



Unaware of Strong Crosswind, Fokker Crew Loses Control of Aircraft on Landing

During approach to Guernsey, United Kingdom, the pilots of the Fokker F27 received a report containing an average of wind-speed values recorded over a two-minute period. They did not request a report of instantaneous wind speed. Thus, the pilots did not know that sudden, strong gusts exceeded the crosswind limit in the company operations manual. The aircraft touched down about mid-field, according to witnesses, then overran the end of the runway, veered left and struck an embankment.

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FSF Editorial Staff

At 1818 local time Dec. 7, 1997, a Fokker F27 Mark 500 was destroyed during a landing at Guernsey Airport, Channel Islands, United Kingdom. The aircraft touched down past the normal touchdown zone on a wet runway, encountered a strong crosswind, exited the end of the runway and struck an embankment. Four of the 54 occupants received minor injuries.

The U.K. Air Accidents Investigation Branch (AAIB) said, in its final report, that the investigation identified the following causal factors:

- “The commander [captain] decided to continue with the landing knowing that touchdown was beyond the normal point;
- “The commander was not aware at touchdown that the crosswind component of the surface wind affecting the aircraft exceeded the [company operations] manual limit; [and,]
- “The commander could not apply maximum braking to both main-landing-gear brakes [while] maintaining directional control through differential braking and full rudder application.”



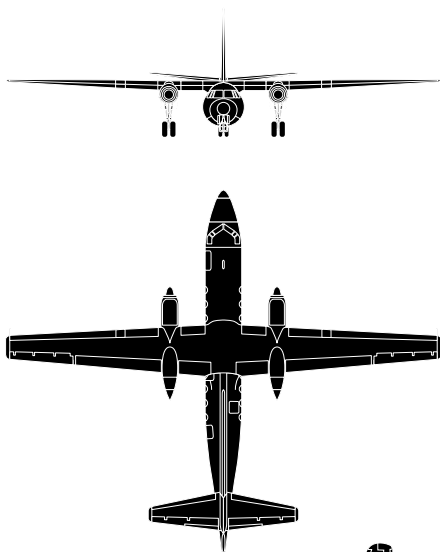
The aircraft was operated by Air UK (now KLM UK) and was scheduled for four round-trip flights between Guernsey and Southampton, England. (The Channel Islands are off the coast of France, approximately 190 kilometers [118 nautical miles] south-southwest of Southampton, which is on the southern coast of England.)

The captain, 50, had an airline transport pilot (ATP) license and 14,000 flight hours, including 2,865 flight hours in type. He reported for duty at 0915 in Norwich, drove to London Heathrow Airport and flew as a passenger on a scheduled flight to Guernsey.

The first officer, 37, had an ATP license and 2,150 flight hours, including 320 hours in type. He reported for duty at 1045 at London Stansted Airport, traveled by taxi to London Heathrow Airport and flew as a passenger on a scheduled flight to Guernsey.

The aircraft was built in 1977 and had accumulated 44,877 service hours and 53,639 landings.

Before beginning the first flight at 1610, the crew recognized that adverse wind conditions might be encountered at Guernsey Airport. The weather forecast said that surface winds would be from 170 degrees at 25 knots, gusting to 45 knots.



Fokker F27 Mark 500

The first flight of a prototype Fokker F27 was conducted in 1955. Deliveries of the twin-turboprop, medium-range airliner began in 1958. The F27 Mark 100 had Rolls-Royce Dart 511 engines and 32 seats. The F27 Mark 200 was introduced in 1959 with Dart 536-7R engines. Production of a military version, the F27 Mark 400M, with accommodations for 46 parachute troops, began in 1965.

The F27 Mark 500 was introduced in 1967. The aircraft is similar to the Mark 200 but has a longer fuselage and a large cargo door. The Dart 536-7R engines each produce 2,140 shaft horsepower (1,596 kilowatts) and turn four-blade Dowty-Rotol propellers. The aircraft has accommodations for two pilots in the cockpit and 52–60 passengers in the cabin.

Wing span is 95.2 feet (29 meters). Overall length is 82.2 feet (25 meters). Basic operating weight with 52 passenger seats is 28,000 pounds (12,701 kilograms). Maximum payload is 13,000 pounds (5,897 kilograms). Standard maximum fuel load is 9,090 pounds (4,123 kilograms). Maximum takeoff weight is 45,900 pounds (20,820 kilograms). Maximum landing weight is 43,500 pounds (19,732 kilograms).

