AFHRL-TR-78-67

LEVEL

AIR FORCE
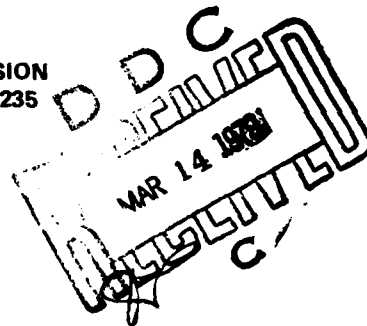
AD A0 65641

DDC FILE COPY

HUMAN RESOURCES

AIR FORCE FEMALE PILOTS PROGRAM:
INITIAL PERFORMANCE AND ATTITUDES

By

Jeffrey E. Kantor
Bart E. Noble, Capt, USAF
Sandra A. Leisey
Terry McFarlane, A1C, USAF

PERSONNEL RESEARCH DIVISION
Brooks Air Force Base, Texas 78235

DDC

MAR 14 1979

February 1979
Interim Report for Period July 1976 — July 1978

LABORATORY

AIR FORCE SYSTEMS COMMAND
BROOKS AIR FORCE BASE, TEXAS 78235

79 03 12 1

NOTICE

When U.S. Government drawings, specifications, or other data are used
for any purpose other than a definitely related Government
procurement operation, the Government thereby incurs no
responsibility nor any obligation whatsoever, and the fact that the
Government may have formulated, furnished, or in any way supplied
the said drawings, specifications, or other data is not to be regarded by
implication or otherwise, as in any manner licensing the holder or any
other person or corporation, or conveying any rights or permission to
manufacture, use, or sell any patented invention that may in any way
be related thereto.

This interim report was submitted by Personnel Research Division,
under project 7719, with HQ Air Force Human Resources Laboratory
(AFSC), Brooks Air Force Base, Texas 78235. Dr. Jeffrey E. Kantor
(PEM) was the Laboratory Principal Investigator.

This report has been reviewed and cleared for open publication and/or
public release by the appropriate Office of Information (OI) in
accordance with AFR 190-17 and DoDD 5230.9. There is no objection
to unlimited distribution of this report to the public at large, or by
DDC to the National Technical Information Service (NTIS).

This technical report has been reviewed and is approved for publication.

LELAND D. BROKAW, Technical Director
Personnel Research Division

RONALD W. TERRY, Colonel, USAF
Commander

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER AFHRL-TR-78-67	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) AIR FORCE FEMALE PILOTS PROGRAM: INITIAL PERFORMANCE AND ATTITUDES		5. TYPE OF REPORT & PERIOD COVERED Interim rept. July 1976 – July 1978
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Jeffrey E. Kantor Bart E. Noble Sandra A. Leisey Terry McFarlane		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Personnel Research Division Air Force Human Resources Laboratory Brooks Air Force Base, Texas 78235		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62703F 77190917
11. CONTROLLING OFFICE NAME AND ADDRESS HQ Air Force Human Resources Laboratory (AFSC) Brooks Air Force Base, Texas 78235		12. REPORT DATE February 1979
		13. NUMBER OF PAGES 40
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

SM Study Nr. 6642

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

female aircrew	pilot selection
female pilots	pilot training
female utilization	psychomotor performance
flying training	simulator performance
paper-and-pencil aptitude tests	undergraduate pilot training (UPT)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Following the 1975 decision to open Air Force pilot training to qualified officers of both sexes, research was undertaken (a) to establish a data base, from female pilot selectees, composed of pre-training measures found to be predictive of training performance for men, (b) to compare these data with those previously obtained from male pilot selectees for overall performance and predictive efficiency, and (c) to monitor the flying performance of women as judged by themselves, their instructors, and their supervisors in comparison with official Air Force flight standards and relative male performance. It should be noted that the results, presently available, are preliminary and reflect only the initial summary of findings from a continuing research project.

DD FORM 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Item 20 (Continued)

Few significant differences were found between men and women entering pilot training. Comparable performance on most pre-training measures, combined with equivalent graduation rates, factors associated with flight training performance, and student impressions of the flight training experience, all lend strong support to the conclusion that men and women behave similarly in flight training. However, instructor ratings of male and female student characteristics did reveal several areas in which males were rated significantly better. The factors underlying these differential ratings were not discernible from the available data. Overall, the similarities between the sexes greatly outweighed the differences, indicating that coeducational pilot training can be accomplished without significant modification to the training system or resultant change in student attrition rate.

PREFACE

This work was performed under project 7719, Air Force Personnel Systems Development on Selection, Assignment, Evaluation, Quality Control, Retention, Promotion, and Utilization; task 771909, Specialized Procedures to Improve Personnel Classification and Assignment. Research was performed by the Personnel Research Division, Air Force Human Resources Laboratory.

The authors wish to express their appreciation to the many individuals without whose assistance this research could not have been accomplished. Particular appreciation is paid to Capt Nicholas Varney, Mr. David Hunter, Mr. Roy Chollman, and SrA Stan Prescott for their valuable contributions. Finally, we wish to acknowledge the enthusiasm and professionalism of the women who serve the Air Force as pilots and to thank them for their cooperation as subjects in this study.

1

TABLE OF CONTENTS

LIST OF TABLES

AIR FORCE FEMALE PILOTS PROGRAM:
INITIAL PERFORMANCE AND ATTITUDES

I. INTRODUCTION

Although women have been involved in civil aviation since its inception and were utilized in a variety of non-combatant flying roles during World War II, no continuing program for female pilots was established at the conclusion of the war, and the female military pilot contingent was quickly demobilized. In general, until the mid-1970's, military aviation was an almost totally male domain. In the past few years, factors such as changes in military policies, social pressures, and the increased importance of maximizing personnel payoffs have combined to bring about numerous changes in the role of the military woman. In the Air Force, these changes are perhaps best typified by the decision, in 1975, to open Air Force Undergraduate Pilot Training (UPT) to qualified officers of both sexes. In August 1976, the Air Force began training the first group of female pilot candidates. Since that time two additional groups of women have entered pilot training.

Military aircraft and flying are quite specialized, demanding both a high degree of skill on the part of the aircrew and an optimum interface between the pilot and the aircraft. At the onset of the recent female pilots program, there were many unanswered questions and concerns. Some issues were specific and safety-related, such as whether the women's size, reach, and strength were sufficient to fly current military aircraft. Other concerns were more general, such as whether selection and classification procedures developed and refined on an all-male population could be equally applicable and effective for women. Additionally, it was unknown how well women would learn and perform in a training environment that was optimized for an all-male population and represented a traditionally male role in the Air Force. With the training costs associated with flying steadily rising and with training and fuel funding restrictions being imposed at all levels, answers to these questions had to be obtained in order to evaluate the overall practicality of training female pilots and, if necessary, to make appropriate adjustments to the training system to maximize the training of both sexes.

At the request of Hq USAF/DPPT, the Personnel Research Division of the Air Force Human Resources Laboratory (AFHRL), in cooperation with other Air Force agencies, undertook research designed to provide information relevant to the training and utilization of female Air Force pilots and to assess and evaluate the performance of women in UPT and during their first few years in operational flying squadrons.

To achieve these goals, a research plan was formulated to obtain measures prior to training, at the conclusion of training, and at several points during the women's initial operational tours. The specific objectives of the research were (a) to establish a data base from female UPT selectees composed of paper-and-pencil aptitude measures, psychomotor test performance, and performance on a 5-hour behavioral sample flying task, (b) to compare these data with those previously obtained from male subjects both for overall performance and for predictive efficiency as concerns UPT training outcome, and (c) to monitor the flying performance of women as judged by their instructors, supervisors, and themselves in comparison to both official Air Force flight standards and relative male performance. This report will include documentation and evaluation of the data obtained previous to and at the conclusion of UPT. Additional data regarding the operational flying performance are being collected and will be reported later.

