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Chapter II GENERAL AVIATION ENVIRONMENT INTRODUCTION

General aviation does not exist in a vacuum independent of other influences. It is controlled by Congressional action and extensive mandatory regulation. The system components interface in compliance with statutory provisions and operating rules.

Economic factors influence airport administration and finance. Vehicle airworthiness certification costs are becoming increasingly burdensome. Rising costs of nearly all goods and services necessitate close scrutiny of expenditures. General aviation is no exception. Certain groups are taking hard looks at competitive modes and travel substitutions, especially for intercity and business trips.

Substitution—a change in mobility patterns and communicative behaviors—may lead to profound changes in our interaction patterns.

Protection of the environment, such as lowering of noise levels, natural resource depletion prevention, and the preservation of clean and fresh water are all concerns of general aviation.

The following discussion examines some of the background, development, and relationships between and among these issues.

THE REGULATORY ENVIRONMENT

Regulatory Scope

The four major areas of concern pertaining to the role of government regulation in general aviation are: (1) airports, (2) air agencies, (3) aircraft, and (4) airmen. Some regulation of general aviation as well as other transportation and public services is undertaken at every level of government.

The Federal Government under its authority to regulate interstate commerce, has played an almost exclusively predominant role in the regulatory control of aircraft and air agencies. Airport regulation, however, has been predominantly under local control. This situation is rapidly changing as Federal assistance to local airports increases. States still play an important role in approving the allocation of Federal airport improvement funds. Local governments exercise their authority

through the final approval or disapproval of the required matching funds to meet the Federal grants for airport improvement. Physical control of the airport environment also remains in local hands through their zoning jurisdiction, constraining ordinances, and through local court decisions. Different areas of regulatory concern are cross-classified in Figure 2-1, by both the level of government and the area of regulatory concern.

Legislative and Regulatory History

The people of the United States gave Congress the right to regulate interstate commerce for the good of the nation. It was natural, therefore, that the first direct implementation of aviation control came through the Air Commerce Act of 1926.

The Air Commerce Act of 1926

This act undertook regulation by licensing pilots, aircraft, and agencies, and by introducing conditions pertaining to the issuance and renewal of appropriate licenses and certificates. These conditions included demonstration of knowledge and proficiency by pilots and agencies and minimum safety requirements relating to aircraft. Compliance with these rules was made mandatory by the Act, which also mandated the promotion of air commerce and the creation and operation of an airways system. The Bureau of Air Commerce, which was created by the Act, was charged with this responsibility and thus became the forerunner of the former Civil Aeronautics Agency (CAA) and the Civil Aeronautics Board (CAB) and the Federal Aviation Administration (FAA) as we know them today today.

The Civil Aeronautics Act of 1938

The Civil Aeronautics Act of 1938 created the Civil Aeronautics Authority (CAA) to regulate aviation with respect to both safety and economics. The 1940 amendment gave the Civil Aeronautics Board (CAB) the authority for both economic and safety regulation and for determination of "probable cause" in aircraft accidents. The safety regulation was to be implemented by the CAB which was created by the 1940 amendment to the Act.

The 1940 amendment not only gave the CAB the authority to regulate air carriers by establishing fares and authorizing routes, but clearly entrusted the CAA with the responsibility of promoting air commerce by developing the federal airways system. This responsibility led to the Federal Airport Act of 1946 and the subsequent Federal Airport and Airway

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Airports	Air Agencies	Aircraft
<p>FEDERAL Legislative</p> <ul style="list-style-type: none"> Federal Aviation Act of 1958 Federal Aid to Airports Act, 1946 Department of Transportation Act of 1966 National Environmental Policy Act, 1969 Airport and Airway Development Act, 1970 Airport and Airway Revenue Act, 1970 <p>Regulatory</p> <ul style="list-style-type: none"> Federal Air Regulations Part 107 Airport Security Part 139 Certification and Operation Part 151 Federal Aid to Airports Part 153 Acquisition of U S Land for Public Airports Part 154 Acquisition of U S Land—ADAP Part 155 Release of Airport Property from Surplus Part 159 National Capital Airports Advisory Circulars (FAA) 150 Series Technical Standard Orders National Airport System Plan 	<p>Legislative</p> <ul style="list-style-type: none"> Federal Aviation Act, 1958 (CAB, FAA) Department of Transportation Act, 1966 (NTSB) <p>Regulatory</p> <ul style="list-style-type: none"> Federal Air Regulations Part 91 General Operation and Flight Rules Part 121 Certification and Operation—Domestic, Flag, Supplemental Air Carriers and Commercial Operators of Large Aircraft Part 123 Certification and Operation—Travel Clubs Using Large Aircraft Part 127 Certification and Operation of Scheduled Air Carrier with Helicopters Part 129 Operations of Foreign Air Carriers Part 135 Air Taxi and Small Commercial Operators Part 141 Pilot Schools Part 143 Ground Instructors Part 145 Repair Stations Part 147 Maintenance and Technician Schools Civil Aeronautics Board Economic Regulation National Transportation Safety Board Investigative Regulations 	<p>Legislative</p> <ul style="list-style-type: none"> Federal Aviation Act of 1958 <p>Regulatory</p> <ul style="list-style-type: none"> Federal Air Regulations Airworthiness Standards Part 23 Normal Utility and Aerobatic Airplanes Part 25 Transport Category Airplanes Part 27 Normal Category Rotorcraft Part 29 Transport Category Rotorcraft Part 31 Free Balloons Part 33 Aircraft Engines Part 35 Propellers Part 36 Noise Standards Part 37 Technical Standard Order Authorizations Part 43 Maintenance Part 45 Identification Part 47 Aircraft Registration Part 49 Recording Aircraft Titles and Security Documentation
<p>STATE Legislative</p> <ul style="list-style-type: none"> Enabling Statutes for Airport Purposes 1. Condemnation 2. Zoning 3. Operation 4. Taxing 5. Leasing 6. Financial (Grants and Bonds) <p>Regulatory</p> <ul style="list-style-type: none"> Commercial Licensing System Planning Approval of Grants (Federal and Local) 	<p>Legislative</p> <ul style="list-style-type: none"> Enabling Statutes or Aeronautical Authority Acts Certification and Operation of Intrastate Carriers (Large) Intrastate Portions of Interstate Carrier Operations Air Taxis and Commercial Airlines <p>Regulatory</p> <ul style="list-style-type: none"> Not Applicable 	<p>Legislative</p> <ul style="list-style-type: none"> Not Applicable <p>Regulatory</p> <ul style="list-style-type: none"> Aircraft Registration or Certification Recording Chattels or Liens
<p>LOCAL Legislative</p> <ul style="list-style-type: none"> Minimum Altitude Ordinances Head Taxes Zoning Regulations <p>Regulatory</p> <ul style="list-style-type: none"> Not Applicable 	<p>Legislative</p> <ul style="list-style-type: none"> Noise and Pollution Level Ordinances <p>Regulatory</p> <ul style="list-style-type: none"> Not Applicable 	<p>Legislative</p> <ul style="list-style-type: none"> Not Applicable <p>Regulatory</p> <ul style="list-style-type: none"> Not Applicable
<p>OTHER Court Action</p> <ul style="list-style-type: none"> Nuisance Inverse Condemnation Zoning 	<p>Court Action</p> <ul style="list-style-type: none"> Nuisance 	<p>Court Action</p> <ul style="list-style-type: none"> Not Applicable

**MAJOR AVIATION CONTROLS
LEGISLATIVE AND REGULATORY
FIGURE 2-1**

Development Act of 1970 and the concurrent Airport and Airway Revenue Act. The latter provided funds for the support of programs initiated under the former. The main sources of these funds are airline ticket and aviation fuel taxes.

The Federal Aviation Act of 1958

Following several mid-air collisions in the 1950's, Congress passed the Federal Aviation Act in order to better define and to isolate air safety responsibility. Under the Act, CAB retained economic jurisdiction and the responsibility for determining probable "cause of accidents," while FAA acquired the responsibility and authority to promulgate safety regulations. Although this system seemed to be functioning successfully (the domestic air carriers hit a zero fatality year in 1970), Congress placed the control of air transportation under the jurisdiction of a newly created Department of Transportation in that year.

The Department of Transportation Act of 1970

This act transferred the responsibility for the promulgation of safety rules to the Secretary of Transportation and established the National Transportation Safety Board which now determines probable cause of accidents. It also directed that safety rules be placed under the jurisdiction of the FAA, leaving the CAB with the responsibility for economic regulation of air transportation.

Thus, the CAB presently regulates all common carriage by air including route authorization, fares, and preservation of the financial well-being of the carriers to assure continued existence and service to the public. FAA regulates aircraft, pilot, and air agency certification and operation as well as airway and airport development and funding.

Airports

Several states have stepped in to fill the voids in aviation regulation or control in the area least affected by Federal legislation—the airport.

Many states license airports for commercial reasons, including tax regulation and control of fees and charges. The Federal government has recently undertaken to license all air carrier airports for safety requirements (FAR Part 139), and continues to establish minimums for safety specifications at all airports accepting Federal funds for improvement.

Subdivisions of the states have passed ordinances restricting the use of airports, some of which have been upheld by the courts, while others were declared "an undue burden on in-

terstate commerce." Zoning, however, remains the chief regulatory area open to the states and many have passed enabling legislation for local zoning laws and authorized condemnation for airport purposes.

