding over a dormant field with no other airplanes in motion, the tower controller then occupied Lepore with his own confusions. Eventually he cleared the airplane to land, as if he had a choice in the matter. Those pilots were going to put the airplane on the ground regardless. That turned out to be quite difficult to do—a piece of flying that pushed Paladino and Lepore to their limits, and probably the Legacy as well. The problem was the damaged airplane's inability to slow and its limited ability to bank to the left, a condition compounded by poor visibility aft from the cockpit, and burdened by the controller's chatter as well as a chorus of automated alarms triggered by the airplane's necessarily unusual configuration. But Paladino flew well, and Lepore took up the slack, and in the end they landed safely at Cachimbo, doing more than 200 miles an hour over the runway threshold, touching down firmly, then braking hard to bring the airplane to a stop. In the cabin the passengers cheered and clapped.

Lepore said, "Good job, good job, funny, good, we're good."

Paladino said, "Fucking we're alive!! fuck you!!!" It was a victory cry, a shout of exuberance and relief. He laughed ferociously.

Lepore laughed less strongly. "Fuck you!" he agreed. "Good job, good job."

The controller instructed the Legacy to taxi to the ramp for parking. Paladino gave the controls to Lepore. He said, "I'm sorry, dude. I didn't mean to do that to you." Briefly they talked over each other. Lepore escaped by radioing thanks to the 747. But as they slowly taxied in, Paladino got back to his apology. "Hey, I'm really sorry."

Lepore said, "Nothing to be sorry about, man."

"I didn't mean to … "

"Don't … "

"I know the speeds, I know everything about … "

"Don't you worry about anything. I'm not … "

"I just want you to understand, you're the captain."

"I don't have … Don't … Believe me, I'm the last person you need to talk to about shit. I mean, it doesn't matter to me. It was perfectly … "

"I didn't mean to come across like that. I was just trying to think of what to do."

Lepore said, "I'm more worried about my friggin' … "

Paladino finished for him. " … life."

It was an awkward exchange. But the greater problem, now sinking in, was the reality of a collision at 37,000 feet. Lepore especially was disturbed. He kept coming back to the consequences. When one of the ExcelAire executives, Ralph Michielli, came forward, he said, "Fuckin' A, Ralph! What the fuck?"

Michielli said, "What if we hit something else? I mean, we were at the proper altitude … "

Paladino summarized the situation just prior to the impact. He did not mention the transponder or tcas. Accurately enough he said, "The guys forgot about us. Previous frequency had completely forgotten about us. And I started querying them. 'This is not right. I haven't talked to anybody in a long time.'" He did a verbal shrug. "We're alive."

Lepore said, "Yeah, but I'm worried about the other airplane. If we hit another airplane. I mean, what else could it have been?"

Paladino agreed. "At 37,000 feet? Yeah, it was a hard hit, though, whatever it was."

That evening at dinner on the air base they got word that a Boeing had disappeared. A search was under way. An English-speaking official from Manaus called the base for a preliminary interview with the Legacy's captain. Lepore took the call. Brazilian investigators have told me that Paladino was standing beside him as he spoke. The call was taped by the Brazilians. On the phone Lepore confirmed that the collision had occurred about 100 miles from Cachimbo, when the airplane was level at 37,000 feet.

The official asked, "Level at 370?"

"Level at 370."

The official said, "O.K.! And the tcas system was on?"

Lepore said, "No."

The official said, "What? … Hello?"

Lepore said, "No, it wasn't."

"No tcas."

If Paladino was there, one can only imagine his reaction. A voice can be heard insisting that the tcas was on. Replying again to the official Lepore said, "The tcas was on."

"O.K., was on? But no signal was reported."

"No, no, we didn't get any, uh … any warning, no."

With that conversation, the Brazilian government took the first step in a process of bringing criminal charges against Lepore and Paladino, essentially for reckless flying. Though safety experts deplore it, the criminalization of airplane accidents is a growing trend worldwide. It led in this case to Lepore and Paladino being detained in Brazil for two months, after which they returned to New York, where they now fight the charges from a stubborn distance, still flying for ExcelAire, but only within the United States, lest Brazil try to grab them abroad. Big law firms represent the victims, the operators, and the manufacturers in civil lawsuits, and as with every air disaster the fighting among them will go on for years.

