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The 1995 Aircrew Operational Vision Survey: Results, Analysis, and Recommendations

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The Office of Public Affairs has reviewed this technical report, and it is releasable to the National Technical Information Service, where it will be available to the general public, including foreign nationals.

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

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13. ABSTRACT *(Maximum 200 words)*
The Visual Enhancement and Eye Protection, Integrated Product Team (VEEP-IPT) designed and distributed in early fiscal year 1996 the "1995 Aircrew Operational Vision Survey." This comprehensive, operationally relevant survey with 161 questions was sent to all 31,205 total force, rated, US Air Force aircrew members (Active Duty, Air National Guard, Reserve). The survey included sections on general information, aircrew spectacles, contact lenses, clinic support, sunglasses, aircrew clear, sun, and high contrast visors, laser eye protection, night vision goggles, ballistic protective dust/wind goggles, vision standards, and a section for written comments. The total force return rate was over 55% with 60% of Active Duty aircrew returning their surveys. Data from the 17,282 returned surveys are being used to define aircrew vision problems, prioritize mission deficiencies, validate user requirements, modify aeromedical policy, and establish valid research requirements. Included in this initial report are the results and analysis of responses from the returned surveys. Survey questions and the raw question by question results are included as Appendices 1 and 2. Selected data have been compiled and cross-correlated, and are found in Appendix 3. The data provide a cross-section of aircrew demographics and opinions, and highlight critical vision and safety issues. Each section has a summary of VEEP-IPT recommendations and recognition of safety of flight issues. Data are maintained in an accessible database at the Ophthalmology Branch at Brooks AFB, and efforts are under way to continue analysis and cross-correlation of the data, including 3400 hand written comments.

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CONTENTS

LIST OF TABLES AND FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

ANVIS	Aviator's Night Vision Imaging System
AOC	Clinical Sciences Division, Armstrong Laboratory
AOCO	Ophthalmology Branch, Armstrong Laboratory
AETCI	Air Education and Training Command Instruction
AF	Air Force
AFB	Air Force Base
AFI	Air Force Instruction
AFMOA	Air Force Medical Operations Agency
AFR	Air Force Regulation
AMC	Air Mobility Command
ANG	Air National Guard
ANSI	American National Standards Institute
BGen	Brigadier General
CDC	Centers for Disease Control
CSAF	Chief of Staff of the Air Force
DoD	Department of Defense
FAA	Federal Aviation Administration

LIST OF ABBREVIATIONS AND ACRONYMS (Cont)

HCV	High Contrast Visor
HSC/CC	Human Systems Center/Commander
HUD	Head Up Display
IAS	Improved Aircrew Spectacle
HQ	Headquarters
IPT	Integrated Product Team
LEP	Laser Eye Protection
NATO	North Atlantic Treaty Organization
NAV/WSO	Navigator/Weapon System Officer
NASA	National Aeronautics and Space Administration
PLZT	Nuclear Flash Protection Goggles
SCL	Soft Contact Lens
SG	Surgeon General
UFT	Undergraduate Flying Training
UPT	Undergraduate Pilot Training
USAF	United States Air Force
VEEP-IPT	Vision Enhancement and Eye Protection, Integrated Product Team

PREFACE

The 1995 Aircrew Operational Vision Survey was conceived, designed, and implemented by members of the Visual Enhancement and Eye Protection Integrated Product Team (VEEP-IP). Due to USAF organizational changes, the performing organization previously part of Armstrong Laboratory is now part of the USAF School of Aerospace Medicine. A special thanks goes to all VEEP-IPT members who wrote and edited questions for the survey, to SSgt Vincent Franco for transcribing data from the database, and to Maj Ron Tutt for formatting data in the appendices, and graphics support. Thanks to the 17,282 aircrew members who took the time to complete the survey, and for patience awaiting publication of the results.

THE 1995 AIRCREW OPERATIONAL VISION SURVEY: RESULTS, ANALYSIS, AND RECOMMENDATIONS

SUMMARY

The Visual Enhancement and Eye Protection, Integrated Product Team (VEEP-IPT) designed and distributed the "1995 Aircrew Operational Vision Survey." This comprehensive, operationally relevant survey was sent to all 31,205 total force, rated, US Air Force aircrew members (Active Duty, Air National Guard, Reserve). Data from the 17,282 returned surveys are being used to define aircrew vision problems, prioritize mission deficiencies, validate user requirements, modify aeromedical policy, and establish valid research requirements. Included in this report are the results and analysis of responses from the returned surveys. Survey questions and the raw results are included as Appendices 1 and 2. Selected data have been compiled and cross-correlated, and are found in Appendix 3.

INTRODUCTION

History of Vision Enhancement and Eye Protection, Integrated Product Team (VEEP-IPT)

An Integrated Product Team (IPT) is a multidisciplinary organization that brings together all functions that have a stake in a product or process, in order to make integrated decisions affecting that product or process, and is empowered to act upon those decisions. The VEEP-IPT was created in March 1994 at the direction of Major General George Anderson, Commander, Human Systems Center, and Brigadier General Robert Belihar, Air Force Material Command Surgeon. A newly created IPT to evaluate current vision standards was incorporated into the VEEP-IPT by General Anderson on 15 April 94. The VEEP-IPT was chartered to explore operational aerospace vision issues. The original IPT charter included the following mission statements:

a. Build a diverse team that includes users, aerospace vision scientists, flight surgeons, planners, developers, and procurement specialists to provide operational vision support for USAF aircrew members.
b. Evaluate current operational vision issues.
c. Develop better products for vision enhancement and eye protection, faster.
d. Improve aeromedical vision standards.
e. Be a single point of contact for funneling information to the users.

The charter membership of the VEEP-IPT included representatives from the scientific and research community, life support, engineering, acquisition, FAA, NASA, the Army and the Navy, as well as actively flying pilots, navigators, and flight surgeons (Table 1). One of the major products of the VEEP-IPT has been the 1995 Aircrew Operational Vision Survey (the survey).

Table 1. Charter VEEP-IPT Members, March 1994

NAME	OFFICE SYMBOL
BGen Robert Belihar	HQ/AFMC/SG
Col Doug Ivan	AL/AOCO
Col David Hammer	AFSOC/SG
Col Dick Levy	AFSA/SEL
Col John Stepp	USAFSAM/CC
Col Eric Wohlrab	HQ AFMOA/SGPA
Col Richard Dennis	AL/AOCO
Col Dan Yoshii	WHMC/PSAV
Col Robert E. Miller II	HSC/XRM
Group Capt Duncan Mitchell	HQ AFMOA/SGPA
Col (sel) Steve Sem	AFELM/DOD Med Spt/CC
LtCol Bob Cartledge	AL/OEO
LtCol Jim Collier	HQ AFSPC/SGPA
LtCol Marty Clement	HSC/YAS
LtCol Michael Farrell	HSC/YAWM
LtCol Donald Gagliano	USAMRD-BAFB
LtCol John Kent	WHMC/PSAV
LtCol Harry Marden	HQ AETC/SGPA
LtCol Mel O'Neal	AL/CFHV
LtCol Jeff Rabin	USAARL
LtCol Courtney Scott	HQ AMC/SGPA
LtCol Tom Travis	HSC/YAWM
Maj Doug Apsey	AL/AOCOP
Maj Brad Dunn	AL/AOCOP
Maj Gerald Groebe	HQ AETC/XOTI
Maj Robert Namendorf	HQ AETC/XORR
Maj Walt Sipes	HSC/XRTA
Maj Dennis Scholl	HSC/XRTA
Capt Paul Khuri	HSC/YASP
Capt Jason Ruesch	HSC/YAE
Capt Robert Thomas	Al/AOCO
Lt Gordan Ford	HQ AETC/XORR
Lt Cathy Moore	AL/XPTM
Lt Rey Morales	AL/CFT
Lt Christine Poprik	HSC/XRS
Lt Rory Shrum	AETC/XOR-SYSREP
CMSgt Milton Yopp	HQ ACC/DRWC
Dr Van Nakagawara	FAA/CAMI
Dr Keith Manuel	DS26 NASA/JSL
Dr Terry Yates	AL/AOCO
Dr H. Lee Task	AL/CFHV
Dr Leonard Temme	NAMRL
Dr Shari Thomas	AL/OEO
Dr Thomas Tredici	AL/AOCO
Dr Roger Wiley	USAARL/SGRD-UAS
Mr Dennis Struck	HQ AMC/XPQS

Table 2. VEEP-IPT Working Groups, March 1994

HIGH CONTRAST VISOR (HCV) WORKING GROUP	
Col Doug Ivan (Chair)	AL/AOCO
Col Eric Wohlrab	HQ AFMOA/SGPA
Col Richard Dennis	AL/AOCOP
LtCol Vanderbeek	ACC/SGPA
LtCol Tom Travis	HSC/YAWM
AIRCREW SURVEY WORKING GROUP	
Col Eric Wohlrab (Chair)	HQ AFMOA/SGPA
Col Doug Ivan	AL/AOCO
Col Richard Dennis	AL/AOCOP
Col Dick Levy	AFSA/SEL
Col David Hammer	AFSOC/SG
LtCol Harry Marden	HQ AETC/SGPA
LtCol Courtney Scott	HQ AMC/SGPA
LtCol Tom Travis	HSC/YAWM
LtCol Vanderbeek	ACC/SGPA
LtCol Jim Collier	HQ AFSPC/SGPA
LtCol John Kent	WHMC/PSAV
LtCol Donald Gagliano	USAMRD-BAFB
Maj Robert Namendorf	HQ AETC/XORR
Maj Doug Apsey	AL/AOCOP
Maj Brad Dunn	AL/AOCOP
Lt Rey Morales	AL/CFT
Dr Terry Yates	AL/AOCOC
Dr Shari Thomas	AL/OEO
AEROMEDICAL VISION STANDARDS WORKING GROUP	
LtCol Harry Marden (Chair)	HQ AETC/SGPA
Col David Hammer	AFSOC/SG
Col Doug Ivan	AL/AOCO
Col Robert E. Miller II	HSC/XRM
LtCol Donald Gagliano	USAMRD-BAFB
LtCol Vanderbeek	ACC/SGPA
LtCol Giovanetti	AFMEA/SGPA
LtCol Tim Ray	DODMERB
Lt Gordon Ford	AETC/XORR
Dr Terry Yates	AL/AOCOC
CUSTOMIZED VISION CARE AND OPTICAL FABRICATION LAB WORKING GROUP	
Col Robert E. Miller II (Co-chair)	HSC/XRM
Col (sel) Steve Sem (Co-chair)	AFELM/DOD Med Spt/CC
Col Dick Levy	AFSA/SEL
Col David Hammer	AFSOC/SG
Group Capt Duncan Mitchell	HQ AFMOA/SGPA
Col Doug Ivan	AL/AOCO
Col Richard Dennis	AL/AOCOP
LtCol Donald Gagliano	USAMRD-BAFB
LtCol John Kent	WHMC/PSAV
Maj Doug Apsey	AL/AOCOP
Maj Brad Dunn	AL/AOCOP
Lt Gordon Ford	AETC/XORR
Dr Van Nakagawara	FAA/CAMI

Development of the Survey

At the charter VEEP-IPT meeting, March 1994, the committee Chairman, Colonel Douglas J. Ivan, Chief, Ophthalmology Branch, Armstrong Laboratory, directed the IPT to form four major working groups. The Aircrew Survey Working Group (Table 2) was charged with development of a comprehensive survey that included input from users (pilots, operations, safety, etc.), as well as input from medical staff. The survey was regarded as a necessary and pivotal requirement upon which to base more far reaching initiatives and vision programs under the management of the VEEP-IPT.

The first Chairman of the Survey Working Group was Colonel Eric Wohlrab, HQ Air Force Medical Operations Agency (AFMOA). His initial thrust was to distribute a March 1994 letter notifying all AF Major Commands that a survey was being developed, and to solicit input for question development. Originally, a six-month time line was established to develop, distribute, and return the surveys. Sample surveys from the field were requested to be returned by 22 April 1994, but due to a number of administrative problems the initial six month time line was extended.

In August 1994, Group Captain Duncan Mitchell (AFMOA) assumed the interim Survey Working Group Chair due to transfer of Colonel Wohlrab. Sample questions that had been submitted by Major Command representatives were compiled by Group Captain Mitchell and forwarded to the VEEP-IPT Chairman for review in late August 1994. Shortly thereafter, Colonels Richard Dennis and Robert Miller, Armstrong Lab/AOCO, were appointed Co-Chairmen of the Survey Working Group and guided the project to completion. Four major tasks were completed prior to distributing the survey:

1. Questions were developed from VEEP-IPT and field input.
2. A contractor was selected to print and distribute copies.
3. The AF Chief of Staff endorsement was obtained by Brigadier General Belihar for the survey cover letter.
4. An advertising campaign was undertaken to encourage high participation.

Question Development

An initial call for sample questions went out to VEEP-IPT members and to Major Command representatives in March 1994. Questions arriving from the field were archived, and other questions were written by the VEEP-IPT executive staff, located at Brooks AFB, TX. Over 500 questions were reviewed, consolidated, and arranged in 11 sections related by topic. After numerous local reviews and revisions, in February 1995, a draft survey with 152 questions was sent to all VEEP-IPT members for review and comments. One reviewer of this draft stated "The most effective surveys are the ones that only ask relevant 'have-to-know' data input—short/concise! This one would end up in the trash." Long surveys often do end up in the trash. A previous Human Resources Directorate survey of 12,000 aircrew, with 160 questions, had a poor return rate of 33%; therefore, Human Resources personnel recommended the VEEP-IPT survey have no more than 120 questions. The fact that the final survey, with 161 questions,

produced an outstanding 60% return rate for Active Duty is testament to the quality of question writing and editing, teamwork, the importance of the issues, the effectiveness of the advertising campaign, and the impact of the Chief of Staff endorsement.

Survey Production Contract

A number of commercial and military sources were consulted as prospects to print, distribute, score, and analyze the survey data. Estimated costs from commercial sources ranged from $68K to over $100K. The Survey Branch at HQ Air Force Military Personnel Center (AFPC) offered to administer the survey at a cost of $45K. This cost included purchase of a new Scantron 8699 booklet scanner, Forms/Labels Integrated Printing System (FLIPS) software, printing of booklets and envelops, postage, and initial analysis and report writing. Funds from the Armstrong Laboratory were authorized in the amount of $45K in February 1995. The final product actually came in under budget at $27,481. During survey development, the Survey Branch was able to repeatedly edit and update the format of draft Scantron booklets as changes were provided by the VEEP-IPT. The orange color of the survey itself was driven by the new scanning system.

Chief of Staff of the Air Force (CSAF) Endorsement

The CSAF endorsement was sought for a number of reasons. The Survey Working Group wanted to avoid the impression that the survey was a "medic" survey, and felt that endorsement from the CSAF would emphasize the importance and operational relevance of the information that would be extracted from the results. In fact, the CSAF, General Ronald Fogleman had been an avid supporter of the survey, and in July 1995, at the request of Brigadier General Belihar (HSC/CC), he signed the cover letter attached to the final edition of the survey that was distributed in October 1995.

Experience with other large surveys indicated that a special emphasis on completing the survey was needed in order to optimize the response rate. General Fogleman's letter stressed that the survey was anonymous, and that timely and accurate responses were needed. Certainly, the General's endorsement substantially contributed to the high 55.4% overall and 60% Active Duty rate of return.

Pre-production and Advertising Campaign

There were two main goals in the advertising strategy. First, aircrew members needed to know that a survey was forthcoming. Also, flight surgeons needed to be prepared to brief entire squadrons on the history of the VEEP-IPT, the contents of the survey, and the importance and operational relevance of the data. As early as March 1994 a "heads up" letter was sent to all Major Command Surgeon's offices outlining plans for the survey and soliciting support. Details of the forthcoming survey were spread by word of mouth, at professional meetings, and by correspondence.

Four months prior to distributing the survey, members of the VEEP-IPT executive staff prepared an informational memorandum for all operational flight surgeons. This memorandum

also included briefing slides and instructions for conducting squadron briefings. Additionally, each active duty optometrist and ophthalmologist received a memorandum describing the goals of the survey with a charge to encourage aircrew to complete it. The forthcoming survey was also publicized in Air National Guard and Reserve publications. The surveys were distributed to all Active Duty rated aircrew members the last week of October 1995, and to Reserve and Guard component members during their November training assemblies.

SURVEY DATA ANALYSIS

Introduction

This section contains a brief review of data from each of the 11 sections of the survey. The Survey Section of the AF Military Personnel Center, Randolph AFB, TX, scanned the returned survey booklets. After some initial analysis, the data were transferred to Armstrong Laboratory/AOCO for further statistical analysis and presentation/publication of results. Actual survey questions and raw question-by-question results are found as Appendices 1 and 2. A partial compilation and cross-correlation of the data appears as Appendix 3. Sections covered include:

I: General Information
II: Aircrew Spectacles
III: Contact Lenses
IV: Clinic Support
V: Sunglasses
VI: Aircrew Clear, Sun, High Contrast Visors
VII: Laser Eye Protection (LEP)
VIII: Night Vision Goggles (NVGs)
IX: Ballistic Protective Dust/Wind Goggles
X: Vision Standards
XI: Comments

The VEEP-IPT committee met in October 1996 (Table 3) to review findings of the survey that had been compiled up to that date by the executive staff. The section analysis below is largely derived from the Committee's analysis of the data. Selected items from each section are reviewed, and where applicable, comments related to operational issues not specifically covered in the survey are also included. In particular, safety of flight issues are highlighted. Note that some numbers and percentages in Appendices 2 and 3 will not match exactly, for example when comparing actual survey answers with correlated data. Small discrepancies exist due to management of missing data (unanswered questions) and rounding. Some reported percentages are referenced to the entire survey population, and some to a subset of responses to a particular question felt to be operationally relevant. Additionally, numbers of respondents reported will underestimate the true total force numbers by an amount proportional to the return rates (60% for Active Duty).

Table 3. Meeting Attendance, VEEP-IPT Meeting, 24 Oct 1996

NAME	OFFICE SYMBOL
BGen Robert Belihar	HSC/CC
Col Richard J. Dennis	AL/OEO
Col Douglas J. Ivan	AL/AOCO
Col Paul Lilly	AL/CFHV
Col Melvin O'Neal	HSC/XRT
Col Tim Ray	DODMERB
LtCol Leon McLin	AL/OEO
LtCol John F. Kent	AL/CF
LtCol William Thornton	ACC/SGPO
LtCol Richard Trifilo	AMC/SGPA
LtCol Courtney Scott	HQ/USAF/AFMOA
LtCol Isaac Shaw	ACC/SGPO
Maj Bruce Baldwin	AL/AOCO
Maj Terry Peacock	HSC/XRT
Capt Steve Rafferty	AETC/SGP
Dr. Van Nakagawara	FAA/CAMI
Dr. Terry Yates	AL/AOCO
Dr. Robert Miller	AL/OEO

Section I. General Information

The survey was sent to all 31,205 Active Duty, Air National Guard , and Reserve rated, USAF aircrew on record as of the 1 Oct 95 survey distribution date (Table 4). Rated aircrew include pilots, navigators, and flight surgeons. Weapon system officers, and electronic warfare officers are included in the "Navigator" category. Returned surveys include a mixture of 64 various other crew positions and are lumped together in the category "other."

Table 4. Survey Population

	Active Duty	ANG	Reserve
Pilots	15,515	4,069	2,968
Navigators	5,463	1,155	655
Flight surgeons	874	275	1231
Totals	21,852	5,499	3,854
Male	12,695	2,329	1,554
Female	265	51	46

Aircrew were requested to complete and return the survey by 1 January 1996. The overall return rate was an outstanding 55.4% with a 60% rate from the Active Duty force (Table 5). This return rate was acknowledged to be extremely high for this type of survey; in fact, it was the highest return rate ever achieved for a USAF operational aircrew survey. The high participation was attributed to pre-distribution of the VEEP-IPT prepared aircrew slide briefing on the survey that was given by local flight surgeons, advertisement from ophthalmologists and optometrists, the survey cover letter endorsement obtained by BGen Belihar from General Fogleman, and other factors discussed above.

The return for females was about 2% of the total return, which correlates with the number of female aircrew as of October 1995 (Air Force Personnel Center/DPSARA). Since 1995, the number of female pilot candidates has increased. For the period July 1994 to July 1995, about 5% of student pilots were identified as female (Callister, King & Retzlaff, 1996). From July 1995 to September 1997 approximately 8.4% of over 3400 individuals entering undergraduate flying training were female (Enhanced Flight Screening database, Brooks AFB, TX). In FY 99 approximately 3% of rated aircrew were female (AFPC/DPSARA).

Table 5. Survey Return Rates
(Overall Return Rate: 55.4%)

	Active Duty		ANG		Reserves	
Pilots	9,114	(59%)	1,720	(42%)	1,209	(41%)
Navigators	3,473	(64%)	566	(49%)	298	(45%)
Flight Surgeons	395	(45%)	112	(41%)	99	(43%)
Others	94		13		14	
Totals	13,076	(60%)	2,411	(44%)	1,620	(42%)

Question 8 asked "Are you currently flying with a medical waiver?" The relatively high numbers of medical waivers for Active Duty (28%) and eye related waivers (13%) seemed unusually high, but these numbers were confirmed through a subsequent mathematical analysis of wavier statistics from a USAF waiver file maintained by USAF/SG and AL/AOC.

The survey reported rate of smoking by aircrew is generally low at 6% or less compared to the national average of 25.5 in 1994 (CDC, July 1996), and the overall Air Force rate of 25.1% (Risk Factor Pilot Project-BRFESS, 1995).

Section II. Aircrew Spectacles

The survey indicated that as of October 95, 39.4% of Active Duty pilots, 63.6% of navigators, and 78% of flight surgeons required corrective lenses to fly. Spectacle or contact lens correction is required, during flying duties, when vision in either eye is less than 20/20 (AFI 48-123, 1994). The relatively high 39% figure for pilots is consistent with previous trends in such data seen whenever a relaxation of visual standards has occurred. There have been two sets of visual acuity and refraction standards relaxation since a 1988 analysis indicated that 27% of pilots wore spectacles (Miller, Woessner, Dennis, O'Neal, & Green, 1990). In 1980, only 20% of pilots wore corrective spectacles (Provines, Woessner, Rahe, & Tredici, 1983). Estimates of data from Dunsky and Levene (1969) show that in 1969 about 17% of pilots and 29% of navigators were required to wear glasses for flying in 1969.

