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**ARE THE VISUAL ACUITY REQUIREMENTS FOR PILOTS
IN THE AIRLINE INDUSTRY JUSTIFIABLE?**

William C. Gladish

ABSTRACT

The purpose of this review is to investigate and determine whether the airline industry is justified or unjustified in requiring a more stringent vision criterion than the Federal Aviation Administration. The new law established by the Americans with Disabilities Act of 1990 is applicable to this issue. This Act requires airlines to show that the selection criteria are job-related and consistent with a business necessity. This paper assumes that all such vision criteria would fall into three areas: safety, performance, and investment risk. The data indicate that pilots in the distant visual acuity range from 20/20 to 20/200 have nearly equivalent levels of safety and that pilots who wear corrective lenses have nearly equivalent levels of performance. The data indicate that pilots in the distant visual acuity range from 20/20 to 20/150 pose no significant investment risk. Therefore, the Americans with Disabilities Act of 1990, if interpreted as its authors intended, prohibits such discrimination.

INTRODUCTION

The pilots responsible for flying the nation's airlines are scrutinized very closely for their health and piloting skills. The traveling public demands this scrutiny and it is the responsibility of the Federal Aviation Administration (FAA) to set minimum standards for safety. Federal Aviation Regulation (FAR) 61.151 requires airline transport pilots to obtain a first class medical certificate (Aircraft Owners and Pilots Association [AOPA], 1992). This certificate is discussed in Federal Aviation Regulation 67.13 (b) (1), which states:

Distant visual acuity of 20/20 or better in each eye separately, without correction; or of at least 20/100 in each eye separately corrected to 20/20 or better with corrective lenses (glasses or contact lenses) in which case the applicant may be qualified only on the condition

that he wears those corrective lenses while exercising the privileges of his airman certificate. (AOPA, 1992)

However, the *Guide for Aviation Medical Examiners* states that if an airman's distant visual acuity is worse than the current requirement of 20/100 but is not worse than 20/200, and corrects to 20/20, the airman shall not be required to submit a Report of Eye Evaluation, provided a careful clinical examination finds no evidence of significant underlying pathology (Federal Aviation Administration, Office of Aviation Medicine, 1992). Dr. David Root, an FAA Medical Examiner, stated that although FAR 67.13 specifies 20/100, 20/200 is the greatest uncorrected vision a pilot can have and still obtain a first class medical certificate without a waiver. (Dr. David Root, personal communication, May 13, 1991) Dr. Henry K. Boren,

Manager of the Medical Review Branch, in the Civil Aeromedical Institute stated:

The Federal Air Surgeon in 1986 issued guidelines to allow first and second class medical certificates to be issued to airmen whose distant visual acuity is worse than 20/100, but not worse than 20/200, if a careful clinical examination did not reveal evidence of significant underlying pathology. These airmen are issued a Statement of Demonstrated Ability (SODA) to validate their medical certificate. These standards were modified after years of observing the pilot population proving that these limits with correctable visual acuity could be established without imposing a threat to aviation safety. (Henry K. Boren, person-

al communication,
October 24, 1991)

Therefore, this paper will consider 20/200 as the worst visual acuity a pilot could have and still obtain a first class medical certificate. In addition, all pilots referred to in this paper are assumed to have vision correctable to 20/20 in each eye by the use of glasses or contact lenses.

The major airlines, those airlines with more than \$1 billion in annual revenue, further restrict distant visual acuity requirements as guidelines for employment as a pilot (Massey, 1990). Twelve airlines were contacted by mail, each on two separate occasions. The first occasion was a letter requesting the company's vision requirements and the reasons for those requirements. A second letter was sent requesting the same information. Of the twelve airlines contacted, four responded. Although all four stated their vision requirements, three of the four did not offer any reasons for their vision policies. The fourth airline stated that their vision requirement was based on advice from physicians. Delta Airlines stated it requires 20/20 uncorrected vision (Delta Airlines Personnel Representative, personal communication, September 13, 1991).

