# RHYMES AND REASONS

"Far out!" And was it ever. Henry John Deutschendorf, Jr., age 53, in typical fashion, did not bridle his enthusiasm about the glistening new LongEZ experimental plane on the tarmac at the Santa Maria Airport in California. It was the perfect aircraft for a man born in Roswell, New Mexico, of all places, the son of a U.S. Air Force test pilot. The plane was audacious, personal, and, well, a real spaceship. John, as he preferred to be called to avoid confusion with Henry John Sr., like his father had flown a lot of airplanes through the years, but this exotic number might turn out to be the best of all — fast, definitely eye-catching, and a blast to fly. Dad would have been proud.

New? No, not exactly. The LongEZ wasn't actually new, but the fresh paint job by the local refurbishing shop shined as white as the sun on new mountain snow and looked as slippery as a sheet of melting ice. Subtle multicolor accents on the wing-mounted cargo pods made a classy finishing touch — not so small as to go unnoticed and not so large that they detracted from the striking futuristic form of the Y-shaped composite airframe sitting on the pavement in the full morning sun. This LongEZ looked like an instrument sculpted by segmented porcelain insects on a distant planet, designed to propel an earthly being or two through the atmosphere at breakneck speed for over 1,000 miles, a craft he had wanted to fly and own more than any other. And own it he did. His new FAA call sign was up on the tail where it belonged, painted in crisp block letters. It





read N555JD. Yep, there was simply no other way to say it. This plane — his new plane — was "Far out!"

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The "JD" on the call sign was not, of course, for Henry John Deutschendorf, Jr., the name given to him by his parents back in Roswell and the name on his pilot's license. Everyone in this little corner of this little airport a few miles from the coast here in Central California knew who was on site and who now owned this Rutan-designed LongEZ experimental aircraft. It was none other than the famed John Denver — songwriter, singer, environmentalist, and lifelong aviation enthusiast. He had searched high and low for a LongEZ of his own and now he had it.

Unlike the other 1200 pilots and craftsmen who had acquired the plans and toiled away for years in garages and hangars across the country and around the world, John Denver never had the time or the inclination to build one of these so-called homebuilt experimental planes on his own. Given his demanding schedule and the money he had in the bank, it made so much more sense to go out and find one in good shape and buy it. And that is what he had done just a few weeks before on September 27, 1997. The previous owner lived in the pastoral western community of Santa Ynez, less than an hour's drive down Highway 101. John had taken a ride in the back seat, just as he had done on a few other rides in the LongEZ, and decided that this was the plane for him. The aircraft had been delivered to the shop in Santa Maria, inspected, cleaned, sanded, re-painted, and flown, and was now ready for its new celebrity owner. John was back in town to pick up the refurbished plane, take his checkout flight, and be on his way back up to Monterey for a game of golf with friends tomorrow morning and then

more practice with the plane over picturesque Monterey Bay and Carmel-By-The-Sea in the afternoon. The weather along the coast was great, the people were friendly, and the plane was ready to go.

This little white aircraft was ideal for transporting him across country from one gig to the next, and piloting the LongEZ through the Rockies back home was something to look forward to. The plane was so much more maneuverable and faster than most of the other single-engine alternatives and, with the pusher propeller well behind the cockpit instead of out front where it would obscure the view, so much more enjoyable to fly. Nothing would lie between him and the whole world except the pointed white nose and small forward canard. Flying N555JD over the breathtaking Pacific shoreline or through the alpine passes and valleys in Colorado would be the real-life incarnation of the child's joyous dream — gliding effortlessly from fencetop to fencetop with arms outstretched, propelled magically by thought in any direction through space.

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N555JD LongEZ experimental, the complete and proper name for this specific plane resting on the concrete, was solidly built, well maintained, and capable of everything it was originally designed to do, a plane made for the person consumed with flight and the machines that make it possible. That word "EXPERIMENTAL" stenciled under the pilot's canopy was an important one, however, and meant that many key features of this plane lie outside the rules and restrictions imposed on common production general aviation aircraft. Despite the fact that the LongEZ design was immensely popular and numerous — more numerous, in fact, than many mass-produced production models — the Federal Aviation Administration still





considered it beyond the purview of many of its regulations. These "builder-pilots" were the ones putting their lives on the line in their own handmade flying machines, the FAA reasoned; so they were treated with a special set of rules, rules requiring airworthiness and licenses, but rules that allowed considerable design flexibility by the maker and preservation of the fiercely-guarded independence of the so-called "homebuilder."

This particular LongEZ, N555JD, had been hand built in Texas some years before. Like each and every one of the other 1200 LongEZs now flying, this plane was unique in its construction, something to be expected when the same paper plans are executed a thousand times over by hundreds of individuals instead of by a single aircraft factory where consistency in manufacturing and assembly is of paramount importance. It was the builder of this kit aircraft who determined exactly just how much fiberglass and resin to apply to the structure during construction, how much to sand here and there, the amenities and high-end instrumentation in the cockpit, and exactly where to position a display or a control.

The creator of the original design specified every necessary detail in the plans. However, as just about everyone in the aircraft business knew, homebuilders were an independent-minded bunch and often had their own ideas about how certain design details should be carried out. Many homebuilders, including the builder of N555JD, liked to incorporate improvements into the designer's plans, changes that might, at least in their eyes, enhance safety, reduce complexity, improve performance, or just look cool. When finished in Texas in 1987, N555JD LongEZ was structurally sound in the common sense of the term and capable of everything it was required to do. But the plane had a handful of characteristics that made it slightly unusual, especially for a pilot not well rehearsed in the operation of the controls and displays, a pilot who, based on considerable

experience with mass-produced aircraft, expected certain things to work in certain ways.

Unlike a creature selected for flight by eons of evolutionary forces, a man and aircraft fly by operating in concert in a system of inputs and outputs between the living and inert, inputs and outputs traveling across the man-machine interface — from the man to the machine and from the machine to the man. It is the interface that makes this system of interworking elements unique, and it is the interface that so often determines the degree to which the system does or does not do what it is intended to do. This beautiful experimental aircraft — this plane that was so capable of everything it was built to do — would soon render one particular and very capable pilot quite incapable of everything that was required of him. This pilot, this lover of flight, this man of song and nature and boundless energy — this man of rhymes — would soon meet his fate for the simplest of reasons.

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As famous as John Denver in his own right, renowned aircraft designer Burt Rutan of Mojave, California conceived the idea and drew the plans for the first LongEZ in the late 1970's. The unconventional approach and overall shape of the plane and its older sister the VariEze sent ripples through the aviation design world and established Rutan as perhaps the most innovative airframe designer around. The concept was just a hint of Rutan's genius in years to come when he and one of his imaginative teams out in the barren desert near Edwards Air Force Base built *Voyager*, the first aircraft of any kind to be flown nonstop and unrefueled around the world. Although considerably larger than the LongEZ, *Voyager* employed many of the features Rutan had incorporated into the VariEze and





LongEZ: a unique shape, composite fiberglass foam structure, low weight, smooth laminar-flow wings, vertical winglets, low drag, canards, and a pusher propeller (and, in the case of *Voyager*, a second propeller in front). *Voyager* ended up hanging from the ceiling in the sacrosanct halls of the Smithsonian National Air and Space Museum in Washington, D.C., and Burt Rutan continued on with his unequaled career designing some of the most innovative flying machines — and spacecraft — ever imagined.

John Denver's particular LongEZ officially came to life on June 12, 1987 when an FAA Airworthiness Inspector from the Houston Flight Standards District Office issued an airworthiness certificate to builder Adrian D. Davis, Jr. Davis had constructed the kit plane using Rutan plans and had submitted the approval application in the amateur-built, experimental category the previous month on May 5. The inspector, after completing the appropriate review of the new plane, checked the box on the application stating "I have found the aircraft described meets the requirements for the certificate requested." The inspector also included a "letter of operating limitations," however, noting that "This aircraft shall contain the placards, listings and instrument markings required by FAR 91.3" (subsequently redesigned 14 CFR 91.9), which stated that key controls and displays were to be clearly identified and marked to aid in their intended operation and that a pilot was to comply with such labels and markings. The inspector had identified a somewhat minor deficiency considering the overall state of completion of this homebuilt, but, for whatever reason, all of the required "placards, listings and instrument markings" were not incorporated into N555JD LongEZ after the airworthiness certificate was issued.

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Back on the tarmac at the Santa Maria Airport, John Denver approached the plane with Roger, his checkout pilot and mechanic. Roger was the same pilot who had taken John for a backseat ride in September and who had transported the plane up to Santa Maria from Santa Ynez for refurbishing. The rocket-like fuselage of the LongEZ was compact and narrow. About two feet back of the pointed front end was the canard, looking something like a 2-by-12 plank inserted through the nose; the elongated bubble cockpit cover began another couple of feet behind that. The pilot's seat was up front and had a high head support that extended almost all the way up to the top of the tinted canopy. Immediately behind the pilot's seat was a bulkhead and behind that a separate passenger compartment. Behind the passenger seat was a floor-to-ceiling firewall and next the engine, a high-output Lycoming O-320-E3D that produced 150 hp. It could push the plane up to 235 mph — making N555JD one of a handful of LongEZs that could attain such speed. Long-swept wings with vertical winglets at the ends and large fuel tanks in the extended wing roots were perhaps the most distinguishing feature of the airframe. Aerodynamic drag reduction was the key to achieving high speed on a compact powerplant, and everything about the shape, especially the overall pusher propeller design, suggested how efficiently it would slip through the air.

There were three landing wheels at the end of spindly mounts, two in the back under the wings and a third in the nose under the canard. The rear landing structures did not retract and were tall enough to ensure that the pusher propeller behind them would not come in contact with the runway during takeoffs and landings. The nose gear was equally tall, but retracted cleanly into the fuselage after takeoff. When fully parked on the ground, the front landing gear could be pulled up into the nose of the LongEZ, which was then dropped down to





rest on the pavement, putting the entire plane in an interesting kowtow position.

John and the checkout pilot, both standing next to the plane to make things easier, reviewed the aircraft and its systems, discussing the repainting, the change in the registration number, and basic maintenance. N555JD was nicely decked out for a homebuilt. It had an electrical starter, an electric force bias trim system for both the pitch and roll axis, an electrically actuated speed brake that deployed from the fuselage belly, and a single axis roll autopilot. The control stick containing the electric trim and speed brake switches was located along the right side for right-hand operation.

The two 26-gallon fuel tanks were located on either side of the passenger cockpit, one in each of the wing roots. Each tank was shaped to fit within the unusual form of the wing next to the fuselage. As John had seen during his earlier test ride in the back seat the previous month, the fuel indicators were on the left and right walls of the passenger cockpit, behind the pilot. They were simple sight gauges, each a column of glass filled with fuel and a little floating red ball. With the plane sitting level (or in level flight), the position of the ball displayed the level of the fuel in the tank. But, due to the varying shape of the tank, there was a markedly nonlinear relationship between the height of the floating red ball in each sight gauge and the quantity of fuel in each tank. Pump a few quarts of fuel in each tank — enough to fill the sump and then some — and the ball floated above the bottom of the sight glass; pump in 26 gallons and the little red ball floated all the way up to the top. The fuel sight gauges were not labeled and there were no scale markings, but it all seemed easy enough to understand.

One slightly tricky part was reading the fuel indicators if you were flying without a passenger. Some LongEZ pilots said that they could see the sight gauges from the front pilot's seat by

loosening their waist and shoulder straps and craning their heads around to catch a glimpse of the display on each side wall of the rear cockpit. Most just checked the fuel level of each tank while still on the ground rather than trying to read the displays while in the air. Besides, many LongEZs, including N555JD, had a supplemental fuel monitoring system like the *Fuelwatch* device in N555JD that displayed the fuel burn rate and fuel remaining. Use of the device, however, required that it be reset each time fuel was added, something the checkout pilot informed John he had not done due to his lack of familiarity with both the interface and the procedure. Accordingly, John would have to rely on good estimates of the fuel on board when he took off, his flight plan, the floating balls in the sight gauges, and worst-case estimates of fuel consumption until he figured out how to set and use the fuel monitoring instrument.

Each fuel tank was filled from a separate spout on each wing root. The fuel line from each tank was usually routed to a valve in the cockpit — and then back to the engine. As on many aircraft, the pilot selected the tank from which the engine would draw fuel — left or right. Burt Rutan's plans for the LongEZ called for the fuel lines from each tank to be routed up the underside of the fuselage to a valve mounted on the underside of a console directly in front of the pilot, between his legs, and just aft of a small window providing a view down to the landing gear and the earth below. The line out of the valve ran aft, under the console, under the pilot, under the passenger compartment, and back to the engine.

Logically, Burt Rutan's design specified that the little valve handle on the console in front of the pilot be set up so that it was turned to the left to draw fuel from the left wing tank and turned to the right to draw fuel from the right wing tank. The "off" position, in which no fuel would be drawn from either tank, was straight back. Rutan was not a human factors engineer or





ergonomist (one who specializes in the design of operator interfaces) but he knew a thing or two about the conditions in which a fuel selector valve might be used and how most pilots would expect it to operate: left is for left and right is for right. It seemed appropriately simple and straightforward.

Rutan was also fully aware of the dangers of having fuel lines running through or under the pilot or passenger compartment. A fire in a cabin, especially one as compact as on the LongEZ, was not something any pilot or passenger wanted to face in the air or on the ground. Accordingly, he designed the underside of the fuselage to withstand a major impact, such as might occur in a crash landing, to protect these lines from damage or rupture. Engineering is often an exercise in trade-offs, and Rutan reasonably balanced the need for an accessible control location with the consequences of running fuel lines near the cockpit. The stronger underside structure would add unwanted weight to the airframe, but provide the necessary margin of safety given the routing of the fuel lines up to the selection valve in front of the pilot.

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The location and operation of the fuel selector valve was one of the first things Roger discussed with John. The Texas builder of N555JD, Adrian D. Davis, Jr., had his own ideas about fuel lines and their routing within the aircraft. This ultimately influenced his decision about where to locate the fuel selector control. Rather than running the fuel lines from the wing up under the cockpit to a selection valve in front of the pilot and then back to the engine, Davis had routed the lines from the left and right tanks directly back to the engine compartment behind the passenger bulkhead in the back of the plane. This way, no fuel lines ran in or under the cockpit. Davis was not aware that

designer Burt Rutan had considered this factor and that the original plan with the strengthened underside provided the desirable margin of safety.

