

**Keilir Conference on Eyjafjallajökull and Aviation
September 15-16, Keflavik Airport, Iceland
Presentation of Conference Chairmen, Panelists and Speakers**



Capt. Eric Moody
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Guest of Honour of the Conference and Invited Speaker was Capt. Eric Moody.
The captain who glided his B747 to safety out of volcanic ash over Java on 24 June 1982.



Capt. Eric Moody and the President of Iceland Olafur Ragnar Grimsson
at the president's residence, Bessastadir (Sept.2010)

Some recent interviews with Capt. Eric Moody by the press and TV:

BBC: Eric Moody: The pilot who flew into volcanic ash in 1982

http://news.bbc.co.uk/2/hi/uk_news/8623210.stm

MIRROR NEWS: How hero pilot Eric Moody saved 263 lives after navigating through volcanic ash

<http://www.mirror.co.uk/news/top-stories/2010/04/16/hero-pilot-eric-saved-263-lives-115875-22189294/>

MAIL ONLINE: The story of BA flight 009 and the words every passenger dreads...

<http://www.dailymail.co.uk/news/article-431802/The-story-BA-flight-009-words-passenger-dreads-.html>

Airsidetv.com - Interview With Capt Eric Moody BA Flt 9 Part (7 min. video)

<http://www.youtube.com/watch?v=IZI6WdJF370>

AlJazeera English: How ash could damage air planes

http://www.youtube.com/watch?v=hkdDRM_kTcY&feature=related

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Some photos of Capt. Eric Moody's visit to Keilir Aviation Academy and the Aviation Conference in Keflavik, Iceland in September 2010.

http://en.keilir.net/keilir/about_keilir/gallery



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DOWN TO A SUNLESS SEA

The anatomy of an incident

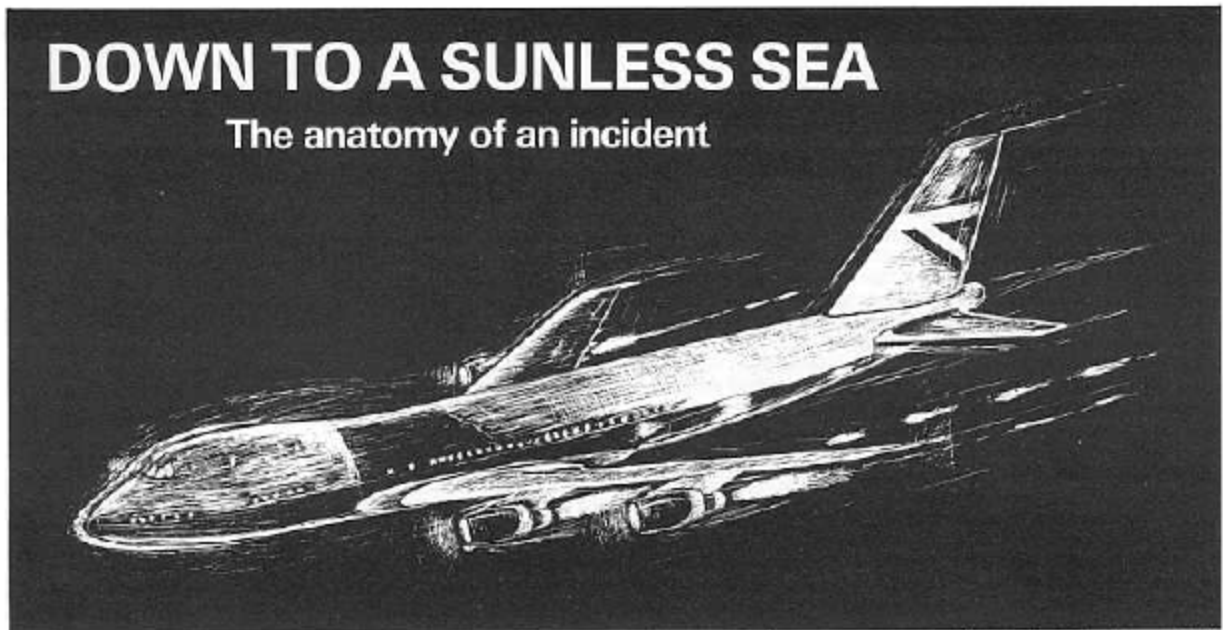


Illustration: John Stewart-Smith

The job of the airline pilot in the early days of civil aviation was one in which character, skill and a dogged ability to stick to the task, under extreme pressure, were tested on an almost daily basis. Weather forecasting was rudimentary, navigation was based on fleeting glimpses of railway lines through ragged cloud and accurate landings on an ability to discern a dim line of gooseneck flares. The aircraft were subject to frequent technical failures and the engines had to be nursed with the sensitivity old stagecoach drivers used in handling an inexperienced team of four. Those who learned their trade during the war came through an even more deadly and unforgiving school. Nowadays, the modern generation of pilots sit in air-conditioned comfort, with reliable engines, navigating errors measured in yards rather than miles on aircraft which can land themselves, smoothly and accurately, in almost impenetrable fog.

We are the first generation of pilots who may go through a whole career without having a genuine emergency; many pilots have completed fifteen years flying without having suffered an engine failure. Although this is undoubtedly a blessing, it does beg the question, how will they behave if they are eventually put to the test?

Apart from those who have an innate ability to generate excitement (it is known as lack of airmanship) we tend to be posed our most difficult problems on the simulator. The adrenalin which flows through the veins and the clammy hands which are caused by it, are a pale imitation of the real thing. It is a sham, because the fear which causes it is a fear of appearing a fool, rather than fear for one's life.

Pilots by nature have to be a fairly self-confident breed and such a charmed life is likely to over-enhance confidence in their own basic flying ability, but most would admit to occasional doubts about how they would behave under extreme stress. They would like to emerge triumphant from a trial but, at the same time, they have no wish to be put to the test. They obviously have great interest in the design faults and mechanical failures which affect airline safety but they are even more interested, in a vicarious sense, in the behaviour of the pilot under stress.

Did he think as quickly and as clearly as in normal circumstances? Did he feel he had plenty of time to make decisions or did time appear to pass quickly? Was the story presented to him by the instrumentation consistent, or confusing? Did he handle the aircraft as well under pressure as he did normally?

Captain Eric Moody, Senior First Officer Roger Greaves and Senior Engineer Officer Barry Townley-Freeman found the answers to these questions, and many more, on the 24th June 1982, when they set out to fly BA 009 from Kuala Lumpur to Perth.



12.00z "Speedbird 9 cleared for take-off."