United Airlines requires no worse than 20/100 uncorrected vision (United Airlines Flight

Officer Employment Manager, personal communication, June 28, 1991). Northwest Airlines requires no worse than 20/40 uncorrected vision, and other major airlines average no worse than 20/70 as a requirement for employment consideration (Massey, 1990).

Exceptions are made in the industry. Major airlines, national airlines (those airlines with revenue from \$100 million to \$1 billion), and regional airlines (those airlines with revenue less than \$100 million) have hired pilots with 20/200 (Future Airline Pilots of America, 1992). One regional airline, Air Wisconsin, officially stated that it requires no worse than 20/200 uncorrected vision for employment consideration (Air Wisconsin Employment Specialist, personal communication, June 18, 1991).

Since the FAA has determined that a pilot with uncorrected vision of 20/200 correctable to 20/20 is safe and there are airlines hiring these pilots, one must ask: are other airlines justified in demanding better vision than the FAA limit of 20/200?

The nation's concern for civil rights and fair play is demonstrated by numerous civil rights laws. A recent such law, the Americans with Disabilities Act (ADA) of 1990, prohibits all employers, including privately owned businesses, from discriminating against disabled employees or job applicants when making

employment decisions. As of July 26, 1992, private employers with 25 or more employees are covered by this Act. In addition, the employer must provide reasonable accommodation to disabled employees and job applicants so long as it does not inflict undue hardship on the business. This Act explicitly protects citizens with impaired sight (Hunsicker, 1990).

The *Federal Register* gives one definition of "reasonable accommodation" as, "Modification or adjustments to a job application process that enable a qualified applicant with a disability to be considered for the position such qualified applicant desires." (Federal Register, 1991) This definition is applicable to the airlines' visual acuity requirements. The term "undue hardship" means, with respect to provision of an accommodation, significant difficulty or expense incurred by a covered entity in light of the following factors:

- (1) The nature and net cost of the accommodation,
- (2) The overall financial resources of the facility or facilities involved in the provision of the reasonable accommodation,
- (3) The overall financial resources of the covered entity,
- (4) The type of operation or operations of the covered entity, and
- (5) The impact of the accommodation upon the operation of the facility

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(Federal Register, 1991).

A letter was sent to Bobby Silverstein, Chief Counsel and Staff Director, Senate Subcommittee on Disability Policy, explaining the FAA's and the airline industry's visual acuity requirements and asking if the ADA would be applicable to this subject. The following statement is from a letter dated 4 February 1992, from Silverstein: (personal communication, February 4, 1992)

The threshold question in determining coverage under Title I of the ADA is whether a person has a disability as defined by the Act. The definition of disability under the ADA addresses three different circumstances.

The first two circumstances covered in the definition require that the individual have an impairment that 'substantially limits one or more of the major life activities.' An individual with a minor vision impairment may not meet this requirement if the impairment is not of sufficient severity to substantially limit any major life activities.

The third part of the definition of disability, which is 'being regarded as having such an impairment,' is most pertinent to the situation you describe. This includes individuals with impairments that are not sub-

stantially limiting in major life activities in cases where a covered entity treats the impairment as constituting such a limitation.

An example of this would be where an employer reassigns an employee with controlled high blood pressure, which does not substantially limit that individual's activities, to a less strenuous job due to unsubstantiated fears that the individual will suffer a heart attack.

The facts that you present appear to fit within this category. In the case you describe, the airlines have criteria for pilots that screens out individuals with corrected vision. Assuming that the individual's vision impairment does not substantially limit any major life activities, the employer must be able to show that the selection criteria is job related and consistent with a business necessity. The airlines would have to articulate a non-discriminatory reason for screening out persons with corrected vision.

The fact that the Federal Aviation Administration allows persons with corrected vision to obtain pilot's licenses would lend support to the argument

that the more stringent criteria set by some airlines is not job-related or consistent with a business necessity.

