Flight MH370: International Law and How We Use It

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I Introduction

This article arises out of a seminar given to the Queensland chapter of the Australian branch of the International Law Association on 7 August 2014, about the loss of Malaysia Airlines flight MH370. It considers the historical development of the body of international law that underpins international air transport, international law that is relevant to the search for the missing airliner and the investigation of what caused the accident, international law issues applicable if the airliner was harmed deliberately, and the recovery of damages for the losses sustained. It will also suggest some possible future legal developments. The title of this article reflects the fact that the MH370 incident provides a valuable illustration about the complexity and reach of international law, and how it operates as a real and effective legal system that is essential to our everyday lives.1

II Background

Malaysia Airlines flight MH370 was a scheduled flight from Kuala Lumpur to Beijing. The aircraft was a Boeing 777-200ER, with Malaysian registration 9M-MRO, carrying a crew of 12 and 227 passengers. The Captain, Zaharie Ahmad Shah, had joined Malaysia Airlines in 1981 and had over 18,000 hours of flying experience. The First Officer, Fariq Abdul Hamad, had joined Malaysia Airlines in 2007 and had some 2,700 flying hours.2

The flight departed Kuala Lumpur early in the morning of 8 March 2014 (00:41 local time), and last contact with air traffic control in Kuala Lumpur was at 1:19am. That communication finished with the widely reported handover ‘Good Night Malaysian Three Seven Zero’, as the aircraft was at that time departing Malaysian controlled airspace and shortly due to enter airspace under air traffic control in Ho Chi Minh City. Two minutes later, travelling at its assigned cruising altitude of 35,000 ft, its radar transponder signal was lost. After that time, there was no successful communication with the aircraft, however ground based radar tracked it changing course to the west, and 6 ‘handshakes’ or ‘pings’ were transmitted to an Inmarsat satellite, proving that the aircraft remained flying for several hours after communications had been lost.

Technical analysis of those ‘pings’, involving mathematical calculations that allowed for the Doppler Effect, established two possible flight paths. One, travelling north west, would

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2 The title references former ICJ President Dame Rosalyn Higgins’ collection of her General Course lectures to the Hague Academy of International Law, published as R Higgins, Problems and Process — International Law and How We Use It (Oxford University Press, 1994).
have taken the aircraft over land, where it would have been detected by radar. The other option would have taken the aircraft south west, into the southern Indian Ocean. The ongoing search in the Indian Ocean has yet to find any trace of the airliner.

III The Regulation of International Air Transport

A International Law and Sovereignty over Airspace

Before the First World War, there were various theories about the airspace above states, including the airspace above states’ territorial waters. These ranged from the view that airspace was entirely ‘free’ (a view promoted by French jurists), to airspace being state territory up to a certain altitude, with it being ‘free’ above that, to airspace being state territory subject to a right of innocent passage for foreign civil aircraft, and airspace being entirely territory subject to state sovereignty (a view promoted by British jurists). The only thing that everyone agreed upon (consistently with established principle) was that airspace over the high seas and *terrae nullius* was free and open to all.3

Aviation was of course in its infancy then. The Wright brothers had only made the first powered flight of a fixed wing aircraft on 17 December 1903. Louis Bleriot won a £1,000 prize in 1909 for being the first person to fly the English Channel in a heavier-than-air aircraft. Although the first powered flight in an airship had been made in 1852, they were still relatively unsophisticated. World War I changed all of that. Aeroplane technology advanced rapidly due to the desire to deploy aircraft for aerial reconnaissance, bombing and machine-gunning enemy positions, and attacking enemy aircraft. Payloads, speed, range, and technical capacity all increased substantially. The English Channel no longer spared the British public from direct exposure to the consequences of war between European powers, with London being bombed by German ‘Zeppelin’ airships.

After the First World War there was general international consensus that airspace above states was to be regarded as sovereign territory. The Latin maxim *Cujus est solum ejus est usque ad coelum, et ad inferos* was to apply, namely that whoever owned the soil owned all the way up to Heaven and down to Hell.4

The Paris Peace Conference of 1919, in addition to negotiating the Treaty of Versailles, also created an Aeronautical Commission which drafted the 1919 *Paris Convention for the Regulation of Aerial Navigation*. It was signed by 27 state parties on 13 October 1919, and was ultimately ratified by 37 states. The 1919 *Convention* created the International Commission for Air Navigation (ICAN), which operated under the direction of the League of Nations.

Article 1 of the 1919 *Convention* provided that:

> Every Power has complete and exclusive sovereignty over the air space above its territory’ and article 2 provided that ‘Each contracting State undertakes in time of peace to accord freedom of innocent passage above its territory to the aircraft of the other contracting States.

Unsurprisingly this freedom was not extended to military, customs or police aircraft,

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which were only permitted to enter foreign airspace with express permission of the overflown state (arts 32 and 33). However article 15 introduced a rider to the freedom of passage granted by article 2 by providing that the establishment of 'international airways' was subject to the consent of the states flown over. The potential commercial interests were already obvious. These basic principles remain the same today.

In Nicaragua v United States, the ICJ reaffirmed that '[t]he principle of respect for territorial sovereignty is also directly infringed by the unauthorised overflight of a state's territory by aircraft belonging to or under the control of the government of another state'.

B The Limit of Airspace

One thing that the 1919 Convention did not do was spell out a height limit for airspace. Although for scientific purposes, the so-called Karman Line (an altitude of 100,000 metres or some 328,000 feet) is often used as the boundary between the Earth's atmosphere and outer space, no legal definition has ever been agreed for the boundary between airspace and space itself. With the Soviet Union's launch of the world's first satellite, Sputnik, on 4 October 1957, satellites and other space vehicles began to traverse state territory in earth orbit. Initially, these were within what is now referred to as 'low earth orbit', namely an altitude of between 160 km and 2,000 km. This is well above the 100 km height of the Karman Line. A geostationary orbit (also referred to as a geosynchronous orbit), which is used for communications and weather satellites that are to remain in the same position vis-à-vis the ground, is much higher being at an altitude of 35,786 km (or 20,200 km for semi-synchronous orbits).

No states protested that traversing satellites were breaching their sovereignty (the authors of Oppenheim point out that such a view would have entailed considerable difficulties for all) and it quickly became an accepted principle of customary international law that sovereignty over airspace did not extend into outer space, which was to be free for the use of all states. There were a number of UN General Assembly resolutions which included statements to this effect, and articles 1 and 2 of the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies provide for this.

There is probably little practical need for a legal definition of the boundary between airspace and outer space. Commercial airliners tend to operate up to about 45,000 feet. Military aircraft can go higher, but even purpose built reconnaissance aircraft were limited by the fact that the air in the upper atmosphere becomes too thin to provide sufficient lift for flight, and so only a rocket can go higher. The Lockheed U2 in which Gary Powers was shot down over the USSR in 1960 was limited to around 70,000 feet, and the Lockheed SR-71 Blackbird could approach 90,000 feet, which is about 27.5 km. That is a long way from the 160 km required for a stable low earth orbit. At 130 to 150 km the atmosphere is too dense and puts too much drag on a satellite for orbit to be maintained for more than a few weeks.