ExcelAire and the pilots have hunkered down into a defensive position, whose general outlines can be anticipated: the pilots did nothing improper or illegal, and despite all the circumstantial evidence to the contrary, the Legacy's transponder and tcas functioned correctly throughout the flight. According to this argument, the failures lay entirely within the Brazilian air-traffic-control system. Such a position would require an explanation of why the 737 did not show up on the Legacy's tcas, and why just after the impact, when Paladino questioned Lepore about the unit, the Legacy's transponder suddenly reappeared on air-traffic-control screens. Competent lawyers will probably come up with reasons.

In any case, on the evening of the accident the pilots did not suspect the nightmare that lay ahead. They were relieved about their survival. Perhaps they toasted it. But they were not callous about the fate of the dead, as is claimed by some of the victims' families. They are decent guys, ordinary workaday pilots. Like the people on the ground within earshot of the impact thunder, they did not sleep easily that night.

Listen to audio from the cockpit.

The Recovery

Several days later, when Megaron and his band of Caiapó warriors launched their aluminum boats into the Jarinã River, they carried no radio, no G.P.S., no electronics of any kind. They had gasoline for the outboard motors, some pots and pans, and a few machetes and axes. They did not ask permission. They were not assigned a route. They chose the Jarinã River because it runs in the right direction. They were confident navigators. They understood the importance of common sense.

The river carried them eastward. Eventually it brought them to the vicinity of the crash. They realized they were near when they saw an air-force helicopter hovering downsun ahead. They did not think that

the helicopter was an iron bug. They knew that it was bringing in soldiers and carrying away the dead. There was no need to code the location or punch up displays, no need to submit their minds. They simply stayed in their boats until the river could take them no closer. There they made camp on the riverbank and spent the night. In the morning they set out to cut a trail to the crash site, a distance of about two miles. The jungle was especially dense, but with 23 men to swing machetes, in the afternoon they arrived. They had slopped around along the way, but in the end their accuracy was fine.

House of War, December 2008

City of Fear, April 2007

Rules of Engagement, November 2006

More ...

The site smelled of jet fuel, which had soaked into the soil and spilled into two small streams that flowed through the forest there. It also smelled of death, or more accurately of organic decomposition, which in the heat was well advanced. Perhaps a hundred soldiers were at work, expanding a helicopter landing zone, and collecting and bagging the victims. They had built a camp out beyond a cluster of wreckage from the Boeing's wings, where the landing gear could be seen still desperately extended. The main wreckage lay just to the north in a dispersed chaos of torn and twisted metal, shattered machinery, bent hydraulic lines, tubes, wiring harnesses, cockpit displays, cabin seats, and all the transported contents of the airplane—a sad spillage of luggage, purses, briefcases, clothes, medicines, cosmetics, photographs, trophy fish that sportfishermen had been hauling home from Manaus, and thousands of computer parts that the Boeing had been carrying in its cargo hold and that now littered the forest and slumped into a stream. The debris had dug into the earth on impact, and had drawn trees and branches into the tangle. The condition of the dead should be left unsaid, except to note the mercilessness of the slaughter, and the fact that after Gol Flight 1907 hit the ground hardly any corpse remained intact. Carnivorous tigerfish had braved the poisoned streams and were feeding on flesh that had fallen into the water. This is what happens when a wing is severed in flight. The Caiapós are warriors, perhaps, but they were deeply disturbed by the scene.

