

BY MARK LACAGNINA

**A relayed company message distracted the crew during an autoland approach.**



U.K. Air Accidents Investigation Branch

The Boeing 737-300 freighter was about 500 ft above ground level (AGL) during a Category IIIA approach to England's Nottingham East Midlands Airport when the flight crew was told by air traffic control (ATC) that the airline had instructed that they were "not to land here." The commander, the pilot flying, inadvertently pressed the autopilot-disengage button instead of the radio-transmit button on his control yoke to seek clarification of the message. The 737 deviated above the glideslope and left of course before sinking rapidly.

Confusion briefly reigned on the flight deck before the commander initiated a go-around, although too late to avoid ground contact. The right main landing gear separated when the 737 touched down in a grassy area between the runway and a parallel taxiway. However, the aircraft became airborne

again, and the crew was able to fly it to Birmingham Airport and conduct a successful emergency landing.

In its final report on the accident, the U.K. Air Accidents Investigation Branch (AAIB) said that a causal factor was the airport tower controller's inappropriate transmission of a company radio message when the crew was engaged in a late stage of an autoland approach. The crew's delayed decision to go around also was a causal factor; the approach should have been rejected immediately after the autopilots disengaged, the report said.

The accident occurred the morning of June 15, 2006, during a scheduled cargo flight from Liège, Belgium, to London Stansted Airport. The aircraft was operated under the call sign Quality 325N by TNT Airways, a Belgian company that provided cargo services internationally with a mixed fleet. The 737 was

manufactured in 1987 and converted to a freighter in 2004; it had accumulated 45,832 airframe hours and 34,088 cycles.

The aircraft was scheduled to depart from Liège at 0234 coordinated universal time (0134 London time). Both pilots were Belgian nationals. The commander, 42, had 8,325 flight hours, including 4,100 hours in type and 4,000 hours as a flight engineer. "The commander had been promoted within the company, having previously been a copilot," the report said. "He completed his command qualification on 9 February 2006." The copilot, 35, had 1,674 flight hours, including 1,377 hours in type.

"The performance of both pilots may have been adversely affected by tiredness, as a result of the combined effects of their overnight periods on duty and the low point in their circadian rhythm," the report said.

# Bad CALL

The commander had been on duty since 1815 the previous day. His duty period began in Istanbul, Turkey, after a rest period of more than 12 hours. “He later reported that he was not able to sleep well before commencing duty and was affected by tiredness at the time of the accident flight [after 10 hours 25 minutes of flying],” the report said. The copilot had a rest period of nearly 17 hours before his duty period began in Vienna, Austria, at 1925 the previous day. He had flown 9 hours 15 minutes when the accident occurred.

## Unforecast Fog

The weather forecast for Stansted called for 8 to 10 km (5 to 6 mi) visibility, scattered clouds at 1,500 ft and light winds, with a 30 percent probability of a temporary reduction of visibility to 4,500 m (about 2 3/4 mi) and a broken ceiling at 700 ft. The report said that “good weather” was forecast for the two alternate airports, East Midlands and Liverpool.

“The fuel required for the flight, according to the flight plan, was 5,514 kg [12,156 lb],” the report said. “The actual cargo load was such that extra fuel capacity was available, so the crew decided on a fuel load of 7,500 kg [16,535 lb].”

The 737 departed from Liège at 0312. Near-ing London at 0344, the copilot established radio communication with Essex Radar and advised the controller that they had received Stansted automatic terminal information system (ATIS) information Quebec, which said that visibility at the airport was 6 km (3 3/4 mi). “However, Essex Radar advised the crew that ATIS information Romeo was now in force, giving a visibility of 4,900 m [about 3 mi] in mist,” the report said. “Additionally, the controller informed the crew that there were reports of fog approaching Stansted Airport and that the touchdown RVR [runway visual range] was showing 1,000 m [3,000 ft].”

The instrument landing system (ILS) at Stansted was not in service because of extensive runway maintenance in progress. A temporary surveillance radar approach procedure had been commissioned with a minimum descent height of 930 ft and a minimum RVR of 2,000 m (6,500 ft).

Believing that the visibility at Stansted would improve as the sun continued to rise, the crew requested and received clearance from ATC to hold (Figure 1). While flying a holding pattern northwest of the airport, however, the crew received several updates indicating that visibility was steadily decreasing. At 0401, they were advised that RVR was between 650 and 350 m (2,100 and 1,200 ft).

