International Regulation of Commercial Civil Aircraft: Regulatory Agencies and Requirements Governing Large Transport Aircraft Certification.

by

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ABSTRACT

During the advent of the aircraft era, nations understood the need to agree upon international standards to govern aircraft. After many collaborative efforts and interim organizations, the International Civil Aviation Organization emerged as the major international governing board for all international aircraft matters. In the midst of the Second World War 1944, the International Civil Aviation Organization issued the Chicago Convention, which set the basis for all future endeavors in international aerospace law. Through the decades, amendments, exceptions for member states, and other International Civil Aviation Organization mandates have been issued and have formed the comprehensive body of international regulations that govern international aviation.

Never the less, the International Civil Aviation Organization understood the reality of allowing member states to self-regulate intra-national aircraft as well as working closely with the member states. Hence, governmental organizations such as the Federal Aviation Administration and the Joint Aviation Authorities, while each retaining their sovereign authority over aviation in their respective regions, work closely with each other and the International Civil Aviation Organization. Spearheaded by recent International Civil Aviation Organization conferences and despite the differences in their respective airworthiness codes, the Joint Aviation Authorities and the Federal Aviation Administration have been collaborating to form a joint process for the type certification of aircraft.

As economic and political borders between nations disappear, the future of international aerospace law will rely on the successful co-operation of International Civil Aviation Organization with the major national aviation authorities, aircraft manufacturers in the installation of a single codex of regulations that any nation could pursue to insure the performance, safety, and operability of aircraft.

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1.0 Background of International Civil Aircraft Regulation

The aircraft industry is subject to regulation: from local recreational pilots to large multi-national corporations, each has a set of local, national, and at times international codes, statues, and laws by which they are supervised. Aircraft fall into several categories of regulation, from large aircraft, such as jumbo-jets, heliotropes, personal aircraft, state aircraft, civil private aircraft, civil commercial aircraft, and military aircraft to aircraft components. In a globalized society one can have military aircraft designed by one state, built by another, and finally operated by a third state, who may then sell the aircraft to another state. The governments of the world quickly realized that the nascent aircraft industry would need to be regulated in order to insure the reliability and the safety of aircraft. They developed associations, boards of governance, and preliminary rules by which the groundwork for future regulations and organizations would be made.

1.1 Early History of International Regulation

The Brothers Wright held their historic flight at the end of 1903 and ushered in a new era of transportation. In less than ten years the aircraft, industry grew to such an extent as to warrant a closer look at international air regulation. In 1910, the French Government invited eighteen other European states to convene the first important conference to create an international air code. The need for such a meeting came from the close proximity of many nation-states, that through a new form of transportation brought them even closer. This conference was first conference to lay down a number of basic governing principles. However, all was thrown asunder in the First World War, as the safe transport of gods and persons over prolonged distances became almost impossible.

During the First World War, the allied powers created the Inter-Allied Aviation Committee that after the Paris Peace Conference of 1919 evolved to become the Aeronautical Commission. The Paris Peace Conference of 1919 led to the Paris Convention of 1919. The principle of complete and exclusive sovereignty of a state over the airspace above its territory was first articulated by the Paris Convention (Diederiks-Verschoor 4). This soon became the legal standard in international civil aviation in future conferences and agreements. The Paris Convention defined the term "aircraft" as, '*tout appareil pouvant se soutenir dans l'atmosphere grace aux reactions de l'air*'. This base definition, loosely rendered, as all machines that can hold itself in the atmosphere through reactions with the air, applied not only to standard propeller-engine airplanes, but to ground-based machines such as hovercraft (Diederiks-Verschoor 5). This definition would remain unchanged until the late sixties when the ICAO redefined 'aircraft'. This new definition, 'any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface', removed the latter discrepancy (Diederiks-Verschoor 5).

Article 34 of the Paris Convention established the International Commission for Air Navigation. That would deal with the standards of airworthiness, crew competency certificates, centralized gathering and publication of information and rendering of advice to member states. ICAN was the major international organization until the end of the Second World War ("History: The Beginning"). During the 1920's and the 1930's, ICAN oversaw the continuous technological and commercial growth of aviation, and promoted the safety and reliability to build a successful aero-industry.

The Ibero-American Conference of 1926 and Pan-American Conference of 1928 followed the Paris Convention. The Spanish Government invited the Latin-American States to Madrid in 1926 to recognize the provisions held in the Paris Convention of 1919. The 1927 conference in Havana, the Pan-American Conference was an attempt to create a parallel of the Paris Conference for the Americas; however, neither with a provision for an ICAN-like structure, nor with technical annexes, the Pan-American Conference did not achieve the cohesiveness that the Paris Conference achieved (Diederiks-Verschoor 6).

1.2 The Chicago Conference

In 1944, President Franklin Roosevelt invited allied and neutral nations to discuss the future of aviation in a post-war society. The great technological impetus given by the Second World War to the aviation industry would create a number of post-war civil aviation; with this in mind, fifty-six nations were invited to Chicago for the Civil Aviation Conference, the hostile Axis nations and Argentina were not invited. Of the fifty-six nations invited, fifty-two attended, save the former USSR (Naveau 26). Being the major military power, the US approached the conference to seek a revision of the rigid doctrine of absolute sovereignty, through a more liberal approach of freedom of the air by advocating complete freedom of competition. The UK, sought a more conservative approach, where the doctrine of State Sovereignty established by the Paris Convention would be preserved, but some sort of International Air Authority would regulate routes, tariffs, and license operators. The Australian-New Zealand position would internationalize the major airlines under a single international authority; which in stark

contrast to the US liberalization policy, this internationalizationist policy would replace the doctrine of state sovereignty (Diederiks-Verschoor 9-10).

Nevertheless, amid the many positions and posturing, the fifty-two nations came up with the most important document in the history of aviation, "the Conference achieved an awesome result by drafting, adopting and opening for signature of one major convention, three agreements, a standard form of bilateral agreements for provisional air routes and the text of twelve technical annexes." (Naveau 27) The Convention on International Civil Aviation (also known as the Chicago Convention), the Interim Agreement on International Civil Aviation (IAICA), the International Air Services Transit Agreement (IASTA), the International Air Transport Agreement (IATA) and the Draft of Technical Annexes were adopted and opened for signature ("History: The Beginning").

Before continuing, it is necessary to define a few phrases: The contracting state is a member of the ICAO. The state of design is the state that has jurisdiction over the organization responsible for the type design of an aircraft. The State of Manufacture is the state that had the jurisdiction over the organization responsible for the final assembly of the aircraft. The state of occurrence is the state where an accident or incident occurs. The State of Operator is the state where the principal place of the aircraft operator is located. The state of registry is the state where the aircraft is registered (Annex 8 Part 1).

The basic principles for the Convention of International Civil Aviation (CICA) deal with state sovereignty, equality of states, absence of discrimination and non-interference. Article One of CICA states, "Each state has complete and exclusive sovereignty over the airspace above its territory." This statement applies both to physical

travel over the territory and the authority over service in the territory. As with maritime law, the high seas have no national sovereignty, as does the air space over non-appropriated territories (Naveau 29). This would allow a nation to prohibit all travel over its airspace and allow only a state-owned airline to operate, or allow a nation to prohibit a specific nation to travel over the nation's airspace or operate an airline. The air territory where state sovereignty exists is all the airspace over the national territory and the national waters. The UN Convention on the Law of the Sea in 1994 extended the territorial sea limit to twelve miles and established the right of transit over all the sea straights, even if they are within the territorial sea limit. CICA established equality of opportunity, the preamble of CICA "taking due account of the equal right of all States to participate in the (air) traffic. Hence, all nations are able to have an air transport service and more importantly, sovereignty over air. In addition to equality, CICA compels that the laws and regulations established by a Contracting State must be complied with by all Contracting States, without any distinction to nationality.

Article 9 strengthens the principle of national sovereignty, by conforming the rights a state has to regulate air traffic in its airspace.

> Each contracting State may, for reasons of military necessity or public safety, restrict or prohibit uniformly the aircraft of other States from flying over certain areas of its territory...[and] reserves also the right, in exceptional circumstances or during a period of emergency, or in the interest of public safety, and with immediate effect, temporarily to restrict or prohibit flying over the whole or any part of its territory...Each contracting State, under such regulations as it may prescribe, may require any aircraft entering the areas contemplated ... above to effect a landing a soon as practicable thereafter at some designated airport within its territory. (CICA)

One great example of Article 9 in effect is the shutdown of US airspace after the September 11 2001 terrorist attack. In an unprecedented move, but wholly in accordance

to international regulation established by CICA, the US diverted all incoming international flights to neighboring nations and closed US airspace to non-US carriers.

Article 33 of the Chicago Convention places the burden on the State of Registry to recognize and to render valid the airworthiness of an aircraft given by another member of the ICAO. For example, the French civil aviation authorities will recognize and render valid the airworthiness of the aircraft issued by the US civil aviation authorities for an aircraft registered in France if and only if the requirements used by the US are equal (or greater) to the minimum standards set by the ICAO.

In addition, the state of registry must notify the state of manufacture when the state of registry first registers the aircraft. The state of manufacture is mandated to transmit future and pertinent data to the state of registry for future airworthiness; likewise, the state of registry also is mandated to transmit future and pertinent data to the state of manufacture regarding airworthiness for use by other states who are states of registry as well (CICA Article 33). This policy can be seen in effect when there exists an accident investigation or a discovered design flaw. In the globalized economy of today, it would be common to have multiple nations-states participating in an investigation. In one scenario, the State of Registry, the State of Manufacture, and the State of Occurrence would cooperate to insure the future safety of all other similar aircraft.

In an impressive move, CICA limits the state sovereignty established in its Article 1. The most important limitation requires that Contracting States must observe the international regulations governing air navigation. Hence, states do not have absolute governance over their air space, rather they are subject to international regulations and rules set up by an international organization (Diedericks-Verschoor 13-14). CICA

also regulates the nationality of an aircraft. In Article 18, CICA enforces single nationality for an aircraft. Article 17 states that the nationality of an aircraft is determined by where the aircraft is registered, and an aircraft can have only one nationality. From Article 19, the registration of aircraft in a contracting state shall be made with respect to the laws and regulations of said state. Hence, while there may be many nation-states participating in the operation and construction of aircraft, there can be only one nationality subject to one national airworthiness code. One of the most import limits of sovereignty occurs in Article 21:

> Each contracting State undertakes to supply to any other Contracting State or to the International Civil Aviation Organization (ICAO) on demand, information concerning the registration and ownership of any particular aircraft registered in the that State. In addition, each contracting State shall furnish reports to the ICAO, under such regulations as the latter may prescribe, giving such pertinent data as can be made available concerning the ownership and control of aircraft registered in that State and habitually engaged in international air navigation. The data thus obtained by the ICAO shall be made available by it on request to the other contracting States. (CICA)

Thus, a State is required to supply information regarding an aircraft to any other State requesting that information, or through the ICAO as an intermediary. Article 25 forces states to render aid and emergency service to an aircraft in distress over their air territory, though this applies only to civil aircraft (CICA). Though CICA discusses state aircraft and civil aircraft in Article 3, it fails to define explicitly the types of state aircraft. However, state aircraft especially military aircraft were defined and regulated in the Warsaw Convention, the Hague Protocol, and the Guadalajara Convention (Diedericks-Verschoor 36). A special status belongs to Red Cross Aircraft depending on the services they provide. Red Cross aircraft become military aircraft when they render aid to military casualties or transport supplies for military medical units. The Geneva

Convention of 1949 defined the status of military Red Cross aircraft, whereas with civil Red Cross aircraft, the Chicago Convention applies. Red Cross aircraft belonging to an international organization must register in some country and follow the rules and regulations of the State of Registry (Diedericks-Verschoor 35).