Rate of climb at sea level and at 40,000 pounds (18,144 kilograms) gross weight is 1,480 feet per minute (451 meters per minute). Normal cruising speed at 20,000 feet and at 38,000 pounds (17,237 kilograms) gross weight is 259 knots (480 kilometers per hour). Range is 940 nautical miles (1,741 kilometers).

Source: *Jane's All the World's Aircraft*

“During his preflight preparation, the commander noted that the crosswind at Guernsey would need close monitoring throughout the day, as it would be close to the aircraft’s crosswind limits,” said the report.

The company’s operations manual said that a crosswind component of 29 knots was the maximum crosswind component for landing.

The first officer was the pilot flying on the flight from Guernsey to Southampton. He said that the aircraft was “difficult to keep straight” on the runway during takeoff.

“Moderate turbulence [was] encountered after takeoff between 500 [feet above ground level (AGL)] to 1,000 feet AGL, but the remainder of the flight was uneventful,” said the report.

After the aircraft was landed in Southampton, the captain conducted an external inspection of the aircraft and supervised refueling of the aircraft to increase the total fuel quantity to 1,745 kilograms (3,847 pounds).

“This was sufficient for the flight to Guernsey with necessary reserves to divert back to Southampton,” said the report.

The aircraft was within its weight-and-balance limits when it departed from Southampton at 1723 with four crewmembers, 50 passengers (46 adults, three unaccompanied children and one infant) and 704 kilograms (1,552 pounds) of baggage. The captain was the pilot flying.

“During the cruise, the first officer obtained the latest weather for Guernsey from the automatic terminal information service [ATIS],” the report said. “This gave the surface wind as 170 degrees [at] 19 [knots] gusting to 32 knots, visibility five kilometers [three statute miles] in rain, cloud scattered at 600 feet, broken at 800 feet, temperature 11 [degrees Celsius (52 degrees Fahrenheit)] ... with turbulence and wind shear below 200 feet AGL.”

During an approach briefing, the captain told the first officer that, because of the crosswind conditions, they would use a lower-than-normal flap setting and a higher-than-normal landing reference speed.

“The commander briefed the first officer that he intended to carry out a ‘radar-vectored’ ILS [instrument landing system] approach to Runway 27 using 26.5 degrees of flap, instead of the usual 40 degrees, for greater aileron control in the crosswind conditions during the landing,” the report said. “He also intended to add 10 knots to the target threshold speed (TTS).” The crew had calculated the TTS as 96 knots with 40 degrees of flap.

The final approach was conducted in turbulence and with a 25-degree to 30-degree crosswind correction to the heading.

“The aircraft was slightly above the prescribed glide path as it crossed the [runway] threshold, and the commander stated that ... it was obvious to him that the aircraft would touch down beyond the normal landing area,” said the report. “He therefore decided to initiate a go-around.”

The crew flew the aircraft to 1,500 feet and received radar vectors from air traffic control (ATC) for another ILS approach to Runway 27.

“The commander described the second approach as being more stable and on the correct three-degree glide path throughout,” the report said. “The drift angle this time was between 30 degrees and 40 degrees from the inbound track.”

ATC cleared the crew to land and said that the surface wind was from 180 degrees at 18 knots. About three minutes later (19 seconds before the aircraft touched down on the runway), ATC told the crew that the surface wind was from 190 degrees at 20 knots.

The values for wind direction and wind speed provided to the crew by ATC were averages of values recorded during a two-minute period by an anemometer near the Runway 27 touchdown zone.

This procedure was a result of the U.K. Civil Aviation Authority (U.K. CAA) adoption in 1997 of a recommendation by the International Civil Aviation Organization (ICAO) that ATC facilities use surface-wind-indication systems that provide average wind-speed values and average wind-direction readings, rather than systems that provide instantaneous readings. The recommendation was contained in ICAO Annex 3, *Meteorological Service for International Air Navigation*.

The U.K. CAA published Aeronautical Information Circular (AIC) 4/1997, *Surface Wind Information at U.K. Aerodromes*. AIC 4/1997 included the following information:

“Surface-wind-indication systems at [ATC] units enable controllers to report to aircraft the best practicable information about the surface wind which an aircraft will encounter during takeoff and landing. ICAO Annex 3 ... makes recommendations for the use of averaging-wind-indication systems to replace traditional display equipment giving instantaneous readings. These recommendations have been accepted by the [U.K.] CAA for immediate implementation at certain ATC units in the [United Kingdom] and, in due course, compliance will be required at all permanent ATC units at U.K. aerodromes.