The aircraft was laden with 247 passengers and 91,000 kg of fuel for the flight to Perth, the night was moonless, but clear, and the flying conditions were smooth. The en-route weather forecast was good and the crew expected an uneventful flight lasting 5 hrs. The flight crew ate their meal after settling into the cruise at 37,000 ft. This was supplemented by a tray of satay (a speciality of Malayan cookery). The crew had finished their meal by the time the aircraft was south of Jakarta on Airway B69.

Eric Moody had a quick look at the area ahead of the aircraft with the weather radar and picked up nothing more interesting than returns from the surface of the sea. He made his way aft and found that the crew toilet was occupied. He descended the stairs to the first class area and started a conversation with the forward purser Sarah Delane-Lea. Almost immediately he was called to the flight deck by Fiona Wright the Stewardess I. As he climbed the stairs he noticed puffs of 'smoke' billowing out from the vents at floor level and a smell which he described as 'acid, or ionised electrical', such as one finds near sparks from electrical machinery. He entered the flight deck to find the windscreens ablaze with what appeared to be the most intense display of St. Elmo's fire he had ever experienced. Eric strapped himself into his seat and again looked at the weather radar. Nothing of significance was in view, but he was pleased that in his absence, the other two crew members had put on the seat belt signs and the engine igniters.

Roger then pointed out the side windows at the engine intakes which were glowing as if lit from within. The electrical discharges had a stroboscopic effect which gave the illusion that the fans were moving slowly backwards. At the same time the St. Elmo's fire on the windscreen had given way to a display of what looked like tracer bullets. All this happened so quickly that there was little time for discussion and Eric had been distracted by the display from what he considered to be the most important consideration, the smoke which appeared to have got into the air-conditioning.

Before he could speak Barry called out "Engine failure number 4!" Eric immediately asked for the Engine Fire Drill, and the other two crew members carried it out. Roger believes the crew were helped by the fact that the problem compounded itself gradually. The slow build-up of danger ensured that they were not plunged instantly into an extreme situation. They became more alert and concentrated as the incident became more complex and at no time lost control of their reasoning processes. They were soon

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forced to face the full consequences of their problem by the voice of the Flight Engineer.

"Engine failure number 2 . . ."

"Three's gone . . ."

"They've all gone!"

Eric stared at the instrumentation in front of him and refused to accept the full impact of what had been said. "Four engines do not fail", was the refrain which dominated his thinking. He had practised a four engine failure detail on the simulator some months earlier and then, the assumption had been made that all generators would fail, leaving the aircraft on standby electrical power, fed from the aircraft batteries. This would have caused a failure of the co-pilot's instrumentation and much of the cockpit lighting. Yet the instrumentation all appeared to work and the auto-pilot remained in control. The display on the engine instruments was also very confusing as the instruments were a mixture of Smiths and General Electric, some which froze under power loss and some in which the needles dropped off the scale. There were also some amber lights indicating that engines had exceeded their maximum turbine gas temperatures. While he studied this confusing display, Eric heard Barry suggest that they shut the engines down. At the same time he noticed that the airspeed was decreasing. He put the auto-pilot into a gentle descent and turned to his co-pilot "OK Roger, put out a Mayday".

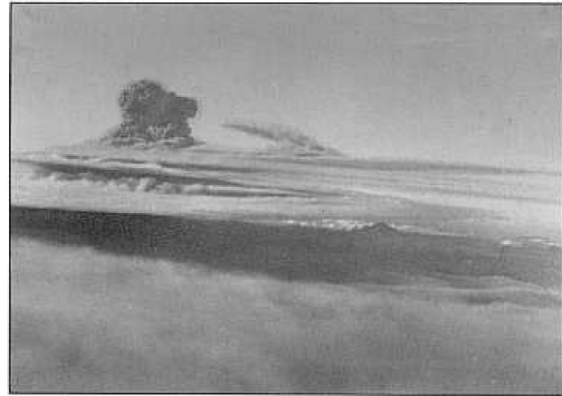


13.44z "Jakarta, Jakarta, Mayday, Mayday Speedbird 9. We've lost all four engines. We're leaving 370".

Eric then controlled the aircraft using the auto-pilot, while the other two carried out appropriate emergency drills. Both pilots shared the task of moving the engine start levers on different occasions. Because the auto-pilot remained in control, Eric had time to consider the likely cause of such a multiple failure: electrical? (check all circuit breakers); fuel? (turn on all pumps and cross feed cocks); icing? (turn on engine anti-icing). All the crew members, afterwards, felt that checklists, for such extreme emergencies, should contain every item for consideration and not



S.F.O. Roger Greaves, Captain Eric Moody and S.E.O. Barry Townley-Freeman.



Mount Galunggung erupting
(Photo by courtesy of L. J. R. Allen ANZ)

leave anything to intuition. Although crew members will always exercise their initiative, it is better that they have trust, that the check list covers everything. The dominant feeling of the crew at this point was the question 'what have we cocked up?'

The first relights were attempted on engines 1, 2 and 3, but Eric decided, with the agreement of the crew, to attempt relights on the number 4 engine along with the others. (The number 4 engine fire handle had been pulled when the fire drill had been carried out).

At 26,000 ft. the cabin pressure warning horn sounded as the cabin climbed through 10,000 ft. The crew started to don their oxygen masks. When Roger removed his mask from the stowage it fell to pieces in his hand. The bayonet fitting came out of the supply pipe and the tubing disengaged itself from the mask. Eric was presented with an unenviable choice. Should he continue to descend as slowly as possible and have his co-pilot suffer the effects of anoxia, or should he increase the rate of descent till the aircraft was at a more survivable altitude. He chose the latter, and began an emergency descent.

However he decided not to extend the gear, as instructed in the flying manual, because it opened up the possibility of having to ditch the aircraft with gear extended, should it prove impossible to retract them. With hindsight it is now obvious that during gear extension, the hydraulic power from windmilling engines might not be powerful enough to move the gear and the flying controls at the same time. They had previously turned the aircraft on a Northerly heading back towards Jakarta and they decided that with a safety height of 10,500 ft in that area, they would turn back out to sea when the aircraft reached 12,000 ft. At this time the inertial navigation systems were giving a display of gibberish and were no use in fixing their exact position.

When they reached 20,000 ft. Eric retracted the flight spoilers and reduced the rate of descent. Ironically he noticed that Roger had, by then, managed to fit the oxygen mask together (a test of intelligence and manual dexterity while under extreme pressure).