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C The Chicago Convention and ICAO

The 1919 Convention was not limited to settling issues of sovereignty. It contemplated an ongoing regime for the regulation of all matters relating to international air transport, overseen by ICAN. The 1919 Convention required that - like ships - civilian aircraft were to be registered with one of the contracting states, and would be regarded as possessing the nationality of that state. The state of registration would be responsible for certifying the airworthiness of the aircraft, and for licensing its pilot and crew.

Safety was a key issue. The 1919 Convention required states to provide foreign aircraft with the same assistance for landing, particularly for aircraft in distress, as they would provide to their own aircraft. ICAN was, amongst other things, directed to collect and communicate to contracting states information of any kind concerning international air navigation, wireless telegraphy, meteorology and medical science relevant to air navigation, and to publish maps for air navigation.

Since 1919, the need for broad and deep regulation of international air transport by an international organisation has never been in doubt. Today, international civil aviation is regulated by the Convention on International Civil Aviation. It was signed in Chicago on 7 December 1944 by 52 states. It has been amended a number of times, and is one of the most signed of all treaties, now having 191 state parties. The Chicago Convention established the International Civil Aviation Organization (ICAO). In October 1947, ICAO became a specialised agency of the United Nations linked with the UN Economic and Social Council, pursuant to articles 57 and 63 of the UN Charter.

Unsurprisingly, ICAO is a substantial organisation, with a permanent secretariat located in its headquarters in Montreal, under the control of a Council of 36 member states (including Australia), which is elected by an Assembly, which comprises all 191 member states. Disagreements between states on the application of the Chicago Convention or its Annexes are decided by the Council, with appeals either to the ICJ or an ad hoc arbitral tribunal.

At this point it is also worth mentioning the airlines' trade association, the International Air Transport Association. The IATA was established in Havana in 1945, and has approximately 240 airlines as members. It is the successor body to the International Air Traffic Association (also IATA), which was established by six European airlines to promote standardisation of tickets and administrative procedures, and to help airlines compare technical procedures. ICAO's website states that it has over 10,000 'International Standards and Recommended Practices' (known as 'SARPs'), which are contained in 19 Annexes to the Chicago Convention. Annex 13 deals with Aircraft Accident Investigation. For operating practices and material that are deemed to be too detailed to be included in a SARPs, ICAO publishes PANS: Procedures for Air Navigation Services.

Like the 1919 Paris Convention, the Chicago Convention does not apply to military, customs or police aircraft. It reaffirms exclusive state sovereignty over airspace above land and territorial waters (arts 1 and 2). Articles 5 and 6, as modified by state practice, permit civil aircraft to overfly state territory, or to land, but the operation of scheduled or commercial charter flights requires state consent.

The underlying themes of the Chicago Convention are the harmonisation of rules and

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procedures through ICAO, and the granting of national treatment (i.e. non-discriminatory treatment) to the aircraft of all other states.

States undertake to keep their rules of the air uniform – as much as possible – with those established under the Convention (art 12), and to open their airports and air navigation facilities to aircraft registered in all other states, and to impose the same fees on foreign aircraft as their own aircraft for the use of airports and air navigation facilities (art 15).

As for the 1919 Convention, states are responsible for registering and certifying aircraft, airworthiness and crew licences, and communications equipment (although the operation of communications equipment when overflying a state is to be in accordance with that state's regulations) (arts 30, 31, 32). States are to recognise the certifications given by other states, provided that they reach any minimum standards for airworthiness and crew competency prescribed by ICAO (art 33).

States undertake that in accordance with recommendations by ICAO they will (as far as practicable): provide airports, radio services, meteorological services and other air navigation facilities to facilitate international air navigation; put into effect standard systems of communications, codes, markings, signals, lighting and operational practices; and collaborate in publishing aeronautical maps and charts (art 28).

States are to cooperate in establishing uniformity in regulations and procedures, with ICAO to adopt international standards and recommended practices for: communications and air navigation aids, characteristics of airports and landing areas, rules of the air and air traffic control, licensing of operational and mechanical personnel, airworthiness, registration and identification of aircraft, collection and exchange of meteorological information, log books, aeronautical maps, customs and immigration procedures, assisting aircraft in distress, accident investigation, and any other appropriate matters concerned with the safety, regularity and efficiency of air navigation (art 37).

Article 38 permits states to notify ICAO of any areas in which their own regulations and practices cannot comply with the international standards, known as 'differences'.

In addition to the Chicago Convention, states also signed the 1944 Chicago International Air Services Transit Agreement, which dealt with scheduled international air services, and gave the consent necessary under articles 5 and 6 of the Chicago Convention. It is known as the 'Two Freedoms' agreement, because all states agreed to first, permit scheduled airline services to fly across their territory without landing, and secondly, permit scheduled airline services to land for non-traffic purposes (eg to refuel).

The Chicago Convention and the 'Two Freedoms' agreement are implemented into Australian domestic law by the Air Navigation Act 1920 (Cth), and are reproduced in Schedules to that Act.

An attempt to gain a broader consensus was unsuccessful. A second similarly named treaty also entered into in 1944 (the Chicago International Air Transport Agreement) also permitted airlines to board and disembark passengers, mail and cargo. It is known as the 'Five Freedoms' agreement. However few countries ratified it, and its chief sponsor, the USA, denounced it in 1946. The general view was that it gave too much of commercial value away for nothing.9

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As a result, the operation of scheduled international airline services has been achieved through a network of bilateral treaties known as Air Services Agreements. Australia has 90 of these. Usually they are structured with a treaty level Air Services Agreement that is supplemented by arrangements of less than treaty status between the relevant aviation authorities in Australia and the other state, such as MOUs or exchanges of letters.\(^\text{10}\)

**IV Search and Rescue**

Search and rescue is dealt with in Annex 12 to the *Chicago Convention*. Paragraph 2.1 requires states to provide search and rescue services within their territories on a 24 hour basis. For the high seas and areas of undetermined sovereignty, regional air navigation agreements are to allocate responsibility. Paragraph 3.1 requires states to cooperate with neighbouring states, and indeed this international cooperation has been one of the outstanding features of the search for flight MH370. However before embarking on a discussion of the MH370 search, some context is helpful.

**A The Maritime History**

ICAO is not the only international organisation concerned with search and rescue. By the beginning of the 20\(^\text{th}\) century, substantial numbers of people were travelling by sea and loss of life was heavy. The annual loss of life from British ships alone was between 700 and 800 people.\(^\text{11}\) But it was the loss of the White Star Line’s *Titanic* in April 1912 that galvanised the British government to hold an international conference to agree on safety standards. That conference resulted in the 1914 *Convention for the Safety of Life at Sea*, although it never entered into force due to World War I. Subsequent versions were signed in 1929, 1948, 1960 and 1974. The latter two versions were drafted at conferences held under the auspices of the then Intergovernmental Maritime Consultative Organization (established by its own *Convention* in 1948), which since 1982 has been known as the International Maritime Organization or IMO.