But with the fuel tank selector valve now in the engine compartment in the back of the plane, Davis had to devise some way for the pilot to operate the distant valve. The solution seemed straightforward, if not exactly attractive: a long steel and aluminum pole was connected to the valve behind the firewall over the left shoulder of the backseat passenger bulkhead and ran forward 45 inches across the side of the passenger compartment, just above shoulder level, up to the bulkhead behind the pilot's seat. A small handle protruded just within the pilot's reach in the cockpit, behind and over his left shoulder.

The change in orientation of the valve and in its position relative to the pilot meant that the simple control/response relationships envisioned by Rutan no longer applied. There were no labels for the control positions, so Roger showed John Denver how it all worked. To use fuel from the left tank, you had to turn the handle, positioned over and behind you, to the right. Turning the handle to the down position drew fuel from the right tank. The off position was straight up. John thought that it was a little confusing, especially considering that it wasn't easy to even see the control located back behind and over his shoulder. Reaching the handle and flying the plane at the same time was of additional concern. Like the single wrong note in an otherwise perfect melody, it had to be changed; he discussed with Roger his desire to have him reconfigure the fuel lines to bring the selector valve and handle up into position in front of the pilot as specified in the original Rutan design. The shop could certainly make that modification for him, replied Roger, and they discussed a date about a month away when John would drop off the plane for the necessary rework while he was on tour.





There was, however, one more thing that they needed to go over, and it had to do with how John would actually operate the control in flight. The fuel selector valve handle was now over his left shoulder and could be reached and operated only with the right hand. A valve handle forward and center could have been operated by the left or right hand. The trouble with N555JD was that you had to have your right hand on the stick while flying the plane, so operating the fuel selector valve with his right hand was going to be something of a trick. Roger had developed a strategy to deal with this situation, although he had deliberately avoided switching fuel tanks when in the air due to his own dislike of the arrangement. His technique was to loosen the full waist and shoulder straps to give you enough room to wiggle around, engage the autopilot, let go of the control stick with your right hand, twist around almost 90 degrees to the left, and reach for the fuel selector valve handle back over your left shoulder.

Knowing that he would get this whole thing straightened out in a month, but also aware that he was going to be flying LongEZ N555JD until then, John Denver wanted to work out the fuel switching procedure on the ground before going up. Sitting in the cockpit, he mentally rehearsed the steps necessary to operate the controls. He also realized that, due to his moderate stature and the fixed configuration of the cockpit, he had a little trouble depressing the rudder pedals fully. Roger retreated to the hangar and returned in a few minutes with a down-filled seat cushion to place behind John's back. This seemed to help. John was now moved up close enough to the pedals so that he could fully depress them. He was now, however, even a few more inches away from the marginally accessible fuel selector handle back behind his left shoulder.

With various ground preliminaries out of the way and his checkout pilot, Roger, in the back seat, John Denver started the

engine, obtained all of his clearances from the tower, taxied to the runway, pointed the nose upwind, and cranked up the throttle. In no time the wheels left the runway and the ground fell away below through the nose gear check window between his outstretched legs. The plane was a dream, sensitive to the touch, slippery, and maneuverable beyond all belief. He gained some altitude and eased into a long sweeping turn, all the while getting the feel of the controls. They turned back towards the airport as if on a large oval racetrack, made a nice long U-turn again, and set up for a little touch-and-go on the runway. With the runway coming up he eased back on the throttle and stick and gently sat the wheels on the deck, then gave it some more gas again and scooted off directly into another takeoff. Roger had him repeat the entire procedure once again, and then together they practiced some slow airspeed maneuvers out away from the airport, all the while communicating over the intercom and headsets that connected John in front to Roger in the back. John appeared to be doing just fine, and Roger had him circle around once again, line up, and bring the plane in for a final landing. It was a great first flight, if only a little short.

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His checkout flight completed, John packed his gear in N555JD and said his thank-yous and goodbyes to Roger and the folks at the Santa Maria airport. Back out at the plane, Roger told him that he had something on the order of 15 or more gallons of fuel on board, which was about twice as much as he should expect to consume in the hour-long flight up to Monterey. About one-third of the fuel was in the left tank and two-thirds in the right.

Sitting in the cockpit one last time before departing, John again asked Roger to go over the unmarked positions of the fuel





selector handle to make certain that he had it right. He had to remember that right was for the left tank, down was for the right tank, and up was for off. OK, he could remember that. And if by chance he should accidentally run a tank dry, the engine would "pop" loudly as it lost compression and quit. He didn't want to be changing tanks under such circumstances, but it was good to know that it could be done if by chance he used all of the fuel in one tank. With the fuel selector moved downward to draw fuel from the fuller right tank, John Denver obtained his clearances from the tower and departed northward to Monterey.

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It was always a difficult thing to explain to a non-pilot. There was something about mastering all of the procedures, navigation rules, instrumentation, and skills involved in flight that John found deeply satisfying and even relaxing. Perhaps it was that piloting was so different from songwriting. The latter required hours of stumbling through possibilities and the occasional moment of pure inspiration when lyrics and melody worked perfectly together; the former demanded discipline, order, and precise execution. It was also possible, of course, that his enjoyment of flight was due to the simple fact that he was raised on various Air Force bases in the 1950's, surrounded by all manner of powerful and exotic flying machines, or that it was often his father who was up in the sky in the pilot's seat as the loud jet roared overhead. At any rate, it didn't really matter. Flying was fun, he could certainly afford it, and piloting N555JD was a blast.

Many years before this day, John had reached and surpassed the level of skill one might call an expert. He was not one of those weekend flyers who spent a nervous Sunday morning looping around the same pattern in a Cessna 172. John Denver

was a highly experienced pilot, having logged more than 2,750 hours of stick time in everything from a glider, to a seaplane, to a Learjet. He had owned many planes and had once even flown a jet fighter — courtesy of his father and the Air Force.

LongEZ N555JD actually felt a little bit like that jet fighter, only smaller and so much lighter. It was certainly nimble, and it took only the slightest movement of the hand and foot controls to bank, climb, or dive. Unlike a conventional airplane where the rudder pedals were connected to a single vertical fin at the back of the plane, the LongEZ pedals controlled the two vertical rudders on the tips of the left and right wings. Pressing the right rudder pedal moved only the right rudder in an outboard direction, increasing drag and turning the plane with a right yaw. The two rudders were very effective at turning the plane, and, because they were tall and above the longitudinal center of gravity of the entire aircraft, rudder activation also produced a pitch-up moment along with the yaw. This required John to make a little downward pitch input on the stick in his right hand to keep the nose generally level whenever he turned using the pedals. Coordination was all part of flying through three dimensions, and it was great getting the feel of a new machine.

After his climb out away from the airport and once up to cruising altitude, John settled back into the loose seat cushion behind his back. It was nice of Roger to have found it for him in the shop. The cushion wasn't too uncomfortable, but again this was something that he would probably get changed at some point in the near future. This was, after all, now *his* airplane and he should set it up to his liking.

Off to the right down below was Highway 101. To the left was the productive farm land of the Santa Maria Valley and, beyond, the coastline and the Pacific. The little beach towns of Oceano, Avila, and Cayucos came and went below, as did San Simeon and serpentine Highway 1 along the Big Sur coast.





Within no time he was approaching the Carmel Valley up ahead. He had covered a lot of ground in under an hour. John Denver contacted Monterey airport, obtained landing clearance, and brought the LongEZ N555JD in for a smooth touchdown. He taxied to a hangar where he had made arrangements to park the plane indoors for the night. It had been a great day. Now it was time for some relaxation with friends, a good night's sleep, and a game of golf tomorrow morning followed by more practice with his new aircraft late in the afternoon.

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After a leisurely breakfast, John Denver enjoyed the scheduled game of golf on a spectacularly beautiful course and afterward moved on to a late lunch. There, he declined all offers of drinks from his friends, knowing the importance — and illegality — of such things given his plans to fly later that afternoon.

Back in the hangar where he had parked his LongEZ at the airport, he met up with a maintenance technician who offered a helping hand. They discussed the plane, as pilots like to do, and talked about the cockpit and controls. John mentioned the situation with the fuel selector valve handle, and the technician retrieved a set of vise grip pliers that they clamped onto the valve handle over the pilot's left shoulder to make the control a little more accessible and easier to turn. It seemed a bit of a kludge, however, and John decided that he would stick with the system as it was, rather than messing around with the vise grips. Should he need to change fuel tanks, which would be unlikely on his short flight, he would just turn on the autopilot, as he had discussed with the checkout pilot in Santa Maria, release the stick, and reach up and turn the valve over his shoulder with his right hand.

With the assistance of the congenial technician, John started working through his preflight activities. The flight up from Santa Maria the day before had consumed some portion of the roughly 15 gallons of fuel with which he had started out; the question, of course, was how much. He asked the maintenance technician about the fuel quantity in the right and left tanks. The mechanic looked over the open rear cockpit to inspect the sight gauges in the back seat. The red ball in the right tube was floating just below the halfway mark; the red ball in the left tube was floating just shy of a quarter of the way from the bottom. You have "less than half in the right tank and less than a quarter in the left tank." "Do you want to add fuel?" he asked.

John thought for a moment about what the technician had said, his flight up from Santa Maria, the two 26-gallon tanks, and his plans for the afternoon. With nearly half in the right tank and almost a quarter in the left, he reasoned, he should have plenty of fuel. After all, he was only going to do a few touch-and-goes and get out over the ocean for a little while. "No thanks," he said. He was going to be up for no more than one hour and did not need to take on fuel.

The interchange about fuel levels did, however, raise the recurring point about seeing the fuel sight gauges from the pilot's seat. The maintenance technician had another idea; he once again retreated for a minute and returned with a small shop mirror mounted on a long thin handle used to look around corners in tight spaces. John could actually see the two fuel indicators back behind him on the left and right walls of the passenger compartment while holding the mirror, but again it certainly wasn't optimal. He thanked the mechanic and stowed the mirror in the cockpit.

For the next twenty minutes, John Denver stepped through his preflight procedures with occasional assistance from the maintenance technician. In addition to various routine





inspections, John wanted to check for contaminants in the fuel, so he borrowed a fuel sump cup and drained a small amount of fuel from each tank's sump. The fuel was clear and everything looked as it was supposed to.

With the plane out of the hangar and on the tarmac, John straightened up the feather-filled seat cushion, climbed up into the cockpit, sat down, and strapped himself in. The maintenance technician wished John a good flight and gathered up his tools as John continued with his preflight activities from the cockpit. He checked the operation of the control surfaces, verified control positions, put on his headset, looked around to see that everything was clear, and started the engine. It roared to life for a few seconds, but soon quit. John twisted around to the left and reached up to the fuel selector valve handle. It was pointed up, the "off position." There must have been just enough fuel in the line to start the engine. He turned it to the right position to draw fuel from the left tank and turned back around, straight in his seat. John saw the maintenance technician, who had obviously heard the engine start and then die, walking back out from the hangar to see what was going on. He waved to him and gave him a thumb's up signal, indicating that everything was fine. John then looked around again to make sure everything was clear and restarted the engine. It fired right up and continued to run smoothly. The maintenance technician returned the wave and walked back into the hangar.

John contacted ground control at the Monterey Peninsula Airport Air Traffic Control Tower and obtained a taxi-for-takeoff clearance from out in front of the hangar. It was 5:02 in the afternoon on October 12, 1997. He taxied toward the east end of the runway for a planned takeoff west out over the ocean. At 5:09 he contacted the local controller, reported that he was ready for takeoff on runway 28, and requested permission to stay in the traffic pattern for some touch-and-go landings, circling

around a large imaginary race track to practice takeoffs, flying, and landings. Three minutes later at 5:12 the controller informed him that he was cleared for takeoff. He straightened out the nose of LongEZ N555JD, increased the throttle, and let up on the brakes. The plane accelerated smoothly off the line and quickly left the ground. The west end of the runway fell away through the nose gear window, as did the Navy Golf Course and the Fairgrounds and Highway 1. Seconds later he was above the beach and Monterey Bay, flying over Cannery Row and the Aquarium. John executed a nicely rounded U-turn and headed east to make another U-turn so that he could line up headed west again, drop in, and make a touch-and-go on the same spot where he had taken off just minutes before. He eased back on the throttle, gently brought the plane down on the runway, accelerated back up to speed and took off again over the Pacific. He looped around again for a second time in the traffic pattern, made another touch-and-go, rose above the bay and Point Pinos and prepared to loop back again for a final touch-and-go.

The plane indeed flew like a dream. All he had to do was think about where he wanted to go and it took him there. The tiniest movement of his hand, the smallest pressure by his feet — so small that it was easy to forget that you had to move anything at all — broadcast his thoughts to the plane. No, that wasn't right. It was really more like there was no plane at all. He was flying through space exactly as he had dreamed it as a child, pushing away from the top of the fence and gliding over the backyard, his arms outstretched and his heart full of joy. This is what it was all about.

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During the preceding 15 minutes of touch-and-goes the little red ball on the left wall of the passenger compartment behind





John had fallen precipitously toward the bottom of the vertical tube as the engine drew down the fuel in the left tank. Neither John Denver nor the maintenance technician on the ground knew that the *level* of fuel in the tank and the corresponding position of the red ball in the sight glass did not directly match the actual *volume* of fuel remaining. When he left the hangar only 25 minutes before, the 26-gallon tank was not (as suggested by the quarter-way position of the red float in the unmarked, unscaled, and transparent tube) nearly one-fourth full with over 6 gallons of fuel. It was closer to 3 gallons. And the right tank, rather than having just under half of 26 gallons as inferred by the floating red ball in the unmarked glass tube, contained about 6 gallons. Although built to specifications, each tank was not the same size from top to bottom. The lower quarter of each tank — at least as measured by its height — held much less than the middle or upper quarters. Not only was each sight glass unlabeled, it presented a decidedly nonlinear representation of the fuel volume. In actuality, there was now not even enough fuel in the left tank to fill the one-quart sump. LongEZ was in serious danger of running out of gas in the left tank at the most inopportune moment, and John Denver would be faced with the problem of operating the confusing and inaccessible fuel selector valve to switch to the right tank.

