Trans Australia Airline’s Fokker F-27 Friendship Abel Tasman, flew into the sea on a beautiful moonlit night in June 1960, while preparing for a final approach to Mackay, Queensland. Its 25 passengers and four crew were all killed, making it one of Australia’s two worst fatal airline accidents.

The Mackay disaster was a savage blow for TAA which, although government owned, had established a reputation for esprit de corps, innovation and high operational standards. In its 14 years of operation it had not even scratched a passenger, in contrast to ANA which, in the same period, had written off no fewer than five DC-3s (at that time still a front line airliner), and killed 53 passengers. This abysmal record had prompted a macabre industry joke, ‘prang your way with ANA’, mocking the company’s slogan, ‘Wing your way with ANA’.

The tragic blemish on proud TAA’s formerly unstained record prompted not only a major technical accident investigation by the Department of Civil Aviation, but also a public inquiry.

The Board of Accident Inquiry did not convene until 4 October to allow it to have the benefit of the Department’s investigation. Under a senior judge, Mr Justice Spicer, the inquiry sat for 16 days and heard from 95 witnesses. The council appearing for the Department, Mr J.E. Starke, QC, told the inquiry that, since 1953, the Department had been working on an instrument to record in-flight pilot conversations and readings of all vital instruments that would be of great
assistance in determining the cause of an aircraft accident. He said the device had not yet been perfected, but that the Director-General, Sir Donald Anderson, had told him that when it was, it would be fitted to all aircraft.

This statement prompted Mr Justice Spicer, in his final summing up on 8 December 1960, to comment: ‘it had proved impossible to reach a firm conclusion on the cause of the accident because there was no way of finding out what happened on the aircraft in the last few minutes of its flight. It would have been helpful to have a record of any conversation between the captain and first officer during the period and of the readings of the flight instruments up to the moment of impact’.

He recommended that as flight recorders were under development for use in the investigation of accidents, the Department should continue to pursue the matter with a view to installing such equipment in airline aircraft ‘at no distant date’.

Mr Starke QC’s statement to the inquiry was incorrect. The flight recording equipment referred to was being developed, not by the Department of Civil Aviation, but by Dr David Warren of the then Department of Supply’s Aeronautical Research Laboratories (ARL).

Warren’s expertise was in fuels research, and in this capacity he had been a member of an expert panel examining reasons for the mysterious in-flight explosions of three near-new de Havilland Comet jetliners.

The Comets were of interest because of their possible future use by British Commonwealth airlines on the Australia-UK air route. Warren reasoned if the pilots had some warning of the impending disaster, and there had been a record of their conversation, there was a good chance it might have revealed what was happening to the aircraft.

From boyhood, Warren had had a strong interest in electronics. As a teenage pupil at school, he built ‘crystal sets’, simple unpowered radio receivers capable of picking up the transmissions of nearby broadcasting stations in sufficient strength to be listened to with a pair of headphones, which he would sell to fellow pupils for the princely sum of five shillings, thereby considerably enhancing his pocket money. (As a more junior boy at the same school, I have a clear memory of David Warren clamping a pair of headphones to my young ears so I could listen to the music!).

Drawing on his considerable electronics background, he set out, initially as a private venture, to develop a small recorder that would not only record a crew’s conversation, but also pertinent instrument readings. With the support of his superintendent at ARL, Dr Lawrence Coombes, and an instrument engineer, he completed a prototype by 1958. Its recording medium was a continuous loop wire, making it as fireproof as possible. It would record cockpit conversations and up to eight instrument readings over the last four hours of any flight, before the wire recycled, automatically erasing the older information.

Although the prototype was successfully flight tested with the cooperation of the Department of Civil Aviation and ARL outlined the details of Warren’s development to all sections of the Australian industry, no one seemed to show any interest.

Four years later, former Air Marshall Robert Hardingham, at that time secretary of Britain’s Air Registration Board, was making an informal visit to ARL. Hardingham was an old friend of Dr Coombes, who introduced Warren to him. When Warren explained the flight recorder, Hardingham was highly impressed. He told Coombes, ‘Put this lad and his gadget on the next courier flight to London!’

ARL again wrote to the Department of Civil Aviation, referring to ARL’s report on the recorder four years before, and offering to make the prototype available for tests, pointing out that its development had been slowed ‘by lack of any official recognition’.

David Warren builds a prototype FDR called the ARL Flight Memory Unit.

the ARL system becomes the Red Egg, made by the British firm of S. Davall & Sons.

Trans Australia Airlines’ Fokker F-27 Friendship Abel Tasman crashes onto the sea, on final approach to Mackay, Queensland, killing all 29 onboard.

1957-58

1960

1960

1963

1965

1965
The department’s reply remains difficult to understand, to say the least. In a long letter, analysing projected amendments to US Civil Air Regulations, it pointed out that there was no recorder adequate for their purposes yet available, and that no aeroplane certified for flight below 25,000 feet would be required to install flight recorders. The letter inexplicably concluded: ‘Dr Warren’s instrument is intended for a fundamentally different purpose ... and consequently has little immediate direct use in civil aircraft.’