II. METHOD

Subjects

A total of 30 women were tested for this study and compose the population of women who had entered UPT as of July 1978. These women were selected from active duty and reserve components of the

5

Air Force by the regular pilot selection boards utilizing the same criteria developed for male candidates. These criteria include satisfactory performance on the pilot composite of the Air Force Officer Qualifying Test, appropriate recommendations from commanding officers, satisfactory service records, and the capability of meeting or exceeding the physical standards set for aircrew personnel. All 30 women were tested prior to entry into UPT but, at present, only 16 have been tested at the conclusion of training. Five were eliminated during training, and nine are still in training.

Data were collected specifically for this study from a total of 40 men. Sixteen of these men were co-students with the 16 women and were tested at the conclusion of their training. The remaining 24 men were instructor pilots who were involved in the flight training of both the men and women who were tested.

For comparative purposes, historical data from a total of 235 men were used in this study. These data were collected on 106 men who had entered UPT during the 2 years prior to the entry of women into the program and from 129 men who were pilot qualified and finishing their last year at the Air Force Academy. Data collected from these subjects were used for comparison with the data base established on the pre-training measures obtained on the female flying students.

Pre-Training Measures

Prior to training, the female pilot candidates were administered a battery of tests including paper-and-pencil aptitude measures, psychomotor performance measures, and behavioral sample measures obtained from a simulator which, in instrumentation and operating characteristics, duplicated a T-41 or Cessna light aircraft. All measures obtained had previously been found to be associated with the performance of men in UPT and are under evaluation for use in a ground-based pilot screening system designed to eliminate prospective pilot candidates who are unlikely to complete UPT (Hunter & Thompson, 1978).

Specifically, the paper-and-pencil battery that was used included measures of verbal aptitude (PH 7227RC), non-verbal aptitude (PH 7228RC), and psychomotor aptitude (PH 7229RC). The subtests composing these measures and a short description of each are presented in Appendix A. These tests had been developed prior to this project and are documented by Hunter (1975). The psychomotor performance measures were obtained using portable psychomotor test devices developed for AFHRL under a contract awarded to Systems Research Laboratories. These devices measure (a) two-hand coordination by having the subject manipulate two joysticks which control the tracking of a target moving in a circular pattern and (b) complex coordination by having the subject manipulate a single joystick and a set of rudder pedals which control two points to be moved and maintained at different locations on a cathode ray tube (CRT) stimulus display. Presentation of instructions, control of the stimulus display, and subject scoring are all controlled electronically within the unit. Each subject receives a final composite score from this device which reflects the subject's level of psychomotor coordination, with lower scores reflecting better performance. Original development of these tests is documented by Sanders, Valentine, and McGrevy (1971).

Behavioral sample data were obtained by having the subject fly a 5-hour standardized syllabus in one of two Singer-Link General Aviation Trainers (GAT-1). These simulators were interfaced to a Varian 620 minicomputer and Bell and Howell audio/visual equipment to provide electronically controlled instructional materials and performance scoring. The system was designed for use with naive subjects and involves demonstrating flight maneuvers which the subject then attempts to duplicate. These maneuvers range in difficulty from simple straight-and-level flight to takeoff and completion of a landing pattern in turbulent conditions with strong crosswind effects. Measures on various flight parameters, comparing the subject's actual performance to the desired performance, are obtained throughout the syllabus. These measures are combined to produce scores reflecting the subject's average error amplitude by hour for a variety of flight parameters and a total score which is a linear function found to be maximally predictive, for male subjects, of UPT success. The development and validation of this system are documented by Long and Varney (1975).

6

Post-Training Measures

Data were obtained at the conclusion of training from the graduating female students, from the graduating male co-students, and from the instructor pilots who had taught these classes. Surveys were used to collect information relevant to the comparative learning rates, flight performance, safety consciousness, and overall pilot potential of male and female students in UPT. Students were asked to provide information pertaining to only their own abilities, while instructors were asked to evaluate men and women comparatively. As part of another on-going research effort to probe male and female performance in civil aviation, a set of surveys was developed for administration to civilian pilots and instructors. These surveys were adapted for use in this research, and copies of these instruments are provided in Appendix B. However, since not all the material on the original surveys was relevant to military aviation, only certain sections (presented later in this report) were administered to the subjects of this study. Additionally, data regarding student training outcome (pass/fail), checkride scores, and reasons for attrition were obtained.

Statistical Procedures

The use and interpretation of statistical procedures in this study were constrained by the relatively few female subjects available. Even though the population of women entering UPT was studied, this group was considered as a sample of the larger population of women who will enter as the program progresses. The statistical analyses conducted were accomplished to provide insight and guidance for additional research, to highlight any areas needing immediate attention, and to provide recommendations for adjustments in planning, training, and policy. As increasing numbers of women enter pilot training and more subjects and data become available, further analyses are planned to provide more conclusive results. Therefore, the results obtained to date should be regarded more as feedback on a continuing program rather than the definitive results from a completed project.

To evaluate the statistical significance of male/female differences in pre-training measures. "t" tests were used in comparisons between male and female averages. Additionally, "t" tests were used to identify significant differences on the survey data obtained from the subjects at the completion of pilot training. For all "t" tests, the Type 1 error rate (α) was controlled at .01 per family of comparisons using the Bonferroni technique (Miller, 1966). This procedure controls error rate at the determined level regardless of the number of comparisons or the degree of interdependency. Finally, linear regression analyses were used first to evaluate the importance of the sex of the student as a predictor of UPT performance and then to determine the significance of the pre-training measures as predictors of UPT performance for men and women.

III. RESULTS AND DISCUSSION

Pre-Training Measures

From the pre-training paper-and-pencil test battery, data were obtained from 106 male UPT candidates during the period 1973–1974. Similar data were obtained from the 30 female UPT candidates during the period 1975–1977. Scale means and standard deviations are presented, by sex, in Table 1. It should be noted that subject time constraints were encountered while testing the last group of 10 female UPT candidates and only partial data were obtained from these women. Therefore, the scale values presented in Table 1 reflect the performance of only 20 women for scales 1–8 and all 30 women for scales 9–21. To evaluate the statistical significance of the obtained male/female differences, "t" ratios were computed and compared to a critical Bonferroni "t" ratio (3.59). Any obtained "t" ratio which was greater than the critical value indicated a difference significant at or beyond the .01 level. The computed "t" ratios are also presented in Table 1. Out of 21 comparisons, only five significant differences were found. Men performed significantly better on the Tool Functions, Electrical Maze, and Tools tests while women performed significantly better on the Word Grouping and Trace Tapping tests. These sex differences are of the type commonly encountered in testing. Men will often score better than women on mechanical background measures while women often outperform men on verbal and fine dexterity tasks. Overall, there was more similarity than dissimilarity between male and female performance on the pre-training paper-and-pencil test measures.

7

Table 1. Male/Female Performance on Pre-Training
Paper-and-Pencil Tests

Test Name	Male (n = 106)		Female (tests 1—8 n = 20 9—21 n = 30)		t ratio
	X̄	σ	X̄	σ	
1. Scale Reading	17.55	3.45	18.45	2.87	1.24
2. Letter Sets, Total	20.11	3.97	21.75	3.25	1.99
3. Tool Functions	6.75	1.62	4.75	1.34	5.91*
4. Electrical Information	7.00	1.76	6.55	1.53	1.18
5. Mechanical Principles	8.20	1.74	7.75	1.64	1.11
6. Word Knowledge	8.72	1.34	8.95	1.02	.88
7. Word Grouping	7.87	1.51	9.05	.97	4.51*
8. Verbal Analogies	8.35	1.39	8.85	1.31	1.55
9. Block Counting, Total	38.08	9.65	36.90	10.02	.57
10. Point Distance, Total	28.41	10.59	34.20	9.56	2.86
11. Electrical Maze	8.29	4.04	5.60	2.25	4.74*
12. Pattern Detail	8.67	3.11	8.70	3.44	.04
13. Rotated Blocks	6.42	2.37	5.50	2.03	2.11
14. Tools	7.11	1.82	3.63	1.54	10.48*
15. Figure Analogies	7.75	2.09	8.57	1.36	2.56
16. Hidden Figures	6.08	2.93	7.20	2.30	2.21
17. Answer Sheet Marking	114.63	17.62	123.00	16.63	2.40
18. Table Reading	28.91	6.26	32.07	7.52	2.10
19. Large Tapping	84.65	15.57	89.63	11.08	1.97
20. Trace Tapping	125.13	20.12	136.53	15.13	3.70*
21. Discrimination—Reaction	89.70	16.42	95.50	12.93	2.04

Note: — Bonferroni critical t ratio; α = .01, for 21 comparisons = 3.59.
  * $p < .01$.

