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16. Abstract <p>Attrition from an active airman status amounts to approximately 17% annually. Summary data presented have served to quantify, to some extent, the characteristics of airmen medically certified during 1968 subsequently becoming attrition during 1970. The contribution of medical factors to attrition has been considered as well as experience, occupation, usage, and geographic characteristics. Population comparisons and prevalence rates are also presented for the various medical factors considered. Disenchantment and/or economic considerations appear to be the most important factors associated with attrition. Medical factors do not contribute substantially to attrition.</p>					
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# ATTRITION FROM ACTIVE AIRMAN STATUS DURING 1970

## I. Introduction

Attrition from an active airman status amounts to approximately 17% annually. Many theories have been advanced concerning possible reasons for attrition, most of which seem empirically sound, i.e., economic influences, disenchantment, geographically associated weather and congestion conditions, occupational mobility, medical factors and, of course, death to name a few.

With a potential for airman population turnover about one out of six annually, it appears important that the aviation community know as much as possible concerning characteristics of the attrition group. The impact of a trend in either direction could have rather profound implications with respect to future planning.

At present, the FAA has no follow-up on the majority of individuals falling into the attrition group. Failure to renew medical certification required to exercise flying privileges serves as the only indicator of inactivity and reasons are not apparent unless death occurred as a result of aircraft accident or FAA medical certification was denied. The extent to which most of the above-mentioned factors contribute to attrition can only be surmised. One might rank these factors and receive general agreement; however, very little more would be known concerning attrition. Considerable information is available concerning medical causes for denial; however, this factor contributes less than 1% to the overall attrition rate.<sup>1</sup>

This study has served to quantify, to some extent, the characteristics of airmen medically certified during 1968 subsequently becoming inactive during 1970 for reasons other than denial of FAA medical certification. Specific factors are not identified, as such, but the summary data does serve to validate some of the factors mentioned.

Of particular interest with respect to medical certification is the extent to which observed medical factors on last examination may have

contributed to attrition. A considerable portion of the study is devoted to the medical and biologic characteristics of airmen in the attrition group. Experience, occupation, usage, and geographic characteristics are also included.

This study, therefore, focuses on some of the more obvious characteristics of those airmen who become inactive for unknown reasons.

## II. Methods and Source

The Aeromedical Certification automated medical record files maintained in Oklahoma City, Oklahoma, provided the source for identification and extraction of relevant summary data concerning the characteristics of airmen becoming inactive during 1970. The "active master tape file" contains the most recent record of an airman's medical application for certification. The tape file includes applications issued, pending and denied certification, and abbreviated records of significant pathology cases retained for future medical reference in the event an airman decides to again exercise his flying privileges following a period of inactivity. The latter being the only instance when a record is maintained on the active master tape file for a period of time greater than 3 years from the date of application. After 3 years, providing that a record has not been superseded by a more current examination from the airman, the record is either converted to an abbreviated record (if significant pathology is present or if the airman was denied medical certification) or it is transferred to a historical tape file.

In this study, a medically certified airman is considered "active" for a maximum of 24 calendar months following his last FAA medical examination, i.e., regardless of the class of medical certificate originally issued, it is valid for third class purposes for a period of time up to 24 calendar months.

Using this definition as a basis for determining activity, those airmen whose last FAA examina-

tion exceeded the 24 calendar month criteria at any time during 1970 were selected for the study. Essentially, this amounts to selection of those airmen whose most recent FAA examination was performed during 1968. The number of airmen identified by this procedure amounted to 151,917. Population comparative data represents those airmen medically certified as of 1 January 1971 under the 24 calendar month definition. The active population totaled 727,430 as of 1 January 1971.

Data from the last medical record was selected and extracted from the master tape file for construction of the various frequency tables presented in this study. Airman applicants denied medical certification, whether new applicants or renewals, were not considered in the study since denial is an obvious reason for attrition. Denied applicants have been considered in detail elsewhere.<sup>1</sup> As previously stated, denied airmen amount to less than 1% of total applicants.

Data presented are descriptive in nature with appropriate population comparisons via conventional statistical methodology where compatible data exists and statistical treatment would be meaningful. Data limitations, where pertinent, are discussed in footnotes to the various tables.

### III. Findings and Discussion

#### A. Medical and Biologic Characteristics

##### 1. Pathology Prevalence on Last Examination.

a. Critical Pathology by Body System. While many diseases are potentially critical in the mortality or morbidity sense, the Office of Aviation Medicine has identified several which are considered "critical" to the flight environment. The primary consideration in the FAA definition of "critical pathology" is related to potential of the disease for sudden incapacitation or inability to respond to the flight environment. Many of the listed diseases are, of course, critical regardless of the environment. Others may appear less critical in the classical sense; however, the unique definition must be recalled.

Federal Aviation Regulations, Part 67, specify that a medical certificate will be denied if an applicant has an established medical history or clinical diagnosis of any of the following conditions:

- (1) A character or behavior disorder that is severe enough to have repeatedly manifested itself by overt acts.
- (2) A psychotic disorder.
- (3) Chronic alcoholism.
- (4) Drug addiction.
- (5) Epilepsy.
- (6) Disturbance of consciousness without satisfactory explanation of the cause.
- (7) Myocardial infarction.
- (8) Angina pectoris or other evidence of coronary disease.
- (9) Diabetes, requiring insulin or oral hypoglycemics.

However, some 800 airmen (approximately 400 of which are still active) have been exempted from the regulations and certified through the appeal procedure since 1961 in recognition of the existence of an above noted medical condition, following extensive medical review by the agency and consultant specialists. History, prognosis, and potential risk of sudden incapacitation are the primary considerations in such cases. It is appropriate to note, however, that airmen issued medical certificates with one of the nine conditions mentioned are often given special medical and operational restrictions that allow for control of risk.