At this point Roger noticed that his airspeed indication showed 320 kts whilst Eric's showed 270 kts. Eric thought that it was worth assuming that the higher figure was correct in case they had been attempting to start the engines while outside the relight envelope. Again they had no luck, although the fuel had been igniting behind the engines and treating those passengers with window seats to a view of, what appeared to be, four engines on fire. At about that time the cabin reached 14,000 ft. and the passenger oxygen masks were deployed. Eric decided it was time to have a word with them.



"Good evening ladies and gentlemen. This is your Captain speaking. We have a small problem. All four engines have stopped. We are all doing our damndest to get them going again. I trust you are not in too much distress."

Eric then asked the Cabin Service Officer to come to the flight deck. He attempted to explain the problem to him while wearing

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Log



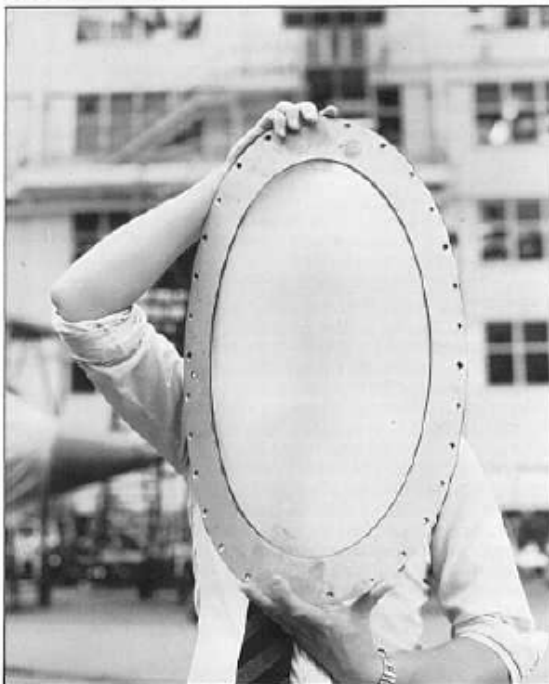
Route of aircraft

his oxygen mask. Graham Skinner could not understand Eric's words, but he realised that his presence on the flight deck was not helping matters, so he nodded, and returned to his job of helping the passengers.

It was about this point that Eric started to consider the awesome consequences of attempting a deadstick touchdown on the sea at night. His father had taken him, as a child, to Hythe pier to watch the flying boats land. He knew that flying boats did not fly at night because of the difficulty of judging height above water. He remembered, with some amusement, a training film made by British Airways which simulated a ditching at sea. The Captain playing the role (no actor) had used the phrase 'it's not our day' in passing the bad news on to the cabin crew. This reverie was interrupted by sounds of jubilation from the other two crew members as number 4 engine started. (This was the engine which had first run down and the success amply repaid Eric's gamble in trying to start it). The other three engines started, an almost interminable, 90 seconds later. They were at 12,000 ft.



13.57z "Speedbird 9. We're back in business. All four running, level 12,000."



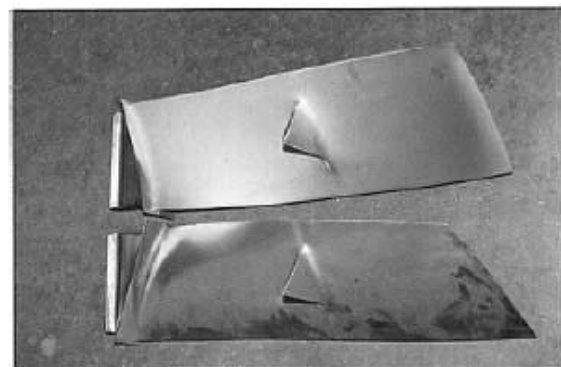
The effect of sandblasting on landing light cover

They immediately requested a climb to a height which gave them more clearance over the high ground ahead of them and asked for clearance to Jakarta. They climbed to 15,000 ft. and at about this height there was a resumption of the St. Elmo's Fire. When the throttles were pulled back to level out the Number 2 engine surged continually. It felt as though it would shake the aircraft apart, so it was shut down, but not without great reluctance. At this point Eric suspected that the St. Elmo's Fire, above 15,000 ft, was somehow connected with the engine problems and concluded that the engines themselves were severely damaged. He decided to descend to get away from the strange atmospheric effects but resolved to leave the throttles in their present position and to control the aircraft speed and descent by the use of speedbrakes, flaps and undercarriage. This required a leap of the imagination as up till then they had strong suspicions that the engines had failed because of an oversight, or an error, by the crew. They were cleared to Jakarta Airport where the weather was fine, with calm wind and good visibility. The only added complication was that glide path information was not available for Runway 24.



14.21z "This is Speedbird 9, could you turn runway lights fully up please."

While the aircraft was on the base leg for runway 24 the crew had great difficulty in picking up any lights on the ground and, in particular, in picking out the runway lights. Eventually the runway was spotted to the right of the aircraft out of the co-pilot's side-window. When they lined up with the runway the lights again disappeared and the crew realised that their front windows were almost opaque. The final descent, to touched



Wear on blade tips

down, was made using the localiser, to stay on the centreline, and by peering through the outer edge of the left hand front window, which was still clear. Eric was just able to make out the lights of the VASIs on the left of the runway. The other two crew members called out the radio altitude and DME distance to help in judging the descent. When they were over the runway the whole of the front windows were filled with a diffuse glare of light. This was comforting in that it proclaimed the general proximity of the runway, but the delay before the wheels touched down felt like minutes rather than seconds. The landing itself was smooth, Eric felt that the earth seemed to gather them up; downstairs in the cabin spontaneous cheers and clapping broke out from the passengers.

The crew taxied the aircraft off the runway towards the terminal building. The glare of light from the parking area again filled the front windows with a blinding glare. They decided to call it a day and parked the aircraft.



14.31z "Speedbird 9, I can't see with the light in my eyes. I'll hold it."

Conclusions

It was two days before the crew got confirmation of the cause of the incident. Barry was convinced that it was caused by an

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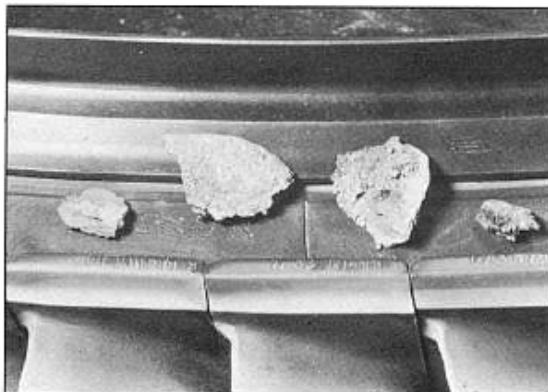
encounter with volcanic ash when he found his hands and clothes covered in a fine black dust as they waited for steps to be brought to the aircraft. When they got outside they found all the leading edges, engine nacelles and nose cone stripped of paint as if the aircraft had been sandblasted, as indeed in one sense it had. They had flown into the dust cloud from a volcanic eruption from Mount Galunggung which is positioned about 110 miles south east of Jakarta. The plume of ash started to become visible on satellite weather photographs, after the event.