At 5:27 John communicated with the controller for the seventh time in the past dozen minutes, informing the tower that he was going to leave the traffic pattern after one more touch-and-go and fly out over the ocean for a few minutes. The controller acknowledged his transmission and requested him to recycle his transponder code, which he did. With permission for his approach, he made the final adjustments to his westward turn and tilted the white nose of N555JD slightly downward toward the runway. He eased back on the throttle, dropped the plane down gently, kissed the earth with the wheels one last

time, pushed up the throttle and rose up and away over the Pacific and the setting western sun. This time he hit the landing gear control, and the nose gear retracted smoothly into the fuselage.

Moments later, before passing through 500 feet, just beyond Cannery Row and the Monterey Bay Aquarium, the engine sputtered and then "popped" as it starved for fuel and lost compression. A dozen residents and tourists enjoying the October sunset raised their faces to the odd sound from the strange white craft moving across the blue sky not so very high overhead.

At that moment John Denver knew, no doubt, exactly what had happened. There wasn't time to loosen the straps or set the autopilot. He turned frenziedly in his restraints, his left side against the feather-filled cushion behind him, and reached hard with his right hand for the fuel tank selector valve well behind and over his left shoulder. In so doing he applied just the slightest bit of pressure on the right pedal. The tall vertical rudder at the end of the long right wing moved outward, increasing drag and turning the plane to the right. Simultaneously, the nose pitched upward. Without his hand on the stick to counteract the natural action of the plane, the nose continued to rise up, and within a half second LongEZ N555JD had rolled hard right and over with her nose aimed straight down to the sea. The plane drilled nose-first through the surface just off Lover's Point, shattering into a mass of fiberglass, metal, flesh, and bone as it slammed into the rocks on the bottom 30 feet below the surface.

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# A KID IN A CAR

It was afternoon and time for a nap. Her father knew it, Zoie wanted it in truth, but she was not about to admit it with that touch of obstinacy or falling eyelids and nodding head of a two-year-old who has been up for most of the day. Life was too full, too real, too fun, too happy to miss even an hour. Nevertheless, he knew what was right and picked her up with all the care and love of a parent, and she held on willingly to her father's side under his strong arm as he opened the door of his pickup truck with his other hand and slid the front seat forward and leaned in and placed her gently in the back. The truck was his extended-cab Ford, the one with the power windows and all of the options and comfortable bench seat in back with more than enough room for a toddler to lie down and take a nap on a pleasant day in Anthony, Kansas while her father worked outside for a short while just a few steps away.

It was nice inside the truck. The grown-up talk and small noises from outside faded into the distance and the padded bench seat under her head and back felt like her bed at home when the sheets were tight and newly made. The ceiling above was a soft fuzzy carpet, and a light breeze flowed through the comfortable cab from one side to the other. Unhurried white clouds slid across the upside-down picture framed by the open window just behind and above her head. They were pretty white clouds with funny heads and big puffy bodies with little tails that seemed to wiggle as they drifted across the blue picture

from one side to the other. It was fun to watch the clouds.

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Then from outside, amid the little noises and the occasional clank of a tool and hushed voices of grownups who knew that someone had been put down for a nap, there was a sound — the sound of something alive, the sound of quick light steps and paws on pavement, the unmistakable musical whimper of a real dog, not an imaginary dog in the sky. It sounded like a friendly dog, a big puppy looking for attention and a pat on the head, and she most certainly knew that its tail was wagging.

Zoie rolled over onto her side and then onto her hands and knees and crawled across the seat to the open window. She probably grabbed the arm rest first, then reached up the door to hold the ledge where the window was retracted within the wall, and pulled herself up. Her head popped above the window sill and she looked toward the sound. It *was* a dog! A fluffy happy dog, and its tail was wagging back and forth a million times a minute! She raised one knee and then the other up onto the armrest to prop herself up to look out the open window at the real dog just outside. Her face was now just beyond the plane of the retracted glass and her knees on the armrest bore her weight.

The dog saw Zoie framed in the window and turned toward her. Her head came out a little more in anticipation and her knees shifted across the armrest, an armrest with a rocker switch on its upper surface — the control for the electric power window. Pressing one side of the switch made the glass retract and go down, which, of course, it already was. But pressing the other side made the glass go up. Like the radio and the other electric-powered parts in the cab, the power windows worked only when the key had been left in the ignition and turned to the "accessory" position, which, tragically, was the case on this





otherwise pleasant day in Kansas.

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Her knee came to rest on the switch, the electric motor started to spin, and the window launched up and out of its slot; it was a very strong window made of shatterproof safety glass with a dull but solid edge. It caught her in the delicate intersection between her chin and neck and took her up to the top until the back of her neck below the skull pressed hard against the upper edge of the steel frame and the full weight of her dangling body bore down on the edge of the sheet of glass pressed against her two-year-old esophagus. She did not make a sound.

Roughly one minute passed before the two-year-old was seen. The door was opened as fast as humanly possible and the window lowered and her lifeless body pulled from the truck.

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Zoie Gate's was but one of 42 strangulations from power windows identified by an informal survey of newspaper articles covering a number of decades conducted by the nonprofit group Kids 'N Cars in 2002. Each of these accidents involved a disturbingly similar set of circumstances: an unattended toddler, a key left in the ignition, a traditional rocker-type switch design, and a Ford, General Motors, or Chrysler product. The Kids 'N Cars research identified no cases involving recessed lever-type power window switches which were designed to avoid inadvertent actuation, especially by a child. Such switches are found on luxury vehicles and foreign cars designed to a different set of standards. To date, the "big three" auto manufacturers have maintained that their designs are safe, that keys should

never be left in the ignition, and that children should never be left unattended in cars, which of course is true. Be that as it may, the paucity of such accidents in cars having recessed power window switches speaks for itself.

Furthermore, although existing Federal standards limit the maximum force of a power window to reduce the likelihood of finger amputations and the like, this force — and its concentration on the small surface area of the edge of a plate of glass — easily exceeds that which is sufficient to strangle a toddler. The auto-reversing power window — one which retracts when it encounters an obstruction — is available on some high-end vehicles and cars having an "express-up" function in which the control need not be held while the window goes up. Also, rear window lockout switches are available on many vehicles, but frequently are not used.

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# THE PERILOUS PLUNGE

Fried chicken, mashed potatoes, chicken gravy, buttermilk biscuits, sweetened rhubarb, and the piece of boysenberry pie *a la mode*. What more could a hungry soul ask for? On Friday night, September 21, 2001 the offerings available to Lori Mason-Larez and the other guests at Knott's Chicken Dinner Restaurant in Buena Park, California were much as they had been for 67 years. There was just a lot more of it nowadays and an astoundingly greater number of hungry customers and generous meals served from the same location off Beach Boulevard every day except Christmas, 364 days per year, an average of 3,021 meals per day, in excess of one million meals each and every year.

The menu was basically the same as in 1934, but otherwise Knott's was vastly different than when Walter and Cordelia Knott first opened Knott's Berry Place out in the center of rural Orange County in Southern California. It started as a berry farm with a roadside stand to hock Walter's fresh fruit and Cordelia's tasty preserves to passing motorists. Walter popularized the boysenberry, named after his neighbor, Mr. Boysen. Business picked up quickly when Cordelia began selling the chicken dinners with help from their three daughters, transforming the place from a roadside fruit stand and tea room into a bustling eating establishment, all in the middle of the Great Depression. Customers were soon lined up outside the door.

Within a few profitable years, Walter saw that the folks





needed to be entertained while they waited for a table at the newly named Chicken House Restaurant at Knott's Berry Farm. He started buying up old western ghost towns and moving interesting buildings and rusty mining gear to a transplanted ghost town of his own design out behind the restaurant. In time there was a shooting gallery, a real stagecoach with a team of horses, a mule ride with actual mules, and even an antique narrow-gage steam engine and train that ran on its own track. The amusements eventually drew more visitors than the Chicken House Restaurant, and by 1968 they were forced to fence in the whole operation and charge a small admission to the park. You could still pan for gold, watch the flour mill turn, see the girl spin wool on an old spinning wheel, and even find a peacock feather or two, but it would cost you a couple of dollars — a small price to pay for a few hours of pleasant and safe entertainment.

But times change and people change. Walter and Cordelia, and eventually their daughters, passed on after long and active lives, and competing theme parks with more thrilling amusements delivering instant gratification of rapid acceleration and centrifugal force, not fantasy reenactments of the old West, popped up around the state. By the last decade of the century, the Knott heirs knew that if Knott's was to survive they had to take a plunge of their own and they eventually sold out. The profitable line of packaged foods became part of ConAgra, and in 2001 Knott's Berry Farm was known as *Knott's Theme Park*, "America's favorite theme park" with "world class rides" and "high-octane thrills," run by Cedar Fair of Sandusky, Ohio, owner and operator of a half-dozen big-time amusement parks spread around the United States. The most popular attractions now were the new rides built out behind the old Ghost Town, especially the rides that gave a minute or two of visceral thrills, like the *Supreme Scream*, *Grand Slammer*, and, especially, the

*Perilous Plunge.*

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At a quarter past 10 o'clock on Friday night, September 21, 2001, a few hours after dining at the Chicken Dinner Restaurant, Mrs. Lori Mason-Larez of Duarte and three of her five children stood in the crowded line anxiously awaiting their turn to board the 24-person boat for a spin on the *Perilous Plunge* amusement ride billed as "the world's tallest and steepest watercoaster." Another of her children, 9-year-old Marty John, was going to watch and not ride; he was out with his aunt, Shirley Roman, at a good vantage point to see the faces of his mother, brother, and sisters when their open boat tipped over the edge of the *Perilous Plunge* way, way up in the air, practically falling down the unbelievably steep slope 15 degrees off of vertical from the dark sky high overhead. The boat could not actually come out of the trough when it shot down the watery slope because it was mechanically attached. Regardless, the whole thing looked rather perilous to anyone standing in line on the boarding ramp waiting to get on.

Once Lori, the three kids, and other riders climbed into the boat it would take only a minute until it was released into the flume and made its way around to the base of the steeply angled trough headed up. There the boat would latch onto the chain drive and be pulled up out of the water and high into the sky, just like on a roller coaster. It would make a little half-turn while floating in the elevated water trough 120 feet in the air and then take the plunge over the edge. They would reach a speed of over 50 miles per hour on the way down, then decelerate as the bow hit the water at the bottom, pushing a two-story wave into the air. Based on the deafening screams heard every minute when a boatload of riders went over the "falls," it would be quite





a show when the Mason-Larez clan took the plunge. Everyone would, of course, get thoroughly drenched — but that was part of the fun. The ride was said to simulate going over Niagara Falls, and, given its height of nearly 120 feet, this was not too far off the mark. It would be over quickly, more quickly, as things would turn out, for one rider in particular.

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Shirley Roman, Lori's sister, worked for the Target department store chain and had acquired the tickets for Knott's at a special discount arranged by Knott's and Target. Shirley brought her own daughter, her sister Lori, and four of Lori's five kids as guests. The husbands had opted to stay home. Earlier that evening, after dining at the Chicken Dinner Restaurant, the group had walked through what was left of Ghost Town and gone on an assortment of rides. Lori found the courage to ride *Jaguar*, a reasonably tame roller coaster with not as many turns and upside-down maneuvers, but she opted to sit out when the group went on *Montezooma's Revenge*, a serious roller coaster with two upright loops. Taking the kids to a theme park was one thing, but going on a thrill ride that looked and sounded as if it might be a bit "over the top" in terms of personal discomfort was another.

As seen from above, the course of the *Perilous Plunge's* trough that carried the water and boat was a big figure eight. The bottom loop circled over a small pond of water, and this is where the boat slowed to a stop so that riders could board from the platform on which Lori and her kids now waited in line. The other half of the figure eight was 120 feet in the air, and the cross point of the "up" trough with its integrated chain lift and the "down" trough where the boat zoomed back down was about halfway up. It was a brief ride as amusement park rides go. The

boat made only one complete circuit of the figure eight: the loop around the bottom, the steep rise up to the top, a turnaround, and then over the edge and down the steep slide with the big splash at the bottom where the boat came to rest and the riders, drenched from head to toe, disembarked in laughter and disbelief.

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Judging by the screams of the riders a half-minute before, it sounded as if the whole experience would be more terrifying than thrilling — especially the moment when the boat tipped over the edge more than ten stories high and started its descent down at 75 degrees. But the riders sitting in the boat that now drifted up to the loading dock were all laughing and chatting away, so it couldn't be all that unbearable. There was the sign at the beginning of the line that said that people with heart problems, back or neck trouble, or those who had recently had surgery should not go on the ride. Neither Lori nor the kids had any of these problems, so there was no reason to think that the *Perilous Plunge* might be dangerous for any member of the family.

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Built at a cost of 9 million dollars and in operation for about a year, the *Perilous Plunge* was designed and constructed by Intamin AG of Switzerland, one of the largest manufacturers of amusement park thrill rides in the world. Passengers in the boat obviously had to be restrained, especially for the plunge over the edge and the long ride down, so Intamin incorporated a common T-shaped restraining bar for each seat. The seated passengers would pull the bar toward them, straddling the





lower vertical part of the T-bar between the legs, and pull the horizontal part down on top of the upper thighs. The bar had a ratcheting effect and could be pulled down far to sit tight on the legs of a small or thin person, or pulled down only partially if the rider was large. Once engaged and checked by the ride attendant at the loading dock, the bar stayed in place until the boat completed the figure-eight circuit of the ride and returned to the loading dock. There was also a horizontal grab handle up at about chest height in front of each seat.

Cedar Fair, owner of Knott's, felt that the T-bar by itself was insufficient for restraining passengers and asked Intamin to add a seat belt to each of the 24 seats in each boat. Intamin made it clear that the seat belts were unnecessary for the safety of riders, but wanted to appease their client and went ahead and added the seat belts. People come in all shapes and sizes, of course, and the seat belt was made long enough to encircle a girth in excess of 60 inches.