Reference to Table I indicates that the total prevalence rate of critical pathology was lower among the attrition group than among the active airman population as of 1 January 1971. Prevalence was higher among the attrition group for Ear, Nose, Throat, and Mouth pathologic conditions but not statistically significant.<sup>2</sup>

b. All Pathology by Body System. Prevalence of all pathology by body system for the active airman population and the attrition group is shown in Table II. The prevalence rate among the attrition group exceeded that of the active airman population for respiratory pathology, cardiovascular pathology, abdominal pathology, neuropsychiatric pathology, and other miscellaneous pathological conditions, which include alcohol, drugs, endocrinopathies, and general systemic conditions. The total "all pathology" prevalence rate for the attrition group also exceeded that of the active airman population. Statistical significance was observed at the .05 or .001 levels for all rate differences except cardiovascular.

Reference to Table II suggests, however, that the influence of all medical factors recognized on the last examination contributed little to total attrition in terms of quantitative magnitude. There were 12,610 recognized pathological conditions from a total of 151,917 airmen involved in attrition (some airmen have more than one pathology). Therefore, approximately 8% of the attrition group had recognized pathology.

Certainly, some medical problems develop subsequent to the last examination; however, assuming an incidence rate of double the current prevalence rate, medical factors would account for less than one-fifth of the total attrition group.

**2. Critical Electrocardiographic Defects.** The FAA requires applicants for first class medical certification to submit electrocardiographic evidence of absence of myocardial infarction on the first examination after age 35 and annually after age 40. Some other airmen are required to submit EKGs in connection with follow-up cardiovascular evaluations for certification; however, the results are usually not coded for computer input.

As with pathology, the EKG defect categories are differentiated into "critical" and so called "non-critical". Non-critical categories are omitted in this analysis since many non-critical codes reflect technical problems instead of medical problems and since policy regarding the capture and input of these non-critical defects changed during the time period under study thus making comparisons inappropriate.

Table III, therefore, considers critical EKG defect prevalence, by broad interpretive categories, among first class airmen required to submit EKGs from the attrition group and the active population. Prevalence rates were greater in all critical defect areas among the attrition group and statistical significance was observed at the .001 and .05 levels for all defect areas except "Disturbances in Rhythm". Some medical attrition is surely realized from this area; however, total possible contribution to the attrition group in terms of magnitude (165 airmen) would be small.

**3. Restrictions.** Restrictions and limitations requiring observance of certain medically related cautions are placed on the certificates of approximately one-third of the active airmen.

Table IV compares the prevalence of restrictions/limitations among active airmen and the attrition group. Results indicated greater prevalence among the attrition group for: Oxygen Required When Flying Above 7,999 Feet; Passenger Carrying Prohibited; Not Valid for Night Flying or by Color Signal Control (Color Vision); Not Valid for Night Flying (Glaucoma Restriction); Not Valid for Flying Where Radio Use Is Required; Valid for Flight Test Only; Limited to Military Control Tower Operator Duties; and Valid for Student Pilot Purposes Only. Statistical significance existed at the .001 level for Not Valid for Night Flying or by Color Signal Control (Color Vision) and at the .20 level for Valid for Student Pilot Purposes Only.

**4. Waivers.** Statements of Demonstrated Ability (Waivers) are also issued in certain instances. Disqualifying organic conditions are not waived, but applicants may receive individual consideration through special medical evaluation when significant medical deficiencies exist. Table V compares the prevalence of waivers by defect cause for active airmen and the attrition group. Attrition group prevalence exceeded active population prevalence for 3 defects only with no statistical significance observed.

**5. Previous Examination Status.** Table VI shows the distribution of the attrition group by age, class of medical certificate issued, and whether a previous medical examination was recorded on FAA files, i.e., whether the airman was a new applicant at the time of certification in 1968. It is apparent from Table VI that slightly more than half (52.5%) of the attrition group had no previous record of FAA medical examination, compared to an approximate 20% representation of new applicants in the population. Two-thirds of the attrition group came from general aviation categories requiring third class medical certification, compared to a 51% representation in the population. Higher classes of medical certification, i.e., class one and two normally associated with commercial usage, contributed the remaining one-third, compared to 11.3% and 37.7% representation respectively in the population.<sup>3</sup> Table VI also shows the majority of attrition to occur among airmen less than 40 years of age with a record of previous FAA examination; whereas, most attrition occurred prior to age 30 for those without previous FAA medical examination.

6. Age and Sex. Table VII shows the age distribution by class and sex for the attrition group. Population comparison for average age is also provided.

Average age was slightly less among the attrition group (34.2 years) as compared to the active population (35.3 years). The greatest difference between mean age comparison existed for First Class airmen (30.9 years for attrition versus 35.1 years for the population). Table XII, however, shows that 80% of the first class attrition was not occupationally connected to aviation as compared to only 33% showing non-aeronautical occupations in the active population (this category does include a small number of airmen who did not indicate their occupation on the application).<sup>4</sup> Thus, it appears that the average age of the first class attrition group was affected considerably by airmen not requiring first class medical certification, possibly young men anticipating an airline pilot career.

As of 1 January 1971, female representation in the population amounted to 29,832 (4.1%) of the total 727,430 active airmen.<sup>4</sup> Reference to Table VII indicates 9,321 (6.1%) of the total 151,917 airmen in the attrition group were females. Such a difference in sex representation is obviously statistically significant.

7. Height and Weight. The height distribution by class and sex for the attrition group is shown in Table VIII. Table IX shows the weight distribution by class and sex for the attrition group. Neither table is particularly remarkable.

