The Gimli Glider Incident
from an article published in Soaring Magazine by Wade H.Nelson

If a Boeing 767 runs out of fuel at 41,000 feet what do you have? Answer: A 132 ton glider with a sink rate of over 2000 feet-per-minute and marginally enough hydraulic pressure to control the ailerons, elevator, and rudder. Put veteran pilots Bob Pearson and cool-as-a-cucumber Maurice Quintal in the in the cockpit and you've got the unbelievable but true story of Air Canada Flight 143, known ever since as the Gimli Glider.

Flight 143's problems began on the ground in Montreal. A computer known as the Fuel Quantity Information System Processor manages the entire 767 fuel loading process. The FQIS controls all of the fuel pumps and drives all the 767's fuel gauges. Little is left for crew and refuelers to do but hook up the hoses and dial in the desired fuel load. But the FQIS was not working properly on Flight 143. The fault was later discovered to be a poorly soldered sensor. A highly improbable, one-in-a-million sequence of mistakes by Air Canada technicians investigating the problem defeated several layers of redundancy built into the system. This left Aircraft #604 without working fuel gauges.

In order to make their flight from Montreal to Ottawa and on to Edmonton, Flight 143's maintenance crew resorted to calculating the 767's fuel load by hand. This was done using a procedure known as dripping the tanks.

"Dripping" could be compared to calculating the amount of oil in a car based on the dipstick reading. Among other things, the specific gravity of jet fuel is needed to make the proper drip calculations.

The flight crew had never been trained how to perform the drip calculations. To be safe they re-ran the numbers three times to be absolutely, positively sure the refuelers hadn't made any mistakes;each time using 1.77 pounds/liter as the specific gravity factor. This was the factor written on the refueler's slip and used on all of the other planes in Air Canada's fleet. The factor the refuelers and the crew should have used on the brand new, all-metric 767 was 0.8 kg/liter of kerosene.

After a brief hop Flight 143 landed in Ottawa. To be completely safe, Pearson insisted on having the 767 re-dripped. The refuelers reporting the plane as having 11,430 liters of fuel contained in the two wing tanks. Pearson and Quintal, again using the same incorrect factor used in Montreal, calculated they had 20,400 kilos of fuel on board. In fact, they left for Ottawa with only 9144 kilos, roughly half what would be needed to reach Edmonton.

Lacking real fuel gauges Quintal and Pearson manually keyed 20,400 into the 767's flight management computer. The flight management computer kept rough track of the amount of fuel remaining by subtracting the amount of fuel burned from the amount (they believed) they had started with. Their fate was now sealed.

According to Pearson, the crew and passengers had just finished dinner when the first warning light came on. Flight 143 was outbound over Red Lake Ontario at 41,000 feet and 469 knots at the time. The 767's Engine Indicator and Crew Alerting System beeped four times in quick succession, alerting them to a

fuel pressure problem. "At that point," Pearson says, "We believed we had a failed fuel pump in the left wing, and switched it off. We also considered the possibility we were having some kind of a computer problem. Our flight management computer showed more than adequate fuel remaining for the duration of the flight. We'd made fuel checks at two waypoints and had no other indications of a fuel shortage." When a second fuel pressure warning light came on, Pearson felt it was too much of a coincidence and made a decision to divert to Winnipeg. Flight 143 requested an emergency clearance and began a gradual descent to 28,000. Says Pearson, "Circumstances then began to build fairly rapidly." The other left wing pressure gauge lit up, and the 767's left engine quickly flamed out. The crew tried crossfeeding the tanks, initially suspecting a pump failure.

Pearson and Quintal immediately began making preparations for a one engine landing. Then another fuel light lit up. Two minutes later, just as preparations were being completed,the EICAS issued a sharp bong indicating the complete and total loss of both engines. Says Quintal, "It's a sound that Bob and I had never heard before. It's not in the simulator." After the "bong," things got quiet. Real quiet. Starved of fuel, both Pratt & Whitney engines had flamed out. Pearson's response, recorded on the cockpit voice recorder was, "Oh f%@&."

At 1:21 GMT, the forty million dollar, state-of-the-art Boeing 767 had become a glider. The APU, designed to supply electrical and pneumatic power under emergency conditions was no help because it drank from the same fuel tanks as the main engines. Approaching 28,000 feet the 767's glass cockpit went dark. Pilot Bob Pearson was left with a radio and standby instruments, noticeably lacking a vertical speed indicator - the glider pilot's instrument of choice. Hydraulic pressure was falling fast and the plane's controls were quickly becoming inoperative. But the engineers at Boeing had foreseen even this most unlikely of scenarios and provided one last failsafe : the RAT.