From the psychomotor test devices, data were obtained from 129 pilot qualified male seniors attending the Air Force Academy during the 1977—78 academic year. These psychomotor test devices are newly developed electronic systems and were not available when the male UPT candidate sample was obtained (1973—1974). However, the majority of the academy sample will enter UPT, and it was believed that this group would function as an acceptable reference base for the performance of the 30 women tested prior to their entry into UPT. From the raw data obtained on these two groups, psychomotor test composite scores were computed, and the male and female group averages and standard deviations are presented in Table 2. To evaluate the significance of the observed difference, a "t" test was accomplished, and it was thereby determined that the sex difference found was not statistically significant. Therefore, it should be assumed that the observed difference in male and female performance is best attributed to chance variation.

Table 2. Male/Female Performance on Pre-Training
Psychomotor Tests[a]

	Males (n = 129)		Females (n = 30)
X̄	−.039		1.14
σ	2.57		4.40
"t" ratio:		1.41[ns]	

[a]Averages and standard deviations reported in this table are composite scores reflecting an individual's performance on several psychomotor tasks, lower scores indicate better performance.

[ns]not significant.

8

Data were obtained on the 5-hour standardized flight syllabus, behavioral sample test (flight simulation), from the 106 men who entered UPT during the period 1973–1974. Each subject flew a General Aviation Trainer through increasingly more complex maneuvers while a minicomputer presented instructional materials and monitored performance. Because of subject time constraints encountered during the testing of the last group of 10 women entering pilot training, data were obtained only on the 20 women who had entered UPT prior to this last group. The average composite scores and standard deviations for these men and women are presented in Table 3. Again, to evaluate the significance of the observed difference, a "t" test was accomplished, and it was determined that this observed difference was also not statistically significant.

Table 3. Male/Female Performance on Pre-Training Behavioral Sample Test (Simulator Flying)[a]

	Male UPT Candidates	Female Pilot Candidates
$\overline{X}$	.0133	.1106
σ	4.045	2.967
"t" ratio	$.127^{ns}$	

[a]Average and standard deviations reported in this table are composite scores reflecting an individual's mean error on pitch angle, bank angle, side-slip, heading, and altitude; lower score indicates better performance.

^{ns}not significant.

To summarize the findings from the pre-training measures, male and female performances, with the few exceptions noted on the paper-and-pencil tests, were comparable and did not differ significantly. While in both the psychomotor test and behavioral sample test (flight simulator) there appeared to be a trend indicating somewhat better performance for male subjects, it was found that these differences were not statistically significant. It should again be emphasized that this is an interim report and additional data are being collected. As additional subjects are tested, it is possible that either this non-significant trend may be found to be persistent and significant or the present differences may be attenuated. However, at the present time, these differences are not statistically significant, and it is best to conclude that there are only random variations between the performance of men and women.

Post-Training Measures

Post-training measures included UPT training outcome (pass/fail) and survey responses from the graduating female students, an equal number of graduating male students, and instructor pilots who had taught these classes. Using training outcome as a criterion, a series of linear regression analyses were accomplished to determine whether sex was related to UPT performance and to determine for men and women the significance of the pre-training measures as predictors of UPT performance.

Using the sex of the student as a predictor of UPT training outcome, a non-significant correlation of .08 was obtained; therefore, it is possible to conclude that performance in UPT, as measured by completion of training, is not related to the sex of the student. In other words, male and female students graduate from UPT at equivalent rates. For the male students, using the set of pre-training measures as predictors, it was found that only the bank angle error score from the third hour of the standardized flight syllabus was significantly related to UPT training outcome ($r = .323, p < .01$). For the female students, it was found that only the bank angle error for the 1st hour was significantly related to UPT training outcome ($r = .69, p < .01$). These results are somewhat difficult to interpret because of the small sample size. Further research will determine if these results indicate that learning or performance changes are more predictive of male success while previous experience factors are more predictive of female success. Additional attention will be

given to this area as more data become available; however, at this point, it may be best to regard these findings as indicative of the similarity between factors associated with flight training success for both sexes.

Surveys were administered to graduating female student pilots and an equal number of graduating males during the week immediately prior to completion of UPT. These surveys solicited the individuals' impressions of their own student experience in terms of (a) learning rates for specific skills taught in training, (b) attitudes toward their own training and student performance, (c) assessment of their personal attributes related to flight performance, (d) assessment of the level of skills achieved, and (e) identification of factors associated with problem incidents encountered in UPT. Survey item responses for male and female student pilots are summarized in Table 4. Again, to evaluate the significance of observed differences on Sections I to IV of the survey, "t" ratios were computed, and it was found that no significant differences existed among the male and female survey responses. The data obtained in Section V, relating to problem situations, did not lend themselves to statistical evaluation, but a casual inspection of the data from this section would also lead to the conclusion that the male and female UPT experiences were very similar. Overall, these survey data provide strong evidence of the similarity between male and female perceptions from the flight training environment.

At the same time that surveys were administered to the graduating students, other surveys were being administered to the instructor pilots who had taught these students. These surveys contained three sections designed to solicit the instructor's comparative evaluations of male/female differences in (a) learning rate for specific skills taught in UPT, (b) personal attributes related to flight performance, and (c) attitudes toward training and general performance in UPT. Survey item responses from the instructor pilots are presented in Table 5. Also presented in this table are "t" ratios computed to assess the significance of male/female mean ratings. Significant (p < .01) differences were found indicating that the instructors believed that men possessed more physical strength and endurance than women, more overall potential for piloting, more ability to manage stressful situations in flight, and more overall airmanship. The other (28) comparisons were not found to indicate significant differences between male and female students. It would seem that the instructor pilots did evidence strong opinions regarding the overall comparative capabilities of the female students; however, given the lack of significant differential ratings on specific factors, it is difficult to gain insight as to what gave rise to these more general opinions. Two of the possible explanations seem to be the most reasonable: either the available data do not provide sufficient information to pinpoint areas of sex-related differences strong enough to account for these general instructor opinions, or it is possible that social conditioning may be impacting more on the general comparisons than on the specific, task related comparisons. Additional data will be collected to research this area.

To summarize the findings from the post-training measures, men and women graduate from UPT at comparable rates, similar pre-training factors are related to performance in UPT for men and women, and experiences in and perceptions of flight training do not significantly differ for men and women. Instructor ratings reveal generally similar student attributes but also an overall impression that men are more likely to be competent pilots and evidence more overall airmanship; however, the factors underlying these opinions are not clear.

Table 4. **Summary of Post-Training Survey Responses:**
Male and Female Student Pilots

Section I

    A. Text: Please indicate the degree of learning difficulty which you experienced in each of the following areas of flight and ground training.