#### *B. Experience, Occupation, Usage, and Geographic Characteristics*

1. Flight Time. Flight time during the past six months and total to date, broken down by civilian and military flight time, is a required item of information on the application for medical certification. Validity of the data is subject to question as concerns accuracy since individual recall is relied upon to respond to this item. However, the purpose for requiring the response is not affected to any extent since the interest concerns rather gross breakdowns of how much total experience and the recency of experience. To this extent, the data are useful for purposes of this study.

a. Flight Time During the Past Six Months. Recency of experience data reflected

by Table X clearly indicate that the majority of airmen in the attrition group had done very little flying during the 6 months prior to their last FAA medical examination. Almost three-fourths of this group had less flight time than what would be considered minimum for proficiency purposes.

b. Total Flight Time to Date. Consistent with the results of the recency of experience data, Table XI shows about 62% of the attrition group to have 50 hours or less total experience. Most of these individuals, therefore, probably did not complete requirements for a private pilot rating. Equally important with respect to the total experience is the second less pronounced peak among individuals with 100-500 hours total experience.

2. Occupations of Airmen in the Attrition Group. Table XII shows attrition to be proportionally higher among non-aeronautical occupations. With the single exception of aircraft mechanics and fixed base operators without commercial ratings, attrition from aeronautical occupations was proportionally less than the corresponding population representation by occupation.

3. Stated Usage of Flying Privileges in the Attrition Group. Proportionally fewer airmen among the attrition group indicated business as a reason for flying on their last FAA medical examination when compared to the general population as seen in Table XIII. This is, of course, consistent with findings with respect to occupation and flying time. Pleasure flyers represent a larger proportion of the attrition group than their representation in the general population.

4. Geographic Distribution of Airmen in the Attrition Group. Proportional comparison of the attrition group by state versus the total active airman population by state shows the attrition group to be slightly higher in 13 of 48 states. Both military and international airmen in the attrition group were also slightly greater than population representation. However, no particular geographic pattern emerged and the net effect was not remarkable. The influence of geographically associated weather and congestion factors on attrition appears less significant than might be expected. Table XIV shows distribution by state for the attrition group as compared to the total population as of 1 January 1971.



#### IV. Summary

Several attrition factors were considered, including economic reasons, geographically associated weather and congestion conditions, occupational mobility, and disenchantment with aviation. However, a primary focus of this study has been to quantify the extent to which medical factors might contribute to unknown causes for attrition. Prevalence of various medical conditions on last examination among the attrition group was examined and compared with corresponding active population prevalence for those conditions.

The total prevalence of "critical" pathology was lower for the attrition group than for the active population. Prevalence for Ear, Nose, Throat, and Mouth pathological conditions was higher among the attrition group but not statistically significant.

Considering all pathology, critical and so called non-critical, prevalence among the attrition group exceeded that of the active population overall and for 5 of the 9 body systems used for classification purposes by the Office of Aviation Medicine.

Prevalence rates were greater for all EKG defect areas among the first class certified attrition group when compared to the corresponding active population group.

However, in terms of percentage contribution to the total attrition group, medical factors appear to be ruled out as a significant cause for attrition on the basis of medical findings on the last examination.

More than half (52.5%) of the attrition group had no previous FAA medical examination, compared to about 20% in the population. Approximately two-thirds (67.5%) of all attrition was among general aviation categories which require third class medical certification, as compared to a 51% representation in the population.

The female attrition group was larger than expected based on population representation.

72.6% of the attrition group indicated less than 10 hours flight time during the six months prior to their last FAA medical examination. Total flight experience was less than 50 hours for 62% of the attrition group.

95% of the 1970 attrition group were airmen with non-aeronautical occupations as compared to 83% with non-aeronautical occupations in the population.

The geographic distribution of the attrition group was proportionally comparable to the active population distribution, thus negating the influence of presumed weather and congestion factors associated with certain geographic areas.

Empirical expectations have been quantified to some extent by this study. With approximately three-fourths of the attrition group indicating less than 10 hours flying time during the six months prior to the last FAA medical examination, the majority of which were from general aviation categories, the most significant causes for attrition appear to be economic influence and disenchantment with aviation.

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Table I

PREVALENCE OF CRITICAL PATHOLOGY BY BODY SYSTEM  
ACTIVE AIRMEN VERSUS THE 1970 ATTRITION GROUP

Critical Pathology/Body System	1970 Attrition Group			Active Airman Population		
	Frequency of Occurrence	Percent	Prevalence Per 100,000	Frequency of Occurrence	Percent	Prevalence Per 100,000
Eye	2,792	65.96	1837.85	15,925	63.30	2189.21
Ears, Nose, Throat, and Mouth	9	.21	5.92*	33	.13	4.54
Cardiovascular	424	10.02	279.10	2,794	11.11	384.09
Abdominal	129	3.05	84.91	624	2.48	85.78
Neuropsychiatric	40	.94	26.33	269	1.07	36.98
Other Miscellaneous Conditions	839	19.82	552.28	5,512	21.91	757.74
TOTAL	4,233	100.00	2786.39	25,157	100.00	3458.34

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section.

NOTE: Critical pathology as recorded on the most recent examination or carried forward as historical data from previous examinations. The total active airman population was 727,430 as of 1 January 1971; and the total attrition population was 151,917. Point prevalence data presented in this table was obtained by the following formula:

$$\text{Prevalence per 100,000} = \frac{\text{Cell Frequency}}{\text{Population or Attrition Total}} \times 100,000$$

\*Asterisks indicate those areas where attrition group prevalence exceeds population prevalence with no statistical significance.

Since a primary interest of this study was the extent to which medical factors contribute to attrition, statistical significance was determined for only those medical factors where attrition group prevalence exceeded population prevalence.