The RAT is the Ram Air Turbine, a propeller driven hydraulic pump tucked under the belly of the 767. The RAT can supply just enough hydraulic pressure to move the control surfaces and enable a dead-stick landing. The loss of both engines caused the RAT to automatically drop into the airstream and begin supplying hydraulic pressure.

As Pearson began gliding the big bird, Quintal "got busy" in the manuals looking for procedures for dealing with the loss of both engines. There were none... Neither he nor Pearson nor any other 767 pilot had ever been trained on this contingency. Pearson reports he was thinking "I wonder how it's all going to turn out." Controllers in Winnipeg began suggesting alternate landing spots, but none of the airports suggested, including Gimli, had the emergency equipment Flight 143 would need for a crash landing. The 767's radar transponder had gone dark leaving controllers in Winnipeg using a cardboard ruler on the radar screen to try and determine the 767's location and rate of descent.

Pearson glided the 767 at 220 knots, his best guess as to the optimum airspeed. There was nothing in the manual about minimum sink - Boeing never expected anyone to try and glide one of their jet airliners. The windmilling engine fans were creating enormous drag, giving the 767 a sink rate of somewhere between 2000 and 2500 fpm. Copilot Quintal began making glide-slope calculations to see if they'd make Winnipeg. The 767 had lost 5000 feet of altitude over the prior ten nautical (11 statute) miles, giving a glide ratio of approximately 11:1. ATC controllers and Quintal both calculated that Winnipeg was going to be too far a glide; the 767 was sinking too fast. "We're not going to make Winnipeg" he told Pearson. Pearson trusted Quintal, and immediately turned north.

Only Gimli, the site of an abandoned Royal Canadian Air Force Base remained as a possible landing spot. It was 12 miles away. It wasn't in Air Canada's equivalent of Jeppensen manuals, but Quintal was familiar with it because he'd been stationed there in the service. Unknown to him and the controllers in Winnipeg, Runway 32L (left) of Gimli's twin 6800 foot runways had become inactive and was now used for auto racing. A steel guard rail had been installed down most of the southeastern portion of 32L, dividing it into a two lane dragstrip. This was the runway Pearson would ultimately try and land on, courting tragedy of epic proportions.

To say that runway 32L was being used for auto racing is perhaps an understatement. Gimli's inactive runway had been "carved up" into a variety of racing courses, including the aforementioned dragstrip. Drag races were perhaps the only auto racing event not taking place on July 23rd, 1983 since this was "Family Day" for the Winnipeg Sports Car Club. Go-cart races were being held on one portion of runway 32L and just past the dragstrip another portion of the runway served as the final straightaway for a road course. Around the edges of the straightaway were cars, campers, kids, and families in abundance. To land an airplane in the midst of all of this activity was certain disaster.

Pearson and Copilot Quintal turned toward Gimli and continued their steep glide. Flight 143 disappeared below Winnipeg's radar screens, the controllers frantically radioing for information about the number of "souls" on board. Approaching Gimli, Pearson and Quintal made their next unpleasant discovery: The RAT didn't supply hydraulic pressure to the 767's landing gear. Pearson ordered a "gravity drop" as

Pearson thumbed frantically through the Quick Reference Handbook, or QRH. Quintal soon tossed the QRH aside and hit the button to release the gear door pins. They heard the main gear fall and lock in place. But Quintal only got two green lights, not three. The nose gear, which fell forward against the wind, hadn't gone over center.

Six miles out Pearson began his final approach onto what was formerly RCAFB Gimli. Pearson says his attention was totally concentrated on the airspeed indicator from this point on. Approaching runway 32L he realized he was too high and too fast, and slowed to 180 knots. Lacking divebrakes, he did what any sailplane pilot would do: He crossed the controls and threw the 767 into a vicious sideslip. Slips are normally avoided on commercial flights because of the the tremendous buffeting it creates, unnerving passengers. As he put the plane into a slip some of Flight 143's passengers ended up looking at nothing but blue sky, the others straight down at a golf course. Says Quintal, "It was an odd feeling. The left wing was down, so I was up compared to Bob. I sort of looked down at him, not sideways anymore.