The engines were the worst affected parts of the aircraft with the turbine blades having the most damage. The tips of the blades were ground away where they were blasted by the ash at high speed. The material of the ash was mostly silicate particles with a mean diameter of .075 mm. Apart from wearing away the high speed parts of the engine the 'silicacious refractory material sintered in contact with the hot metal fusing itself to the blades'. This is what happens inside steel furnaces. The changes in blade shape and size had serious effects on the efficiency of the engines with the number 4 engine (significantly the engine which ran down first) being the least damaged. Ash was also found in the pitot tubes which had caused the differing airspeed readings. In October 1984 ICAO issued a special report on the dangers of volcanic ash to aircraft, where it was pointed out that the incident on the 24th June 1982 was the ninth eruption of Mount Galunggung that year. The report found that prevention was better than cure, but suggested that any pilot who encountered such a problem should, altitude permitting, reduce thrust to zero, descend and leave the area as soon as possible. Consideration should be given to turning off engines and restarting them when clear of the ash and inside the reflight envelope of the aircraft.

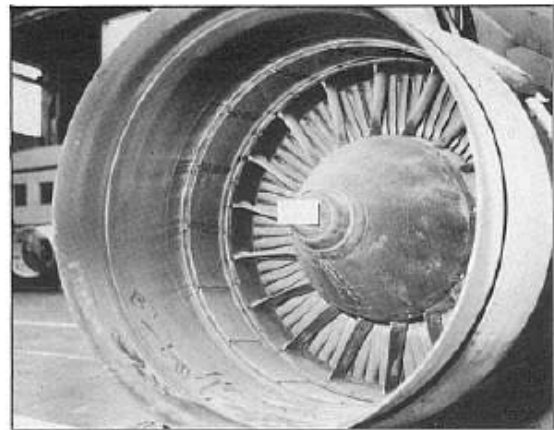
What Can be Learnt from the Behaviour of the Crew?

It would be comforting to think that this was an average crew and that a similar outcome would have emerged had others been flying the aircraft. If this be the case then British Aviation is indeed blessed with the standards of their pilots and flight engineers. If they were unexceptional crew members then it is obvious that they behaved in an exceptional way. They exhibited a quality which is described, best, by a word which is much loved by football managers, and the word is 'bottle'. This describes a sort of courage which is not of the gung-ho variety but the sort which causes someone to persist in an enthusiastic and inspiring manner when the odds for success look slim. Barry said that, had the aircraft landed in the sea, he would have still been trying to start engines as the fuselage touched the water. This is the sort of professionalism which passengers deserve to get from their flight crew.

Barry felt, very strongly, that check lists, which have to be used in such extreme emergencies, should contain every item of relevance to that emergency (perhaps in an expanded form in the Flying Manual) and suggests that the crew should read out, from the check-list, the items which are meant to be 'memory items'. When there are three concurrent drills to be carried out while one is "thinking through treacle", close adherence to a comprehensive checklist is the only way to guard against error.



The material which adhered to the blades



The engine intake after the event

Their efforts were successful because:

- i) One pilot ensured that while check-lists were being completed, the aircraft attitude and speed were always monitored (somebody minded the shop).
- ii) the emergency was managed in a rational and safe manner,
- (iii) the emergency checklists were fully utilised.
- iv) they continued to try to start the engines even though for 13 minutes there was no visible reward for their efforts,
- v) they used the auto-pilot to reduce work load so that, at least, one member of the crew could detach himself from the check-list and try and reason his way to a solution,
- vi) where necessary they made bold decisions: trying to start No.4 engine and refusing to climb back into the cloud of ash, and
- vii) they made full use of each crew member, aircraft system and landing aid, to ensure a safe landing.

This was an exercise in crisis management, the sort of thing which NATO spends much of its time studying. Any Captain finding himself in such an extreme situation must ensure that, at any particular moment, he clearly identifies the aspect of the problem which is most relevant to the safety of the aircraft and attempts to solve it. He must be able to delegate some responsibilities, and clear-minded enough to ignore those problems which are not an immediate danger to the aircraft. These priorities will change as time goes on so the pilot must guard against tunnel vision. This is an aspect of aviation which is not studied widely, although, in recent years, there have been five occasions when multi-engined aircraft lost all engine power. The most amazing aspect of these incidents is that there has been no loss of life in any of them.

Postscript

Afterwards the crew were amazed to see the way the event captured the imagination of the world. Their own reactions were mixed, some feeling a sort of delayed action euphoria, while others felt very lucky to be alive. They all felt that after similar incidents, crews should not be allowed back to their jobs until normality returns. Eric found himself both lauded and hounded by the press of the world, often being asked questions which were both silly and uninformed. Always he was being asked for quotes. "Give us a quote about what it was like to land on a dark night with no forward vision" he was once asked. "It was a bit like negotiating one's way up a badger's arse" said Eric not because of any great knowledge of brock bums (presumably the Arctonyx collaris, or the Sumatran badger) but because it is how a dark night is described in his beloved Hampshire. Eric was pleased with his quote and disappointed when it was never used, even when he changed badger for possum (*Didelphis Massupialis*) in Australia. We have much pleasure in including the quote in the LOG, long renowned for its fearless misuse of the English language.

Jack Diamond

The story of BA flight 009 and the words every passenger dreads ...

by ZOE BRENNAN

Last updated at 16:23 29 January 2007



With unbelievable restraint, Captain Eric Moody addressed British Airways flight 009 as his Boeing 747 drifted inexorably down towards the Indian Ocean.

Displaying the stiff-upper-lip spirit that built an empire, he uttered the words that are every air passenger's worst nightmare: 'Ladies and gentlemen, this is your captain speaking. We have a small problem. All four engines have stopped. We are doing our damndest to get it under control. I trust you are not in too much distress.'

Minutes before, while cruising at ten kilometres above the sea, Captain Moody had instructed his first officer to send a Mayday call to ground control in nearby Indonesia. The date was June 24, 1982, and this extraordinary flight has since gone down in aviation history.