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The line was now short and they would be among those boarding the next boat, Boat No. 1. It had six rows of high-backed red plastic seats, and each row held four passengers. Boat No. 1 had just come down the flume, making a truly impressive wave as it bottomed out at the foot of the steep slide. It drifted up to the loading platform, its occupants wet but happy. The late summer evening was pleasant and cool, just the right temperature for wearing a light sweater. The soaked riders now unbuckling their seat belts left no doubt that Lori's blue sweater was going to be dripping wet when this was all over.

The single broad line of people split up into six single-file lines — one for each of the six rows of seats on Boat No. 1. Lori and the kids had been assigned to the fourth row. The kids were

excited. The time had come. They stepped off the dock and over the side and down in. It was a bit wet inside and the boat moved slightly as the passengers stepped around and scooted across. Lori took seat 13 and her daughter Darlene sat to her right. The seat belts were somewhere down between the seats, and Lori slid her hands down beside her thighs to find the belts that belonged to her. Darlene and the other kids were quick to catch on and had already found and buckled their own seat belts, each one sliding the loose end through the buckle and tightening it low and tight across the waist. Darlene, being the helpful daughter that she was, turned to the side and helped her mother find the two pieces of her seat belt, threading the parts together, and tightening it down. Lori, like every other passenger, grabbed the top part of the T-bar up by her knees and pulled it back toward her. The ride attendants looked everything over. Everyone was buckled in and the restraint bars were in place. A few words were said and the boat rolled off of its restraints and floated out into the current of the water-filled trough with a boatload of giddy thrill seekers at Knott's Theme Park. The time was 10:19 p.m.

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They floated softly in the current. It was comfortable, and the sounds of the park faded into the void of the dark sky overhead. The boat drifted around its half-circle course. In under a minute they were facing the tall trough to take them up, up high into the sky above the crowd. The mechanisms took hold of the underside of the boat with a clank and pulled it forward and then upward. There was no going back now. The bow rose, and in a moment they were angled steeply and being towed almost straight up, it seemed, into the sky, higher and higher, until they were 10 stories, then 11 stories, then a full 12





stories up above the rest of Knott's Theme Park and the bustling crowds below.

Then the bow flipped over back down level as the boat crested the vertical trough onto the horizontal track. It smacked flat off the drive mechanism of the lift and into the water in the elevated trough. They were floating again, floating in a boat in a water-filled trough 120 feet up in the air at 10:20 at night above Southern California. There was Walter Knott's old Ghost Town down below and off in the distance Beach Boulevard and the lights of Orange County. The lights seemed to spread out forever.

By now the seat belt that had originally been strapped around Lori Mason-Larez's 58-inch stomach had worked its way down to a position near her pelvis and legs. At 5 feet 8 inches and 292 pounds, Lori Mason-Larez was a very large woman whose center of gravity was considerably higher than that of a woman of average weight. The T-shaped restraining bar was positioned exactly where it was when the boat left the dock, but, due to her girth, the horizontal part could not be pressed firmly against the muscles of the upper leg and instead was up against the soft fluid tissue around her abdomen. Lori turned and exchanged some friendly but nervous words with the people in the row of seats behind her, then looked over at the kids. They started to scream. The drop-off ahead was as abrupt as the edge of a cliff. The sound of the water flowing over the edge grew loud. She held on to the grab bar in front.

Boat No. 1 dove over the precipice with a force strong enough to fling out anything or anyone not firmly restrained. The bow nosed down, the stern flipped up. Lori Mason-Larez, her hands gripping the handle in front of her with all her might, unable to overcome the substantial force of her own accelerated mass, popped out of the boat up high in the air like a blue champagne cork. Daughter Darlene's thrill ride scream turned

into one of utter terror as the blur of a large blue body flew out and down past the boat within the heavy spray of water coming off the downshoot at the top of the flume, impacting the rail of the trough ahead and below them, then the support girders, and on down to the shallow pool 120 feet below. The boat accelerated to 50 miles per hour, then bottomed out at the base of the flume and pushed out a spectacular 40-foot spray of water. The waves died down, the water slowed, and Boat No. 1 drifted into the dock in the current. Seat No. 13 was empty. Its lap bar was in its original position and the seat belt was latched, lying flat on the seat bottom. Lori Mason-Larez was declared dead one hour later at the West Anaheim Medical Center.

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Knott's immediately closed down the *Perilous Plunge*, the investigators were called in, and the attorneys sharpened their pencils. The first report was from the Orange County Coroner who revealed that Lori Mason-Larez had suffered a fractured skull, a fractured arm, and a severed leg during her horrific fall. The report also disclosed her unusual dimensions and weight. Not unlike other amusement park patrons seriously injured or killed in recent years, she was at one of two extreme ends of the distribution of body size, with physical attributes not well accommodated by the particular restraint system. By October, the family had filed a wrongful death suit seeking 30 million dollars in damages from Knott's parent company, Cedar Fair, and the manufacturer of the *Perilous Plunge*, Intamin AG.

Investigators from the California Division of Occupational Safety and Health issued their report five months later and identified both the cause of the accident and a dozen required changes to the ride. With her 50-inch hip circumference, 58-inch abdomen, 5 feet 8 inch stature, and weight of 292 pounds, the





rider could not be adequately restrained by the seat belt and the T-bar during the rapid teeter-totter motion of the boat as it topped over the edge headed down the shoot. Her high center of gravity and low strength-to-mass ratio further limited her ability to hold herself down in her seat. Given these facts, her ejection from the boat was a near certainty. And although the ride's operating manual produced by Intamin AG stated that any person who could not fit within a seat and the restraint system should not be allowed to ride, the procedures were loosely interpreted and enforced by the ride's staff so as not to offend certain patrons.

On June 1, 2002 Knott's General Manager Jack Falfas re-opened the *Perilous Plunge* with a test ride before the media and park visitors. Among other things, new signs listing maximum height and weight limits had been posted, a mock-up of the seats and restraint systems for examination by patrons had been placed in the waiting line, and a new set of verbal instructions for passengers had been adopted. Most importantly, and against the advice of Intamin AG, Knott's added a four-point, double over-the-shoulder restraint system to each seat. The family's lawsuit against Cedar Fair and Intamin AG was settled on March 28, 2003 for an undisclosed amount.

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# TITANIC'S WAKE

"Hey Walter! Come over here. You've got to see this," called out David Durand to his friend and coworker.

The scene below on the Chicago River was enough to send a shiver up anyone's spine, and the vantage point from the third story of the Watson Warehouse on the north bank of the river that ran east and west through the middle of downtown Chicago was disturbing, but also oddly comical. The time was 7:15 in the morning, Saturday, July 24, 1915. The stage was set, the players had arrived, the curtain had gone up. And like anxious theater patrons in the front row of the balcony, the two warehouse employees had an up-close and personal view of the drama's final act. David Durand's hunch that all was not right was right on the mark. The two were about to witness theatrical tragedy: a compelling plot, a tension-filled setting, a cast of thousands, a calamity of unparalleled and unthinkable consequence. The decisions of designers, a profit motive, the legacy of the *Titanic*, the ill-conceived directives of politicians, and the behavior of an energetic crowd of young Americans were about to converge in one horrible moment in time down on the river near the Clark Street Bridge in downtown Chicago.[3]

Walter Perry, now with David Durand at the window, took a few seconds to comprehend the sight on the river. His response said it all: "My God!"

[3] This story is based principally on the definitive book on the subject, Eastland: Legacy of the Titanic, by G. W. Hilton.





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Tied up to the dock on the south bank of the well-developed Chicago River at the Chicago and South Haven wharf between Clark and La Salle, diagonally across from the third-story window in the Watson Warehouse, sat the biggest and most glamorous of the Great Lakes passenger steamers, the stately *Eastland*, pointed east toward Lake Michigan less than a mile away. At 275 feet in length and only 38 feet in width, she looked like a smaller and narrower version of a big ocean liner. Designed to travel fast across the Great Lakes and shallow connecting waterways, the *Eastland* had a normal draft of only 14 feet, something one might not expect given the visual proportions of her high steel sides, knifelike bow, and narrow beam.

This morning the *Eastland*, along with a handful of smaller ships, was chartered for the annual Western Electric Company cruise and picnic. In all, 7,000 employees of the Hawthorn telephone assembly plant in Cicero, members of their families, friends, or anyone else who could be cajoled into buying a ticket for 75 cents were boarding the *Eastland* or one of the other chartered ships for the 38-mile trip to Washington Park in Michigan City, Indiana. At the previous year's event the *Eastland* departed late due to the time it took to board the large number of passengers; accordingly, this year she was the first to open her gangway and would be the first to head out onto the lake. Despite the early morning hour and a light misty drizzle, the temperature was a comfortable 70 degrees. Passengers by the thousands now lined the wharf or were making their way by streetcar or foot over to the river.

The annual Western Electric picnic was a grand affair, and everyone dressed in their finest summer attire. The excursion was particularly popular with young adults and families, but

especially among the many single young women who worked at the plant. It was the best opportunity all year for these hardworking and spirited Americans to socialize and meet people. Their names stumbled from the lips like roll call on Ellis Island: Marie Adamkiewicz; Florence Begtschke; Frantisek Danek; and Marie, Joseph, Rose, and Anna Dolejs, ages 17, 18, 19, and 20; Darowski, Dawska, Eicholz, and Erkman; Knoftz, Kupkowski, Kzarburg, and Landsiedel; Lane, McGlynn, McLaren, and McMahon. There were Hoffmans, Hipples, and Johnsons by the dozen. They were switchboard operators, inspectors, coil winders, laborers, drivers, foremen and forewomen, shop hands, shipping clerks, telephone assemblers, typists, and machinists, all decked out in their finest outfits, all ready for a fun-filled day off from work, all overflowing with life and optimism.

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The most eager to board, particularly those wanting to ride to Michigan City on the *Eastland* instead of one of the other ships, arrived at the wharf soon after daybreak. The early morning hour and the wet weather did not dampen the participants' spirits in the slightest. Captain Harry Pedersen, who took command of the *Eastland* the previous season, had been on board since before midnight, and Chief Engineer Joseph Erickson had already finished breakfast. By 6:20 he had worked his way down to his station in the engine room. Pedersen and Erickson, like so many of the crew and passengers, were European immigrants who had built productive lives for themselves here in Chicago and its suburbs.

By 6:30 the crowd on the banks of the river had grown to 5,000, and by 6:40 the *Eastland's* aft starboard gangway was open for the loading of passengers. The *Eastland* had five functional





levels for equipment, crew, cargo, and passengers: (1) the lowest level, below the water line, with the engine room, boiler room, and crew space; (2) the Main Deck, just above the water line, containing the gangways, passenger areas, bar, galley and baggage and cargo areas; (3) the Cabin Deck, with more passenger space, a dining room, and the officers' mess; (4) the Promenade Deck, with additional passenger space and the smoking room at the stern; and, finally, (5) the exposed Hurricane Deck at the very top level of the ship. The whole affair was topped off with two large smoke stacks, one behind the other, in the middle of the ship.

The aft starboard gangway through which passengers were now boarding at a pace of about 50 per minute was slightly lower than the wharf, and passengers had to walk down steps from La Salle Street and then across the downward-sloping gangplank across the water and over to the gangway in the side of the ship. The gangway threshold was about four feet above the water line, but it could sink to one foot above the water when the ship was fully loaded. A waist-high dutch door on the aft gangway could be closed once the ship was under way, but was now open. Members of the crew collected tickets from passengers and kept a running count as they came aboard.

As passengers filed inside the enclosed Main Deck they tended to move upward to the higher decks, well above the water. As on most ships, there seemed to be more fresh air up top, and it was increasingly more open and easier to see out the higher one climbed. The Cabin Deck had far more portholes through her metal walls than did the lower Main Deck and was preferable in this regard. But unlike the Cabin Decks on other Great Lakes steamers where passengers could stand at an open rail, the *Eastland's* Cabin Deck, like the Main Deck, was fully enclosed within the exterior steel walls of the ship. A steel wall with portholes made it difficult to take in the view, so many

passengers continued up to the Promenade Deck which had a walkway all the way around the perimeter of the ship. Plus, a five-piece orchestra was playing music for dancing on the Promenade Deck. The Hurricane Deck, one flight up, provided the best view of all, but it held the new lifeboats and other lifesaving gear and therefore had limited space for passengers.

Having an outside view or being on the upper decks was not good enough for many; some people also wanted to be on the right, or starboard, side of the ship, next to the wharf to watch those coming aboard or look out for arriving friends or family. A bit later on, at 7:30, when the ship cast off, passengers fortunate enough to be on the starboard side could make the customary goodbye wave to those staying behind on shore. It was part of the fun of traveling on a big ship. As a consequence of the movement of passengers both upward and predominantly to the right side, the *Eastland* developed a noticeable list — or unintentional tilt — to starboard, toward the wharf, within minutes of the first passengers boarding through the aft starboard gangway at 6:40. An additional 50 passengers with a combined weight of 3 to 4 tons came on board each minute.

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This list to starboard during boarding might seem very peculiar for such a large ship, but listing was not that unusual for the *Eastland*. She was designed with a very shallow draft, but also built to take on water ballast should the need arise. Down in the engine room below the water line, Engineer Joseph Erickson wrote in his log at 6:48 that a list to starboard had developed, and he ordered his engine room crew to right or steady the ship — to bring her straight upright again. "Boys, steady her up a little," were his exact words.

"Steadying her up a little" was done with the water





ballasting system — a series of very large water tanks, lines, valves, and a pump to move water in and out of the space in the lowest few feet of the ship from bow to stern. The system allowed the ship to be trimmed when under way to improve performance, but also enabled the crew to compensate for an uneven distribution of the load, especially a list to port or starboard. Like a moving bicycle on land, once under way and at speed on the lake, the *Eastland* usually straightened up nicely and moved comfortably across the water. She had developed a reputation, however, for being a bit "tipsy," especially while boarding and unboarding passengers. The water ballast system was the method for dealing with the issue.

An inlet below the water line on the port side ran to a longitudinally mounted manifold, about 12 feet long, near the floor in the center of the engine room. Pipes from the manifold fed the various ballast tanks, and the flow of water into each was controlled with valves, also located on the manifold. An air vent ran vertically from port and starboard tanks up to 10 feet above the water line. More than one tank could be filled at a time, but only a single detachable 16-inch handwheel was used to open and close all of the valves — an economical system, no doubt, but one not conducive to quick response by the engine room crew.