Table II

PREVALENCE OF ALL PATHOLOGY BY BODY SYSTEM  
ACTIVE AIRMEN VERSUS THE 1970 ATTRITION GROUP

Body System	1970 Attrition Group		Active Airman Population	
	Frequency of Pathology Occurrence	Prevalence Per 100,000	Frequency of Pathology Occurrence	Prevalence Per 100,000
Eye	3,467	27.49	18,615	31.50
Ears, Nose, Throat, and Mouth	523	4.15	2,959	5.01
Respiratory	366	2.90	1,359	2.30
Cardiovascular	2,111	16.74	10,014	16.95
Abdominal	3,052	24.20	13,093	22.16
Neuropsychiatric	929	7.37	3,473	5.88
Bones and Joints	842	6.68	4,258	7.20
Muscles	121	.96	673	1.14
Other Miscellaneous Conditions	1,199	9.51	4,642	7.86
<b>TOTAL</b>	<b>12,610</b>	<b>100.00</b>	<b>59,086</b>	<b>100.00</b>

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section.

NOTE: All pathology as recorded on the most recent examination. Only critical pathology is carried forward as historical data from previous examinations. The total active airman population was 727,430 as of 1 January 1971; the total attrition population was 151,917. Point prevalence data presented in this table was obtained by the following formula:

$$\text{Prevalence per 100,000} = \frac{\text{Cell Frequency}}{\text{Population or Attrition Total}} \times 100,000$$

\*Asterisks indicate those areas where attrition group prevalence exceeds population prevalence with no statistical significance.

Since a primary interest of this study was the extent to which medical factors contribute to attrition, statistical significance was determined for only those medical factors where attrition group prevalence exceeded population prevalence.

\*\*Indicates statistical significance at .001.

\*\*\*Indicates statistical significance at .05.

Table III

PREVALENCE OF CRITICAL ELECTROCARDIOGRAPHIC DEFECT  
 AMONG FIRST-CLASS AIRMEN REQUIRED TO SUBMIT EKGs -  
 ACTIVE AIRMAN POPULATION VERSUS THE 1970 ATTRITION GROUP

EKG Defect	1970 Attrition Group			Active Airman Population		
	Frequency of Occurrence	Percent	First Class Prevalence Per 100,000	Frequency of Occurrence	Percent	First Class Prevalence Per 100,000
Disturbances in Rhythm	6	3.64	381.44*	77	3.70	211.87
Conduction Defects	62	37.58	3941.51***	932	44.74	2564.46
T and ST Changes	80	48.48	5085.82**	878	42.15	2415.87
EKG Evidence of Myocardial Infarction	17	10.30	1080.74***	194	9.31	533.80
Dextrocardia	-	-	-	2	.10	5.50
TOTAL	165	100.00	10489.51**	2,083	100.00	5731.50

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section.

NOTE: Critical EKG defect status as of most recent examination, including history. The number of first class airmen requiring electrocardiograms as of 1 January 1971 equaled 36,343. The first class attrition group requiring electrocardiograms equaled 1,573. Point prevalence data presented in this table was obtained by the following formula:

$$\text{Prevalence per 100,000} = \frac{\text{Cell Frequency}}{\text{Population or Attrition Total}} \times 100,000$$

Requiring EKGs

\*Asterisks indicate those areas where attrition group prevalence exceeds population prevalence with no statistical significance.

Since a primary interest of this study was the extent to which medical factors contribute to attrition, statistical significance was determined for only those medical factors where attrition group prevalence exceeded population prevalence.

\*\*Indicates statistical significance at .001.

\*\*\*Indicates statistical significance at .05.

Table IV

PREVALENCE OF CERTIFICATE RESTRICTIONS  
ACTIVE AIRMAN POPULATION VERSUS THE 1970 ATTRITION GROUP

Certificate Restrictions	1970 Attrition Group			Active Airman Population		
	Frequency of Occurrence	Percent	Prevalence Per 100,000	Frequency of Occurrence	Percent	Prevalence Per 100,000
Must Have Available Glasses for Near Vision While Flying	6,957	13.85	4579.48	50,136	18.91	6892.21
Must Wear Glasses for Distant Vision While Flying	36,874	73.42	24272.47	185,105	69.83	25446.44
Must Wear Glasses for Near and Distant Vision While Flying	1	.00	.66	7	.00	.96
Must Wear Prismatic Correction While Flying	5	.01	3.29	49	.02	6.74
May Wear Contact Lenses While Flying	275	.55	181.02	1,570	.59	215.83
May Wear Contacts While Flying: Glasses Must Be Available	1,178	2.33	775.42	6,738	2.54	926.27
Must Wear Hearing Aid While Flying	49	.10	32.25	297	.11	40.83
Must Wear Artificial Limb While Flying	7	.01	4.61	209	.08	28.73
Oxygen Required When Flying Above 7,999 Feet	8	.02	5.27*	21	.01	2.89
Passenger Carrying Prohibited	4	.01	2.63*	17	.01	2.34
Not Valid for Pilot In Command	-	-	-	7	.00	.96
Not Valid for Control Tower Operator Duties	63	.12	41.47	515	.19	70.80
Not Valid for Air Transport Duties	1	.00	.66	11	.01	1.51
Flying of Jet Aircraft Prohibited	-	-	-	1	.00	.14
Not Valid for Night Flying or By Color Signal Control (Color Vision)	2,561	5.10	1685.79**	9,657	3.64	1327.55

Table IV (Continued)