As a new TV documentary investigating the so-called 'Jakarta Incident' makes clear, nothing was quite as one might expect that terrible night.

Incredibly, passengers and crew reacted to the captain's cataclysmic announcement not with screams and hysteria, but with an extraordinary calm as the realisation that they were almost certainly sinking to their deaths hit home.

Looking out of the aircraft windows, they could see that their plane was coated in an eerie white light and that the engines were on fire, with great jets of flame trailing into the sky.

The cabin was now filled with a thick, sulphuric smoke, and the mighty jet bucked up and down as if it were a piece of flotsam adrift on stormy seas.

Mothers moved to comfort their children, husbands reached for their wives' hands, and air hostesses worked their way down the cabin, teaming solo passengers with a companion to accompany them into the darkest of nights.

Hours before, the BA scheduled flight had taken off from Heathrow Airport. After the long check-in, the 263 passengers settled into their seats, ordered drinks from the cabin crew, and

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prepared for the flight which would take them to New Zealand via India, Malaysia and Australia.

At the very back of the enormous jet, Betty Tootell made sure her 80-year-old mother, Phyl, was comfortable, and then began to read the Jane Austen novel she had bought for the journey.

Brought up in Britain, the pair had emigrated to New Zealand three years earlier, and were returning after a summer holiday in suburban London. Seated in front of her, James Ferguson was on his way back from a trip to the Holy Land, and was looking forward to getting home. Some rows ahead, Charles Capewell sat with his two young boys, Chas, ten, and Stephen, seven. In a few hours, the family expected to be reunited with their mother in Perth, Australia.

On the flight deck, the crew were fresh and alert. They had taken control at the last stopover in Kuala Lumpur, Malaysia. Captain Moody had had his first taste of flying at the age of 16, when he took a gliding lesson. He was one of the first pilots ever trained on the Boeing 747. First officer Roger Greaves had been a co-pilot for more than six years, and Barry Townley-Freeman was flight engineer.

As the jet flew over the Indonesian city of Jakarta, it was cruising at more than 36,000ft and had been in the air for an hour-and-a-half. Expecting an easy flight, Captain Moody checked his weather radar, which showed smooth sailing for the next 300 miles.

Assured that all was well, he asked Greaves to take charge while he took a break and stretched his legs.

In the cabin, chief steward Graham Skinner had observed excessive smoke in the air. Back in 1982, it was still legal to smoke on jets, and he was concerned it may have been a smouldering cigarette.

In the cockpit, the flight took an unsettling turn. First Officer Greaves said: 'Barry and I were just sitting there minding the shop, pitch dark night, of course, and then we started to get these pinpricks of light on the windscreen.'

His engineer, Townley-Freeman, asked whether it could be St Elmo's Fire - a natural phenomenon sometimes seen when planes fly through highly charged electric thunderclouds. The only thing was, there were no thunderclouds that night. The radar showed a clear sky.

Alarmed by this turn of events, the two men were further disturbed to see, with the help of their landing lights, a thin layer of cloud surrounding their plane.

Back in the cabin, a shudder of turbulence shook passengers as they slept. Breaking off from her book, Betty Tootell glanced to her left, where she had a clear view of the port wing. 'To my surprise, it was covered in a brilliant, shimmering light,' she recalls.

'I carried on reading, but I found that I kept reading the same paragraph over and over. I then noticed that thick smoke was pouring into the cabin through the vents above the windows. I didn't know what was happening.'

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Neither did the crew. They decided it was time to call their captain back to the controls. 'The smoke filling the plane smelt like a sulphuric, electrical smell,' recalls Moody. 'I went on the flight deck expecting to hear that we had some electrical smoke from the aircraft.'

Suddenly, Greaves said: 'Oh my Lord. Look at engine four! It's lit up somehow.' The captain was distracted, however: he had just noticed that the engine on his side was illuminated.

Ahead of them, they appeared to be flying into a sheet of brilliant white light, and the temperature within the aircraft began to soar.

Twenty-five years on, Skinner describes the scene: 'It got really, really hot,' he says. 'You were perspiring, drenched in sweat. The acrid smoke filling the cabin was at the back of your throat, up your nose, in your eyes - your eyes were running.'

Most of the passengers now realised that this was no regular flight. Charles Capewell told his young sons to close the blind on his porthole, and affected an air of calm as his blood ran cold.

He says: 'As young as they were, they knew we were in bad, bad trouble and they looked at me as if to say: "Well, what do we do now, Dad?"'

In the absence of an explanation, the cabin crew stowed away loose items in a bustle of efficiency, offering blind reassurance to passengers in an attempt to stop the air of latent panic igniting. Chief steward Skinner explains: 'If I was misleading them, then that was for a reason, because I didn't want them to get as upset as I felt.'

'I just couldn't believe what was happening, and yet I was chatting to the passengers, saying: "Nothing to worry about. It's just a little hiccup."'

By now, the passengers could see the extent of the problem with their own eyes, however. Betty Tootell says: 'There were huge flames coming out of all four engines. You were plagued by questions: Are we going to burn to death? Are we going to choke to death on the smoke? What's causing it? What are they going to do about it?'

As the fire engulfed the engines, one of them revved loudly and failed. Recalling the drill he was taught as a young pilot, Captain Moody began to shut it down. Next, engine two failed. Then the unthinkable happened. The engineer delivered the death knell: all four engines had failed.

In the cabin, the most ominous sound of all filled the air: a rumbling, grating noise almost like a cement mixer, followed by total silence. Flight 009 had entered that nameless void. It was falling from the sky.

Passenger Charles Capewell says: 'The quietness was unbelievable. It seemed eerie and surreal, as if we were suspended in space. All we could feel was this quietness and the whimpering from the few people who were really upset.'

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So what passes through the human mind as you stare death in the face? The passengers of Flight 009 offer a unique glimpse.

Tootell, who has written a book, *All Four Engines Have Failed*, on passengers' response to their neardeath experiences, recalls: 'The atmosphere in the cabin was very tense and very quiet. At first, it was raw fear and disbelief, and then after a while it turned to acceptance. We knew we were going to die.'

In the cockpit, the crew fought to control the giant glider that the 747 had become. Greaves radioed a Mayday warning to Jakarta control. Initially, they failed to understand the message - seemingly unable to comprehend such a catastrophe.

He repeated the warning, in the international format drilled into every flight crew: 'Mayday, Mayday. Jakarta control. Speedbird nine. We have lost all four engines. Repeat, all four engines. Now descending through flight level 3-5-0.'