The only problem was that the slip further slowed the RAT, costing Pearson precious hydraulic pressure. Would he be able to wrestle the 767's dipped wing back up before the plane struck the ground? Trees and golfers were visible out the starboard side passengers' windows as the 767 hurtled toward the threshold at 180 knots, 30-50 knots faster than normal. The RAT didn't supply "juice" to the 767's flaps or slats so the landing was going to be hot. Pearson didn't recover from the slip until the very last moment. A passenger reportedly said "Christ, I can almost see what clubs they are using." Copilot Quintal suspected Pearson hadn't seen the guardrail and the multitude of people and cars down the runway. But at this point it was too late to say anything. A glider only gets one chance at a landing,and they were committed. Quintal bit his lip and remained silent.

Why did Pearson select 32L instead of 32R? Gimli was uncontrolled so Pearson had to rely on visual cues. It was approaching dusk. Runway 32L was a bit wider, having been the primary runway at Gimli in prior year. Light stantions still led up to 32L. And the "X" painted on 32L, indicating its inactive status, was reportedly quite faded or non-existent. Having made an initial decision to go for 32L the wide separation of the runways would have made it impossible for Pearson to divert to 32R at the last moment. Pearson says he: "Never even saw 32R, focusing instead on airspeed, attitude, and his plane's relationship to the threshold of 32L."

The 767 silently leveled off and the main gear touched down as spectators, racers, and kids on bicycles fled the runway. The gigantic Boeing was about to become a 132 ton, silver bulldozer. One member of the Winnipeg Sports Car Club reportedly was walking down the dragstrip, five gallon can full of hi-octane racing fuel in hand, when he looked up and saw the 767 headed right for him. Pearson stood on the brakes the instant the main gear touched down. An explosion rocked through the 767's cabin as two tires blew out. The nose gear, which hadn't locked down, collapsed with a loud bang. The nose of the 767 slammed against the tarmac, bounced, then began throwing a three hundred foot shower of sparks. The right engine nacelle struck the ground. The 767 reached the tail end of the dragstrip and the nose grazed a few of the guardrail's wooden support poles. (The dragstrip began in the middle of the runway with the guardrail extending towards 32L's threshold) Pearson applied extra right brake so the main gear would straddle the guardrail. Would all the sports car fans all be able to get out of the way, or would Pearson have to veer the big jet off the runway to avoid hitting stragglers?

The 767 came to a stop on it's nose, mains, and right engine nacelle less than a hundred feet from spectators, barbecues and campers. All of the race fans had managed to flee the path of the silver bulldozer. The 767's fuselage was intact. For an instant, there was silence in the cabin. Then cheers and applause broke out among Flight 143's passengers. They'd made it; they were all still alive. But it wasn't over yet. A small fire had broken out in the nose of the aircraft. Oily black smoke began to pour into the cockpit. The fiery deaths of passengers in an Air Canada DC-9 that had made an emergency landing in Cincinnati a month before was on the flight attendants' minds and an emergency evacuation was ordered. The unusual nose-down angle the plane was resting at made the rear emergency slides nearly vertical. Descending them was going to be treacherous.

The only injuries that resulted from Pearson's dead-stick landing of Flight 143 came from passengers exiting the rear emergency slide hitting the asphalt. None of the injuries were life-threatening. The fire in the aircraft's nose area was battled by members of the Winnipeg Sports Car Club who converged on the plane with dozens of hand-held fire extinguishers. Pearson had touched down 800 feet from the threshold and used a mere 3000 feet of runway to stop. A general aviation pilot who viewed the landing from a Cessna on the apron of 32R described it as "Impeccable." The 767 was relatively undamaged.

Air Canada Aircraft #604 was repaired sufficiently to be flown out of Gimli two days later. After approximately $1M in repairs, consisting primarily of nose gear replacement, skin repairs and replacement of a wiring harness it re-entered the Air Canada fleet. To this day Aircraft #604 is known to insiders as "The Gimli Glider." The avoidance of disaster was credited to Capt. Pearson's "Knowledge of gliding which he applied in an emergency situation to the landing of one of the most sophisticated aircraft ever built." Captain

Pearson strongly credits Quintal for his cockpit management of "Everything but the actual flight controls," including his recommendation of Gimli as an landing spot. Captains Pearson and Quintal spoke at the 1991 SSA Convention in Albuquerque about their experiences. Pearson was, at the time, still employed and flying for Air Canada, and occasionally flying his Blanik L-13 sailplane on the weekends; he has since retired to raise horses. Maurice Quintal is now an A-320 Pilot for Air Canada,and will soon be captaining 767's; including Aircraft #604.

An amusing side-note to the Gimli story is that after Flight 143 had landed safely, a group of Air Canada mechanics were dispatched to drive down and begin effecting repair. They piled into a van with all their tools. They reportedly ran out of fuel en-route, finding themselves stranded somewhere in the backwoods of Manitoba.

Credits:

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