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Fast, Low Approach Leads to Long Landing and Overrun

Following a nonprecision approach in instrument conditions and gusty winds, the Fokker F27 came to a stop on a seawall. The investigation resulted in recommendations for a precision approach procedure and an adequate runway-overrun area at the Irish airport.

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FSF Editorial Staff

At 1702 local time Nov. 2, 2002, a Euroceltic Fokker F27 Mark 500 touched down near the midpoint of the runway after a nonprecision approach in twilight instrument meteorological conditions to Sligo (Ireland) Airport. The airplane overran the runway and came to a stop with the main landing gear on a seawall and the nose section in Sligo Bay. Damage to the aircraft was substantial. There were no injuries among the four crewmembers and 36 passengers.

In a final report issued in August 2005, the Irish Air Accident Investigation Unit (AAIU) said, "The probable cause of this accident was a fast, low approach, leading to the aircraft landing late, beyond the normal touchdown point, thereby making it impossible [for the flight crew] to stop the aircraft on the remaining runway available."

The report said that contributing causes were:

- "The lack of an adequate overrun area before an aircraft, failing to stop on the runway, enters the sea;
- "The lack of experience of the operator in scheduled air operations; [and,]
- "The changing operational management structure and uncertain nature of the direction of the company with regard to aircraft type and network development."

The aircraft was being operated on the fourth leg of scheduled public-service-obligation [i.e., state-subsidized] flights between Dublin and Sligo. [Dublin is on the eastern coast of Ireland. Sligo is on the northwestern coast of the island, about 170 kilometers (92 nautical miles) from Dublin.]

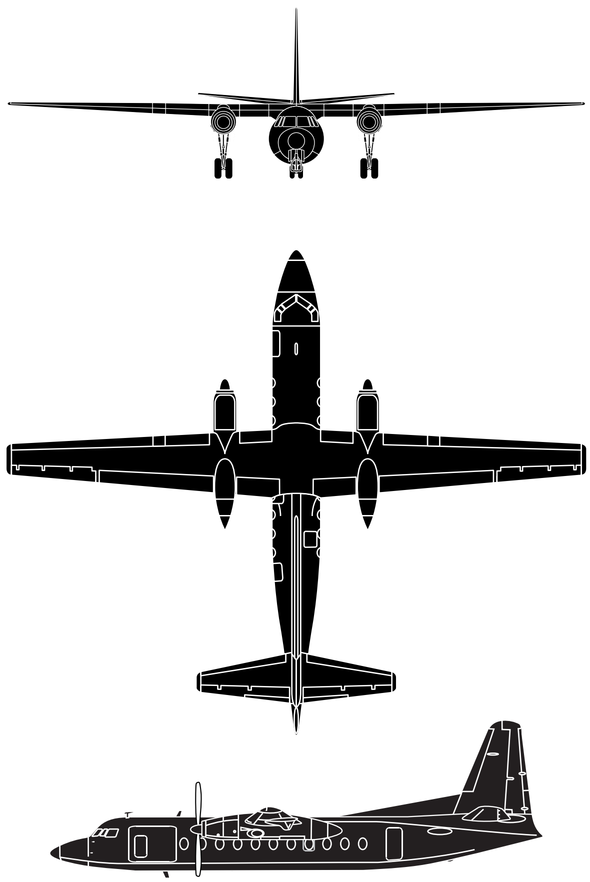
Euroceltic also provided scheduled air service between Dublin and Donegal. [Donegal is about 50 kilometers (27 nautical miles) northeast of Sligo.] On the day of the accident flight, a scheduled flight to Donegal was canceled because of strong crosswinds at the Donegal airport. The airline made arrangements to board the passengers on the scheduled flight to Sligo and to transport them by bus from Sligo to Donegal.

The captain, 48, was the pilot flying (PF). He held an airline transport pilot license (ATPL) and had 5,710 flight hours, including 1,176 flight hours in type.

"A month prior to the accident, following an audit by the CAA [U.K. Civil Aviation Authority], the company imposed an operational limitation on the captain … requiring that he only fly left-hand seat under supervision," the report said. "This requirement was fulfilled on the accident flight, as the supervising pilot was the chief pilot of the company and a qualified line-training captain."

The supervising pilot, 61, was the pilot not flying (PNF). He held an ATPL and had 20,117 flight hours, including 787 flight hours in type.

Both pilots had received a 14-hour rest period before reporting for duty. They had been on duty about 6.5 hours when the



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 has 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 military 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 1,596 kilowatts (2,140 shaft horsepower) and turn four-blade Dowty-Rotol propellers. The aircraft has accommodations for two pilots and 52–60 passengers.