“When available, the two-minute-averaged surface wind is provided to aircraft requesting start-up or taxi clearance and when the current meteorological information is passed to arriving aircraft. Pilots may, as an alternative, request an instantaneous-wind [report]. The two-minute-averaged surface wind is used when the surface wind is included in an ATIS recording.

“When a pilot requests the instantaneous surface wind at aerodromes where the two-minute-average surface wind is normally used, the word ‘instant’ will be inserted to indicate that the wind being reported is not the two-minute average. (Although not grammatically correct, the word ‘instant’ has the advantage of brevity.)”

On Feb. 4, 1997, ATC personnel at Guernsey Airport changed wind-reporting procedures to comply with AIC 4/1997. The changes required controllers to provide average wind values directly to pilots and on ATIS recordings.

Nevertheless, the U.K. CAA’s *Manual of Air Traffic Services* said that controllers, at their discretion, may provide instantaneous-wind values to pilots who do not request them.

At the time of the accident, the surface wind was gusting to 34 knots. The flight crew did not request an instantaneous-wind report, and ATC did not provide an instantaneous-wind report.

The first officer said that indicated airspeed was 120 knots during the final approach and 110 knots as the aircraft crossed the runway threshold. The captain said that the aircraft was at the correct height when it crossed the runway threshold.

“Both pilots stated that, during the flare at a height estimated by the commander to be between 10 [feet] to 15 feet above the runway, the aircraft appeared to float,” the report said. “The commander reduced the engine torques to zero.”

The captain said that the aircraft touched down “a little beyond” the normal touchdown point. He said that the aircraft touched down on the left-main landing gear first, then on the right-main landing gear and the nose landing gear.

Runway 27 is 1,463 meters (4,797 feet) long and 45 meters (148 feet) wide. The approach end is 9.5 meters (31 feet) higher than the departure end, resulting in a 0.65 percent downward slope. A pilot who landed a light twin-engine airplane 13 minutes before the Fokker landed said that the runway was “very wet” but did not appear to have any standing water.

The Fokker’s landing was observed by several firefighters who were standing by in their vehicles because of the weather conditions.

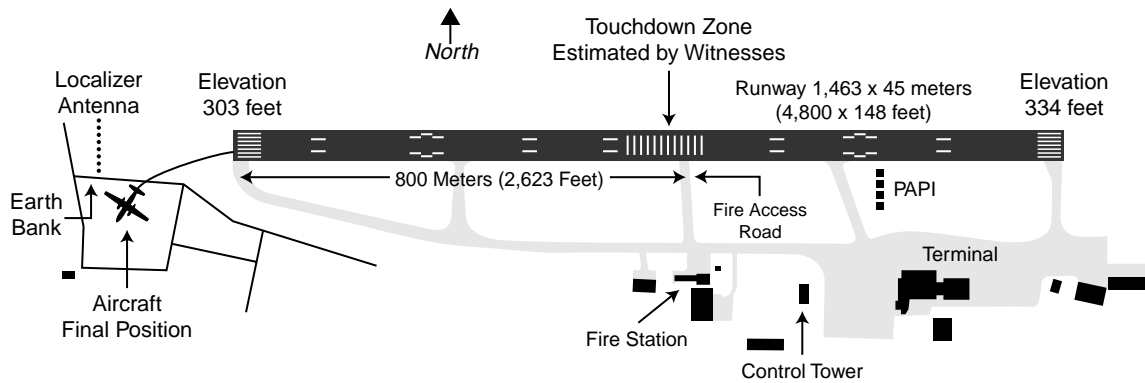
“They described the touchdown point as being opposite the fire-access road — that is, with 750 meters to 900 meters [2,459 feet to 2,951 feet] of runway remaining,” said the report. (See Figure 1, page 4.)

The report said that, according to the manufacturer’s calculations for the existing conditions — including aerodynamic braking from both propellers in ground-fine pitch, the aircraft should have been brought to a stop on the runway after rolling for 653 meters (2,141 feet).

“However, this figure contains no margins to allow for operational conditions, such as actual runway friction and the amount of braking used by the pilot,” said the report.

The aircraft touched down on the runway at an indicated airspeed (recorded by the flight data recorder) of 105 knots. The captain said that he moved the power levers for both

Ground Track of Fokker F27; Guernsey Airport, Channel Islands, United Kingdom; Dec. 7, 1997



PAPI = Precision approach path indicator
 Source: U.K. Air Accidents Investigation Branch

Figure 1

engines to bring the propellers into ground-fine pitch. The propellers provide aerodynamic braking in ground-fine pitch.