The FAA is charged with the responsibility of developing an airport system for the United States. It does so through a National Airport Systems Plan (NASP). Of the approximately 13,000 landing strips in the country, about 3,040 are in the NASP. Inclusion of an airport in the plan provides it with basic eligibility for development funding, given that all other qualifications are met. Development funds are derived from the Airport and Airways Trust Fund created under the 1970 act. The FAA reviews the following main requirements as conditions to application for development funding: (1) submission of an airport master plan, (2) submission of cost estimates, (3) information regarding the environmental impact of proposed improvements, and (4) a clear indication of the source and availability of matching funds.

Funds are then allocated on a priority basis according to the then existing policy of the administration. Upon acceptance of funds, the airport must enter into an agreement to construct and operate the airport according to the pertinent Technical Standard Orders (TSOs), Advisory Circulars (ACs), and Federal Aviation Regulations (FARs) issued by the FAA. The agreement also required public operation of the airport and prohibits discrimination.

Regardless of whether or not federal funds are involved, airports serving certificated carriers must comply with FAR—Part 139. This regulation controls the safety characteristics of the airport and facilities, as well as their day-to-day operation.

Most states have passed enabling legislation permitting their political subdivisions to promulgate zoning ordinances and to institute condemnation proceedings for development or control purposes. Some states also undertake to license airports not controlled by the Federal government while others merely license them for commercial or taxing purposes, thereby avoiding conflict with federal regulations.

States usually exert some control on airport development, through the provision of matching funds. In some states, such as Connecticut, the entire state airport system is operated by the state. In others, the State Aviation Department exercises varying degrees of control over the approval of requests for federal funds.

Legal Implications of Airport Planning and Land Use

Few types of transportation facilities generate more controversy regarding their compatibility with neighboring land uses than do airports. General aviation airports, particularly those accommodating corporate aircraft, are no exception. As a community's demand for general aviation services increases in response to its population growth and economic development, the availability of open space in which to construct or operate an airport shrinks at an equally rapid rate in response to similar pressures. As a result, homeowners living uncomfortably close to an existing or planned facility frequently resort to the courts for protection from any actual or anticipated encroachments on their right to use and enjoy their property, regardless of who was there first—the airport or the property owner. At the same time, local officials typically attempt to devise whatever constitutionally permissible regulations are available to minimize this friction between the airport and its neighbors. It is therefore from these two perspectives—that of the neighboring homeowners and that of the municipality as a whole—that the airport planner should evaluate the legal implications of any land use plan he formulates for a general aviation airport.

Ideally, a community planning a new airport should acquire sufficient acreage of land surrounding the facility so as to insure that the airport could in no way interfere with its neighboring property owners. By leasing back most of this buffer area to various industries (with the necessary restrictions on use) it could then reduce some of the acquisition costs and provide for future expansion of the airport as well. However, the initial investment cost alone would still make this approach impractical for many communities. Moreover, any such attempt becomes even more difficult if, as in most cases, the airport is already there when the city or county finally recognizes the need for regulating adjacent land use. If the airport is privately owned, the local governing board will also lack any authority to initiate such a plan. Consequently, many airports today—both publicly and privately owned—find themselves in the midst of time consuming and expensive legal tangles with their neighbors.

Although actions in common law nuisance and trespass seldom succeed, they can become potent weapons against airports that fail to observe proper operating procedures. In general, it has been held that, if properly located, constructed, and operated, airports are not a nuisance unless it can be shown that they in some significant way endanger the health and safety of neighboring citizens.¹ Contiguous property owners must yield their privacy to a reasonable degree, so that legitimate businesses such as airports, which presumably contribute to the general welfare, may operate for the benefit of all.² Similarly, the operator of an airplane has been held privileged to enter the airspace above land in the possession of another as long as he does so in a "reasonable" manner, at such a height as is in conformity with legislative requirements, and without interfering unreasonably with the possessor's enjoyment of the surface and the airspace above it.³ Only when the flights are so low and frequent as to be dangerous to the safety of landowners or as to substantially interfere with their enjoyment of their property will an injunction issue in a nuisance or trespass action.⁴

A more serious problem arises, however, where localities have failed to acquire through eminent domain the necessary easements for approach lanes over property surrounding public airports. Although the ancient doctrine of *Cujus est solum, est usque ad coelum* ("the owner of the soil owns to the heavens") is no longer relevant in this modern age of air travel, and even though the federal government has declared itself to be possessed of complete and exclusive national sovereignty over airspace needed for takeoffs and landings (49 USC Sec. 1508), courts have nevertheless consistently held that property owners are entitled to compensation should overflights interfere substantially with the use and enjoyment of their property. Of course, no artificial line may be drawn to determine at which altitude an overflight becomes a "taking," since each case depends upon the nature of the interference and the kind of use to which the property is being put.

In the landmark case of *United States v. Causby*, 328 U.S. 256 (1946), the Supreme Court held that inverse condemnation or taking had occurred where low and frequent flights by military aircraft over plaintiff's property had diminished its value and severely limited its utility. The court reached a similar decision in *Griggs v. Allegheny County*, 369 U.S. 84 (1962), noting in particular that, in accepting federal funds for the airport, the county had also

¹ *Thrasher v. Atlanta*, 178 Ga. 862. But see *Swetland v. Curtiss Airports Corp.*, 55 F.2d 201.

² *Anderson v. Souza*, 36 Cal. 2d 825.

³ *Reaber v. Martin Theatres of Florida, Inc.*, 52 So. 2d 682.

⁴ *Vanderslice v. Shawn*, 26 Del. Ch. 225.

agreed to acquire all necessary easements therefor.

However, an important distinction has arisen, in the federal courts at least, as to those cases where an actual physical invasion of the airspace over the property in question has occurred and those where the interference did not involve a direct overflight. Although the former may be compensable as an unconstitutional taking, the latter is frequently considered merely "consequential" damage for which the U.S. Constitution provides no remedy. Thus, in *Batten v. U.S.*, 306 F. 2d 580 (1962), the circuit court of appeals denied compensation when the noise, vibration, and smoke that harassed residents was not accompanied by physical invasion by the Air Force jets of the airspace directly above.⁵ State courts are split on the issue of whether an overflight is necessary for compensation, but many have now rejected the taking/damages distinction and consider instead whether the flights are an "unreasonable burden" on the complaining property owners.⁶

There are also a number of other limitations to recovery for a taking. By definition, of course, a taking requires public ownership or control of the airport. Even then, if the market value of the property has actually increased because of the airport's proximity, no compensation is permissible regardless of the noise or other annoyances.⁷ Depending on the relevant statute of limitations, failure to contest an encroachment can cause the easement to ripen into a prescriptive right. In some instances, subsequent buyers who purchase with notice of the adjoining airport and its flight patterns may be held to have assumed the risk of noise and other damage when they purchased their land.⁸ Finally, courts are reluctant to grant compensation without a showing of **substantial** interference with the use and enjoyment of the property. Flights at altitudes of several thousand feet are not likely to involve an unconstitutional taking of property without just compensation.

While private actions such as nuisance and

inverse condemnation suggest one kind of approach to resolving land use conflicts around airports, local planning boards are likely to resort to another—zoning. Conceptually, zoning seeks to segregate incompatible uses into their own largely homogenous districts, thereby eliminating the friction between certain users of land, protecting the health and safety of the general public, and insuring orderly growth and development of the community. Yet the effectiveness of zoning depends entirely on the forethought of the original planners and the willingness of administrative officials to strictly enforce the provisions of the ordinance. The checkered history of zoning in most states indicates that it has been, in many instances, a less than successful method of land use control. However, zoning still remains one of the best tools available today for balancing the rights of individual property owners with the interests of the community in orderly land development.

One of the initial steps both in locating the airport and zoning the area around it is determining the types of use that would be compatible with its operation. Schools, hospitals, and residences appear the least desirable, whereas open space, agriculture, recreation, and commercial and industrial development represent the most likely possibilities. Once having identified the proper uses, the task then becomes to devise a large enough buffer zone, particularly under the approach lanes, so as to exclude all but these enumerated uses. This kind of exclusive district zoning has generally been upheld where authorized by the state enabling statute and where enacted under a proper exercise of the police power. That is, it must be shown (as with zoning in general) that the ordinance bears a substantial relationship to the health, safety, morals, or welfare of the general public and does not unduly burden a few citizens for the benefit of all.⁹

Several other statutory or constitutional restrictions also must be considered, however. Most enabling acts require that the zoning ordinance and all amendments thereto be drawn "in accordance with a comprehensive plan." This requirement has been interpreted as imposing a burden upon the municipality to study and consider **all** elements involved in the zoning scheme, including prior existing uses, topographical features, and so forth, such that the final ordinance represents an "integrated product of a rational process."¹⁰ Thus, the establishment of the buffer district and indeed of the airport itself cannot appear haphazard or piecemeal in relation to the rest of the plan for

⁵ See also *Bennett v. United States*, 266 F. Supp. 627 and *United States v. DeQueen and Eastern Railroad Co.*, 167 F. Supp. 545. One alternative is to sue under the Federal Tort Claims Act for physical damage to property, as in *Western v. McGehee*, 202 F. Supp. 287.

⁶ *Thornburg v. Port of Portland*, 376 P. 2d 100; see also *Martin v. Port of Seattle*, 391 P. 2d 540.

⁷ *Dick v. United States*, 169 F. Supp. 491.

⁸ Hill, "Liability for Aircraft Noise: The Aftermath of *Causby* and *Griggs*," 190 U. Miami L. Rev. 1, 27-30.

⁹ *Rathkopf, The Law of Zoning and Planning*, 3rd ed., New York: Clark Boardman Co., Ltd., 1974.