Wingspan is 29 meters (95 feet). Overall length is 25 meters (82 feet). Basic operating weight with 52 passenger seats is 12,700 kilograms (28,000 pounds). Maximum payload is 5,897 kilograms (13,000 pounds). Standard maximum fuel load is 4,123 kilograms (9,090 pounds). Maximum takeoff weight is 20,820 kilograms (45,900 pounds). Maximum landing weight is 19,732 kilograms (43,500 pounds).

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

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

aircraft departed from Dublin at 1605. The report said that the aircraft's center of gravity was within limits and that the takeoff weight was 18,854 kilograms (41,566 pounds); maximum takeoff weight is 20,820 kilograms (45,900 pounds).

At 1622, the flight crew radioed the control tower at Sligo Airport to obtain the current weather conditions. They were told that the surface winds were from 120 degrees at 15 knots, gusting to 29 knots; visibility was 3,000 meters to 5,000 meters (1.9 statute miles to 3.1 statute miles); there was a broken ceiling at 700 feet and an overcast ceiling at 1,000 feet; surface temperature was 12 degrees Celsius (54 degrees Fahrenheit); the NDB/DME (nondirectional beacon/distance-measuring equipment) approach to Runway 11 was in use; and the runway was wet.

Runway 11 was 1,199 meters (3,934 feet) long and 30 meters (98 feet) wide, and had a level asphalt surface. The landing threshold was displaced 30 meters; available landing distance was 1,171 meters (3,842 feet).

"No approach lights are located on the approach to Runway 11," the report said. "However, Runway 11 does have threshold wing-bar lighting and runway end lighting."

At 1653, the crew told the controller that the aircraft was passing over the NDB. The controller cleared the crew to conduct the NDB/DME approach.

At 1700, the crew told the controller that the aircraft was passing over the final approach fix, inbound to the runway. The controller cleared the crew to land the aircraft and said that the winds were from 120 degrees at 15 knots, gusting to 29 knots. About one minute later, the controller said that the winds were gusting to 31 knots.

The flight crew told investigators that the approach was difficult to conduct because of the gusty wind conditions. They said that wind direction varied between 100 degrees and 130 degrees, and that gust velocity varied between 23 knots and 35 knots.

"The PF told [investigators] that large throttle changes were required to maintain airspeed due to the gusty conditions," the report said.

The PF recalled that as the aircraft neared the runway threshold, indicated airspeed (IAS) was approximately 120 knots and the precision approach path indicator (PAPI) showed three green lights and one red light, indicating that the aircraft was slightly low.

The flight crew told investigators that they conducted the approach lower and faster than normal because of the gusty wind conditions.

Recorded cockpit voice communications indicated that the PNF made radio-altitude callouts at 50 feet, 20 feet and 10 feet. About two seconds before touchdown, he told the PF to "keep the right wing down."

Recorded flight data indicated that "the aircraft floated along the runway surface initially at [an] IAS in excess of 130 knots until touchdown."

"At 1702, the aircraft made an initial touchdown at approximately the midpoint of the runway and appeared to a number of witnesses not to immediately decelerate," the report said.

The aircraft touched down initially on the nosewheel, "with minimum contact of the main wheels," the report said. Several witnesses said that the aircraft bounced after initial touchdown.

The PF selected the propeller ground-fine position, but the PNF told him that the six lights indicating that the propeller blades were in the ground-fine position had not illuminated. The PF re-selected the ground-fine position, and the PNF said that all the lights had illuminated.

"At this time, the aircraft was well down the runway, past the apron taxiway/runway intersection," the report said. [The intersection was approximately 480 meters (1,575 feet) from the end of the runway.]

The PNF told the PF to "brake hard."

"The PF initially applied a brake pressure which he considered was possibly insufficient to slow the aircraft," the report said. "As full brake pressure was applied, the aircraft began to skid, and then it slid the remaining distance of the runway until it departed the paved surface at the right-hand side of the threshold of Runway 29."

The aircraft came to a stop about 50 meters (164 feet) beyond the runway threshold.

"The main wheels [were] embedded in boulders that formed part of an embankment leading down to the sea," the report said. "The main wheels were approximately one meter [three feet] short of where the boulders fall away into the sea. The nosewheel, cockpit and forward section of the fuselage cleared the top of the boulder embankment, and the aircraft tilted approximately 15 [degrees to] 20 degrees nose-down onto the outgoing tide."

