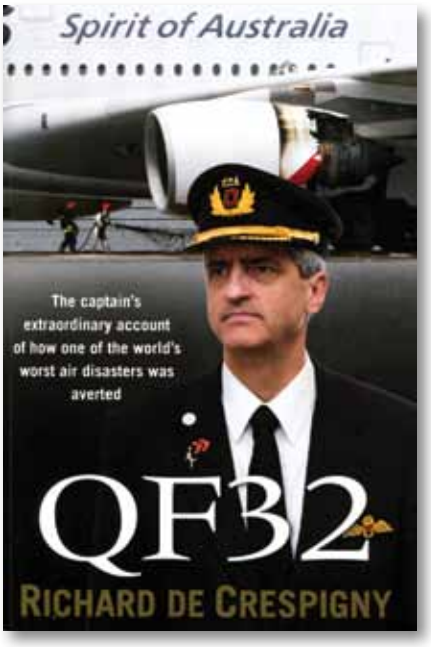


# After Shock

**An uncontained engine failure began an in-flight drama to save Qantas Flight 32.**

BY RICK DARBY

**BOOKS**

## Epic Fail

**QF 32**

De Crespigny, Richard. Sydney, Australia: Pan Macmillan Australia, 2012. 358 pp. Photographs, appendixes.

On Nov. 4, 2010, and the following day, jaws dropped all over the world as facts of the accident involving Qantas Flight 32 — QF32 — became known. The near disaster and its successful resolution were the stuff of compelling drama.

The flight began when Richard Champion de Crespigny, a Qantas captain and pilot-in-command of QF32, signed for *Nancy-Bird-Walton*, an Airbus A380, the world's largest passenger aircraft. The doors were closed and the airplane was now "his." Four minutes after a routine takeoff from Changi Airport in Singapore, headed for Sydney with 469 people aboard, the no. 2 engine (left inboard) was ruptured by an explosive failure while the airplane was climbing through 7,400 ft. De Crespigny describes what happened immediately afterward:

"The huge Rolls-Royce Trent 900 engine was destroyed. The extent of damage was unprecedented in Airbus's history. Two heavy chunks tore through the wing, traveling at approximately two times the speed of sound. The fan blades and chunks acted like the explosive core of a hand grenade, ripping wing panels into shrapnel that sprayed like missile fragments over the fuselage as far as the massive tail sections. One chunk also ripped through the aircraft's belly, severing hundreds of wires.

"Over 600 wires were cut, causing almost every aircraft system to become degraded. ... The hydraulics, electrics, brakes, fuel, flight control and landing gear systems were all compromised."

Understandably, many readers could be tempted to skip directly to the later chapters describing the accident and the efforts of the flight crew to return the airplane safely to Changi while the cabin crew worked to calm passengers and prepare for a possible evacuation.

But if they skip earlier chapters, readers will miss something important. The biographical

background de Crespigny relates played an important part in the story; it made him the man he is and contributed to his ability as a team leader in the cockpit when every action was critical and so many lives were at risk.

De Crespigny came by his aristocratic name from noble Huguenot ancestors in the reign of French King Louis XIV in the 17th century. That family's mansion survives, up the road from Omaha Beach of Normandy invasion fame. Several of his ancestors were distinguished in various ways, including eccentricity. The Rev. Heaton de Crespigny fought a pistol duel in 1828 ("he was later defrocked and died in the Australian gold fields"). In 1883, Sir Claude de Crespigny tried to travel from England to France in a balloon, found himself at 17,000 ft, decided discretion was the better part of valor and crash landed in Holland. He also became the assistant executioner for the English county of Essex.

Richard de Crespigny's account of his young self suggests he was something of a "Wright brothers" type, fascinated with mechanical devices from an early age. He learned to rebuild a motorbike or car engine and start it working again. "The time bashing around on those bikes and fixing them gave me a respect for machinery that I took into my aviation career," de Crespigny says.

It's a long way from a bike to an A380 with four engines each normally producing 70,000 lb (31,752 kg) maximum thrust, 52 flight control surfaces, 16 wheels, and fly-by-wire systems. Still, it's likely that de Crespigny's keenness to understand the workings of equipment was a positive factor when he met the supreme test of his flying career.

"I have to learn the machine from the ground up, not from the buttons and checklists down," he says. "I don't like controlling machinery I don't fully understand … . I need to understand the philosophy of how the machine is designed and assembled so I can understand the limits and standard operating procedures. I have to know the purpose for every checklist, rather than just relying on computer displays."