Table 6. Percent of Rated Aircrew Requiring Spectacles, 1969 - 1995

	Pilot	Nav	FS
1969	17	29	NA
1980	19.6	50	NA
1988	27.4	51.5	NA
1995	39.4	63.6	78

The survey results reflected dissatisfaction with the progressive degradation in quality of the current aircrew frame expressed by over 56% of pilots and navigators. Progressive deterioration in the quality of the original frame has occurred as a consequence of the competitive bidding process. A total of 51% of all DoD frame users reported a lens falling out of the DoD frame at sometime (flying or not flying). For civilian frame users, 31% reported a lens fell out of the frame at sometime. Over 1600 aircrew, including 24% of DoD frame users, reported a lens falling out in flight between 1 to 10 times, some during critical phases of flight. This was identified as a potential safety of flight issue.

An overwhelming majority (83.5%) of respondents wants a new flight frame. The majority of spectacle wearers (50%) desires a black combat frame, and 60% requested an alternate gold colored dress frame. The negative ratings of the current aircrew frame and the desire for a new frame highlight the requirement for a new USAF or DoD aircrew frame.

A proposed new improved aircrew spectacle (IAS) has been developed and in May 1996 a proposal package transitioned to the AF Surgeon General (SG) for review and purchase decision. The new proposed frame meets current safety frame standards (ANSI Z87.1, 1989), whereas the current frame does not. The IAS also incorporates other features that improve upon its operational effectiveness, such as non-reflective matte black color, and strengthened eyewire, which improves stability of the lenses.

The IAS has been highly rated by users and evaluators. If adopted, the new frame would be available in three widths (52, 55, and 58 mm) and three temple lengths (140, 145, and 150 mm) which should allow fitting 99+% of all aircrew. A matte, anti-reflective black "combat" version and an optional gold colored dress frame are supported by the aircrew survey, and proposed as part of the transition package. The VEEP-IPT members have formally endorsed the new IAS.

The survey suggested that there is a problem with unauthorized use of unapproved civilian spectacle frames. Pending acquisition of a new aircrew frame, the USAF/SG and Armstrong Lab/AOCO developed specific criteria for an interim authorization for civilian frames and lenses. A 1990 policy letter (HQ USAF/SGP, 90-082) listed the requirements for the alternative civilian frame to be used by aircrew, and that policy was recently updated. About 23% of all spectacle wearers currently wear a civilian frame, but 68% of civilian frame users did not know if their frame met the approved policy guidelines previously outlined by the USAF/SG. About 3% of civilian frame users responded that they were aware that their frames did not comply with the existing policy but were wearing them anyway. This was identified as a potential safety of flight issue. The VEEP-IPT recommended that the civilian frame policy should be incorporated into an appropriate Air Force Instruction (AFI). Air Force Regulation 167-3, Ophthalmic Services, is currently being revised as an AFI and the VEEP recommended that it incorporate the USAF/SG civilian frame requirements in its revised contents.

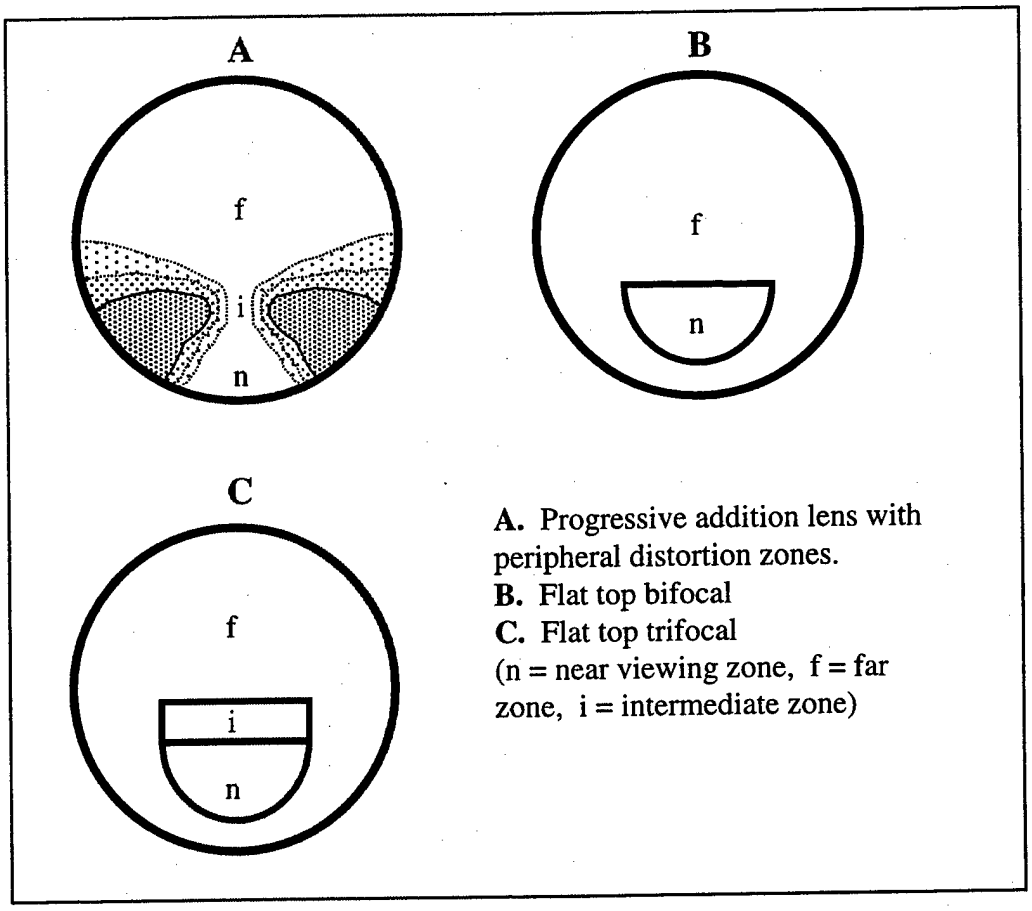
Air Force Instruction 11-206, General Flight Rules (1996), requires that "Crew members who wear corrective spectacles or contact lenses must carry a spare set of clear prescription spectacles on their person while performing aircrew duties." Of contact lens wearers surveyed, 17% indicated that they do not carry a spare pair of spectacles when flying, and presumably a higher percent of spectacle wearers may not carry a spare. Although the survey did not specifically query non-contact lens wearers about carrying spare spectacles, from previous reports and anecdotally, we know that many pilots do not carry back-up spectacles on flying missions. The spectacle back-up requirement was established as a criterion for participation in the USAF Soft Contact Lens Program. Non-compliance with the spare spectacle requirement is a potential safety of flight issue.

Currently, 18% of Active Duty, 39% of ANG and 46% of Reserve spectacle wearing aircrew require multifocals (bifocals or trifocals) in the cockpit. Over 75% of these aircrew did not have their multifocals specifically fitted to cockpit measurements. A guide booklet, *Prescribing Spectacles for Aviators*, prepared by Miller, Kent & Green, 1989, is available that has cockpit measurements, which should be used to custom fit multifocal prescriptions for

specific aircraft. This should be accomplished prior to flight, and individual aircrew should have adequate time to adapt to new multifocals before the next flight.

Although aircrew use of progressive addition (no line) multifocals (Figure 1) is currently prohibited, 175 respondents indicated that they use progressive addition lenses. This is a potential safety of flight issue. However, 51% of multifocal users state they would prefer progressive lenses, despite the fact that 47% of pilots do not believe multifocals provide an adequate field of view. The progressive type of multifocal often has the smallest field of view of any multifocal type.

Figure 1. Multifocal Types



Research on the use of progressive addition bifocals in the cockpit should be encouraged, including appropriate simulator studies. However, progressive lenses are expensive, more difficult to adapt to, difficult to fit, and may be incompatible with high performance aircraft because of optical blind spots, increased visual field limitations, and induced head movements.

Forty-seven percent of pilots feel their multifocals do not provide a wide enough field of view. The standard bifocal width is 28mm, but the optical fabrication labs also have the larger 35 mm size available as a custom order. Some of the problems identified with bifocals may

actually represent the need for a larger bifocal width, or a trifocal instead of a bifocal. Aircrew should have unrestricted access to larger multifocals, including trifocals, when requested. Unfortunately, the USAF must rely on Army and Navy spectacle fabrication laboratories with regard to availability of non-standard multifocals. The labs and aircrew should be educated as to the special needs and availability of non-standard multifocals. A dedicated USAF or DoD aircrew optical fabrication laboratory should be considered.

Recommendations/Conclusions

1. Dissemination of policy on the backup spectacle requirement should be improved (17% of contact lens wearers do not always take back-up spectacles on flights).
2. The VEEP-IPT supports the new IAS.
    a. 60% of aircrew are dissatisfied with the current aircrew frame.
    b. Tri-service endorsement of the new IAS should be encouraged.
3. Confirm number (%) of aircrew wearing prescription spectacles by records review.
4. Aircrew should have unrestricted access to proper multifocals (large D segment, trifocals).
5. Investigation of the feasibility of an aeromedical progressive lens study should be pursued.
6. Expedited review and processing of proposed new IAS package by SG staff should occur.
7. The USAF/SG civilian frame policy should be incorporated into the appropriate AFI, i.e., the AFI replacing AFR 167-3.

Six potential safety of flight issues were identified in this section:

1. The current aircrew frame is not a safety frame.
2. 47% of aircrew had a lens drop out of the frame, with 22% in flight.
3. 68% of civilian frame wearing aircrew do not know if their frames meet USAF/SG requirements.
4. Unauthorized progressive lenses are being used.
5. 75% of aircrew do not have bifocals fitted to cockpit measurements.
6. 17% of contact lens wearers do not carry backup spectacles.

Section III. Contact Lenses

At the time of the survey the Air Force had over 8 years of routine operational aircrew soft contact lens (SCL) experience. The initial implementation plan for this program was signed June 1989, and has been updated several times since then, to include participation by undergraduate flying training (UFT) students in 1995. However, the use of contact lenses for medical reasons has been authorized and managed through the Aeromedical Consultation Service of the Clinical Sciences Division at Brooks AFB, TX, for nearly 30 years. Since 1989 there have been no Class A mishaps or permanent groundings reported secondary to over 25,000 man-years of contact lens wear in rated aircrew members. A Class A mishap involves loss of life or permanent disability, greater than 1 million dollars of equipment damage, or destruction of an aircraft (AFI 91-204, 1996). A permanent grounding from flying duties might result from a

complication such as a corneal ulcer that causes a permanent reduction of visual acuity below established standards.

The School of Aerospace Medicine/AFCO maintains an active database on SCL problems related to the operational use of SCLs (USAF Soft Contact Lens Incident Data Base) and has collected data from the field since 1995. This database compiles information sent by squadron flight surgeons on SCL related problems such as corneal infections, and less serious problems that result in grounding or a change in SCL type or wearing schedule. There have been fewer than 30 incidents reported since 1995 despite an estimated 13,000 man-years of SCL use. This complication rate from SCL is quite low compared to the general population (Poggio, Glynn, Schein, Seddon, Shannon, Scardino, & Kenyon, 1989). This may be the result of several primary mitigating factors: USAF aircrew are younger, more educated and may actually manage their lens wear better, resulting in lower overall complication rates compared to the general public; or, the low rates reported may reflect an under-reporting phenomenon, especially since civilian eye care providers are utilized and may be unaware of the reporting requirement.

As of October 1995, there were about 4400 rated aircrew in the SCL program and a large non-rated population. Current Air Force policy states that government purchase of lenses may be made with line (non-medical) squadron funds, with approval determined by each line squadron commander (HQ USAF/SG Memorandum, 1996). The survey showed that 33% of Active Duty, 4% of ANG, and 8% of Reserve aircrew members are provided soft contact lenses (SCLs) and solutions purchased with squadron funds. The remainder of individuals must purchase lenses with personal funds. Roughly, 90% of aircrew from all components believed the squadron should provide lenses and solutions at no cost to the aircrew member.

USAF mobility policy requires that all SCL wearing aircrew maintain an adequate supply of spare SCLs in the mobility bag (AFI 48-123, A16, 1994). The relatively poor compliance (42%) with the mobility bag requirement for spare pairs of SCLs may be directly related to the funding issue. Only 30% of contact lens wearers said their lenses were purchased by the squadron. Furthermore, 16% had difficulty getting lenses during deployment, and 26% had difficulty getting cleaning solutions. The survey indicated that 98% of those wearing SCLs perceived an operational advantage from wearing contact lenses over spectacles. Due to operational advantages associated with SCL use, the VEEP-IPT has recommended that the Air Force fully fund the aircrew SCL program.

The survey results indicated that 17% of contact lens wearers are not carrying a backup pair of spectacles when they fly, although the SCL policy letter and AFI 11-206, 1996, require that spare spectacles be carried. One recommended solution to poor compliance with the backup spare spectacle requirement would be to include this requirement in aircrew preflight checklists.

The survey revealed that 26% of aircrew experienced a displacement of their contact lens one or more times; 10% experienced a loss of a lens one or more times; and 29% reported particles under a lens (dirt, eyelash) one or more times. A contact lens was reported removed inflight by 24% of aircrew, primarily for dryness and foreign bodies beneath the lens. Of all these events, only 2% of respondents reported the mission was affected. However, any inflight

problems that affect the mission are potential safety of flight issues or may have different operational significance in combat.

Although all contact lenses used in the SCL program are approved by the FDA for extended wear, the SCL program prohibits overnight wear of lenses, except under "certain operational circumstances," (HQ USAF/SG Memorandum, 1996). Even though over 97% said they knew extended wear was prohibited, in question 53, 1038 people said they had slept in their lenses, and 205 said they wore lenses on an extended wear basis over 10 times. Extended wear increases the risk of serious eye infections by as mush as 15 times (Poggio, et al, 1989), and should be avoided except under operational necessity.

AL/AOCO had previously determined that the policy requiring aircrew to be proficient in removal of SCLs while wearing flight gloves had certain limitations related to compliance, efficacy, and safety. The survey results confirmed the existence of these problems, and this requirement has subsequently been dropped from the SCL program. Aircrew are now instructed to remove their flying glove(s) in order to remove a contact lens.

The survey indicated that 93% of Active Duty aircrew were adequately briefed by the flight surgeon on the program. Fewer numbers of ANG (84%) and Reserve (76%) indicated they were briefed. A comprehensive Flight Surgeon Briefing Package was distributed during the early years of the SCL program, but is in need of revision and redistribution. USAFSAM/AFCO is developing a new PowerPoint based briefing guide on the SCL Program especially targeted for flight surgeons. This guide will be posted to the AFC website: http://triton.brooks.af.mil.

Recommendations/Conclusions

1. Advertise and emphasize operational reasons, i.e., escape and evasion, for taking backup spectacles on missions, including missions where contact lenses are worn.
2. The survey results support a 100% AF buy policy for SCLs due to the operational advantages, customer demands, improved medical monitoring of the program, enhanced escape and evasion potential, properly stocked mobility bags, and inherent cost savings for volume purchase.
3. A Flight Surgeon Briefing Guide on the SCL Program, to be administered to aircrew, should be developed including the hazards of extended wear. This guide should be distributed to all flight surgeons, including ANG and Reserve members.

Four potential safety of flight issues were identified in this section:

1. 17% of aircrew do not carry a pair of back up spectacles on missions despite regulatory requirements to do so.
2. 26% of aircrew experience contact lens displacement, and 10% had a contact lens fall out in flight.
3. Lenses are being worn on an overnight basis in lieu of policy.
4. Non-compliance with mobility requirements (spare lenses), and poor resupply during contingency operations may lead to disrupted operational readiness.

Section IV. Clinic Support

Overall, vision support from flight surgeon offices and eye clinics was rated highly. However, 70% of those responding reported that the eye clinic did not make the recommendation that new glasses be evaluated in the cockpit before flying, and 95% did not have glasses fitted with helmet, mask, or headset on. The VEEP-IPT recommended that the *USAF Cockpit Spectacle Fitting Guide* (Miller, Kent, & Green, 1989) be updated and/or redistributed.

Currently, annual dental exams are required for Active Duty flyers. However, a complete eye exam is not required, only a visual acuity screening by Flight Medicine technicians. The survey indicated that 63% of respondents desired an annual eye exam by an AF eyecare professional, and 16% did not believe they received as comprehensive an assessment of vision in the Flight Medicine office as was occupationally necessary.

Recommendations/Conclusions

1. Cockpit specific fitting of spectacles should be performed; this message needs better dissemination to all eye clinic personnel and flying squadrons.
2. Consider updating written policy on fitting of spectacles with flight gear.
3. Reinforce the need to have aircrew check their new eyewear in the cockpit before a mission.
4. Consider complete annual eye exams for aircrew.
5. Update *USAF Cockpit Spectacle Fitting Guide.*

Section V. Sunglasses

The survey indicated that there is a problem with wear of unauthorized civilian sunglasses. Currently, 52% of all aircrew wear sunglasses in flight (prescription and non-prescription). Of all sunglass wearers, 47.5% wear USAF issue sunglasses, and 52.5% wear commercially purchased types. Commercially purchased, non-prescription sunglasses were reported worn by over 4000 aircrew, representing 80% of all non-prescription sunglasses (commercial and DoD issue). This large number of non-DoD issued sunglasses presents a potential safety hazard if proper design guidelines and lens requirements are not met.

Air Force regulations only authorize neutral density (gray) lenses for aircrew use. Of the commercial sunglass wearers, only 35% wear neutral density lenses, with 26%, 21%, and 6% wearing unapproved green, brown, and yellow lenses respectively. Such non-neutral tints induce color vision deficits that are unpredictable and potentially incompatible with modern cockpit displays, color-based ground references, targets, etc. Although the specific problem of color distortion induced by colored lenses was not specifically addressed for sunglass wearers, questions 106 and 107 indicate that yellow tints can cause difficulties seeing cockpit displays. A 1992 incident involving naval aviators wearing yellow visors has been reported, where closed runway markings were rendered invisible because of the yellow tinted visors (Yacavone & Erickson, 1992). The use of non-neutral tints thus is a safety of flight issue.

We have known, anecdotally, for some time that many pilots do not wear sunglasses when flying, especially in air-to-air engagements, because the lenses are regarded by aircrew to be too dark and block too much light, often making instruments difficult to see. Overall, survey respondents reported that DoD supplied sunglasses were too dark (20%), too light (16%), or just right (64%). Twenty-six percent of fighter aircrew reported that the DoD supplied sunglasses were too dark. The density of neutral gray tinting may vary with prescription as a function of lens type and thickness. The standard aircrew tint is N-15 (15% transmission), but N-31 tints are available for individuals desiring a lighter tint (AFR 167-3). Quality control, for both density and color, of tinting plastic lenses is a known problem (Rabin, Wiley, Levine, Wicks & Rivers 1996), and may have impacted the response to this question. This is another potential safety of flight issue.

Another potential safety hazard was identified: 40% of respondents overall, and as high as 62% of fighter crew indicated that they wear sunglasses plus the USAF sun visor at the same time. This combination results in a transmission of only 2.2%, which is much too dark for safe flying. This combination has already resulted in one potentially avoidable high altitude bird strike mishap (Data on file USAFSAM/AFCO).

The current DoD frame is rather small and may let too much glare in from the sides, so some aircrew flip down the tinted visor, especially while cruise flying, to reduce this peripheral glare. Follow on development of new DoD issued non-prescription sunglasses will be influenced by the decision on adoption of the proposed new improved aircrew spectacle (IAS) frame. The proposed IAS frame is larger than the current standard size DoD frame and would eliminate much of the problem with peripheral glare. Other issues dealing with tinted visors will be covered in the following section.

Recommendations/Conclusions

1. DoD provided tinted lenses are too dark or too light for some aircrew.
2. Individual aircraft differences may potentially drive the need for different cockpit specific types of lenses or tints.
3. A wider range of neutral gray transmission tints may be needed for aircrew depending on operational requirements.
4. Emphasis is needed regarding education of aircrew about the hazards of using sunglasses and tinted visors in combination.
5. There is widespread non-compliance on the wear of civilian sunglasses by aircrew; need to incorporate policy into aircrew guidance.
6. Continue to monitor quality of sun tinted lenses from DoD laboratories.

Three potential safety of flight issues were identified:

1. Unauthorized tinted sunglasses induce unpredictable color vision disturbances that may be incompatible with modern cockpit displays and impair color based ground references, such as navigation aids or target features.
2. Sunglasses and sun visors worn in combination reduce light transmission to hazardous levels.

3. Previously identified tint irregularities from DoD optical fabrication laboratories may still exist, and result in tint densities too dark for safe flight.

Section VI. Aircrew Clear, Sun, High Contrast Visors

Eighteen percent of pilots (24% of fighter pilots) believe the current USAF sun visor is too dark, almost exclusively on the basis of difficulties seeing cockpit displays. Over 61% of all aircrew and 66% of fighter crews would like more than one darkness of sun visor to be available for specific mission requirements.

Fifty-five percent of aircrew reported they do not ever wear a visor. This is potentially a safety of flight issue. For example, T37 regulations require a visor be worn, either clear or sun visor, below 27,000 feet specifically as a preventive step for the bird strike hazard (AETCI 11-201, 1995). Wearing sunglasses only, without the clear visor, provides little ballistic (i.e., bird strike) protection. Appropriately tinted visors suitable for various missions or personal needs are required to optimize ballistic protection compliance. Survey data is available to determine which aircrew who routinely fly at low altitudes wear a visor (question 98 and question 2). Cross-correlation analyses of this type will be pursued in future publications.

The yellow tinted High Contrast Visor (HCV) has been worn by over 3660 aircrew overall (25% of this survey), and 43% of fighter aircrew. Seventy-four percent of those aircrew who have worn the HCV responded that they believe it improves target acquisition. Of the fighter aircrew who have worn the HCV, 74% also reported an improvement in target acquisition. However, 296 respondents (16%) indicated that the HCV interfered with seeing cockpit displays, and 465 respondents (23%) indicated difficulties seeing ground targets with the HCV. Of those wearing the HCV, 18% mistakenly believed that the HCV also provided laser protection. Overall, 87% of pilots who have worn it rated the HCV to be combat effective (20% very, 42% somewhat, 26% minimally), while 13% regarded it to be not effective.

Although the survey results support use of the HCV, the reported color distortions indicate a need for enhanced education and training for users. Yacavone & Erickson (1992) reported an incident involving two naval aviators using an unauthorized yellow visor. The yellow tint rendered the "closed" yellow markings of an Air Force runway invisible. According to the authors "An attempt to land 800 ft short of the displaced threshold resulted in a tower-called wave-off.