¹⁰ *Kozesnick v. Moore Township*, 24 N.J. 154.

the development of the entire community.¹¹

The concept of a comprehensive plan becomes especially important if a locality needs to amend an older ordinance in order to provide the necessary use districts for an airport facility. The amendment must be consistent with either the previously existing scheme or with one which could be rationalized as a logical extension thereof, or it must be part of an entirely new plan.¹² Moreover, persons in a previous classification may rightfully rely upon the rule of law that the classification made in the general ordinance will not be changed unless the change is required for the public good.¹³ Some jurisdictions (though a minority) even place the burden of proof on the proponents of the amendment to show that there was some mistake in the original zoning or that the character of the neighborhood had changed to such an extent that reclassification ought to be made.¹⁴

One option permitted by some enabling acts is interim or stop-gap zoning. An interim ordinance reclassifies land so as either to discourage temporarily its utilization or to permit only such uses as would not interfere with a contemplated plan. The intention is thus to restrict development until such time as a new comprehensive plan (which would then include the airport and buffer zone) can be instituted. The number of non-conforming and vested uses can thus be minimized in the critical zones. However, there is a division of authority as to the constitutionality of such an ordinance,¹⁵ and most courts approving the measure emphasize the "reasonableness" of the short time lapse involved.¹⁶

¹¹ *Hageman v. Board of Trustees*, 20 Ohio App 2d 12 (zoning that modified existing comprehensive plan for airport development held to be a taking)

¹² *Rathkopf op cit*

¹³ *Kennedy v. City of Evanston*, 384 Ill 426

¹⁴ *Wakefield v. Kraft*, 96 A.2d 27

¹⁵ Compare *Rubin v. McAlevy*, 282 N.Y.S. 2d 564 with *Peacock v. County of Sacramento*, 77 Cal Rptr 391

¹⁶ See, e.g., *Deal Gardens, Inc. v. Board of Trustees of Loch Arbour*, 48 N.Y. 500 (ordinance in effect for 1-12 years held unreasonable)

¹⁷ *Fara Ent. Leasing Corp. v. Newark*, 132 N.J.L. 370

¹⁸ *Sarasota-Manatee A.A. v. Harrell's Candy Kitchen*, 111 So 2d 439

¹⁹ *Peacock v. County of Sacramento*, *supra*

²⁰ *State ex rel. Healy v. Board of Commissioners*, 37 Ohio Ops 58

²¹ *Rathkopf op cit*

²² *Frink v. Orleans Corp.*, 159 Fla. 646. See *Engel v. Cranden*, 156 Fla 592

²³ *Golden v. Planning Board of Township of Ramapo*, 30 N.Y. 2d 99

Another type of zoning regulation has also received a mixed reaction in the courts. Although localities universally are permitted (in principle) to impose restrictions upon the height of buildings, height restrictions around airports solely to facilitate the use or operation thereof have more often than not been held to be an unconstitutional "taking."¹⁷ But a minority of jurisdictions, most notably Florida, have upheld such ordinances where the public benefit of the height restrictions were deemed to have outweighed the individual hardships imposed.¹⁸ Moreover, most ordinances that were ruled invalid involved rather severe restriction on use and considerable diminution in value due to the zoning.¹⁹ The safest method for a community, of course, would be actually to acquire the easements under the power of eminent domain should the courts there disapprove of airport height zoning.

Municipalities may also encounter difficulties if they attempt to totally exclude airports through prohibitive zoning. Other communities, for example, may have statutory authority to condemn land within their neighbor's boundaries for use as an airport regardless of any prohibition in the latter's zoning ordinance.²⁰ In regard to excluding private airports, the test of validity developed by the courts is simply whether the prohibition has a reasonable relation to the health, morals, and general welfare of the community in light of the existing uses and characteristics of land in the various districts into which it has been zoned, with reasonable forethought for its future development.²¹ Using this standard, a number of courts have found insufficient justification for the exclusion in some ordinances of privately owned airports.²² Moratoria on development in general have encountered similar problems, although temporary restrictions necessary to give the municipality time to provide sewer and other facilities have been upheld in some circumstances.²³

Although obviously no panacea for the many land use problems involved with airport development, zoning can nevertheless be an effective regulatory tool once its areas of usefulness are recognized and its constitutional and practical limitations carefully delineated. Moreover, although not determinative of the issue, zoning classifications do influence courts in resolving nuisance and other private actions by landowners against airport operators. Of course, previously existing nonconforming uses and the necessity of variances will always disrupt the uniformity zoning seeks to promote, but they need not undermine the over-

all scheme. For it is only through comprehensive planning that a general aviation airport and its neighbors can peacefully coexist.

Air Agencies

Air agencies are subject to federal economic control through the CAB and safety and operation control through the FAA. Air carriers engaged in interstate commerce as common carriers usually require a Certificate of Convenience and Necessity which is issued by the CAB. In addition, all carriers are required to obtain operating certificates from the FAA. The names of those certificates vary according to the function authorized. Some common carriers are exempt from CAB certification, and would thus fall in the general aviation category.

Some air agency certificates relate to ground operations only. Examples are ground schools, aircraft maintenance stations, service and repair stations, and others. Each must meet certain minimum requirements in equipment, personnel, and general facilities.

Most prominent are the air-agencies involved in transporting "persons or property... for compensation or hire," and further, those designated as air carriers which meet the further distinction "as a common carrier," all defined in the Federal Aviation Act of 1958.

The classifications are somewhat complex and in some instances overlapping, but are also exacting for the purpose of regulatory jurisdiction. Figure 2-2 summarizes the characteristics of the different types of aviation activities discussed below.

International, domestic trunk, and local service air carriers are similar and overlapping in regulatory characteristics. The main distinction is in their area of service. International carriers obviously function across international boundaries; domestic trunk carriers serve routes generally within the U.S. with average stage lengths of between 700 and 900 miles (797 miles in 1973). Most domestic trunk carriers also conduct international operations. Local service carriers operate over routes of average stage length of between 250 and 350 miles (303 miles in 1973).²⁴ These three types of air carriers are regulated by the CAB which: (1) issues certificates of public convenience and necessity; (2) designates routes to be served; (3) designates type of service authorized; (4) sets rates and fares to be charged; (5) requires extensive statistical and financial reports; and (6) looks after the financial well-being of

airlines to assure their ability to continue rendering the service to the public.

These carriers must also obtain an FAA operating certificate before they can commence exercising the authority granted to them by the CAB. The FAA regulates every phase of air carrier operation through the use of approved manuals and extensive operating regulations. Regulations, manuals, and operation specifications prescribe departmental organizations; allocation of responsibility; aircraft and equipment; maintenance organization and procedures; flight operations, training and proficiency check procedures; as well as many other details relating directly or indirectly to safety.

Supplemental air carriers provide supplemental seats during peak demand periods. They are limited, in that they may solicit affinity groups or tour charters only, and may not operate on a scheduled basis between points.

All Cargo carriers may operate as scheduled or non-scheduled and may "hold out to the public" for cargo carrying purposes only. They may, with special authorization, carry limited passengers on a charter basis. In contrast, **Commercial Operators of Large Aircraft** may not hold out to the public at all. They operate by contract only and with a limited number of different users. If the number of users becomes sufficiently high (9 or 10), they are deemed to be holding out to the public and required to obtain a supplemental carrier's certificate.

Scheduled carriers, supplementals, all cargo and commercial operators operate under the appropriate sections of Part 121 of the FARs. They all operate, or are authorized to operate, aircraft having certificated gross takeoff weight in excess of 12,500 pounds.

Air Taxi and Commercial Operators of Small Aircraft (ATCO) are considered to be carriers engaged in air transportation when performing air taxi services, but are deemed to be merely engaged in air commerce when acting as a small commercial operator involved in contract flying. The two types of service were combined in one certificate for convenience, since they are both exempt from certification by the CAB under section 298 of the Board's economic regulations. The exemption is predicated on their use of small aircraft, on the theory that their possible impact on interstate commerce is limited, and thus does not, **at this time**, require regulation in the public interest.

For comparison purposes unscheduled air taxis can best be compared to supplemental

²⁴ *Air Transport: 1974, Facts and Figures* (Air Transport Association of America, Washington, D.C.) p. 21

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Air Agency	CAB Certificated	FAA Certificated	Air Commerce	Air Transportation	Scheduled	Charter	Large Aircraft	General Aviation	Passenger Carrier
International Air Carriers	X	X	X	X	X	X	X		X
Domestic Air Carriers	X	X	X	X	X	X	X		X
Local Service Air Carriers	X	X	X	X	X	X	X		X
Supplemental	X	X	X	X		X	X		X
Cargo Only	X	X	X	X	0	X	X		0
Commercial Operators (L)		X	X				X	X	X
Commercial Operators (S)		X	X						
Air Taxi		X	X	X		X		X	X
Commuter		X	X	X	X	X	0	X	X
Helicopter	0	X	X	0	X	X	0	0	0
Intrastate		X	X	X	X	X	X	X	X

X - Applicable
 0 - May be applicable, but not necessarily

**SUMMARY OF CHARACTERISTICS
 OF AIR AGENCIES**

FIGURE 2-2

carriers, while scheduled air taxi operators known as "commuters" are similar to the scheduled air carriers. The distinction lies in the size of the aircraft operated. Exemptions presently cover all operators using aircraft with a maximum certificated gross weight of 12,500 pounds or a carrying capacity of 30 passengers or less with a gross payload not exceeding 7,500 pounds. The Board has indicated a limited inclination to grant waivers to permit ATCOs to operate aircraft in excess of these limitations upon the presentation of proper evidence showing public need and convenience; ATCOs operate under the regulations contained in Part 135 of the FARs, under close supervision of FAA inspectors, as do the large carriers under Part 121.