Seafaring tradition and the Safety of Life at Sea conventions\(^\text{12}\) imposed an obligation to go to the assistance of vessels in distress, however it was not until the 1979 *International Convention on Maritime Search and Rescue* that an international system governing search and rescue was brought into effect. The IMO’s Maritime Safety Committee divided the world’s oceans into thirteen search and rescue areas, and within those areas delimited search and rescue regions for which each of the countries concerned are responsible.

Article 3.2 of the 1979 *Convention* required states to ensure close coordination between sea and aerial search and rescue services. ICAO and the IMO now publish a joint three volume manual, the International Aeronautical and Maritime Search and Rescue Manual, which provides guidelines for a common aviation and maritime approach to organising and providing search and rescue services.


B Australia’s Search and Rescue Responsibilities

Australia’s international search and rescue responsibilities are substantial. Australia’s international Search and Rescue Region covers some 52.8 million square km in the Southern Indian Ocean, Southern Ocean, and South West Pacific Ocean, an area spanning over one tenth of the Earth’s surface. The same boundaries apply for both aviation and maritime search and rescue. It is within this area that the projected flight path of MH370 falls, calculated from Doppler analysis of MH370’s ping signals exchanged with satellites, and where search activities are now taking place. Initially search and rescue had been focussed in the Gulf of Thailand, around the planned flight path. Once it was appreciated that the aircraft had turned west and flown back across the Malay Peninsula, the Strait of Malacca and other waters to the west of Thailand and Malaysia were searched.

C Search and Rescue Operations for Flight MH370

The search is an excellent example of international cooperation, with countries assisting in the search by providing military and civilian ships and aircraft including Australia, China, India, Japan, Malaysia, New Zealand, South Korea, Thailand, the UK, the USA, and Vietnam. Other countries have provided radar data, or granted permission for foreign civilian and military aircraft to use their airspace. At times the search has also shown the limits of international cooperation, with suggestions that countries have been reluctant to share satellite images that might demonstrate the extent of their satellite surveillance capabilities, or to disclose the extent to which their military radar tracked MH370 after her transponder ceased operating, for fear of revealing either the strengths or weaknesses of their radar systems.

The Australian Transport Safety Bureau has coordinated a search strategy group that brought together satellite and aircraft specialists from Boeing, the US National Transportation Safety Board, Inmarsat, the UK Air Accidents Investigation Branch, Thales (a major UK defence contractor), Malaysia’s Department of Civil Aviation, and Australia’s Defence Science and Technology Organisation.

A number of specific treaty based arrangements have also been invoked as part of the search for flight MH370.

D The Five Power Defence Arrangements

The Malaysian government requested assistance under the Five Power Defence Arrangements, which were established in 1971 between Australia, New Zealand, Malaysia, Singapore and the United Kingdom, by way of a series of bilateral agreements. Its headquarters, styled the Integrated Area Defence System, is at Butterworth Air Force base in Malaysia. All the Five Power states deployed ships or aircraft to assist in the search.

E The Comprehensive Nuclear Test Ban Treaty

Although the 1996 Comprehensive Nuclear Test Ban Treaty has not had sufficient ratifications to come into full force, it has established a Vienna based NGO, the Comprehensive Nuclear Test Ban Treaty Organization Preparatory Commission, which (as its name suggests) is undertaking various tasks in preparation for the treaty coming into force, at which time it will transform into the Comprehensive Nuclear Test Ban Treaty Organization. One of those tasks is putting in place infrastructure to detect nuclear tests. The Preparatory Commission operates 60 Infrasound Monitoring Stations located in 35 countries around the world. Infrasound is very low frequency sound waves (in the 20 to 20,000 Hertz range, below the frequency band that is audible to the human ear). Various natural and non-natural phenomena generate infrasonic waves, including rocket launches and significant explosions, including nuclear explosions. The sound waves generated by Concorde travelling at supersonic speeds enabled it to be tracked over large distances, however subsonic commercial aircraft in flight are usually only detected by monitoring stations within a range of about 100 km. It was considered possible that the crash or mid-air explosion of flight MH370 could have been detected by an Infrasound Monitoring Station, depending on the location of the nearest station. The Commission analysed its infrasound data for the relevant time period, however there was no sound detected that could have been the loss of the aircraft.

F The International Charter on Space and Major Disasters

The International Charter on Space and Major Disasters was adopted in 1999, and came into force the following year. It is a voluntary agreement between commercial, government owned, and international entities that operate satellites. Currently it has 23 members. Its parties agree to use their best endeavours to cooperate to provide relevant data from their satellites that may assist in dealing with natural or technological disasters. This may include the temporary re-tasking of satellites. During 2014 from 1 January to 30 September, the Charter has been activated 34 times, in relation to floods, volcanoes, landslides, cyclones and fires around the world. On 11 March, the China Meteorological Administration activated it to obtain satellite data to assist in the MH370 search. This is said to have been the first time the Charter has been activated to search for a missing airliner. One of the American corporate parties, DigitalGlobe, provided its images, and started a crowd sourcing campaign in which over 2 million volunteers studied DigitalGlobe’s images (DigitalGlobe operates a website www.tomnod.com which uses crowd sourcing to review satellite images to further a variety of charitable and humanitarian objectives).

V Accident investigation

By article 25 of the Chicago Convention, states undertake to provide assistance to aircraft in
distress, and (subject to control by their own authorities) to permit the aircraft’s owner or the authorities of its state of registration to also provide assistance. States also promise that ‘when undertaking search for missing aircraft’ they ‘will collaborate in coordinated measures which may be recommended from time to time pursuant to this Convention’. In the event of an accident, article 26 provides that ‘the State in which the accident occurs will institute an inquiry into the circumstances of the accident’ in so far as possible in accordance with any procedure recommended by ICAO. The state of registration has the right to have observers present at the inquiry. Territorial sovereignty means that it is inevitable that the state in which the incident occurs should have primacy in conducting the investigation.

A Who Would Conduct an Inquiry into the Loss of Flight MH370?

In the case of flight MH370, the issue of which country would conduct such an inquiry is complex.

Paragraph 5.1 of Annex 13 provides that:

The State of Occurrence shall institute an investigation into the circumstances of the accident and be responsible for the conduct of the investigation, but it may delegate the whole or any part of the conducting of such investigation to another State or a regional accident investigation organization by mutual arrangement and consent.

In the unlikely event that the accident occurs in the territory of a non-ICAO state, then paragraph 5.2 of Annex 13 provides that if the state of occurrence does not intend to conduct an investigation in accordance with Annex 13, then:

the State of Registry or, failing that, State of the Operator, the State of Design or the State of Manufacture should endeavour to institute and conduct an investigation in cooperation with the State of Occurrence but, failing such cooperation, should itself conduct an investigation with such information as is available.