IASTA (Transit Agreement) and the IATA (Five-Freedoms Agreement) supplemented CICA; however, unlike CICA the acceptance of the agreements was not universal. The Transit Agreement describes the privileges granted by each Contracting State to each other. Only ninety-five states are party to the Transit Agreement, which provides for the multilateral exchange of the technical freedoms of air. The first is the privilege for a Contracting State A to fly across the territory of another Contracting State B without landing. The second privilege allows landing for non-traffic purposes. Contracting State B has the authority to designate the itinerary of the aircraft over its territory and may impose tariffs for airport and facilities use. The economic value of transit flights must be negotiated with a State that had not ratified the Transit Agreement, which explains why certain nations who have a favorable geographical position have not ratified the Transit Agreement. The Five-Freedoms Agreement provides a larger exchange of air freedoms. Since only ten nations ratified the Five-Freedoms Agreement, it never came into effect. The five freedoms of air transport are as follows:

> The first freedom granted by a State is the privilege to fly across its territory without landing; the Second Freedom is the privilege to land for non-traffic purposes; the Third Freedom is the privilege to put down passengers, mail, and cargo taken on in the territory of the State whose nationality is the aircraft possesses; the Fourth Freedom is the privilege to take on passengers, mail, and cargo destined for the territory of the State whose nationality the aircraft possesses; the Fifth Freedom is the privilege to take on passengers, mail, and cargo destined for the territory of any other Contracting State and the privilege to put down passengers, mail, and cargo from any such territory. (Naveau 32)

Though the Five-Freedoms Agreement failed to achieve its purpose, it did form an idea of what future bilateral agreements would discuss. One however should not dismiss implications of the Five-Freedoms Agreement, that look forward to a more liberal approach to air navigation.

The Chicago Convention was and still is a remarkable piece of international agreement. It provided a stable multi-national platform for mechanisms to regulate air navigation. The technical annexes provided guidelines for States to develop their own technical guidelines and propelled new safety standards that flying more reliable. By preserving State Sovereignty, CICA affirmed the previous precedents already established and supported by the nations. A nation must concede some sovereignty ironically, to achieve sovereignty. The overwhelming success of CICA first lies in its ability to create an international consensus: each Contracting State agrees to respect the national sovereignty of each other, while understanding and conceding the need and necessity for a set of rules and regulations to govern air navigation.

The success of the Transit Agreement is contrasted by the failure of the Five-Freedoms Agreement, but nonetheless is a step in the liberalization of the airways. In the future, it would be a move towards global unity to see a complete liberalization of the airways for civil aircraft. However, so long as the economic incentive remains for states to limit air traffic in their territory, global acceptance of the five freedoms will be difficult to achieve. Though the shortcomings of CICA such as the weakness of the economic guidelines set by the convention, the formation of the ICAO, guaranteed the continued commitment to equality, safety, and reliability in air transport.

2.0 Regulatory Organizations of Civil Aircraft

2.1 The International Civil Aviation Organization

What is the International Civil Organization? What role does the ICAO play in the production of civil aircraft regulation? The Chicago Convention provided the authority to form the ICAO, with the Convention itself forming the organization. The Contracting States needed to establish an international institution that would not only standardize the legal, technical, and economic regulations of CICA, but to promote further discussion and insure future safety. However, because the need for an international organization was eminent, and with the delay in more than fifty states ratifying CICA, an interim organization was created: the Provisional International Civil Aviation Organization (PICAO), which from 1944 until 1947 regulated international civil aircraft and air navigation. In April 1947, when the change from PICAO to ICAO was formally concluded ("History: The Beginning"). On October 1947, the recently formed ICAO rightfully became a specialized agency of the newly formed United Nations. This gave the ICAO the authority and the jurisdiction for all international aircraft regulation, with the backing and support from the UN. With the dissolution of ICAN in 1947 by the ICAN member states, the ICAO became the sole organization that regulates, standardizes, and promotes safety for international air navigation ("History: The Beginning").

The ICAO was established to create and guide the principles and techniques of international air navigation and to foster the planning and development of international

air transport. The technical and economic objectives of the ICAO are held by the CICA to be mutually equal and important. Article 44 lays out the objectives of the ICAO.

> The ICAO will ensure the safe and orderly growth of international civil aviation throughout the world; encourage the arts of aircraft design and operation for peaceful purposes; encourage the development of airways, airports, and air navigation facilities for international civil aviation; meet the needs of the peoples of the world for safe, regular, efficient and economical air transport; prevent economic waste caused by unreasonable competition; ensure that the rights of Contracting States are fully respected and that every contracting State has a fair opportunity to operate international airlines; avoid discrimination between contracting States; promote safety of flight in international air navigation; and promote generally the development of all aspects of international civil aeronautics. (CICA)

The objectives of the ICAO mirror the agreements and provisions found in the Chicago Convention, and insure the continuity of the conference. ICAO is empowered by CICA to have the necessary legal capacity to function and to perform its functions in the territory in each Contracting State. "Full juridical capacity shall be granted wherever compatible with the constitution and laws of the State concerned," (CICA Article 47). This allows ICAO to perform with legal and juridical backing, giving greater control over the organization and its policies.

Much like the United Nations, the ICAO is formed by an assembly of nations, a council of nations, a secretariat, and various committees. The chief officers are the President of the Council and the Secretary General, both being elected positions. The Assembly of nations is formed by the member states. Each member state is granted one vote and hence has equal representation, with a simple majority required ratifying a decision. The Assembly must meet at least once every three years where general policy, annual budgets, and financial arrangements are made and are decided. The Assembly decides the general policy of the organization, votes on the annual budgets and

determines financial arrangements, reviews expenditure, approves the accounts, delegates powers to the Council, refers matters to commissions, considers and proposes to States modifications or amendments to the Convention, and generally deals with any matter within the sphere of action of the Organization not specifically assigned to the Council. (CICA Articles 48,49)

The Assembly being the sovereign body of the ICAO, the Council is the executive and is wholly responsible to the Assembly. Composed of 33 member States, who are elected by the Assembly, the Council administers the finances, handles appointments to committees, and holds the general responsibility to implement the objectives of the ICAO. The Council gives continuing direction to the ICAO. The Council adopts the Standards and Recommended Practices to be incorporated in the CICA annexes. The 33 member states hold the distinction of being comprised of states that either are of chief importance in air transport, or of a certain geographic area to insure all areas are represented, or of great contributions to international air navigation facilities (Diedericks-Verschoor 39). The Secretary-General of the ICAO is appointed by the council. Headed by the Secretary General, the Secretariat is divided into five main divisions: the Air Navigation Bureau, the Air Transport Bureau, the Technical Co-operation Bureau, the Legal Bureau, and the Bureau of Administration and Services. Personnel are recruited on a broad geographical basis to insure a more international perspective of each bureau. In addition to the Council, and the Assembly, the ICAO has a number of permanent commissions and committees: the Legal Committee, the Air Navigation Commission, the Air Transport Commission, the Financial Committee, and the Committee of Collective Aid to Air Navigation Services (Diedericks-Verschoor 39-40). The Air Navigation

Commission oversees the technical questions of air navigation, and in general is responsible for the upkeep of the technical annexes of the Chicago Convention. The Air Transport Commission oversees the economic questions of air transport. The Legal Committee of the ICAO studies and prepares draft Conventions for approval in a plenary session of the Assembly. The Legal Committee also advises the Council on legal matters pertaining to air navigation.

The ICAO must work closely with other UN organizations, national organizations, multinational organizations, and with other non-governmental organizations. Mention should be made of the following organizations: the World Meteorological Organization, the International Telecommunication Union, the Universal Postal Union, the World Health Organization, the International Maritime Organization, International Air Transport Association (IATA), the Airports Council International, the International Federation of Air Line Pilots' Associations, and the International Council of Aircraft Owner and Pilot Associations. Special mention will be made of IATA ("How it works").

The work the ICAO carries out with regional and national organizations highlight CICA's unstated objective to achieve a more global presence with a balanced perspective and equality to all regions. The major regional organizations are the European Civil Aviation Conference, the African Civil Aviation Council, Arab Civil Aviation Council, and the Latin American Commission Civil Aviation Commission. The two major organizations that will be discussed and that work with the ICAO are the Federal Aviation Administration of the US and the Joint Aviation Authorities of Europe ("How it Works").

The ICAO seeks to improve and further the development of standards, procedures, communications, planning, law, and technical development. By establishing international standards, recommended practices and procedures which cover many aspects of air transport and air navigation the ICAO creates a uniformity that enables safe, expedient, and efficient operations throughout the world.

> The ICAO provides standards in the licensing of personnel, rules of the air, aeronautical meteorology, aeronautical charts, units of measurement, operation of aircraft, nationality and registration marks, airworthiness, aeronautical telecommunications, air traffic services, search and rescue, aircraft accident investigation, aerodromes, aeronautical information services, aircraft noise and engine missions, security and the safe transport of dangerous goods. ("ICAO Aims")

Once a standard is adopted by the ICAO, each contracting State adopts the standard to its best ability and applies the standard throughout the contracting State's territories. Aware of the need to adopt modern systems and techniques to keep up with the rapid developments and technological advancements in air transport and air navigation, the standards and procedures must be constantly reviewed and changed as deemed necessary.

The development of satellite communications for air traffic management and communications has been one of the major achievements of the ICAO. The creation of new standards and procedures for the future air navigation systems will meet the current and future needs for future communications, navigation, surveillance, and air traffic management (CNS/ATM). As an integrated global system, the CNS/ATM initiative of the ICAO will change the way air traffic services are organized and operated ("ICAO Aims").

ICAO recognizes nine distinct geographical regions, which administer and supervise the planning and provision of air navigation facilities. Airports, meteorological

stations, air traffic control, search and rescue bases, communications, and navigation aids are all supervised at a regional level by the ICAO. The emerging plan results in a more integrated and efficient system for air transport. CICA requires that air transport be operated soundly and economically which would help to establish the equality of opportunity for all nations. To accomplish this, The ICAO assists states to create the development of safe, regular, efficient and economical air transport by providing comprehensive statistical data, which allows states to better plan and regulate the air traffic and air transport services (CICA Article 55).