Helicopter Operators have been involved in all phases of the above air agency descriptions with the exception of trunk line operations. Their certificates and regulations (Part 127) differ with respect only to giving proper acknowledgement of the unique characteristics of rotary-wing aircraft.

Intrastate Air Carriers do not fall within the jurisdiction of the CAB since they are not, by definition, engaged directly in interstate air transportation. They are, however, indirectly engaged in interstate air transportation by carrying goods and persons who are in the course of interstate commerce, in presumably sufficient volume to justify CAB regulation, if the Board chooses to do so. These carriers operate large aircraft as the certificated carriers do. For the most part, the states have attempted to fill this regulatory void through the regulation of intrastate carriers by state public utilities commission or other equivalent agencies. Some states are also attempting to regulate scheduled air taxi operators on the grounds that a regulatory void has been created by the CAB.

Whether or not the courts will decree the exemption process implemented by the CAB to be a sufficient abdication of its regulatory responsibility to leave a void justifying state intervention is still to be seen. Preliminary court decisions seem to indicate a tendency to preserve federal control. The fact that the federal government elected to grant exemptions is construed to be an affirmative assertion of its control in that area of interstate air transportation. The courts are likely to recognize this posture in view of its long-standing unchallenged acceptance.

There are currently no attempts on the part of local governments to regulate interstate or

intrastate air transportation.

Airworthiness

Responsibility for assuring the airworthiness of aircraft and their components is assumed by the federal government on the theory that aircraft are instruments of interstate commerce. As with airmen and agencies, the responsibility is discharged by writing regulations setting minimum safety standards for the characteristics of the product, prescribing certification requirements and procedures, and setting limits on operations.

In figure 2-1 the Federal Aviation Regulations bearing directly on the characteristics of the product are Parts 23 through 35, known collectively as the Airworthiness Regulations; Part 36, concerning noise; Part 37, concerning certain components; and, Part 39, concerning mandatory actions to increase specific product airworthiness. Parts 91 through 135 cover certification and/or operations, and Part 21 sets forth the procedures for certification. Parts 91, 121, and 135 influence the design characteristics of aircraft, as well as operations.

Philosophy

The Federal Aviation Administration is charged with promoting the safety of aviation. The following are the general concepts observed explicitly or implicitly in writing regulations which help discharge their responsibility in regard to airworthiness:

(1) The FAA takes no view of "mission performance." The top speed, range, and carrying capacity can be anything the airframe manufacturer chooses, the takeoff and landing field length requirements can be selected by the manufacturer, and so on.

(2) Certain items of performance, however, do impinge directly on the safety of flight. For these items the Administrator will set what are considered to be minimum safe values, writing these into the regulations, either as definite numbers or as algebraic expressions utilizing parameters which are themselves set by the manufacturer, are prescribed, or are representative of an observable or idealized environment.

(3) As far as is practicable, the FAA sets standards on what an airplane must **do**, rather than on what it **is**. An airplane when stalled must pitch down, for example, and within certain limits it is known how to configure it so that it will do so. The FAA will not prescribe the configuration, but contents itself by implying that a full stall is characterized by uncontrollable pitch down.

(4) On the other hand, prior art is recognized as having given the airplane certain definitive configuration and performance characteristics—it has wings, a tail, one of a small number of engine types, and so on; the cockpit controls and instrumentation are all of familiar sorts. When in order to set a standard of safety it is necessary to refer to such items, the FAA does not hesitate to do so. It prescribes the location of the primary flight instruments on the panel, the shapes of some of the control knobs, the positions, angles of visibility, and color and brightness of the red, green, and white position lights, and so on.

(5) Maintenance of an acceptable level of safety demands that the entire process of fabrication be monitored and controlled. The regulations, therefore, cover every aspect from the properties of materials chosen through to the manufacturer's production certificate and the certificates held by the operator and his individual employees.

(6) The regulations are the product of many years of experiences which have served to indicate what an airplane should (and should not) do and be to be safe. To assure that these experiences are utilized, the regulations are updated continually.

(7) The regulations are intended to be as explicit as possible. The words "each" and "must" appear time after time to insure that the manufacturer has no doubt about the extent and degree of his responsibility.

(8) There is an implicit recognition, however, of the fact that there are limits to what can be done and still keep the airplane a viable transportation device. The regulations surrounding the structural design for example, do not prescribe the high safety factors often seen in the design of ground structures. Instead, the loads to be applied to the structure in the course of normal flying are estimated as accurately as can be done, and the structural components are designed to resist these loads while developing almost the highest stresses they can without failing, thus producing an airframe of minimum weight.

(9) There is also an implicit assumption that knowledge of the degree of risk somehow permits that degree to be higher. The argument goes that passengers on an air-carrier airplane deserve greater protection than do those of a general aviation airplane, since the transport passengers presumably are unable to assess the risk they are assuming when they board, while the general aviation passengers somehow are able to do so. The logic of this is elusive and

there may be other "public interest" type points in support to be made instead, but the fact remains that the provisions of Part 25 are more detailed than those of Part 23.

Content

The Federal Airworthiness Regulations place definite technological constraints on what the manufacturers do. Below, for illustration, is a condensed outline of the contents of Part 25; other airworthiness regulations are similar:

- Subpart A - General
- Subpart B - Flight
 - Performance
 - Stability, Control, Trim and Stalls
 - Ground and Water Handling Characteristics
- Subpart C - Structure
 - Flight, Ground and Water Loads
 - Fatigue Evaluation
 - Lightning Protection
- Subpart D - Design and Construction
 - Systems, Control Surfaces, Landing Gear
 - Accommodations
 - Environmental
 - Emergency, Fire Protection
- Subpart E - Powerplant
 - Fuel, Oil, Cooling, Reduction and Exhaust Systems
 - Controls and Accessories
 - Fire Protection
- Subpart F - Equipment
 - Instruments
 - Lights
 - Safety
 - Miscellaneous
- Subpart G - Operating Limitations and Information
 - Limitations
 - Marking and Placards
 - Airplane Flight Manual
 - Appendices

Certification of Aircraft and Components

The following means of obtaining approval for aeronautical equipment exist:

- (1) Type Certificate: airframe, its engine, and its propeller are Type Certificated.
- (2) Technical Standard Order: A component which has been "TSO'd" may be installed on any airplane for which it is suited, without separate approval.
- (3) Approval: A new component may be

tested and approved for installation on a new airplane receiving its Type Certificate. This meets the regulatory requirement for the aircraft that certain items of its equipment be "approved." However, unless the component is subsequently "TSO'd" it is not in general eligible for use on another airplane, since in theory it is part of the airplane that was Type Certified.

Changing Airworthiness Regulations

There are three means by which Airworthiness regulations may be augmented, altered, or adapted to specific occasions:

(1) **Amendments** are actual changes in the body of the regulations. They are typically promulgated by the FAA itself in response to what appears to be a need being experienced by the entire manufacturing industry. The FAA follows the standard procedure in which Notices of Proposed Rule Making ("NPRM's") are published in the Federal Register (sometimes "Advance NPRM's" are circulated), correspondence invited, and a date and place for public hearings set. Anyone interested can respond, but in practice those who do so are mostly the manufacturers who will be affected by the proposed change. At the close of the hearings the FAA sets forth, again in the Federal Register, a summary of the comments received, FAA's conclusions with regard to them, and the exact wording of the regulatory change. The subscribers to the applicable regulation receive Notices of Amendment, with publication and effectiveness dates, plus revised pages for the regulation itself. The Notice of Amendment again summarizes the reasons for it and the industry response, for background reference.

(2) **Special Regulations** are similar to Amendments in general handling, but do not affect the basic Airworthiness regulations since their applicability is limited. For example, CAR 4 (the predecessor of FAR Part 25) was found to be inadequate in dealing with the determination of the takeoff field length requirements of turbine airplanes. Special regulations were therefore written.

(3) **Special Conditions** are a concession to the fact that manufacturers will (contrary to some people's opinions) push the frontiers of the design art forward, and will produce designs of types with which the existing regulations simply cannot deal. Nevertheless the FAA must in some way approve the safety of a new product by amending the basic regulation for that product only.

Special conditions are established through

a series of arguments between the manufacturer's representatives and those of the responsible FAA Regional office, and frequently those of the FAA in Washington. Proposals are made by both sides and discussed in committees. The result is usually a compromise of some sort, because in the last analysis the FAA will not regulate the new type out of existence since the manufacturer has legal recourse.

The basic regulations can also be "clarified" by the issuance of Advisory Circulars. The Advisory Circulars can be commentaries on anything at all, but when used for this purpose they will specify what tests or criteria can be applied to meet the provisions of the basic regulation. The typical language is:

"This circular sets forth a means, but not the only means, whereby compliance with FAR 25 Par. 25.xxx may be demonstrated."

Since the manufacturer desires clarity in the regulations with which he must comply, he is very likely to standardize on what is set forth in the Circular, thereby in effect (though not in law) making it a part of the regulation.

Demonstrating Compliance

Unlike criminal law, wherein the burden of proof is on the accuser, in many regulatory areas the burden is on the manufacturer actively to demonstrate his compliance with the provisions of the regulations. This applies to the Federal Aviation Regulations, and in airworthiness work it is reasonable and economical of time and effort. The manufacturer developing a new type airplane is assumed normally to have the facilities and equipment for demonstrating the airworthiness of his product. The FAA in turn is relieved of the necessity of spending public money for large amounts of complex equipment, although it does have some—small items such as phototheodolites and trailing airspeed bombs—which it will lend or bail to the manufacturer.