PREVALENCE OF CERTIFICATE RESTRICTIONS  
ACTIVE AIRMAN POPULATION VERSUS THE 1970 ATTRITION GROUP

Certificate Restrictions	1970 Attrition Group			Active Airman Population		
	Frequency of Occurrence	Percent	Prevalence Per 100,000	Frequency of Occurrence	Percent	Prevalence Per 100,000
Not Valid for Night Flying (Glaucoma Restriction)	43	.09	28.30*	202	.08	27.77
Not Valid for Flying Where Radio Use Is Required	14	.03	9.22*	54	.02	7.42
Flying Limited to Remote Areas	-	-	-	1	.00	.14
Valid for Flight Test Only	15	.03	9.87*	60	.02	8.25
Second Class Privileges Limited To Crop Dusting	-	-	-	2	.00	.27
Second Class Privileges Limited To Flight Engineer Duties	6	.01	3.95	51	.02	7.01
Second Class Privileges Limited To Flight Navigator Duties	1	.00	.66	18	.01	2.47
Second Class Privileges Limited To Control Tower Operator Duties	39	.08	25.67	239	.09	32.86
Valid for Air Traffic Controller Duties Only	8	.02	5.27	1,171	.44	160.98
Limited to Military Control Tower Operator Duties	28	.06	18.43*	121	.05	16.63
Valid for Control Tower Duties When Second Controller on Duty	-	-	-	11	.01	1.51
Valid Only when Accompanied by Another Qualified Pilot	1	.00	.66	8	.00	1.10
Valid for Student Pilot Purposes Only	1,183	2.36	778.71***	3,343	1.26	459.56

Table IV (Continued)  
 PREVALENCE OF CERTIFICATE RESTRICTIONS  
 ACTIVE AIRMAN POPULATION VERSUS THE 1970 ATTRITION GROUP

Certificate Restrictions	1970 Attrition Group		Active Airman Population			
	Frequency of Occurrence	Percent	Prevalence Per 100,000	Frequency of Occurrence	Percent	Prevalence Per 100,000
Second Class Privileges Limited To Cargo Operations	-	-	-	2	.00	.27
Time Limitation Restrictions	602	1.20	396.27	3,337	1.26	458.74
Panel Restrictions (Time Limitation)	55	.11	36.20	459	.17	63.10
Miscellaneous Restrictions	244	.49	160.61	1,681	.63	231.09
TOTAL	50,222	100.00	33058.84	265,100	100.00	36443.37

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section and the 1970 Aeromedical Certification Statistical Handbook.

NOTE: Restriction status as of latest examination. The total active airman population was 727,430 as of 1 January 1971; the total attrition population was 151,917. Point prevalence data presented in this table was obtained by the following formula:

$$\text{Prevalence per 100,000} = \frac{\text{Cell Frequency}}{\text{Population or Attrition Total}} \times 100,000$$

\*Asterisks indicate those areas where attrition group prevalence exceeds population prevalence with no statistical significance.

Since a primary interest of this study was the extent to which medical factors contribute to attrition, statistical significance was determined for only those medical factors where attrition group prevalence exceeded population prevalence.

\*\*Indicates statistical significance at .001

\*\*\*Indicates statistical significance at .20.

Table V  
 PREVALENCE OF WAIVERS BY DEFECT CAUSE  
 ACTIVE AIRMAN POPULATION VERSUS THE 1970 ATTRITION GROUP

Waiver Cause	1970 Attrition Group			Active Airman Population		
	Frequency of Occurrence	Percent	Prevalence Per 100,000	Frequency of Occurrence	Percent	Prevalence Per 100,000
External Eye Problem	42	1.27	27.65	279	1.06	38.35
Internal Eye Problem	14	.42	9.21	116	.44	15.95
Glaucoma	-	-	-	5	.02	.69
Deficient Distant Vision	1,217	36.79	801.09	12,074	46.01	1659.82
Deficient Near Vision	3	.09	1.97	23	.09	3.16
Deficient Color Vision	399	12.06	262.64	3,494	13.31	480.32
Contact Lenses	1,368	41.35	900.49	7,804	29.74	1072.82
Field of Vision (Visual Field Deficiency)	2	.06	1.32	15	.06	2.06
Deficient Hearing	142	4.29	93.47	1,376	5.24	189.16
Ear	2	.06	1.32*	4	.02	.55
Throat	-	-	-	1	.00	.14
Mute	2	.06	1.32*	3	.01	.41
Respiratory System	-	-	-	5	.02	.69
Heart Disease-General	-	-	-	7	.03	.96
Heart Disease-Valvular	-	-	-	1	.00	.14
Heart Disease-Vascular	-	-	-	1	.00	.14
Electrocardiogram Abnormalities	1	.03	.66*	1	.00	.14
Neurological	2	.06	1.32	55	.21	7.56



Table V (Continued)  
 PREVALENCE OF WAIVERS BY DEFECT CAUSE  
 ACTIVE AIRMAN POPULATION VERSUS THE 1970 ATTRITION GROUP

Waiver Cause	1970 Attrition Group			Active Airman Population		
	Frequency of Occurrence	Percent	Prevalence Per 100,000	Frequency of Occurrence	Percent	Prevalence Per 100,000
Mental and Nervous	-	-	-	2	.01	.27
Bone and Joint	29	.88	19.09	209	.80	28.73
Muscles	29	.88	19.09	161	.61	22.13
Miscellaneous Conditions	33	1.00	21.72	337	1.28	46.33
Malignancy	-	-	-	3	.01	.41
Amputation	23	.70	15.14	269	1.03	36.98
<b>TOTAL</b>	<b>3,308</b>	<b>100.00</b>	<b>2177.50</b>	<b>26,245</b>	<b>100.00</b>	<b>3607.91</b>

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section and the 1970 Aeromedical Certification Statistical Handbook.