Paragraph 5.3 of Annex 13 provides that:

When the location of the accident or the serious incident cannot definitely be established as being in the territory of any State, the State of Registry shall institute and conduct any necessary investigation of the accident or serious incident. However, it may delegate the whole or any part of the investigation to another State by mutual arrangement and consent.

Presently it is not possible to say where the airliner came down. The current search area is hundreds of kilometres west of Perth, not merely outside Australian territorial waters, but on the high seas far beyond the 200 nautical mile limit of Australia’s Exclusive Economic Zone. Yet if what occurred was a serious mechanical failure over the Gulf of Thailand that left the crew incapacitated and the aircraft flying on autopilot until it ran out of fuel in the Indian Ocean, that failure may amount to an ‘accident’ within the meaning of Annex 13, it being an occurrence associated with the operation of the aircraft in which ‘the aircraft sustains damage or structural failure which … adversely affects the structural strength, performance or flight
characteristics of the aircraft’. Available maps seem to make it clear that when the aircraft first experienced difficulties, it was flying over the Gulf of Thailand, outside Malaysian territorial waters, i.e. more than 12 nautical miles off-shore. The aircraft subsequently turned around and flew west across Thailand.

It is not clear whether an article 26 inquiry has yet been instituted. Currently, there remains an ongoing search for the aircraft. That search was initially under the direction of the Malaysian authorities at Malaysia’s National Disaster Control Centre, however on 17 March 2014 the Australian Prime Minister announced that the Malaysian Prime Minister had requested Australia to take over the search, now that it was being conducted in the Southern Indian Ocean. The Australian Transport Safety Bureau states that Australia is now leading the search at the request of the Malaysian government, but says nothing about an inquiry. Once the search for the aircraft has been completed (whether the wreckage is found or not) it seems that the most likely candidate to conduct the inquiry is Malaysia, on the basis that it is the State of Registry of the aircraft.

B Flight Recorders, a.k.a. the Black Box

A critical part of any accident investigation will be, if possible, an examination of data from what is popularly referred to as ‘the black box’. In fact these are usually two ‘boxes’, which are properly known as the Cockpit Voice Recorder and the Flight Data Recorder. These devices do exactly what their names suggest, although the Cockpit Voice Recorder records ambient noise as well as voices, so that thuds, rushing air, and cockpit alarm sounds are also captured. Recently constructed airliners are fitted with a single recorder that, by utilising digital recordings instead of magnetic tape, is able to combine both functions into a single unit.

Indeed the name ‘black box’ is a misnomer in that the recorders are painted bright orange, to assist in locating them amongst wreckage. They are designed to withstand impact, fire, and immersion in water at great depth, and are equipped with locator beacons. They are labelled in English and French, with instructions not to open them. ICAO’s Annex 6, which deals with safety management, sets the common standards for voice and flight data recorders.

Digital flight recorders generally record 25 hours of flight data, but only two hours of cockpit voice and noise data, which then re-records over the oldest data in a loop (thus wiping anything older than two hours, when the recorder is running). The older magnetic tape versions only held 30 minutes of cockpit voice data, before recording back over itself.

Modern flight recorders track vast amounts of data. Recent magnetic tape units tracked about 100 parameters (eg, time, pressure, altitude, airspeed, vertical acceleration, magnetic heading, control-column position, rudder-pedal position, horizontal stabilizer, fuel flow). Solid state (ie digital) units track a lot more, with the units in the new Boeing 787 ‘Dreamliner’ recording some 146,000 parameters, meaning that the data for a single flight totals several terabytes.

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**C Australia’s Role in the Development of Flight Recorders**

Australia has an interesting role in the history of the black box. Dr David Warren, a scientist at the Commonwealth government’s Aeronautical Research Laboratories, had developed a prototype in 1958. He had the idea whilst serving as the member of an expert panel examining the reasons for the sudden loss of two de Havilland Comet airliners in 1954, aircraft which the Australian government was anticipating would be purchased by Qantas and BOAC to service the UK – Australia route. (Ironically, when Dr Warren was a boy, his father had been killed in an air crash.) However there was little interest in the device from the Australian aviation industry; the airline pilots’ union asserted that pilots would refuse to ‘take off with Big Brother listening’.

On the evening of 10 June 1960, a TAA Fokker Friendship crashed into the sea on final approach to Mackay Airport, killing all 29 passengers and crew. There was no apparent reason for the crash. A Commission of Inquiry was conducted by Sir John Spicer, then Chief Judge of the Commonwealth Industrial Court. The Department of Civil Aviation’s counsel, JE Starke QC (later a judge of the Supreme Court of Victoria) told the Inquiry that an instrument was being developed that would record cockpit conversations and instrument readings, so as to assist in determining the cause of accidents.

Spicer CJ concluded that:

...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 the Department of Civil Aviation continue to pursue the development of flight recorders with a view to installing such equipment in airline aircraft ‘at no distant date’.

When the Minister for Civil Aviation tabled the report in Parliament, he announced that regulations would require that by 1 January 1963, airliners be fitted with flight recorders. Australia was the first country to take this step. It was not until 1964 that the US mandated flight recorders, which were made compulsory on four engine airliners from 1 March 1967.

Although the Aeronautical Research Laboratories had not been able to generate any interest in Dr Warren’s invention, the visiting Secretary of the British Air Registration Board was very interested, and at his request, Dr Warren visited the UK. Ultimately it was the British firm S Davall & Sons that manufactured recorders that were based on Dr Warren’s design, and Dr Warren made another trip to the UK to assist in transferring the technology to Davall, whose first recorder appeared in 1963. Davall’s 1965 model won a large part of the market worldwide. Aeronautical Research Laboratories (and the Australian government) never sought to protect their intellectual property, and Davall subsequently made an ex gratia payment of £1,000 to the Commonwealth government for its assistance. Dr Warren received

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public recognition late in life: he was appointed AO in the 2002 Australia Day honours list, and Qantas has named one of its Airbus A380s after him.

Dr Warren was not the only person to have thought of the idea; there had been various independent attempts, including by the American professor who invented the retractable seat-belt, and an engineer at the American aircraft manufacturer Lockheed, who (like Dr Warren) had participated in air crash investigations. When in September 1961 TAA and Australian National Airways made a joint decision to purchase voice and data recorders to comply with the impending regulation, despite having been in discussion with Dr Warren’s group, they chose a model that was to be produced in the USA by United Data Control. The recorders were not available by the beginning of 1963, forcing the government to extend the deadline. In service, the voice recorders proved to be unsatisfactory, and they were returned to the US for modification.

Thus when in 1966 an Ansett-ANA Vickers Viscount crashed near Winton, Queensland due to an engine fire, data was available from the flight data recorder, but there was no cockpit recording. Spicer CJ also conducted this inquiry, and his Honour again emphasised the value of a cockpit voice recording, and the need to obtain reliable recorders. In due course, a different brand of American cockpit voice recorder was deployed in Australia.