The process of demonstrating compliance is continual throughout the development program. The evidence that the demonstrations have been made takes the forms of:

(1) Drawings of the aircraft and its parts, a complete set of which must be submitted to the FAA Regional Office. The demonstration airplanes, or components thereof which are used to demonstrate compliance, must be certificated by the manufacturer to be "in conformity with the type design" of which the drawings are representations.

(2) Reports of analyses and tests. An ex-

ample of analytical reports is the "Basic Loads" report, which sets forth the computations of the external aerodynamic, ground and water loads generated on the aircraft in operation. A typical test report is that of a structural test of a component. Conformity statements must be written for each tested component, and all analyses and tests must be witnessed and signed by a representative of the FAA.

In most cases the means of demonstrating compliance are well known and used country-wide. In cases where they are not, they must be decided by negotiation, which the manufacturer initiates by writing proposals for the demonstration methods.

Airworthiness Directives

The FAA keeps watch over the condition of individual aircraft of every type. It can extract portions of aircraft log books to show where additional inspections, modifications or parts replacements need to be made because of inadequacies in design which can be shown only when the type aircraft has been in operation and developed "bugs"—cracks in structure, possibilities for faulty system operation, frequent system failures. The manufacturer keeps watch too, through his Customer Service Department, and whenever such a defect appears, an evaluation is made of the various means of eliminating it. This results in the issuance of Service Bulletins inviting the owners to take action, sometimes accompanied by retrofit kits to help with the job.

As long as the manufacturer keeps ahead of the situation the FAA will take no action. If he does not in any particular case, the FAA will issue an Airworthiness Directive (AD) which prescribes the action to be taken, gives the constructor numbers of the affected aircraft, and sets the deadline for accomplishment if applicable. An AD can prescribe anything from more frequent inspections to grounding the type until the provisions of the AD are complied with. Manufacturers are typically alert to and anxious about defects which may lead to AD's, especially on airplanes in current or recent production, and are usually reasonably quick to forestall an issuance by publishing service bulletins, sending out retrofit kits, and issuing engineering changes for production. The FAA knows this, and in any case which can result in an AD, it informs the manufacturer ahead of time in order to allow him to take action on his own. This system may sound too permissive, but in practice it works well, though of course, not perfectly. The rarity of aircraft accidents due to hardware failure attests to this.

Legal Status of Regulations

Until a very few years ago, the issuance of the aircraft type certificate, manufacturer's production certificate, and airworthiness certificates for individual airplanes was sufficient to lay to rest any questions of airworthiness arising from incidents or accidents. However, recent product liability cases are destroying the protection afforded by the regulative structure, in a few cases revealing unsuspected flaws. Contributory negligence of the operator is no longer a defense for the manufacturer, nor is the existence of type certificate, current airworthiness certificate, or any other documentary evidence. "Reasonable care" in design or manufacture is collapsing, and the "implied guarantee" of the manufacturer in marketing the aircraft is interpreted quite all-inclusively.

An illustrative case (rather an extreme one) is that in which a twin-engined airplane suffered an engine stoppage on takeoff, after having made a high-speed taxiing turn onto the active runway. It was shown by tests that if the speed were high enough and the turn short enough the fuel line from a tank would unport, causing a loss of fuel supply and subsequent engine stoppage. High speed turns onto the runway just prior to takeoff are considered foolhardy by the aviation community and are not generally practiced; the certification procedures normally do not contain tests of this nature, and the manufacturer had performed none. This did not protect the manufacturer, however.

The trend of such cases is to put on the manufacturer the burden of making his product both airworthy and foolproof. Since there is a large, if not limitless, number of ways to get in trouble with an airplane, as well as to attack the credibility of the manufacturer in court, these product liability suits are becoming a burden to manufacturers, and the eventual effects will be to make the process of aircraft development slow and overexpensive, and the price of the product ever higher than it is now.

Operation

United States civil aircraft operated within the borders of the country, and air carriers operated both within the United States and in international commerce, do so under the provisions of the General Operating and Flight Rules (FAR Part 91) or the Certification and Operations regulations for air carriers and commercial operators of large aircraft (FAR Part 121). Air Taxi operators are under a separate regulation (FAR Part 135).

Part 91 has no material pertaining to certification. The sections dealing with operations, however, have much in common. To display both the certification and the operation content, the topics dealt with in FAR 121 are presented below in condensed form:

- Subpart A - General
- Subparts B, C, D - Certification Rules for Air Carriers
- Subparts E, F - Approval of Routes
- Subpart G - Manual Requirements
- Subpart H - Aircraft Requirements
- Subpart I - Airplane Performance
 - Operating Limitations
 - Takeoff
 - Weight
 - En route
 - Destination
- Subparts J, K - Special Airworthiness, Instrument and Equipment Requirements
- Subpart L - Maintenance
- Subparts M, N, O, P - Airman, Crewmember, and Dispatcher Qualifications and Training Requirements
- Subparts Q, R, S - Flight Time Limitations (Personnel)
- Subpart T - Flight Operations
- Subpart U - Dispatching and Flight Release Rules
- Subpart V - Records and Reports
- Subpart W - Crewmember Certificate, International

There are several Appendices.

Interaction of Airworthiness and Operating Regulations

As mentioned earlier, the FAA takes no position on performance except as it relates to safety. The Airworthiness regulations are the device by which the FAA seeks to insure safety in design and construction. However, the FAA also seeks to insure safety in operations, and to this end they write the Certification and Operating Regulations. These have their impact on aircraft design (particularly on the design of large commercial aircraft) in the following ways:

(1) A certificated air carrier cannot operate his aircraft unless he carries on board certain items which are not items of required

equipment in the airworthiness regulations. For example, a manufacturer can certificate an airplane without supplemental oxygen equipment under Part 25, and that Part will tell him what the technical requirements for a supplemental oxygen system are. But the actual requirement for such a system is spelled out under Part 121.

(2) The Airworthiness Regulations are not concerned with the range of the aircraft, so they make no statement about total fuel capacity. But the **operating** rules are concerned with it, and the concern is expressed as a fuel requirement in this typical form (91.23):

No person may operate a civil aircraft in IFR conditions unless it carries enough fuel...to:

- (a) complete the flight to the first airport of intended landing;
 - (b) fly from that airport to the alternate airport; and,
 - (c) fly thereafter for 45 minutes at normal cruising speed.
- (Some qualifying statements follow the statement above.)

(3) Part 91, in a section for large airplanes, and Part 121, prescribe the composition of the flight crew.

(4) Part 121 makes provisions for limiting the weight of an aircraft at takeoff and landing. The provision for landing states that no person shall take off an airplane, if its weight on arrival at its destination will be more than the weight allowing it to stop within the first 60 percent of the runway. The takeoff weight provisions are more complicated.

The effect of these rules is simply that the manufacturer looks in both directions when generating a new design. When the provisions of both regulations impact in the same area, such as those for takeoff, the manufacturer includes in the Airplane Flight Manual—an airworthiness document—such operating information as will enable the pilot to comply with both regulations simultaneously. The so-called FAR takeoff field length charts (which are actually weight-limit determination means) are examples of the technique.

The fuel reserve provision and the equipment provision are met by establishing the airplane weight and fuel capacity at which the desired range may be met, considering the reserves and extra equipment as dead weight. The same is done with the flight crew requirements: the addition of a flight attendant requirement simply increases the weight and seating capacity of the airplane.

Comment

Some persons have been critical of the Airworthiness regulations from the viewpoint that they stifle the design process. They cite the 61 knot stalling speed of Part 23 as a prime illustration, and perhaps go on to other things, such as the requirement that an airplane pitch down when it stalls, and so forth.

It should be pointed out in this record that there are two means of "bending" the regulations to accommodate advanced designs: (1) Special Conditions and (2) Demonstrations of "Equivalent Safety." When a manufacturer feels that his product cannot meet a provision of the regulations as written, he may demonstrate that the airplane is just as safe with what it can do. Equivalent safety demonstrations can be expensive and long-drawn out, because safety levels are hard to rank-order.

It should be remembered that regulations are the equivalent of case law—they reflect what has been done wrong in the past. Since the future presumably will be different and the mistakes different, the regulations can apply only to present art—not to future art. If airplanes are always built within the regulations, they will always be built within the present art or very minor extensions of it. But the art as actually practiced will progress in some direction, and the future will generate its own regulations responding to what is done wrong then. Meanwhile the present regulations prevent us from repeating our past mistakes, and the means of bending them to the demands of the future are there.

Pilot Qualifications and Certification

The Federal Aviation Act of 1958 placed the responsibility of certifying pilots, airplanes, flight schools, ground personnel, etc., with the Federal Aviation Administration. The FAA meets this responsibility by establishing and publishing the requirements for certification in a series of directives or mandates called Federal Aviation Regulations (FARs) which are revised and updated from time to time. The FAA also issues licenses to individuals, the basic authorizations to fly an airplane.

Two sections of the Federal Aviation Regulations (Part 61 and Part 141) deal with the requirements for certification of pilots. A person attempting to qualify for a private pilot's certification may do so by satisfying either set of requirements. Part 141 deals with the kind of training received when a student is enrolled in a certified flight school while Part 61 deals with

the kind of training received when a student is placed in the hands of an individual certified flight instructor.

Flight certifications are issued at 5 levels: (1) student, (2) private, (3) commercial (required of any pilot who receives compensation for flying), (4) airline transport, and (5) flight instructor.