    B. Options: 1 = No difficulty
                       2 = Slight difficulty
                       3 = Moderate difficulty
                       4 = Extreme difficulty

Table 4 (*Continued*)

C. Items

	Male Mean	Female Mean	t^a
1. Preflight Operations	1.1	1.0	1.52
2. Airport and Traffic Pattern	1.6	1.7	.39
3. Flight Maneuvers by Reference to Ground Objects	1.7	1.8	.05
4. Flight at Critically Slow Airspeeds	1.7	1.2	2.58
5. Takeoffs and Landings	1.7	1.9	1.01
6. Maneuvers by Reference to Instruments	2.0	1.6	1.52
7. Cross-Country Flying	1.7	1.4	.94
8. Maximum Performance Takeoffs and Landings	1.3	1.6	1.81
9. Night Flying — Night VFR Navigation	1.6	1.4	1.10
10. Emergency Operations	1.7	1.4	1.34
11. Navigation	1.7	1.5	.15
12. Weather	1.5	1.5	0.0
13. Aerodynamics — Principles of Flight	1.3	2.1	2.22
14. Radio Communication	1.5	1.3	.69
15. Aircraft and Engine Operation, Flight Instruments	1.5	1.6	.46
16. Flight Planning	1.7	1.4	1.82

Section II

A. Text: Circle the number which best describes yourself during your student pilot career.

B. Options: Scale: 1 (Extremely good) through 5 (Extremely poor)

C. Items

	Male Mean	Female Mean	t^b
1. Your Attitude toward Flying and Flight Instruction Compared to that of Other Similar Students	1.3	1.6	.95
2. Overall Potential for Becoming a Competent Pilot	1.3	1.6	.74

Table 4 (*Continued*)

	Male Mean	Female Mean	t^b
3. Background Knowledge Pertinent to Flight Performance	1.7	2.3	1.52
4. Ability to Manage Stressful Situations in Flight	1.5	1.9	1.10
5. Performance in Terms of Flight Safety	1.5	1.4	1.04
6. Overall Airmanship	1.4	1.6	.81
7. The Quality of All Your Pilot Training Instruction	1.1	1.6	1.87

Section III

A. Text: Please describe yourself as a pilot in terms of the following attributes.

B. Option: Scale: 1 (Possess this attribute to fullest degree) through 5 (Lack this attribute completely)

C. Items:

	Male Mean	Female Mean	t^c
1. Physical Strength and Endurance	1.4	1.9	1.39
2. Coordination; Quick Reactions	1.5	1.6	.54
3. Ability to Absorb Technical Information	1.6	1.9	1.17
4. Mental Alertness	1.6	1.5	.53
5. Resourcefulness	1.7	1.5	.76
6. Attention to Detail; Thoroughness	1.6	1.6	0.0
7. Prudence	1.6	1.6	0.0
8. Patience	1.5	2.0	1.64
9. Safety Consciousness	1.6	1.4	1.08

Section IV

A. Text: Please indicate the level of skill which you developed in each of the following areas of flight and ground operations.

B. Options: 1 = Extremely skillful
2 = Moderate Skill
3 = Limited Skill
4 = No skill

	Male Mean	Female Mean	t^d
1. Preflight Operations	1.1	1.0	.59
2. Airport and Traffic Pattern	1.3	1.1	.90
3. Flight Maneuvers by Response to Ground Objects	1.4	1.4	0.0
4. Flight at Critically Slow Airspeeds	1.4	1.1	1.44
5. Takeoffs and Landings	1.2	1.4	.82
6. Maneuvers by Reference to Instruments	1.4	1.4	0.0
7. Cross-Country Flying	1.4	1.3	.34

Table 4 (*Continued*)

	Male Mean	Female Mean	t^d
8. Maximum Performance Takeoffs and Landings	1.4	1.4	0.0
9. Night Flying — Night VFR Navigation	1.7	1.6	.28
10. Emergency Operations	1.7	1.4	1.34
11. Navigation	1.2	1.3	.42
12. Weather Understanding	1.8	1.6	.78
13. Aerodynamics Knowledge — Principles of Flight	1.0	1.7	3.61
14. Radio Communication	1.2	1.3	.36
15. Aircraft, Engine, Flight Instruments Operation	1.3	1.2	.42
16. Flight Planning	1.4	1.2	.42

Section V

A. Text: Narrow escapes, close calls, or emergencies some-times occur. Circle the item or items below which have been in some way related or associated with your most threatening experience(s).

B. Items:

	# Males	# Females
1. Weight or Loading	0	0
2. Check Lists	2	1
3. Charts	0	0
4. Unavailable Pre-Flight Information	2	0
5. Inaccurate Weather Forecasts	4	1
6. Lift-offs	1	1
7. Slips	0	0
8. Crosswinds	4	4
9. Flaps	0	0
10. Touchdown	5	3
11. Short Fields	1	1
12. Unimproved Airports	1	1
13. Trees or Wires	1	2
14. Soft Field and/or high grass	0	2
15. Low Visibility	3	4
16. Low Ceiling	2	1
17. Turbulence	3	3
18. Airframe Icing	3	1
19. VFR in Fog or Clouds	2	1
20. High Winds	4	3
21. Mud or Snow	0	1
22. Darkness	1	1
23. Engine Operations	3	2
24. Communications	4	4
25. Malfunction (2): Equipment/ Airplane	6	8
26. Forced Landing	0	0
27. Fatigue	1	1
28. Uninformed Pilot	0	2
29. Infrequent Piloting	0	0
30. Navigation Procedures	0	0
31. Cockpit Distraction	0	2

Table 4 (*Continued*)

	# Males	# Females
32. Steep Turns	0	0
33. Holding Altitude	1	0
34. Lost	1	0
35. Fuel Management	1	1
36. Near Mid-Air Collision	4	2
37. Slow Speed Flight	0	1
38. Stalls or Recoveries	0	1
39. Improper Airspeed	2	0
40. Low Altitude Maneuvers	1	1

[a]Bonferroni critical t, α = .01, 16 comparisons = 3.84.
[b]Bonferroni critical t, α = .01, #C = 7, = 3.53.
[c]Bonferroni critical t, α = .01, #C = 9, = 3.63.
[d]Bonferroni critical t, α − .01, #C = 16, = 3.89.

Table 5. **Summary of Post-Training Survey Responses:**
Instructor Pilot's Evaluation

Section I

A. Text: Please indicate the degree of learning difficulty which you have observed among your students in each of the following areas of flight and ground training.

B: Option:
1 = No difficulty
2 = Slight difficulty
3 = Moderate difficulty
4 = Extreme difficulty

C. Items:

	Male Students	Female Students	t^a
1. Preflight Operations	1.25	1.25	0.0
2. Airport and Traffic Pattern	2.17	2.50	1.70
3. Flight Maneuvers by Reference to Ground Objects	2.04	2.29	1.39
4. Flight at Critically Slow Airspeeds	2.04	2.17	.92
5. Takeoffs and Landings	2.13	2.71	3.10
6. Maneuvers by Reference to Instruments	1.96	2.33	1.52
7. Cross-Country Flying	2.29	2.53	1.16
8. Maximum Performance Takeoffs and Landings	2.00	2.07	.29
9. Night Flying − Night VFR Navigation	2.00	2.26	1.29
10. Emergency Operations	2.04	2.26	1.79
11. Navigation	2.14	2.45	1.44
12. Weather	1.95	2.00	1.11
13. Aerodynamics − Principles of Flight	2.00	2.33	1.56
14. Radio Communications	1.52	1.87	2.31
15. Aircraft and Engine Operation, Flight Instruments	1.68	1.95	1.08
16. Flight Planning	1.59	1.95	.63

Table 5 (*Continued*)

Section II

A. Text: Please rate your average male and female student pilots in terms of the following attributes.

B. Options: Scale: 1 (Possess the attribute to fullest degree) through 5 (Lacks this attribute completely).

C. Items

	Male Students	Female Students	t^b
1. Physical Strength and Endurance	1.71	2.75	5.05*
2. Coordination; Quick Reactions	1.83	2.46	3.04
3. Ability to Absorb Technical Information	2.00	2.63	3.16
4. Mental Alertness	1.79	2.00	1.23
5. Resourcefulness	1.79	2.04	1.41
6. Attention to Detail; Thoroughness	2.25	2.08	1.12
7. Prudence	2.13	2.29	.99
8. Patience	2.29	2.58	1.44
9. Safety Consciousness	1.96	1.92	.19

Section III

A. Text: Circle the number which best illustrates your rating *on the following attributes* for the male and female pilots you have instructed.