There are more than one hundred and eighty Contracting States in the ICAO. As such, each State has a different legal structure based upon the legal philosophy of the state. Facilitation of the adoption of international air law instruments and promotion of their general acceptance is not only a goal and function of the ICAO, rather a necessity. Current legislation considers the international recognition of property rights in aircraft, damage done by aircraft to third parties on the surface, the liability of the air carrier to its passengers, crimes committed on board aircraft, the marking of plastic explosives for detection and unlawful interference with civil aviation. As such, the ICAO is empowered by the UN Charter to request advisory opinions from the International Court of Justice to resolve disputes between member nations. When disputes cannot be resolved by negotiation, the onus falls to the ICAO Council to make a decision; however, it is more common for the Council to mediate and arbitrate the disputes. Bi-lateral treaties usually make the ICAO Council a competent body for arbitration, where in most cases the opinion of the council is binding, unless the participating parties agree that the decision of the council is purely advisory (Diedericks-Verschoor 42). It is important to note that

though the ICAO has never exercised its judicial rights under the Chicago Convention or the UN Charter, the power and authority of the ICAO is not diminished, rather it speaks to the success and compromise the ICAO has been able to achieve with her member nations.

2.2 European Regulation of Civil Aviation

Europe has always been at the foreground in promoting aircraft regulation, from the Paris conference of 1909, to the Paris Convention in 1919. After the Second World War, Europe reeling from the devastation realized that the best way to secure the future was to cooperate with one another, lest they repeat the past world wars. From beneficial economic policies to organized governmental bodies, the mid twentieth century saw the rise of a more unified Europe. The ECAC is one such result in an attempt to achieve the greatest possible degree of co-ordination in an inter-European air transport. Within the framework of the Chicago Convention, the Consultative Assembly of the Council of Europe invited the ICAO to convene a conference in 1953 that would discuss methods of improving commercial and technical cooperation between European (read Western European) airlines. After prolonged discussion, the ICAO convened the Conference of Coordination of Air Transport in Europe in 1954 in Strasbourg. The Strasbourg Conference established ECAC, whose goals would be to generally review the development of intra-European air transport with the object of promoting coordination, the better utilization and orderly development of such air transport (Naveau 68). ECAC would be able to use the services of the ICAO while retaining the ability to establish an independent agenda, convene meetings, and formulate a work plan. This interesting relationship between a regional organization and the ICAO would set the standard for

future regional organizations to follow. ECAC has two major bodies: the Plenary Conference and the Directors General of Civil Aviation, both meet at least every three years (Unmack 208). There are currently 38 Countries in ECAC, membership being available to all sovereign nations geographically situated in Europe that are ICAO contracting states and party to IASTA ("How ECAC Functions").

The objective of ECAC is to promote the continued development of a safe, efficient and sustainable European air transport system (Unmack 207). Hence, ECAC is able to consult member nations on safety issues and policies, while protecting the economic interests of the national airlines of its member states. In this respect, ECAC also brings all matter relevant to its objective, whether it is a tariff dispute or a difference in air traffic control procedures, and creating an acceptable solution to these problems. Also it strives to make an effective contribution to the ICAO and her sister regional organizations. More interestingly, ECAC has a purely, yet powerful consultative powers. Much like the ICAO, ECAC member states are not obliged to implement the recommendations or resolution set forth by the ECAC; nonetheless, it would prove worthwhile for the member state to comply. ECAC is provided with the instruments to encourage multi-lateral instruments or arrangements, giving the ECAC broad discretion to monitor treaties, recommend multi-lateral treaties between member states (Unmack 208). When deemed appropriate, the arrangements would allow for the establishment of joint procedures that would execute the national responsibilities of member states. This sets the stage for the next drama of European cooperation in aircraft regulation: the formation of the JAA.

2.3 JAA and the EASA

In the 1970's, Europe was looking at a new frontier in their aviation history: the progress of the European Community and Economic Union was bringing in more cooperation and economic opportunities. Starting in 1970 with the Joint Airworthiness Authorities, which was designed to produce common certification codes for large airplanes, was created to assist Airbus consortium members (Ashford 201). Without the presence of the Joint Airworthiness Authorities, the time and resources to certify an aircraft made by a number of nations, each with its own code for certification would make the certification of such an aircraft logistically and procedurally difficult, even when national codes were somewhat similar, the interpretation of the regulations differed from State to State. Starting in 1971, the Joint Airworthiness Authorities began working on Joint aviation requirements that culminated with the publishing of JAR-25, the code for airworthiness and certification that is based upon US FAR-25. Thirteen European Civil Aviation Authorities came together in 1979 and discussed an arrangement concerning the development and the acceptance of these Joint Aviation Requirements. Of these, twelve went even further and signed onto a memorandum of Understanding on Future Airworthiness procedures in 1987 that extended the scope of JAR's to maintenance and operations, while respecting the national sovereignty (Ashford 201). However, the 1987 Memorandum expressed interest in creating a single authority that would force states to relinquish some state sovereignty. The 1990 Cyprus agreement created the Joint Aviation Authority. Currently, a single joint certification group works on behalf of all JAA members: One authority, one code (Unmack 209). When an aircraft is certified by the JAA, each member states simultaneous issues certification for that aircraft. On 1 January 1992, JAA codes became referenced in the European Community

Regulation on Harmonized Technical Standards and carried the force of law in the EC States ("What is the JAA").

Membership to the JAA is open to all ECAC members, provided they sign the Cyprus Agreement of 1990; however, the JAA creates two categories of members: full and candidate (Unmack 212). Countries who are members of ECAC who when sign the 1990 Agreement become candidate members. This is to safeguard the high standards and the credibility of the JAA, who during a member's candidacy to insure not only the candidates compatibility with the JAR's but compliance as well. Currently of the thirty-eight ECAC members, only thirty-six have signed the 1990 agreements; of these twenty-five are full members of the JAA, eleven are candidate members. Interestingly, all members of the EU are full members of the JAA, but not all full members of the JAA are members of the EU.

The objectives of the JAA are similar to the objectives of ECAC, however more defined: to promote aviation safety, to insure business effectiveness, to consolidate common standards, to promote worldwide safety, and to integrate seamlessly into the EASA ("What is the JAA"). Aviation safety can be achieved through cooperation by insuring every state is held to high and reliable standard. This can be realized through a harmonization of the standards and practices of every state and the uniform application of these standards. This in whole promotes both worldwide safety by fostering international cooperation and harmonization. The result is a cost effective safety system that promotes fair and equal competition among its member states and a lean system of certification that insures a high level of safety, reliability and efficiency. Finally, since the onset of the

JAA, there has been discussion of creating a single EU agency that would encompass the functions of the JAA and promote safety among non-EU JAA member states, i.e. EASA.

The JAA consists of two bodies, the governing body and an executive body. The Governing body is formed of the JAA Committee and the JAA Board. Each full member is allowed to have a voting representative and candidate members have a non-voting representative. Representatives nominally are responsible for safety and regulation functions in the state from which they come from. The JAA committee is considered the legislative branch, voting on resolutions, membership, and agreements. The executive office of the committee handles day to day issues, and is formed from six committee members of which three countries have permanent seats: France, UK, and Germany ("What is the JAA"). The JAA Board consists of the Directors General of Civil Aviation, keeping in mind that these are also the ECAC representatives. The JAA Board discusses broad policy issues and finalizes budget appropriations. Consisting of a Secretary General governing several departments, the Central JAA is the executive office of the JAA. The departments are Certification, Regulation, Maintenance, Operations, Licensing, and Resources and Development. The departments in the Central JAA have responsibilities for developing an maintaining procedural requirements, as well as for continuing the application of the procedural requirements and technical JAR's ("What is the JAA").

The JAA has been instrumental in creating a system of aircraft safety, reliability, and efficiency. As successful as the JAA is and has been, progress on creating a single aviation authority that would govern all EU member nations and non-EU nations is in the works. The last objective of the JAA is to fully integrate into the EASA. Currently the

JAA system is a supra-national organization that works with the national airworthiness authorities to create a common standard. This is essential in creation a single EU aviation authority that would replace all other national authorities. The implication of loss of national sovereignty is not lost on the member nations. It is interesting to note that in less than 100 years, the doctrine of State sovereignty of airspace originated in the Paris Conference of 1909 seems to have lost its popularity as the move for cooperation to promote economic unity strengthens. Just as the creation of a European Monetary Unit seemed like an impossibility 100 years ago, the creation of a single aviation authority is emergent. In 1998, the Council of European Transport Ministers gave the European Commission the mandate to initiate negotiations on the Convention to establish the EASA (*Air Transport Safety* 1).

EASA will be responsible for issuing certificates and approvals for aircraft design, developing a and implementing regulations and training procedures, ensuring continued airworthiness, undertaking international negotiations, researching aviation safety rules, promoting European aviation safety, licensing of personnel, approval of organizations, and regulating ATM and airports (*Air Transport Safety* 2). This authority of an enhanced and empowered authority would ensure the uniform implementation of harmonized technical and administrative regulations. By concentrating the resources and functions of the national airworthiness authorities, EASA would be a very good equivalent to the American FAA. As with cooperation mergers, this would create an efficient aviation system with reduced bureaucracy and streamlined procedures. A lean organization that would still insure a high degree of safety and reliability, EASA would

allow for the continued prosperity of not only the European aircraft manufacturing industry but also the European commercial aviation industry.

2.4 American Regulation and the FAA[1]

Kitty hawk, North Carolina, USA. 1903. The era of controlled powered flight came forth and the world would never be the same. The growth of the fledgling air industry was given a boost by the technological impetus of World War I and led to growth of passenger and cargo travel throughout the world. Though the US participated in the Paris Convention in 1919, there was no comprehensive national standard or regulations in effect.

The first forms of federal regulation relating to aircraft came through the Post Office, the Kelly Act of 1925 dealt with airmail and the routes used by air mail carriers. With the backing of the fledgling aviation industry, the 1926 Air Commerce Act gave the onus of regulation to the Department of Commerce, with the creation of an Aeronautics Branch charged with the primary authority for aviation oversight. "The Act charged the Secretary of Commerce with fostering air commerce, issuing and enforcing air traffic rules, licensing pilots, certificating aircraft, establishing air ways, and operating and maintaining aids to air navigation." The Aeronautics Brach was keen to introduce more effective and improve current methods of communications. Of the Five departments created by the Air Commerce Act, only two were placed under the Aeronautics Brach, the other three were placed under existing bureaus of the Commerce Department. The Airways Division was placed under the Bureau of Lighthouses, the Aeronautics Research Division under the Bureau of Standards, and the Air Mapping Section, under the

[1] FAA Chronological History. This section explores the development of the FAA and the Federalization of aircraft regulation.

authority of Bureau of Coast and Geodetic Survey. The Air Regulation Division and Air Information Division were under the authority of the Aeronautics Branch.