Even without its engines, a 747 can travel forward ten miles for every 1,000ft it falls in altitude. With no power, flight 009 had begun a long, excruciatingly slow fall. The crew realised they had less than half an hour before they hit the sea.

Moody says: 'When all engines stop, you go into automatic mode. Obviously, we had practised this on the simulator many, many times.'

He began the standard engine restart drill, and decided to turn the crippled craft back towards the closest airport, just outside Jakarta - but a quick calculation told him that they would not make it without at least one functioning engine. As pressure within the cabin fell, oxygen masks dropped from the ceiling - an automatic emergency measure to make up for the lack of air. But some did not work.

Moody took drastic action: to prevent his passengers dying of oxygen starvation, he went into a nosedive, dropping 6,000ft in one minute, to an altitude where there was enough oxygen in the outside atmosphere to fill the cabin once more.

And quite unexpectedly, this action almost certainly saved the lives of every person on board.

Suddenly, engine four roared back into life. As the plane fell past 13,000ft, another engine came back into action, followed by the other two. The crew were euphoric, though when one of the four engines failed again, their fears continued.

With three engines operational, the plane closed in on the airport. But its problems were far from over.

Moody could see nothing outside - the windshield glass had been damaged. Landing equipment on the ground which could help them was not working, and the crew had to land the plane manually. With consummate skill, the pilot guided the aircraft to a perfect landing. 'The airplane seemed to kiss the earth,' recalls Moody. 'It was beautiful.'

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Safely on the ground, passengers hugged each other and applauded the crew. But what had happened? How had all four engines failed?

The result of a forensic investigation into the incident was to change pilot training around the world. Engineers at Rolls-Royce found that the engines had seized up because the plane had flown through a cloud of volcanic ash.

There had been an eruption of the Mount Galunggung volcano southeast of Jakarta that day. Wind had blown a cloud of ash into the path of the plane and the finely ground particles of rock had sandblasted the aircraft and choked its engines.

The volcanic cloud did not show up on the radar because it was composed of very dry material, unlike weather systems which are detected by their water particles.

By dropping into clear, denser air, the crew's efforts to restart the engines paid off, as the volcanic material was blown free.

Tom Casadevall, director of the U.S. Geological Survey, says: 'We've incorporated this learning into training. Pilots now know to look for signs including the odour of sulphur in the cabin and frictional electrification on the leading edges.'

In the months following their brush with death, the crew of flight BA 009 were showered with awards and commendations. With passengers, they formed the Galunggung gliding club, which enables survivors to stay in touch to this day.

And there was one happy postscript. Now 81, Betty Tootell went on to marry James Ferguson, the man who sat in the row in front of her.

'Life is full of surprises,' she says, from her home near Auckland, New Zealand. 'James and I married 13 years ago and we feel we're still on honeymoon. That night, I learned to count every day as a bonus.'

Air Crash Investigation - All Engines Failed! was on National Geographic Channel, February 5, 2007, at 9pm.

Read more: <http://www.dailymail.co.uk/news/article-431802/The-story-BA-flight-009-words-passenger-dreads-.html#ixzz10ZFv2JvF>

British Airways Flight 9

From Wikipedia, the free encyclopedia

Incident

Shortly after 13:40 UTC (20:40 Jakarta time) above the [Indian Ocean](#), south of [Java](#), the flight crew (consisting of [Senior First Officer](#) Roger Greaves and [Senior Engineer Officer](#) Barry Townley-Freeman while [Captain](#) Eric Moody was in the lavatory) first noted an effect on the windscreen similar to [St. Elmo's fire](#).^[1] The phenomenon persisted after Moody returned from the lavatory. Despite the [weather radar](#) showing clear skies, the crew switched on engine anti-ice and the passenger seat belt signs as a precaution.

As the flight progressed, smoke began to gather throughout the passenger cabin of the aircraft and it was at first assumed to be cigarette smoke. However, it soon began to grow thicker and had an ominous odour of [sulphur](#). Passengers who had a view out of the aircraft windows noted that the engines were unusually bright with the light shining forward through the fan blades and producing a [stroboscopic effect](#).^[3]

At approximately 13:42 UTC (20:42 Jakarta time), engine number four began surging and soon [flamed out](#). The flight crew immediately performed the engine shutdown drill, quickly cutting off fuel supply and arming the fire extinguishers. Less than a minute later, at 13:43 UTC (20:43 Jakarta time), engine two surged and flamed out. Within seconds, and almost simultaneously, engines one and three flamed out prompting the flight engineer to exclaim, "I don't believe it—all four engines have failed!"^[3]

Without engine thrust, a 747-200 has a [glide ratio](#) of approximately 15:1, meaning it can glide forward 15 kilometres for every kilometre it drops. The flight crew quickly determined that the aircraft was capable of gliding for 23 minutes and covering 91 nautical miles (169 km) from its flight level of 37,000 feet (11,000 m).^[3] At 13:44 UTC (20:44 Jakarta time), Greaves [declared an emergency](#) to the local [air traffic control](#) authority, stating that all four engines had failed. However, Jakarta Area Control misunderstood the message, interpreting the call as meaning that only [engine number](#) four had shut down. It was only after a nearby [Garuda Indonesia](#) flight relayed the message to Air Traffic Control that it was understood. Despite the crew "squawking" the emergency [transponder](#) setting of 7700, the aeroplane could not be located by Air Traffic Control on their radar screens.

Many passengers wrote notes to relatives. One such passenger was Charles Capewell who wrote "Ma. In trouble. Plane going down. Will do best for boys. We love you. Sorry. Pa XXX" scrawled on the cover of his ticket wallet.^[2]

Owing to the high Indonesian mountains on the south coast of the island of [Java](#), an altitude of at least 11,500 feet (3,500 m) was required to cross the coast safely. The crew decided that if the aircraft was unable to maintain altitude by the time they reached 12,000 feet (3,700 m) they would turn back out to sea and attempt to [ditch](#) into the Indian Ocean. The crew began

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the engine restart drills, despite being well above the recommended maximum engine in-flight start envelope altitude of 28,000 feet (8,500 m). The attempts failed.

Despite the lack of time, Moody made an announcement to the passengers that has been described as "a masterpiece of [understatement](#)".^{[3][4]}

“ *Ladies and gentlemen, this is your captain speaking. We have a small problem. All four engines have stopped. We are doing our damndest to get them under control. I trust you are not in too much distress.* ”

As pressure within the cabin fell, oxygen masks dropped from the ceiling—an automatic emergency measure to make up for the lack of air. On the flight deck however, Greaves's mask was broken; the delivery tube had detached from the rest of the mask. Moody swiftly decided to descend at 1,800 m per minute to an altitude where there was enough pressure in the outside atmosphere to breathe almost normally.