Several occupants — including the first officer and a flight attendant — said, however, that they did not hear the noises normally produced by the propellers in ground-fine pitch. The report said that analysis of sounds recorded by the aircraft's cockpit voice recorder "could not identify the selection of ground-fine pitch."

The manufacturer's calculations for the existing conditions — and for the propellers in flight-fine pitch and, thus, providing no aerodynamic-braking assistance — showed that the stopping distance was 815 meters (2,672 feet).

After touchdown, the first officer moved the flap-selector switch to retract the flaps. When the captain said "your stick" — to transfer aileron control and elevator control — the first officer applied full left aileron.

"It is normal for the PNF [pilot not flying] to call 'five lights' (indicating that both propellers were in ground-fine pitch), 'TGTs [turbine gas temperatures] stable' and 'flaps traveling'," the report said. "The first officer can recall seeing five lights but stated that he did not make the normal call."

The report said, however, that the first officer's omission of the required call "had no material effect on events."

The captain applied full-right rudder and right brake to keep the aircraft traveling straight down the runway. The first officer said that the captain was "standing up in his seat" to apply pressure on the rudder and toe brake.

"As the aircraft traveled down the runway, it felt to the crew as if it was 'skidding or floating with ineffective brakes,'" the report said. "The first officer did not assist with the braking."

The report said that, if the captain suspected that his toe brakes were malfunctioning, he could have asked the first officer to apply his toe brakes, as well. This, however, might have exacerbated the directional-control problem.

"The benefit of such action would have been outweighed by the difficulty in coordinating the braking effort from both pilots, thus creating even more directional-control problems for the commander," said the report.

Eight seconds after touchdown, the aircraft began to turn left. The indicated airspeed at this time was 83 knots.

"There is no doubt that the commander had extreme difficulty in maintaining directional control of the aircraft when it was on the runway," the report said. "He did not know that the crosswind was at or above the limit of controllability."

"To maintain the runway heading, he not only had to apply full (right) rudder but also full-right braking. ... With full rudder deflection and full-right brake applied, it would have been almost impossible for him to apply any significant braking to the left brakes without loss of directional control. Therefore, the total amount of braking applied could only have been marginally more than half of that available."

Sixteen seconds after touching down on the runway, the aircraft started to turn uncontrollably to the left. The captain recognized that the aircraft would exit the runway, and he told the first officer to transmit a Mayday call.

"At the time, the commander was not aware of the reasons why the aircraft was not stopping," the report said.

Postaccident tests showed that the aircraft's anti-skid system operated correctly, and there was no evidence that the aircraft had hydroplaned on the wet runway.

“The tires were examined, and no evidence was observed of operation having occurred with wheels locked,” the report said. “The [anti-skid] units were also functionally tested and found to operate correctly. The brake units were serviceable.”

The report said that the crew’s inability to stop the aircraft on the runway was caused by inadequate braking resulting from the captain’s inability to use the brakes on the left-main landing gear and a possible delay in the propeller blades moving to ground-fine pitch.

The aircraft was turning left and sliding to the right when it exited the end of the runway at a recorded airspeed of about 30 knots. The aircraft then slid a short distance on grass before striking a narrow mound of earth.

“At this point, the left-landing-gear leg passed through the bank without damage,” the report said. “The nose-landing-gear leg separated on impact with the bank, and the right propeller struck hedging, fencing posts and wire on top of the bank. The right-landing-gear leg then struck the bank and collapsed rearwards.

“The aircraft passed over the bank and fell onto the ground outside the airport perimeter, [tilting] rapidly to the right as a result of the left-landing-gear leg contacting the ground while there was an absence of corresponding support from the collapsed right landing gear. The right wing tip struck the ground, causing the wing-box structure to fail in bending approximately 10 feet (three meters) inboard of the tip.”

The report said that the aircraft was damaged beyond economic repair. The aircraft came to rest inclined on its right side.

“The commander called for the full fire drill, and the first officer [shut down both engines], fired extinguishers into both engines and opened his direct-vision window,” the report said.

The captain told the no. 1 cabin attendant to evacuate the passengers through the left side of the aircraft because fuel had been spilled on the right side of the aircraft.