The Air Commerce Act applied only to aircraft participating in interstate and foreign commerce, required mechanics, pilots and other airman to hold a public or private license, created a set of operational rules and rules pertaining to aircraft safety. During the next eight years, amendments to the Air Commerce Act gave the Aeronautics Branch more authority in licensing pilots and enhanced regulatory authority. During this period the Post Office began to relinquish its hold on airways, which, until the now, had been administered by the Post Office. Nonetheless, the Post Office still had authority over airmail functions, though they no longer prescribed routes or airways. In 1928 the Aeronautics Branch created the Aircraft Accident Board and implemented technological advances to aid navigation and communications. The Air Commerce Act served as the impetus to promote uniform regulation among the nations forty-eight states. Because the air Commerce Act only applied within the federal realm, stated had the ability to have differing regulation for within-state travel. In 1928, twenty states had no aircraft regulations, the other twenty-eight had regulation based on federal regulation or state law. The National Conference on Uniform Aeronautics Regulatory Laws organized by the Aeronautics Board in 1930 severed to promote dialogue on the issue. By 1933 all states had some form of aviation regulations, however there was still no uniform code. Until 1941, pilots in certain states did not require a federal license to fly, so long as they did not enter any federal airways or crossed state lines. This required a distinction between federal and state airspace, this was challenged later on, with the end result being that all airspace was under the jurisdiction of the federal government. In US V. Drumm, US

district Courts ruled that national airspace was to be regulated through the federal government, even if the flights did not use civil airways or restricted air space. Allegheny Airlines Inc. v Village of Cedarhurst and American Airlines v. Hempstead removed the jurisdiction of local airspace from local authorities because the legislation would operate in a area preempted by Federal legislation and regulation, pose an unconstitutional burden on interstate commerce, and was in direct conflict with valid federal regulations.

The 1934 change from Aeronautics Board to Bureau of Air Commerce demonstrated the increasing importance and prestige of the emerging air transport industry. The Bureau established the first centers for air traffic control and began efforts in 1936 to expand the system, even though the only technological aids they had were no more advanced than a calculation and blackboard. The amendment to the Air Commerce Act that created the Bureau, also gave it legal authority to strengthen and aid the Bureau in accident investigations. During this period, discussion began surrounding the codification of air regulations. During the tenure of the Aeronautics Branch and the Bureau of Air Commerce, individuals within the organizations periodically issued regulations without any system of clearance. This created a system of air regulations with no standard compilation, with standards and regulations strewn about the regulatory agencies. The urgency to codify the regulations stemmed from the issue of enforceability: since the authority to create regulations lay in the hands of the Secretary of Commerce and not the individuals of the agency. By late 1937, the Bureau published and began to enforce CARs. This also severed as the example for states to base their local legislation for air regulation.

The 1938 Civil Aeronautics Act created an independent agency, the Civil Aeronautics Authority that would expand the government's role by introducing airline regulation, with pricing regulation and air route determination, removing the responsibility from the Commerce Department. This type of agency was able to operate independent of the president executive rights and imbued with separate judicial, and legislative sections. The 1938 Act enlarged and revised the function of the former Bureau of Commerce, compiled a more comprehensive economic regulation, created an Air Safety Board, and Administrator of the Authority. The Civil Aeronautics Authority was a five member boars that were selected by the president. The five member authority were given the authority to create and change safety regulations, regulate air mail rates, airline rates, fares and routes, and airline business. The Administrator, the only member who could be removed at will by the President, was given the responsibility to promote civil aviation and commerce, to establish the nation's airways, to regulate air traffic, to protect air traffic, and to improve and provide air navigation facilities, including airports.

By 1940, President Roosevelt issued Reorganization Plans III and IV as recommendation for the CAA. Realizing that the extra responsibilities given to the CAA required a more clarified relationship between the Administrator and the five-member authority, the CAA (authority) in to the Civil Aeronautics Administration and the Civil Aeronautics Board. The five member authority was transferred to the Department of Commerce as the CAB, that would function independently from the Secretary of Commerce. The CAB was given the responsibility for safety rulemaking, accident investigation and airline regulation, with the Air Safety Board having been merged with the CAB. The Administrator, receiving the new title of Administrator of Civil

Aeronautics, and its eighteen sections formed the Civil Aeronautics Administration. The eighteen sections were envisioned as assisting the Administrator in its duties: Management Planning, Personnel, Washington National Airport, Federal Airways Service, Certification and Inspection, Civilian Pilot Training, Compliance, Aviation Medical, Information and Statistics, Administrative, Coordinator of Field Activities, and Seven Regional managers.

With the foreshadowing of war, national defense became a to priority and effected the buildup of air traffic control towers, airfields, and the creation of a Civil Air Patrol. The war facilitated the removal of jurisdiction of national airspace from the states to the federal government. The CAA and the CAB both saw technological advancements during the Second World War that enhanced their ability to perform their duties: the most important advancement was the use of radar for air traffic control. The CAA began to regulate take-off and landings under the air traffic control. The 1946 Administrative procedure Act forced the CAA to follow a uniform and public procedure in rulemaking, proceedings, and other similar actions. Reorganization Plan V began to discuss the creation of an independent department of transportation that would be in charge of all transportation concerns: aviation, oceanic transport, and road and rail, all of which had been a part of the Department of Commerce. By 1954, the CAB had released all accident investigatory powers to the CAA, citing an increase of air traffic and accidents that would be better handled by the airworthiness regulatory body.

The 1958 Federal Aviation Act transformed the CAA into the Federal Aviation Agency and transferred the safety rulemaking function of the CAB to the FAA. The Federal Aviation act abolished the previous air regulation acts preceding it. This allowed

the new agency to operate without the burden of prior legislation and gave the new agency a better starting point for regulation. The repealed laws were then assigned to the two new bodies created by the act and freed the CAB from its administrative ties to the Department of Commerce. " The regulation of air commerce in such manner as to best promote its development and safety and fulfill the requirements of national defense; the promotion, encouragement, and development of civil aeronautics; the control of the use of the navigable airspace of the United States and the regulation of both civil and military operation in such airspace in the interest of the safety and efficiency of both; the consolidation of research and development with respect to air navigation facilities, as well as the installation and operation thereof; the development and operation of a common system of air traffic control and navigation for both military and civil aircraft." The act separated air transport into twp sections: the CAB would administer the airline side of air transport through economic regulation and accident investigation and the FAA the airworthiness and safety rulemaking.

. The 1966 Department of Transportation Act created one Cabinet Department in which thirty three previously separate agencies were combined. The goals prescribed to the new Department were sweeping: to assure effective and coordinated administration of the nation's transportation programs, to facilitate improvement and development of coordinated transportation, to encourage cooperation of Federal, state, local governments and other interested parties, to stimulate technological advances, and to identify and to solve transportation problems, to develop and recommended national transportation policy. The Federal aviation Agency became the Federal Aviation Administration under the Department of Commerce. The CAB lost their accident investigation function to the

newly created National transportation Safety Board. The NTSB was charged to determine the cause of probable cause of all transportation accidents and to report the facts, conditions, and circumstances pertaining to the accident and to review on appeal, the suspension, amendment, modification, revocation or denial of any issued certificate or license. The CAB was phased out from 1978 to 1984 by the Airline Deregulation Act, which increased the competition in the air transport industry, ending airline regulation. The department of transportation took over most of the functions including the international aviation responsibilities, bilateral treaties, carrier selection, tariff review, Essential Air Service Program, passenger protection, anti=trust review, and certification of economic fitness of airlines.

As times changed, so did the scope of the FAA. Hijacking of aircraft led to FAA involvement in security of aircraft, the creation of federal air marshals for international flights; however in response to the September 11, 2001 terrorist attacks, when domestic aircraft were hijacked, the FAA ceded civil aviation security to the newly created Transportation Security Administration, under the Department of Transportation. The NTSB was removed from the DOT to create a more independent organization better handled to investigate transport accidents. The emergence of computer technology allowed the FAA to enhance air traffic control, air communications, and air navigation. As the air transport traffic grew, so did the noise generated by aircraft engines, leading to FAA regulation of aircraft noise emissions and creation of standards. Regulated through the EPA, noise and air pollution standards are created by the FAA. The expanding air transport industry also forced Congress to authorize the FAA to oversee the certification of airports as well as in aiding in the development and construction of airports.

Globalization led the FAA and the DOT to undertake the increase of a new type of bilateral agreements, that would create co-regulatory partnerships with other nations, where open skies and harmonization have become prevalent

Nearly the end of one hundred years have passed since the historic Orville flight. The US has become a world leader in the aviation industry transporting millions of passengers worldwide and nationally. Regulation in the US has always been changing: it has taken eighty years for the current regulations to come into existence. However, early on, uniformity of regulation became an important issue: states had laws in place for aircraft regulation before any form of national regulation, and there existed different regulations in parallel to the national regulations. However, the federal authorities realized the necessity for states to have a code of air regulation to be similar or to be uniform with the national code, and determining the jurisdiction of states over state airspace. As aviation grew, states began to modify their state regulations to be uniform or similar to national codes; yet, states still had jurisdiction over aircraft and airmen participating in intra-state travel along non-federal airways. The federal government began the process of preempting control over all national airspace before World War II. By the time of the Federal Aviation Act of 1958, the federal government had legal standing over their jurisdiction over all national airspace, even when the aircraft did not participate in interstate commerce or along federal airways.

The US system of regulation provides us a model of how international regulation may work: though the federal government may have pre-empted state rights in air regulation, the fact that states were willing to generate uniform regulation by allowing usurpation of states rights (during a period when states were loathe to surrender states

rights to the federal government) creates a paradigm where the creation of an international uniform code of aircraft regulation requires a minor cession of national sovereignty.

3.0 Regulatory Standards and Differences

3.1 ICAO Annexes

The Annexes of the Chicago Convention (CICA) provide a wealth of regulatory information and standards which for the body of ICAO regulations. Currently there are 18 annexes to the ICAO that deal with topics of international air navigation, from manufacturing to meteorological services. The annexes are updated and adapted constantly to meet the current and future needs for air transport. The ICAO provides the standards in only four languages: English, Russian, French and Spanish. It is the responsibility of a member state to translate the documents into their own national language and notify the ICAO of the translation (*Annex 8* x). Countries who are members of the ICAO must ratify CICA, and by doing so are subject to guidelines of the CICA annexes. The list below shows the annex and the topic.

Annex 1	Personnel Licensing
Annex 2	Rules of the Air
Annex 3	Meteorological Service
Annex 4	Aeronautical Charts
Annex 5	Units of Measurements for Operations
Annex 6	Operation of Aircraft
Annex 7	Nationality and Registration
Annex 8	*Airworthiness*
Annex 9	Facilitation
Annex 10	Aeronautical Telecommunications
Annex 11	Air Traffic Services
Annex 12	Search and Rescue
Annex 13	Aircraft Accident Investigation
Annex 14	Aerodromes
Annex 15	Aeronautical Information Services

Annex 16	*Aircraft Noise and Environment Protection*
Annex 17	Safety
Annex 18	Transport of Dangerous Goods

Table 1: Annexes of the Chicago Convention

The annexes are minimum standards upon which nation states can base their own national codes. Annex 8, Annex 6, Annex 10, Annex 13, and Annex 16, are relevant to national regulation of an aircraft. However, Annex 8 is considered the more relevant document pertaining to national airworthiness codes. In order for an aircraft to fly to an international destination under the transit agreement of CICA, the aircraft must have a certificate of airworthiness, and in order to obtain a certificate of airworthiness an aircraft must meet the minimum standards established by the ICAO in technical annexes. Because the ICAO member states may have different standards in their national codes, they must report these different standards to the ICAO to be registered as an exemption from the ICAO technical annexes.