Recommendations/Conclusions

1. Analyze survey to determine in what types of aircraft instrument readability problems exist with sun visors and the HCV.
2. Analyze survey to determine bird strike protection hazard in threatened aircraft.
3. Analyze survey (cross reference Q 98, Q 100, and aircraft type) to determine what flight conditions are associated with visor problems.
4. The high percentage of acceptance of the HCV as positively influencing combat

effectiveness warrants further investigation.
5. Determine impact of HCV on visibility and readability of cockpit displays, etc. in both color normal and color defective individuals.
6. Develop a neutral density sun visor that is less dark (greater transmission) than present sun visor; consider several shades be available, especially for fighter aircraft.
7. Incorporate advisory messages regarding the wear of the clear visor for ballistic protection, during day or night, in appropriate regulatory documents.
8. Educate aircrew regarding non-laser protective aspect of HCV.

Four potential safety of flight issues were identified:

1. Aircrew may not be adequately protecting themselves against the bird strike hazard.
2. Sun visors should not be worn in combination with sunglasses especially at low altitudes.
3. Non-neutral density tinted visors, including the HCV, induce color deficits that interfere with cockpit displays and ground target references.
4. Currently fielded neutral density visors may be too dark to view cockpit instruments under daylight conditions, resulting in either persistent use with visual degradation or abandonment of wear with subsequent loss of ballistic and sun protection.

Section VII. Laser Eye Protection (LEP)

The survey revealed that 92% of all aircrew have never worn LEP, and of those who have, 73% were fighter aircrew. Of those involved in training exercises using lasers, only 13% overall (22% fighter) have worn LEP during those exercises. It may not be significant that so few fighter aircrew reported they wear LEP during exercises because many of the older systems including LANTIRN (Low Altitude Navigation and Targeting Infrared for Night) did not require LEP. Many new weapon systems utilize lasers of various wavelengths, therefore LEP issues are becoming increasingly important. In addition, many aircrew may not be wearing LEP for reasons that include: approved LEP devices have not been fielded in large enough numbers, an LEP does not yet exist for night use, system problems may preclude acquisition, or the requirement to wear LEP may not exist in individual cases. This is a potential safety of flight issue.

The survey indicates that 43% of fighter aircrew report difficulty seeing cockpit displays while wearing LEP, and between 13 to 22% (depending on the visor type) have trouble seeing other aircraft, aircraft lights, or ground targets. This is a potential safety of flight issue. By design, LEP devices screen out certain wavelengths of light. For example, one LEP lens blocks the green color typically found in head up displays (HUD) making readability of the HUD symbology difficult. Due to a number of different types of laser threats (hostile and friendly), and different cockpit configurations, cockpit specific LEPs or displays that can be seen regardless of LEP will certainly have to be developed.

The survey indicated that at least 38 individuals have been flashblinded by commercial operated outdoor laser light shows, so called COOLs. After over 50 commercial incidents, FAA regulations were implemented that restrict where and when laser light shows can take place, so

the future risk from legitimate laser light shows may become less. However, the threat from exposure of aircrews during a critical phase of flight, for example, from COOLs, or deliberately from a terrorist or rogue laser, remains high. This is a potential safety of flight issue.

The survey indicated that the nuclear flash protection goggles (PLZT) are confused with laser eye protection by many aircrew. PLZTs do not provide laser protection. Question 111 included PLZT as a selection specifically to see if a perceived confusion between PLZT with LEP was real and could be validated through the survey. Since 1029 individuals indicated the PLZT as the LEP they most often used, there appears to be a misconception about this function of the PLZT goggles. A less likely possibility is that the question may have been misinterpreted.

Per the survey, 12-16% of users across the three AF components, and 10% of fighter aircrew, have never had any briefing on biohazards of laser use. Historically, slide presentations, booklets, and videos have been available to use for conducting briefings. A slide presentation and booklet entitled "Operational Hazards of Military Lasers, a Guide for Medical Personnel" (Green, Cartledge & Cheney, 1989) was developed by the USAF School of Aerospace Medicine and made available to all flight surgeons, but it is currently out of print. New materials are being developed by several agencies including the Air Force Safety Center, Air Force Special Operations Command, and the Federal Aviation Administration. Several laser safety presentations are currently available from AFRL/HEDO (www.brooks.af.mil/AFRL). There appears a need for a laser flashblindness simulation to indoctrinate aircrew and minimize cockpit effects from unexpected laser illumination. Although flashblindness simulators are in use in laboratories (AFRL/HED), these devices are not widely available to flying squadrons.

Recommendations/Conclusions

1. Develop a formal aeromedical training program on laser effects, or ensure any presentations currently developed are available to all; develop aeromedical briefing.
2. Inform aircrew regarding LEP cockpit incompatibility issues/laser hazard awareness. Develop laser simulation training for aircrew to minimize impact from cockpit illuminations.
3. Issue advisory regarding confusion of PLZT with LEP.

Five safety of flight issues were identified in this section:

1. The risk of eye injury or disruption of flight deck duties during a critical phase of flight from an inadvertent or deliberate laser illumination remains potentially high.
2. LEP is not universally being worn during training, perhaps due to lack of availability or other factors.
3. LEP induces significant color deficits and interferes with cockpit displays and target referencing.
4. Information needs to be disseminated to aircrew that effectively transmits the message that the HCV and the PLZT are not laser eye protection devices.
5. Commercial laser light shows remain an inflight hazard that require coordinated oversight by regulatory authorities.

Section VIII. Night Vision Goggles

According to the survey 15% of respondents (2479 individuals) have used NVGs while flying. Most aircrew (65%) reported using the AN/AVS-6 (ANVIS) device although fighter aircrew now primarly use the F4949. Of those using NVGs, 26% of Active Duty, 38% of ANG and 30% of Reserves did not take a formal NVG training course. The most often reported limitations of NVG use were the small field of view (43%), followed by decreased depth perception (29%), and poor visual acuity (14%). These operational limitations remain safety of flight issues.

New NVG designs are being developed to overcome the current limitations of poor visual acuity and small field of view. Newer models of the F4949, and the prototype AN/AVS-8 (ITT Night Vision) provide visual resolution that is considerably better than earlier models of NVGs. Prototypes of a 100 degree field of view NVG are being developed under the direction of Air Force Research Laboratory/HEC. Research and development efforts will continue to improve upon the current physiological limitations of these devices in the future.

Survey question 130 asked, "Have you ever had an in-flight incident or accident that was due to the operational limitations of NVGs?" There were 66 "yes" responses. A subsequent validation of this question with accident data from the Air Force Safety Center was in agreement with the magnitude of this apparently high number when multicrew aircraft responses are considered. Since the survey date, 6 Class A mishaps involving the loss of 16 lives have occurred (data on file, USAF Safety Center, Kirtland AFB, NM). This illustrates the importance of enhanced ground and flight training for NVG users.

Nearly 1/3 of aircrew using NVGs have had an in-flight electronic malfunction of the goggles. We are not able to determine from the data if the reported malfunctions were simply dead batteries or some other more significant failure.

Although AFI 11-206 requires all aircrew to do a preflight check of NVGs before each flight, 19% reported that no test lane was available for preflight testing. This is a potential safety of flight issue. In particular, 59% of Air Mobility Command (AMC) crewmembers reported that no NVG lanes were available. This was disproportionately high and probably represented mission variability, i.e., AMC has fewer NVG missions than some other commands. Also, AMC crews frequently travel around the world, and even if the home base has a test lane, a temporary duty base may not. Aircrew did respond, however, that if a test lane was available most used it.

Hoffman Engineering, Stamford, CT, manufactures a portable, battery operated NVG preflight test unit designated the ANV-20/20. It is currently available for purchase and would allow NVG preflighting anywhere, including inside the aircraft and in the field. The ANV-20/20 allows precise focusing at optical infinity, which is more applicable to flying than using a chart positioned at 20 feet for focusing. Improper preflight NVG focusing is responsible for poor inflight NVG visual acuity in many aircrew members (Chyrek, 1995).

The survey indicated that potential problems exist with acuity, re-focusing, and comfort associated with operational use of NVGs. Up to 20% of NVG users had to refocus the NVGs during a mission and between 29-40% experienced NVG vision changes during a mission. Between 10-12% of NVG users experienced after-images or altered color vision after an NVG mission, most of which lasted between 1-5 minutes, but was beyond 15 minutes in 22 respondents. Between 40-60% of aircrew had headaches or eye fatigue after an NVG mission.

About 14% of respondents indicated that poor visual acuity was the one most significant operational limitation of NVG use. Currently there are no uniform visual acuity standards (go/no go) for NVG use. AFI 48-123 states that an individual that fails "to achieve 20/50 visual acuity in the NVG pre-flight test lane should be referred for a routine clinical eye examination." MCR-55-41 (now rescinded) required 20/45 NVG vision for use in specific weapon systems. Data available in the aerospace literature indicate that there is a sub-population of up to 15% of NVG users who fail to achieve adequate (20/50 or better) NVG visual acuity (Silberman, Apsey, Ivan, Jackson, Mitchell, 1994; DeVilbiss, Antonio, & Fiedler, 1994). New improved NVGs, such as the F4949G, provide better NVG acuity than earlier models, and acuities of 20/25 are possible for many observers.

There are no reports of the range of visual acuity for a large number of subjects using late model NVGs, therefore we do not know if a subset of users also have poor acuity with these improved NVG models. Preliminary data from the USAF Photorefractive Keratectomy Study (data on file, USAFSAM/AFCO) show that there are very few people with NVG acuity poorer than 20/50 when proper NVG adjustment techniques and late model NVGs are used. Although new improved NVGs provide better NVG acuity than earlier models, uniform acuity standards would probably enhance the safety of night operations and could be developed through additional research efforts.

Recommendations/Conclusions

1. All NVG users should have formal NVG training; presently the only formal Air Force NVG instructor course is at Air Force Research Lab/HEA, Luke AFB, AZ.
   (http://www.williams.af.mil/html/nvgup.htm)
2. Organize mishap data from NVG operations in coordination with the AF Safety Center.
3. Adequate test lanes or a suitable testing device should be required and are needed by all flying units engaged in NVG operations.
   a. AMC should reevaluate their program.
   b. NVG lanes are used if provided.
4. NVG performance enhancement and development should continue.
   a. Continue development of improved acuity and expanded field of view devices.
   b. Physiological effects of NVGs need continued investigation.
   c. In-flight NVG vision changes need further investigation.
5. NVG performance should be investigated, and vision standards developed for normal individuals and aircrew who have medical waivers to fly with ocular diseases, in order to maximize mission effectiveness and flying safety.

Four potential safety of flight issues were identified in this section:

1. Formal NVG training is not universal (26-38% deficient).
2. NVGs have significant vision performance limitations (field of view, acuity, reduced depth perception, monochromatism, cockpit compatibility).
3. Preflight test facilities are not universal (19-59% deficient).
4. A high number of in-flight electronic malfunctions were reported.
5. Numerous mishaps were reported at the time of the survey, and 6 Class A mishaps have occurred since the time of the survey.

Section IX. Ballistic Protective Dust/Wind Goggles

Dust and wind are operational problems in 8-37% of aircraft types, the lowest incidence in tankers and the highest in rotary aircraft. Although 11-16% of aircrew state that dust/wind create eye problems in their operational environment, less than 1% of aircrew currently use protective dust/wind goggles. This varies considerably with the operational environment. Between 35-39% of aircrew did respond that the AF should develop an improved ballistic/protective goggle. Protective goggles currently are bulky and interfere with the use of NVGs and other life support equipment. They are often not worn as a matter of convenience. Primary use of any newly developed goggle would be most beneficial for the rotary aircrew community.

Recommendations/Conclusions

1. Continue development of a suitable aircrew dust/wind goggle.
2. Eliminate dust from the world.

Section X. Vision Standards

About 6% of respondents believed aircrew vision standards should be determined by the Medical Corps, 19% said by Rated Corps, and 74% said by both. The responses were the same from both spectacle-wearing and non-spectacle wearing aircrew. Seventy-four percent of all aircrew believed current vision standards are adequate, 24% said too strict, and only 2% too lenient. Furthermore, current standards were considered adequate in 69% of spectacle wearers and 79% of non-spectacle wearers. Twenty-seven percent of all pilots believed undergraduate flying training (UFT) candidates should have 20/20 uncorrected vision.

There were some differences of opinion about vision standards when comparing non-spectacle versus spectacle wearing aircrew members. About 1/3 of <u>non-spectacle</u> wearing pilots and navigators believed the UFT vision standards should be 20/20 uncorrected. For those that do wear spectacles while flying, the rates were only 19% and 8% for pilots and navigators, respectively. Understandably, more aircrew who normally function with spectacles think that uncorrected 20/20 vision should not be a requirement.

As seen in answers to questions 159 and 160 (Appendix 2, 3), the majority of all aircrew believe pilots should have different visual qualifications than navigators (Nav/WSO) and flight surgeons:

Table 7. Vision Standards Opinions About Pilots

	Yes	No
Pilots should have the same standards as NAV/WSO	31%	69%
Pilots should have the same standards as FS	13%	87%

When analyzed by crew position (Appendix 3), more pilots than other crew positions agree that pilots should have separate standards from navigators or flight surgeons. Furthermore, spectacle and non-spectacle wearing aircrew differ little in their opinions as to whether pilots and navigators should have the same visual qualifications; both feel different standards are appropriate.

Results of question 161 confirm that, overall, aircrew have widely disparate views on visual standards for pilot selection. About 41% of all respondents indicated that pilot candidates should have uncorrected 20/20 vision, whereas, another 43% said vision correction should not be a factor. A smaller number (17%), selected "a spectacle or contact lens wearer corrected to 20/20" would be their choice for selection into UPT. Sixty percent of flight surgeons felt uncorrected 20/20 should be required, but smaller numbers of pilots and navigators felt normal 20/20 vision should be required (Table 8).

Table 8. Vision Standards Opinions About UPT

Question 161. All things being equal, which of the following candidates would you select into UPT?

	Pilot	Nav	FS
A spectacle or contact lens wearer corrected to 20/20	15%	22%	13%
A non-spectacle wearer with normal 20/20 vision	43%	31%	60%
Wearing a vision correction should not be a factor for UPT selection	42%	47%	27%

Eighty-five percent of all aircrew believed UPT candidates should have normal color vision. According to data maintained by the Aeromedical Consult Service at Brooks AFB, TX, about 81 USAF rated aircrew members, including 39 pilots, are currently flying with a waiver for some type of color vision deficit. It can be expected that about 1 in 12 male, and 1 in 200 female pilot candidates will have a color vision deficit (Birch, 1993).

Overall, 61% of all aircrew believed the USAF should incorporate strict night vision standards. When analyzed by crew position, the numbers are 58% of pilots, 68% of navigators, and 76% of flight surgeons believe night vision standards are warranted. Currently there is no widely accepted night vision tester that could be used for screening subjects or establishing

standards. However, with the increasing numbers of night operations, especially during wartime, the issue of night vision standards requires greater emphasis and more research especially from the refractive surgery perspective.

The Air Force needs more research and development specifically designed to address standards issues, including risk analyses. In some cases, these studies may be unattractive because of cost and time requirements to generate a valid answer. However, with the rapidly changing advances in engineering, such as headup displays and cockpit design, it is important that vision standards issues continue to receive a high priority. The standards data contained in the survey results are being evaluated by the VEEP subcommittee on Aeromedical Standards and were discussed at the Operational Aeromedical Problems (OAP) meeting at Brooks AFB in January 1998.

Recommendations/Conclusions

1. Strict night vision and color vision standards are desired and supported by aircrew overall.
2. The majority of aircrew (74%) believes both the rated and Medical Corps should develop standards together.
3. Development of dual track vision standards for pilots offers attractive operational alternatives that may solve many current interface issues.
4. Consideration should be given to establishing a comprehensive vision AFI, or ensure that current requirements and issues identified by the VEEP-IPT and this survey are disseminated in appropriate AFIs.
5. Vision standards should be based on and supported by performance based data whenever possible and funds provided to develop such data.

Section XI. Comments

The last page of the survey contained space for written comments. The intense interest in this survey, as demonstrated by the high overall return rate, was confirmed by the 3,430 comments returned. As might be expected, there was a wide range of opinions in the comments. A comprehensive report of comments is planned for a future publication but some trends in the comments are included here.

Respondents are quite dissatisfied with DoD issued sunglasses and the aircrew frame in general. The frame is small and of poor quality. Many people reported that it takes too long to order and receive aircrew spectacles. The USAF Soft Contact Lens Program is viewed extremely favorably except for the inconsistent funding by squadrons. A few additional comments are included in Appendix 3.

CONCLUSIONS

The 1995 Aircrew Operational Vision Survey was disseminated to all rated aircrew in early fiscal year 1996. At the time of the survey, there were 31,205 rated individuals, with approximately 76% actively flying (over 90% of Air Reserve Components). Since the date of the survey, the number of aircrew members has fluctuated due to restructuring of the forces. However, the results of the survey provide a timeless "snapshot" view of operational vision issues, regardless of present or future personnel end strengths. The data are now being used, and will be used for years to come, to evaluate aircrew needs and establish aerospace vision research efforts.

The Aircrew Survey Working Group, a sub-committee of the VEEP-IPT, developed the survey. Other working groups (Table 2) have been actively engaged in a variety of operational aircrew issues. The High Contrast Visor (HCV) Working Group authored an all MAJCOM message (032100ZMAY94) that established guidance for use of the yellow colored HCV. The HCV Working Group was subsequently disbanded and the Aeromedical Vision Standards Working Group will cover any future HCV issues.

There are a number of programs currently under development, directly or indirectly as a result of the VEEP-IPT survey. A new improved aircrew spectacle frame has been developed and evaluated in the field. Contracting personnel are currently evaluating the IAS. The office of the USAF Surgeon General has been briefed on the possibility of full funding of the aircrew soft contact lens program. Participants of the FY 1998 Operational Aeromedical Problems (OAP) meeting were briefed on the survey results and used the data for making decisions regarding aeromedical standards. Preliminary survey results have been briefed to the international community at NATO Advisory Group for Aerospace research and Development (AGARD) meetings. Preliminary survey results (Dennis, Ivan, Miller, Tredici & Belihar, 1996) and safety of flight issues (Baldwin & Ivan, 1998) have been presented to the annual meeting of the Aerospace Medical Association. A summary of results has been forwarded to all Major Command representatives and the USAF Safety Center. Additionally, there are numerous research projects throughout the USAF research community that address the recommendations outlined in this technical report. However, there are numerous additional research efforts that should be initiated, as outlined in the text.

This technical report is considered an initial report on the survey data. The database is maintained at Brooks AFB, TX, USAFSAM/ACF (formerly AL/AOCO). Current efforts are aimed at detailed cross-correlation of data with respect to specific Major Commands, aircraft types, etc. For example, an analysis of NVG use by fighter pilots is in manuscript form. This original report, and some subsequent reports, will be accessible on the worldwide web at the USAFSAM Aeromedical Consultation Service web page. In addition to this technical report, information from the survey, especially identified "safety of flight issues" will be disseminated to users and medics by various means of communication such as MAJCOM safety publications and other military and DoD publications.

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APPENDIX 1

ACTUAL SURVEY

This section contains images of the actual Scantron survey booklet. The surveys were completed with pencil and automatically scanned using Forns/Labels Integrated Printing System (FLIPS) software. The answers are currently stored in a database located at The USAF School of Aerospace Medicine/AFCO, Brooks AFB, TX.

USAF SCN 95-64
Exp. 31 Dec 95

1995 Aircrew Operational Vision Survey

USAF Vision Enhancement and Eye Protection
Integrated Product Team

Armstrong Laboratory
Human Systems Center
Brooks AFB, TX

DEPARTMENT OF THE AIR FORCE
OFFICE OF THE CHIEF OF STAFF
UNITED STATES AIR FORCE
WASHINGTON DC 20330

2 Oct. 95

MEMORANDUM FOR ALL USAF RATED AIRCREW

FROM: HQ USAF/CC
1670 Air Force Pentagon
Washington, DC 20330-1670

SUBJECT: 1995 Aircrew Operational Vision Survey

I ask that you take the time to accurately complete the 1995 Aircrew Operational Vision Survey. This survey will help identify visual performance and eye protection problems that may exist in today's operational environment. With your help, we can focus our immediate attention on solving those issues that will significantly improve aircrew performance and safety.

This survey is completely anonymous and by design it will not allow anyone to tie responses back to you as an individual. It is absolutely vital that you provide honest feedback and that you return this survey as soon as possible. The data will be used to determine valid needs, design solutions to quickly solve critical operational deficiencies, and modify aeromedical vision standards for entry into the Air Force.

If you have any questions, contact your base flight surgeon for assistance. Thank you for completing this important operational survey.

RONALD R. FOGLEMAN
General, USAF
Chief of Staff

INSTRUCTIONS FOR COMPLETING THE 1995 AIRCREW OPERATIONAL VISION SURVEY

NOTE

This survey has 11 sections. You may not have to complete every section. For example, if you are a C-5 pilot and do not require spectacles or contact lenses then you would only have to answer items in Sections I, IV, V, IX, X and XI.

To mark your answers:

1) Use a No. 2 pencil 

2) Make heavy black marks that fill the circle for your answer.

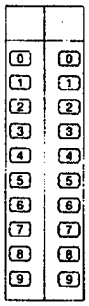
3) DO NOT make stray marks of any kind.

 This is the correct way to enter a response.

 These are incorrect ways to enter a response.