“The no. 1 cabin attendant attempted to open the left-rear door but could not turn the door handle sufficiently,” the report said. “She asked a passenger ... to help, but he could not open [the door] either.” The investigation failed to determine why the door could not be opened.

Passengers began to exit the aircraft through emergency-exit windows beneath each wing. The captain then made a public-address announcement to evacuate through the rear-toilet compartment door.

“The no. 1 [cabin attendant] opened this door, jettisoned it outboard, exited the aircraft and moved the door clear,” the report said. “The [three] unaccompanied children and a substantial number of the [other] passengers followed her.”

The passengers were gathered together on the left side of the aircraft. Firefighters arrived and helped the two flight attendants ensure that all of the passengers had exited the aircraft.

“With all the passengers clear, the no. 2 [cabin attendant] carried out a ‘head count’ while the no. 1 [cabin attendant] checked the passengers for injuries,” the report said. “One female passenger had injured her head during the evacuation.”

The report did not provide information on the minor injuries received by another passenger and by the captain. The first officer received a minor back injury.

“The first officer attempted to stand up in order to exit the aircraft but found it difficult because of a back injury,” the report said. “The commander suggested that the first officer remain seated while he attempted to open the cargo door (situated on the left side, behind the flight deck). This attempt and a further attempt by the first officer failed. As there was no sign of fire or immediate danger, the first officer sat down in one of the passenger seats to await assistance.”

The cargo door later was opened by a firefighter, and the first officer was taken out of the aircraft on a stretcher.

The temperature was 9 degrees Celsius (48 degrees Fahrenheit). Several passengers suffered from shock and cold. Survival blankets from a fire fighting vehicle were distributed to the passengers, but they provided inadequate protection of the passengers.

“Although most of the passengers were given the silver-foil blankets, they found the packaging difficult to open and the blankets almost impossible to wrap around themselves because of the strong wind,” said the report.

After waiting outside for 15 minutes to 20 minutes, the passengers were transported to the terminal building in taxis, ambulances and police cars.

The report said that the airport did not have a current disaster plan.

“Study of the ‘Airport Emergency Procedures,’ published to coordinate the responses of both the airport and [the Guernsey] Island emergency services, showed that they were drawn up in November 1983 and amended in January 1985,” the report said. “Since then, they had fallen into disuse and, as such, no current, definitive airport disaster plan existed.”

The report said that the accident investigation produced the following findings:

- “The flight crew were properly licensed, rested and medically fit to conduct the flight;
- “The aircraft had a valid certificate of airworthiness and maintenance;

- “The aircraft was calculated to be 970 kilograms [2,139 pounds] below the maximum authorized landing weight for Runway 27 and was loaded correctly;
- “The commander did not request ‘instantaneous’ wind information from ATC prior to touchdown, as he had been passed the wind speed and direction [by ATC] only 19 seconds earlier. Thus, his decision to land was based on wind conditions that were acceptable;
- “Friction testing of the runway showed that the runway-surface condition was not a factor in this accident;
- “The aircraft’s wheel-braking [system] and both propeller-pitch-control systems were operating satisfactorily;
- “The aircraft required 653 meters of runway within which to stop with maximum braking and ground-fine pitch selected on both propellers. Although the initial touchdown on Runway 27 was made with 750 meters to 900 meters of runway remaining and ground-fine pitch reportedly selected after touchdown, the aircraft failed to stop;
- “The commander had extreme difficulty in maintaining directional control during the rollout phase and could not apply maximum braking to both main-landing-gear brakes;

- “The commander could not have known the local wind conditions affecting the aircraft at the time of touchdown;
- “The commander, realizing that the aircraft would overrun the paved surface and not knowing whether his brakes were fully effective, had the option of asking the first officer to apply his brakes, as well. This option, however, could have exacerbated the directional-control problems being experienced by the commander; [and,]
- “There were inadequate resources available at the airport to provide protection [and] timely transportation of the survivors to a place of shelter.”

As a result of these findings, the AAIB made the following recommendation: “The [Guernsey] Airport director should produce, issue and be responsible for the maintenance of an airport disaster plan that defines the policy, procedures and areas of responsibility of those airport and island services identified as being required to react in the event of an airport disaster.”♦

[Editorial note: This article, except where specifically noted, is based entirely on U.K. Air Accidents Investigation Branch Aircraft Accident Report 4/99: *Report on the Accident to Fokker F27-500, G-BNCY, at Guernsey Airport, Channel Islands, on 7 December 1997*. The 52-page report, issued in June 1999, contains a color photograph, diagrams and appendices.]

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