NOTE: Waiver status as of latest examination. The total active airman population was 727,430 as of 1 January 1971; the total attrition population was 151,917. Point prevalence data presented in this table was obtained by the following formula:

$$\text{Prevalence per 100,000} = \frac{\text{Cell Frequency}}{\text{Population or Attrition Total}} \times 100,000$$

\*Asterisks indicate those areas where attrition group prevalence exceeds population prevalence with no statistical significance.

Since a primary interest of this study was the extent to which medical factors contribute to attrition, statistical significance was determined for only those medical factors where attrition group prevalence exceeded population prevalence.

Table VI

AGE, MEDICAL CERTIFICATE ISSUED, AND PREVIOUS  
FAA EXAMINATION STATUS OF THE 1970 ATTRITION GROUP

Age	First Class		Second Class		Third Class		Total	
	Prev. Exam.	No Prev. Exam.	Prev. Exam.	No Prev. Exam.	Prev. Exam.	No Prev. Exam.	Prev. Exam.	No Prev. Exam.
< 20	13	132	23	260	65	4,861	101	5,253
20-24	727	1,122	2,435	3,494	3,362	16,908	6,524	21,524
25-29	1,382	1,000	5,086	4,206	4,867	13,903	11,335	19,109
30-34	1,143	400	4,567	2,085	5,305	8,791	11,015	11,276
35-39	536	177	4,435	1,377	5,778	6,573	10,749	8,127
40-44	278	72	3,206	842	7,076	5,182	10,560	6,096
45-49	309	81	3,882	1,033	5,906	3,496	10,097	4,610
50-54	234	35	2,493	531	3,649	1,833	6,376	2,399
55-59	96	12	831	114	2,165	799	3,092	925
60-64	93	-	299	22	1,051	283	1,443	305
65-69	4	1	151	11	465	99	620	111
70-74	1	-	38	1	133	18	172	19
75-79	-	-	9	1	47	7	56	8
80-84	-	-	-	1	10	1	10	2
> 84	-	-	-	-	3	-	3	-
TOTAL	4,816	3,032	27,455	13,978	39,882	62,754	72,153	79,764
PERCENT OF TOTAL	3.2	2.0	18.1	9.2	26.2	41.3	47.5	52.5

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section.

NOTE: Age at last birthday as of 1 January 1971. Previous examination status determined internally by computer comparison.

Table VII  
AGE, MEDICAL CERTIFICATE ISSUED, AND SEX OF THE 1970 ATTRITION GROUP

Age	First Class		Second Class		Third Class		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
Less than 15	-	-	1	-	-	-	1	-
15 - 19	143	2	268	14	4,418	508	4,829	524
20 - 24	1,820	29	5,707	222	18,672	1,598	26,199	1,849
25 - 29	2,363	19	9,118	174	17,030	1,740	28,511	1,933
30 - 34	1,529	14	6,537	115	12,779	1,317	20,845	1,446
35 - 39	710	3	5,718	94	11,258	1,093	17,686	1,190
40 - 44	343	7	3,962	86	11,339	919	15,644	1,012
45 - 49	386	4	4,846	69	8,729	673	13,961	746
50 - 54	267	2	2,974	50	5,151	331	8,392	383
55 - 59	108	-	924	21	2,834	130	3,866	151
60 - 64	93	-	310	11	1,285	49	1,688	60
65 - 69	5	-	160	2	547	17	712	19
70 - 74	1	-	39	-	146	5	186	5
75 - 79	-	-	10	-	53	1	63	1
80 - 84	-	-	1	-	9	2	10	2
Greater than 84	-	-	-	-	3	-	3	-
TOTAL	7,768	80	40,575	858	94,253	8,383	142,596	9,321
Average Age (Attrition)	30.9		35.2		34.0		34.2	
Average Age (Population)	35.1		35.1		35.4		35.3	

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section.

NOTE: Age at last birthday as of 1 January 1971.

Table VIII  
HEIGHT, MEDICAL CERTIFICATE ISSUED, AND SEX OF THE 1970 ATRITION GROUP

Height In Inches	First Class		Second Class		Third Class		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
Less than 59	60	1	194	12	460	92	714	105
59	11	-	53	5	128	24	192	29
60	16	2	89	17	187	209	292	228
61	5	5	36	29	85	291	126	325
62	6	3	49	73	151	887	206	963
63	13	9	67	95	235	954	315	1,058
64	32	6	221	109	627	1,315	880	1,430
65	83	17	491	152	1,278	1,268	1,852	1,437
66	254	9	1,322	141	3,452	1,284	5,028	1,434
67	464	14	2,366	98	5,537	884	8,367	996
68	725	4	4,140	66	9,836	635	14,701	705
69	891	3	4,820	32	10,703	297	16,414	332
70	1,188	5	6,217	13	14,292	127	21,697	145
71	1,175	1	6,178	4	14,554	54	21,907	59
72	1,269	1	6,826	7	15,155	32	23,250	40
73	646	-	3,219	1	7,499	10	11,364	11
74	543	-	2,435	-	5,540	4	8,518	4
75	253	-	1,054	3	2,567	6	3,874	9
Greater than 75	134	-	798	1	1,967	10	2,899	11
TOTAL	7,768	80	40,575	858	94,253	8,383	142,596	9,321
Average Height (Attrition)	68.6		68.5		68.1		68.2	
Average Height (Population)	68.4							

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section.  
NOTE: Height rounded to nearest inch.