SECTION I
GENERAL INFORMATION

1. What is your age?



2. To what type of aircraft have you most recently been assigned?

- ☐ A-7
- ☐ A-10
- ☐ AT-38
- ☐ AC-130
- ☐ B-1
- ☐ B-2
- ☐ B-52
- ☐ C-5
- ☐ C-9
- ☐ C-12
- ☐ C-17
- ☐ C-20
- ☐ C-21
- ☐ C-22
- ☐ C-23
- ☐ VC-25
- ☐ C-27
- ☐ C-130
- ☐ EC-130
- ☐ HC-130
- ☐ MC-130
- ☐ RC-130
- ☐ WC-130
- ☐ C-135
- ☐ KC-135
- ☐ RC-135
- ☐ NKC-135
- ☐ WC-135
- ☐ KC-10
- ☐ C-137
- ☐ C-141
- ☐ EF-111
- ☐ F-4
- ☐ RF-4
- ☐ F-15
- ☐ F-16
- ☐ F-111
- ☐ F-117
- ☐ QF-100
- ☐ QF-102
- ☐ CH/MH/TH-53
- ☐ HH-1
- ☐ UH-1
- ☐ HH-3
- ☐ HH-60
- ☐ UH-60
- ☐ OA-10
- ☐ OA-37
- ☐ TR-1
- ☐ T-1
- ☐ T-3
- ☐ T-37
- ☐ T-38
- ☐ T-39
- ☐ U-2
- ☐ U-6
- ☐ UV-18
- ☐ E-3
- ☐ E-4
- ☐ E-8
- ☐ Other

3. What is your gender?

- ☐ Male
- ☐ Female

4. Current Rank

- ☐ Second Lieutenant
- ☐ First Lieutenant
- ☐ Captain
- ☐ Major
- ☐ Lieutenant Colonel
- ☐ Colonel
- ☐ General Officer

5. Commission Source

- ☐ Direct Commission
- ☐ AF Academy
- ☐ OTS
- ☐ ROTC
- ☐ Other Service academy
- ☐ Other

6. What is your Air Force component?

- ☐ Active Duty
- ☐ Reserve
- ☐ National Guard

7. What is your current flying status?

- ☐ Active
- ☐ Inactive
- ☐ Other

8. Are you currently flying with a medical waiver?

- ☐ Yes
- ☐ No - SKIP TO ITEM 10

9. Is at least one of your waivers for an eye-related condition?

- ☐ Yes
- ☐ No

10. What is your current MAJCOM?

- ☐ ACC
- ☐ AFCC
- ☐ AFIC
- ☐ AFMC
- ☐ AFSPC
- ☐ AFSOC
- ☐ AMC
- ☐ AETC
- ☐ HQ USAF
- ☐ PACAF
- ☐ USAFA
- ☐ USAFE
- ☐ Other MAJCOM

11. What is your total number of military flying hours?

- ☐ Less than 200 hr
- ☐ 200 but less than 1,000 hr
- ☐ 1,000 but less than 2,500 hr
- ☐ 2,500 but less than 5,000 hr
- ☐ 5,000 - 10,000 hr
- ☐ Greater than 10,000 hr

12. What is your most recent crew position?

- ☐ Pilot
- ☐ Navigator
- ☐ Weapons Systems Operator
- ☐ Electronic Warfare Operator
- ☐ Flight Surgeon
- ☐ Other

13. What is your current medical flying category?

- ☐ Class II (Unrestricted)
- ☐ Class IIA (Tanker/Transport/Bomber Only)
- ☐ Class IIB (Nonejection Only)
- ☐ Class IIC (Other Special Requirements)
- ☐ Do not know

14. Do you use tobacco products?

- ☐ Yes - Smoke
- ☐ Yes - Chew
- ☐ Yes - Smoke and chew
- ☐ No

SECTION II

AIRCREW SPECTACLES

15. What type of eyewear do you wear when you fly?

- ☐ N/A, I do not wear spectacles or contact lenses for flying --> SKIP TO SECTION IV
- ☐ I primarily wear contact lenses when I fly
- ☐ I only wear spectacles when I fly
- ☐ I wear spectacles some of the time and contact lenses some of the time when I fly

16. What kind of spectacle frame do you wear for flying?

- ☐ N/A, I do not wear spectacles for flying
- ☐ Only the USAF approved standard aircrew frame
- ☐ Civilian frame that meets USAF approved specifications
- ☐ Civilian frame that does not meet USAF approved specifications
- ☐ Civilian frame - Do not know if it meets USAF approved specifications
- ☐ Other

17. Are you satisfied with the current USAF aircrew spectacle frame?

- ☐ Very Dissatisfied
- ☐ Dissatisfied
- ☐ Slightly Dissatisfied
- ☐ Neither Satisfied nor Dissatisfied
- ☐ Slightly Satisfied
- ☐ Satisfied
- ☐ Very Satisfied

18. What are the most annoying operational problems with the current USAF aircrew spectacle frame? (Please mark all that apply.)

- ☐ N/A, I have never worn the current aircrew spectacle frame
- ☐ Hot spots around ears
- ☐ Slipping under G-acceleration
- ☐ Fogging up
- ☐ Sweat on the lenses
- ☐ Reflections and glints
- ☐ Reduced field-of-vision
- ☐ Hot spots around nose
- ☐ Interferes with peripheral vision
- ☐ Incompatible with life-support equipment
- ☐ Color of the frame
- ☐ I have not experienced any problems
- ☐ Other

19. Would you like to see a new aircrew spectacle frame developed?

☐ Yes ☐ No

20. What non-reflecting color do you think a combat aircrew spectacle frame should be?

☐ Gold ☐ Silver ☐ Black ☐ Other

21. What color would you like for a new dress aircrew spectacle frame if there was an alternate choice to the combat frame?

☐ Gold ☐ Silver ☐ Black ☐ Other

22. If you wear a civilian spectacle frame rather than the current USAF aircrew spectacle frame, what are the most important reasons? (Please mark all that apply.)

- ☐ N/A, I wear USAF aircrew frames
- ☐ Looks better
- ☐ More comfortable
- ☐ More compatible with life-support gear
- ☐ Allows more peripheral vision
- ☐ Lighter than the current aircrew frame
- ☐ Slips less under G-force acceleration
- ☐ Easier to obtain than current aircrew frame
- ☐ Other

23. Have you ever had a lens fall out of your spectacle frame during flight?

- ☐ No, never
- ☐ No, but have had a lens fall out at other times
- ☐ Yes, 1-5 times
- ☐ Yes, 6-10 times
- ☐ Yes, greater than 10 times

24. Have you ever ejected wearing spectacles?

☐ Yes ☐ No

25. If so, did they remain in place during egress?

☐ N/A ☐ Yes ☐ No

26. If so, were you injured by the spectacle frame?

☐ N/A ☐ Yes ☐ No

27. What do you consider the most important criterion in aircrew spectacle frame design?

- ☐ Integration with life-support equipment
- ☐ Cosmetically acceptable for general wear
- ☐ Tell the world you are an aviator
- ☐ Comfort
- ☐ Field of vision
- ☐ Other

5

SECTION II Continued

AIRCREW SPECTACLES

28. When you last ordered a new pair of military aircrew spectacles, did you experience any of the following problems? (Mark all that apply.)

- ☐ N/A, never ordered military aircrew spectacles
- ☐ I have not had any problems
- ☐ Lengthy ordering time
- ☐ Incorrect prescription
- ☐ Incorrect fit
- ☐ Other

29. Before flying, do you routinely take time to check a new aircrew spectacle prescription in the cockpit to see if all distances are clear?

☐ Yes ☐ No

30. How long did it take you to get your last pair of standard USAF aircrew spectacles?

- ☐ N/A, never ordered aircrew spectacles
- ☐ Less than 1 week
- ☐ 1 but less than 2 weeks
- ☐ 2 but less than 3 weeks
- ☐ 3 but less than 4 weeks
- ☐ 4 weeks or more
- ☐ Don't know

31. How frequently do you replace your flight spectacles?

- ☐ Less than 6 months
- ☐ 6-12 months
- ☐ 13-24 months
- ☐ Greater than 24 months

32. What is the most common reason for replacing your flight spectacles?

- ☐ Spectacles lost
- ☐ Lenses scratched
- ☐ Broken frame
- ☐ Broken lens
- ☐ Change in prescription

If you wear multifocals (bifocals or trifocals), please answer items 33 through 42. Otherwise, skip to Section III.

33. Did the eye doctor prescribe your multifocals based on cockpit measurements for your aircraft?

☐ Yes ☐ No ☐ Don't know

34. Did the eye doctor measure you for your multifocals in the actual cockpit?

☐ Yes ☐ No

35. Do your multifocals provide a large enough uninterrupted field of view for your flying duties?

☐ Yes ☐ No

36. With what style of multifocal do you fly?

- ☐ Executive - line goes all the way across the lens
- ☐ Straight Top Series - line goes partially across the lens
- ☐ Progressive - no-line
- ☐ Do not know

37. With what style of multifocal would you prefer to fly?

- ☐ Executive - line goes all the way across the lens
- ☐ Straight Top Series - line goes partially across the lens
- ☐ Progressive - no-line
- ☐ Do not know

38. Were you able to obtain the type of multifocals you wanted?

☐ Yes ☐ No

39. Do you wear trifocals to fly?

☐ Yes ☐ No

40. Do you wear a double segment multifocal to fly, e.g., top bifocal for upper panels?

☐ Yes ☐ No

41. Would a double segment multifocal help you to perform your flight duties?

☐ Yes ☐ No

42. Do you use a separate pair of multifocals for desk work that is a different prescription than your flight multifocals?

☐ Yes ☐ No

6

SECTION III

CONTACT LENSES

43. Which program authorizes you to wear contact lenses?

- ☐ N/A, don't wear contact lenses --> SKIP TO SECTION IV
- ☐ USAF approved soft contact lens (SCL) program
- ☐ Medically waivered SCL program
- ☐ Medically waivered hard contact lens (HCL) program
- ☐ Do not know

44. What type of SCLs do you wear?

(Medically waivered CL wearers skip to item #56)

- ☐ Spherical lenses in both eyes
- ☐ Toric (corrects astigmatism) lenses in both eyes
- ☐ One spherical lens and one toric lens
- ☐ Do not know

45. Was the SCL program adequately briefed to you by your flight surgeon?

☐ Yes ☐ No

46. Were you fully briefed on the SCL cleaning/disinfection system by the eye clinic?

☐ Yes ☐ No

47. Are you using the Air Force recommended AOSept cleaning/disinfection system?

☐ Yes ☐ No

48. If you are not using the AOSept cleaning/disinfection system, why not? (Mark all that apply.)

- ☐ N/A, I use AOSept
- ☐ Unaware AOSept is the Air Force recommended system
- ☐ System is too complicated
- ☐ Not available in this area
- ☐ Allergic to a system component
- ☐ Too expensive
- ☐ Other

49. Were you adequately trained by the flight surgeon or eye clinic to remove your SCLs with your flight gloves on, in case of an emergency?

☐ Yes ☐ No

50. Do you have the required two pair of SCLs or two six-packs of disposable SCLs and a 30-day current supply of solutions in your mobility bag?

☐ Yes ☐ No

51. Does your squadron pay for your contact lenses and supplies?

☐ Yes ☐ No

52. Do you think contact lenses and supplies should be furnished free of cost to all aircrew members that are authorized SCL-wear by the Air Force?

☐ Yes ☐ No

53. How often have you worn your SCLs on an extended-wear basis, i.e., sleeping with them overnight or wearing them more than 24 hours straight?

- ☐ Never
- ☐ 1-5 times
- ☐ 6-10 times
- ☐ More than 10 times

54. Are you aware that you should NOT wear SCLs on an extended-wear basis?

☐ Yes ☐ No

55. Are there mission-related instances when you would like to wear your SCLs on an extended-wear basis?

☐ Yes ☐ No

56. Do you always carry a back-up pair of spectacles on missions?

- ☐ Always
- ☐ Most of the time
- ☐ Sometimes
- ☐ Never

57. Have you ever ejected with CLs in place?

☐ Yes ☐ No

58. If yes, did they remain in place during the ejection sequence?

☐ N/A ☐ Yes ☐ No

7

SECTION III Continued

CONTACT LENSES

59. Have you ever had a CL fall completely off your eye during flight, and if so, how many times?

- ☐ No
- ☐ 1-5 times
- ☐ 6-10 times
- ☐ More than 10 times

60. Have you ever had a CL displace (slide off center) in your eye during flight, and if so, how many times?

- ☐ No
- ☐ 1-5 times
- ☐ 6-10 times
- ☐ More than 10 times

61. Have you ever gotten anything (e.g., eyelash or a piece of dirt) under your lens during flight, and if so, how many times?

- ☐ No
- ☐ 1-5 times
- ☐ 6-10 times
- ☐ More than 10 times

62. Have you ever had to remove a CL in flight? If so, why?

- ☐ No
- ☐ CL uncomfortable
- ☐ CL too dry
- ☐ Particle under lens
- ☐ CL in other eye displaced or lost
- ☐ Other

63. If you have had any problems with your contact lenses while in flight, (such as those addressed in items 59-62), did any of these incidences have an effect on the mission?

☐ Yes ☐ No

64. Do you use rewetting drops when wearing CLs during flight, and if so, how many times during each mission?

- ☐ No
- ☐ 1-5 times
- ☐ 6-10 times
- ☐ More than 10 times

65. Do you feel CLs offer an operational advantage over spectacle wear?

☐ Yes ☐ No

66. If yes, what is the major advantage for you?

- ☐ N/A, no advantage
- ☐ Life-support compatibility
- ☐ Improved visual acuity
- ☐ Improved peripheral vision
- ☐ Eliminates fogging
- ☐ Eliminates reflections
- ☐ Enhances self-esteem
- ☐ No slipping during G-related maneuvers
- ☐ Other

67. What is the biggest operational problem for you with CL wear during flight?

- ☐ I experience no problems
- ☐ Vision not adequate
- ☐ Lenses dry out in the cockpit
- ☐ Lenses are not comfortable
- ☐ Lenses are not stable during Gs
- ☐ Particles get under the lenses
- ☐ Other

68. Have you ever had any CL-related DNIF days, and if so, how many?

- ☐ No
- ☐ 1-5 days
- ☐ 6-10 days
- ☐ 11-15 days
- ☐ More than 15 days

69. Have you ever had difficulty getting CLs during deployment?

- ☐ N/A, never deployed
- ☐ Yes
- ☐ No

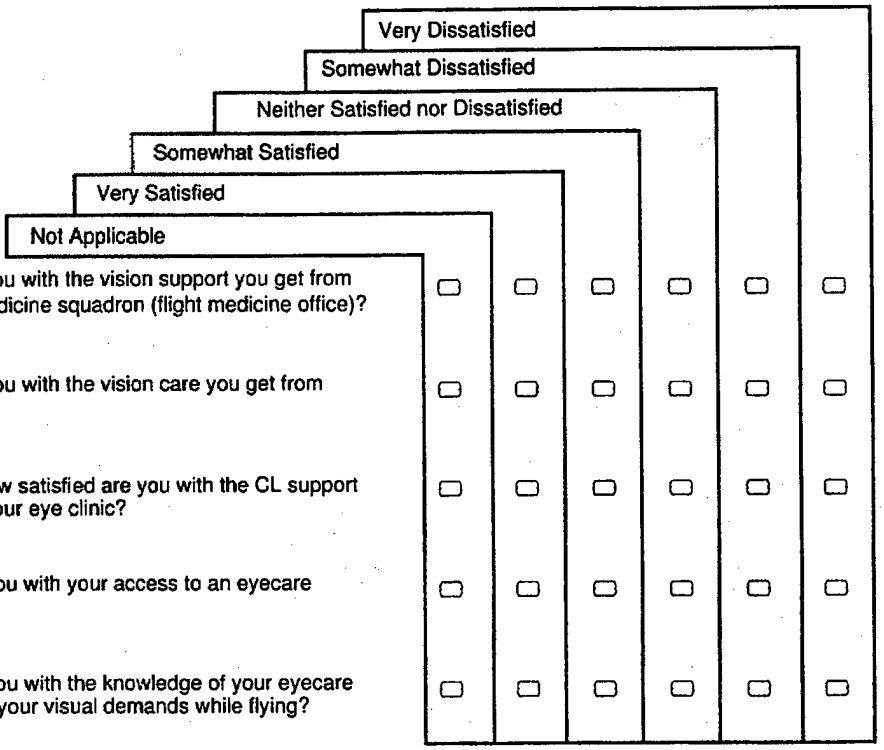
70. Have you ever had difficulty getting CL solutions during deployment?

- ☐ N/A, never deployed
- ☐ Yes
- ☐ No

8

SECTION IV
Clinic Support

Please answer items 71 - 75 using the following scale.



71. How satisfied are you with the vision support you get from your aerospace medicine squadron (flight medicine office)?

72. How satisfied are you with the vision care you get from your eye clinic?

73. If you wear CLs, how satisfied are you with the CL support that you get from your eye clinic?

74. How satisfied are you with your access to an eyecare professional?

75. How satisfied are you with the knowledge of your eyecare professional about your visual demands while flying?

76. Did your eyecare professional or flight surgeon advise you to evaluate your new spectacles for effectiveness in the cockpit before flying with them?

☐ Yes ☐ No ☐ N/A

77. Did eye clinic personnel fit your flight spectacles to you with your helmet/mask/ headset on?

☐ Yes ☐ No ☐ N/A

78. Are you reluctant to identify any vision problems you experience in flight to your flight surgeon?

☐ Yes ☐ No

79. Do you feel current vision testing, as administered by the flight medicine office, is satisfactory for flying purposes?

☐ Yes ☐ No

80. Do you believe a yearly, full, complete, eye examination by USAF eyecare professionals, to determine eye and vision problems, should be required on all rated aircrew?

☐ Yes ☐ No

81. If you are 20/20 and not required to wear spectacles or contacts for flying, would you wear spectacles or contacts to fly if your vision could be corrected to better than 20/20?

☐ Yes ☐ No ☐ N/A

SECTION V
Sunglasses

82. Do you wear sunglasses while flying?

☐ No --> SKIP TO SECTION VI

Yes, I wear ...

- ☐ AF issue prescription
- ☐ AF issue non-prescription
- ☐ Commercial prescription
- ☐ Commercial non-prescription

83. If you wear commercial sunglasses for flying, what color is the tint?

- ☐ Gray
- ☐ Green
- ☐ Brown
- ☐ Yellow
- ☐ Orange
- ☐ Other
- ☐ N/A

84. What do you think about the tint on the USAF sunglasses provided for your flying duties?

- ☐ Too dark
- ☐ Just right
- ☐ Too light

85. Would you prefer a gradient (darker on top and lighter on the bottom) or a solid sunglass tint for flying?

☐ Gradient ☐ Solid

86. Do you ever wear your sunglasses in combination with your sun visor when flying?

- ☐ Always
- ☐ Often
- ☐ Seldom
- ☐ Never

87. Do you ever wear your sunglasses in combination with a laser visor when flying?

- ☐ Always
- ☐ Often
- ☐ Seldom
- ☐ Never

88. What kind of sunglasses do you wear for non-flying duties and recreational activities?

- ☐ N/A, I don't wear sunglasses
- ☐ AF issue
- ☐ Commercial

SECTION VI
Aircrew Clear, Sun, High Contrast Visors

89. Do you wear any of the following types of visors when you fly? (Mark all that apply.)

☐ No --> SKIP TO SECTION VII

Yes, I wear ...

- ☐ Clear visors
- ☐ Sun visors
- ☐ High Contrast visors

90. When you wear your flying spectacles with your visor, does your visor get scratched?

☐ Yes ☐ No ☐ N/A

91. How long is your typical visor serviceable for flying?

- ☐ Less than 3 months
- ☐ 3-6 months
- ☐ 6-9 months
- ☐ 9-12 months
- ☐ Greater than 1 year

92. Do you assess your visual performance in the cockpit with each new type of visor before your initial flight with that visor?

☐ Yes ☐ No

93. At night, do you normally wear the clear visor for protection?

☐ Yes ☐ No

94. Is the sun visor the proper darkness for your flying needs?

- ☐ Much too dark
- ☐ Somewhat too dark
- ☐ Just right
- ☐ Somewhat too light
- ☐ Much too light

95. Have you ever had any difficulty seeing any of your cockpit displays while wearing the sun visor?

☐ Yes ☐ No ☐ N/A

96. Would you like to have more than one darkness of sun visor available to you?

☐ Yes ☐ No

10

SECTION VI Continued

Aircrew Clear, Sun, High Contast Visors

97. How often do you use your sun visor under the following flight conditions?

	Always	Often	Seldom	Never
Taxiing	☐	☐	☐	☐
Take-off / Landing	☐	☐	☐	☐
Air-to-air	☐	☐	☐	☐
Air-to-ground	☐	☐	☐	☐
Low level cruise	☐	☐	☐	☐
High level cruise	☐	☐	☐	☐
Refueling	☐	☐	☐	☐
Dawn / Dusk	☐	☐	☐	☐
During Airdrops	☐	☐	☐	☐

98. How often do you use your clear visor under the following flight conditions?

	Always	Often	Seldom	Never
Taxiing	☐	☐	☐	☐
Take-off / Landing	☐	☐	☐	☐
Air-to-air	☐	☐	☐	☐
Air-to-ground	☐	☐	☐	☐
Low level cruise	☐	☐	☐	☐
High level cruise	☐	☐	☐	☐
Refueling	☐	☐	☐	☐
Dawn / Dusk	☐	☐	☐	☐
During Airdrops	☐	☐	☐	☐

99. Have you ever worn the yellow high contrast visor (HCV)?

☐ Yes
☐ No - Please skip to Section VII

100. How often do you use your high contrast visor under the following flight conditions?

	Always	Often	Seldom	Never
Taxiing	☐	☐	☐	☐
Take-off / Landing	☐	☐	☐	☐
Air-to-air	☐	☐	☐	☐
Air-to-ground	☐	☐	☐	☐
Low level cruise	☐	☐	☐	☐
High level cruise	☐	☐	☐	☐
Refueling	☐	☐	☐	☐
Dawn / Dusk	☐	☐	☐	☐
Night	☐	☐	☐	☐
During Airdrops	☐	☐	☐	☐

101. Were you ever given any operational or aero-medical instructions for using the HCV?

☐ Yes ☐ No

102. Do you believe the HCV improves your ability to see differences in contrast?

☐ Yes ☐ No

103. Do you believe the HCV improves your ability to visually acquire targets?

☐ Yes ☐ No

104. How often do you wear the HCV during hazy conditions?

☐ Never
☐ Less than 10%
☐ 11 - 25%
☐ 26 - 50%
☐ 51 - 75%
☐ 76 - 100%

105. How often do you wear the HCV during sunny conditions?

☐ Never
☐ Less than 10%
☐ 11 - 25%
☐ 26 - 50%
☐ 51 - 75%
☐ 76 - 100%

106. Have you ever had difficulty seeing any of your cockpit displays while wearing the HCV?

☐ Yes ☐ No

107. Have you ever had difficulty detecting targets or target colors on the ground when wearing the HCV?

☐ Yes ☐ No

108. Have you ever experienced headaches or eye fatigue during or after using the HCV?

☐ Yes ☐ No

109. Are you aware that the HCV does not provide laser protection?

☐ Yes ☐ No

110. How would you rate the effectiveness of the HCV in improving your fighting capability?

☐ Very effective
☐ Somewhat effective
☐ Minimally effective
☐ Not effective

11

SECTION VII

Laser Eye Protection (LEP)

111. With which laser eye protection have you had the most experience?

- ☐ Barnes visor (rose colored, day)
- ☐ EEK (green, mid 1980's)
- ☐ FV-4 (dark amber, day)
- ☐ Gentex prototype (gold)
- ☐ PLZT nuclear flash goggles
- ☐ KG3 spectacles (light blue)
- ☐ FV-2 spectacles (amber lenses, day)
- ☐ Army 2 notch spectacles (blue-green lenses)
- ☐ Army 3 notch spectacles (brown)
- ☐ Other
- ☐ Do not know
- ☐ N/A, never worn LEP --> SKIP TO SECTION VIII

112. Were you ever given operational or aeromedical instructions for using LEP?

☐ Yes ☐ No

113. Have you ever flown with LEP in combat?

☐ Yes ☐ No ☐ N/A, never flown in combat

114. Do you feel that USAF aviators should train with LEP?

☐ Yes ☐ No

115. Do you routinely wear LEP during training exercises involving lasers?

☐ Yes ☐ No

116. Have you ever been operationally or aeromedically briefed on how lasers can damage your eyes or temporarily disrupt your vision?