3.2 Annex Eight[2]

CICA establishes the need for a set of regulations. All aircraft engaged in international air navigation must carry proof of airworthiness in form of a certificate rendered valid by the State of registry. The State of Registry cannot render valid or issue a certificate of airworthiness unless the aircraft complies with the national codes of the State of Registry. The State of Registry Other Contracting states must recognize these certificates of airworthiness provided that the standards used to issue a certificate are equal to the current minimum standards established. There may be cases where an aircraft may require and endorsed certificate. "Any aircraft or part thereof with respect to

[2] *ICAO Annex 8 to the International Convention of Civil Aircraft.* Below is a summary of Annex 8, which is used to establish a baseline of regulatory information and procedures to compare to existing national and intra-national regulations.

where exists an international standard of airworthiness or performance an which failed in any respect to satisfy at the time of its certification shall have endorsed on or attached to its airworthiness certificate a complete enumeration of the details in respect of which it failed." Since 17 October 1979, the US certified certain airplanes that do not fully meet the Annex 8 Standards; therefore, these aircraft carry endorsed certificates of airworthiness. However, a contracting state may have the discretion to allow or to bar entry to aircraft with an endorsed certificate. Nonetheless, once the aircraft receives a non-endorsed certificate of airworthiness, a contracting state does not have the discretion to bar entry to the aircraft.

Annex 8, the Standards and Recommended Practices for the Airworthiness of Aircraft, were adopted in 1949, four years after the establishment of CICA. Revised and updated texts of Annex 8 have been instituted as the technologies of aircraft design and manufacturing improved over the years. The primary objective of Annex 8 is to define a minimum level of airworthiness for the recognition of certificates of airworthiness by member states for the express purpose of the flight of foreign aircraft over or into national territories, without replacing the established national codes and regulations.

It is important to note that a Contracting State may only issue or render valid a Certificate of Airworthiness to aircraft that complies with national airworthiness code for said state or any other contracting state. Annex 8 stipulates that the national airworthiness code of a Contracting State must comply with the standards established by Annex 8. Each Contracting State is bound to show proof of compliance to the airworthiness standards by providing evidence. Hence, all documentary evidence, such as design drawings, and records are to be maintained to establish identification with the

approved aircraft. Likewise, the Contracting State issuing a certificate of airworthiness must perform inspections during the construction of the aircraft to insure conformity to the approved design, and to insure satisfactory construction and assembly procedures. Finally, the contracting state shall subject the aircraft to flight trials as deemed necessary by the State. However, if an aircraft to be registered to a new state should have a previous certificate of airworthiness issued by another contracting state, the new state of registry may accept prior issuance as evidence for airworthiness. The State of Registry is responsible for the continued airworthiness for all aircraft, to which they have issued or rendered valid a certificate and thus be able to renew the certificate provided that the Contracting State periodically inspects the aircraft. Proper and efficient communication must occur between the State of Registry and the State of Design. Hence, the State of Registry is responsible to submit information regarding the continued airworthiness of an aircraft to the State of Manufacture, and the State of Manufacture is obliged to report any information regarding the continued airworthiness to the State of Registry. Annex 8 stipulates how an aircraft may temporarily lose its certification of airworthiness via two modes. The first being the failure to maintain the airworthiness of an aircraft: such as failure to maintain a periodic inspection of the aircraft. The second occurs when damage occurs to an aircraft. In this case, the onus of re-certification falls to the State of Registry; however, if the damage is sustained in another state that is not the State of Registry, this State of Occurrence has the ability to ground the aircraft until the State of Registry can provide sufficient evidence of re-certification. In such a case, it is common for the State of Registry and the State of Occurrence to allow the aircraft with no fare-paying passengers to fly to an air navigation facility to be restored to an airworthy

condition. Common differences in Part two of annex 8 occur when a Contracting State does not have a comprehensive and detailed national airworthiness code. In such a case, a Contracting State cannot issue certificates of airworthiness, unless they use an approved national code of another Contracting State. For smaller Contracting States, this is often the case. In rare cases, some Contracting States will have differing standards or definitions. For example, the US defines standard atmosphere sea-level molecular weight as 28.9644 kg $(kg\text{-}mol)^{-1}$ compared to the ICAO measurement of 28.964420×10^{-3} kg mol^{-1}.

Part Three of Annex 8 contains eleven chapters relevant to the airworthiness certification of an airplane. It is reinforced at this time, that the Annex 8 regulations for airworthiness are the minimum requirements for safe, efficient, and reliable flight.

1	General
2	Flight
3	Structures
4	Design and Construction
5	Engines
6	Propellers*

7	Power Plant Installation
8	Instruments and Equipment
9	Operating Limitations and Information
10	Maintenance Information
11	Security
	* *will not be discussed*

Table 2: Annex 8 Chapters

Unlike national codes of airworthiness, which tend to be technical and exact, the Annex 8 regulations are broad guidelines from which national codes can be based upon.

The airplanes to which annex is to be applied must meet certain conditions laid out in Chapter one. Certain aircraft may be excluded from standards in Annex 8 based upon grandfather clauses, specifically some aircraft certified before 22 March 1985 that have exemptions to lighting and markings. Nonetheless, the aircraft retain the majority of regulations. The Standards of Annex 8 shall apply to airplanes of over 5700 kg maximum certified take-off mass intended for the carriage of passengers and/or cargo.

All aircraft engaged in international air navigation must be equipped a minimum of two power plants, hence a Contracting State may use a two-engine aircraft for international air navigation even for trans-oceanic travel. Ranges and limiting conditions, such as the maximum range of the center of gravity, shall be established for the airplane, parts, and engines. In addition to this, the ICAO stipulates that there shall be no unsafe feature or characteristics on the airplane. This statement applies to all facets of an airplane: engines, airframe, etc. Finally, compliance of certification shall be based on tests, calculations, and calculations based on tests provided that the accuracy of the calculations is similar to direct methods of testing. Hence, it is licit to certify an aircraft using data gathered from simulators.

Chapter Two of Part III of Annex 8 discusses flight standards for airworthiness and mandates that compliance with the Standards will be established through flight tests and other applicable test for all applicable combinations and configurations. Tests shall establish the minimum performance data for the take-off of the airplane at maximum mass dealing with power unit failure, landing at missed approach, landing with inoperative power units, and powered balked landings. The scheduling of performance shall be determined so that it will provide a safe relation between the performance of the airplane and the airports and routes. The data from the take-off, accelerate-stop distance, take-off path, en route, and landing, shall be determined and scheduled for the range of mass, altitude or pressure-altitude, wind velocity, gradient of take-off, landing surface and any other operational variables for which the airplane is to be certified. The final note considers sea-landing planes or planes to fly in inclement weather. The flying qualities of control, trim, stability, and stall are discussed in Chapter two. An airplane

should be controllable and manvouverable in all anticipated operation conditions and be able to make smooth transitions from one condition to another. For this, chapter two requires controllability on ground during take-off, taxiing, and landing, controllability during take off when failure of the critical power unit occurs at any point during take-off, and the take off safety speed at which the plane is above the stall speed and above the speed at which the plane remains controllable after failure of the critical power unit. The regulations require that the plane be sufficiently trimmed to minimize the pilots attention and ability to maintain a desired flight condition during normal operation and under conditions in which there are failures of the power units. The airplane should have enough stability as not to tax the concentration of the pilot; nonetheless, the stability shall not create excessive demands on pilot or hinder the maneuverability of the airplane during emergency situations. Because an airplane may reach stall speed during normal flight operation, it necessary that airplanes have clear and distinctive stall warning, which will alert the pilot to arrest the situation. The pilot must be able to arrest the situation without altering engine power to maintain full control. The stalling speeds of an aircraft at each stage of flight shall be known at different power levels, with one being the power level to give zero thrust just above stall. Finally, chapter two requires suitable test to demonstrate that all parts of the aircraft are free from excessive vibrations and flutter under all speed conditions within the operating limitations of the airplane.

The third chapter of Part Three regulates the structures whose failure would endanger the airplane. This chapter establishes the definitions of the design airspeed and the limiting airspeeds. The design air speeds shall be reported for the airplane to withstand gust and maneuvering loads. The limiting airspeeds shall be based on the

correspond design airspeeds with a safety margin and be included in flight manual as operational limitations. Hence, a plane may fly faster than the specified limitations; however, this would endanger the airplane as it reaches the design airspeeds. The flight load calculations are governed by annex 8, which considers the maneuvering loads, the gust loads, ground and water loads, flight control loads, cabin pressure loads, engine effects, and changing loads based of changing configuration. The aircraft shall be able to withstand the loads that arise during flight operation. The maneuvering loads are computed on the basis of maneuvering load factors appropriate to the maneuvers permitted by the operating limitations and shall not be less than the adequate values for the operating condition. The gust loads shall consider both horizontal and vertical gusts velocities and gradients. The airplane structure should be free from flutter, unstable distortion, and loss of control at the limiting speeds, as well as withstand any buffeting and vibrations that occur in flight operation. Obviously, the aircraft structure shall be fabricated and shall have sufficient strength to ensure that fatigue failure under the repeated loading and unloading in flight operations is remote.

Chapter Four requires the design and construction of the aircraft should be performed to give assurance that all parts will function reliably and effective in the anticipated operating conditions. Past experiences and practices proven proficient will form a basis for assurance. All moving parts will be tested to insure that they operate properly under all its operating conditions. Likewise all materials used in construction shall conform to approve specifications and that have the essential properties assumed in the design. The materials shall be protected from deterioration or loss of strength from corrosion, abrasion, weathering, or other causes that may pass unnoticed during regular

maintenance. Fabrication and assembly shall be conducted in such a way to produce a consistently sound and reliable structure. Provisions to examine, replace, or recondition any part of the airplane after severe operations or during periodic operations shall be made adequate. Chapter four gives special consideration to the following design elements: Controls and control systems, system survivability, crew environment, pilot vision, provisions for emergencies, fire precautions, fire suppression, incapacitation of occupants, and protection of flight crew compartment from smoke and fumes. The controls are to be designed to prevent or minimize jamming, inadvertent operations and unintentional engagement of devices. The systems of an airplane are to be designed to allow for safe flight and landing in cases where there has been damage to the airplane. The flight crew compartment shall be designed to minimize incorrect or restricted operations due to interference, fatigue, or confusion. The Pilot shall have an extensive, clear and undistorted field of vision, shall be protected from glares and reflections, and provide features to insure sufficient vision in inclement weather. The flight crew shall be provided with means that prevent or enable action against foreseeable failures of equipment or systems. The design and materials of the cabin material shall be designed to minimize smoke and fume production. The airplane shall be equipped to detect and extinguish all fires. Cargo compartments must be able to extinguish fires caused by sudden explosions or incendiary devices. Protection of the occupants against smoke, depressurization, and fumes caused by explosives, incendiary devices, or other means shall be designed into the airplane. Finally, the flight crew compartment shall be designed to prevent entry of smoke, fumes, or noxious vapors caused by explosives, incendiary devices, or other means. In the event of emergency landings, provisions in the

design shall be made to protect the occupants from fire and deceleration forces. Rapid evacuation facilities for ground and water landings shall be provided on the aircraft in addition to interior layout, which shall be designed to facilitate the rapid evacuation. Finally, the design of the airplane shall minimize the risk of damage during ground handling operations.