Although the tanks were filled using existing water pressure and gravity (because they were below the inlet and water line), emptying the tanks required the use of a pump in addition to the same manifold, valves, and pipes used during filling. With suction from the pump, water from the ballast tanks traveled back through the manifold and out an overboard discharge above the water line on the starboard side. This common inflow and outflow system meant that filling and discharging of tanks could not occur simultaneously. Also, it was not possible to shift ballast quickly by pumping water from one tank to another.

Instead, a filled tank had to be emptied under a discharge configuration, and then the other tank filled under a filling configuration — all using the single, detachable 16-inch handwheel to operate the assorted valves on the manifold.

Each tank had a vent through which a dipstick could be inserted to measure the water level, but a more common and faster method was used when loading from scratch at the dock: all of the tanks were emptied completely before any one or anything came on board. With the inlet valve open, each tank, depending on its capacity, filled within 10 to 25 minutes. The smallest tanks held 40 tons of water; the largest, 82.5 tons. The entire capacity of the tanks was 647 tons, and they could all be filled completely in about an hour. There were no flowmeters available, so Chief Engineer Erickson gauged tank levels by keeping track of how long valves were kept open. Each tank's vent pipe also gave off a characteristic whistle as it filled and the air in the tank was displaced under pressure; when it stopped or when water sprayed out the top, Erickson knew the tank was full and ordered the corresponding valve to be closed by one of the engine room crew using the interchangeable 16-inch handwheel. As with the filling procedure, the rate of discharge was also gauged primarily by keeping track of the amount of time the water flowed. The discharge pump was powerful, and it was possible to empty the tanks in equal or less time than was required to fill them.

Operation of the system required additional feedback, and Erickson had a number of sources of information in this regard. An 18-inch steel inclinometer mounted to the wall of the engine room was his main source of feedback about the ship's left-right list. However, rather than displaying the list in degrees, as one might expect, the tip of the pendulum-like inclinometer pointed to increments marked in inches; Erickson had to note each reading and calculate the actual degrees of list by hand.





Communication between the engine room and bridge was through a standard engine order telegraph containing the traditional small set of engine orders (e.g., stop, full speed, etc.) used on Great Lakes steamers. Any communication between the bridge and engine room regarding the operation of the ballast system occurred through a voice tube. Operation of the ballast system was traditionally under the full control of the Chief Engineer, however, and no communiçations concerning list took place between the bridge and engine room this Saturday morning. Erickson's management of the ballast system was based on the scheduled boarding and disembarking times, the time of day, planned loads, any information that might be shouted down to him from another crew member, and his own visual and kinesthetic sense of the state of the ship.

When Erickson ordered the filling of port ballast tanks at 6:48, the increasing load and list to the right had brought the aft starboard gangway through which passengers were boarding to within 18 inches of the Chicago River. It had been four feet above the water only a few short minutes before. Within a minute, however, the effect of the water flowing into the port tanks became noticeable and the *Eastland* slowly began to straighten up as weight was added to the left ballast tanks to compensate for the disproportionate number of passengers on the right side of the upper decks. The steel inclinometer on the wall of the engine room crept across the scale. At 6:51, only three minutes after action had been taken, it pointed to "0"; the *Eastland* was perfectly upright and on even keel once again.

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But unknown to Chief Engineer Erickson, being on an even keel did not mean the ship was stable or even remotely safe under the current circumstances. In actuality, the *Eastland* was

in a most precarious and temporary unstable equilibrium. She was, to put it simply, in grave danger of rolling over like an egg in the water even though only about a quarter of the 2,500 passengers she was to carry were now on board. To understand the reasons why this was so and how this had all come about, one had to consider the history of the ship and, most importantly, recent "improvements" to enhance her safety in the wake of the sinking of the *Titanic*. Although Chief Engineer Erickson was certainly aware that modifications to the ship had been made during the preceding months, he most certainly was not aware of their full nature, their impact on the ship's stability, and their impact on his own life.

The *Eastland* was built in Port Huron a dozen years earlier, in 1903, by the Jenks Ship Building Company and designed to carry both freight and passengers between Chicago and South Haven during the spring, summer, and early months of fall. The primary freight was fruit, fresh and well-packaged for eventual sale in Chicago, secured in the lower levels of the ship. Passengers were to be carried in mid and upper decks. Although Jenks had a history of building reliable cargo ships for the Great Lakes, the *Eastland* was the first passenger ship the company ever laid down. She was also the last; Jenks got out of the ship building business in 1906 to become an automobile parts manufacturer.

During her first year on the Great Lakes, the *Eastland* showed no signs of instability or crankiness. She plowed her routes and delivered her cargo and passengers in a timely fashion, if only at slightly slower speeds than originally hoped. The first of her many modifications was carried out in 1904, at which time heavy equipment was rearranged to reduce her draft and speed her up to over 20 miles per hour. A heavy air-conditioning system was added for the Cabin Deck. She also became a nearly exclusively passenger ship, as opposed to the





original passenger/freight configuration. The consequence of these changes, especially the movement of heavy machinery and the new air-conditioning equipment above the Cabin Deck, was that she was now somewhat top-heavy. In the parlance of naval architecture, shifting weight upward lowered her metacentric height (the measure of lateral righting moment, a boat's tendency to right herself once tilted left or right). A negative metacentric height is below the water line, a metacentric height of 0 is at the water line, and a positive metacentric height is above the water line. The higher the metacentric height, the higher the righting moment and the ship's inclination to right herself after an induced list. A large sailboat with a deep keel full of lead ballast has a very high metacentric height and a strong righting moment. A telephone pole floating in the water has a metacentric height of 0 or less and a weak or nonexistent righting moment. When first built, the *Eastland's* metacentric height when fully loaded was approximately 18 inches above the water line — typical for the shallow-draft cargo ships that traveled the Great Lakes but less than the metacentric height of two to four feet found on typical passenger ships where the human "cargo" could, unlike boxes of fruit, be expected to move about. The changes made in 1904 lowered her metacentric height from the original 18 inches.

In the 1904 season, after the first major modifications, a preview of later events occurred during a trip when thousands of passengers crowded the Promenade and Hurricane Decks. It was a very hot day, and passengers escaped the uncomfortable conditions in the enclosed decks by moving to the higher open decks. The *Eastland* developed a severe list and would most certainly have rolled over had the crew not instructed passengers to move downward to the lower decks. The owners subsequently limited the number of passengers allowed on the Hurricane Deck, and the *Eastland's* licensed capacity was

lowered from 3,300 to 2,800. This event did not stop further modifications and the subsequent lowering of her metacentric height, however. In preparation for the 1905 season, a pair of large lifeboats were added to the Hurricane Deck, bringing the total to four such pairs of boats up top. Each lifeboat weighed nearly four tons. The listing problems continued, but the only response was to lower her licensed passenger capacity from 2,800 to 2,400 for the 1906 season. This was subsequently lowered to 2,200 and, later, to 2,000 for the 1913 summer season. Some cabins were removed prior to the 1914 season, giving her and additional 3,500 square feet of deck space. Her inspector, reasoning that she now had more room for passengers, increased her licensed capacity to 2,045; realistically, however, this would only make the *Eastland* more top-heavy if the ship were fully loaded with people.

On April 14, 1912, the *Titanic* struck an iceberg and sank in the northeast Atlantic on her maiden voyage. The unusually slow progress of her sinking resulted in the near-term survival of all passengers, an outcome contrary to general experience on sinking ships at the time and the rule of thumb that a third of all passengers most likely would never reach lifeboats before a large ship went down. Although the *Titanic's* lifesaving "boatage" and "raftage" capacity exceeded the requirements of the day, there was insufficient lifeboat capacity for everyone on board, and 829 passengers and 694 crew died as a result. The ensuing public outcry focused almost exclusively on lifeboat capacity and a call for "lifeboats for all." Naval experts correctly pointed out that passenger liner sinkings were actually quite rare, and when they did occur the angle of the ship and limited available time would render the loading and launching of such a large number of lifeboats a near impossibility, especially if thousands of people were involved. As a case in point, the *Empress of Ireland* sank off the coast of Canada in May of 1914 after being rammed by





another ship, a catastrophe that rivaled the *Titanic* disaster. *Empress of Ireland* went down in just 14 minutes, and having twice as many lifeboats on board would not have reduced the loss of life. The cause of safety would be better served, many experts stated in response to the lifeboats-for-all movement, with improved communications, enhanced ship operating performance, and tracking ships and the occasional rogue iceberg.

But "lifeboats for all" it was to be. On March 4, 1915, President Wilson signed into law the *La Follette Seamen's Act* requiring boatage and raftage space for all passengers and crew aboard American ships. Owners of ships operating on the Great Lakes were given one year to comply. The *Eastland*, as it turned out, had been sold the previous year to new owners, The St. Joseph-Chicago Steamship Company, who failed to delve fully into her "cranky" history. In preparation for the 1915 summer season and with an eye on the compliance date for the new federal regulations, they scheduled further "enhancements" to the ship. First, two inches of concrete were laid down in the dining room on the Cabin Deck to repair a rotting wood floor. At 150 pounds per cubic feet, this added 14-19 tons to the ship — about a dozen feet above the water line. The floor on the Main Deck where passengers entered was also rotting, possibly from water spilling in through the low gangways, and an expansive layer of concrete was applied here as well, bringing the total for both areas to 30-57 tons.

In addition to requiring "lifeboats for all," the impending enforcement of the *La Follette Seamen's Act* would regulate the number of passengers ships could carry based on current capacity and other factors. The St. Joseph-Chicago Steamship Company and Captain Pedersen were aware of this and had calculated that the *Eastland's* licensed capacity was going to be reduced for the 1916 season to somewhere between 1,028 and

1,552, depending on the future inspector's interpretation of the new regulations. This would be a substantial reduction in her current licensed capacity and would make the *Eastland* unprofitable to operate. If they could somehow increase the capacity to 2,500 for the 1915 season, they reasoned, the less they would actually lose when the law came into effect. Accordingly, Captain Pedersen had three large lifeboats and two life rafts moved to the *Eastland* from another ship and acquired four additional life rafts. The *Eastland* was launched in 1903 with 6 lifeboats. She now had 11 lifeboats, 37 life rafts, and a work boat, all of which were mounted on the Hurricane Deck, and 2,570 heavy lifejackets stowed on the Hurricane Deck, Promenade Deck, and crew's quarters. In addition, heavy railings made of gas pipe were installed on the Hurricane Deck to keep passengers away from the visually prominent lifesaving gear. At no time was the ship's center of gravity or metacentric height ever calculated or tested. The inspector approved the ship for a capacity of 2,500, as the owners requested, and the *Eastland* reentered service on July 2. For the next three weeks, until July 24th and the Western Electric excursion, she operated with small passenger loads.

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Back in the engine room, at 6:53, just two minutes after having brought the ship to an even keel at 6:51, Chief Engineer Erickson saw the pointer on his inclinometer moving slowly once again, although this time it told him the *Eastland* was starting to tilt to port, away from the wharf. When it reached about 10 degrees, he gave his crew orders to open the valves on the manifold to fill the starboard tank. The engine room crew cranked the valves to the starboard tank open with the interchangeable handwheel and they stayed open for the next





four to five minutes. The *Eastland* rolled slowly upright and the inclinometer once again hung perfectly vertical.

Certainly at this point, but probably minutes before, the *Eastland* was doomed. The modifications completed earlier in the month, especially the addition of the tons of new lifesaving gear added to the Hurricane Deck, had had a dramatic effect on the center of gravity and metacentric height of the ship. Erickson was never given any information which would or should lead him to believe that the metacentric height of the ship had been altered or that the maximum legal passenger capacity had been increased courtesy of the owners, the captain, and an obliging inspector. Although he had been told that they would have a full passenger load, it was Erickson's understanding that this would entail bringing 2,045 passengers aboard, not 2,500, a difference of perhaps 30 or more tons of unpredictable human cargo. Although Erickson believed that he was filling port or starboard ballast tanks to keep a stable ship on an even keel based on the movement of a few erratic passengers, in reality, the *Eastland's* metacentric height was now less than zero. She was as unstable laterally as a floating telephone pole. Erickson had managed to keep the ship from rolling over only through his methodical management of the ballast system.

Minutes later at 7:00 the passenger count at the gangway reached 1,600. The ship still favored a list to port, leading Erickson to conclude that passengers were congregating on the port side when, in fact, a preponderance of passengers were along the starboard side. He ordered the engines started at 7:05 to warm them up and at 7:07 ordered the engine room crew to start the ballast pump to remove water from the No. 3 port ballast tank. This action would replace the water ballast on the left side of the ship with air and should correct the continued list to port. It also meant, however, that starboard tanks could not be filled at the same time.

The informal count of boarded passengers reached 2,500 at 7:10, and those remaining in line were redirected to one of the other ships hired for the excursion. The list to port still persisted and, at about 10 degrees, had not improved despite the continued pumping from the No. 2 port ballast tank. Passengers generally found the listing — first one way and then the other — amusing and paid no attention when the radio officer went out on deck and asked people to move to the starboard side to help balance out the ship. The five-piece orchestra struck up a tune at 7:13, and people started dancing on the Promenade Deck aft, further shifting the load upward. And in stark contrast to the 1904 event in which passengers on the Hurricane Deck were told to move to lower decks to prevent her from turning turtle, today the Hurricane Deck was outfitted with tons of lifeboats and related gear which, unlike cooperative passengers, could not be moved to lower decks on short notice.

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At 7:16, as David Durand and Walter Perry watched from their perch three stories up across the river and as the *Eastland* sat tied up to the wharf but leaning 15 degrees outward toward them, down in the engine room Erickson was giving orders for the ballast system to be reconfigured to bring water into the starboard tanks. Rather than continuing to pump water out of the port tanks, they would pump water into the starboard tanks. Erickson personally opened the valve for the No. 3 starboard tank, his brother Peter opened the valve for the No. 2 starboard tank, and another crewman opened the valve from the intake. A minute passed by during which time nothing seemed to happen or change. The *Eastland* sat frozen in her awkward, schizophrenic stupor. Suddenly, Ray Davis, an assistant to the ship's owners, burst into the engine room and asked Erickson if





something was being done to straighten the ship. Erickson replied that they were doing everything possible, and he asked Davis to return topside to see if the starboard fender strake was hung up on the wharf, preventing the starboard side from rotating back down into the water.