## Where to Go?

The commander had sent a message to the company, via the aircraft communications addressing and reporting system, asking which alternate airport was preferred if they had to divert from Stansted. “[He] had not received a reply, so he contacted the handling organization at Stansted and requested that they call the company operations at Liège to ask for the information,” the report said.

Meanwhile, the crew recalculated their fuel endurance and told Essex Radar at 0403 that they could hold for 35 minutes. They also requested information on current weather conditions at East Midlands and Liverpool. They were told that East Midlands had a visibility of 2,000 m in haze, scattered clouds at 200 ft and

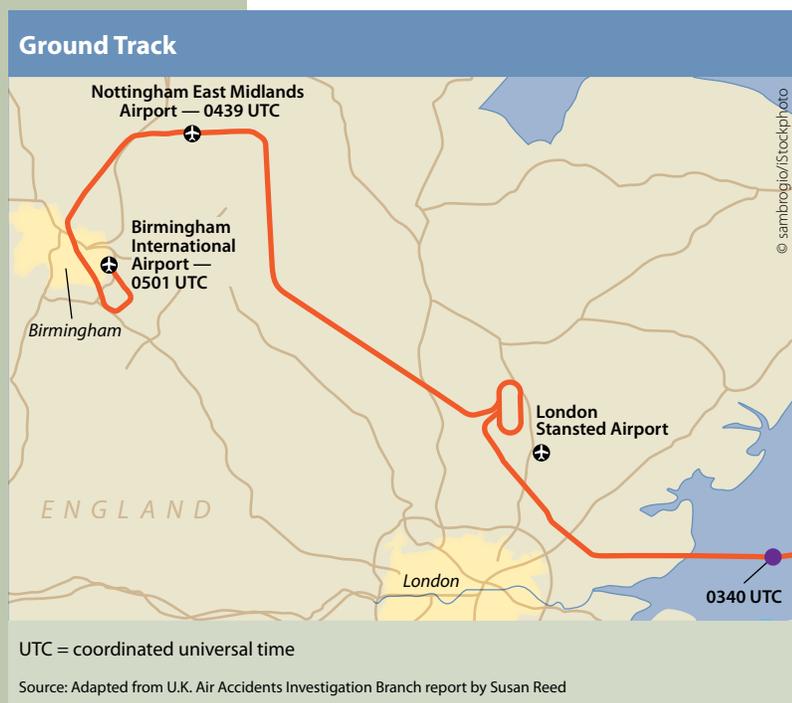


Figure 1

The fuse pins in the right main landing gear failed, as designed, on contact, preventing structural damage to the wing.



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a broken ceiling at 300 ft; Liverpool's visibility was greater than 10 km (6 mi), with a few clouds at 300 ft.

The crew also received a reply from the company that East Midlands was the preferred alternate. At the time, Runway 09 was in use at the airport. At 0419, the crew asked Essex Radar if Runway 27 would be available at East Midlands for a CAT IIIA approach. The controller replied that the airport was changing landing operations to Runway 27 because of the deteriorating weather conditions; RVR was 400 m (1,300 ft) in the runway touchdown zone, 650 m at midfield and 900 m (2,900 ft) in the end zone.

"The pilots agreed that they would attempt an approach to EMA [East Midlands], in accordance with the company preference, as sufficient fuel would remain to continue to

The scrapes in the center of the grassy area were made by the right main gear, engine nacelle and flap track.



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Liverpool Airport should the approach have to be abandoned," the report said.

### High Workload

The crew requested and received clearance to leave the holding pattern and fly to EMA. Their workload was very high during the 15-minute flight. "During the transit, the commander carried out an approach briefing, which included the possibility that a CAT IIIA approach might be required," the report said.

The copilot had difficulty finding the printed approach charts for EMA. He initially searched for them under the heading "East Midlands" and eventually found them under the correct heading, "Nottingham East Midlands."<sup>1</sup> The extra time required to locate the charts placed additional pressure on the crew, the report said.

The crew established radio communication with East Midlands Approach at 0430. The approach controller told the crew that they would be vectored for the ILS approach to Runway 27 and that touchdown zone RVR was 350 m. The flight crew was authorized to conduct CAT IIIA approaches in the 737 with a minimum RVR of 200 m (700 ft).