B. Options: Scale: 1 (Extremely good) through 5 (Extremely Poor)

C. Items:

	Male Students	Female Students	t^c
1. Attitude Toward Flying and Flight Instruction	1.71	1.88	.75
2. Overall Potential for Becoming Competent Pilots	1.67	2.13	3.94*
3. Background Knowledge Pertinent to Flight Performance and Safety	2.00	2.38	1.68
4. Ability to Acquire Flying Skills	1.88	2.54	2.93
5. Ability to Manage Stressful Situations in Flight	2.00	3.00	5.56*
6. Performance in Terms of Flight Safety	2.00	2.17	1.07
7. Overall Airmanship	1.75	2.79	4.61*

[a]Bonferroni critical t, α = .01, #C = 16, = 3.70.

[b]Bonferroni critical t, α = .01, #C = 9, = 3.48.

[c]Bonferroni critical t, α = .01, #C = 7, = 3.40.

*$p < .01$.

IV. CONCLUSIONS

Overall, few significant differences were found between men and women entering and completing UPT. Some of the significant differences which were obtained could be considered typical of male/female performance differences on mechanical and verbal tasks. However, for the samples used in this study, these tasks were not found to be significantly related to pilot training success and are therefore of only secondary interest. Comparable performance on the remaining pre-training measures, including psychomotor tests and behavioral sample (simulator) tests, combined with similar graduation rates, factors associated with UPT performance, and student impressions of the flight training experience, all lend strong support to the conclusion that men and women behave comparably in flight training. Only the comparative differences expressed by the instructor pilots detract from this conclusion, and these differences were found on general, not specific, factors. As part of this ongoing project, research is now being directed to collect more data from additional women entering UPT and, specifically, to collect data relevant to the differential perceptions reported by the instructor pilots.

In general, the similarities between the male and female data collected for this study greatly outweigh the differences. Though it should be reemphasized that this research is still in progress and that the conclusions drawn here are tentative, it would appear that the female segment of the Air Force can provide some part of the aircrew resources needed in the future.

REFERENCES

Hunter, D.R. *Development of an enlisted psychomotor/perceptual test battery.* AFHRL-TR-75-60, AD-A020 544. Lackland AFB, TX: Personnel Research Division, Air Force Human Resources Laboratory, November 1975.

Hunter, D.R., & Thompson, N. *Pilot selection system development.* AFHRL-TR-78-33, AD-A058 418. Brooks AFB, TX: Personnel Research Division, Air Force Human Resources Laboratory, July 1978.

Long, G.E., & Varney, N.C. *Automated pilot aptitude measurement system.* AFHRL-TR-75-58, AD-A018 151. Lackland AFB, TX: Personnel Research Division, Air Force Human Resources Laboratory, September 1975.

Miller, R.G., Jr. *Simultaneous statistical inference.* New York: McGraw-Hill, 1966, 67–70.

Sanders, J.H., Valentine, L.D., Jr., & McGrevy, D.F. *The development of equipment for psychomotor assessment.* AFHRL-TR-71-40, AD-732 210. Lackland AFB, TX: Personnel Research Division, Air Force Human Resources Laboratory, July 1971.

APPENDIX A: PAPER-AND-PENCIL PRE-TRAINING MEASURES

1. Scale Reading — is a test of the subject's ability to read scales, dials, and meters. There are a variety of scales with various points indicated on them by numbered arrows. The subject is to estimate the numerical value indicated by each arrow. There are four sample items and 24 scored items, divided into two separately timed sections.

2. Letter Sets — has items which contain five groups of letters with four letters in each group. Four of the groups of letters are alike in some way. The subject is to find the rule that makes the four groups alike. The fifth group is different from the others and will not fit the rule. He indicates his knowledge of the rule by selecting the group that does not fit. The subject is given two sample items and 30 scored items, divided into two separately timed sections.

3. Tool Functions — contains questions about the use of tools. In each of the 10 items, a tool is depicted and five statements are given concerning the use or type of the tool. The subject must select the statement that best fits the illustration.

4. Electrical Information — is a test of the subject's knowledge of electricity and electrical devices. It contains 10 items which cover a variety of electrical principles and applications.

5. Mechanical Principles — contains 10 items covering mechanical principles and devices, such as gears and pulleys.

6. Word Knowledge — is a test of how well the subject understands words. Each of the 10 items consists of an underlined word followed by five choices. The subject is to decide which one of the five choices most nearly matches the meaning of the underlined word.

7. Word Grouping — consists of 10 items each containing five words. The subject's task is to select the word that does not belong with the others.

8. Verbal Analogies — is a test of the subject's ability to determine the relationships between words. In these 10 items the subject is given one relationship and part of another. The subject's task is to select from among the five choices the one that best completes a relationship similar to the first one (i.e., *Hoof* is to *cow* as *paw* is to   ).

9. Block Counting — is a test of the subject's ability to "see into" a three-dimensional pile of blocks and determine how many pieces are touched by certain numbered blocks. There are two sample items and 80 scored items, divided into two separately timed sections.

10. Point Distance — is a test of the subject's ability to compare small distances quickly. Each problem has a central point surrounded by some lines and circles, among which there is a dot marked "a" and a dot marked "b." The subject is to decide which of the two lettered dots is nearer to the central point. There are two sample items. The test is divided into two separately timed sections with 30 items in each section.

11. Electrical Maze — is a test of the subject's ability to choose a correct path from among five choices. For each item there is a diagram which consists of a large circle at the top of the picture and five lettered boxes at the bottom. In each box there is a dot marked "S" and a dot marked "F." Lines lead from these points to the other boxes and to the circle, with dots indicating connections between lines. The subject must choose the box which has a connection from the "S" through the circle and back to the "F" in the same box. Only one of the five boxes in each item will meet this condition. There are three examples and 16 scored items.

17

12. **Pattern Detail** — is a test of the subject's ability to remember patterns which have been made by arranging straight lines in several ways. The subject is given five minutes to study a page containing 15 of these patterns. The subject is then given 15 items in which he must identify which of five alternatives had been presented on the study page.

13. **Rotated Blocks** — presents the subject with a reference block and requires that he decide which of five other blocks is the same as the reference block, were it rotated in three-dimensional space. There are four sample problems and 10 scored items.

14. **Tools** — is a test about tools and how they are used. Each of the 10 items has a picture of a tool and four other objects. The subject must decide which of the four objects goes with the pictured tool.

15. **Figure Analogies** — is a test of how well the subject can discover logical relationships. The subject is given two figures which have a certain relationship to each other. Then a third figure is given which has that same relationship to one of five alternative figures. The subject's task is to select that figure from the alternatives which bears the same relationship to the single figure that the two original figures bear to each other. There are two sample items and 10 scored items.

16. **Hidden Figures** — is a test of the subject's ability to see a simple figure in a complex drawing. At the top of each page are five figures, and below these are some numbered drawings. The subject is to determine which lettered figure is contained in each of the numbered drawings.

17. **Answer Sheet Marking** — is a test of how fast and how accurately the subject can mark answers. The questions in this test appear as pairs of numbers. Each pair stands for one space on the answer sheet. The first number is the number of the question and the second is the number of the space to blacken for that questions. There are two separately timed sections in this test, each containing 75 items.

18. **Table Reading** — is a test of the subject's ability to read tables quickly and accurately. The items in this test consist of pairs of numbers which correspond to numbers appearing on the abcissa and ordinate of a large table. The subject's task is to find the entry in the table at the intersection of the row and column designated by the pair of numbers. There are five practice problems and 43 scored items in this test.