The first Australian accident investigation to benefit from both a cockpit voice recorder and a flight data recorder was that conducted by the Department of Civil Aviation into the loss of a MacRobertson Miller Airlines Viscount near Port Hedland on 31 December 1968.

VI Communications

This topic has a significant international law heritage. It merits separate treatment because it is relevant not only to international airline operations, but also to search and rescue, and to accident investigation.

A Radio

Radio communication was an early feature of commercial aviation, although range was limited. The 1919 Convention provided that radios (termed ‘wireless apparatus’) were not to be carried unless the state of registration had licensed the radio and the crew member who would operate it. Airliners capable of carrying 10 or more passengers were required to be equipped with a radio, once ICAN was able to draft the regulations that would apply.

Modern airliners are equipped with both VHF and UHF radios for direct communication with air-traffic control and with other aircraft. They also use satellite communication, not just for communications by pilots but also for various aircraft systems to transmit maintenance data to airline or manufacturers’ headquarters.

The International Telecommunications Union (which was originally established by the 1865 International Telegraph Convention as the International Telegraph Union) headquartered in Geneva is a UN agency that coordinates the use of the radio spectrum (allocating bands and frequencies) and satellite orbit paths, and develops common technical standards. A series of revised versions of the ITU’s constitution and establishing convention have been signed between 1865 and 2010 to take into account technological and political changes.

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Every three to four years, World Radiocommunication Conferences develop the ITU's Radio Regulations, which have treaty status and bind ITU member states.²⁴

B Satellite Communications

The relevant satellite communication system for MH370 was ACARS, the Aircraft Communications Addressing and Reporting System. When flight MH370 first experienced difficulties, the ACARS system was disabled. However its Satellite Data Unit, which was responsible for making the data connection between the satellite and ACARS, remained operational. That unit was able to make the seven 'handshakes' or 'pings' between the aircraft and the satellite that have been used to calculate MH370's possible flight-path.

Malaysia Airlines uses the Inmarsat satellites to transmit data from its aircraft. The satellite in question was Inmarsat's Indian Ocean Region 1-3 Satellite. Inmarsat plc is now a private company based in the UK, however it was originally an international organisation. In 1976, the International Maritime Organization established the International Maritime Satellite Organization by way of the Convention on the International Maritime Satellite Organization. The Convention entered into force in 1979. Its purpose was to provide satellite services for the IMO's Global Maritime Distress and Safety System, which established an internationally agreed set of safety procedures, mandatory safety equipment, and communications protocols. Amendments to the Safety of Life at Sea Convention in 1988 required ships sailing in specified areas to carry equipment able to use Inmarsat satellites for ship to shore satellite communication in case of distress, and to receive the IMO's worldwide maritime safety information broadcast service.

In 1994, the organisation's name was changed to the International Mobile Satellite Organization, to reflect its provision of services to aviation and other modes of transport. Between 1998 and 2001, it was restructured by the Convention on the International Mobile Satellite Organization, in light of increasing competition from private providers of satellite communications. The operational side was privatised, creating Inmarsat plc, with the International Mobile Satellite Organization retaining oversight and certain powers of control to ensure that GMDSS and other public services continue to be provided, at low cost and (in some instances) at no cost. The IMSO signed an agreement with ICAO in 2000 to regulate their relationship.

Another major provider of satellite communications, Intelsat, has a similar history. It was established in 1964 by 11 participating countries. From 1978 its satellites hosted the 'Hot Line' direct telephone link between the White House and the Kremlin. It was privatised in 2001, with its public services (distinct from those provided by Inmarsat) supervised by the International Telecommunications Satellite Organization, which is based in Washington DC. ITSO has 149 member states and is tasked with providing telecommunications services on a global and non-discriminatory basis.

Emergency location beacons have saved thousands of lives. There are three types: (1) Emergency Position Indicating Radio Beacons (EPIRBs), which are used by ships and mandated for certain vessels under the Safety of Life at Sea Convention; (2) Emergency Locator Transmitters (ELTs), which are used by aircraft; and (3) Personal Locator Beacons (PLBs), which are used by individuals. All of these are utilised via the International Cospas-

²⁴ See <http://www.itu.int/pub/R-REG>.
Sarsat Programme, which was established by international agreement between Canada, France, the USA and the former Soviet Union in 1979. The original satellites, placed in low earth polar orbits, relied upon Doppler calculations (the same technique applied to MH370’s pings) to calculate beacon location to within about three nautical miles. Newer beacons use GPS technology and satellites in geosynchronous or semi-synchronous orbits for accuracy within about 20 metres.

C Radar transponders
The transponders that were the subject of much media coverage are neither conventional radio systems, nor satellite based systems. They transmit a radio signal that is used by air traffic control radar systems in determining the aircraft’s location, height and identity. Those radar systems are called ‘secondary radar’, to distinguish them from ‘primary radar’ which passively reflects a radio signal off the body of the aircraft in order to detect it. The transponder signals are also detected by nearby aircraft, so that the anti-collision systems (Traffic and Collision Avoidance System or TCAS) on both aircraft may communicate and negotiate collision avoidance, with the system in each aircraft issuing spoken directions to the respective crews to climb and descend in opposite directions. A good example of the regulatory work undertaken by ICAO is the setting and periodic revision of the common standards for TCAS systems.

VII Hijacking and Terrorism
There has been much speculation that flight MH370 was the victim of foul play. Both hijacking and terrorism have been suspected.

For hijacking, suspicion focussed on the Captain, who was alleged to have had an unhappy marriage and who had constructed a flight simulator in his home study. However no real evidence has emerged to support the theory that he was able in some way to neutralise the co-pilot, and then commit suicide and murder over 200 people at the same time. On the other hand, explanations relying on a mechanical failure also must postulate an unusual scenario in which the aircraft’s communications systems were disabled, and all aboard were incapacitated before any distress call could be made, yet the aircraft was capable of continuing to fly on autopilot for many hours afterwards, until its fuel was exhausted.

For terrorism, suspicion initially focussed on two young Iranian nationals, who were travelling on a stolen Austrian passport and a stolen Italian passport respectively. But no evidence emerged linking them with any terrorist group, and a general consensus formed that they were merely seeking to migrate to Europe.

A Interpol’s Stolen and Lost Travel Documents Database
The International Criminal Police Organization, usually known as Interpol, is an international organization recognised by the UN, with a General Secretariat located in Lyon. It is under the control of a General Assembly at which its 190 member states are represented.