Since the airlines did not provide any detailed reasons for their visual acuity restrictions, this paper assumes that the airline industry could justify vision requirements on the basis of: safety, performance, and investment risk. The terms 'safety' and 'performance' need no further explanation; the term 'investment' risk, as used in this paper, refers to the airline industry spending resources on a newly hired pilot. According to a telephone conversation with Walter Coleman, Vice President of Operations, for the Air Transport Association, the airline industry spends approximately \$40,500 to train a newly hired pilot.

An additional \$4,000 per pilot is spent on training every year, and another \$10,000 is required to upgrade a pilot to captain. Coleman continued, saying that all of these estimates are conservative. Assuming a newly hired pilot is a captain in five years, the airlines will have invested over \$70,000 in direct training costs alone. Given this investment, it is understandable why the airlines would want to keep their pilots vision well within the FAA's 20/200 limit. If there is medical evidence to support the contention that a pilot with 20/20 uncorrected vision has significantly stronger and healthier eyes over time than a

pilot with less than 20/20 uncorrected vision, then the airlines would be able to reduce the risk of a pilot losing the first class medical certificate and airline transport pilot rating. Losing a pilot after a \$70,000 investment would be very costly to a company and could be argued as undue hardship as defined by the ADA.

The purpose of this paper is to investigate safety, performance, and investment risk and determine whether the airline industry is justified in requiring a more stringent vision criterion than that of the FAA.

RELATED STUDIES ON SAFETY AND PERFORMANCE

In 1926, President Calvin Coolidge signed the Air Commerce Act, which established federal regulations for civil air commerce. These regulations outlined the first physical standards for pilots and required 20/20 uncorrected vision for both near and distant vision. This visual acuity standard was based on studies of airmen's performance in military and civilian flight schools during the 1920s. Amendments to the visual acuity standards since the 1920s have been empirical, the most recent being in 1986 (Henry K. Boren, personal communication, November 15, 1991).

As stated earlier, in 1986 the Federal Air Surgeon established 20/200 as the worst distant visual acuity a pilot could have for a first and second class

medical certificate (Henry K. Boren, personal communication, October 24, 1991). In addition, the FAA found through experience that safety is not adversely affected by permitting medical certification at any level of uncorrected visual acuity. The FAA is considering eliminating all uncorrected distance vision standards and establishing one near-vision acuity standard for all classes of certification (U.S. General Accounting Office, 1990).

The Canadian Aviation Visual Standards Conference was held in Ottawa on June 6-7, 1990. The Department of Health and Welfare (Civil Aviation Medicine) provided expertise and coordinated the conference. Also attending the conference were representatives from the following organizations: International Civil Aviation Organization, Universities of Waterloo and Montreal optometry departments, Canadian Society of Aerospace Medicine, and experts in ophthalmology, optics, refractive surgery, muscle imbalance, and color vision.

The major airlines, the Canadian Airline Pilot's Association, the Transport Canada Test Pilot Group, Canadian Air Traffic Services, and the Air Transport Association of Canada also had considerable input. The conference recommended that Category I (airline transport and commercial ratings) be distance vision

6/60 (20/200) correctable to 6/9 (20/30), allowable refractive error: +3.5D (diopters). This recommendation presumes that there is no active or chronic visual pathology that could jeopardize air safety during the period of licensure (Liddy, 1991).

The Israel Air Force Aero-medical Center conducted a study of helicopter pilots in 1987. The visual acuity of 38 helicopter pilots experiencing serious air accidents was compared to a control group of 72 pilots. The subjects were matched for age, aircraft, and flight hours. Subjects with decreased visual acuity were divided into two groups. The first group had minor decreases in vision up to 20/25 and did not require corrective lenses. The second group had visual acuity of 20/30 or worse with correction to 20/20 using lenses. The study concluded that helicopter pilots with corrective lenses or minor uncorrected decreases in visual acuity are not at increased risk for serious air accidents (Froom, 1987).