☐ Yes ☐ No

117. Has glare from the sun ever been a problem when you flew with LEP?

☐ Yes ☐ No

118. Do you assess your visual performance in the cockpit with each new LEP before your initial flight with that LEP?

☐ Yes ☐ No

119. Have you ever had difficulty seeing other aircraft when wearing LEP?

☐ Yes ☐ No

120. Have you ever had difficulty seeing other aircraft's lights when wearing LEP?

☐ Yes ☐ No

121. Have you ever had difficulty seeing ground targets when wearing LEP?

☐ Yes ☐ No

122. Have you ever had difficulty seeing cockpit displays when wearing LEP?

☐ Yes ☐ No

123. Have you ever experienced any headaches or eye fatique during or after flying with LEP?

☐ Yes ☐ No

124. Have you ever noticed bothersome visual distortions from your LEP?

☐ Yes ☐ No

125. Have you ever flown at night using a LEP designated for daytime only use?

☐ Yes ☐ No ☐ Do not know

126. Have you ever been flash blinded or visually disturbed by a commercial laser light show during flight?

☐ Yes ☐ No

SECTION VIII

NIGHT VISION GOGGLES (NVGs)

127. Which type of NVG do you primarily use for flying duties?

- ☐ Don't wear --> SKIP TO SECTION IX
- ☐ AN/AVS-6 (ANVIS)
- ☐ F4949
- ☐ Cats Eyes
- ☐ AN/PVS-5
- ☐ Other

128. Have you ever taken a formal USAF Night Vision Device training course?

☐ Yes ☐ No

129. What do you feel is the one most significant operational limitation of the NVGs you use?

- ☐ Insufficient field-of-view
- ☐ Poor resolution (visual acuity)
- ☐ Reduced depth perception
- ☐ Lack of color contrast (green image)
- ☐ Other
- ☐ No significant operational limitations

130. Have you ever had an in-flight incident or accident that was due to the operational limitations of NVGs?

☐ Yes ☐ No

131. Have your NVGs ever electronically malfunctioned in flight?

☐ Yes ☐ No

132. Do you feel that you received adequate training on how to properly focus/adjust the NVG before you started flying with them?

☐ Yes ☐ No

133. What type of eyewear do you wear with NVGs?

- ☐ None
- ☐ Standard aircrew prescription spectacles
- ☐ Special safety prescription spectacles
- ☐ Contact lenses
- ☐ Non-prescription ballistic protective dust/ wind goggles (e.g., Gargoyles or Oakleys)
- ☐ Contact lenses and goggles in combination

134. If you are NOT required to wear spectacles or contact lenses when you fly, would you wear protective safety spectacles with NVGs if they were available?

- ☐ Yes
- ☐ No
- ☐ N/A, I wear prescription spectacles

135. If available, would you wear a ballistic protective dust/wind goggle or visor with NVGs?

☐ Yes ☐ No

136. Does your unit have a NVG test lane available for you to pre-flight your NVGs?

- ☐ Yes
- ☐ Yes, but it is inadequate
- ☐ No

137. If you do have a test lane, do you use it to pre-flight your NVGs?

☐ Yes ☐ No ☐ N/A

138. Have you ever noticed a change in your vision that required you to refocus your NVGs during an ascent or descent?

☐ Yes ☐ No

139. Have you ever experienced a decrease in NVG vision with increased altitude that would not improve by refocusing the NVGs?

☐ Yes ☐ No

13

SECTION VIII Continued

NIGHT VISION GOGGLES (NVGs)

140. During a NVG mission, does your NVG vision normally:

- ☐ Remain stable throughout the mission
- ☐ Gradually decrease
- ☐ Gradually increase
- ☐ Fluctuate throughout the mission

141. How long does it normally take your eyes to adjust to the dark after NVG wear to a point where you can safely land the aircraft?

- ☐ Less than 1 minute
- ☐ 1 but less than 3 minutes
- ☐ 3 but less than 6 minutes
- ☐ 6-10 minutes
- ☐ More than 10 minutes
- ☐ N/A

142. Have you ever experienced after-images or altered color vision after a NVG mission?

☐ Yes ☐ No

143. If yes, how long does it take for the after-images or altered color vision to disappear?

- ☐ Less than 1 minute
- ☐ 1 but less than 5 minutes
- ☐ 5 but less than 10 minutes
- ☐ 10-15 minutes
- ☐ More than 15 minutes
- ☐ N/A

144. Do you ever experience headaches or eye fatigue when flying with NVGs?

- ☐ Yes, frequently
- ☐ Yes, sometimes
- ☐ No

145. Have you ever felt that your depth perception was altered after flying a NVG mission?

- ☐ Yes, frequently
- ☐ Yes, sometimes
- ☐ No

146. Have you ever felt that your visual acuity was decreased after flying a NVG mission?

- ☐ Yes, frequently
- ☐ Yes, sometimes
- ☐ No

SECTION IX

BALLISTIC PROTECTIVE DUST/ WIND GOGGLES

147. Do problems from dust and wind create eye discomfort or affect your vision when flying?

☐ Yes ☐ No

148. Do you currently use a ballistic protective dust/wind goggle?

☐ Yes ☐ No

149. If you do use a ballistic protective dust/wind goggle, is it adequate?

- ☐ Yes
- ☐ No
- ☐ N/A, don't use a protective dust/wind goggle

150. Would you like to see the USAF develop and provide an improved ballistic protective dust/wind goggle?

☐ Yes ☐ No

14

SECTION X

VISION STANDARDS

151. In your opinion, who should determine USAF aircrew vision standards?

- ☐ Rated Corps
- ☐ Medical Corps
- ☐ Both
- ☐ Other

152. Do you believe that the current USAF aircrew vision standards are:

- ☐ Adequate as written
- ☐ Too strict
- ☐ Not strict enough

153. Should USAF aircrew vision standards for flying applicants (entry) be more strict than vision standards for current rated aircrew?

☐ Yes ☐ No

154. If you feel entry and retention standards should be different, when should retention vision standards be applied, i.e., when should aircrew be held to Class II (already trained aircrew) standards?

- ☐ Before UPT/UNT
- ☐ During UPT/UNT
- ☐ After graduation from UPT/UNT
- ☐ N/A, standards should be the same

155. Do you believe we should select only UPT/UNT candidates with at least uncorrected 20/20 vision acuity?

☐ Yes ☐ No

156. Do you believe we should select only UPT/UNT candidates with normal color vision?

☐ Yes ☐ No

157. Do you believe that color vision plays a key role for your crew position in your aircraft?

☐ Yes ☐ No

158. Do you believe the USAF should incorporate a strict night visual acuity standard?

☐ Yes ☐ No

159. Do you believe that pilots and Nav/WSOs should have the same visual qualifications?

☐ Yes ☐ No

160. Do you believe that pilots and flight surgeons should have the same visual qualifications?

☐ Yes ☐ No

161. All things being equal, which of the following candidates would you select into UPT?

- ☐ A spectacle or contact lens wearer corrected to 20/20
- ☐ A non spectacle wearer with normal 20/20 vision
- ☐ Wearing a vision correction should not be a factor for UPT selection

15

Section XI - Comments

COMMENTS/SUGGESTIONS: (Please feel free to comment on any operational vision problems that you may have so that the scientific community might find ways to help solve them and improve your fighting capability.)

Spectacle use: ☐ I wear spectacles/contact lenses ☐ I do not wear spectacles/contact lenses

RANK: ☐ 0-1 ☐ 0-2 ☐ 0-3 ☐ 0-4 ☐ 0-5 ☐ 0-6 ☐ 0-7 or above

WEAPONS SYSTEM: ☐ Fighter ☐ Bomber ☐ Tanker ☐ Transport
☐ Recon ☐ Rotary ☐ Other

FORM NO. F-8783-AFB PC 02 3395-C1535-5 4 3 2 1

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS SURVEY
PLEASE RETURN THIS SURVEY BOOKLET IN THE PRE-ADDRESSED ENVELOPE PROVIDED.

16

APPENDIX 2

QUESTION BY QUESTION

ANSWERS

This Appendix contains the raw answers to all 161 questions in the survey. Most questions have an associated graph to more efficiently view the answers. Results from more than one question are cross-correlated in Appendix 3.

SECTION I

GENERAL INFORMATION

Questions 1 - 14

1. What is your age?

AGE*	FREQ	AGE*	FREQ
22	3	44	464
23	12	45	422
24	80	46	437
25	269	47	414
26	369	48	355
27	525	49	268
28	711	50	161
29	875	51	100
30	983	52	98
31	902	53	70
32	980	54	52
33	967	55	23
34	919	56	14
35	943	57	12
36	817	58	11
37	746	59	7
38	777	60	10
39	702	61	4
40	685	62	4
41	647	63	4
42	614	64	4
43	527	65	5

*Age range was truncated at 22 and 65 years.

2. To what type of aircraft have you most recently been assigned?

ACFT	FREQ
A-7	5
A-10	459
AT-38	100
AC-130	135
B-1	461
B-2	51
B-52	939
C-5	576
C-9	137
C-12	90
C-17	158
C-20	34
C-21	279
C-22	11
C-23	4
VC-25	2
C-27	35
C-130	1902
EC-130	192
HC-130	314
MC-130	241
RC-130	6
WC-130	36
C-135	82
KC-135	2217
RC-135	330
NKC-135	58
WC-135	18
KC-10	344
C-137	51
C-141	1124

ACFT	FREQ
EF-111	78
F-4	402
RF-4	81
F-15	1178
F-16	1778
F-111	361
F-117	52
QF-100	0
QF-102	0
CH/MH/TH-53	136
HH-1	19
UH-1	121
HH-3	19
HH-60	211
UH-60	2
OA-10	32
OA-37	9
TR-1	179
T-1	0
T-3	93
T-37	430
T-38	472
T-39	23
U-2	45
U-6	0
UV-18	29
E-3	229
E-4	42
E-8	5
OTHER	528

2. To what type of aircraft have you most recently been assigned?
(Sorted by frequency)

ACFT	FREQ
KC-135	2217
C-130	1902
F-16	1778
F-15	1178
C-141	1124
B-52	939
C-5	576
OTHER	528
T-38	472
B-1	461
A-10	459
T-37	430
F-4	402
F-111	361
KC-10	344
RC-135	330
HC-130	314
C-21	279
MC-130	241
E-3	229
HH-60	211
EC-130	192
TR-1	179
C-17	158
C-9	137
CH/MH/TH-53	136
AC-130	135
UH-1	121
AT-38	100
T-3	93
C-12	90

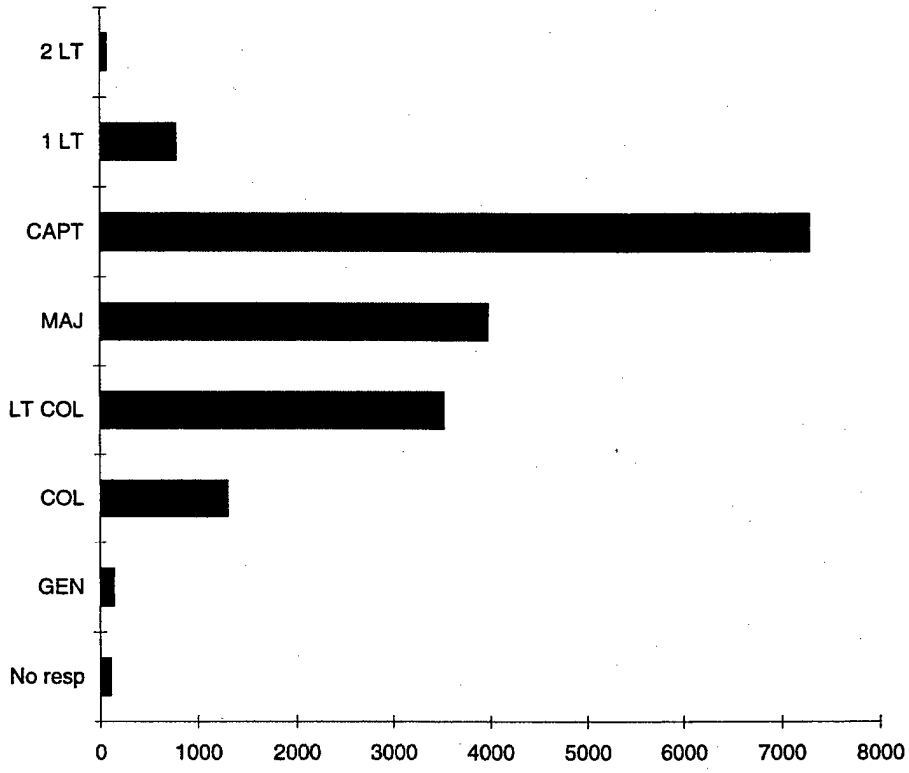
ACFT	FREQ
C-135	82
RF-4	81
EF-111	78
NKC-135	58
F-117	52
B-2	51
C-137	51
U-2	45
E-4	42
WC-130	36
C-27	35
C-20	34
OA-10	32
UV-18	29
T-39	23
HH-1	19
HH-3	19
WC-135	18
C-22	11
OA-37	9
RC-130	6
A-7	5
E-8	5
C-23	4
VC-25	2
UH-60	2
QF-100	0
QF-102	0
T-1	0
U-6	0

3. What is your gender?

	FREQ	%
M	16578	97.9
F	362	2.1
No resp	167	

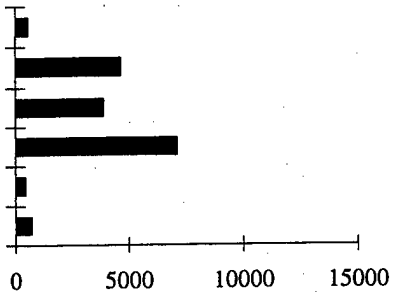
4. Current Rank

	FREQ
2 LT	52
1 LT	769
CAPT	7278
MAJ	3977
LT COL	3517
COL	1292
GEN	127
No resp	94



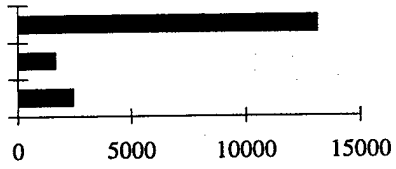
5. Commission Source

	FREQ
Direct Commission	509
AF Academy	4601
OTS	3853
ROTC	7039
Other Service Academy	374
Other	658



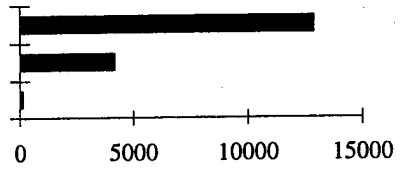
6. What is your Air Force component?

	FREQ
Active Duty	13076
Reserve	1620
Air National Guard	2411



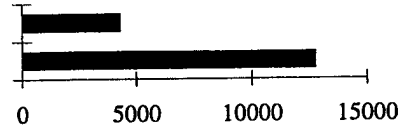
7. What is your current flying status?

	FREQ
Active	12813
Inactive	4131
Other	69



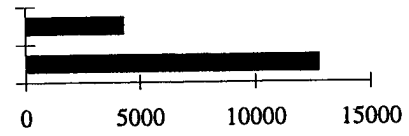
8. Are you currently flying with a medical waiver?

	FREQ
Yes	4248
No	12692



9. Is at least one of your waivers for an eye-related condition

	FREQ
Yes	2009
No	2675



10. What is your current MAJCOM? (Major Command)

MAJCOM	FREQ
Air Combat Command - ACC	6102
Air Force Communications Agency - AFCC	1
Air Force Inspection Agency - AFIC	69
Air Force Materiel Command - AFMC	708
Air Force Space Command - AFSPC	151
Air Force Special Operations Command - AFSOC	623
Air Mobility Command - AMC	3997
Air Education and Training Command - AETC	2294
Headquarters USAF - HQ USAF	493
Pacific Air Forces - PACAF	907
US Air Force Academy - USAFA	190
US Air Forces Europe - USAFE	519
OTHER	917

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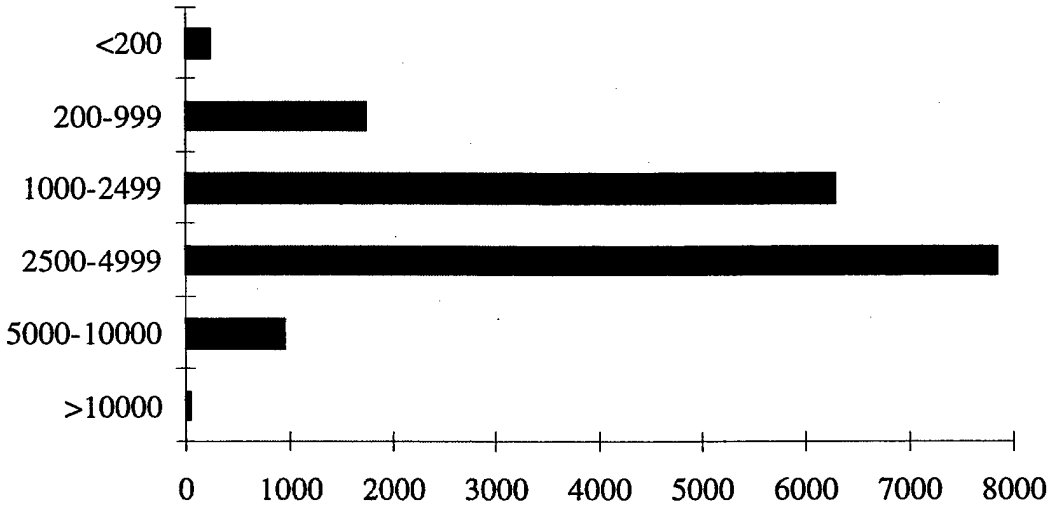
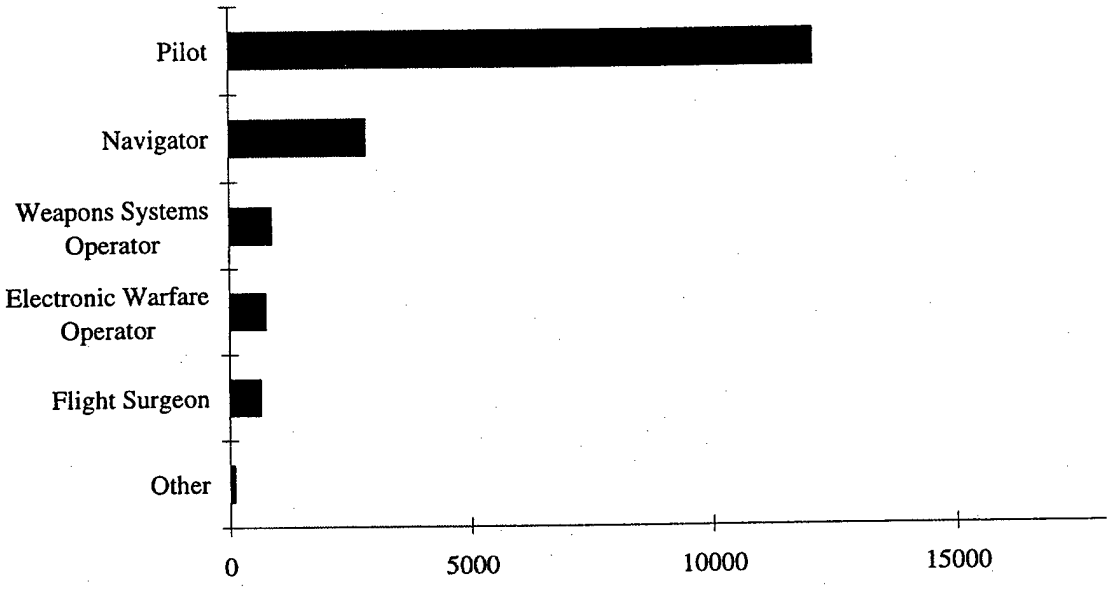
11. What is your total number of military flying hours?

	FREQ
Less than 200 hr	226
200 but less than 1,000 hr	1729
1,000 but less than 2,500 hr	6295
2,500 but less than 5,000 hr	7853
5,000-10,000 hr	947
Greater than 10,000 hr	31



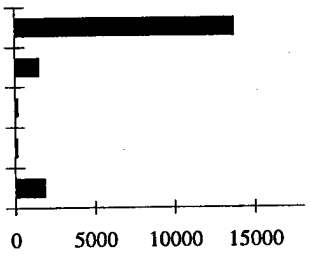
12. What is your most recent crew position?

	FREQ
Pilot	12043
Navigator	2774
Weapons Systems Operator	846
Electronic Warfare Operator	717
Flight Surgeon	606
Other	64



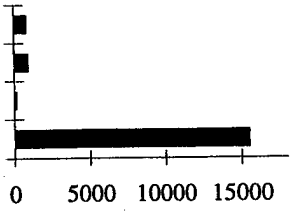
13. What is your current medical flying category?

	FREQ
CLASS II (Unrestricted)	13653
CLASS IIA (Tanker/Transport/Bomber Only)	1431
CLASS IIB (Nonejection Only)	87
CLASS IIC (Other Special Requirements)	47
Do Not Know	1748



14. Do you use tobacco products?

	FREQ
Yes-Smoke	736
Yes-Chew	816
Yes-Smoke and Chew	51
NO	15390



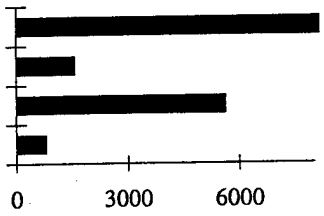
SECTION II

AIRCREW SPECTACLES

Questions 15 - 42

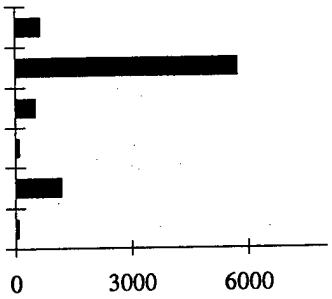
15. What type of eyewear do you wear when you fly?