Engines being the major unit of propulsion for commercial civil aircraft engaged in international air navigation, have a small section in Annex 8 because they are subject to Annex 16, which will be discussed in the next chapter. However, Chapter Five regulates the tests, the design, construction, ratings, and limitations of the engine. The engines shall be tested to insure that starting, idle, acceleration, and other characteristics demonstrate freedom from detonation, surge, or other detrimental conditions during operation. The endurance test shall demonstrate the reliability and durability of the engine and be conducted in conditions in excess from the declared limits. The engines shall be tested to establish that there is no excessive decrease in power at the conclusion of operating and endurance tests. The design and construction of the engine shall be done to insure reliability within operation conditions when installed in accordance to chapter 7 regulations. The ratings and their respective atmospheric conditions, all operating conditions, and limitations shall be declared. The regulations for propellers are similar in nature and tone to the regulations for engines.

Chapter seven regulates the installation of the airplane's power plants and can be considered a continuation of chapter four regulations. The regulations state that all power plants be installed to comply with their intended and anticipated operating conditions, as well as providing means to either start or stop an engine during flight by the crew. The

power plants shall be installed independently, so that plant and its subsystems can be controlled irrespective of the status of the other engine. In addition, the cooling system shall maintain temperatures in the power plant within the established limits required for safe operation of the plant. The maximum air temperature will be reported in the flight manual. All subsystems for the power plant, such as fuel, oil, and air induction must be able to supply the plant with its requirements during anticipated operating conditions. To protect the regions surrounding the power plant such as the fuel tank form potential fire hazards: the affected areas shall be isolated by fire resistant material. Means to allow the crew to cut off flow of flammable fluids from affected regions shall be required; fire detection units shall be located to ensure rapid detections of any fire; and finally such regions shall be provided fire suppression systems.

Chapter eight discusses the required instruments and equipment for an airplane. It states that the airplane shall have instruments and equipment necessary for the safe operation of the airplane. These instruments shall be subject to chapter four regulations. Safety and survival equipment shall be reliable and readily accessible for either crew or passenger. Airplanes shall be required to have navigation and anti-collision lights that shall assist others in preventing collisions in mid-air. These lights shall be designed to be readily identifiable yet neither adversely affect the performance of the flight crew nor subject an outside observer to harmful dazzle.

Chapter nine gives guidelines for operating limitations and information though means of the airplane flight manual, markings, or placards that will ensure a safe operation of the airplane. The limitations to be reported are the following: loading limitations, airspeed limitations, power plant limitations, flight crew limitations,

equipment and system limitations, and post-failure fly time limitation. The post-failure fly time limitation is the maximum time for which system reliability has been established in relation to approval of operations by two-turbine engines aircraft beyond the threshold established by Annex 6, Part I, 4.7. Chapter nine continues by requiring that an airplane flight manual containing at least the airplane limitations and procedures be made available. Finally, the marking and placards on equipment and controls shall highlight limitations or information for the flight crew's attention during flight as well as for the ground crew during ground operations.

Chapter ten briefly discusses continuing airworthiness. Maintenance for the airplane shall include information regarding the frequency of maintenance tasks, recommended methods for maintenance tasks, and maintenance tasks prescribed by the state of design.

Chapter eleven regulates the security requirements for airplanes. The current international regulation touches on three points. The design of a least-risk bomb location to minimize the effect of an onboard explosive shall be considered. The design of the flight crew door and bulkhead shall be done to minimize penetration by small arms fire and grenade shrapnel. The interior design of the aircraft shall not facilitate the concealment of weapons, explosives, or other dangerous objects but facilitate searches for such objects.

As is, Annex 8 is not sufficient to constitute an international code of airworthiness. Rather it is an attempt to do so: by creating a set of standards by which a state can generate its own airworthiness code. It is creating a unified system of airworthiness certification. However, the language of Annex 8 is not authoritative, it

allows for states to create methodologies and allows member states to have different standards for certifying aircraft. Because Annex 8 respects the sovereignty of a Contracting state to create its own standards for an airworthiness code, it is weakened as a document. In some cases, Contracting States change definitions, ignore certain aspects, or edit standards to their liking -- the Unites States is the most culpable of this offense, as they have the most exemptions submitted to the ICAO. However, it is not the fault of the Annex 8 for the lack of authoritative dictates: ICAO does not have any executive ability to force compliance of standards on member states other than suggest standards. Using Annex 8 to create a true international airworthiness code would require giving the ICAO executive rule over a Contracting nation's regulatory agency, a step to which many states would object.

3.3 JAR 25 & FAR 25 Differences

JAR 25 and FAR 25 are the documents generated by the JAA and the FAA, respectively, to insure airworthiness of aircraft. Both have taken many years to codify and still are subject to change and interpretation. The JAR 25 were created to provide an environment that would minimize type certification for joint ventures and to facilitate trade of aviation products with the members of European States. When the JAR 25 was created, it was formed with the requirements and regulations of the member states. This in mind, the base code for the JAR 25 was the FAR 25, created by the FAA. Nonetheless, differences between the base code and the revised code exist: these include regulations that are not required by JAR but are by FAR, regulations unique to JAR-25, and regulations that are differently defined.

JAR 25X20 is the first and major regulation that is unique to JAR 25 and relates to the applicability of JAR 25. While FAR 25 is generic in the sense that it regulates all types of transport aircraft, JAR 25X20 restricts JAR 25 to all turbine-powered aircraft. This eliminates all other types of aircraft, such as hydro craft, which are subject to regulation by FAR 25 when they are used as transport aircraft. JAR 25X725 imposes stricter standards to nose wheel steering: no skill is required to operate the system and the steering must not interfere with landing gear. Most of the JAR regulations not in FAR 25 are recent considerations that bear little obstacle to joint harmonization. JAR 25X261 simply requires that procedures for flight in rough air should be established. JAR 25X1360 requires that aircraft manufactures to protect crew and passengers from shock and burn hazards. JAR 25X899 require the airplane be protected from electrical discharge from static electricity or external electrical shocks. JAR 25X1362 ensure an added level of safety for evacuations by requiring that emergency circuits have suitable supply of electricity. Other JAR 25X's deal increase the safety element by requiring that the aircraft systems and subsystems do not generate a hazard to the integrity of the aircraft: JAR 25X799 states that the water distribution system should create no hazard to the aircraft; JAR 25X1315 states that directors have an accuracy to insure safe operations. While FAR 25 does not require these regulations, including them in FAR 25 would increase the level of safety in aircraft and would minimize the differences between the two codes of regulation and lead to a single harmonized code of airworthiness.

Because JAR 25X20 makes JAR 25 applicable only to turbine-powered aircraft, several JAR 25 regulations do not follow the base code. FAR 25.111e is a requirement for aircraft equipped with standby power rocket engines that is not required in JAR

25.111. Reciprocating engine aircraft, seaplanes and amphibian aircraft regulated by FAR 25 are not required for JAR and have no equivalent in JAR 25, specifically FAR 25.237 b, FAR 25.925 b, FAR 25.951 b-1, FAR 25.955 b-1, FAR 25.961 a-1, FAR 25.961 a-4i, FAR 25.975 b, FAR 25.977 a-1, FAR 25.1001 e, FAR 25.1009 b, FAR 25.1043 a-3, FAR 25.1045 d, FAR 25.1045 e, FAR 25.1091 b, FAR 25.1093 a, FAR 25.1093 c, and FAR 25.1305 b. In developing a harmonized code for air worthiness, it would be necessary to modify existing national codes to either include other forms of transport aircraft; however, it is understood that creating a worldwide airworthiness code for aircraft would be helped if that code dealt with transport aircraft, which by quantity are used worldwide, as opposed to specialty transport aircraft.

The second class of FAR 25 regulations not required by JAR 25, are considered differing standards. FAR 25.161 e-3 requires that airplanes with four or more engines must maintain trim in rectilinear flight at the weight at which the two engine inoperative climb is equal to at least 0.0013 VS02 at an altitude of 5,000 feet. FAR 25.177 d states that rudder gradients must meet the requirements listed in FAR 25.177c but the regulation is not required in JAR 25. FAR 25.305 e and f require the airplane to withstand buffeting and structural vibrations occurring in normal operating conditions, to withstand forced vibration from any failure, malfunction in the flight control system. JAR 25 also does not require regulations of auxiliary power units, rather referring all APU regulation to JAR APU a new document that regulates all APU. FAR 25.792 e allows the use of symbols for passenger information signs and placards in the place of actual letters, by its omission from JAR 25, it is inferred that symbols cannot be used for passenger information signs. The tail cone and ventral exits or large body aircraft must be

designed and constructed in such a manner as not be opened during flight and marked with a readable placard, by FAR 25.809. JAR 25 does not include a cabin ozone concentration regulation to limit the amount of ozone that is comparable to FAR 25.832. Clearly, these differences between the FAR and the JAR must be resolved in order to generate a unified airworthiness code. The ideologies that lie beneath the regulation should be understood, for example, the JAA regulates APU's in JAR APU, not through JAR 25. Nonetheless, compromise and negotiation will become a major part of creating a unified code, specifically when dealing with passenger and crew safety. Some may point to the omission of FAR 25.832 and 25.809 and accuse the JAA of not truly promoting passenger and crew safety, though the JAA may point to several JARX regulations that enhance the safety of passengers and crew members.

Among the regulations that have made both documents, there are apparent differences from the FAR 25, which was established as the base code, and JAR 25. While both documents contain 25.21d, a provision describing the general tolerances allowed for flight-testing, JAR 25.21 goes further in its language and establishes limiting factors for the tolerances. Differences in language and in definitions offer a third class of differences. JAR 25.103 and FAR 25.103 at first glance discuss the stall speed to be established for aircraft; however, JAR 25.103 and FAR 25.103 discuss two different stall speeds: FAR defines stall speed as the minimum steady flight speed at which the airplane is controllable at zero thrust, the most unfavorable center of gravity, and the weight of compliance. JAR 25.103 gives a more precise definition: the stall speed, Vsr, is expressed as equal or greater than V at CL max weighted by the square root of the load factor normal to the flight path. JAR 25.103 goes further than FAR 25.103 by limiting

Vsr for a stick pusher to two knots, a regulation not mentioned in FAR 25.103. This discrepancy in stall speed carries through the entire JAR 25, when any specification requiring the stall speed as a factor for compliance: JAR 25.107 g defines Vfto as 1.18 Vsr , though FAR 25.107 makes no mention of Vfto as a function of stall speed. Stall speed discrepancies occur in the climb and landing situations, control and maneuverability, and in stall demonstrations. Section 25.251a gives an example of differing language in the two documents. FAR 25.251 states, "The airplane must be demonstrated in flight to be free from any vibration and buffeting that would prevent continued safe flight in any likely operating condition" compares to JAR 25.251a which states, "The airplane must be designed to withstand any vibration and buffeting that might occur in any likely operating condition. This must be shown by calculations, resonance tests, or other tests found necessary by the Authority." With FAR 25.251a being the base code, the differences in JAR 25.251 a become apparent: FAR requires that in any operating condition the aircraft must be free from any type of vibration or buffeting that would create and unsafe conditions, and requires proof only through flight testing. JAR 25.251shades the regulation with the wording, "designed to withstand" and "that might occur." Hence an aircraft may be in an situation where the vibration or buffeting caused by flight operations may incur temporarily in safe flight but the aircraft can tolerate a small amount , enough to "withstand." Also, JAR 25.251 does not impose verification through flight testing, rather it allows proof of compliance through "calculations and resonance tests," and has the option of imposing future or better forms of testing. In the comparison, JAR 25.251a seems to be a more relaxed condition than the predecessor base code, nonetheless it is within the parameters of the base code and

follows the general spirit but eschewing traditional flight testing by using newer, less costly methods of testing.