Malaysian passport control, like Australian passport control, does not avail itself of

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Interpol’s Stolen and Lost Travel Documents database. Established in 2002 following the 11 September 2001 terrorist attacks, Interpol states that it now records over 40 million travel documents (including passports, identity documents and visas) that have been reported as stolen or lost to the authorities of 167 countries. National police and immigration services can search it. In 2013 it was searched over 808 million times by national police and immigration services, generating over 67,000 ‘hits’\textsuperscript{26} 808 million seems like a large number, but compared to the number of people travelling internationally worldwide, it shows that the system is not used nearly as frequently as it should be. For example of those 808 million queries, 250 million were made by the US, 120 million by the UK, and 29 million by Singapore. Interpol is keen for more use to be made of its database. It has even developed a system that would permit airlines, hotels and banks to check customers’ documents against the database, with positive ‘hits’ also relayed to local law enforcement authorities. In May this year, AirAsia announced that it would run a pilot project using Interpol’s system at passenger check-in.\textsuperscript{27}

The harmonisation of border control systems that was necessary to ensure that machine readable passports and biometric passports can be read by all was achieved through ICAO. Machine readable passports began to be issued in the 1980s. The more recent innovation is the biometric passport, with its contactless smart card containing facial recognition data and – in some countries but not Australia – fingerprint recognition and iris recognition. For both machine readable passports and biometric passports, the standard formats are specified in ICAO document 9303.

**B Jurisdiction in relation to Hijackings and Terrorism**

For the international lawyer, hijacking and terrorism involving aircraft raise various issues, in particular, those surrounding jurisdiction.

Work sponsored by ICAO\textsuperscript{28} led to the 1963 Tokyo Convention on Offences and Certain Other Acts Committed on Board Aircraft. It deals with criminal offences committed on board aircraft, and other acts that even if not offences, jeopardize the safety of the aircraft or the people on board, or good order on board. It provides for jurisdiction, and authorises the Captain to take necessary steps against persons on board, and to request others on board to assist.

Article 4 permits a state which is not the state of registration to ‘interfere with an aircraft in flight’ in order to exercise criminal jurisdiction over an offence committed on board where the offence has effect on the territory of that state, is against the security of that state, or is committed against one of that state’s nationals or permanent residents. There is no definition of what a state may do to ‘interfere’ but it would seem to include forcing the aircraft to land. Indeed Appendix II of ICAO Annex 2 provides detailed procedures for interceptions, by both the military interceptor and the airliner being intercepted.

A state of aircraft hijackings in the late 1960s led to the Hague Convention for the Suppression of Unlawful Seizures of Aircraft of 1970. It obliges state parties to establish jurisdiction over offenders, and obliges them either to extradite offenders to a state wanting

\textsuperscript{26} See <http://www.interpol.int/INTERPOL-expertise/Border-management/SITD-Database>.


to try them (and gives a legal basis for doing so) or to prosecute.

The Montreal Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation of 1971 is directed at acts of sabotage against civilian aircraft in the air and on the ground, and a 1988 Protocol deals with acts of violence directed at airports. It similarly obliges state parties to establish jurisdiction over offenders, and obliges them either to extradite offenders to a state wanting to try them (and gives a legal basis for doing so) or to prosecute.

A number of hijackings were connected with political causes, in particular the Palestine Liberation Organisation. Some states were reluctant to cooperate in the punishment of such hijackers. ICAO was not able to agree on a multilateral enforcement mechanism. As a result the 1978 Bonn Declaration was issued by seven states: Canada, France, Italy, Japan, the UK, the USA and West Germany. Those countries proclaimed that they would terminate all air traffic with any state that refused to extradite or prosecute hijackers, or failed to return a hijacked aircraft. Support for the declaration was expressed by 34 states, and a further 43 approved of it in principle. In 1981, Pakistani militants supported by the Afghanistan government hijacked a Pakistani plane and killed a Pakistani diplomat on board. The Afghan government refused to turn the hijackers over to Pakistan. As a result European countries enforced an air boycott against Afghanistan from 1982 until 1986.

On 10 September 2010 in Beijing, the Convention on the Suppression of Unlawful Acts Relating to International Civil Aviation was signed. It is still awaiting the necessary number of ratifications to enter into force. It criminalises the transport of nuclear, chemical or biological substances on aircraft intended for use in terrorism or other illegitimate activities, or using such substances against aircraft, or releasing them from an aircraft. It also criminalises the use of an aircraft itself as a weapon, as occurred in the 11 September 2001 attacks. State parties are obliged to establish jurisdiction over offenders and to try them or extradite them.

C The Shooting Down of Civilian Airliners

As noted above, Appendix II of ICAO Annex 2 provides detailed procedures to be followed in the case of intercepting airliners that have strayed into unauthorised airspace. These procedures were not followed in the notorious 1983 incident when a USSR fighter shot down an off-course Korean Airlines 747.29 The Council of ICAO subsequently adopted an amendment to the Chicago Convention, adding article 3 bis (a):

The contracting States recognize that every State must refrain from resorting to the use of weapons against civil aircraft in flight and that, in case of interception, the lives of persons on board and the safety of aircraft must not be endangered.

Note the distinction between prohibiting ‘the use of weapons’ and mere ‘interference’ or use of force.

The navigational errors made by the Korean jumbo were a major reason why President Ronald Reagan announced that the US government would, once it was fully operational, permit worldwide civilian access to its military satellite navigation system which was then

29 M N Shaw, International Law, (Cambridge University Press, 5th ed, 2003) 473ff discusses a number of incidents in which civilian airliners have been shot down.
under development, and which is now known as GPS.

Sadly the shooting down of Korean Airlines Flight 7 was not an isolated incident. There have been numerous examples of civilian airliners shot down, either by intercepting aircraft or by ground fire, the latter the result of missile tests or military exercises gone wrong, by mistaking a civilian aircraft for a military one (what appears to have happened with Malaysia Airlines flight MH17, which was shot down over Ukraine on 17 July 2014), and sometimes, the deliberate targeting of a civilian aircraft known to be carrying passengers. A Wikipedia page catalogues over 20 examples.30

The better known of these include an El Al Lockheed Constellation, which strayed into Bulgarian airspace in 1955 and was shot down when it refused to land, a lost Libyan Airlines 727 which was shot down by Israeli air force fighters in 1973 when it refused to land (five survived, including the co-pilot who explained that the French crew fully understood the direction to land but decided not to comply), and an Iran Air Airbus en route to Dubai that was shot down in 1988 by the guided missile cruiser USS Vincennes, after having been misidentified as an attacking Iranian F-14 Tomcat.

A less well known example is a Royal Dutch Indies Airways DC-3 shot down by Japanese ‘Zero’ fighters en route from Java to Broome.31 The pilot, Ivan Smirnoff, had been a Russian fighter ace in World War I and despite having been wounded by machinegun fire, he succeeded in making a crash landing on a beach near Broome. All crew and passengers survived the landing, although the Japanese pilots then strafed the aircraft as she lay in the surf. Four passengers died of their wounds in the following days before rescuers arrived. Before take-off Smirnoff had been handed a small package containing a consignment of diamonds valued at £300,000 (some $20 million in today’s currency). Smirnoff said the package was lost when evacuating. There is debate as to whether he had been told its contents or not. A local fisherman later handed in £20,000 worth of diamonds he said he found at the scene. He and two associates were subsequently charged with, but acquitted of, stealing the remaining diamonds.