	FREQ
N/A, I do not wear spectacles/contacts for flying	8869
I primarily wear contact lenses when I fly	1534
I only wear spectacles when I fly	5593
I wear spectacles or contact lenses when I fly	760



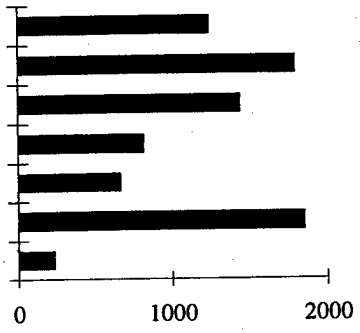
16. What kind of spectacle frame do you wear for flying?

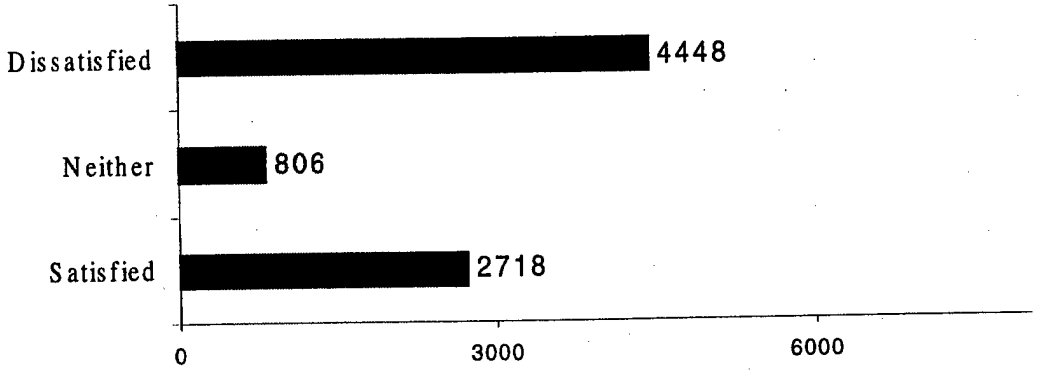
	FREQ
N/A, I do not wear spectacles for flying	611
Only the USAF approved standard aircrew frame	5696
Civilian frame that meets USAF specifications	478
Civilian frame does not meet USAF specifications	58
Civilian frame unknown if meets USAF specifications	1139
Other	31



17. Are you satisfied with the current USAF aircrew spectacle frame?

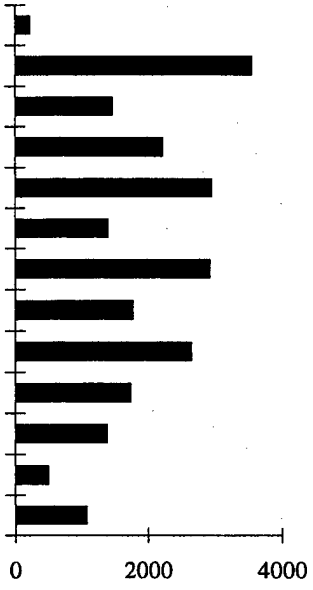
	FREQ
Very Dissatisfied	1233
Dissatisfied	1783
Slightly Dissatisfied	1432
Neither Satisfied nor Dissatisfied	806
Slightly Satisfied	654
Satisfied	1842
Very Satisfied	222





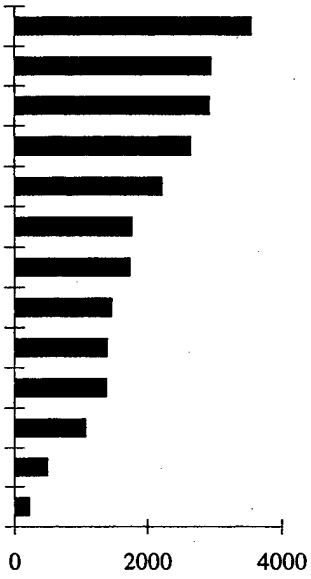
18. What are the most annoying operational problems with the current USAF aircrew spectacle frame?

	FREQ
N/A, I have never worn the current aircrew frame	199
Hot spots around ears	3535
Slipping under G-acceleration	1441
Fogging up	2204
Sweat on the lenses	2937
Reflections and glints	1370
Reduced field-of-vision	2906
Hot spots around nose	1748
Interferes with peripheral vision	2633
Incompatible with life-support equipment	1715
Color of the frame	1356
I have not experienced any problems	473
Other	1049



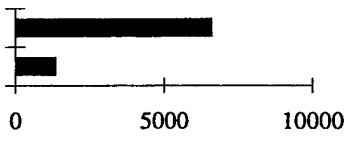
18. (Arranged by frequency)

	FREQ
Hot spots around ears	3535
Sweat on the lenses	2937
Reduced field-of-vision	2906
Interferes with peripheral vision	2633
Fogging up	2204
Hot spots around nose	1748
Incompatible with life-support equipment	1715
Slipping under G-acceleration	1441
Reflections and glints	1370
Color of the frame	1356
Other	1049
I have not experienced any problems	473
N/A, I have never worn the current aircrew frame	199



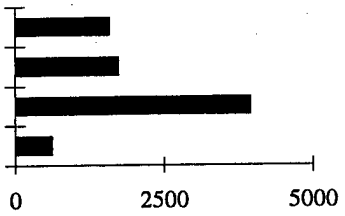
19. Would you like to see a new aircrew spectacle frame developed?

	FREQ
Yes	6571
No	1299



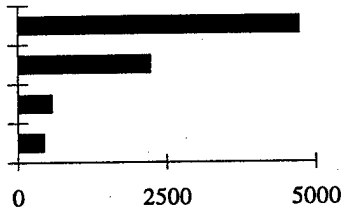
20. What non-reflective color do you think a combat aircrew spectacle frame should be?

	FREQ
Gold	1566
Silver	1713
Black	3939
Other	593



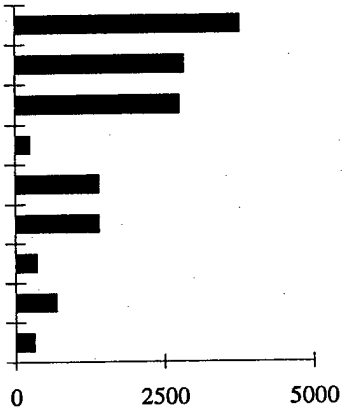
21. What color would you like for a new dress aircrew spectacle frame if there was an alternate choice to the combat frame?

	FREQ
Gold	4708
Silver	2204
Black	548
Other	415



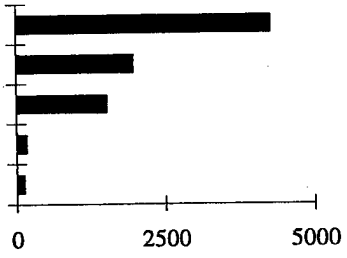
22. If you wear a civilian spectacle frame rather than the current USAF aircrew spectacle frame, what are the most important reasons? (Please mark all that apply.)

	FREQ
N/A, I Wear USAF aircrew frames	3761
Looks better	2817
More comfortable	2741
More compatible with life-support gear	221
Allows more peripheral vision	1380
Lighter than the current aircrew frame	1380
Slips less under G-force acceleration	332
Eaiser to obtain than current aircrew frame	665
Other	287



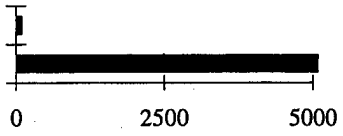
23. Have you ever had a lens fall out of your spectacle frame during flight?

	FREQ
No, never	4254
No, but have had lens fall out at other times	1947
Yes, 1-5 times	1498
Yes, 6-10 times	146
Yes, greater than 10 times	103



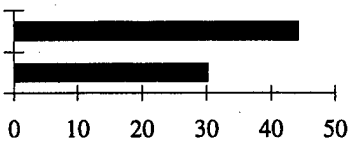
24. Have you ever ejected wearing spectacles?

	FREQ
Yes	78
No	7893



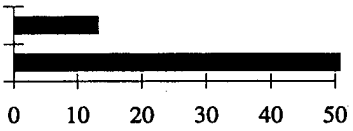
25. If so did they remain in place during egress?

	FREQ
Yes	44
No	30



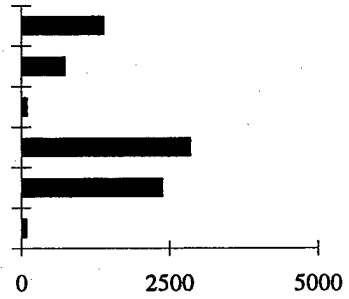
26. If so, were you injured by the spectacle frame?

	FREQ
Yes	13
No	117



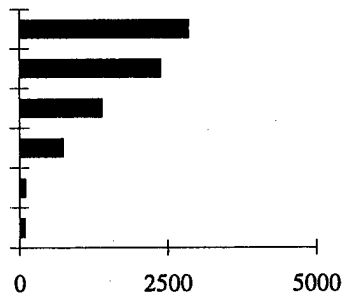
27. What do you consider the most important criterion in aircrew spectacle frame design?

	FREQ
Integration with life-support equipment	1379
Cosmetically acceptable for general wear	721
Tell the world you are an aviator	78
Comfort	2832
Field of vision	2364
Other	65



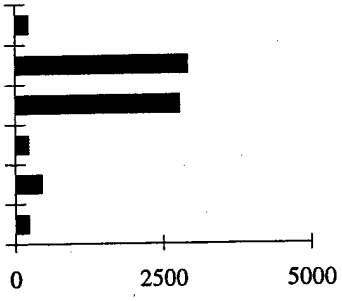
27. (Arranged by frequency)

	FREQ
Comfort	2832
Field of vision	2364
Integration with life-support equipment	1379
Cosmetically acceptable for general wear	721
Tell the world you are an aviator	78
Other	65



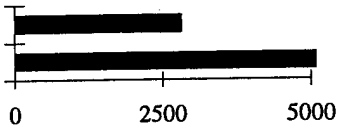
28. When you last ordered a new pair of military aircrew spectacles, did you experience any of the following problems? (Mark all that apply.)

	FREQ
N/A, never ordered military aircrew spectacles	206
I have not had any problems	2904
Lengthy ordering time	2761
Incorrect prescription	198
Incorrect fit	422
Other	197



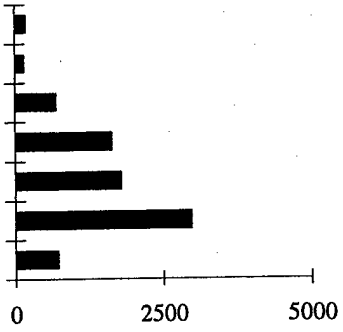
29. Before flying, do you routinely take time to check a new aircrew spectacle prescription in the cockpit to see if all distances are clear?

	FREQ
Yes	2797
No	5099



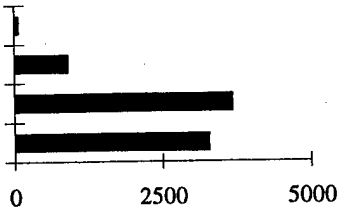
30. How long did it take you to get your last pair of standard USAF aircrew spectacles?

	FREQ
N/A , never ordered military aircrew spectacles	161
Less than 1 week	129
1 but less than 2 weeks	669
2 but less than 3 weeks	1605
3 but less than 4 weeks	1763
4 weeks or more	2959
Don't know	698



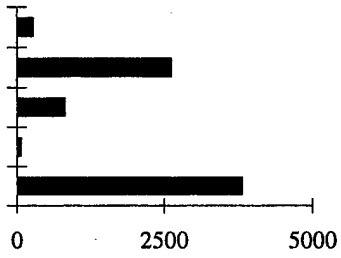
31. How frequently do you replace your flight spectacles?

	FREQ
Less than 6 months	50
6-12 months	885
13-24 months	3670
Greater than 24 months	3275



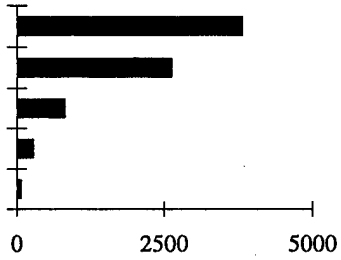
32. What is the most common reason for replacing your flight spectacles?

	FREQ
Spectacles lost	259
Lenses scratched	2605
Broken frame	802
Broken lens	47
Change in prescription	3793



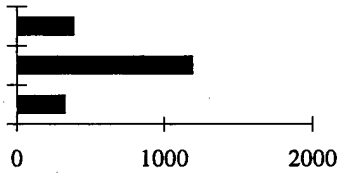
32. (Arranged by frequency)

	FREQ
Change in prescription	3793
Lenses scratched	2605
Broken frame	802
Spectacles lost	259
Broken lens	47



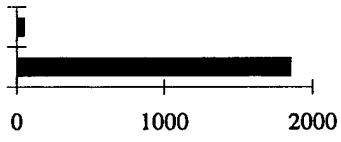
33. Did the eye doctor prescribe your multifocals based on cockpit measurements for your aircraft?

	FREQ
Yes	382
No	1182
Don't know	322



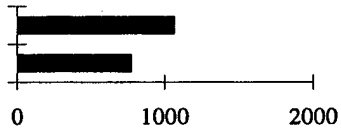
34. Did the eye doctor measure you for your multifocals in the actual cockpit?

	FREQ
Yes	40
No	1842



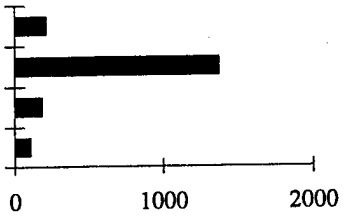
35. Do your multifocals provide a large enough uninterrupted field of view for your flying duties?

	FREQ
Yes	1058
No	766



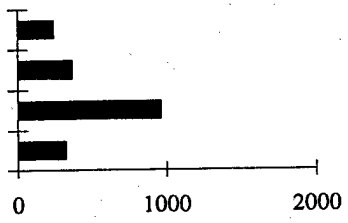
36. With what style of multifocal do you fly?

	FREQ
Executive - line goes all the way across the lens	202
Straight Top Series - line goes partially across the lens	1365
Progressive - no-line	175
Do not know	98



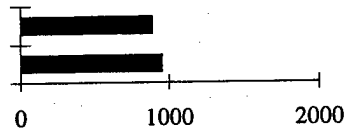
37. With what style of multifocal would you prefer to fly?

	FREQ
Executive-line goes all the way across the lens	232
Straight Top Series-line goes partially across the lens	356
Progressive-no-line	954
Do not know	313



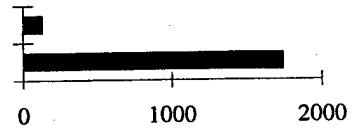
38. Were you able to obtain the type of multifocals you wanted?

	FREQ
Yes	878
No	943



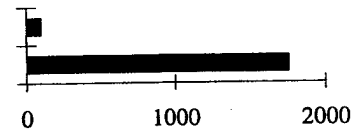
39. Do you wear trifocals to fly?

	FREQ
Yes	121
No	1733



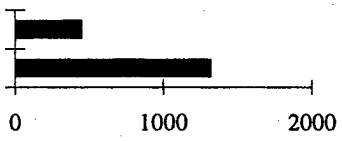
40. Do you wear a double segment multifocal to fly, e.g., top bifocal for upper panels?

	FREQ
Yes	88
No	1745



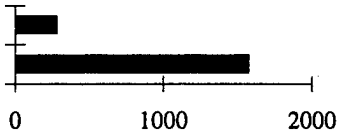
41. Would a double segment multifocal help you to perform your flight duties?

	FREQ
Yes	444
No	1309



42. Do you use a separate pair of multifocals for desk work that is a different prescription than your flight multifocals?

	FREQ
Yes	277
No	1563



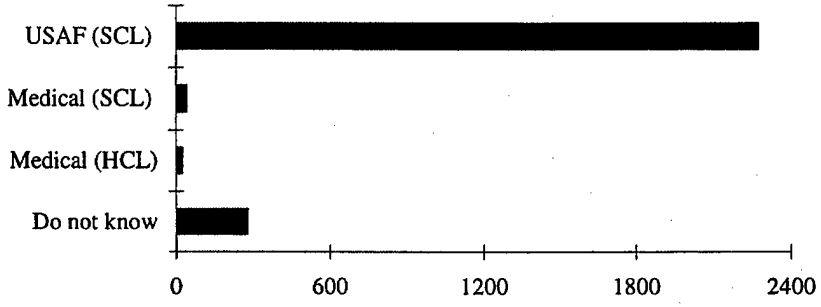
SECTION III

CONTACT LENSES

Questions 43 - 70

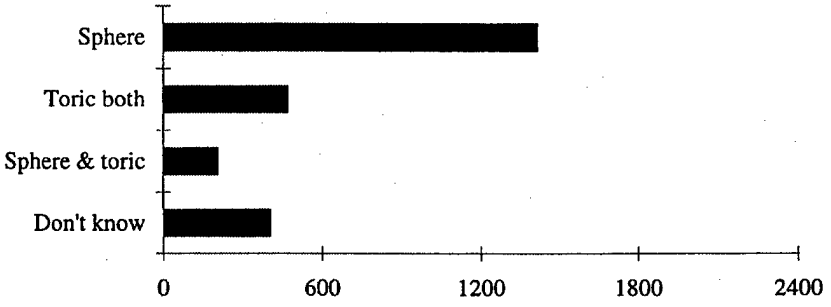
43. Which program authorizes you to wear contact lenses?

	FREQ
N/A, don't wear contact lenses	4975
USAF approved soft contact lens (SCL) program	2270
Medically waivered SCL program	36
Medically waivered hard contact lens (HCL) program	17
Do not know	272



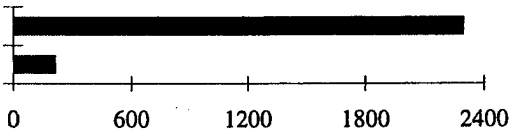
44. What type of SCLs do you wear?

	FREQ
Spherical lenses in both eyes	1410
Toric (corrects astigmatism) lenses in both eyes	464
One spherical lens and one toric lens	198
Don't know	398



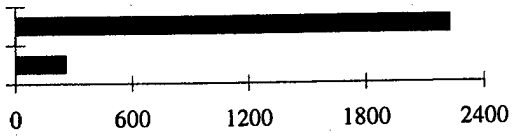
45. Was the SCL program adequately briefed to you by your flight surgeon?

	FREQ
Yes	2289
No	207



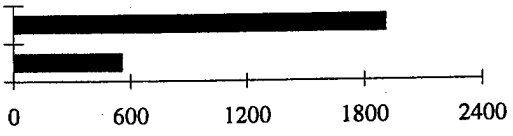
46. Were you fully briefed on the SCL cleaning/disinfection system by the eye clinic?

	FREQ
Yes	2219
No	252



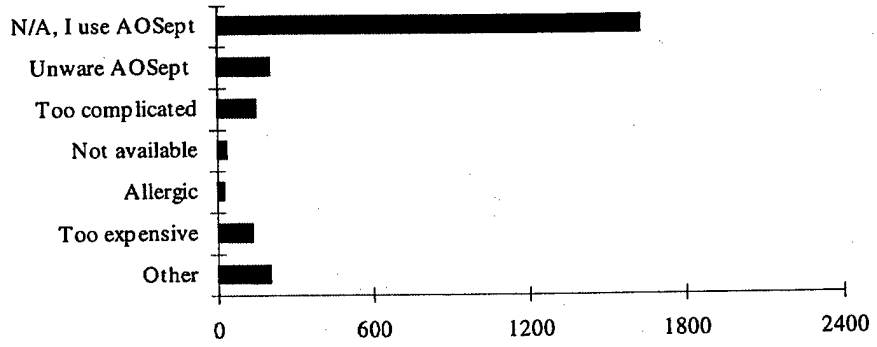
47. Are you using the Air Force recommended AOSept cleaning/disinfection system?

	FREQ
Yes	1903
No	552



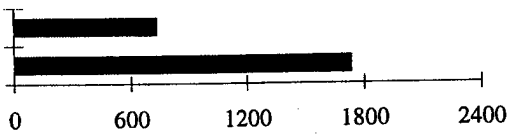
48. If you are not using the AOSept cleaning/disinfection system, why not? (Mark all that apply.)

	FREQ
N/A, I use AOSept	1621
Unware AOSept is the AF recommended system	194
System is too complicated	146
Not available in this area	31
Allergic to a system component	19
Too expensive	127
Other	194



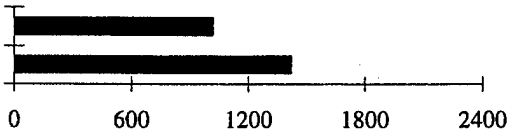
49. Were you adequately trained by the flight surgeon or eye clinic to remove your SCLs with your flight gloves on, in case of an emergency?

	FREQ
Yes	727
No	1727



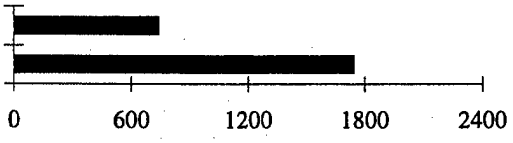
50. Do you have the required two pair of SCLs or two six-packs of disposable SCLs and a 30-day current supply of solutions in your mobility bag?

	FREQ
Yes	1012
No	1417



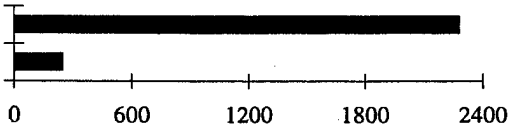
51. Does your squadron pay for your contact lenses and supplies?

	FREQ
Yes	732
No	1739



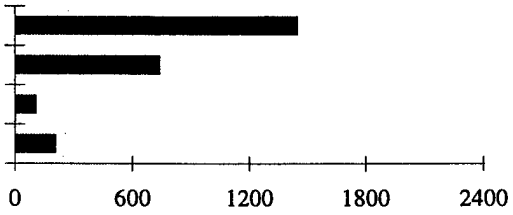
52. Do you think contact lenses and supplies should be furnished free of cost to all aircrew members that are authorized SCL-wear by the Air Force?

	FREQ
Yes	2273
No	240



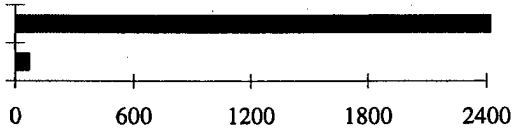
53. How often have you worn your SCLs on an extended-wear basis, i.e., sleeping with them overnight or wearing them more than 24 hours straight?