The differences existing in JAR 25 and FAR 25 do not detract from the fact that both documents are compatible with the guidelines given by Annex 8 of the Chicago Convention. Though the differences are not major and pose no obstacle to creating a unified code of airworthiness, they cannot be considered minor.

3.4 International Regulation Scenarios

The idea of a lean aerospace industry has been well established. New methods and practices have permeated the aerospace industry from the manufacture of new aircraft, to the actual use of the aircraft by an airline. However, as lean as an industry can become, they still must jump over the hurdle of regulation, whether it is the type certification process that affects an aircraft manufacturer or the continuation of certification that is the responsibility of the aircraft purchaser. However, even when the aircraft is kept within one state, the complexity and bureaucracy of certification increases the sunken cost of an aircraft, whether it applies to an airplane or a helicopter. The Airbus A340 was certified by the JAA over four years requiring 600 meetings, 14 months of inspections and testing, over three thousand documents and supporting documents. The FAA spent over three years demonstrating compliance to special conditions and flight-testing for a parallel certification, compared to the Boeing 717, which received concurrent approval by the JAA and FAA, under the joint FAA/JAA program, Concurrent and Cooperative Certification. The Boeing 717-200 completed certification and flight-testing in one year, and required significantly less man-hours and testing ("Boeing 717 JAA FAA Certification") . Cooperation achieves results. However to

understand the path to cooperation, we must understand first how international regulation can improve cooperation between nations and the obstacles that hinder them.

Country A contains both the aircraft manufacturer and the aircraft operator, and the aircraft travels only within the boundaries of country A. There is one code airworthiness code to regulate airworthiness, operation, maintenance and other procedures. The complications of treaties and international law arise when there are two counties involved in the process. Country A contains the aircraft manufacturer, but in this scenario country A and country B both have aircraft operators, with the aircraft only traveling in their respective countries. Now there are two codes of airworthiness, and the aircraft manufacturer must consider the airworthiness codes of country A and country B. Later, country A and Country B agree upon a treaty that allows flights between the two. The bilateral treaty discusses various aspects of airworthiness, frequency, and pricing. In this basic example, country A and country B allow only one flight between each country each day, provided the incoming aircraft meet or exceeds the national airworthiness codes of the state the aircraft enters. Now airlines must ensure that either their current aircraft meet the other countries airworthiness codes, or they must purchase new ones that meet the requirements. The airlines must also employ certified maintenance workers to insure the continued airworthiness of the international aircraft. Though this seems complicated, it is understandable that parties strive to achieve some efficiency and cost savings. This places the onus of a compatible aircraft design on the aircraft manufacturer. Likewise the aircraft operators must strive to streamline their maintenance staff by employing engineers trained for both airworthiness codes, or training their current engineers. So far we have dealt with two countries, two airlines, and one aircraft

manufacturer in one of the countries. Things become more complicated when a third country enters the fray, as a total of three bilateral treaties are needed for the three countries. The aircraft manufacturer now must consider three codes of airworthiness, while the aircraft operator must consider three codes for maintenance, pilot certification, crew certification, and other procedures and certifications. As more countries enter the aviation market, the nations convene and decide that it would be a good idea to create an international body under whose auspices would create an international code for airworthiness, so that international air travel would be less taxing on their national industries. So the international organization creates a general code of regulations that govern international travel. Now airlines can consider two codes: one a national code that governs domestic travel, the other an international code that governs international travel. However, the single aircraft manufacturer must consider both the international regulations as well as the regulations of the other states. Nonetheless, the nations realize that using the international code, as a basis for the national code would allow their airlines to have a more versatile fleet of aircraft. This also would create a cost-saving scheme, as the airlines would be able to purchase the same aircraft for both domestic and non-domestic traffic, and allow for a versatile set of maintenance engineers, crews, and pilots. Soon most nations have domestic codes based upon the common set of international codes and the aircraft manufacturer would then worry about the differences in the codes. However, this does not forecast that the differences are minor; rather these differences can be as severe as performance restrictions and mechanical ones. Thus country A may require four engines for travel ranging over one thousand meters, while the minimum established is two for international travel. Country B may impose noise

restrictions on all domestic aircraft, where none is required by international law. Hence, the aircraft manufacturer still must meet the demands imposed by national airworthiness codes differences.

An example of this is the current FAA regulation for cockpit door intrusion prevention, a regulation to secure cockpit doors from unauthorized entry. This regulation came into being after the 2001 terrorist attacks in the United States. The regulation to secure cockpit doors from forced intrusion applies to all US registered aircraft of a certain size (i.e. limiting them to all passenger aircraft, as opposed to private aircraft), as well as all aircraft flying within destinations in the US. However pursuant to both bi-lateral and international treaties, foreign registered aircraft entering the US airspace are exempt to the cockpit door regulation (cf. 14 CFR 121) In these situations, when a regulation is viewed as important to secure the safety of the aircraft, international regulations may follow. After the FAA regulation came into effect, a security meeting of the ICAO convened to discuss regulation that would implement cockpit intrusion prevention in the body of international regulation, pending approval from the member states to enact such legislation. Independently, other aviation authorities also are looking into creating similar regulation for all aircraft in transport within their territories. This is an example of how countries realizing a need to for some commonality in their regulations to insure overall safety. In this case, it behooves a country to promote a similarity of legislation, lest consumers perceive that their national air industry is less safe than others, and hence choose to travel by other means. This applies to the airlines, as consumers today have a greater opportunity of choice, and if the consumers think an airline is not sufficiently safe they will choose not to fly on said airline, even if the airline is subject to same amount

and level of regulation. The demise of Value Jet Airlines in the 1990's is a definite example of consumer thought in action: following the tragic accident of Flight 592 in the Florida Everglades, the bargain airline was unable to recuperate from drop in consumer confidence from the thought that the airline was overall unsafe and unreliable. Though air authorities have differing regulations, there is a need for commonality: to promote uniform safety regulations and to insure consumer confidence in the air travel industry.

The scenario becomes more complicated when there is more than one aircraft manufacturer especially when a country that seeks to protect their national industry, or is perceived to do so. In such a case, a country may seek to limit competitors either through economic or regulatory restrictions. In such cases the more obvious method of limiting competitors is through regulation. Country A and Country B both house two aircraft manufacturers. Country A has a well established aircraft manufacturing industry, while country B recently entered the aircraft manufacturing industry. These companies compete to sell aircraft to the airlines in both countries, as well as other countries. Afraid that Aircraft Manufacturer A (AM A) is selling more aircraft and threatening the stability of AM B, Country B places a tariff on all aircraft imports which forces airlines in country B to reconsider purchasing foreign aircraft. Obviously irritated, Country A on behalf of AM A, takes country B to the international trade court. The court rules that the tariff is an impediment to free trade, and orders country B to remove the tariff, which country B does. Country B, still worried about the survival of its air manufacturing industry, issues a regulation that limits the age of aircraft that are able to fly in their country, in the guise of a safety requirement. This proves effective in many ways: one, it removes older aircraft from service. In our scenario, country A's aircraft manufacture is older and more

established, and hence have a majority of the older aircraft. This policy also locks out AM A's resale market of older, serviceable aircraft. Second, the safety act levels the playing field in country B, as most new aircraft will have been made by AM B, enabling better competition in Country B. Weary, Country A argues to international trade court that the regulation in country B is contrary to free trade and stifles competition, however this time the trade court disagrees because the regulation is applies to the aircraft of both countries, and in accordance with international law, country B can impose reasonable safety regulations on aircraft flying within their boundaries. In our small scenario, country B enacts differing legislation to protect their air industry, under the guise of regulatory safety.

The best example of protective regulation is the hush-kit controversy in European markets. In the late 1990's, the EU pursued regulation that would ban all aircraft equipped with aircraft engine mufflers from landing at European airports. Aircraft Engine mufflers, or hush kits, are attached to older aircraft engines to meet current noise regulations ("US to Initiate Formal Complaint Against EU on Hushkits"). The European Union claimed that the hush kit regulation was necessary to provide both adequate emission control of particulates and of noise. The argument is that because Europe is more condensed than other air travel markets, the effects of noise and air pollution are more acute. Hence, Europe required stricter regulation. The fact that most hush kitted aircraft are U.S. aircraft, and that US manufacturers make most hush kits, irritated the US and with Europe being the largest export market for US aerospace producers, the US claimed that the hush kit regulation, based upon design rather than performance standards, was regulatory measure that discriminated against free and fair trade. In

accordance with international law, the US petitioned the ICAO to resolve the dispute under Article 84 of the Chicago Convention, marking the first time the US bringing such action ("US File Complaint with ICAO on EU Hushkit Regulation"). According to the complaint, the EU hush kit decision was a departure from uniform international aircraft noise standards established by the ICAO. The US expected to lose loss of more than two billion US dollars, in a market that contributes a thirty-seven billion surplus to the US trade balance ("US File Complaint with ICAO on EU Hushkit Regulation" and "US to Initiate Formal Complaint Against EU on Hushkits"). By March 2002, the EU had repealed the hush kit regulation, and replaced it with a noise management directive, that adopts many of the ICAO regulation on noise management. The US terminated the complaint issued to the ICAO and the ICAO established an international framework for airport noise management ("US Pleased by EU Decision to Repeal 'Hushkit' Regulation"). Though it is uncertain whether or not EU regulation was meant to discriminate against US aerospace producers, it is clear that a threat to "free and fair trade" was perceived. The US took action to protect it aerospace industry, by using the conduits of international law, and prevailed. What does this say as to the prospects of uniformity and cooperation? It is true that with a uniform regulation among the nations, the problem of restrictive or anti-competitive regulations would not be considered a problem, and the time and money wasted in the effort to overturn such restrictive regulation would have been channeled into more positive and helpful decisions to reduce noise pollution, and other concerns. It is clear that international regulation currently attempts to provide a level and fair field of competition with respect to the international air travel market and that any regulation considered anti-competitive may be considered

contrary to the established international policies and standards. This does should not bar states from creating new legislation, rather a state must show that the new regulations are based on results and not arbitrary measures. In comparing the anti-hushkit regulation to cockpit door intrusion prevention regulation, anti-hushkit regulation was seen more as an arbitrary design regulation, rather than one based on the prevention of noise pollution. 14 CFR Part 121 and Part 25 require cockpit doors to be designed and retrofitted to stop unwanted entry into the cockpit; in the regulation. Cockpit door intrusion on the other hand was seen as a positive measure that was based wholly upon insuring the security of the aircraft; nonetheless, the US justified the change under the jurisdiction of national safety and knowing that ICAO has no requirement for cockpit door intrusion, notified the ICAO (*Flight Crew Compartment Access* 2114 and *Door Designs and Security Considerations in the Design of the Flight Deck on Transport category Airplanes* 2124).