**D Responsibility for the Shooting Down of Malaysia Airlines Flight MH17**

Whilst on the topic of the shooting down of civilian airliners, it is timely to make some brief points about responsibility for the shooting down of Malaysia Airlines flight MH17, on the assumption that she was indeed shot down by a Russian made SA-11 ‘Buk’ surface to air missile, supplied by the Russian armed forces to pro-Russian militant groups operating in eastern Ukraine. The contemporaneous jubilant social media postings by a militant group claiming responsibility for shooting down a Ukrainian military transport (which were deleted very shortly afterwards), intercepted telephone conversations, and US satellite detection of a surface to air missile launch, would all seem to rule out the competing theory advanced by the Russian government and Russian media, namely that flight MH17 was shot down by an air-to-air missile fired by a Ukrainian air force jet.

The ICJ has dealt with state responsibility for so-called ‘armed bands’ in two decisions, *Military and Paramilitary Activities in and against Nicaragua (Nicaragua v USA)* in 1986,  

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which the Court reaffirmed in Application of the Convention on the Prevention and Punishment of the Crime of Genocide (Bosnia and Herzegovina v Serbia & Montenegro) (the Genocide Case) in 2007. In the Genocide Case, the Court held that:

This question has in fact two aspects, which the Court must consider separately. First, it should be ascertained whether the acts committed at Srebrenica were perpetrated by organs of the Respondent, i.e., by persons or entities whose conduct is necessarily attributable to it, because they are in fact the instruments of its action. Next, if the preceding question is answered in the negative, it should be ascertained whether the acts in question were committed by persons who, while not organs of the Respondent, did nevertheless act on the instructions of, or under the direction or control of, the Respondent.  

In relation to the first limb of the test, namely whether the militants could be found to be ‘organs of Russia’ despite (obviously) not having legal status as organs of the Russian government (unlike the Russian army), it is sufficient if the militants ‘act in complete dependence’ on Russia. The Court held (para 392):

... persons, groups of persons or entities may, for purposes of international responsibility, be equated with State organs even if that status does not follow from internal law, provided that in fact the persons, groups or entities act in “complete dependence” on the State, of which they are ultimately merely the instrument. In such a case, it is appropriate to look beyond legal status alone, in order to grasp the reality of the relationship between the person taking action, and the State to which he is so closely attached as to appear to be nothing more than its agent...

The Court endorsed (at para 391) the following passage from paragraph 109 of Nicaragua v USA:

determine ... whether or not the relationship of the contras to the United States Government was so much one of dependence on the one side and control on the other that it would be right to equate the contras, for legal purposes, with an organ of the United States Government, or as acting on behalf of that Government.

This test was not made out in relation to the ‘contras’ that were supported by the United States, and accordingly it seems unlikely on the evidence to hand that it would be made out in relation to the Ukrainian separatists.

In relation to the second limb, that of ‘acting under direction or control’, the Court referred to article 8 of the ILC Articles on State Responsibility which prescribes that the conduct of a person or group will be considered to be an act of a state if they are ‘in fact acting on the instructions of, or under the direction or control of, that State in carrying out the conduct’ and held that article 8 needed to be understood in the context of the following passage from paragraph 115 of the judgment in Nicaragua v USA:

For this conduct to give rise to legal responsibility of the United States, it would in principle have to be proved that that State had effective control of the military

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52 [2007] ICJ Rep 43, 162 [384].
or paramilitary operations in the course of which the alleged violations were committed.

The Court elaborated (para 400) that the ‘effective control’ test required that:

It must however be shown that this “effective control” was exercised, or that the State's instructions were given, in respect of each operation in which the alleged violations occurred, not generally in respect of the overall actions taken by the persons or groups of persons having committed the violations.

Whether this test is made out will depend on more precise evidence than is currently available. For example, to what degree were the separatists receiving day-to-day instructions about the types of military activities they were to engage in and where they were to do so? Were those orders largely followed? If Russian military personnel were present with (or even operating) the Buk vehicle when the missile was fired, that could also lend support to the proposition that it was a piece of military equipment that remained under the effective control of Russia.

Then there is the question of whether the militants who fired the missile may themselves bear responsibility for breaches of international law. If they acted recklessly in targeting flight MH17 without taking adequate precautions to determine whether she was a civilian aircraft or a military aircraft, their conduct could amount to a War Crime, within the meaning of article 8 of the Rome Statute of the International Criminal Court, which proscribes acts against civilians not taking part in hostilities.

VIII Civil Liability for Death, Injury and Property Damage

As international airlines developed after the First World War, it quickly became clear that an international regime was also needed to achieve uniformity in relation to liability for damage or loss of baggage and cargo, and injuries or death suffered by passengers. This was effected by the Convention for the Unification of Certain Rules Relating to International Carriage by Air signed in Warsaw in 1929.

The Warsaw Convention did establish a uniform regime, but article 22 imposed relatively low caps on damages, and article 20(1) provided that:

The carrier is not liable if he proves that he and his servants and agents have taken all necessary measures to avoid the damage or that it was impossible for him or them to take such measures.

Controversy over limits on compensation caused controversy for decades, and subsequent Protocols to increase these caps were not signed by all parties, resulting in a patchwork for quantum.33

The 1955 Hague Protocol (in force 1963, with 137 parties) increased the limits by substituting a new article 22. The United States still found the level of damages to be unacceptably low, and stated its intention to denounce the Warsaw Convention. This was

33 See ICAO’s ‘Current lists of parties to multilateral air law treaties’: <http://www.icao.int/Secretariat/Legal/Lists/Current_lists_of_parties/AllItems.aspx>.
averted by the Montreal Agreement of 1966, signed between the US Civil Aeronautics Board and airlines operating in and out of the USA. It set a higher cap, US$75,000 including legal costs.

The 1971 Guatemala Protocol sought to further increase the limits, but it never attracted enough signatures to come into force. The 1975 Montreal Additional Protocols made various changes, including increasing the caps, and substituting IMF Special Drawing Rights ('SDRs') for the French gold francs (Poncaré francs) that were specified in the original article 22(4). However only a minority of states signed the Protocols.34

Additional Protocols No 1 and No 2 both did not come into force until 15 February 1996. They replaced article 22 with a new provision that (pursuant to Additional Protocol No 2) capped liability for death or injury to passengers at 16,600 SDRs and capped liability for baggage and cargo at 17 SDRs per kg, unless higher amounts were agreed in the contract of carriage. At today's exchange rates, the death or injury cap of XDR16,600 is less than AUD30,000.

The 1995 IATA Intercarrier Agreement on Passenger Liability and the 1996 IATA Agreement on Measures to Implement the IATA Intercarrier Agreement increased the cap to 100,000 SDRs, and limited carriers' defences on liability.