	FREQ
Never	1444
1-5 times	732
6-10 times	101
More than 10 times	205



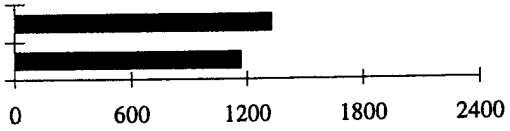
54. Are you aware that you should NOT wear SCLs on an extended-wear basis?

	FREQ
Yes	2415
No	67



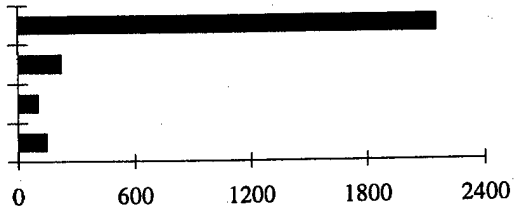
55. Are there mission-related instances when you would like to wear your SCLs on an extended-wear basis?

	FREQ
Yes	1320
No	1160



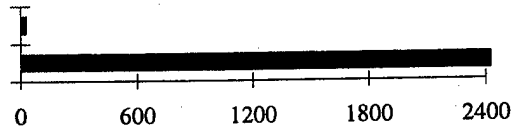
56. Do you always carry a back-up pair of spectacles on missions?

	FREQ
Always	2146
Most of the time	219
Sometimes	97
Never	140



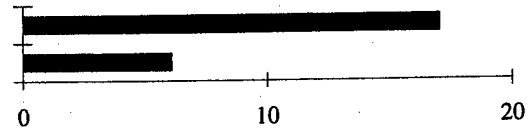
57. Have you ever ejected with CLs in place?

	FREQ
Yes	23
No	2555



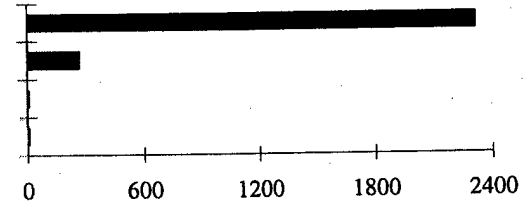
58. If yes, did they remain in place during the ejection sequence?

	FREQ
Yes	17
No	6



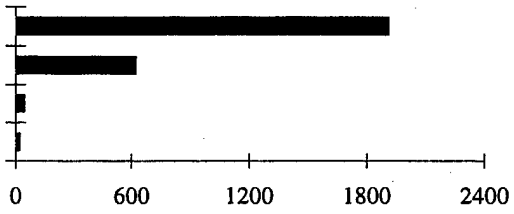
59. Have you ever had a CL fall completely off your eye during flight, and if so, how many times?

	FREQ
No	2309
1-5 times	265
6-10 times	2
More than 10 times	1



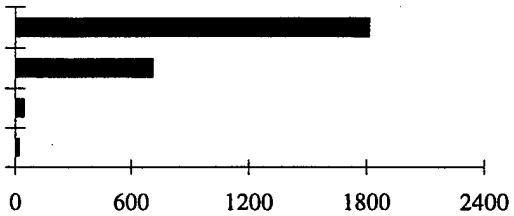
60. Have you ever had a CL displace (slide off center) in your eye during flight, and if so, how many times?

	FREQ
No	1907
1-5 times	616
6-10 times	37
More than 10 times	14



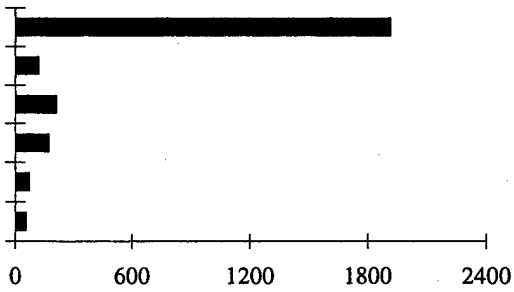
61. Have you ever gotten anything (e.g., eyelash or a piece of dirt) under your lens during flight, and if so, how many times?

	FREQ
No	1809
1-5 times	706
6-10 times	38
More than 10 times	11



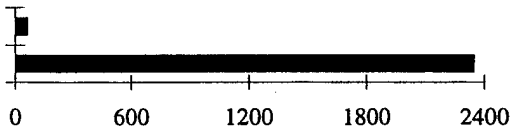
62. Have you ever had to remove a CL in flight? If so, why?

	FREQ
No	1909
CL uncomfortable	112
CL too dry	204
Particle under lens	164
CL in other eye displaced or lost	65
Other	49



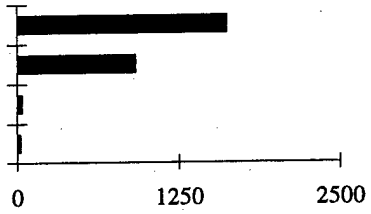
63. If you have had any problems with your contact lenses while in flight, (such as those addressed in items 59-62), did any of these incidences have an effect on the mission?

	FREQ
Yes	56
No	2340



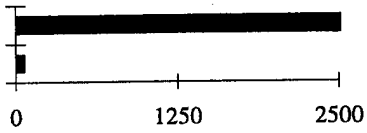
64. Do you use rewetting drops when wearing CLs during flight, and if so, how many times during each mission?

	FREQ
No	1612
1-5 times	905
6-10 times	27
More than 10 times	14



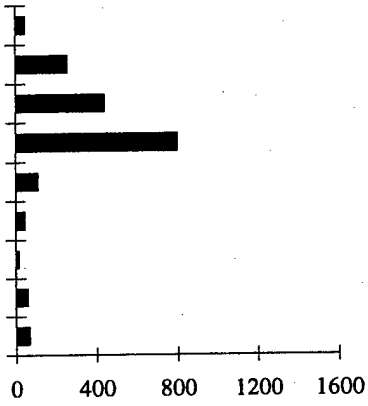
65. Do you feel CLs offer an operational advantage over spectacle wear?

	FREQ
Yes	2505
No	59



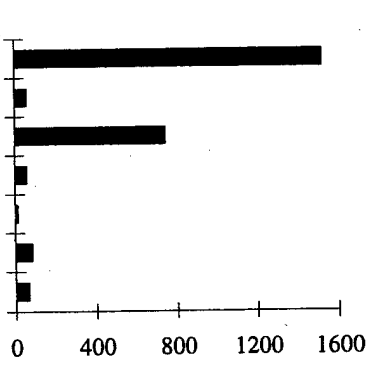
66. If yes, what is the major advantage for you?

	FREQ
N/A, no advantage	41
Life-support compatibility	250
Improved visual acuity	433
Improved peripheral vision	793
Eliminates fogging	104
Eliminates reflections	38
Enhances self-esteem	8
No slipping during G-related maneuvers	52
Other	60



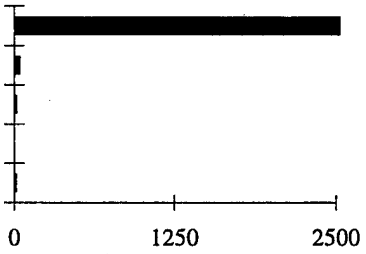
67. What is the biggest operational problem for you with CL wear during flight?

	FREQ
I experience no problems	1514
Vision not adequate	53
Lenses dry out in the cockpit	737
Lenses are not comfortable	52
Lenses are not stable during Gs	7
Particles get under the lenses	76
Other	58



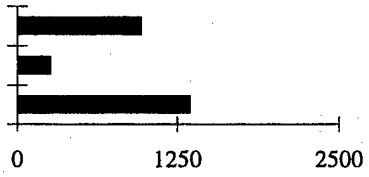
68. Have you ever had any CL-related DNIF days, and if so, how many?

	FREQ
No	2517
1-5 days	32
6-10 days	8
11-15 days	1
More than 15 days	2



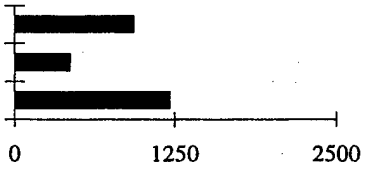
69. Have you ever had difficulty getting CLs during deployment?

	FREQ
N/A, never deployed	960
Yes	249
No	1337



70. Have you ever had difficulty getting CL solutions during deployment?

	FREQ
N/A, never deployed	923
Yes	422
No	1201



SECTION IV

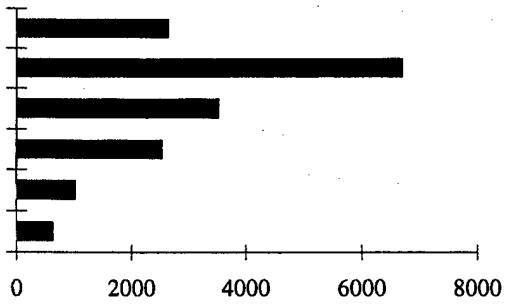
CLINIC SUPPORT

Questions 71 - 81

"Please answer items 71 - 75 using the following scale."
Not Applicable - Very Satisfied - Somewhat Satisfied
Neither Satisfied nor Dissatisfied - Somewhat Dissatisfied - Very Dissatisfied

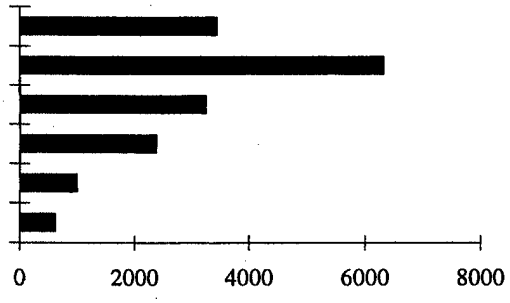
71. How satisfied are you with the vision support you get from your aerospace medicine squadron (flight medicine office)?

	FREQ
N/A	2619
Very Satisfied	6671
Somewhat Satisfied	3507
Neither	2510
Somewhat Dissatisfied	988
Very Dissatisfied	597



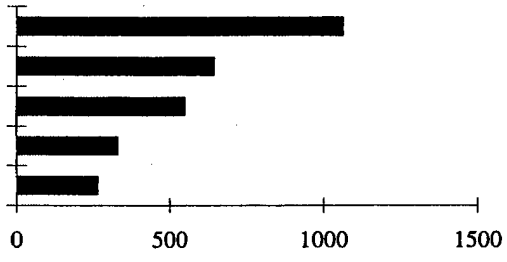
72. How satisfied are you with the vision care you get from your eye clinic?

	FREQ
N/A	3418
Very Satisfied	6297
Somewhat Satisfied	3226
Neither	2360
Somewhat Dissatisfied	975
Very Dissatisfied	593



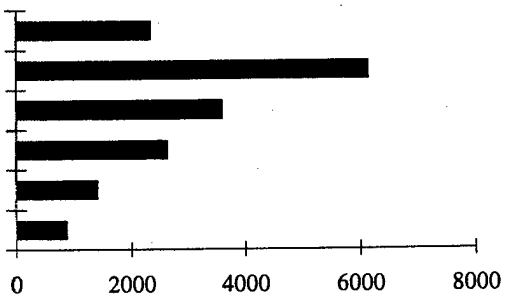
73. If you wear CLs, how satisfied are you with the CL support that you get from your eye clinic?

	FREQ
N/A	12649
Very Satisfied	1059
Somewhat Satisfied	642
Neither	545
Somewhat Dissatisfied	324
Very Dissatisfied	259



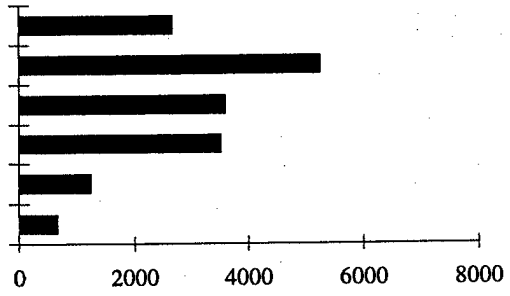
74. How satisfied are you with your access to an eyecare professional?

	FREQ
N/A	2319
Very Satisfied	6115
Somewhat Satisfied	3569
Neither	2603
Somewhat Dissatisfied	1379
Very Dissatisfied	844



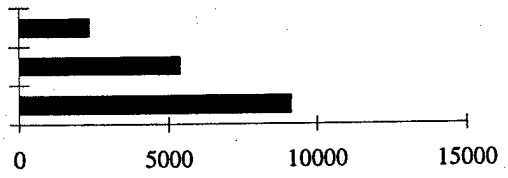
75. How satisfied are you with the knowledge of your eyecare professional about your visual demands while flying?

	FREQ
N/A	2645
Very Satisfied	5227
Somewhat Satisfied	3578
Neither	3498
Somewhat Dissatisfied	1209
Very Dissatisfied	637



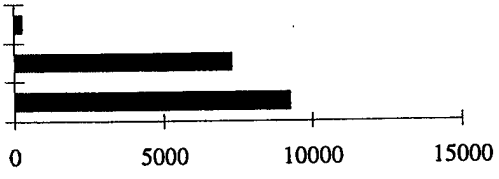
76. Did your eyecare professional or flight surgeon advise you to evaluate your new spectacles for effectiveness in the cockpit before flying with them?

	FREQ
Yes	2294
No	5345
N/A	9086



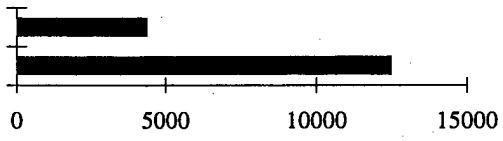
77. Did eye clinic personnel fit your flight spectacles to you with your helmet/mask/headset on?

	FREQ
Yes	235
No	7275
N/A	9205



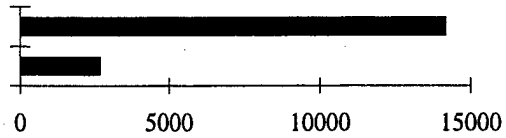
78. Are you reluctant to identify any vision problems you experience in flight to your flight surgeon?

	FREQ
Yes	4326
No	12435



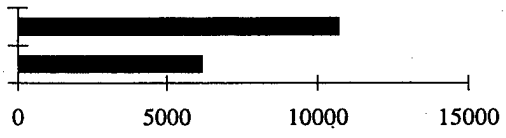
79. Do you feel current vision testing, as administered by the flight medicine office, is satisfactory for flying purposes?

	FREQ
Yes	14141
No	2642



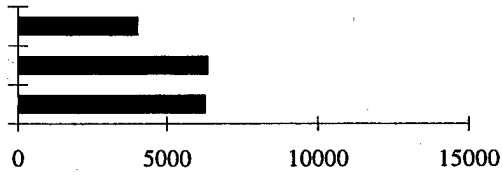
80. Do you believe a yearly, full, complete, eye examination by USAF eyecare professionals, to determine eye and vision problems, should be required on all rated aircrew?

	FREQ
Yes	10650
No	6137



81. If you are 20/20 and not required to wear spectacles or contacts for flying, would you wear spectacles or contacts to fly if your vision could be corrected to better than 20/20?

	FREQ
Yes	3966
No	6310
N/A	6231



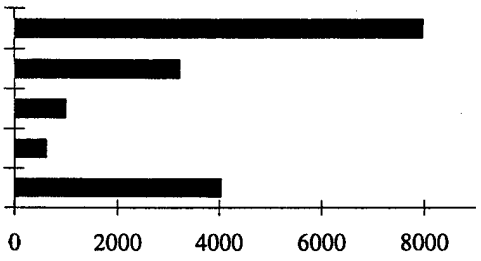
SECTION V

SUNGLASSES

Questions 82 - 88

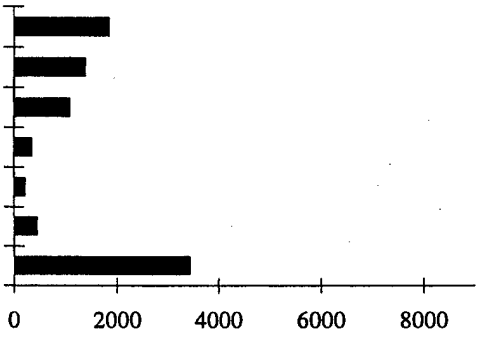
82. Do you wear sunglasses while flying?

	FREQ
No	7942
AF issue prescription	3191
AF issue non-prescription	977
Commercial prescription	589
Commercial non-prescription	4010



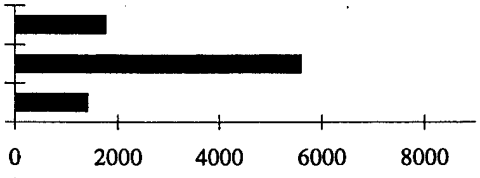
83. If you wear commercial sunglasses for flying, what color is the tint?

	FREQ
Gray	1821
Green	1361
Brown	1056
Yellow	308
Orange	188
Other	425
N/A	3396



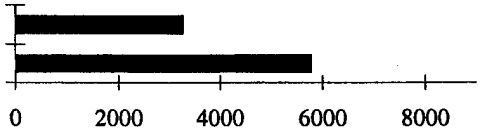
84. What do you think about the tint on the USAF sunglasses provided for your flying duties?

	FREQ
Too dark	1743
Just right	5570
Too light	1389



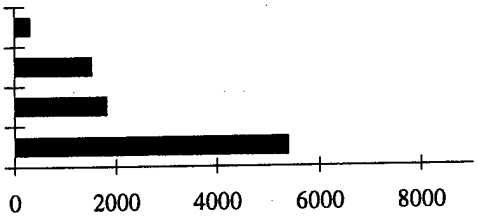
85. Would you prefer a gradient (darker on top and lighter on the bottom) or a solid sunglass tint for flying?

	FREQ
Gradient	3237
Solid	5752



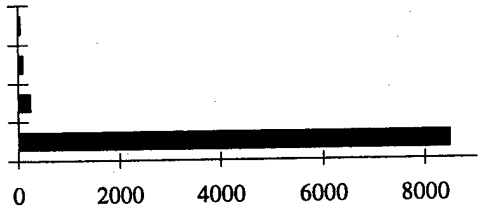
86. Do you ever wear your sunglasses in combination with your sun visor when flying?

	FREQ
Always	271
Often	1491
Seldom	1785
Never	5363



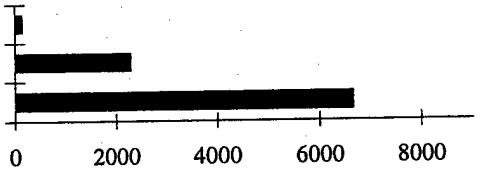
87. Do you ever wear your sunglasses in combination with a laser visor when flying?

	FREQ
Always	17
Often	63
Seldom	210
Never	8457



88. What kind of sunglasses do you wear for non-flying duties and recreational activities?

	FREQ
N/A, I don't wear sunglasses	115
AF issue	2265
Commercial	6628



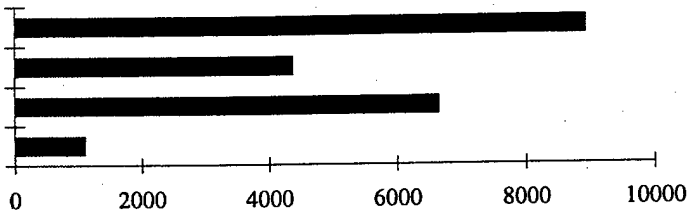
SECTION VI

AIRCREW CLEAR, SUN, HIGH CONTRAST VISORS

Questions 89 - 110

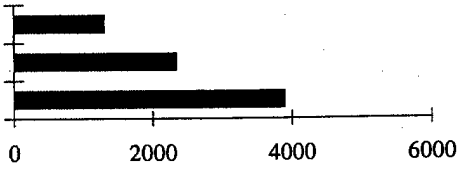
89. Do you wear any of the following types of visors when you fly? (Mark all that apply.)

	FREQ
No	8908
Clear visors	4342
Sun visors	6622
High contrast visors	1087



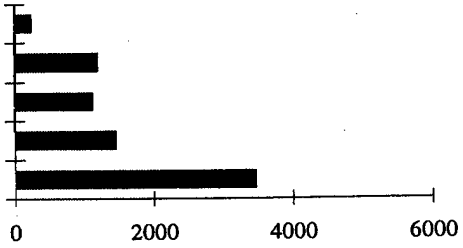
90. When you wear your flying spectacles with your visor, does your visor get scratched?

	FREQ
Yes	1287
No	2319
N/A	3873



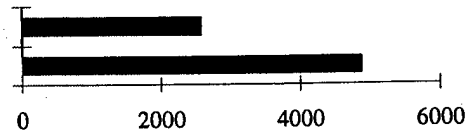
91. How long is your typical visor serviceable for flying?

	FREQ
Less than 3 months	223
3-6 months	1179
6-6 months	1111
9-12 months	1440
Greater than 1 year	3441



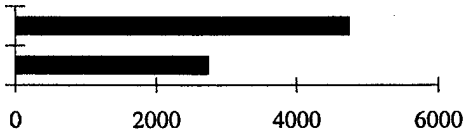
92. Do you assess your visual performance in the cockpit with each new type of visor before your initial flight with that visor?

	FREQ
Yes	2553
No	4866



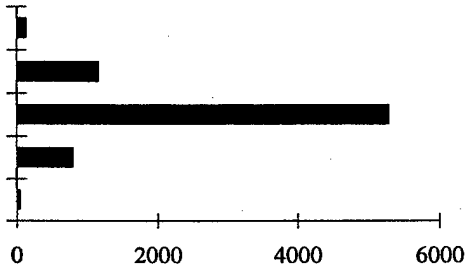
93. At night, do you normally wear the clear visor for protection?

	FREQ
Yes	4725
No	2718



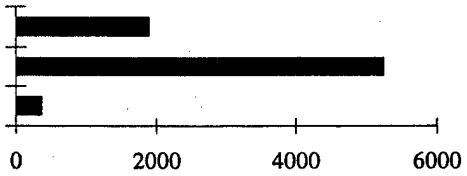
94. Is the sun visor the proper darkness for your flying needs?

	FREQ
Much too dark	118
Somewhat too dark	1141
Just right	5260
Somewhat too light	781
Much too light	26



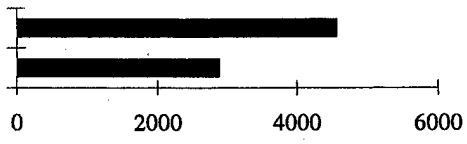
95. Have you ever had any difficulty seeing any of your cockpit displays while wearing the sun visor?