The cabin crewmember, who was seated in the rear of the cabin, used the public-address system to tell the passengers to remain seated with their seat belts fastened. She then went to the cockpit door and asked if an evacuation could be conducted. A company engineer (maintenance technician), who occupied the cockpit jump seat, told her that an evacuation could be conducted through the aft cabin door.

The tower controller had activated the airport-accident alarm when he observed the aircraft pass the intersection at an abnormally high speed. The controller also used an emergency telephone number to request police, firefighting and ambulance services.

Aircraft rescue and firefighting (ARFF) personnel arrived almost immediately after the aircraft came to a stop. There was no fire.

Because the aft cabin door was high off the ground, ARFF personnel "had to improvise with ladders and cradles to evacuate the passengers," the report said. "This was carried out very effectively and efficiently. … Had there been injuries on board or, indeed, had the aircraft not been halted by the main wheels contacting the boulders, the outcome would have been far more serious."

The occupants were transported by bus to the airport terminal building, where they were examined by health-service personnel.

"While none of the passengers or crew complained of any injuries, a number of passengers were distressed by their experience," the report said.

During postaccident interviews, passengers provided similar descriptions of the approach and landing.

"The approach was described as long and bumpy," the report said. "The aircraft appeared to land very fast and was not slowing down. … Spray and smoke [were] seen coming from the left-side tires. The left outer tire was seen to explode, while the left inner tire was seen to deflate and rotate around its rim."

The inner tire on the right main landing gear also deflated. Examination of the four main landing gear tires found no indication of hydroplaning. Skid marks and X-shaped rips were found on the three deflated tires, indicating that they had burst.

"The failure of three burst tires is consistent with the aircraft landing with the wheels not rotating," the report said. "The probable scenario is that the brakes were heavily applied either when the aircraft was airborne during a bounce or when it had touched on with only the nosewheel in ground contact. When the main wheels subsequently came into contact with the runway, the locked tires were worn away quickly. … The anti-skid [system] would not have released the brakes in such circumstances. … Once each tire had burst and deflated, it rotated on its rim, thereby negating any braking effect.

"The non-failure of the starboard [i.e., right] outer tire may have been a result of the port [left] wing being low at touchdown due to the crosswind effect, poor braking effect on this particular wheel or a combination of such factors."

The night of the accident, incoming tidewater entered the aircraft and reached the first few rows of passenger seats. When the aircraft was moved by recovery specialists to the airport ramp the next evening, investigators observed that seawater corrosion already had begun to form on the cockpit instrument panel and central console.

"This salt water caused immediate visible corrosion in the cockpit and rendered the airframe a total economic write-off," the report said.

The accident might have been prevented if a precision instrument approach procedure (e.g., an instrument landing system [ILS] approach) had been available to the flight crew, the report said.

"Research by … Flight Safety Foundation has shown that nonprecision approaches are six times more likely to lead to an approach-and-landing incident than a precision approach," the report said. "An additional problem for older-generation aircraft such as the F27, which does not have a flight management and guidance system, results in all nonprecision approaches being flown manually, rather than coupled to the autopilot. This may increase workload, particularly in adverse weather conditions."

Euroceltic originally had provided scheduled air service with Britten-Norman Trislanders. The company began adding F27s to its fleet and increasing its services in late 2000.

"In trying to expand its route network and in commencing operations with its F27s, the operator encountered the problems which are daily headaches for an established operator but are considerable setbacks for an *ab initio* undertaking," the report said. "These included difficulty in securing the necessary maintenance backup for public transport aircraft of this type [and] crew training."

The company ceased operations in January 2003.

Based on the findings of the investigation, AAIU made the following recommendations:

- "Sligo Airport should consider the installation of an [ILS]."
- "Sligo Airport, in conjunction with the IAA [Irish Aviation Authority], should improve the overrun area of Runway 11." [The report said that IAA responded that it "is not in a position to provide or assist in the provision of a runway end safety area at Sligo Airport. It has advised the licensee of Sligo Airport to provide same and is aware that the airport has commissioned a design and anticipates applying for planning permission."]
- "The [U.K.] Department of Transport should ensure that appropriate aviation technical support is available to any committee or panel awarding [public-service-obligation] air routes." [The report said that the U.K. Department of Transport responded that it had implemented the recommendation.]♦

[FSF editorial note: This article, except where noted, is based on Irish Air Accident Investigation Unit Formal Report No. 2005-015. The 26-page report contains illustrations and appendixes.]

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