At 13,500 feet (4,100 m), they were approaching the altitude at which they would have to turn over the ocean and attempt a risky ditching. Although there were guidelines for the procedure, no one had ever tried it in a Boeing 747—nor has anyone since. As they performed the engine-restart procedure, engine number four started, and at 13:56 UTC (20:56 Jakarta time), Moody used its power to reduce the rate of descent. Shortly thereafter, engine three restarted, allowing him to climb slowly. Shortly after that, engines one and two successfully restarted as well.^[5] The crew subsequently requested and expedited an increase in altitude to 11,500 feet (3,500 m) in order to clear the high mountains of Indonesia.^[6]

As the aircraft approached its target altitude, the [St. Elmo's fire](#) effect on the windscreen returned. Moody throttled back, however engine number two surged again and had to be shut down. The crew immediately descended and held 12,000 feet (3,700 m).

As Flight 9 approached Jakarta, the crew found it difficult to see anything through the windscreen, and had to make the approach almost entirely on instruments, despite reports of good visibility. The crew decided to fly the ILS, [Instrument Landing System](#), however, the glideslope was inoperative, so they flew the localizer as the first officer monitored the airport's DME ([Distance Measuring Equipment](#)). He then called out how high they should be at each DME step along the final track to the runway, creating a virtual glide slope for them to follow. It was, in Moody's words, "a bit like negotiating one's way up a [badger](#)'s arse".^[1] Although the runway lights could be made out through a small strip of the windscreen, the landing lights on the aircraft seemed to be inoperative. After landing, the flight crew found it impossible to taxi, due to glare from apron floodlights which made the already sandblasted windscreen opaque. Therefore, *City of Edinburgh* had to wait for an airport tug to tow her in.

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Aftermath



Damaged engine parts from BA 9 on display at [Auckland Museum](#)

It was found that *City of Edinburgh's* problems had been caused by flying through a cloud of [volcanic ash](#) from the eruption of [Mount Galunggung](#). Because the ash cloud was dry, it did not show up on the weather radar, which is designed to detect the moisture in clouds. The cloud sandblasted the windscreen and landing light covers and clogged the engines. As the ash entered the engines, it melted in the combustion chambers and adhered to the inside of the power-plant. As the engine cooled from not running and as the aircraft descended out of the ash cloud, the molten ash solidified and enough broke off to allow air to flow smoothly through the engine allowing a successful restart. The engines had enough electrical power to restart because one generator and the onboard batteries were still operative; generator or battery power is required for ignition of the engines.

Engines one, two and three were replaced at Jakarta, as well as the windscreen, and the fuel tanks were cleared of the ash that had entered them through the pressurisation ducts, contaminating the fuel and requiring that it be disposed of. After being ferried back to London, engine number four was replaced and major work was undertaken to return the aircraft to service. G-BDXH also entered the [Guinness Book of Records](#) as the longest glide in a non-purpose-built aircraft, until the record was broken by the [Air Transat Flight 236](#) incident.

Although the airspace around Mount Galunggung was closed temporarily after the incident, it was re-opened days later. It was only after a [Singapore Airlines](#) 747 was forced to shut down three of its engines while flying through the same area nineteen days later (13 July), that Indonesian authorities closed the airspace permanently and re-routed airways to avoid the area, and a watch was set up to monitor clouds of ash.^[3] This was not, in fact, the first encounter from this eruption; a [Garuda](#) DC-9 encountered ash on 5 April 1982.^[7]

The crew received various awards, including the [Queen's Commendation for Valuable Service in the Air](#) and medals from the [British Air Line Pilots Association](#). Following the incident, the crew and passengers formed the Galunggung Gliding Club as a means to keep in contact.^[8]

One of the passengers, Betty Tootell, wrote a book about the incident, *All Four Engines Have Failed*. She managed to trace some 200 of the 247 passengers on the flight, and went on to marry a fellow survivor, James Ferguson, who had been seated in the row in front of her. She notes: "The 28th December 2006 marks the start of our 14th year of honeymoon, and on the

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24th June 2007 many passengers and crew will no doubt gather to celebrate the 25th anniversary of our mid-air adventure."^[9]

Today, British Airways operates Flight 9 from [London Heathrow](#) to [Bangkok](#) and [Sydney](#). *City of Edinburgh*, later renamed *City of Elgin*, continued to fly for British Airways, before being sold to [European Aviation Air Charter](#). The aircraft was taken out of service in February 2004 and the 30-year old aircraft was scrapped in July 2009.

The incident featured in an episode of the *Mayday* documentary TV series [Air Crash Investigation](#) titled "All Engines Failed".

In January 2009, following the ditching of [US Airways Flight 1549](#) on the Hudson River, Moody described his feelings during and after the event, in a piece for the [The Scotsman](#).^[10]

September 2009 saw *City Of Edinburgh* take on a fresh significance when the environmental campaign group [10:10](#) bought the fuselage of the plane and had it converted into thousands of 10:10 tags. The tags, made in the shape of the campaign's logo, are worn as necklaces or bracelets and are used to raise funds and awareness of 10:10's work, primarily to persuade individuals, organizations and businesses to reduce their carbon emissions by 10% in 2010. On 7 April 2010, the process was documented in a news feature shown on [BBC Scotland](#).^[11]

Similar incident

A nearly identical incident occurred on 15 December 1989 when [KLM Flight 867](#), a B747-400 from [Amsterdam](#) to [Anchorage, Alaska](#), flew into the plume of the erupting [Mount Redoubt](#), causing all four engines to fail due to [compressor stall](#). Once the flight cleared the ash cloud, the crew was able to restart each engine and then make a safe landing at Anchorage.^[12]

Other gliding airliners

- [US Airways Flight 1549](#) - 15 January 2009, made an emergency landing in the [Hudson River](#) after losing power in both engines, caused by multiple bird strike.
- [British Airways Flight 38](#) - 17 January 2008, crash-landed with extremely reduced power after ice crystals in the fuel clogged the fuel-oil heat exchanger (FOHE) of each engine.
- [Air Transat Flight 236](#) - 24 August 2001, made an emergency landing in the [Azores](#) without fuel.
- [Hapag-Lloyd Flight 3378](#) - 7 July 2000, landed in a powerless glide 500 metres (0.31 mi) short of the runway in [Vienna, Austria](#), with all aboard surviving.
- [Scandinavian Airlines Flight 751](#) - 27 December 1991, made an emergency landing after losing power on both engines due to ice ingestion.
- [TACA Flight 110](#) - 24 May 1988, made an emergency landing after losing all power because of water ingestion to the engines.
- The [Gimli Glider](#) (Air Canada Flight 143) - 23 July 1983, ran out of fuel between [Montreal](#), [Quebec](#) and [Edmonton](#), [Alberta](#), landing in [Manitoba](#).