Since the bulk of the nation's general aviation fliers are either students, or hold private or commercial licenses, this discussion will be limited to those certificate levels.

Within each certificate level there are three different kinds of ratings which an individual must receive in order to fly. For a student, ratings are added by his flight instructor, while holders of Private and Commercial certificates have ratings added by the FAA or by the FAA's designated examiner. The three kinds of ratings are: (a) category ratings, (b) class ratings, and (c) type ratings.

A **category** rating deals with the kind of aircraft and is for either: (1) lighter than air (balloons), (2) gliders, (3) airplanes, or (4) rotorcraft (helicopters).

Within the category rating "Airplanes" (above) there are four **class** ratings: (1) single engine, land planes; (2) single engine, seaplanes; (3) multi-engine, land planes; and (4) multi-engine, seaplanes.

Type ratings apply to any turbo-jet powered aircraft and to all airplanes over 12,500 pounds takeoff weight. An individual wishing to fly a light jet airplane or a plane heavier than 12,500 pounds **must** have a rating for that particular aircraft; however, a person who wishes to fly any model of light plane may do so with a private pilot's license provided he have proper class and category ratings described above and that he flies alone. To carry passengers, the regulations become more demanding; he must have made 3 takeoffs and landings within the last 90 days.

In addition to the above ratings, there is a special rating which must be achieved to fly on instruments. Table II-1 sets out age, medical, knowledge, skills, and experience requirements for a private pilot's certificate as designated by FARs of October 1, 1974. In practice, the average student obtaining a private pilot license under FAR 61 receives about 65 total flight hours extended over a period of approximately one year while the student certifying under FAR 141 in a concentrated study at a flight school usually totals about 55 hours flying time in a shorter time.

TABLE II - I
FEDERAL AVIATION REGULATIONS FOR CERTIFICATION AS A
PRIVATE PILOT, AIRPLANE CATEGORY¹

Minimum Age	17 years old
Medical Examination	minimum: 3rd class medical certificate
Knowledge ²	<ol style="list-style-type: none"> 1. FARs applicable to private pilots 2. VFR navigation 3. Recognition of critical weather conditions 4. Safe and efficient operation of airplanes
Proficiency	<ol style="list-style-type: none"> 1. Preflight operations 2. Airport and Traffic Pattern operations 3. Flight Maneuvering, Ground Reference 4. Slow Speed Flight 5. Normal and Crosswind take-offs and landings 6. Instrument Control and Maneuvering 7. Cross-country Dead Reckoning and Radio Navigation 8. Maximum performance take-offs and landings 9. Night flying, VFR conditions 10. Emergency operations
Experience:	
Total Flight hours	40 ³
Dual hours	20
Solo or Pilot in Command hours	20 (including 3 solo take-offs and landings at airports with a control tower)
Solo Cross Country hours	10 ⁴ (each flight must be more than 50 nautical miles with 1 flight with landings at 3 points each at least 100 miles from others)
Dual Cross Country hours	3
Instrument Flight hours	10
Night Flight hours (local)	3 (including 10 take-offs and landings)

¹ Tabled entries are for FAR Part 61 except as noted

² FAR Part 141 requires 8 hours 45 minutes of ground discussions (briefings and de-briefings)

³ FAR Part 141 requires 35 hours of total flight time

⁴ FAR Part 141 requires 5 hours of cross-country solo flight time

Although certificates never expire, to use them (*i.e.*, to fly), a pilot is required to have a physical examination periodically depending upon the level of his certification. For example, private pilots are required to have physical examinations every 2 years, commercial pilots every year, and airline transport pilots every 6 months.

FAR 91 deals with operating rules. In theory, a pilot's certificate may be removed for violation of these regulations or with violation of the certification rules in Part 61. Because the highest priority of the FAA revolves around

commercial flight operations, FAA observers are spread out too thin in practice to monitor the bulk of private pilot behavior. Thus, the FAA is a relatively weak enforcer in general aviation. Most monitoring is done by the pilots themselves and peer pressure is an effective enforcer. When a violation is reported to the FAA, that agency usually writes to the pilot involved stating that he may have been in violation and asking for his statement. The pilot may support his behavior or he may confess to the violation and surrender his pilot's certification for suspension up to one year. Commercial pilots

found in violation of FAR regulations are frequently given civil penalties such as fines.

AIRPORT ADMINISTRATION AND FINANCE

Introduction

Airport administration and finance are highly interdependent. The governmental level of the sponsor of the airport, e.g., federal, state, or local, bears heavily on both the structure of the administration and the financing possibilities of airports. The two subjects will be treated separately below, but with necessary cross referencing.

Many airports in the United States grew from grass strips, privately owned, on what was then the edge of town. Population growth brought traffic, revenue, and increased local demand for airport facilities. This demand was originally based as much on civic pride as on economic feasibility. The airport was considered to be a governmental function, and not expected to break-even and certainly not make a profit. Local citizens in the communities with sufficient wealth voted approval of bond issues to originate and improve small airports.

Some communities, not so well endowed, came into a windfall when the Surplus Airports Act authorized the transfer of World War II military training fields to local communities. Many which would not otherwise have been able to afford an airport suddenly owned one. Assisted to some extent by the airport, the loss sustained in operations was minimized and the local taxes made up the difference.

The depression, although it set all development back to a large extent, provided another windfall to public airports through the Works Project Administration (WPA). This "make work" program expended millions of dollars on airport improvement and construction.

The Federal Airport Act of 1946 authorized expenditure of up to \$100 million annually over seven years on eligible projects at local airports. This Act was replaced with the more extensive Airport and Airways Development Act of 1970, providing considerably more funds and easing the financial problems of airports to some extent.

Administration

The classification of airports by function was discussed in the previous chapter. The administrative structure of an airport is, however, more dependent on its size than it is on its func-

tion. Thus, a small air carrier airport may have a similar administrative structure and the same number of employees as does a large general aviation airport, if they both have approximately the same number of operations. An airport's level of activity seems also to be related to the level of government owning and operating the facility. The higher the level of government, the larger the airport tends to be.

Owners and Sponsors

Inasmuch as the size of an airport determines the governmental level of sponsorship, the size of the political subdivision may also be a significant factor limiting the size of the airport. This is especially true since capital expenditures for improvements are limited by the total assessed valuation of the taxing authority involved. However, airports are frequently owned by towns located near large metropolitan areas and may draw substantial traffic from the population hub. Such airports may generate sufficient surplus funds to support capital improvements independent of tax support. It is thus difficult to generalize a relationship between the sizes of airports and the political subdivisions they serve.

Many cities own and sponsor airports, which are thus financially supported by public funds raised mainly through property taxes. This may frequently lead to problems of conflict of opinion as to need for airport improvements. In large cities, such as Baltimore or Philadelphia, where the more affluent have moved to the suburbs, the remaining population may see little need for frequent use of an airport. In fact some may never expect to see it, and therefore quite naturally are not interested in approving city bond issues to support airport improvements. In some instances this has led to state ownership of the airports. State ownership, as it now exists in Baltimore and has existed in Connecticut for some time, has the advantage of spreading the tax investment over a much larger base. It also enhances the probability of obtaining matching funds to qualify for federal grants for airport improvements.

Aside from the question of desirability, locally owned airports are usually operated by locally oriented political bodies such as town boards, city councils, and boards of supervisors. Frequently the airport serves a much larger community and airport needs are not necessarily consistent with the desires of the citizens of the community in which it is located. In fact, quite frequently the opposite is true—everyone wants the airport in someone else's backyard. Since the local governing body will

be dependent on local support, it may be more responsive to the local sympathies than to the needs for airport improvement. If, on the other hand, the airport is owned by the state, the state representatives from the local airport community may oppose or support improvements according to the dictates of the local electorate. This could occur without adequate consideration of whether or not the improvement is needed for the benefit of the larger community or the entire state. The opposite might also hold, and a diversified state legislature may not be responsive to local airport needs. State aeronautics departments usually tend to support airport development and keep the legislature appropriately informed to assure proper attention to the overall state airport system.

Where an airport's community of interest extends over several political subdivisions, each subdivision may have its say in the airport operation through an independent authority as expressed by its representatives who are appointed to the airport board. The authority may own the airport or merely operate it. It may also have taxing authority for airport development purposes, sometimes with limited time spans and almost always with a ceiling placed on the percentage of total assessed valuations. The authority may also enjoy political independence, as is the case with state operated airports. This may result in its becoming insensitive to the desires of the local community.

This code of sponsorship is frequently desirable from the tenants' point of view, especially since the total revenue is retained by the authority and generally expended for airport purposes only. While some of these revenues may be spent on such facilities as roads, bridges, subways, or even office buildings, this is often preferred to the possible loss of revenue to the general funds of a city's, town's, county's, or state's. At most airports operated by municipal or county governments all airport revenues must by law be paid to the general government fund, and thus made available for appropriation for non-airport functions by the local governing body. This often tends to frustrate efforts at airport improvements.

The determination of who will operate an airport is dependent on both its size and function. Generally there are four major possibilities:

(1) At very small airports there is frequently insufficient revenue to generate funds to cover an airport manager's salary and an income for a fixed base operator (FBO). Some

communities have overcome this problem by appointing a combined manager and FBO, thus providing a salary or partial salary only, yet permitting the manager to receive the proceeds of the normal FBO functions. At a new very small airport, the revenue is seldom sufficient to support a fixed base operator so this model might be the only alternative to sponsoring an unattended airport.