One minute later at 7:18 the *Eastland* started to straighten up. It began slowly but then quickened, and at 7:20 the ship was as straight up and down as she should be. "I believe we are getting her," said Erickson to his engine room crew as the *Eastland* moved back toward the vertical, believing their attempts had been successful. In reality, however, it was miraculous that the ship was upright at all. But with the listing problem apparently solved and with no knowledge whatsoever of the ship's true instability, Erickson and the rest of the crew began to prepare for her departure from the wharf. The gangplank to the aft starboard gangway was brought in and the aft line to the wharf was cast off. In keeping with the tradition of waving "goodbye," a majority of passengers on the exposed upper decks lined the starboard rail rather than the port rail.

The *Eastland* stayed on an even keel for less than a minute. By 7:21 she started to lean to port once again. First 5 degrees, then 10 degrees, then 15 degrees, and 20 degrees. Erickson heard water, lots of water. It was spilling in through the scuppers on the port side of the Main Deck. He wondered if starting the engines had somehow upset the balance of the ship and ordered them to be shut down. But it had nothing to do with that. The list continued beyond 20 degrees. Erickson instructed one of his crew to run up topside to pass the word that passengers should move to the starboard side to counter the list to port. The message was spread through the crowd, and more passengers moved over to the right side of the ship.

The list to port continued, and at 7:23 the water began to pour into the port gangways and down into the engine room.

Captain Pedersen, up on the bridge, who later referred to the list to port at this moment as only a "trifle," signaled to Erickson on the engine order telegraph to "standby." The stern line was cast off, and the back end of the ship began to swing out slightly into the Chicago River in preparation for departure. As the ship drifted away from the wharf, passengers began to step away from the starboard rail, toward the centerline of the ship and toward the port rail, which was now down at an angle of nearly 25 degrees.

Incredibly, at 7:25 as her stern drifted out further into the river, the *Eastland* seemed to be righting herself again. For one minute she wavered in the balance, still tilting to port, but holding steady. But all hell had broken loose in the engine room. Water washed across the floor. Erickson issued orders for his crew to start the bilge pump. A minute later she stopped her rotation towards vertical and started tilting to port one last time. Experienced crewmen knew what was about to happen. The oilers and stockers bolted for the ladders as the list to port passed 30 degrees.

Up on the Promenade Deck the passengers were asked to move to the starboard side again, but the wooden floors were now too steep and slippery from the drizzle for anyone to climb upward. Dancing was no longer possible, so the musicians dug in their heels and switched to ragtime. Passengers laughed and talked, incredibly still not cognizant of the danger. The *Eastland* continued listing further to port, and at 7:28 her decks slanted an unbelievable 45 degrees. A piano slid off its supports on the Promenade Deck and a large refrigerator in the bar crashed and slid across the floor. There were a dozens screams and terrified shouts. Water poured in through the port gangways and Main Deck port holes. Passengers on the Main Deck rushed to the stairway. Down below in the engine room Chief Engineer Erickson turned on the water injectors to cool the boilers, fearing





they might explode when hit by the river water.

From their third-story perch above the river, David Durand and Walter Perry watched as the *Eastland* slowly rolled over onto its side without a splash. In an instant thousands of people were in the river, screaming and thrashing, grabbing in panic for anything, including each other. The *Eastland*, lying flat on her side, settled to the muddy river bottom, her port half underwater and her starboard half above. The two warehouse employees bolted down the stairs and over to the bank of the river to help.

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When all the bodies were finally retrieved, identified, and counted, the final death toll was 844 passengers — 15 more passengers than died on the *Titanic*. With few exceptions, those who survived were on one of the upper exposed decks when she rolled over, and those who died were inside the enclosed Main and Cabin Decks. The lifeboats remained attached to their davits, the lifejackets packed in their boxes. Like all 70 members of the crew, Chief Engineer Erickson knew the ship well enough to know what to do. As the water reached his neck, he slipped out of the engine room along a steering cable under the main deck, slithered through an air duct and over to an air pocket under a port hole on the starboard side where he was pulled out to safety.

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After twenty years of litigation, on August 7, 1935, The United States Circuit Court of Appeals upheld a lower court ruling that the owners of the *Eastland*, the St. Joseph-Chicago Steamship Company, were not responsible for the disaster. The ship was ruled to be seaworthy and "all proper precautions" had

been taken by the operators. Blame was conveniently placed on Chief Engineer Joseph Erickson who, according to the court, was negligent in his duties to fill the ballast tanks properly. Erickson was not present to defend himself — he died of heart failure in 1919 at the age of 37.

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# DRIVEN TO DISTRACTION

The highway outside Marseilles twisted around the rugged mountains inland and high above the Mediterranean coast. It was a driver's road, the kind that played back to you when you steered confidently up through smooth curves and accelerated out and then down inviting long downhill stretches until you braked firmly again and set up for the next sweeping turn and the reward of another unwound ribbon of asphalt even more perfect than the last.

April was the best time of year in Provence. The cold winds of winter were gone, the hordes of foreign tourists had not yet arrived, and August and the invading army of vacationing Parisians was many months in the future. It was a beautiful day. All one had to do while driving this particular day was mind the road and the many groups of bicyclists in their colorful outfits out plying the rural highways at the opening of the cycling season.

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The driver's name may have been Monique, which is as good as any other name considering that the police spokesman did not give her name when he announced to the press that she had been arrested later after the carnage on the highway earlier that Sunday. He did say that she was 27 years of age. Her companion in the passenger seat up front was clearly involved

but remained unnamed as well and was not the person responsible for operating the car. Yes, it was appropriate in this case that the finger be pointed directly at the one whose foot was on *l'accélérateur* and whose hands were not entirely on the steering wheel and whose eyes were someplace other than the road ahead. There was also, the policeman said, a contributing factor, an unusual mitigating circumstance, if you will, involving Monique and her companion that played a role in the accident. Monique's mind and hands were elsewhere for many critical moments as she sped down the scenic highway across the rolling French countryside.

It was not a matter of the speed or the road; it was all about *the matter of the distraction* which came when she least expected it. One might have guessed it was a bit of fooling around or even an incoming call on a mobile phone, but neither was the case. It was something else that was inside the car.

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Everything was pleasant and controlled one second before, but the next second the shrill *beep beep beep beep beep beep* distress signal blared out from somewhere around the dashboard and filled the cabin. Panic set in.

"What is it? What is it?" shouted the companion in the passenger seat, wondering what the sound was and from where it was coming. The pure-tone distress signal was very difficult to localize.

"The Tamagotchi!" came the frantic reply.

"The Tamagotchi?"

"Yes! The Tamagotchi!"

The key in the ignition was attached to a small chain which also looped through the small egg-shapped device dangling next to the steering column. It was Monique's Tamagotchi, an





imported object from Japan. As the manufacturer said, the Tamagotchi was "the original virtual reality pet," a flattened colorful egg with three tiny buttons across the bottom, a small liquid crystal display in the center, and a key chain attached to the top. At the level of reality — not virtual reality — the Tamagotchi was a miniature video game which received inputs from the player via the three little buttons and provided feedback with moving pictures on the display and piercing auditory beeps when it needed serious attention from its owner.

Monique had acquired her Tamagotchi some days before and knew that the objective of the whole thing was to keep the Tamagotchi "alive" for as long as possible — just like a pet dog or cat. Each Tamagotchi was, according to Bandai Company, the manufacturer, an egg from distant space that had landed on Earth. Once actuated or "woken up," it required "nurturing" and "parenting" from its human parent. Its "lifespan" depended on how it was cared for, and it signaled its need to be "fed, nurtured, and cleaned" through its display and beeps, to which the caring parent had to respond in a timely manner by pressing the three buttons to provide "food" or "attention." It took a new owner quite a while to figure all these details out, and sometimes it took a seemingly random approach to pressing the tiny buttons with the very tip of your finger to get the beeping to stop and the Tamagotchi back to a healthy state as shown on the tiny display.

Once "hatched," it could not be turned off and therefore required near-constant attention, especially during its early days of life. "It is not a game," said Tomio Motofu, the spokesperson for Bandai. "You're looking after a space creature whose lifespan depends on how you care for it." "It is more than a toy," added Mary Woodworth of Bandai USA Division, "it is a learning device. It teaches people to be responsible."

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And at this moment Monique took her responsibilities — at least the responsibility of keeping her Tamagotchi alive — very seriously, more seriously than her responsibilities as the driver of the car. The Tamagotchi's bleating beeps meant that it was in very critical distress and that it required immediate and undivided attention in order to survive. At most, a Tamagotchi could live for 26 days, the current record in Japan. Anything over 17 days was rare. But Monique had not had her Tamagotchi nearly that long — only a matter of days, actually — and she would be considered a failure as a parent should her Tamagotchi expire prematurely as a result of her lack of attention and poor parenting skills.

The Tamagotchi on the key chain dangling from the ignition of the car rolling down the highway with the cyclists in the hills of Provence was indeed expiring. Its beeps were frantic and loud, the kind of sound heard only when a Tamagotchi was near death due to neglect early in its short life. Its buttons had to be pressed and its little display examined closely to see what was wrong and what it needed to continue to live.

"The buttons! The buttons! Press the buttons!"

Her passenger now understood that this all had something to do with the round electronic gadget on the key chain and leaned forward and grasped it, being careful not to pull the attached key out of the ignition of the running car.

"You must hurry! Press the buttons! The Tamagotchi is in distress!"

But this was all so unfamiliar to the companion who was fiddling with the Tamagotchi, looking for the tiny buttons so they could be pressed to somehow save the life of the egg from space. It was taking too long, and Monique took her eyes from the road and a hand from the wheel and pointed to the





Tamagotchi and said that it was "here" that the buttons had to be pressed while the car drifted away from the center of the lane, then precariously to the side and then near the shoulder. Her attention was now fully heads down, focused entirely on the dying Tamagotchi on the key chain hanging from the ignition, telling her friend in a panic what to do to save its life when the car, traveling three or four or five times faster than the pack of cyclists ahead on the side of the road, mowed into the back of the group from behind. One rider took the full force of the front of the car and flew up and out and over and down to the pavement with instantly fatal injuries; another was injured. The Tamagotchi expired as well.

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Driver saves virtual pet (1998). *Reuters News Service*, April 8.

# NEGATIVE TRANSFER

NASA 1 [Flight Control, Edwards, California]: "Okay, cockpit camera on now."

Milt Thompson [Test Pilot, in the M2-F2 Lifting Body under the B-52 mother ship's right wing]: "Okay, coming on."

NASA 1: "All systems go, thirty seconds now, Milt."

Thompson: "Okay."

B-52: "On speed."

NASA 1: "Fifteen seconds now."

Thompson: "Roger."

NASA 1: "Ten seconds now."

Thompson: "Okay. Five, four, three, two, one, release!"

The silver wingless aircraft fell free from the B-52. Milt Thompson looked up for just a second through the Plexiglas bubble canopy over his head as the B-52's massive right wing receded into the sky above. The release was clean and surprisingly smooth, not at all like the hard launch when he was in the X-15. This was different. He had simply flown away from the mother ship without any lurching or jerks. "A pleasant surprise," he thought, and a relief considering that the M2-F2 lifting body had never before flown on its own in the air. First flights were always a little nerve-racking, but so far this had been a piece of cake.

Forty-five thousand feet of empty space now lie between Thompson and the Mohave desert below. He was currently pointed north. The sun had just come up over the horizon off to





his right. The flight plan called for him to make a 90-degree turn to the left, followed by another left turn, test the peroxide rocket along the way, deploy the landing gear at the last possible second, and put the aircraft down horizontally on Rogers Dry Lake. If all went well, and even if it didn't, he would be on the ground in under four minutes. Either way, it was going to be a wild ride.

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The M2-F2 was the most peculiar-looking aircraft ever flown by NASA — if you could call a near free-fall from over eight miles up "flying." Officially, it was "a modified half-cone, rounded on the bottom and flat on the top, with a blunt rounded nose and twin vertical tail fins." Unofficially, some likened its shape to that of an old-fashioned footed bathtub with a tapered boatlike underside. The idea of a wingless lifting body had originated with Dr. Alfred J. Eggers Jr., a NASA R & D director up at the Ames Aeronautical Laboratory south of San Francisco. The central issue triggering his thinking was how to bring a manned spacecraft back through the Earth's atmosphere without parachutes or complicated splashdowns in the middle of the ocean. A controlled flight back from space was far more desirable than a "plunge to Earth in a ballistic trajectory." A flyable returning spacecraft could be landed on a conventional airport runway, and the craft might even be reused for multiple return trips into space. But there were many problems associated with a "flyback" return, the greatest being that conventional aircraft wings and any control surfaces attached to them would melt away. Eggers reasoned that a lifting body shape with a blunt nose, round bottom, and flat top would provide sufficient lift to enable a pilot to actually steer the craft down from Earth orbit to a runway and survive the extreme heat

of reentry.

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Milt Thompson had been at his desk at the pilots' office a few years before in 1962 when he heard NASA engineer Dale Reed running up and down the hallway outside. Reed had been advocating the construction of a flight test model of a lifting body, and now he had taken matters into his own hands in a very clever way. He had carved a small lightweight model of a lifting body and attached it to a long string. The longest enclosed straight space around just happened to be the hallway outside the pilots' office, and Reed tested his design by running up and down the floor, his little lifting body model in tow. To the surprise of just about everyone present, the model was very stable in its simulated flights down the hall. Reed's antics were more than a test, however; he was also floating his proposal that the center undertake a relatively small-scale program to develop and fly a piloted lifting body. Initially, at least, they could test a prototype by towing it rather than investing in an expensive propulsion system. Reed was up on the roof launching his model out towards the aircraft ramp after his demonstration in the hallway to further his case and appease his growing cadre of followers, including a number of test pilots.