The following studies refer to performance. The U.S. Army conducted a study in 1968 of the performance of pilots with uncorrected 20/20 vision and pilots with vision corrected to 20/20. The study conducted a comparative evaluation of the performance of 113 students with refractive error. The performance of students requiring corrective lenses was

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compared to students who did not require lenses. In-flight evaluations and written test scores were used for comparisons. The study used the results of primary rotary wing training conducted at Fort Walters, Texas, and primary fixed wing training at Fort Stewart, Georgia. The results showed no significant difference in the performance of the two groups throughout the first sixteen weeks of flight training (North Atlantic Treaty Organization Advisory Group for Aerospace Research and Development, 1968).

Another performance study was conducted by the Department of Ophthalmology, Naval Aerospace Medical Institute. In 1987, the performance of 45 student naval aviators with corrective lenses who underwent primary flight training at NAS Whiting Field, Florida, were studied. The outcome variables were completion rate, primary flight training grades, and flight hours. The control group used for the completion rate was all other students who underwent primary flight training during the same time period. The controls for training grades and flight hours were randomly selected from individuals who attended the same training squadrons as the corrective lens wearers under study. Additionally, the controls for training grades and flight hours must have completed flight training within one month of the corrective lens wearers under study. The

results demonstrated that aviators with corrective lenses were significantly more likely to complete training. These results were associated with the increased screening and motivation of the corrective lens wearers. However, the corrective lens wearers were not significantly different in primary flight grades or hours. The results suggest that naval aviators with corrective lenses were competitive with their contemporaries (Bohnker, 1991).

The preceding information suggests that pilots in the distant visual acuity range of 20/20 to 20/200 have nearly equivalent levels of safety. In addition, the studies suggest that pilots who wear corrective lenses have nearly equivalent levels of performance with pilots who do not wear corrective lenses.

MEDICAL ASPECTS OF UNCORRECTED VISION RANGING FROM 20/20 TO 20/200

As stated earlier, the airline industry invests over \$70,000 in training costs alone over a five-year period to develop a newly hired pilot into a captain. It is therefore understandable that the airline industry would want to protect this investment. If a pilot with 20/20 uncorrected vision has less risk of approaching the FAA's limit of 20/200 in the future than a pilot with corrected vision of 20/20, then the airlines would be able to reduce the risk of losing the training investment of \$70,000.

To determine whether pilots with uncorrected 20/20 vision are, in fact, less likely to approach the FAA's 20/200 limit, three optometrists and one ophthalmologist were interviewed for their expert opinions.

This paper used the closest geographically located optometrists. The first three agreeing to an interview were selected; a total of five were contacted. The ophthalmologist who agreed to an interview was provided with an academic associate. This associate's only knowledge of this paper's subject matter was its need for vision experts. Although the sample size of experts is admittedly small, the consistency of the responses from the four experts lends support to the argument that a larger sample size would produce similar results.

The vision experts were given background information on the FAA's and the major airlines' vision requirements. They were also informed that the average age of a newly hired pilot for the major airlines is 34 (Massey, 1990). Since the airlines list only one vision requirement for a pilot applicant, visual acuity, the experts were instructed to consider the pilots in question in exactly the same manner except for visual acuity. Once it was clear that the experts understood this background information, the subjects were given a series of questions about pilots in the visual acuity range of

20/20 to 20/200. The following text is a summary of each doctor's comments.

Stephen Byrnes, O.D., stated that 34 year old pilots in the visual acuity range of 20/20 to 20/150, as a group, have an equal probability of approaching the FAA's limit of 20/200. He went on to say the only reason he would not include pilots over 20/150 is because of the risk associated with an individual's day-to-day fluctuation and possible equipment and/or examiner errors. If a pilot were very near the FAA's 20/200 limit, these errors could cause the individual to go over the 20/200 limit. He also said that pilots in the range from 20/20 to 20/200 are equally likely to have healthy eyes in the future (Stephen Byrnes, personal communication, January 22, 1992).

Daniel M. Wilson, M.D. (ophthalmologist), said that pilots in the range from 20/20 to around 20/150, as a group, have an equal probability of approaching the FAA's limit of 20/200. In addition, the high end of the range could be closer to 20/200 if careful and precise examinations were given. Wilson said that pilots in the range from 20/20 to 20/200, as a group, do not have a significant difference in eye health. He went on to say that as visual acuity worsens so does one's chance of retinal detachment, but for pilots in the 20/20 to 20/200 range the risk would not be significant.