19. **Large Tapping** — requires that the subject place three pencil dots inside a large number of circles arrayed regularly across the page. The score is the number of circles in which the subject places the three dots during the time limit.

20. **Trace Tapping II** — consists of small numbered circles connected by an irregular line. The subject is to place one dot in each circle as quickly as he can, starting with the circle numbered one and proceeding along the irregular line. The score is the number of circles in which the subject places a dot.

21. **Discrimination-Reaction** — is a test of speed of reaction to a signal. The signal is an arrangement of black and white circles within a box. The subject's task is to place a check mark on one of four lines to indicate the relationship of the white circle to the black circle. There are eight practice problems and 100 scored items on the test.

> To complete this survey, please check or circle the correct
> response item or enter the appropriate information.

A. PILOT DATA

1. Year of Birth _____

2. Sex: a. Female
            b. Male

3. Zip Code of Current Address _____

4. Pilot Certificate:

    a. Student
    b. Private
    c. Commercial
    d. Airline Transport
    e. Private with Flight Instructor Certificate
    f. Commercial with Flight Instructor Certificate
    g. Airline Transport with Flight Instructor Certificate
    h. Other (Foreign)
    i. None (Uncertificated or Expired)

5. Pilot Ratings

    a. Single Engine Land
    b. Multiengine Land
    c. Single Engine Sea
    d. Multiengine Sea
    e. Single Engine Land, Instrument
    f. Multiengine Land, Instrument
    g. Single Engine Sea, Instrument
    h. Multiengine Sea, Instrument
    i. Single Engine Land/Sea
    j. Multiengine Land/Sea
    k. Single Engine Land/Sea, Instrument   Airplane Fixed
    l. Multiengine Land/Sea, Instrument   Wing
    m. Single-multiengine Land
    n. Single-multiengine Sea
    p. Single-multiengine Land, Instrument
    q. Single-multiengine Sea, Instrument
    r. Single-multiengine Land/Sea
    s. Single-multiengine Land/Sea, Instrument

5.   (Continued)

      t.   Rotorcraft
      u.   Rotorcraft, Instrument
      v.   Glider
      w.   Lighter than air
      x.   None

6.   Occupation/Profession

      a.   Physician
      b.   Lawyer
      c.   Salesman
      d.   Company Executive
      e.   Farmer/Rancher
      f.   Accountant
      g.   Professional Pilot
      h.   Clergyman
      i.   Military Personnel
      j.   Engineer
      k.   Dentist
      l.   Policeman
      m.   Teacher
      n.   Banker
      p.   Student (Scholastic)
      q.   Truck Driver
      r.   Housewife
      s.   Technician
      t.   Construction Worker
      u.   Heavy Equipment Operator
      v.   Bus Driver
      w.   Undertaker
      x.   Mechanic
      y.   Other _____

7.   Accumulated Flight Experience (Hours)

      a.   Total Time
      b.   Time in Last Two Months
      c.   Time in Last Ten Days
      d.   Pilot-in-Command
      e.   Instruments (Actual or Simulated)
      f.   Night
      g.   Cross-Country

B.   FLIGHT TRAINING

1.   Year when you began pilot training

      _____

2.   How did you obtain your pilot training?

   a.   Private Instructor
   b.   Flying Club
   c.   Local Fixed Base Operator
   d.   Part 135 Flight School
   e.   College or Technical School
   f.   Military

3.   Geographic region in which you learned to fly:

   a.   New England
         CT, ME, MA, NH, RI, and VT

   b.   Eastern U.S.
         DE, MD, NJ, NY, PA, VA, and WV

   c.   Southern U.S.
         AL, FL, GA, KY, MS, NC, SC, and TN

   d.   Great Lakes Region
         IL, IN, MI, MN, OH, and WI

   e.   Central U.S.
         IA, KS, MO, and NB

   f.   Southwest U.S.
         AR, LA, NM, OK, and TX

   g.   Rocky Mountain States
         CO, MT, ND, SD, UT, and WY

   h.   Western U.S.
         AZ, CA, and NV

   i.   Northwest U.S.
         ID, OR, and WA

   j.   Alaska
         AK

   k.   Pacific
         HI

   l.   Foreign (Specify) _____

4. Please indicate the degree of learning difficulty which you experienced in each of the following areas of flight and ground training:

```
1 - No difficulty
2 - Slight difficulty
3 - Moderate difficulty
4 - Extreme difficulty
```

a.	Preflight Operations	1	2	3	4
b.	Airport and Traffic Pattern	1	2	3	4
c.	Flight Maneuvers by Reference to Ground Objects	1	2	3	4
d.	Flight at Critically Slow Airspeeds	1	2	3	4
e.	Takeoffs and Landings	1	2	3	4
f.	Maneuvers by Reference to Instruments	1	2	3	4
g.	Cross-Country Flying	1	2	3	4
h.	Maximum Performance Takeoffs and Landings	1	2	3	4
i.	Night Flying — Night VFR Navigation	1	2	3	4
j.	Emergency Operations	1	2	3	4
k.	Navigation	1	2	3	4
l.	Weather	1	2	3	4
m.	Aerodynamics — Principles of Flight	1	2	3	4
n.	Radio Communications	1	2	3	4
o.	Aircraft and Engine Operation, Flight Instruments	1	2	3	4
p.	Flight Planning	1	2	3	4

5. How many hours of instruction did you have when you first soloed?

_____

6. How many hours of training did you have when your instructor recommended you for the private pilot flight examination?

_____

7. How many times did you take the private pilot flight test?

_____

8. At what type of airport did you conduct most of your training?

   a. Controlled (Control Tower)
   b. FSS (Airport Advisory Service)
   c. Unicom
   d. Uncontrolled (No Unicom or FSS)

9. Please rate the utility of the following items to your overall flight training process:

   ```
   1 - Extremely valuable
   2 - Moderately valuable
   3 - Little value
   4 - No value whatsoever
   5 - No opinion or not used
   ```

a.	"Private Pilot Handbook"	1 2 3 4 5
b.	Programmed Self-Study Ground Instruction Course	1 2 3 4 5
c.	Formal Ground School Classes	1 2 3 4 5
d.	"Hangar-Flying" with Other Pilots or Students	1 2 3 4 5
e.	Audio-Visual Ground Training Devices	1 2 3 4 5
f.	Ground Simulators	1 2 3 4 5
g.	General Aviation Magazines (e.g., Flying)	1 2 3 4 5
h.	Instructor's Teaching Techniques	1 2 3 4 5
i.	Instructor's Personality	1 2 3 4 5
j.	Exposure to More than One Instructor	1 2 3 4 5
k.	Simulated Instrument Training ("Hooded")	1 2 3 4 5
l.	Solo Practice of Stalls	1 2 3 4 5
m.	Solo Practice of Takeoffs and Landings	1 2 3 4 5
n.	Solo Cross-Country Practice	1 2 3 4 5

10. Circle the number which best describes yourself during your student pilot career.

> Scale: 1 - Extremely good
> 5 - Extremely poor

a. Your Attitude toward Flying and Flight Instruction Compared to that of Other Similar Students   1   2   3   4   5

b. Overall Potential for Becoming a Competent Pilot   1   2   3   4   5

c. Background Knowledge Pertinent to Flight Performance   1   2   3   4   5

d. Ability to Manage Stressful Situations in Flight   1   2   3   4   5

e. Performance in Terms of Flight Safety   1   2   3   4   5

f. Overall Airmanship   1   2   3   4   5

g. The Quality of All Your Pilot Training Instruction   1   2   3   4   5

11. What particular problem areas, if any, did you encounter during your pilot training?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