A response from the RAAF was even more dismissive: ‘The recording would yield more expletives than explanations. Loss of aircraft is an accepted risk with predictable cost ...’

The powerful Australian Federation of Airline Pilots was scathing. ‘Such a device is not required ... it would be like having a spy in the cockpit ... no crew would take off with Big Brother listening.’

Meanwhile, in contrast, Warren’s month-long visit to the UK generated much interest. The UK-based EMI company offered to take over the remaining development, provided they were granted sole production rights. The company planned to manufacture some of the recorders at its Australian plant, but ARL were later dismayed to receive a letter from

the company saying that their ‘financial experts could not agree that the project was likely to be profitable’.

Months later, ARL’s efforts to create industry interest in their flight recorder was given impetus when the Minister for Civil Aviation, Senator Shane Patridge, tabling the report into the F-27 Mackay accident in Federal Parliament, announced that, from the beginning of 1963, airline aircraft would be required to be equipped with recorders for both instrument data and cockpit conversations. The requirement would apply to all turbine-powered aircraft with all-up weights of 12,500 pounds and above. The minister believed Australia was the first country in the world to take this action.

ARL’s hoped-for renewed interest was hindered by the fact that no commercial manufacturer appeared to be interested in developing a production version of the flight recorder. The one exception was the UK-based S. Davall & Sons, but it was awaiting details of what the British Ministry of Aviation would specify for the installation of flight recorders. In 1965, this led to the Davall Flight Deck Wire Recorder, based on Warren’s original design, being ordered by British European Airways, Aer Lingus, Alitalia and other European airlines.

The Department of Civil Aviation, though it had shown little interest in ARL’s development apart from an encouraging letter from the senior officer responsible for air safety investigation, agreed to assist ARL with further flight testing. But it did not expect their flight recorder could be in production by the required fitment date. ARL now realised that for any commercial manufacturing they would have to look overseas.

With the required fitment date of 1 January 1963 looming, Australia’s domestic airlines made the joint decision to order the flight recorders being developed by United Data Control in the U.S.A. For ARL and David Warren, it was a knockout blow. By the beginning of 1963, the ordered U.S. flight recorders were still not available, so the Department granted a two-year extension because of ‘development and production difficulties’. Even so, after the cockpit voice recorders arrived and were fitted, they were found to be unacceptable because of tape jamming problems.
During August 1966, all the voice recorders were removed from aircraft and returned to the U.S. for modification.

Thus, a month later, when an Ansett-ANA Viscount 800, VH-RMI, developed a fire in its No. 2 engine while en route from Mt Isa to Brisbane and broke up in flight while on emergency descent west of Winton, its extensive wreckage trail yielded broken pieces of metal flight data recording tape, but no cockpit voice recording.

The subsequent inquiry was also chaired by Mr Justice Spicer. He again strongly emphasised the value of cockpit voice recorders, saying that every effort should be made to obtain satisfactory recorders. The Department later gave approval for the installation of more recently developed U.S. Fairchild recorders as an alternative to the United Data Control equipment.

The final airline fatality in the saga of Australian flight recorder history (and indeed in the 40-year evolution of safe Australian airways operations), occurred in north-west Western Australia on the last day of 1968. Near the end of a scheduled flight from Perth to Port Hedland, a MacRobertson-Miller Viscount 700, VH-RMQ, called flight service, reporting it wascommencing descent. A few minutes later it called again to pass the usual 30-mile inbound report and advise it had descended through 7000 feet. Nothing more was heard. Half an hour later, a light aircraft reported burning wreckage 28nm south of Port Hedland. The Viscount’s starboard wing had separated in flight. There were no survivors.

For the first time, the investigation had the advantage of both flight data and cockpit voice recordings, both yielding information right up to the point of impact. The greater part of the flight was normal, with the Viscount cruising in smooth air at 19,000 feet, and the wing had failed without warning as the aircraft descended into the top of thermal turbulence at just under 7000 feet. The moment of failure was clearly distinguishable on the voice recording from the marked change in wind noise as the wing failed and the aircraft began its fatal plunge to the ground.

The failure was finally attributed to a fatigue crack in the main spar, initiated some years before by a steel bush, one of a number in the spar carrying bolts for wing attachments, being forced into its intended hole in the spar when it was distorted, broaching metal from the hole.

Today, flight data and cockpit voice recorders are essential equipment for all major airliners throughout the world and have helped solve many otherwise inexplicable accidents. But until 1999, David Warren’s contribution to its development remained almost unknown. In October that year, Time magazine, to mark the 40th anniversary of its Australian publication, featured people who had been the Pacific’s most outstanding contributors of the century.

David Warren at last received recognition. He was awarded the Australian Institute of Energy’s medal for that year and a year later the Hartnett Medal of the Royal Society of the Arts. A year later he was given the Royal Aeronautical Society’s Lawrence Hargrave Award for 2001.

In 2002, he was officially recognised in the Australia Day Honours list, being appointed an Officer in the General Division of the Order of Australia for his ‘service to the aviation industry, particularly through the early conceptual work and prototype development of the black box flight data recorder’, and in November 2008, Qantas named one of its new Airbus A380s after him in honour of his services to aviation. David Warren died in July 2010, at the age of 85.