Individuals at the 20/200 mark would have a probability of less than one percent for such a detachment (Daniel M. Wilson, personal communication, January 22, 1992).

Paul Herman, O.D., said that pilots in the range from 20/20 to very near 20/200, as a group, have an equal probability of approaching the FAA's limit of 20/200. Herman continued, "At age 34 there is a very high probability one's distance vision will not change again until around age 60." Individuals in the range from 20/20 to 20/200, as a group, have an equal probability of healthy eyes in the future (Paul Herman, personal communication, January 27, 1992).

Bradley Baker, O.D., said he would consider people in the range group from 20/20 to 20/180 to have an equal probability of approaching the FAA's limit of 20/200. The reason he did not select 20/200 is because of day-to-day fluctuations and other minor errors. He went on to say that standard eye charts jump from the measurement of 20/100 to 20/200; therefore, an eye chart which could measure visual acuity between 20/100 and 20/200 would be required, a task that could easily be accomplished. Baker stated, "Equipment is available that can measure visual acuity very accurately by using responses from the brain" (Bradley Baker, personal interview, January 27, 1992).

SUMMARY

The purpose of this paper was to review safety, performance, and investment risk and determine whether the airline industry is justified in requiring a more stringent vision criterion than the FAA requires. While this is an important issue because of our country's spirit of fair play, the new law established by the Americans with Disabilities Act of 1990 establishes legal protection, which may have a tremendous impact on the U.S. airlines' hiring procedures and/or litigation.

According to Silverstein, Chief Counsel and Staff Director, Senate Subcommittee on Disability Policy, the Americans with Disabilities Act of 1990 requires the airlines to provide non-discriminatory reasons for the more stringent vision criteria. These reasons must be job-related or consistent with a business necessity. The major airlines were contacted several times requesting detailed reasons for the more stringent vision criteria, but none provided the requested information. Therefore, this paper assumed that all job-related and business necessity reasons would fall into three areas: safety, performance, and investment risk.

This paper accessed many computer databases: NTIS, STAR, MEDLINE, LION, and others. Additional organizations contacted for information and assistance, included FAA, U.S. Army, U.S. Navy, U.S. Air

Force, Equal Employment Opportunity Commission, Senate Subcommittee on the Disabled, and the nation's airlines, optometric associations, pilot associations, and vision experts. Unfortunately, this effort did not uncover a great deal of information related to the areas under scrutiny. This could be attributed to related material existing but not uncovered, or it could be that there has been little research addressing this important issue. Additional investigative research and studies need to be conducted.

The information obtained indicates that the FAA and other independent organizations do not consider pilots in the 20/20 to 20/200 range group to be different in safety. The studies uncovered indicate that

pilots who wear corrective lenses have nearly equivalent levels of performance as pilots who do not wear corrective lenses. Selected vision experts agreed that pilots in the 20/20 to 20/200 range group have, for all practical purposes, an equal probability for healthy eyes in the future. In addition, only very near the FAA's limit of 20/200 pose any risk to airlines for losing their investments. This risk point should be established by a more indepth analysis; however, based on the vision experts interviewed for this paper, it would be around 20/150.

Therefore, it is the conclusion of this paper that the airlines are not justified in discriminating against pilots in the visual acuity range of 20/20

to 20/200 because of safety. In addition, the airlines are not justified in discriminating because of performance against pilots who wear corrective lenses, nor are they justified in discriminating against pilots in the visual acuity range from 20/20 to 20/150 because of potential investment risk.

It is also the conclusion of this paper that the Americans with Disabilities Act of 1990, if interpreted as its authors intended, prohibits such discrimination.

In closing, since the ADA requires airlines to articulate an explicit and non-discriminatory reason for its vision criteria, it will also require the FAA to articulate an explicit and non-discriminatory reason for its 20/200 limit.□

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