C. FLYING PROFILE

1. Estimate the percent of annual time you spend flying the following types of aircraft:

    a. Fixed-wing, single-engine piston, land _____ %
    b. Fixed-wing, single-engine piston, sea _____ %
    c. Fixed-wing, multi-engine piston, land _____ %
    d. Fixed-wing, multi-engine piston, sea _____ %
    e. Fixed-wing, turboprop _____ %
    f. Fixed-wing, turbojet _____ %
    g. Rotary wing _____ %
    h. Glider _____ %
    i. Lighter than air _____ %

    Total **100** %

2. Show make and model of aircraft flown most often:

    a. Make _____
    b. Model _____

3. Indicate how you usually obtain an aircraft for piloting purposes:

    a. Rent
    b. Club
    c. Friend or Relative
    d. Employer Provides
    e. Part Owner (not club)
    f. Sole Owner

4. How many total hours do you fly annually? _____

5. Estimate the kinds of flying you do by percent of total hours:

    a. IFR _____ %   h. Day _____ %
    b. VFR _____ %   i. Night _____ %
        Total **100** %   j. Simulator _____ %
                                Total **100** %
    c. Business _____ %
    d. Pleasure _____ %   k. Cross-Country _____ %
    e. Commercial _____ %   l. Local _____ %
    f. Instructional _____ %   Total **100** %
    g. Other _____ %
        Total **100** %

6. Indicate the geographic region(s) in which you do most of your flying:

    a. New England
       CT, ME, MA, NH, RI, and VT

    b. Eastern U.S.
       DE, MD, NJ, NY, PA, VA, and WV

    c. Southern U. S.
       AL, FL, FA, KY, MS NC, SC, and TN

    d. Great Lakes Region
       IL, IN, MI, MN, OH, and WI

    e. Central U. S.
       IA, KS, MO, and NB

    f. Southwest U. S.
       AR, LA, NM, OK, and TX

    g. Rocky Mountain States
       CO, MT, ND, SD, UT, and WY

    h. Western U.S.
       AZ, CA, and NV

    i. Northwest U.S.
       ID, OR, and WA

    j. Alaska
       AK

    k. Pacific
       HI

    l. Foreign (Specify) _____

D. SELF-EVALUATION OF PILOT CAPABILITIES

1. Please rank (in decreasing order) your motivations for flying:

    a. Travel   _____
    b. Business   _____
    c. Employment   _____
    d. Sport   _____
    e. Education   _____
    f. Other (Specify)   _____ _____

2. Have you ever considered a career in military aviation?

    ____ No.
    ____ Yes, some thought.
    ____ Yes, considerable thought.
    ____ Yes, attempted and/or succeeded in pursuing a career in military
    aviation.

3. Please describe yourself as a pilot in terms of the following attributes.

Scale:	1	-	Possess this attribute to fullest degree
	5	-	Lack this attribute completely

a.	Physical Strength and Endurance	1	2	3	4	5
b.	Coordination; Quick Reactions	1	2	3	4	5
c.	Ability to Absorb Technical Information	1	2	3	4	5
d.	Mental Alertness	1	2	3	4	5
e.	Resourcefulness	1	2	3	4	5
f.	Attention to Detail; Thoroughness	1	2	3	4	5
g.	Prudence	1	2	3	4	5
h.	Patience	1	2	3	4	5
i.	Safety Consciousness	1	2	3	4	5

4. If you had been flying regularly at the rate of one hour each week and
    then stopped flying completely for six months, how many hours do you feel
    you would need to fly at the end of the six months to regain your former
    proficiency?

    _____

5. Please indicate the level of skill which you developed in each of the following areas of flight and ground operations:

```
1 - Extremely skillful
2 - Moderate skill
3 - Limited skill
4 - No skill
```

a.	Preflight Operations	1 2 3 4
b.	Airport and Traffic Pattern	1 2 3 4
c.	Flight Maneuvers by Response to Ground Objects	1 2 3 4
d.	Flight at Critically Slow Airspeeds	1 2 3 4
e.	Takeoffs and Landings	1 2 3 4
f.	Maneuvers by Reference to Instruments	1 2 3 4
g.	Cross-Country Flying	1 2 3 4
h.	Maximum Performance Takeoffs and Landings	1 2 3 4
i.	Night Flying — Night VFR Navigation	1 2 3 4
j.	Emergency Operations	1 2 3 4
k.	Navigation	1 2 3 4
l.	Weather Understanding	1 2 3 4
m.	Aerodynamics Knowledge — Principles of Flight	1 2 3 4
n.	Radio Communication	1 2 3 4
o.	Aircraft, Engine, Flight Instruments Operation	1 2 3 4
p.	Flight Planning	1 2 3 4

6. Occasionally, the visibility drops to the point where you fly reluctantly. This minimum is _____ miles.

7. Occasionally, the ceiling drops to the point where you fly reluctantly.

a. This minimum in flat country is _____ ft.

b. In hilly rough country it is _____ ft.

8. Indicate the usual maximum 90° cross wind in which you takeoff or land using the aircraft you have flown most:

    _____ knots or _____ miles per hour

9. If you have needed or desired to go by air but had these weather situations, check the worst condition, if experienced, in which you have flown in each case:

    a. Rain   very light___ light ___moderate ___heavy ___no experience ___
    b. Snow   very light___ light ___moderate ___heavy ___no experience ___
    c. Haze   very light___ light ___moderate ___heavy ___no experience ___

10. During the past 24 months, how many intended flights have been cancelled because of forecast weather ?

    _____

    Altered because of encountered weather ?

    _____

11. Pilots usually limit themselves for safety. What self-imposed limitations have caused you to alter or cancel flights? (You are not limited to one response.)

    a. Dense Airport Traffic
    b. Complex Airport Procedures
    c. Complex Equipment
    d. Below Par Physically
    e. Lack of Desired Proficiency for Particular Aircraft
    f. Lack of Desired Proficiency for Flight Conditions
    g. Other (Specify)

    _____

    _____

12. Narrow escapes, close calls, or emergencies sometimes occur. Circle the item or items below which have been in some way related or associated with your most threatening experience(s).

    a. Preflight

        1. Weight or Loading   4. Unavailable Pre-Flight Information

        2. Check Lists   5. Inaccurate Weather Forecasts

        3. Charts

    b. Takeoff or Landing

        1. Lift-Offs   6. Short Field

        2. Slips   7. Unimproved Airports

        3. Cross Wind   8. Trees or Wires

        4. Flaps   9. Soft Field and High Grass

        5. Touchdown   10. Pontoons or Skis

    c. Weather

        1. Low Visibility   5. VFR in Fog or Clouds

        2. Low Ceiling   6. High Winds

        3. Turbulence   7. Mud or Snow

        4. Airframe Icing   8. Darkness

    d. Equipment Failure

        1. Engine Operations   3. Malfunction(s): Equipment or Airplane

        2. Communications   4. Forced Landing

    e. Pilot Related

        1. Fatigue   8. Lost

        2. Uninformed   9. Fuel Management

        3. Infrequent Piloting   10. Near Mid-Air Collision

        4. Navigation Procedures   11. Slow Speed Flight

        5. Cockpit Distractions   12. Stalls or Recoveries

        6. Steep Turns   13. Improper Airspeed

        7. Holding Altitude   14. Low Altitude Maneuvers

    f. Other (Specify)

_____

_____

FLIGHT INSTRUCTOR SURVEY

> To complete this survey, please check or circle the correct response item or enter the appropriate information.