They did what they could, mostly by swinging axes to expand the landing zone. For the main work of collecting and tagging the human remains, they lacked the necessary skills and equipment. After a few days the air force asked them to leave. They understood—or later claimed to me that they had—but rather than fully comply, they withdrew to their camp by the river, where they built shelters and settled in for an indeterminate stay. As they saw it, this was their forest, and they were its guardians. Their stewardship didn't amount to much by Christian standards. The recovery effort lasted two months, while the soldiers struggled to reclaim and identify every last occupant of the Boeing, probing the ruins under difficult conditions, heavily garbed against disease and aggressive bees. During all that time the Caiapós stood by, visiting the site each day, but staying out of the way. One afternoon at the river camp three settlers appeared in a dugout canoe, drawn by the universal impulse to gawk at disaster. The Caiapós protected the site by sending them away. They did nothing about another impulse at play, which led some soldiers to pocket the watches, jewelry, and other valuables that they found. Perhaps the Caiapós didn't know, or perhaps they didn't care. Internally their agenda had more to do with souls than possessions. After the air force finally left, the Caiapós danced among the Boeing's remains, and with their shaman's guidance began the long, gentle process of reaching out to the dead.

When I met the men who had done this work—Megaron, the shaman, and several others—more than a year had gone by. They were angry that the Boeing still lay in their forest, and apparently would never be removed. Sitting in their council space in the shade of trees, I asked them why they cared. They said it was because of the damage being done to the environment. This was the message I was supposed to convey. I answered, however, that airplane wreckage is largely inert, and that operations to remove the Boeing would make things worse. Megaron was not convinced. He wanted a full-blown environmental-impact study performed. He and the shaman seemed to have an employment program in mind.

We spoke about the collision itself. They knew that American pilots were involved, and they assumed that I would take their side. I answered that it is pointless to use this accident for nationalisms of any kind. Certainly blame should be assigned, some to individuals directly involved, some to cultures in aviation and beyond. You can include the Brazilian generals who insist on militarizing Air Traffic Control, and the sort of software engineers who make even digital cameras tedious to figure out. You can include the corrupted tax structures that allow airplanes as questionable as the Legacy to be built, sold, and flown. You can even include Business Jet Traveler for wanting to ride along. But assigning blame can only go so far. Ultimately the accident leaves you to ponder a paradox associated with progress and modern times. I asked the Caiapós to consider that in all the sky above the forest only these two airplanes had been in flight. It was as if in a space the size of the Caiapó village—no, all the way out to the road—you had shot two arrows in opposing directions, and they had collided. What were the odds? In the past it never would have happened. Even if you had assigned them identical flight paths, the arrows would have passed some distance apart because of the inherent inaccuracies of flight. But now better feathers have been invented, and have become required equipment for the high-speed designs. As a result, the new arrows are extraordinarily accurate, which allows more of them to be shot around, but with increasing reliance on tightly coupled systems of control. The sky is just as big as it ever was, but the margin for error has shrunk. And when the systems fail? That is what happened over the Caiapós' land. The paradox was precision. Mistakes were made, the Devil played, and two arrows touched nose to nose.

William Langewiesche is *Vanity Fair*'s international correspondent.

William Langewiesche

William Langewiesche is *Vanity Fair's* international correspondent.

SEE MORE BY WILLIAM LANGEWIESCHE »

Cocktail Hour

Our essential daily brief on culture, news, and style.

ENTER YOUR E-MAIL

Your e-mail address

SIGN UP

By signing up you agree to our User Agreement and Privacy Policy & Cookie Statement. This site is protected by reCAPTCHA and the Google Privacy Policy and Terms of Service apply.

Sponsored Links by Taboola

These Barefoot Shoes are Leaving Neuropathy Experts Baffled
Bandion Vitality

Doctor Designed Sandals Will Change Your Life.
Lifeyi
Get Offer

Rob Gronkowski Chooses These Shoes As His Favorite
Wolf & Shepherd
Learn More

The Shoe Orthopedists Swear by for Pain Relief
Bandion Vitality

Seniors on SS Are Now Entitled To These 12 "Kickbacks" In April (Tap...
SmartPassyClassic
Learn More

The Bra Designed by A 70-year-old Grandma Is Taking California By Storm!
Lifeyi
Get Offer

~~$2.50~~ $1/mo for 1 year + a free tote.

Join now ›

Limited Time Offer - ~~$2.50~~ $1/mo for 1 year + a free tote. — SUBSCRIBE