Reed's greatest obstacle was available resources at the center, not lack of interest. The X-15 research program was in full swing and the director, Paul Bikle, was not about to divert engineers, mechanics, and money to Reed's proposed program. But Reed was persistent and he moved his desk, along with his drawings, charts, models, and recently recorded movies of his lifting body models in flight, into the pilots' office. In no time, Reed had worked his charms on Milt Thompson, hooking an advocate and skilled test pilot at the same time. Reed,





Thompson, and an engineer named Dick Eldredge brought Eggers down from the Bay Area to obtain his endorsement and presented a plan for a six-month feasibility study. Bikle could no longer swim against the changing tide of interest in manned lifting bodies, and he approved the program. Progress was rapid, and in September the small team and a sailplane contractor started work on the M2-F1, a full-size flight-capable lifting body with a wooden exterior. Bikle, having now fully endorsed the concept, became the program manager. Thompson had become the principal test pilot. By March, 1963, the M2-F1 was being towed on a 1,000-foot line behind a '63 Pontiac Catalina convertible with a 421-cubic-inch triple-carb Tripower engine, more than enough horsepower to get the M2-F1 and Thompson up into the air at 120 mph. By early 1964, they had installed an ejection seat and were flying the M2-F1 at altitude, pulled aloft by a C-47. There had been many accomplishments and many successful test flights during those few short years, and many opportunities to celebrate late in the afternoon at the Rock-a-Bye saloon in Rosamond out beyond the edge of the dry lake.

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The initial test flight of the M2-F2, now under way during the still of daybreak, July 12, 1966, was an important one for the lifting body program. As the first of the "heavyweight" designs, the M2-F2 was a serious aircraft made of aluminum and steel, not wood and resin. It weighed in at a hefty 4,620 pounds, without ballast and test pilot, and was 22 feet long and 10 feet wide. Milt Thompson sat forward in the craft, his head literally poking up above the flat top but under the bulbous Plexiglas canopy. Down beyond his feet was the rounded Plexiglas nose through which he could see the ground below.

The F-104 chase plane slightly behind and to the side chimed in on the radio. Milt Thompson's flight was progressing well: "It's a beauty."

NASA 1: "Heading is good."

Thompson: "Okay."

NASA 1: "Coming up on forty thousand feet now; check alpha [angle of attack] and airspeed. And, start your turn."

It was now a scant 26 seconds since Thompson had released from the B-52. He had fallen one mile closer to the desert floor. But with a forward speed of 450 knots at release, he had covered more than twice that much distance over the ground. At top speed and under the best of circumstances he could traverse three miles for every mile he fell. His first major maneuver was the first 90-degree turn to the left to set him up headed west, running along the north shore of Rogers Dry Lake. He pushed the stick to the left and the M2-F2 started a smooth westward turn.

The faster he went the more lift the M2-F2 would generate, and he needed to pick up speed and lift if his landing on the lake bed was to be horizontal rather than vertical. Thompson pushed the stick forward to tilt the nose down and start picking up airspeed. The next maneuver in the flight plan was a practice landing flare at altitude in which he would fly the M2-F2 relatively fast and then pull back on the stick to level her out as if he were landing.

Thompson pushed over and immediately began to pick up speed. Simultaneously, he felt a slight left-right oscillation, as if his bathtub-shaped aircraft was rolling a bit from side to side, like a baby's cradle being rocked one way and then the next. Aerodynamic simulations had predicted that this instability might occur during flight, and he knew he had to be exceptionally careful about introducing a pilot-induced oscillation (PIO) in the M2-F2, particularly during a turn. The





shape of the lifting body could make recovery from a PIO very difficult — or even impossible — to handle.

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NASA and Northrop (the aerospace contractor selected to build the M2-F2) faced one particularly unique challenge when designing the control system for the M2-F2 some months before. Unlike the M2-F1, which had short horizontal tip fins and elevons, the M2-F2 had no horizontal wing surfaces which might be used also for mounting moveable surfaces to control roll. Wings would project out into the free stream flow during reentry, and everyone wanted the M2-F2 lifting body design to be as close as possible to a real spacecraft that would have to withstand the extreme heat when entering the atmosphere at 17,000 miles per hour. How, then, were they to make the craft roll left and right, which would be necessary when turning or leveling out to land?

The decision was to eliminate the elevons entirely and use the other moveable surfaces to control roll. There were only two: the left-right inboard ailerons at the rear and the left-right vertical tail rudders. Wind tunnel tests showed that using the left-right inboard ailerons alone to control roll would not work. Lifting one aileron produced a high-pressure region above it and inboard of the adjacent vertical fin. The result was a dangerous yawing moment and, surprisingly, a roll moment in the exact opposite direction of the original control input! No one ever said flying a bathtub would be easy.

The solution was to interconnect the control of the rudder on the two tail fins and the two parts of the horizontal aileron. When the pilot made inputs to move the ailerons, the rudders would move proportionally to counteract the yawing moment produced by the moving ailerons. Furthermore, Thompson

could change the degree to which the rudder moved in concert with the ailerons by adjusting a control, a vertical hand wheel off to his left that they called the *interconnect ratio changer*. Roll it one way and you got a large response from the rudder with an aileron input; roll it the other direction and you got next to no response from the rudder in concert with your aileron input. The adjustment was necessary for two reasons: first, no one was quite sure what ratio would work best and, second, Milt was likely going to need to change the ratio as he changed speed and moved through different layers of the atmosphere with their different densities. They all knew that it was not the ideal way to solve the problem, but it seemed like it would work.

On the downside was the fact that the aircraft was highly sensitive to pilot-induced oscillations, in which moving the stick to the left would result in the aircraft rolling to the left — but perhaps further than intended by the pilot. The pilot would invariably respond by moving the stick to the right, and the aircraft would roll hard to the right and so on, back and forth, with each cycle becoming more and more pronounced until he lost complete control. If the setting on the interconnect ratio changer was just right, however, he should be able to control everything and avoid the pilot-induced oscillations.

Milt had spent hour upon hour in the M2-F2 flight simulator going over the subtle handling characteristics of the craft and the flight plan. Using the Air Force's X-15 simulator cockpit, they had been able to simulate not only the M2-F2 controls, but also the handling characteristics of the M2-F2 under all conceivable circumstances. Just as he had shown by his skilled handling of the M2-F1 while being towed behind the Pontiac, Milt's skill flying the M2-F2 simulator impressed everyone on the team.

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With the M2-F2's nose now angled down, the airspeed





indicator passed 290 knots. Thompson's altitude was now down to 22,000 feet, over halfway there. He pulled back gently on the stick, bringing the nose up level, and then up a little higher, simulating the landing he planned to make once he reached the level of the lake bed. The flare maneuver lowered his rate of descent and also burned off some speed. The g forces built up to 1.5 times the force of gravity as he slowed down, the nose still angled up somewhat. At 18,000 feet his speed had fallen back down to 200 knots. He brought the nose down level again. So far, so good.

The next step in the tightly orchestrated flight plan was to fire the XLR-11 peroxide rocket in the tail, the same type of rocket used in the Bell X-1 flown by Chuck Yeager. The purpose of the rocket was to extend the M2-F2's range by providing thrust. With the propulsion provided by a rocket, he could cover a greater distance and descend at a slower rate. This could come in handy during landing or if there were an unexpected change in plans during the "glide" down to Earth. But if the rocket was not aligned perfectly with the center of gravity of the aircraft, he could careen off in some insane direction and break up. Thompson made doubly certain that the nose was straight and level. He raised the safety cover and flipped the switch. The rocket kicked in and he accelerated straight ahead over the desert as planned.

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Seconds later he was setting up for the final turn and landing on the forgiving expanse of dry lake bed. Ground control came on to help him stay exactly on the plan.

NASA 1: "Okay, add one degree on your upper flap."

Thompson: "Okay."

NASA 1: "Okay, do you have the field in sight?"

Thompson looked out forward and to the left through the canopy, across the Mohave Desert. He was headed west and the rising sun was now behind him. The marked landing area on the lake bed was many miles away, but in clear view to the south. "Affirm."

"Check your dampers and interconnect and start your turn anytime. Start your turn, Milt," said NASA 1.

"Okay," replied Milt Thompson. He cautiously moved the control stick to the left to initiate the turn.

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It was at this juncture that his problems began. The M2-F2 lifting body did not respond quite as planned. Flight controllers on the ground were receiving near-instantaneous flight data from M2-F2. Everyone on the team was aware and focused on the unfolding drama. For Milt Thompson, it was the rapidly changing view out his little cockpit; for those on the ground it was the shocking, sudden seesaw movement of an automated ink pen on the chart recorder. Yet no one said a word. It would only distract him.

As Milt Thompson passed through 16,000 feet on his final turn to the marked landing spot, he sensed that the sensitivity of the controls was too great. The tiniest of inputs to his stick made the M2-F2 oscillate slightly from side to side. His gaze alternating between his instruments and the view outside, he reached down and felt for the interconnect ratio changer and moved it slightly to decrease control sensitivity. That seemed to help, but, still, he sensed that he was on the edge of a controllability problem. He reached back down with his left hand again and moved the interconnect ratio changer once more, simultaneously coordinating the movement of the stick in his right hand and the rudder pedals with his feet. His turn nearly





complete, he pushed the nose over to pick up speed, headed for the dry lake bed ahead.

Suddenly, just as he had feared, the vehicle began to roll, first to the left and then to the right, just 5 degrees or so to each side. Each time he moved the stick to counteract the roll in the opposite direction he found himself rolling back even harder in the other direction. He reached for the interconnect ratio control again, moving it to further lower the sensitivity of the flight controls, but the controls seemed to become even more sensitive. Now he was rolling 10 degrees to one side and suddenly 10 degrees to the other.

M2-F2 was now in a 30-degree dive, driving toward Rogers Lake Bed 8,000 feet below at a rate of 300 knots. Thompson's rate of descent was 18,000 feet per minute. If he did not get M2-F2 under control he would pound into the hard clay bottom in 27 seconds. He grabbed for the interconnect ratio control and moved it all the way to the lowest setting. The control wheel slammed up against the hard physical stop. Suddenly, he was rolling a full 45 degrees to the left and quickly 45 degrees to the right, a full 90 degrees each second, one side to the other. The motions were violent, and his robin's-egg blue helmet slammed up against the left side and then the right side of the Plexiglas canopy each time the silver M2-F2 rolled wildly from one side to the other.

Milt Thompson was experienced enough to know that this was now a matter of life and death. He had do so something, but the question was "what?" Pilot-induced oscillation was just that — pilot-induced. If he made no control inputs there should not be any pilot-induced oscillations. If he centered the stick, that would still be a control input, wouldn't it? The lifting body was supposed to be aerodynamically stable all on its own, just like Dale Reed's scale model that he pulled down the hallway and glided off the roof. It should work, he told himself. It

should work. It had to work. "Let go of the stick, stupid! Let go!"

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The over-the-shoulder movie camera made a fitting record of the moment and this NASA test pilot with the right stuff. As the horizon rolled from straight up and down to straight down and up each second, as Milt Thompson's helmet banged against one side and then the other of the clear Plexiglas canopy, and as the desert floor came into focus as in a big magnifying glass, Milt Thompson's black-gloved hands sprang back and away from the control stick, just as if they had been burned. It was his only way out and his last hope.[4]

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The M2-F2 lifting body, a 4,620-pound silver bathtub plummeting through the sky at more than 300 miles an hour, magically stopped oscillating from one side to the other and leveled out, stable as ever. Milt looked down at the interconnect ratio control and saw that it was set to the *maximum* sensitivity position. He had been moving it in the wrong direction! He also realized in that moment that the interconnect ratio control in the simulator was a lever, not a wheel, and that it moved in exactly the opposite direction as the actual control now under his left hand. He was the victim of a classic case of *negative transfer*. He reset the interconnect ratio control to its correct position, grabbed the control stick, pulled up to just above the level of the lake bed, slowed to 240 knots, dumped the landing gear, and sat the M2-F2 lifting body wheels down on the lake bed. A

[4] A Northrop flight control engineer watching the film during the M2-F2 postflight review nearly passed out.





magnificent roostertail of dust followed his track across the hard packed clay. Without a parachute or the wheel-less skids of the X-15 to slow it down, the M2-F2 would roll on southward across the desert for over a mile and a half. Milt Thompson enjoyed the ride.

NASA 1: "Beautiful, Milt."

B-52: "At least it goes a little farther than the X-15, doesn't it?"

Thompson: "Yes, it do. I'm trying to get to the Rock-a-Bye."

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All dialogue in this story is from *Flying without Wings* (Thompson and Pebbles, 1999) and the M2-F2 test flight transcript.

# END GAME

In the morning when the sun burned bright over the blue of the Aegean Sea and the thousand islands of Greece, he did not want to face another day of life. For Pandelis Sfinias, architect of a business empire, Chief Executive of the ferry company Minoan Flying Dolphins, Vice President of the parent company Minoan Lines, President of the Union of Coastal Ship Owners, multimillionaire Greek business executive well-connected to the most powerful politicians, it was not a day to savor the Mediterranean sun or the view out the sixth-floor office window over the industrial port of Piraeus on the outskirts of Athens. It was only another day to bear the weight, the angst, the thick depression of the two months since September 26, 2000 when the *Express Samina* ferry went down in the Aegean Sea. "These things happen," he told himself early on. They had a large fleet of ships and the law of averages would eventually work their way around if you stayed in the game long enough. "Everything would heal with time," consoled his friends. He had at least ten or even twenty years left in his career and they said he had to accept the past and move on.

But the game was not worth playing anymore, he said to himself under his breath, submerged below the depressants and alcohol still in his blood, sitting silently at the table during the morning meeting in his office suite high up in the building. He wanted no part of it, no part of anything anymore. What was the point? There was only one path out — out and away from





the ceaseless avalanche of words and anger and threats and hatred that had washed over the whole of the country and the whole of his floating empire, Minoan Flying Dolphins. There was no option, but for the moment there was the matter of the meeting to attend to and the summary required by his guests in his office high above the street.



It had not started out this way, he began to tell the visitors, sitting again at the table and projecting back in time. In the beginning only a decade before it was an ingenious scheme to unify and revive the large Greek ferry business, a sound business plan with important links to government and regulators to serve 10 million Greek ferry passengers each year, an arrangement to make a great amount of money for the key investors. What they had to do first was create a new company, Minoan Flying Dolphins, owned by the parent company, Minoan Lines. Next, they would buy up as many as possible of the smaller family-owned Greek ferry companies servicing select routes into and out of Greece from Italy and Turkey, but mostly the lines between the major ports sprinkled around the Aegean. Ferry boats, not airliners or bridges, were the veins and arteries of Greece, carrying passengers and cargo throughout the Archipelago as they had done for eons. Whoever could acquire the infrastructure and reorganize it into one system would control the modern Aegean's lifeblood — the cargo, the cars, the trucks, the people and their money — all moving ceaselessly between the seaports of the northeast Mediterranean. This ferry business was not glamorous, but it could be very profitable if you knew how to play the game.