When, as a Qantas pilot, he transitioned from the Boeing 747 to the Airbus A330 — the aircraft he flew before the A380 — he had a huge task of knowledge replacement: "I went through all the manuals, and I phoned engineers and I questioned designers and talked to test pilots until I fully understood what I was about to take control of."

Shortly after 1000 local time on Nov. 4, during QF32's climbout, two booming noises startled the flight crew and shook the airplane. De Crespigny selected "altitude hold" and pulled back the thrust levers. He soon realized that the autothrust system had failed.

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"There was shock around me as the other pilots waited for me to speak," he says. "With the aircraft flying straight and level, and at a constant speed, I now focused on the engine and warning display, the top display in the middle of the instrument panel. Engine [no.] 2 looked very sick. All of the [indications] for thrust, temperature and pressures were replaced with crosses telling us that there was no data to display. It appeared that all the sensors had been blown off that engine. This was a catastrophic failure."

As bad as the situation was — and de Crespigny did not yet know *how* bad — the airplane could fly and was controllable in cruise.

The captain was fortunate to have four other pilots in the cockpit for task sharing: First Officer Matthew Hicks; Second Officer Mark Johnson; and two check pilots, Capt. David Evans and Capt. Harry Wubben.

Fuel was available to fly a holding pattern, assess the situation and plan the landing. But even plentiful fuel turned out to be a mixed blessing, because the jettison valves and pumps were inoperable. There was no way to dump fuel, which would necessitate a seriously overweight landing.

The Airbus's electronic centralized aircraft monitoring (ECAM) system tells the pilots what is wrong and presents checklists designed to deal with it. "The ECAM checklists started

with engines, hydraulics, flight controls, then fuel, each of them with a series of fixes we had to perform to see if we could get the problem under control," de Crespigny says. "The explosions had obviously started a fire and disabled an engine, which we'd shut down, hopefully containing or extinguishing the fire. But the fix for the fire in engine [no.] 2 was only the beginning of it: engines [nos.] 1, 3 and 4 were degraded in different forms, the fuel system was in a total mess, the hydraulics and electrics and pneumatics were plundered, and even our flight controls were compromised."

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De Crespigny says, "The aircraft was so injured, and so many of the 250,000 sensors were complaining, that I had reached the limit of my ability to absorb them all. The ECAM threw up so many failures, degradations and checklists — especially in the fuel system — that I could not evaluate all the interactions and consequences of the cascading failures. I just wasn't confident how much of the aircraft we had left."

The turning point came, he says, when he decided to concentrate on what *was* working. As everyone knows, the landing involved no injuries, but that wasn't the end of the ordeal; leaking fuel in the vicinity of brakes heated to 500 degrees C (932 degrees F) by the landing speed and overweight condition created a fire hazard that prevented the passengers and crew from exiting the plane. It was another 52 minutes before disembarkation was judged safe and the first passenger descended the airstairs. The no. 1 engine would not shut down, even with water sprayed directly into it. It continued turning for three and a half hours after the landing.

The author's description of the calculation of landing parameters, discussion (and sometimes disagreement) among the flight crewmembers, contact with air traffic control, announcements to the passengers and further automated warnings makes a grippingly suspenseful story. The book fills in details that news reports could not convey at the time, not only of technical issues but about crew resource management.

The cabin crewmembers, headed by customer service manager Michael von Reth, prepared for an emergency evacuation while, perhaps more difficult under the circumstances, calming and reassuring the passengers. This involved identifying any passengers who showed signs of losing control, which could have initiated contagious panic throughout the back of the plane. Von Reth had to give special care to a few passengers, but only a few.

*QF32* shows occasional signs of hasty preparation, such as some repeated information. But with a series of events of such complexity, even that may help the reader understand the big picture. De Crespigny mentions the awards the crew received, including the Flight Safety Foundation Professionalism Award. "This last award is remarkable because it included Michael von Reth in the citation, the first time a cabin crewmember had ever been recognized in the FSF's 65-year history," he says. Actually, the Foundation has given a different award, for heroism, to several cabin crewmembers including Richard DeMary, the lead flight attendant who risked his life to help rescue passengers from the burning cabin of USAir Flight 1016 following a crash in 1994.

In any case, there was indeed plenty of credit to go around. As for Richard de Crespigny, he sums up the attitude that helped him in his role during the emergency: "I'm old school in this respect: On board, I believe the pilot's job is exactly as written in the federal laws; pilots are 'responsible for the safety of the passengers and crew' regardless of what stands between them and disaster. Whether it's a fly-by-wire computer or a few cables connected to your rudder pedals, your job is to know your plane, be unafraid of the plane and to *fly the plane*."

*FSF video interviews with de Crespigny and von Reth can be accessed at <flightsafety.org/media-center/news>.*