Table IX  
WEIGHT, MEDICAL CERTIFICATE ISSUED, AND SEX OF THE 1970 ATTRITION GROUP

Weight In Pounds	First Class		Second Class		Third Class		Total	
	Male	Female	Male	Female	Male	Female	Male	Female
Less than 90	20	1	49	4	100	29	169	34
90 - 99	-	2	-	10	19	122	19	134
100 - 109	4	3	8	64	93	747	105	814
110 - 119	24	19	76	182	408	1,814	508	2,015
120 - 129	117	27	431	227	1,465	2,127	2,013	2,381
130 - 139	358	13	1,371	175	4,164	1,670	5,893	1,858
140 - 149	711	3	3,106	98	7,996	848	11,813	949
150 - 159	1,123	4	5,317	47	12,196	461	18,636	512
160 - 169	1,367	3	7,050	23	15,390	250	23,807	276
170 - 179	1,342	1	7,119	9	15,557	131	24,018	141
180 - 189	1,111	2	6,315	4	13,361	82	20,787	88
190 - 199	715	1	4,350	5	9,266	40	14,331	46
200 - 209	421	-	2,444	4	5,737	22	8,602	26
210 - 219	219	1	1,438	2	3,557	12	5,214	15
220 - 229	114	-	770	3	2,104	11	2,988	14
230 - 239	62	-	367	1	1,229	5	1,658	6
240 - 249	25	-	174	-	690	4	889	4
Over 249	35	-	190	-	921	8	1,146	8
TOTAL	7,768	80	40,575	858	94,253	8,383	142,596	9,321
Average Weight (Attrition)	170.1		172.6		168.5		169.7	
Average Weight (Population)	172.5							

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section.

NOTE: Weight rounded to nearest pound.

Table X

REGENCY OF FLIGHT EXPERIENCE IN THE 1970 ATTRITION GROUP

Age	Flight Time Last Six Months (Hours)													Total
	0-10	10-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400-449	450-499	>499		
Less than 20	4,619	721	11	3	-	-	-	-	-	-	-	-	-	5,354
20 - 24	23,304	3,888	549	184	58	22	13	11	2	3	4	10	10	28,048
25 - 29	23,710	5,082	947	295	115	77	35	54	21	31	10	67	67	30,444
30 - 34	15,914	4,623	975	273	130	117	51	55	30	50	11	62	62	22,291
35 - 39	13,186	4,046	935	242	100	92	42	78	27	48	23	57	57	18,876
40 - 44	11,042	3,953	1,011	234	109	97	44	52	25	40	19	30	30	16,656
45 - 49	9,319	3,670	914	296	136	100	47	74	40	44	21	46	46	14,707
50 - 54	5,455	2,131	656	210	87	50	38	53	19	33	14	29	29	8,775
55 - 59	2,303	1,113	345	97	44	35	13	20	11	18	5	13	13	4,017
60 - 64	931	500	157	46	22	19	9	18	12	17	8	9	9	1,748
65 - 69	387	225	68	20	15	7	1	4	1	2	-	1	1	731
70 - 74	83	71	24	8	4	1	-	-	-	-	-	-	-	191
75 - 79	34	20	4	2	2	1	-	-	-	1	-	-	-	64
80 - 84	8	3	-	1	-	-	-	-	-	-	-	-	-	12
Over 84	1	1	1	-	-	-	-	-	-	-	-	-	-	3
TOTAL	110,296	30,047	6,597	1,911	822	618	293	419	188	287	115	324	324	151,917
PERCENT	72.6	19.8	4.3	1.3	0.5	0.4	0.2	0.3	0.1	0.2	0.1	0.2	0.2	100.0

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section.

NOTE: Age at last birthday as of 1 January 1971. Flight time last six months from item 17, FAA Form 8500-8, rounded to nearest hour.

Table XI

## TOTAL FLIGHT EXPERIENCE IN THE 1970 ATTRITION GROUP

Age	Total Flight Time (Hours)							Total
	0-50	50-100	100-500	500-1000	1000-2000	2000-5000	>5000	
Less than 20	5,297	42	13	1	-	-	1	5,354
20 - 24	24,613	1,684	1,644	73	27	7	-	28,048
25 - 29	23,533	2,727	3,601	326	176	74	7	30,444
30 - 34	14,262	2,431	4,492	560	313	185	48	22,291
35 - 39	10,282	1,852	4,752	963	484	373	170	18,876
40 - 44	7,117	1,465	5,073	1,445	749	542	265	16,656
45 - 49	4,870	1,104	4,524	1,652	1,091	918	548	14,707
50 - 54	2,604	557	2,472	1,065	781	781	515	8,775
55 - 59	938	220	1,112	530	440	419	358	4,017
60 - 64	331	68	434	250	209	213	243	1,748
65 - 69	115	19	160	117	100	123	97	731
70 - 74	29	3	32	23	35	38	31	191
75 - 79	9	1	12	6	11	12	13	64
80 - 84	2	-	1	2	3	3	1	12
Over 84	-	-	-	-	-	1	2	3
TOTAL	94,002	12,173	28,322	7,013	4,419	3,689	2,299	151,917
PERCENT	61.9	8.0	18.7	4.6	2.9	2.4	1.5	100.0

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section.

NOTE: Age at last birthday as of 1 January 1971. Flight time total to date from item 16, FAA Form 8500-8, rounded to nearest hour.

Table XII

## OCCUPATIONS OF THE 1970 ATTRITION GROUP

Occupation	First Class	Second Class	Third Class	Total	Percent Attrition	Percent Population
Pilot, Scheduled and Non-Scheduled Airlines Only (includes captain, co-pilot, first and second officer)	750	20	2	772	.51	5.18
Flight Engineer	20	149	9	178	.12	.66
Flight Navigator/Flight Radio Operator	3	26	2	31	.02	.06
Commercial, Business, Executive, or Self-Employed Pilot (First Class)	471	21	6	498	.33	1.55
Commercial Pilot, Self-Employed (Second Class)	2	215	7	224	.15	.43
Commercial Pilot, Not Self-Employed (Second Class)	11	577	7	595	.39	1.37
Aero Application, Crop Duster, Spray Pilot	2	127	4	133	.09	.32
Air Traffic Controller	19	3,517	31	3,567	2.34	5.34
Flight Instructor	109	222	2	333	.22	.93
Aircraft Mechanic and Fixed Base Operators (who are not commercial pilots)	205	569	474	1,248	.82*	.79
Not Given or Non-Aeronautical	6,256	35,990	102,092	144,338	95.01*	83.37
TOTAL	7,848	41,433	102,636	151,917	100.00	100.00

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section; and, 31 December 1970 distribution of airman occupations from the 1970 Aeromedical Certification Statistical Handbook.