In the continuing scenario, there are two states involved in aircraft production. Realistically, many nations are involved in the production of aircraft: from one state that produces the fuselage of the aircraft, another the wings, and several others in the construction of control and computer systems, and finally the state where the whole aircraft is assembled. In such an environment, it is conceivable for these separate entities to create a collective group that would function as a single body devoted to aircraft production. To promote cooperation and ease in regulation, their respective countries form a single regulatory agency that supercedes the authority of their own national regulatory agencies. Through treaties and conferences, Countries A, B, C, and D unite their national aviation authorities, creating a single aviation authority. Now, an aircraft or

aircraft parts manufactured in countries A, B, C, or D can be used in any of the member nations. Obviously will support trade between these nations.

The example of the JAA clearly illustrates this example. Beginning in the 1970's as a progression of common regulation, the JAA facilitates the development and certification of joint projects and eases the import of export of aeronautical products between the member nations of the JAA. The JAA succeeded in removing the burdens of the multiple certifications, creating common maintenance systems, and promotes work sharing between the member nations. The benefit of joint certifications is twofold: one it reduces the cost and manpower for the aircraft manufacturer; second, common regulation reduces governmental bureaucracy. Both aircraft manufacturers and aviation authorities recognized these benefits. The Swedish Civil Aviation Administration commented on the certification of the Saab 340 in the early eighties:

> The primary objective of the joint process shall be the efficient certification of the SF340 in the manner acceptable to the participating authorities and such that each authority obtains a satisfactory basis for its won national certification of the aircraft but will less total work than would have been required has the national certifications or validations been done individually based on the Swedish or US certification (Hedblom 207).

European aircraft producers placed the pressure on the JAA to minimize the burden on the manufacturer in certification work, without dealing with different countries on a case-by-case basis. Aircraft producers also noted that joint certification would allow for a simpler production line: since several counties have the same standards, it would be much simpler to produce one design to satisfy the requirements, rather than have several designs for different nations. The gives greater flexibility to the aircraft producers by making their products certified in several states without any need for change. Airlines

are able to buy and sell aircraft across the boundaries without having to re-certify their aircraft, which gives them a greater control over their respective fleets. The JAA and its future incarnations have been a progressive experiment in states relinquishing national sovereignty, while promoting their national aerospace industries. Though the success of Airbus Industries can be argued elsewhere, the joint certification provided by the JAA serves only to help and not hinder the success of Airbus and all other European aerospace industries. What does the JAA experience bears in relevance? It shows that idea of national sovereignty is outdated in a global society. While it is true that nations should reserve the right to protect their national interests and boundaries, they should realize the benefits of cooperation and joint ventures with other nations. The JAA example shows that a set of regulations common to more than just one nation is feasible and practical. To adjust the example to contain more than just the members of the JAA would not strain the success of the JAA, as membership in JAA has increased since its inception in the 1970's.

The current international legislation does not supercede the national regulations in place. It presents a platform by which national standards are compared to one another, via the principle of national sovereignty: the laws of a nation are held above international law. ICAO standards and regulations are simply recommended guideline that nations may or may not follow, in certain cases, the ICAO allows for many exemptions to their guidelines: some nations do not have a national airworthiness code for example, while others have exemptions for size standards. ICAO cannot promote its vision of a uniform international aerospace field, without having any punitive powers, which it does not have, save through the international courts. The example of the JAA proves valuable to the experience of international cooperation and to the future of the ICAO. While limiting the

national sovereignty of the member states, the JAA provides an environment of true cooperation and an exactness of regulation. This eases the bureaucracy that can at times entangle the air transport industry. When an aircraft or an aircraft is certified in a member state, all member states simultaneously certify the aircraft. This reduces the cost of certification, since the aircraft is placed through the certification once, and not subject to different regulations of the different states. This increases the freedom of trade, as the aircraft can be freely traded to other states without need to certify the aircraft in the new state. Maintenance, aircraft operations, pilot and crew certification, accident investigations are among the many nuances of the air transport industry that will achieve significant efficiency and effectiveness, though a singular airworthiness code.

Initiatives in developing a single design code and in creating a worldwide type certification for aircraft have been spurred by significant progress in harmonization of JAA and FAA aircraft design standards.

> At present there is neither a worldwide aircraft neither design standard nor a multi-lateral legal framework for the mutual recognition of aircraft type certificates. With the trend of multinational design, production and operation of aeronautical products, it is timely to examine the legal implications of harmonizing national rules (Holderbrach and Weber 4).

Not only ICAO recognizes the need for a more comprehensive multinational system, but aircraft producers and aircraft consumers as well.

> With the globalization of markets and the resulting increase in competition aircraft and engine manufacturers, aircraft operators and aviation regulators have become increasingly concerned with the economic burden associated with the validation of the initial certification in cases where this includes technical inspections, evaluations and testing (Holderbrach and Weber 4).

Hence, the incentives for harmonization are a streamlined certification process, elimination of extra-national validation, and removal of technical trade barriers. The ITF,

an international union which represents the transport workers, also sees the benefit of more harmonized system of international regulation that would promote a worldwide set of detailed safety rules and labor conditions that would prevent social dumping. There is an industry-wide movement, from labor unions, aircraft management, to major international organizations, to create some set of worldwide regulations that would cover many aspects of international aviation; from type certification or aircraft to safety standards for air transport workers. The movement focuses on two key points: safety and cost efficiency.

Creating a worldwide air transport set of regulations is easier said than done. The issue of sovereignty is not the only barrier to consider: differing environmental standards have been a source of contention, enforcement of current international regulations is difficult if non-existent, and amendment of the differing opinions of regulation. Another major problem for a supra-national aviation regulatory organization is the time required to create one. The JAA, currently the most successful experiment in a supra-national aviation regulatory agency, has taken more than twenty years and still has yet to reach its objective as the EASA.

National sovereignty is the keystone for all international legislation. Since the 1919 Paris Conference, international aviation regulation has been based on nation preserving their national sovereignty: the ability to regulate aircraft within their respective boundaries. Even today, ICAO, which is the supreme aviation regulatory agency with UN jurisdiction, does not interfere with national sovereignty of its member states. ICAO has no authority to insure compliance by member nations, and nations have the options of requesting exemptions to achieve certification with minimal

consequence – a footnote on the certificate of airworthiness does not qualify as deterrence. Even member states have the ability to nullify international treaties at whim to meet their own needs. The 1971 case between India and Pakistan clearly illustrates this point. Following the destruction of an Indian airliner forced to land at Lahore airport in Pakistan, India banned all Pakistani flights from flying over Indian airspace. Arguing that India had violated the Chicago Convention and the Transit Agreement, Pakistan filed a complaint to the ICAO council. The Council ruled in favor of Pakistan based on the treaties signed by both nations. However, claiming that the Chicago Convention and Transit agreement had been suspended during the 1965 Pakistan-Indian war, India appealed to the International court of Justice arguing that a 1966 agreement superceded the Chicago convention and transit agreement which was never renewed. The decision of the ICJ was adamant at securing the rights of ICAO, lest India generate a bad precedent for other nations:

> [The ICJ] rejected the Government of Pakistan's objections on the question of the ICJ's competence and held that it had jurisdiction to entertain India's appeal; it further considered the council to be competent to receive the Application and Complaint laid before tit by the Government of Pakistan; and in consequence, the Court rejected the appeal lodged by the Government of India against the decision of the Council to assume jurisdiction in those respects (Diedericks-Verschoor 42).

Rather than dispute the Chicago Convention and its treaties, India and Pakistan both barred the other country from flying over their respective territories in 2001 citing safety concerns and imposing national sovereignty. The US has barred all flight originating or touching down in Iraq from entering US airspace. Clearly, this could be conceived as a violation of the Chicago Convention and the Transit Agreement; however, the US can bar flights from hostile nations based upon the doctrine of national sovereignty, citing

general safety concerns and the continuance of the embargo sanctioned by the UN following the invasion of Kuwait. Disputes between nations can cause a breakdown of treaties that form the basis of international regulation; combined with the doctrine of national sovereignty, it can be virtually impossible to create a uniform worldwide code of aircraft regulations.

4.0 Conclusions and Discussions

4.1 Conclusion

National sovereignty extends over the other issues; nations have the ability to have differing environmental regulations, labor regulations, licensing regulations, and much more. The hush-kit controversy mentioned earlier was based on the national sovereignties of the member nations of the European Union to create legislation to regulate aircraft in their airspace. Because the European Union repealed the regulation, the ICAO Council or the ICJ never resolved the issue; however, it would be conceivable that the European Union would be able to cite national sovereignty to validate their legislation concerns. This doctrine has allowed for stricter environmental regulations in Europe, than in other major air markets, ranging from engine emissions to noise control over major urban areas. . Obviously the pressure and demands required by new environmental codes would generate opposition from entities within the air transport industry, from the aircraft engine produces, who would bear the majority of the environmental concerns, to the respective national regulatory agencies, who would consider stricter regulations excessive and restrictive. Nonetheless, in the development of a worldwide code for air regulation, it would be beneficial to include a code that would reflect stricter environmental codes, as those exist in Europe. The reductions of noise and

particulate emissions that the new laws would require would be beneficial not only to major urban centers but to the overall health of the environment.

The time required to create a code will be great: development, ratification, implementation, and enforcing of regulation will all take a significant amount of time. Even using current international law, i.e. Ice's Annex 8 as a starting point, the time estimate would be over twenty years just for ratification and enforcement of an enhanced Annex 8. However, a change in Annex 8 would not be only ones required: amendments to the Chicago Convention, the various annexes, and the transit and transport agreements would take a considerate amount of time and effort to re-develop. A quicker alternative is to create a multilateral instrument that would provide for multi-national recognition for type-certificates issued by a partition member state. The current standards set forth by the ICAO could be used as the basis of a multi-lateral aggregated and wood provide the ground to amend the Chicago Convention or to develop a new convention to create a more coherent regulatory body.

Currently there exists no singular code of regulation, though the ICAO provides a minimal set of standards and regulations that apply to all nations. The current framework does not allow for a singular comprehensive set of airworthiness regulations, though efforts in harmonization have begun. The idea for harmonization lies in the knowledge of the efficiency and product it offers, and it behooves any nation to promote such ideology in a globalize society. The obstacles that hinder a cooperative international organization are the same obstacles that hinder other international projects and though it may sound trite, nation-states must work together and be ready to make sacrifices on their

part to create worldwide regulations that would be beneficial to the air transport industry in all sectors.

4.2 Discussion For Future Study

In the pursuit of a single airworthiness code, economic impact will play an important factor to show the feasibility and necessity of said code. Studying the economic impact of unified airworthiness codes of JAR 25 can be performed with the following suggestions: data prior to the formation of the JAR 25, data during the formation of JAR 25, and data after the established JAR 25. The data should consist of the cost of certification, hours required to perform certification, cost differentials, etc. A second venue of research consists of researching the cost savings of joint FAA and JAA certification and the effect of bilateral treaties on the aircraft certification. Another worthwhile endeavor would be a thorough investigation of the differences of environmental differences, related specifically to the engines. Finally, a comprehensive study of the all the differences in all aircraft regulations ranging from Japan to South Africa that would cover all aspects of air navigation regulation, such as air traffic control, language, software, and airport facilities, would be a course for further research.

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