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- [Southern Airways Flight 242](#) - 4 April 1977, made an emergency landing on a highway after losing all power because of water and hail ingestion to the engines.

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Real-life thriller by best-selling author Óttar Sveinsson:

MAYDAY ASH CLOUD

The human dramas of the Eyjafjallajökull eruption of 2010 - neatly interwoven with the story of the 747 jumbo jet whose encounter with an ash cloud led to the flight ban.

This is the true-life adventure of the families under Eyjafjallajökull – their struggle with evacuation, volcanic ash, lava and floods, and stories from stranded people in Europe and elsewhere in the world in April 2010 ... combined with riveting accounts from the people who were aboard the aircraft that caused the flight ban: Crew and passengers on BA 009 describe how 263 people believed they were going to die, when the 747 jumbo jet flew without warning into an ash-cloud in 1982. All four engines catch fire and fail ... In minutes the aircraft is going to ditch in the Indian Ocean. The strangest of chances connect the pilot of the doomed jet and passengers with the dramatic events of 2010 when the Icelandic ash-cloud halted aviation in Europe.

Personal stories are skillfully woven into a tale of Icelandic heroes - children wearing protective masks, and an international fashion model who dreamed of nature in Iceland, and fell in love with a farmer beneath the Eyjafjallajökull glacier, to be caught up in the eruption and make her escape with her baby. We learn of a life-and-death race with donated organs in mainland Europe; a gravely-ill woman rescued from Scotland by an RAF helicopter and flown to London at low altitude, navigating by following the roads; and the German chancellor's extraordinary visit to the USA which left him wandering all over Europe in an effort to get home.

(212 pages, 90 photographs)



Journalist Óttar Sveinsson is the author of a series of gripping books about true-life struggles with the elements, amazing ordeals and acts of heroism. He is a storyteller who combines suspense with compassionate probing of the emotions of those who took part in these events: their fears, their resolution, and the triumph against all odds.

Óttar's annual books have consistently made the Icelandic best-seller lists since 1994. They are published in German, English, Danish and Dutch as well as in Reader's Digest. One of his true-life stories was filmed by a Hollywood crew from Rescue 911 on Snæfellsjökull glacier in Iceland and broadcast in over 40 countries. The BBC has also made programmes about the events he describes.

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MAYDAY ASH CLOUD

Páll Ólafsson below the Eyjafjallajökull volcano:

"I was going through Hell. Blinded by thick volcanic ash pouring down on us from Eyjafjallajökull, we struggled to find our way home to milk the cows, guided only by a Satnav. Dad was overcome when we were evacuated from the farm the previous evening. The armoured rescue truck kept drifting off the road. My wife had got away to Reykjavik with the baby – she'd just made it across the Markarfljót river before the floodwater swept the road away. I didn't know if our 200 cows and calves were still alive. I hadn't slept for three nights. As we got out of the truck outside the cowshed, we could hardly see our hands in front of our faces. I feared a massive explosion or a flood. There was a dead silence."

the Story:

At around the same time, 6 am on 15 April 2010, Eric Moody, a retired British Airways pilot, answers his phone. Reporters are on the line. Heathrow and other European airports are closing down because of a huge ash cloud from Iceland. Is it justifiable? Eric's reply: "Yes, absolutely. In view of my experience, it makes perfect sense."

In this book, the dramatic story of what happened in Iceland in April 2010 is recounted by witnesses and participants, adults and children. And, no less exciting, pilot Eric Moody, his crew and passengers recount the tale of Boeing 747 flight BA 009, and 263 people who looked death in the face, after flying unawares into a cloud of volcanic ash. All four engines flame, then die. The crew desperately strive to restart the engines... but without success. Thick smoke fills the cabin, oxygen masks deploy, the lights go out, and the cabin crew disarm the emergency exits.

Will they ditch in the Indian Ocean among sharks? Or will they crash into a mountainside, for a mercifully swift end? Passengers and crew vividly recall the "Jakarta incident" of 1982.



Angelika Niall, passenger, aged 32:



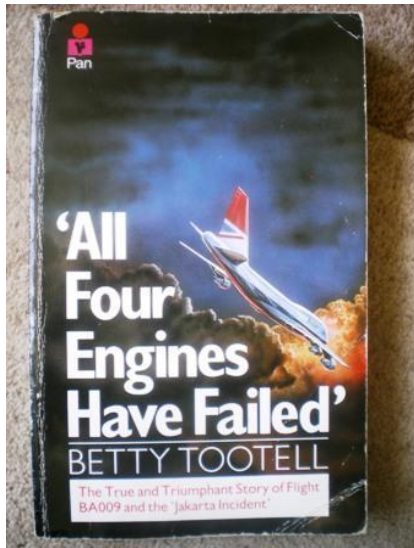
"The lights were going out, leaving only the emergency EXIT lighting. I said to Elke: *Do you think we'll have to jump now?* The oxygen masks dropped down. Our cabin attendant was clearly uneasy. The crew had no idea what was happening. The cabin supervisor walked through the darkened cabin with a big oxygen bottle on his back and a breathing mask over his face, trying to speak to us through a megaphone, but it was hard to understand him. He had clearly lost contact with the pilots on the flight deck. It was like being in a disaster movie. I sat with trembling knees ... I couldn't control my limbs. I just breathed from the oxygen mask, and awaited my fate. I saw myself going under the water, with air bubbles all around. Then I drown. I don't want to go like that."

Captain Eric Moody had been through all the checklists, and made forty attempts to restart the four engines:



"All sorts of silly things came up in my mind. I had a few hundred quid in my left trouser pocket: What a bloody waste! To go to the bottom of the sea with all that cash on me! The flight engineer was sitting behind the pilots' seats, with his oxygen mask on. Sweat was pouring down his face. He was absolutely soaking. We had dropped down to 13,000 feet. I called out: *Come on, Barry ... you are not bloody well trying!*"

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All Four Engines Have Failed: True and Triumphant Story of Flight BA 009 and the Jakarta Incident

(ISBN: [033029492X](#) / [0-330-29492-X](#))

[Betty Tootell](#)

Bookseller: Briony Lacey (Redhill, ., United Kingdom)

Bookseller Rating: ★★★★★

Quantity Available: 2