The aircraft was at 2,000 ft at 0437 when the copilot told the approach controller that they were established on the ILS localizer. The controller cleared the crew to conduct the approach and to establish radio communication with East Midlands Tower.

The tower controller cleared the crew to land and advised that the surface winds were from the southeast at 2 kt and that touchdown zone RVR was 350 m. "Approximately one minute later, the copilot asked for and was again given confirmation that they were clear to land," the report said. "Around this time, the crew had completed their landing checks for a CAT IIIA landing, with the landing gear extended and flap 40 set."

### 'You Are Not to Land Here'

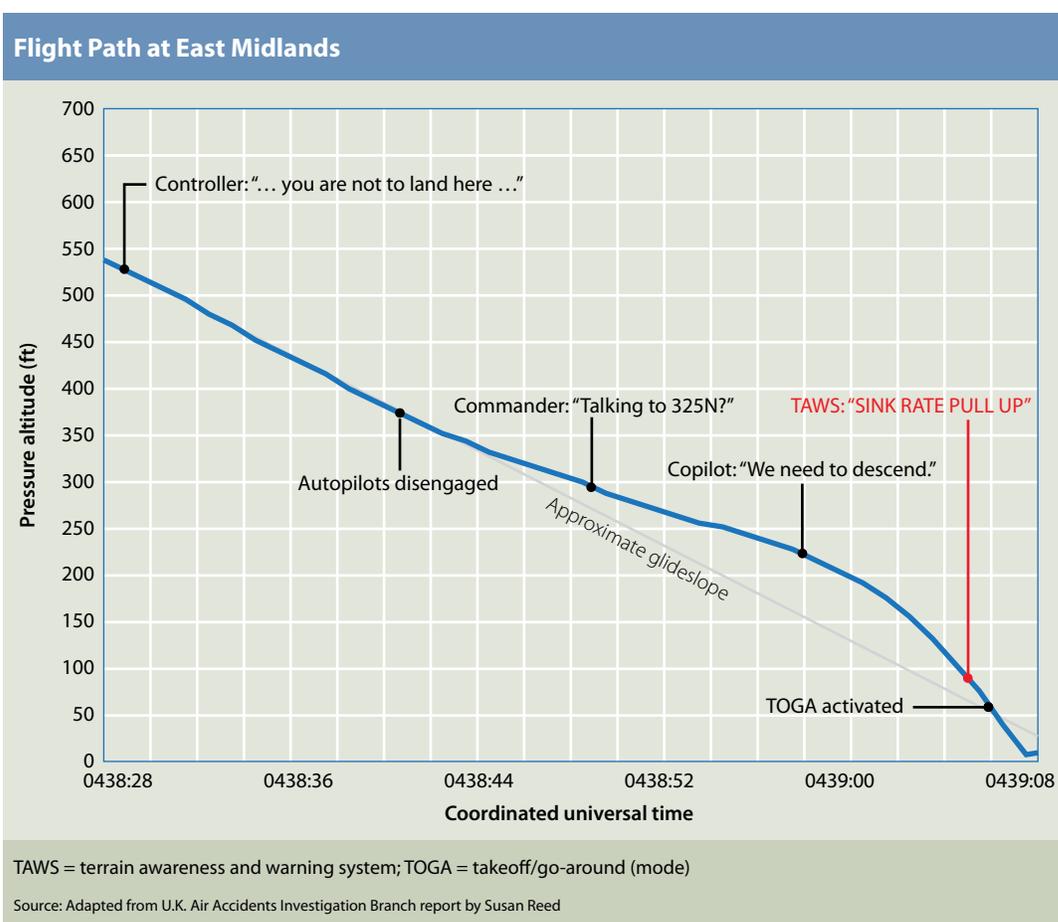
About 0438, the tower controller received a telephone call from a company representative. "He was informed that the company would like the aircraft to divert to Liverpool Airport rather

than land at EMA,” the report said. “With the aircraft on final approach, the controller immediately took the decision to advise the crew of their company’s request and give them the opportunity to go around. ... The most prudent action would have been for the [controller] to have taken no action and allowed the aircraft to land.”

The U.K. Civil Aviation Authority’s *Manual of Air Traffic Services (MATS)* allows controllers to relay company messages pertinent to the flight but requires the radio transmission to be prefixed with “Company advise/request ...”<sup>2</sup>

Figure 2 shows the aircraft’s flight path. It was within 2 nm (4 km) of the runway when the tower controller radioed, “Three two five November, I’ve been instructed that you are not to land here from your operation ... operational authority. At your discretion, you may go around.”