The regulatory environment was the keystone, he summarized, including the domestic and international rules

governing everything from the mandatory retirement age of ships to the number of life jackets stowed aboard each vessel. One might think that such regulations were not within the purview of those whom the rules would regulate, but this was not the case. Fortunately, Sfinias and Minoan Lines nurtured close ties to the political party in power, and together they worked toward regulations that made the plan all the more feasible. Perhaps the largest obstacle had been the new European Union rule that all open-ocean ferries be retired after 27 years of service. The ruling's intent was to get older, less-reliable and less-safe ships off the water and have them replaced with newer and faster models with stronger hulls, safer designs, and up-to-date lifesaving gear. But Sfinias had presented the Greek ferry industry's arguments articulately to their new European friends, pointing out the uniqueness of the Greek ferry business, its importance to the country's economy, its role in tourism and industry. Unlike operators in the English Channel or Scandinavia, Greek shippers had many more ports to service and a large population that depended on them for their very existence. Forcing Greek operators to retire ships after 27 years would bring total financial ruin to the industry, they argued. They could not possibly operate under such a rule, most certainly over the near term. The EU regulatory commission finally agreed and granted Greece a variance on the 27-year retirement-age regulation, deciding that — at least until the matter was reconsidered by the commission in another five years — Greek ferry companies did not have to scrap their ships until they reached 34 years of age. For Minoan Flying Dolphins and Pandelis Sfinias, the planning and positioning had paid off again.

With the EU regulators having taken the bait, Minoan Flying Dolphins was poised for the next step in the scheme: running available old ships on selected routes or, if they choose to do so,





buying at bargain prices the old ferries now forced onto the market in other parts of Europe. A 27-year-old ferry, now worthless in the rest of Europe, could make money hand over fist for another seven years in Greece. One had to take advantage of every opportunity, especially if the opportunity was of your own making. This was business, after all.

In 1999, Minoan Flying Dolphins acquired 70 aging ferries and hydrofoils, getting the equipment at a steal. Yes, yes, they would modernize their fleet with new high-speed catamarans and super-fast ferries as they could be afforded, but high-volume and longer-distance routes would still be serviced with the older, larger, and enormously less-expensive ships. The pieces had continued to fall into place, and it had been due in no small part to the connections and untiring effort of Minoan Flying Dolphins' chief executive officer, whose emotionless façade at the meeting around the table in the plush office high above the street below concealed the anguish and utter desperation of the true man underneath.

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The summary of recent years continued. The last element of the plan required advances on the political front. "The Greek government," Sfinias had argued cleverly before, should "determine the rules of the game so that they are fair for all companies and EU countries, without making exceptions for Greek shipowners," casting an air of modern business objectivity to the discussion. But in his next sentence he made his real objectives crystal clear: "Yet, this doesn't mean that anyone can enter Greek waters on their terms. Rules will be implemented. Otherwise, who would maintain lines to the small remote Greek isles during the winter months?" "The Greek government... will establish rules, like licenses of expediency, labour contracts, etc.,

imposing certain obligations on shipowners, and in exchange the government will grant licenses." What he proposed was not a classic American approach in which the government defined the service to be provided and companies submitted their bids for the contract. Rather, Sfinias described an "arrangement," one in which there is "...an exchange between shipowner obligations and government control of price lists, routes and crew synthesis." It was, according to Sfinias, a "...system of issuing licenses under specific terms," a system that served the needs of the people but also the needs of the ship operators. In keeping with the longstanding and often-questioned ties between the shipowners and the government, individual shipping companies would service certain routes under "arrangements" with the government regulators. The result was that true competition, especially competition from foreign ferry companies, would be stalled — like the regulations for mandatory retirement of old ships — for five years, plenty of time for Minoan Flying Dolphins to establish a choke hold on the ferry market in the Aegean.

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With the background and history out of the way, he moved on to the current crisis and the events of the past two months. It had been a big fall from the heady days of one year before when their plan rolled on unimpeded like a massive swell sweeping across the open ocean. As everyone in the office knew, the *Express Samina*, a 345-foot 4,407-ton 34-year-old ferry, had sunk after 10:00 p.m. on Tuesday the 26th of September with 550 passengers aboard. Since then, a day had not passed without yet another shocking revelation from the television newscasters and the next public announcement from the government regulators. His life and that of others in the business had been threatened,





bombs had been planted, lawsuits had been filed, employees had been jailed. It was true that perhaps he and others at the top had not paid enough attention to the day-to-day operations of the ferry business and the management of each ship and crew. But he had cultivated so many friendships over the years, and it pained him to see so many he knew turn against him and the company after a tragic accident like this. The latest rumors were that he — as the biggest fish — was next on the list for prison.

The newsclippings and preliminary reports on the table made it all painfully clear: the *Express Samina's* helmsman and midshipman were in the big room on the main deck behind the bridge watching the action-packed soccer match on the television with many of the 550 passengers as disaster was about to strike. It was one of the biggest games of the season, the match between the hometown team from Panathinaikos, near Athens, and the team from Hamburg. The white ball, bright green uniforms of the Greek players, and red shirts of the team from Germany made it easy to follow the game even if you were quite far from the screen. It had been an exciting match, and it wasn't easy to tear oneself away from the television when the home team was playing and there were so many feverish soccer fans on board. Captain Yiannakis had been watching some of the game himself, but now he was taking a snooze in his private room. He was supposed to have been awakened a dozen minutes before when they were many miles outside the harbor by first officer Psychoyos, who was technically in charge while the captain was napping but busy making the moves on an attractive woman in a far-off corner of the lounge. While the ball bounced around the field and the colorful players darted and dashed and the passengers and crew shouted their support for the teams and first officer Psychoyos devoted his attention to the pretty young lady, the *Express Samina* chugged on through the stormy sea at 19 knots, steered straight ahead by her trusty

autopilot, all alone on the quiet and empty bridge of the ship. The setting was not lost on survivor Christa Liczbinsky from Germany, interviewed later by the reporters, who turned to her husband, a Lufthansa Airlines pilot, and remarked jokingly during the soccer game, "Who's driving the ship?"

Directly ahead lie the Portes islets, locally known as The Gates, the 20-meter-high twin rock spires two kilometers outside the destination port of Paros, marked clearly with fully functioning navigation lights. Suddenly, someone shouted out about an impending collision. The helmsman and first officer ran to the bridge and turned the wheel, but it was too late. Many of the 550 passengers watched out the windows in horror as they drove straight into the towering rocks. A side stabilizer blade well below the water line hit, ripping a 3-meter hole into the hull. The *Express Samina* came to a grinding halt and began to flood. The ship could survive a breach of the hull of this size, but the watertight bulkhead hatches had to be closed. However, the crew had not followed regulations and had not closed the hatches for the 5-hour trip. The water rushed throughout the bow and then back toward the stern. She began to list to port, the power was lost, and the lights went out.

The *Express Samina* began to settle slowly with her bow somewhat down but relatively level. No safety instructions had been provided by the crew when they left port five hours before, so the passengers were on their own. There was a scramble for life jackets. A crewman appeared and announced that everything was under control; the ship was in no danger of sinking, he said. There was no need to worry. Everyone should stay where they were, inside the ship, and await further instructions. But the one hundred or so foreign passengers who did not speak Greek did not understand the instructions, and most left the apparent safety of the large main rooms and went out on deck in the storm, prepared to abandon the sinking ship.





For 45 minutes the 4,407-ton ferry continued to settle, her open main deck drawing closer to the storm-fed waves each minute, the largest swells now drenching the terrified passengers out on the deck. One of the follow-on newsclippings had an interview with a tourist from Oxford, England. Like others, he had tried unsuccessfully to launch a lifeboat. Some of the equipment was missing and he could not understand the instructions which, although in English, were awkward and unclear. He had figured out some of it, but when he got to the part where he was to "cross two ropes" there weren't two ropes to cross. At this point the lifeboat was free from its mounting, but it could not be launched. He gave up and prepared to go overboard.

After 40 minutes the deck was down to the level of the churning water. More passengers jumped over the side, while others climbed over the rail and stood on the edge, waiting until the last possible moment, each wondering if they were jumping to survive or to their death. Most passengers on the open deck huddled about, not knowing what to do. The ship settled further down and the main deck of the ferry boat that was longer than a soccer field sank under. Perhaps a hundred people, most wearing old life jackets stuffed with cork and wood, bobbed to the surface as the waves washed them across the ship and the deck slipped away beneath them. Ironically, they were the fortunate ones and would all survive. As the upper decks of the ship submerged beneath the boiling surface and the *Express Samina* disappeared, the British tourist from Oxford found his lifeboat afloat, albeit upside down. He clung to it for his life, a modern-day Ishmael afloat on the carpenter's coffin.

The passengers, mostly Greek, who had followed the orders of the crew to stay seated indoors were unaware of the extent of the danger and had to escape quickly from the rooms as they flooded. People on the lower decks never had a chance. The

deck-class passengers still in the main enclosed lobby had a bigger challenge according to the latest reports from the press: as was usually the case on the *Express Samina*, the big side doors on the main deck-class room may have been wired and chained shut to keep lower-class passengers out of upper-class areas.

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The press became insufferable in the days that followed, but, honestly, could he really blame them? Eighty-two people had drowned. Some of the bodies floated into the rocky coves of the island, videotaped by the news helicopters for all to see on the television reports. Others were found by rescue divers the next day, arms and legs of lifeless bodies waving gently in the undersea currents of the Mediterranean, life jackets hung up on equipment or stuck in the rails, ghostly open-eyed faces with gaping mouths trapped behind flooded panels of glass and locked doors. Quick-thinking fishermen and two British warships had picked up the survivors.

The captain, first mate, helmsman, and midshipman were arrested two days later on charges of "homicide with possible malice, causing serious bodily injuries with possible malice, violating maritime regulations, violating international regulations, ...sinking a ship, ...and deserting a ship." The captain had appeared in court on the island of Syros, handcuffed and humiliated, and was paraded before the cameras and the press like a man being led to the gallows before a bloodthirsty mob.

Minoan Lines had to respond to the negative press. After all, the financial health of the company might be at stake if people continued to get carried away with their emotions — and there was no shortage of emotion by September 28. They crafted and released a response to the press with the intent of clarifying





the business relationship between the various arms of the company and minimizing overall financial damage, but it backfired. In retrospect it was not surprising that people took it the wrong way, seeing the announcement as a callous attempt to contain their monetary losses without mention or regard for the loss of life and responsibility. The press release read:

> "For your accurate and comprehensive information, Minoan Lines' management responding to the latest media reports following the sinking of the ferry boat *Express Samina* feels obliged to clarify the following: Minoan Lines is a minority shareholder of Minoan Flying Dolphins with a 31.6% stake; however, we wish to emphasize that there are no common business, managerial or organizational identities between the two separate legal entities. The ferry boat *Express Samina* belongs to Minoan Flying Dolphins, a company that shouldn't be mistaken with Minoan Lines, an autonomous legal entity and with a separate shareholder structure."

The fact that Pandelis Sfinias was the Vice President of the parent firm and Chief Executive of the subordinate company was conveniently omitted from the press release.

The aftershocks grew larger the first week in October. The government's preliminary investigations concluded that all Minoan Flying Dolphins' ferry boats were substandard. Greek Premier Costas Simitis addressed parliament on the accident, proclaiming that those responsible would be held accountable. The Communists and left-wing politicians cried out that it was the ruling party and their back room deals that had brought this all about. The government threw a counterpunch to quell the opposition, announcing that the Greek island ferry routes would

be opened to full competition one year earlier than planned, a ruling that would benefit Minoan Flying Dolphins' chief potential rival, Strintzis Lines. Strintzis Lines, in turn, announced that it was raising 200 million dollars to be spent on new ships. Minoan Flying Dolphins' long-planned October 11 listing on the Athens Stock Exchange would have to be postponed, Sfinias and others had decided reluctantly.

The courts seized four of Minoan Flying Dolphins' high-speed ships on October 14 as guaranteed payment for unfolding legal suits. That same morning a bomb was planted outside the Piraeus office of the former minister of merchant marine affairs who was rumored to have been behind a number of shady ferry business deals. The anarchist group Revolutionary Nuclei claimed responsibility. Eighteen members of the *Express Samina* crew filed suit against the company on October 25, seeking 2.9 billion drachmas from Minoan Flying Dolphins, claiming they had been rendered "nervous wrecks" by the accident.

On October 31 the government approved a 10 percent increase in ferry boat fares, issued new ferry operating licenses to Minoan Flying Dolphins' competitors, and recalled the license of the *Express Naias*, the *Express Samina's* sister ship. November 8 saw another quarter-million dollar court award and the arrest of the Greek Harbor Corps Chief on charges of dereliction of duty with regard to inspections of the *Express Samina*.

The latest blow was particularly personal. Minoan Flying Dolphins had secured loans totaling 4 billion drachmas from EFG Eurobank and Alpha Bank one year before with Pandelis Sfinias' entire personal fortune as collateral. The deadline for payment was December 29, only a month away. With the company all but shut down and the onslaught of lawsuits, the cash had vaporized. They no longer had the funds to make the payment. Sfinias would have to pay up.





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He thought of his wife, Julie, at his estate on the island of Ekali, and of his sons. He thought of the 82 lives. These were his only regrets, his only silent pleas for forgiveness. Pandelis Sfinias, architect of a business empire, Chief Executive of the ferry company Minion Flying Dolphins, President of the Union of Coastal Ship Owners, multimillionaire Greek business executive well-connected to the most powerful politicians, pushed his chair back smoothly away from the table and stood up casually in his tailored suit, as if in thought about the next point of discussion at the summary meeting around the table in the plush office high above the street below.

He walked to the big window. It was now noon and the sun was even brighter over the blue of the Aegean Sea and the thousand islands of Greece. He casually pushed it open as if to take in the view and then stepped up and out and away without saying a word.

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