It is usually necessary for the small municipally operated airport to depend on various municipal departments for support functions such as runway maintenance, lawn mowing, snow removal, and legal aid. These airports might also have to depend on air traffic control facilities at nearby airports, because they usually have either unmanned towers or no towers at all.

(2) Many medium-to-large size general aviation airports generate sufficient revenue to make the employment of an airport manager feasible and still leave adequate revenue for an FBO. Such airports often have limited local air carrier service, and are thus able to afford a limited staff.

(3) Large airports, both air carrier and general aviation, have professional airport managers with staffs of specialists in such areas as operations, administration, and maintenance. The tenants of such airports usually include FBOs who bid for rental rights and for the right to serve aviation needs at the fields. Many FBOs at that level are highly specialized and provide a single service such as fuel, flight instruction, or avionics maintenance.

(4) The airport authority approach usually involves an administrative structure similar to that of a municipally operated facility, with an in-house staff for handling specialized functions.

Finance

Because airports are commonly operated by public bodies they are often not conceived of as monopolies. This, however, is true since the user has little choice in selecting an airport once he has chosen his ultimate destination. General aviation and scheduled air carrier pilots are usually captive clients, who do not have the choice to taxi down the street to another gas station where the fuel might be cheaper, except in some instances of preferential refueling.

Monopolies are normally regulated to prevent abuses in the levels of rates and services. While the market has historically been in the buyers' favor, many airports are presently serv-

ing more than or close to the volume of traffic necessary for an economically feasible operation. With this financial maturity come both the opportunity for innovations in airport finance, and the necessity for governmental regulation, as witnessed by the introduction of airport certification through FAR Part 139. Although restricted in its applicability to airports served by certificated air carriers, it was the first exercise of major governmental control beyond prescribing prerequisites to obtaining federal funds and grants for airport development. In addition, regulation necessitated by essential security measures added to the momentum toward the federal regulation of airports. Will the authority to approve rates and charges for rentals and landing fees be among the future areas of control as a result of this momentum? It appears that the authority is indeed present and recognized by the FAA as is clear from its requirement that airports charge only reasonable and non-discriminating fees.

Models of Airport Finance

There are four common models on which airport financial policy can be based. These are: (1) the general benefit model, (2) the break-even model, (3) the public utility model, and (4) the industrial model.

The **general benefit model** applies to small airports and is thus perhaps the most common. These airports do not generate sufficient revenue to cover their operating costs and the debt service on improvements (or depreciation if the improvements are already paid for). This situation requires partial funding from the political subdivision sponsoring the airport. The subsidy is justified on the basis of the need for supporting public facilities from which all citizens derive either a direct or indirect benefit. The social and economic benefit of airports to communities by way of creating employment and promoting commerce and tourism have been suggested in a number of studies and will be the subject of other parts of this report.

The **break-even model** is the most widely accepted by both airport operators, users, and governmental bodies. In this model the airport is expected to generate sufficient revenues to cover the costs of operations and amortization and/or depreciation, as appropriate.

At this point the "single cash register" airport or the airport with an independent financial structure, warrants some discussion. Under this concept all revenue is retained in a fund separate from other governmental accounts, and all revenue is applied to the cost of operations, amortization of debt, or other airport

costs. None of the funds are diverted to other governmental use. Surplus revenue (profit), although inconsistent with the true break-even model, if invested in airport capital improvements does not disqualify the airport from this classification. The reinvestment of surplus revenue in capital improvements, tends to be treated as prepayment of, or payments in lieu of, future amortization.

It seems that tenants and users are not disturbed by reasonable surplus generated by the fees they pay, so long as they are comfortable with the knowledge that the surplus will be "plowed back" into the airport.

Dulles International Airport, operated by the FAA, is a good example of the break-even concept. Airline "use agreements" or leases break down the original payoff period into three 10-year spans. The first is an operating loss period, the second a break-even, and the third is a profit period where the initial losses are recovered.

This approach is extremely well adapted to the ability of users to pay the required fees. Traffic builds up with time and the base over which the charges must be spread is constantly increasing. It is therefore possible to have increasing gross revenues without appreciable rate increases. Rate increases would only be necessary in order to accommodate rises in costs associated with the provision of services which cannot be covered by increased revenues.

The **public utility model** is most frequently proposed by those communities which own successful airports in highly populated areas drawing their revenue from diversely originating passengers. The profit is therefore at least partially from residents of other communities. Under this model the airport sponsor is assured of generating sufficient revenues to meet the airport's operating costs, debt service, and/or depreciation, and to generate an acceptable fair rate of return on his investment, similar to the situation in other public utilities. It must be observed, however, that other public utilities are both recognized and regulated as monopolies. As such their rates, efficiency, performance, and accounting procedures are subject to scrutiny and review. This is presently not the case with airports, but the possibility for taking such action in the future exists.

The **industrial model** which allows airports to generate profits in the same sense that industry does, has not received wide acceptance. It is not appealing to most airport operators because they recognize the public role of air-

port service; they prefer the assured income approach that avoids the highly fluctuating industrial return, and do not care to undertake the more complicated financing procedures necessary to accommodate wide fluctuation in profit and loss. Most do not want to give up the comfort of assured income not available to the purely market-oriented operation.

Airport Bonding and Sources of Capital

Airport bonds are usually municipal bonds and take the same familiar forms: general obligation bonds or full faith and credit bonds; and revenue bonds. The latter fall in two general categories: bonds supported by the revenue of the airport only, and special purpose bonds issued against a single segment or function of the airport's revenue.

General obligation bonds are bonds issued against the general obligation of the community issuing the bond. In other words they pledge the full faith and credit of the city, town, or state issuing them. Since the issuing body has authority to levy taxes on local property to provide amortization funds, the bonds are generally considered a good risk by financial institutions. The tax free interest also acts as an additional incentive to those wishing to invest in them.

Most political jurisdictions are, however, limited in the total amount of bonds they can issue, relative to the total assessed valuation of real property in the community. Because many citizens, towns, and counties have already reached the limits of their authority to tax, and since many are in poor financial condition because of the exodus to the suburbs, some city-owned airport bonds no longer enjoy their previous appeal.

Because general obligation bonds usually require the voters' consent as expressed in a referendum, airport operators and sponsors often turn to **revenue bonds** in order to avoid a defeat at the polls. Revenue bonds pledge the revenue of the airport against their amortization. Naturally the rates are higher on revenue bonds, but they still enjoy the tax-free benefit of municipal bonds and enjoy considerable popularity with financial institutions.

Special purpose bonds are frequently issued by airport sponsors to construct specific projects such as cargo facilities, fuel facilities, or hangars. The special bonds may in that case be issued against the revenue from that specific project only. The popularity of these bonds is somewhat less than that of the other types for obvious reasons. The success of such a bond issue is more dependent on the probable suc-

cess of the particular project and on the credit of the parties obligating rental or royalty revenue by lease or contract.

Build and lease back agreements may be used either as pledge revenue to support revenue bond issues or against mortgages on facilities constructed for a particular tenant. For example, an FBO may want hangar space at an airport and may be willing to sign a twenty-year lease. The airport may borrow the money, pledging the lease proceeds as a security, and granting conditional possession to the lending institution if the proposed tenant defaults. The institution may then sublease the facility to another tenant, thus continuing the revenue flow till the expiration of the debt.

Banks and other lending institutions have historically avoided financing tenant construction at airports because the title to the land is vested in the airport sponsor. The tenant merely has a leasehold. In the event of default and subsequent foreclosure, the bank has only the leasehold as security, most leaseholds being of the non-assignable or extremely restricted type. They do not present a readily marketable privilege and are therefore not the most desirable security.

Increasing sophistication of many of the medium and large airport sponsors has led to the design of lease clauses containing clearly defined limitations on the assignment or attachment of the leasehold, while simultaneously leaving sufficient flexibility to permit a lending institution to replace the tenant with an equivalent tenant for the remainder of the term.

Because of the financial distress of many cities today and the reluctance of others to devote scarce capital to projects with restricted benefit, many projects such as hangar construction, cargo facility construction, and fuel distribution facilities are being financed in this manner.

Government Assistance

Most people are of the impression that the federal aid programs provide the bulk of the funds necessary for airport development. They are also of the impression that the general taxpayers' money goes into the fund. Neither concept is accurate.

Under the previous Federal Airport Act of 1946, funding for airport improvements was derived from airline tax and other aviation sources. These taxes were, however, paid into the general fund and were not actually earmarked for airport or airways improvements.

The Airport and Airways Development Act



of 1970 incorporated many of the features of the previous act but also introduced many innovations. The concurrent legislation, the Airport and Airway Development Act of 1970 provided the funds to carry out the proposed development. Taxes were imposed on airline passenger fares, airline freight or cargo waybills, aviation fuel and related products, aircraft registration, etc. Thus the cost of development was brought home to the user as directed in the act. As protection for the user against the diversion of funds extracted from his contribution, the trust fund concept was imposed and the use of the funds restricted.

The development of the airways system, which was previously supported from general government funds, became eligible for receiving \$250 million per year for the five-year duration of the act.

Airport planning is of course essential to the orderly development of the national aviation system. Therefore, \$2 million were designated for developing a National Airport Systems Plan (NASP) and provision was made for making individual grants to airports for master planning their own development consistent with the role assigned to them by the NASP.

The funds made available for airport development are divided into two main categories: air carrier airports and general aviation airports. The former are to receive \$310 million per year (by 1973 amendment) and the latter are allocated \$30 million per year.