Both pilots heard the transmission, which had included only part of their call sign — “Quality” was omitted. The copilot, whose command of English was limited, did not realize that the transmission was meant for them and did not understand the message; thus, he did not reply to the controller. “With no response from the copilot, the commander was not sure whether the ATC message was for his aircraft and, if so, what it meant,” the report said. “He attempted to respond to ATC himself, but he inadvertently pressed the autopilot disconnect button as he started to speak, so that both autopilots disconnected.”



**Figure 2**

According to the airline’s standard operating procedures (SOPs), a missed approach should have been initiated immediately after the autopilots disengaged. However, the commander attempted to re-engage the autopilots while responding to the controller’s transmission, and the copilot failed to call for a go-around. “Had he done so, it is very likely that the commander would have overcome his own distractions and carried out a go-around in good time,” the report said.

About 10 seconds elapsed before the commander asked the controller, “Talking to three two five November?” The controller replied, “Three two five November, clear to land.” The commander acknowledged the clearance.

A CAT IIIA approach requires both autopilots to be operating in the approach mode. The system had defaulted to the control wheel steering mode when the autopilots were disengaged; in this mode, only one autopilot can be engaged.

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Nevertheless, the commander made several attempts to re-engage both autopilots.

“The copilot observed that the aircraft was going above the glideslope and pointed this out to the commander by saying ‘one dot high,’” the report said. “With no response, he said in French, ‘We need to descend.’”

### ‘Green’ Fills the Windscreen

The 737 was at about 87 ft AGL and descending at 1,500 fpm when the terrain awareness and warning system generated a “sink rate, pull up” warning. “The commander looked up and saw ‘green’ filling the front windscreen,” the report said. “He disconnected the autopilot, selected the takeoff/go-around (TOGA) mode and made an aft control wheel input. Almost immediately,

the aircraft hit the ground; this was followed by a short period of extreme confusion.”

Neither pilot could recall precisely what happened after ground contact. The copilot told investigators that he thought the commander was not reacting, so he called “go around” several times. The commander heard the calls, applied power “and, in his own words, ‘recovered his senses,’” the report said. The copilot assisted in applying full power and rotating the aircraft to a climb attitude.

The impact occurred at 0439. After breaking off at its fuse pin attachment points, the right main gear struck the inboard flap assembly and the rear fuselage, and came close to striking the horizontal stabilizer. The bottom of the right engine nacelle and right wing tip also were damaged.

“The pilots were aware that the aircraft had suffered some damage, as the landing gear unsafe warning horn was sounding and one landing gear red light indication was showing,” the report said. “As the ‘split flaps’ indication was also showing, they decided not to attempt to change the aircraft’s configuration.”

The tower controller had heard the sound of the 737’s engines and radioed, “Quality three two five November, I hear you have gone ‘round, and was that because of the reasons I gave you or because of the weather?”

The copilot told the controller that the aircraft had “touched the ground” and requested clearance to divert to Liverpool. “The controller responded with an explanation of the message that he had passed to the crew prior to landing, and he completed this transmission with the instruction ... to climb to 4,000 ft,” the report said.

### ‘We Have Big Problems’

At 0443, the commander declared an emergency. “We have big problems,” he said. “We have to maintain three thousand feet. We have one unsafe gear, and we have flap problems. ... We are of a low fuel status, three thousand kilos, and we need an airfield where we have CAVOK [ceiling and visibility OK for visual flight operations].”

The approach controller, who also was the ATC watch supervisor, was monitoring the 737 crew’s radio transmissions and told the tower

## Boeing 737-300



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The 737 was designed to use many components and assemblies from the 727. Deliveries of the first production model, the 737-200, with Pratt & Whitney JT8D engines, began in 1967. The larger 737-300 was introduced in 1984 with CFM International CFM56 engines rated at 20,000 lb (9,072 kg) thrust.

The 737-300 can carry 128 to 149 passengers and 1,068 cubic ft (30 cubic m) of cargo. Maximum standard takeoff weight is 124,500 lb (56,473 kg). Maximum landing weight is 114,000 lb (51,710 kg). Maximum operating speed is Mach 0.82. Cruising speed is Mach 0.75.