A.   FLIGHT INSTRUCTOR DATA

    1.   Year of Birth _____

    2.   Sex: a.   Female
                 b.   Male

    3.   Zip Code of Current Address _____

    4.   Pilot Certificate:

        a.   Private with Flight Instructor Certificate
        b.   Commercial with Flight Instructor Certificate
        c.   Airline Transport with Flight Instructor Certificate
        d.   Other

    5.   Pilot Ratings:

        a.   Single Engine Land
        b.   Multiengine Land
        c.   Single Engine Sea
        d.   Multiengine Sea
        e.   Single Engine Land, Instrument
        f.   Multiengine Land, Instrument
        g.   Single Engine Sea, Instrument
        h.   Multiengine Sea, Instrument
        i.   Single Engine Land/Sea
        j.   Multiengine Land/Sea
        k.   Single Engine Land/Sea, Instrument
        l.   Multiengine Land/Sea, Instrument
        m.   Single-multiengine Land
        n.   Single-multiengine Sea
        p.   Single-multiengine Land, Instrument
        q.   Single-multiengine Sea, Instrument
        r.   Single-multiengine Land/Sea
        s.   Single-multiengine Land/Sea, Instrument

                                   Airplane Fixed Wing

        t.   Rotorcraft
        u.   Rotorcraft, Instrument
        v.   Glider
        w.   Lighter than air
        x.   None

6. Total flight experience (hours): _____

7. Number of years as an active flight instructor: _____

8. Geographic region in which you have done most of your instructing:

   a. New England
      (CN, ME, MA, NH, RI, and VT)
   b. Eastern U.S.
      (DE, MD, NJ, NY, PA, VA, and WV)
   c. Southern U.S.
      (AL, FL, GA, KY, MS, NC, SC, and TN)
   d. Great Lakes
      (IL, IN, MI, MN, OH, and WI)
   e. Central U.S.
      (IA, KN, MO, and NB)
   f. Southwest U.S.
      (AR, LA, NM, OK, and TX)
   g. Rocky Mountain
      (CO, MT, ND, SD, UT, and WY)
   h. Western U.S.
      (AZ, CA, and NV)
   i. Northwest U.S.
      (ID, OR, and WA)
   j. Alaskan
      (AK)
   k. Pacific
      (HI)
   l. Foreign (Specify) _____

9. How do you regard your activities as a flight instructor:

   a. Full time (principal occupation)
   b. Part time (secondary occupation)
   c. Avocational (not primarily for income)

10. Approximate hours of flight instruction given per year:

    a. Male students: _____
    b. Female students: _____

11. To how many students have you given at least five (5) hours of instruction?

    a. Male   _____
    b. Female   _____

12. How many of these students did you recommend for the private pilot flight examination?

    a. Male   _____
    b. Female   _____

32

13. How many students have you instructed who successfully acquired the certificate or rating upon which they were working?

   a. Male   _____
   b. Female   _____

14. How many of these students failed to achieve the certificate or rating upon which they were working?

   a. Male   _____
   b. Female   _____

15. At what type of airport have you conducted most of your instruction?

   a. Controlled (Control Tower)
   b. FSS (Airport Advisory Service)
   c. Unicom
   d. Uncontrolled (no Unicom or FSS)

B. EVALUATION OF STUDENT PILOTS

   1. On the average, how many hours of dual flight does a student pilot accumulate before soloing?

      a. Male   _____
      b. Female   _____

   2. On the average, how many total hours of flight (dual plus solo) does a student pilot accumulate before you declare him or her ready for the private pilot examination?

      a. Male   _____
      b. Female   _____

3. Please indicate the degree of learning difficulty which you have observed among your students in each of the following areas of flight and ground training:

```
1 - No difficulty
2 - Slight difficulty
3 - Moderate difficulty
4 - Extreme difficulty
```

		Male	Female
a.	Preflight Operations	1 2 3 4	1 2 3 4
b.	Airport and Traffic Pattern	1 2 3 4	1 2 3 4
c.	Flight Maneuvers by Reference to Ground Objects	1 2 3 4	1 2 3 4
d.	Flight at Critically Slow Airspeeds	1 2 3 4	1 2 3 4
e.	Takeoffs and Landings	1 2 3 4	1 2 3 4
f.	Maneuvers by Reference to Instruments	1 2 3 4	1 2 3 4
g.	Cross-Country Flying	1 2 3 4	1 2 3 4
h.	Maximum Performance Takeoffs and Landings	1 2 3 4	1 2 3 4
i.	Night Flying - Night VFR Navigation	1 2 3 4	1 2 3 4
j.	Emergency Operations	1 2 3 4	1 2 3 4
k.	Navigation	1 2 3 4	1 2 3 4
l.	Weather	1 2 3 4	1 2 3 4
m.	Aerodynamics - Principles of Flight	1 2 3 4	1 2 3 4
n.	Radio Communications	1 2 3 4	1 2 3 4
o.	Aircraft and Engine Operation, Flight Instruments	1 2 3 4	1 2 3 4
p.	Flight Planning	1 2 3 4	1 2 3 4

4. Please rate your average male and female student pilots in terms of the following attributes:

```
┌─────────────────────────────────────────────────────────────────┐
│  Scale:      1  –  Possesses this attribute to fullest degree     │
│              5  –  Lacks this attribute completely                │
└─────────────────────────────────────────────────────────────────┘
```

		Male	Female
a.	Physical Strength and Endurance	1 2 3 4 5	1 2 3 4 5
b.	Coordination; Quick Reactions	1 2 3 4 5	1 2 3 4 5
c.	Ability to Absorb Technical Information	1 2 3 4 5	1 2 3 4 5
d.	Mental Alertness	1 2 3 4 5	1 2 3 4 5
e.	Resourcefulness	1 2 3 4 5	1 2 3 4 5
f.	Attention to Detail; Thoroughness	1 2 3 4 5	1 2 3 4 5
g.	Prudence	1 2 3 4 5	1 2 3 4 5
h.	Patience	1 2 3 4 5	1 2 3 4 5
i.	Safety Consciousness	1 2 3 4 5	1 2 3 4 5

5. Circle the number which best illustrates your rating on the following attributes for the male and female pilots you have instructed.

```
Scale:   1 - Extremely good
         5 - Extremely poor
```

		Male	Female
a.	Attitude Toward Flying and Flight Instruction	1 2 3 4 5	1 2 3 4 5
b.	Overall Potential for Being Competent Pilots	1 2 3 4 5	1 2 3 4 5
c.	Background Knowledge Pertinent to Flight Performance and Safety	1 2 3 4 5	1 2 3 4 5
d.	Ability to Acquire Flying Skills	1 2 3 4 5	1 2 3 4 5
e.	Ability to Manage Stressful Situations in Flight	1 2 3 4 5	1 2 3 4 5
f.	Performance in Terms of Flight Safety	1 2 3 4 5	1 2 3 4 5
g.	Overall Airmanship	1 2 3 4 5	1 2 3 4 5

6. Please rate the utility of the following items to the overall flight training process:

> 1 - Extremely valuable
> 2 - Moderately valuable
> 3 - Little value
> 4 - No value whatsoever
> 5 - No opinion or not used

a.   "Private Pilot Handbook"   1 2 3 4 5

b.   Programmed Self-Study Ground
     Instruction Course   1 2 3 4 5

c.   Formal Ground School Classes   1 2 3 4 5

d.   "Hangar-Flying" with Other Pilots
     or Students   1 2 3 4 5

e.   Audio-Visual Ground Training Devices   1 2 3 4 5

f.   Ground Simulators   1 2 3 4 5

g.   General Aviation Magazines
     (e.g., Flying)   1 2 3 4 5

h.   Instructor's Teaching Techniques   1 2 3 4 5

i.   Instructor's Personality   1 2 3 4 5

j.   Exposure to More than one Instructor   1 2 3 4 5

k.   Simulated Instrument Training
     ("Hooded")   1 2 3 4 5

l.   Solo Practice of Stalls   1 2 3 4 5

m.   Solo Practice of Takeoffs and Landings   1 2 3 4 5

n.   Solo Cross-Country Practice   1 2 3 4 5

7.   Do your instructional techniques for male and female students differ?

Yes_____   No_____   (If "yes," explain)

_____
_____
_____
_____
_____

8.   Do you have any comments relative to other differences which you believe exist between male and female students?

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____