A consequence of the monetary caps on claims against airlines for damages for injury or death, especially for carriers operating outside America, has been the bringing of claims against aircraft manufacturers in plaintiff-friendly jurisdictions such as the USA. This strategy was particularly effective in the case of aircraft that were manufactured in the United States.

Ultimately ICAO recognised that the Warsaw Convention had outlived its usefulness, and drafted a new text that was adopted at an International Conference on Air Law held in Montreal in 1999, the Convention for the Unification of Certain Rules for International Carriage by Air.

The Montreal Convention provides that carriers are liable for the full extent of damage suffered, unless they can prove that the damage was not the result of the carrier's negligence or wrongful act, or that it was solely due to the negligence or wrongful act of a third party. Even if the carrier can make out those exceptions, it is still subject to strict liability up to a capped amount, although the Montreal Convention's caps are more generous, and article 24 provides a mechanism for them to be updated every 5 years. The current limit of XDR113,100 is approximately AUD190,000.

The Montreal Convention does not only deal with compensation for death or injury. It also imposes fixed liability limits for cargo, and implements a regime for electronic documents to replace the paper documents of carriage (Air Waybills). The Montreal Convention now has 108 parties, however this still leaves over 80 states who are party to the Chicago Convention and thus members of ICAO, but not party to the Montreal Convention. Thus considerable inconsistency in liability remains, and in October 2013, the ICAO Assembly passed a resolution urging all members to ratify the Montreal Convention as soon as possible.

In Australia, the Warsaw Convention, and subsequently the Montreal Convention, have been implemented by the Civil Aviation (Carriers' Liability) Act 1959 (Cth), as amended (see ss 9B, 11 and 21). That Act also implements a separate system of liability for domestic

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34 Additional Protocol No 1 has 49 parties, and Additional Protocol No 2 has 50 parties (the same as No 1 with the addition of Oman). Additional Protocol No 3 never came into force. Additional Protocol No 4 came into force in 1998, and has 58 parties.
travel, which includes a damages cap of $725,000 (s 31(1)). Part IVA of the Act requires carriers to hold insurance to cover their liabilities to passengers, whether arising under the international regimes, or the Act's regime for domestic travel.

Loss caused to persons or property on the ground as a result of an aircraft in flight, or a person or object falling from it, is dealt with by the Rome Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface 1952. Liability is simple because the Convention makes the operator of the aircraft strictly liable, however it also imposed low caps on damages. This resulted in relatively few countries signing it. Australia signed the Rome Convention in 1953 and ratified it in 1958, but denounced it from 8 November 2000, on the basis that the liability caps were inadequate, and most foreign carriers operating in Australia were not subject to the Convention anyway. Such loss is now dealt with by the Damage by Aircraft Act 1999 (Cth), which came into effect after Australia denounced the Rome Convention. Liability remains strict (s 11), but there are no caps on damages.

IX Conclusions

The discussion above shows clearly how international air travel would be impossible without the framework of international law within which it takes place, namely a broad-ranging body of international law that is used, and complied with, by both state and non-state actors.

The sheer size of Australia’s international search and rescue area can impose substantial (and expensive) responsibilities on the Australian government. There are other states – in particular the USA, New Zealand, South Africa and Chile – that also have large international maritime search and rescue areas. On the other hand some states that have comparatively small areas are also much poorer than Australia, and have much less of the military and civilian infrastructure and equipment that is needed to carry out maritime search and rescue.

The search for flight MH370 has been expensive. Various figures are reported. It appears that by June 2014, Australia had spent around $40 million, with the federal budget then setting aside a further $60 million for ongoing searching. Three months after the search began, Australia and Malaysia agreed that from then on, they would share the search costs between them on a 50-50 basis. An MOU to this effect was signed on 28 August 2014. Many other countries will also have incurred substantial costs in assisting in the search. It may be that more formal agreements need to be put in place (rather than relying on ad hoc arrangements), possibly involving the use of insurance to spread the costs over the industry as a whole.

There are a number of areas in which further regulation by ICAO or other international organisations appears to be desirable.

It is likely that there will be a move to require some sort of satellite tracking for airliners involving the regular reporting of their position obtained via GPS. Inmarsat has offered

35 Part IV, which pursuant to s 27(1) applies to any travel falling outside the Warsaw Convention or Montreal Convention regimes, whether it is Australian domestic travel or travel between Australia and a place outside Australia.
36 See <http://www.icao.int/Secretariat/Legal/Lists/Current lists of parties/AllItems.aspx>.
to provide such a service free of charge. Position reports would need to be made very frequently, to keep the search area as small as possible.

Air France flight 447, which crashed on 1 June 2009 en route from Rio de Janeiro to Paris, had its ACARS system programmed to report its position (using GPS) every ten minutes. Despite having an accurate 'last known position' from within only a few minutes of the event, it was not until five days afterwards that searchers first located debris. After a number of unsuccessful underwater searches, revised statistical modelling enabled a further expedition to finally locate the wreckage nearly two years later, on 3 April 2011.

The ACARS system on MH370 had been disabled when difficulties first arose, either as a result of mechanical failure, or because somebody in the cockpit turned it off manually. Airlines can purchase an upgraded system (called 'Swift') that transmits the aircraft's location and other data via satellite, even if ACARS is turned off. It is mandatory for flights on the North Atlantic corridor between the USA and Europe, but not elsewhere in the world. Flight MH370 was not fitted with the Swift system. To be most effective, the satellite reporting system would have to be independent, and capable of remaining operating despite the aircraft's usual systems losing electrical power.

A related suggestion is that flight recorders should stream their data live via satellite, so that there is no need to find the physical recorder at all. Currently, flight data may be unrecoverable not only because the location of the crash site is unknown, but also because the recorders were damaged in the crash, or because those with physical control of the crash site are unwilling to hand the recorders over. Live streaming does pose technical difficulties because of the volume of data involved. One solution would be to record all of the data on-board, and stream only the most important data via satellite. However the difficulty in finding Air France flight 447, and the failure so far to find any trace of flight MH370, show that at least some data (even if it is just aircraft location) needs to be transmitted live. If that happens, then 'searches for missing planes won't have to resemble the hunt for Amelia Earhart'.

Other issues relating to flight recorders are extending the operating time and range for their locator beacons to assist in finding them, and extending the time period of the cockpit voice recorder from two hours to the entire flight, so that relevant recordings from earlier in the flight are not overwritten if the aircraft continues flying for some hours afterwards.

Although it does not seem to have played any role in relation to flight MH370, the potential for hijackers or terrorists to make use of stolen or lost travel documents is an obvious problem. Australia (and others) ought to make more use of Interpol's database of stolen and lost travel documents.

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Finally, the MH17 incident has led to many calls for a review of the use of air space over territory in which armed conflict is taking place. Restricting airliners to higher altitudes out of the reach of hand held surface-to-air missiles (as was done over eastern Ukraine) will not protect them from more sophisticated weapons.