Production of the 737-300 ceased in 2000 after 1,113 were built.

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

controller to transfer the flight to his frequency. The approach controller told the crew to maintain 3,000 ft and fly a heading of 230 degrees for radar vectors to Runway 15 at Birmingham Airport, which had CAVOK weather conditions.

At 0445, the approach controller told the crew that they had “thirty track miles to go to Birmingham” and asked what problems they had. In addition to the gear unsafe and split flaps warnings, there were indications that Hydraulic System A — one of two main hydraulic systems in the 737 — had failed and that the aft cargo door was not secure. Hydraulic System A is the sole source of power for the outboard spoilers, ground spoilers and nose gear steering system.

Not aware that the right main gear had separated, the crew conducted the manual and emergency gear-extension procedures listed in the quick reference handbook (QRH). The commander, who was hand-flying the 737, then decided not to conduct any other QRH procedures and to concentrate on landing the aircraft as soon as possible. “He was experiencing some control difficulties, in particular in maintaining the aircraft’s wings level,” the report said.

### Dry Ice and Pyrotechnics

When the crew established radio communication with Birmingham Approach, they were told that the Runway 15 glideslope was not available because of routine maintenance. The commander told the controller that they required a full ILS and said that they would conduct the ILS approach to Runway 33.

“During the next three minutes, the controller continued to provide radar headings and also established from the crew the aircraft’s fuel endurance and the number of persons on board,” the report said. “The copilot checked the NOTOC [notice to captain relating to hazardous

cargo] and passed information to ATC that part of the aircraft’s cargo was dry ice and pyrotechnics. The crew reiterated that they needed to be on the ground as soon as possible.”

At 0451, the controller said that the pilot of a police helicopter airborne over the city of Birmingham had offered to check the landing gear. The 737 crew accepted the offer and were told to fly a heading of 170 degrees to rendezvous with the helicopter. The 737 was at 2,500 ft when it flew by the helicopter. The controller told the crew that the helicopter pilot had reported that the nose gear and left main landing gear were extended but the right main gear appeared to be “up.”

The report said that although the extra information about the gear was beneficial to the pilots, placing a damaged aircraft directly over the populated area of the city was “undesirable.”

### ‘Gentle Touchdown’

The flight crew prepared for a landing on Runway 33, which is 2,605 m (8,547 ft) long. The copilot conducted the “Partial or Gear-Up Landing” checklist, and the commander made a final attempt to manually lower the right main gear.

Surface winds were from 100 degrees at less than 5 kt when the aircraft touched down slightly to the left of the runway centerline at 0501. The landing was video-recorded by the police helicopter. “This showed a well-executed emergency landing, with a gentle touchdown and good control of the aircraft during the rollout,” the report said.

The 737 came to a stop about 305 m (1,000 ft) from the end of the runway. “The aircraft was supported by its right engine nacelle, both left main wheels and the right nose wheel; the left nose wheel was just clear of the runway surface,” the report said.

Aircraft rescue and fire fighting personnel arrived within 15 seconds, spread foam under the right engine as a precaution against fire and assisted the crew in evacuating the aircraft through the left forward entry door. None of the nearly 2,000 kg (4,409 lb) of fuel remaining in the aircraft leaked, and there was no fire. The report noted that there had been no substantial movement of the cargo.

### Sticking to SOPs

The AAIB made only one recommendation based on the findings of the investigation: It called on the Belgian Civil Aviation Authority to require TNT Airways to review its SOPs to ensure that they include clear guidance on when go-arounds should be conducted.

“Although the circumstances of this event could easily have led to a catastrophic accident, there are few safety recommendations that can be made,” the report said. “This is because actions by individuals which contributed to the accident were either inappropriate or were not in compliance with existing procedures. Noncompliance with procedures, whether inadvertent or deliberate, can be difficult to prevent and can only be addressed by effective training and maintaining a culture of adherence to SOPs within an organization.”

*This article is based on AAIB report no. 5/2008: “Report on the Accident to Boeing 737-300, Registration OO-TND, at Nottingham East Midlands Airport on 15 June 2006.”*

### Notes

1. The airport’s name was changed from “East Midlands” to “Nottingham East Midlands” in early 2004. In December 2006, the name was changed to “East Midlands Airport — Nottingham, Leicester and Derby.”
2. The manual was revised after the accident to prohibit transmission of company messages that might distract pilots during a critical period of flight.