One-third of the funds is allocated on a statewide basis considering both the population and area of the state. Another third is allocated on the basis of enplaned airline passengers, which represents the main source of the revenue constituting the fund. The rest is left to the discretion of the administration. General aviation has a similar allocation with different percentage distributions.

The restrictions on eligible projects are numerous. The airport must be in the NASP. The project itself must be completed according to FAA specifications. Another significant restriction is that stipulated by section 20 (b) of the act, which prohibits the use of the funds for any building used for other than safety purposes such as crash and fire facilities. This provision prohibits the expenditure on needed hangars, terminal facilities, roads, and other public facilities on the airport. The recognized rule of thumb in the industry states that for every dollar spent on eligible projects an equal amount will eventually be required on the terminal side to accommodate the additional

traffic generated by the improvement.

The act was permitted to expire on July 1, 1975. As this document went to press, Congressional committees were studying the possibility of extending the act and expanding the list of eligible projects to include public areas of terminals such as waiting rooms, lobbies, corridors, concourses and hold rooms, people-movers, baggage claiming devices, and many others logically related to accommodating the passenger who is the main source of the funds. The percentage of federal participation under the expired act was 50 percent of eligible projects at large hub airports, 75 percent at smaller airports, and 82 percent for certification or security. The percentage limitations are also undergoing review. The case of 90 percent federal participation in interstate highway facilities is frequently cited to support the argument for changing this formula.

Sources of Revenue

The successful offering of revenue bonds is dependent on demonstrating the availability of sources of revenue with a high degree of certainty in order to assure sufficient cash flow to amortize the debt. Airports look primarily to airlines, concessions, and general aviation fees, in that order, to generate that revenue. As can be seen, strictly general aviation airports are hard-pressed to produce revenue with the certainty necessary for revenue bond funding. Whereas the airline must serve the airport and is somewhat a captive tenant and user, general aviation aircraft may or may not fly, when and where they choose. By their nature, they are not subject to contractual obligations to assure funds.

The airlines negotiate leases and use-agreements with the airports they serve. The leases usually provide for set rates of square-foot rentals to cover such areas as private offices, ticket counter space, baggage make-up space and many other areas too numerous to mention. Most accept the policy of rentals for exclusive use areas in terminals, but some dispute still rages regarding the extraction of rentals for areas not under the exclusive control of the airlines.

The rates and charges are generally negotiated and are thus acceptable to both parties, even if reluctantly so. Nevertheless, as a result of the airport's monopoly, the airlines really have no choice to reject rates and fees required by the airport. The airport has the authority to establish the rates and charges by ordinance without the consent of the airlines.

One must then ask if federal regulation of

this monopolistic rate-setting capability would not be consistent with the anti-trust philosophy of our government. Some feel such affirmative regulation is necessary while others feel that the carriers' protection is provided for:

(1) in fact that without the signature of the airline on lease agreements the airport's ability to issue revenue bonds is greatly reduced;

(2) in the fact that upon acceptance of federal funds for improvement, the airport must enter a "grant agreement" with the FAA which prohibits charging unreasonable or discriminating fees; and,

(3) in the fact that generally the airline agreements to a break-even philosophy obligate the airlines serving the airport to review and adjust their landing fees annually so as to assure a loss-free operation of the airport.

The greatest area of dispute centers around proposed improvements to be amortized as part of the costs underwritten by the carriers. The carriers frequently believe that the improvements may be unnecessary, excessive or, too extravagant. Several airports are presently in court with the airlines over disputes concerning the reasonableness of the rates and fees. Recent economic conditions have made the airlines more cost conscious and less likely to accept unnecessary improvements or expansion.

The **landing fees** charged to both airlines and general aviation are usually based on the maximum gross certificated landing weight of the aircraft, regardless of the actual weight on landing. They range from a few cents per thousand at smaller airports to over \$1 per thousand at some large hubs. The airlines and general aviation frequently pay **fuel flow** charges of set rates per gallon of enplaned fuel. Airports have also generally imposed security charges on the airlines to help cover the cost of additional improvements and operating costs occasioned by federal requirements relating to security measures on airports. The CAB allowed the airlines temporary fare surcharges to meet this contingency, so the cost has been passed on to the user.

Two categories of concessions usually cover the concession revenues at an airport; aeronautically related and public supported concessions. **Aeronautical concessions** include a percentage of gross FBO contracts; fuel flow charges; aircraft parking fees; maintenance fees; clearing or turn-around fees, etc. **Public support concessions** include restaurants at 10 percent to 25 percent of gross; auto parking at 25 percent to 95 percent; and

many others such as barbers, drug stores, gift shops, and taxi and bus stands.

The general rule of thumb is to estimate future income from concessions on the basis of a per passenger average income of \$1 to \$2. This source, at large hub airports, frequently accounts for over 50 percent of the gross revenue and at others is the most significant single factor. Unfortunately at the small general aviation airport there is insufficient passenger flow to generate adequate returns.

In addition to landing fees, fuel flow charges, and percentage of gross on aviation service, such as repairs and maintenance, some general aviation elements pay square-foot rentals. Corporate based aircraft usually generate demand for office space and frequently lounge space as well. Many airports are solely general aviation and yet are profitable. The volume of revenue may well be there, but because of its relative uncertainty, it is difficult to rely on it as a basis for long-term financing.

Additional financial benefits for the airport may be reaped if the sponsor retains the land surrounding the airport and promotes the development of an industrial park in the area. The "build and lease back" arrangements can be profitable here, and the airport can benefit by an appreciation in the land value.

It is frequently difficult to tell whether an airport is or is not generating surplus revenue, or to make meaningful comparisons of airport fiscal policies. This is due to the lack of standardization in airport accounting systems. All efforts by the federal government, the Air Transport Association (ATA), and others have failed to establish an acceptable standard accounting procedure for airports. The reasons do not necessarily stem from the desire of the airport to hide its financial status, nor from a refusal to cooperate. The problem is a derivative from the more general problem resulting from the fact that each town, city, council, or independently created authority, has by law, certain prescribed accounting procedures to which it must conform. These vary by state and by locality within the state. This is compounded by the demands made by bond indenture agreements and other special situations.

Conclusion

The large hub airport is generally capable of supporting its own improvements and of functioning on a break-even basis. Airport sponsors proposing the public utility model for airport financing usually meet with formidable opposition from airlines and the federal government. The break-even model therefore seems

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likely to prevail and the trend toward independent authorities will most likely continue.

Medium and small hub airports will continue their struggle uphill to fiscal independence. More realistic federal airport support policies should help these airports become more independent of the local tax base.

The small general aviation airport appears to be most vulnerable in the temporary economic set back and is likely to suffer most in the cost conscious era to follow. Unless it is located in a hub area which is served by air carrier (not necessarily at the same airport), the airport has little chance of becoming self-supporting and must depend upon continued local tax subsidy. Such airports are becoming less likely candidates for public support as the population perceives a diminished opportunity to use them. Since their revenues are minimal, the possibilities for successful bonding are low. Their continued success will depend on a realistic evaluation of community need and on the use of cost conscious approaches in both capital planning and daily operational policies.

PHYSICAL ENVIRONMENT

Introduction

Noise pollution, air quality, water quality, and land use around general aviation airports are important parts of the physical environment. The planning and construction of public facilities such as general aviation airports should be guided by a desire to achieve the highest possible level of social benefits, with a minimum expenditure of human, physical, economic, and environmental resources. Large scale physical facilities are usually accompanied by undesirable environmental side-effects.

In an attempt to minimize possible environmental damage resulting from major public undertakings, the National Environmental Policy Act of 1969 (Public Law 91 - 190) was enacted to require that for any project which involves major Federal funding, and which significantly affects the quality of the human environment, an environmental impact statement must be filed with the Council on Environmental Quality

(CEQ). This statement must include the following:

- (1) The environmental impact of the proposed action;
- (2) Any adverse environmental effects which cannot be avoided should the proposal be implemented;
- (3) Alternatives to the proposed action;
- (4) The relationship between local short-term uses of man's environment and the maintenance and enhancement, of long-term productivity; and,
- (5) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.²⁵

The environmental impact statement should consider ecological factors including (1) noise pollution; (2) air quality; (3) water quality; (4) fish and wildlife; (5) solid waste; (6) energy supply and natural resources development; and, (7) protection of environmentally critical areas such as floodplains, wetlands, beaches, dunes, unstable soils, steep slopes, and aquifer recharge areas.

This section will discuss environmental legislation affecting airports and the more common environmental effects resulting from airport construction, with special emphasis on general aviation airports. The discussion will focus on the regulation of noise, pollution, and water quality.

Environmental Legislation

Environmental legislation which has emerged within the last five or six years may eventually influence the utilization of general aviation airports. One of the primary objectives of the Noise Control Act of 1972 (Public Law 92-574) is to control noise from aircraft and aircraft operations. The FAA is authorized to develop regulations to control aircraft noise emissions, as well as to impose curfews, flight path modifications, or other procedures deemed necessary to protect the public. Among the states with environmental regulations, the State of California has established state-wide controls for noise around airports.²⁶ Airport authorities may also control noise: the Port of New York Authority imposes noise standards on the airlines and operators who use its airports.²⁷ The right of the operator to control noise through the imposition of a curfew has been upheld in the California courts.²⁸ But at least one decision severely limited the power of

²⁵ P. L. 91 - 190 Title I, Sec 101, pt C.

²⁶ Howard, George P. (Ed) *Airport Economic Planning* (Cambridge The MIT Press, 1974), p. 425

²⁷ *Ibid.*, p. 806

²⁸ *Stagg v Municipal Ct. of Santa Monica*, 82 Cal. Rptr 578 (1969).