NOTE: Occupation as recorded by the airman in item 10, FAA Form 8500-8.

\*Asterisks indicate those areas where attrition group prevalence exceeds population prevalence.



Table XIII

STATED USAGE OF FLYING PRIVILEGES  
IN THE 1970 ATTRITION GROUP

Type Of Flying	Attrition Group		General Population	
	Frequency	Percent	Frequency	Percent
Business	28,075	18.5	207,462	28.5
Pleasure	123,842	81.5*	519,968	71.5
TOTAL	151,917	100.0	724,430	100.0

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section and 1970 Aeromedical Certification Statistical Handbook.

NOTE: Type of flying as recorded by the airman in item 14, FAA Form 8500-8.

\*Asterisk indicates area where attrition group prevalence exceeds population prevalence.

Table XIV

## STATE OF RESIDENCE - ACTIVE ARMEN VERSUS THE 1970 ATTRITION GROUP

State	Attrition Group			Active Population	
	First Class	Second Class	Third Class	Total	Percent
Alabama	49	387	1,194	1,630	1.1*
Alaska	31	247	881	1,159	.8
Arizona	75	459	1,393	1,927	1.3*
Arkansas	15	302	837	1,154	.8*
California	1,704	4,613	12,627	18,944	12.5
Colorado	239	759	1,522	2,520	1.7
Connecticut	87	309	1,122	1,518	1.0
Delaware	8	54	211	273	.2
District of Columbia	24	37	132	193	.1
Florida	935	1,542	3,941	6,418	4.2
Georgia	271	573	1,885	2,729	1.8
Hawaii	62	93	166	321	.2
Idaho	19	179	603	801	.5
Illinois	243	1,110	4,712	6,065	4.0
Indiana	78	505	2,646	3,229	2.1*
Iowa	19	356	1,786	2,161	1.4
Kansas	123	477	1,986	2,586	1.7*
Kentucky	19	210	909	1,138	.7
Louisiana	56	510	1,312	1,878	1.2
Maine	12	106	413	531	.3
Maryland	63	300	1,218	1,581	1.0
Massachusetts	184	437	1,617	2,238	1.5
Michigan	82	785	3,784	4,651	3.1
Minnesota	257	642	2,294	3,193	2.1
Mississippi	20	253	946	1,219	.8*
Missouri	199	666	2,323	3,188	2.1*
Montana	21	225	753	999	.6
Nebraska	13	234	1,023	1,270	.8
Nevada	25	208	465	698	.5
New Hampshire	26	105	277	408	.3
New Jersey	219	578	2,157	2,954	1.9
New Mexico	19	217	815	1,051	.7
				7,257	1.0
				6,172	.8
				8,908	1.2
				4,911	.7
				93,215	12.8
				12,119	1.7
				8,336	1.1
				1,436	.2
				851	.1
				30,667	4.2
				13,879	1.9
				2,052	.3
				3,470	.5
				30,161	4.1
				14,703	2.0
				10,060	1.4
				12,010	1.6
				4,993	.7
				8,368	1.2
				2,348	.3
				7,789	1.1
				10,770	1.5
				22,304	3.1
				16,381	2.2
				4,544	.6
				14,540	2.0
				4,226	.6
				6,053	.8
				3,332	.5
				2,433	.3
				15,825	2.2
				4,953	.7

Table XIV (Continued)

## STATE OF RESIDENCE - ACTIVE AIRMEN VERSUS THE 1970 ATTRITION GROUP

State	Attrition Group			Active Population	
	First Class	Second Class	Third Class	Total	Percent
New York	422	1,182	4,285	5,889	3.9
North Carolina	62	364	1,487	1,913	1.3
North Dakota	5	110	583	698	.5*
Ohio	128	989	4,383	5,500	3.6
Oklahoma	65	521	1,743	2,329	1.5
Oregon	59	544	1,478	2,081	1.4*
Pennsylvania	146	682	3,082	3,910	2.6
Rhode Island	14	53	184	251	.2
South Carolina	49	249	688	986	.6
South Dakota	11	69	466	546	.4
Tennessee	69	400	1,735	1,735	1.1
Texas	393	2,108	6,832	9,333	6.1*
Utah	48	231	592	871	.6*
Vermont	5	53	143	201	.1
Virginia	135	470	1,431	2,036	1.3
Washington	349	881	2,385	3,615	2.4*
West Virginia	6	101	326	433	.3
Wisconsin	67	389	1,643	2,099	1.4
Wyoming	4	82	328	414	.3*
U. S. CIVILLIAN TOTAL	7,234	26,956	91,275	125,465	
Military International	8	13,973	10,496	24,477	16.1*
	606	504	865	1,975	1.3*
TOTAL AIRMEN	7,848	41,433	102,636	151,917	100.0
				727,430	100.0
				605,392	
				113,554	15.6
				8,484	1.2

Source: Civil Aeromedical Institute, Aeromedical Certification Branch, Medical Statistical Section and 1970 Aeromedical Certification Statistical Handbook.

NOTE: State of residence as recorded by the airman in item 2A, FAA Form 8500-8.

\*Asterisks indicate those areas where attrition group prevalence exceeds population prevalence.