	FREQ
Yes	1874
No	5225
N/A	343



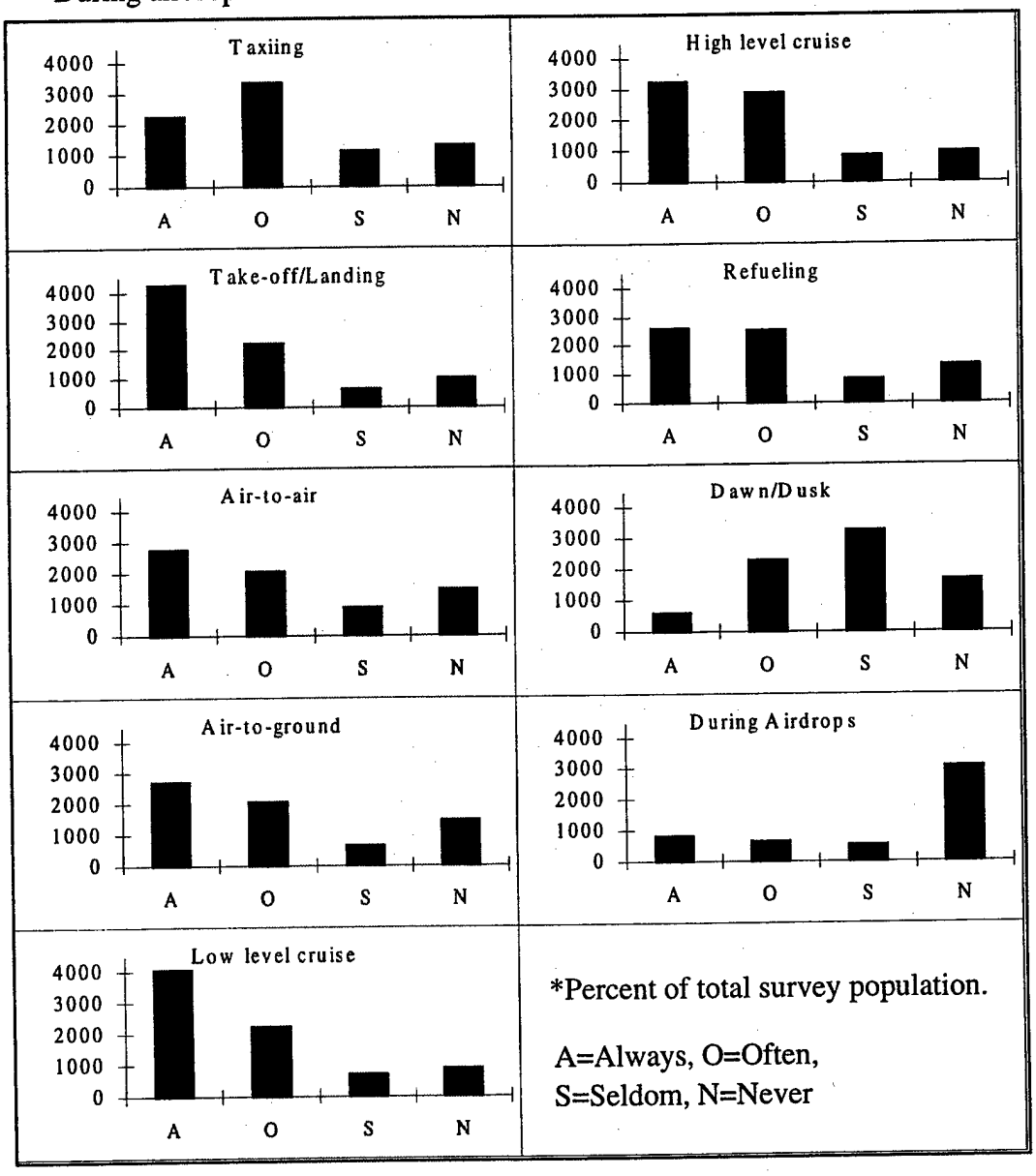
96. Would you like to have more than one darkness of sun visor available to you?

	FREQ
Yes	4545
No	2860



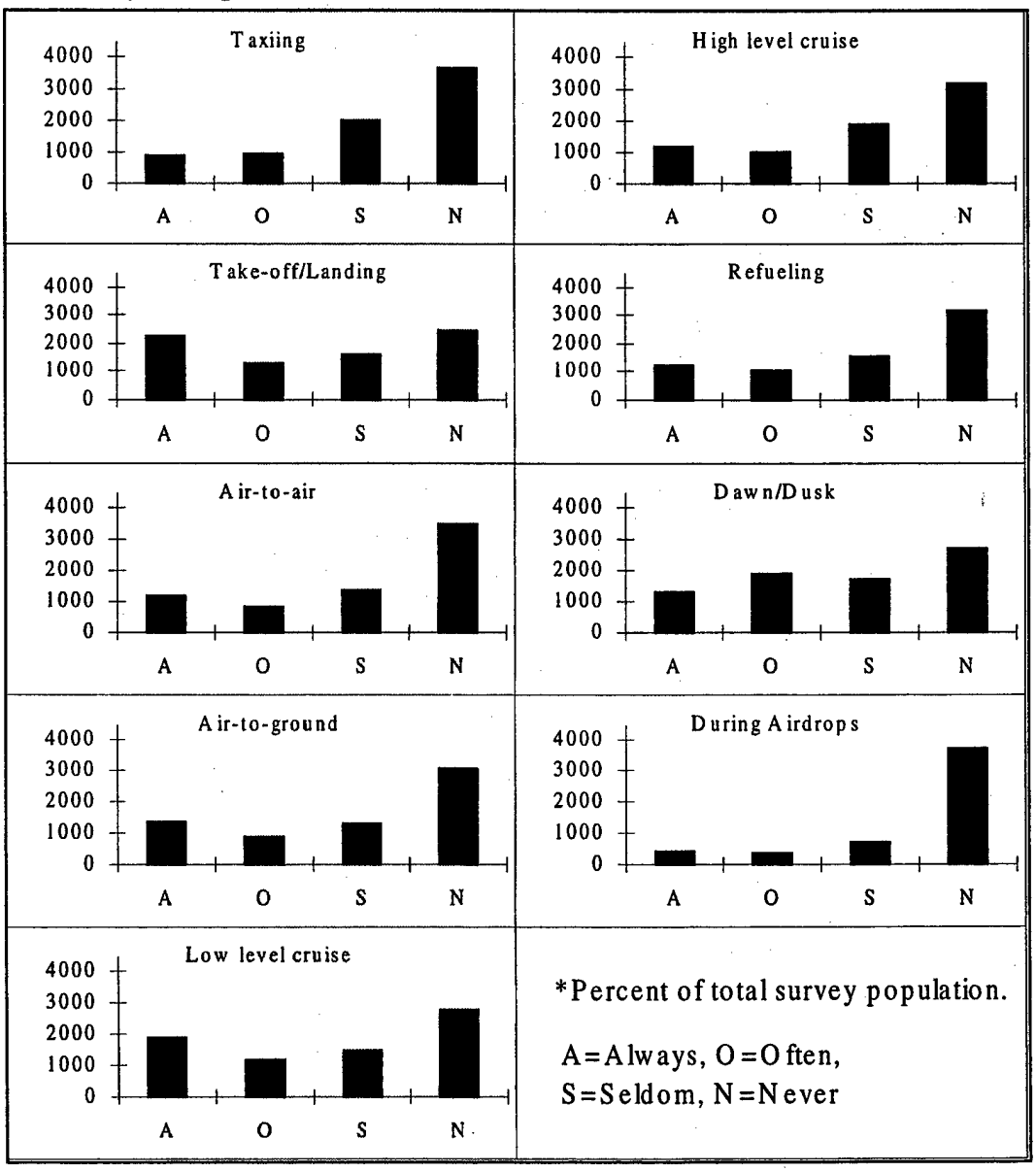
97. How often do you use your sun visor under the following flight conditions?

	Always	*%	Often	*%	Seldom	*%	Never	*%
Taxiing	2246	13	3396	20	1139	7	1284	8
Take-off/Landing	4225	25	2194	13	661	4	995	6
Air-to-air	2764	16	2092	12	911	5	1480	9
Air-to-ground	2752	16	2059	12	634	4	1497	9
Low level cruise	4100	24	2234	13	699	4	913	5
High level cruise	3246	19	2915	17	800	5	972	6
Refueling	2624	15	2550	15	837	5	1351	8
Dawn/Dusk	612	4	2332	14	3255	19	1666	10
During airdrops	822	5	663	4	516	3	3100	18



98. How often do you use your clear visor under the following flight conditions?

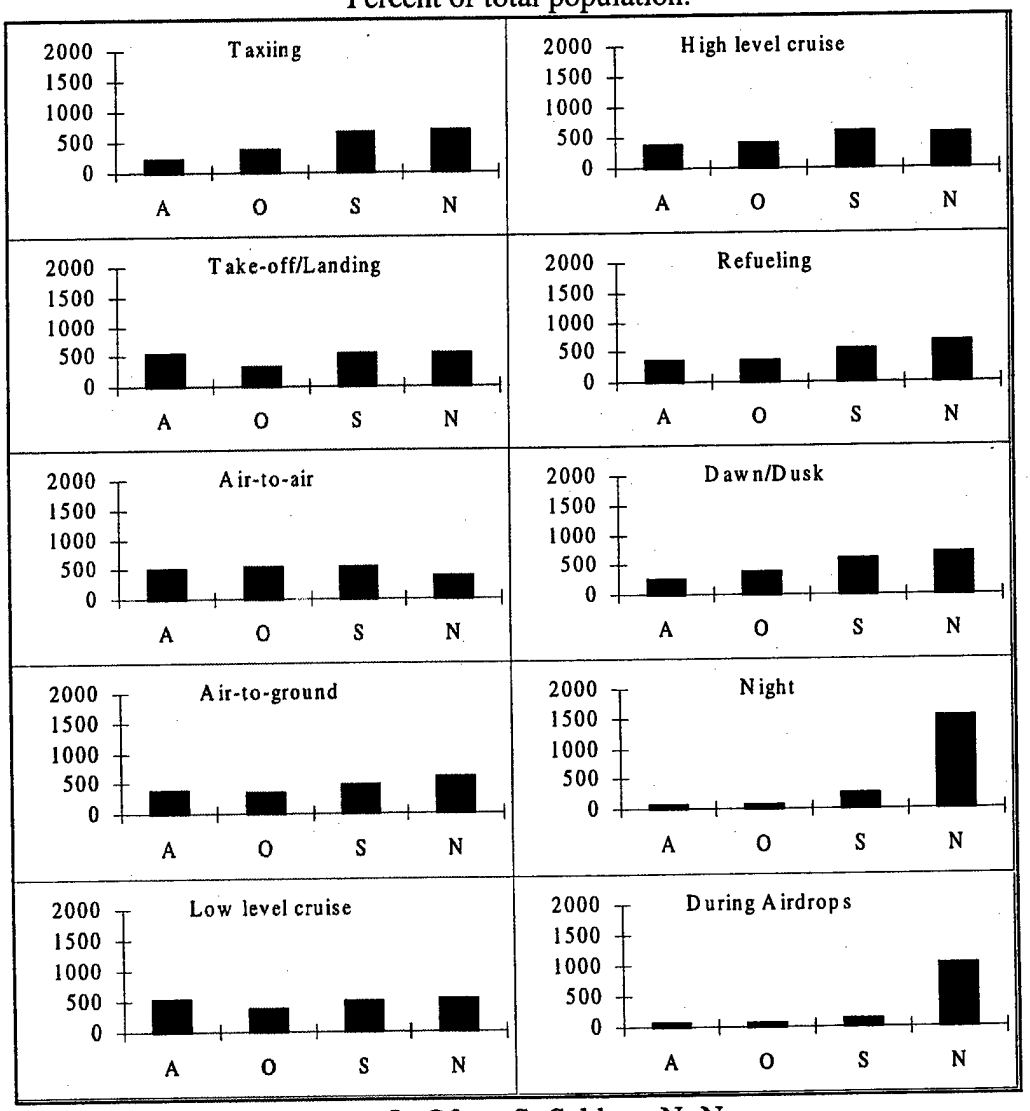
	Always	*%	Often	*%	Seldom	*%	Never	*%
Taxiing	901	5	960	6	2027	12	3685	22
Take-off/Landing	2269	13	1278	8	1597	9	2451	14
Air-to-air	1158	7	804	5	1351	8	3479	20
Air-to-ground	1334	8	902	5	1313	8	3076	18
Low level cruise	1869	11	1169	7	1498	9	2754	16
High level cruise	1213	7	1034	6	1882	11	3196	19
Refueling	1233	7	1003	6	1522	9	3149	18
Dawn/Dusk	1288	8	1873	11	1689	10	2701	16
During airdrops	429	3	331	2	681	4	3742	22



100. How often do you use your high contrast visor under the following flight conditions?

	Always	*%	Often	*%	Seldom	*%	Never	*%
Taxiing	227	1.3	374	2.2	661	3.9	702	4.1
Take-off/Landing	552	3.2	322	1.9	527	3.1	551	3.2
Air-to-air	518	3.0	552	3.2	539	3.2	370	2.2
Air-to-ground	373	2.2	357	2.1	462	2.7	597	3.5
Low level cruise	523	3.1	386	2.3	512	3.0	520	3.0
High level cruise	376	2.2	404	2.4	581	3.4	568	3.3
Refueling	362	2.1	336	2.0	543	3.2	676	4.0
Dawn/Dusk	253	1.5	385	2.3	611	3.6	686	4.0
Night	70	0.4	63	0.4	261	1.5	1510	8.8
During airdrops	63	0.4	53	0.3	112	0.7	1034	6.0

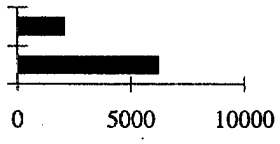
*Percent of total population.



A=Always, O=Often, S=Seldom, N=Never

99. Have you ever worn the yellow high contrast visor (HCV)?

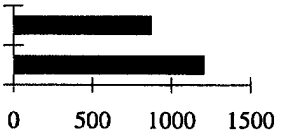
	FREQ
Yes	2028
No	6148



100. (See previous page)

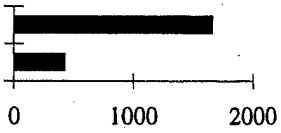
101. Were you ever given any operational or aeromedical instructions for using the HCV?

	FREQ
Yes	863
No	1195



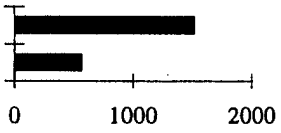
102. Do you believe the HCV improves your ability to see differences in contrast?

	FREQ
Yes	1648
No	417



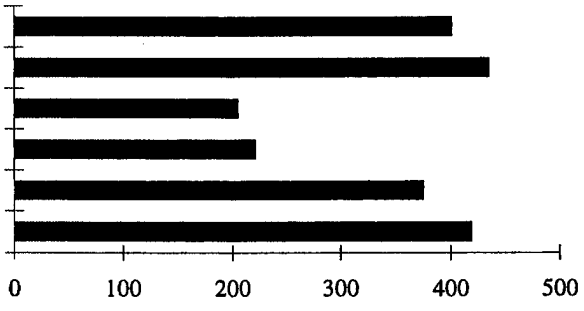
103. Do you believe the HCV improves your ability to visually acquire targets?

	FREQ
Yes	1505
No	557



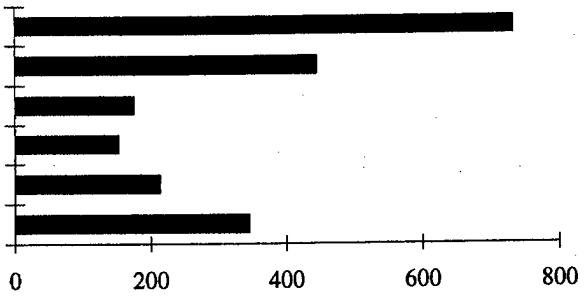
104. How often do you wear the HCV during hazy conditions?

	FREQ
Never	400
< 10%	434
11-25%	204
26-50%	220
51-75%	374
76-100%	418



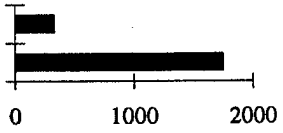
105. How often do you wear the HCV during sunny conditions?

	FREQ
Never	730
< 10%	443
11-25%	173
26-50%	151
51-75%	212
76-100%	343



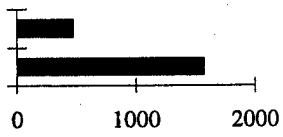
106. Have you ever had difficulty seeing any of your cockpit displays while wearing the HCV?

	FREQ
Yes	324
No	1735



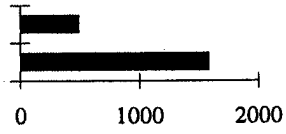
107. Have you ever had difficulty detecting targets or target colors on the ground when wearing the HCV?

	FREQ
Yes	465
No	1556



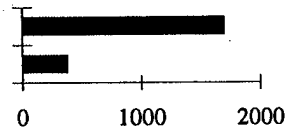
108. Have you ever experienced headaches or eye fatigue during or after using the HCV?

	FREQ
Yes	479
No	1568



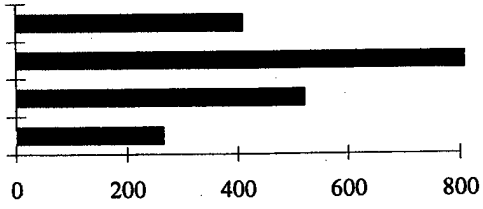
109. Are you aware that the HCV does not provide laser protection?

	FREQ
Yes	1681
No	371



110. How would you rate the effectiveness of the HCV in improving your fighting capability?

Very effective	408
Somewhat effective	855
Minimally effective	520
Not effective	263



SECTION VII

LASER EYE PROTECTION (LEP)

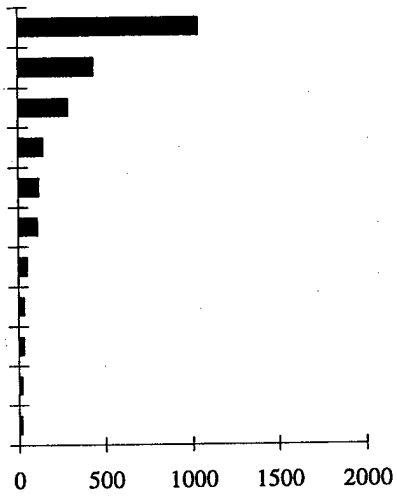
Questions 111 - 126

111. With which laser eye protection have you had the most experience?

	FREQ
Barnes	282
EEK	111
FV-4	137
Gentex prototype	103
PLZT nuclear flash goggles	1029
KG3 spectacles	12
FV-2 spectacles	25
Army 2 notch spectacles	23
Army 3 notch spectacles	9
Other	43
Do not know	429
N/A, never worn LEP	13964

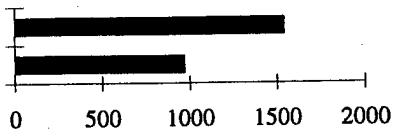
111. (Sorted by frequency)

N/A, never worn LEP	13964
PLZT nuclear flash goggles	1029
Do not know	429
Barnes	282
FV-4	137
EEK	111
Gentex prototype	103
Other	43
FV-2 spectacles	25
Army 2 notch spectacles	23
KG3 spectacles	12
Army 3 notch spectacles	9



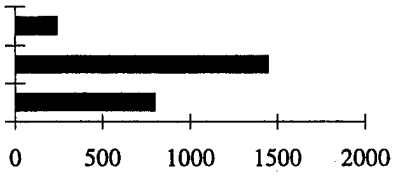
112. Were you ever given operational or aeromedical instructions for using LEP?

	FREQ
Yes	1536
No	962



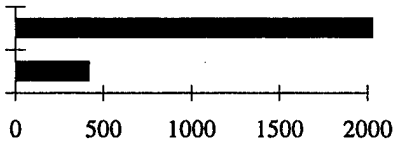
113. Have you ever flown with LEP in combat?

	FREQ
Yes	234
No	1440
N/A, never flown in combat	792



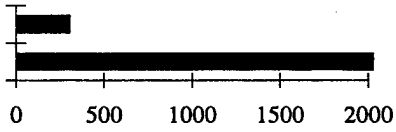
114. Do you feel that USAF aviators should train with LEP?

	FREQ
Yes	2027
No	411



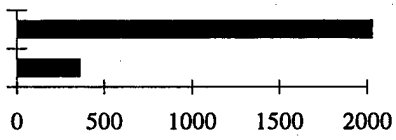
115. Do you routinely wear LEP during training exercises involving lasers?

	FREQ
Yes	301
No	2095



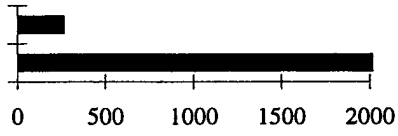
116. Have you ever been operationally or aeromedically briefed on how lasers can damage your eyes or temporarily disrupt your vision?

	FREQ
Yes	2108
No	354



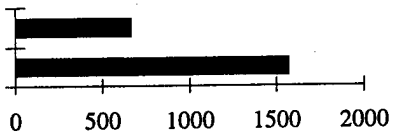
117. Has glare from the sun ever been a problem when you flew with LEP?

	FREQ
Yes	258
No	2008



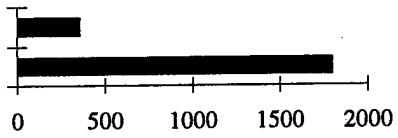
118. Do you assess your visual performance in the cockpit with each new LEP before your initial flight with that LEP?

	FREQ
Yes	656
No	1563



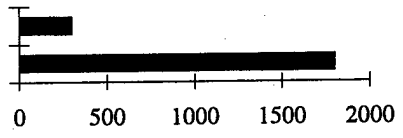
119. Have you ever had difficulty seeing other aircraft when wearing LEP?

	FREQ
Yes	350
No	1790



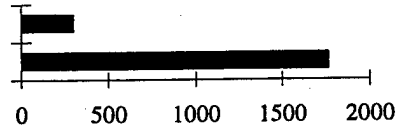
120. Have you ever had dificulty seeing other aircraft's lights when wearing LEP?

	FREQ
Yes	293
No	1795



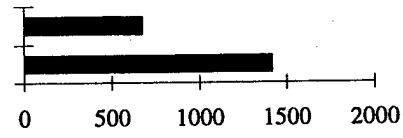
121. Have you ever had difficulty seeing ground targets when wearing LEP?

	FREQ
Yes	293
No	1757



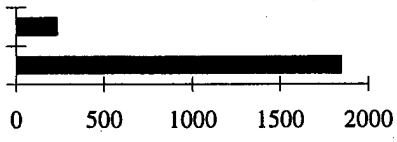
122. Have you ever had difficulty seeing cockpit displays when wearing LEP?

	FREQ
Yes	667
No	1409



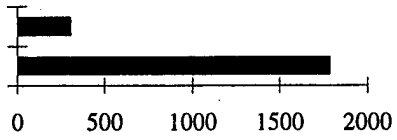
123. Have you ever experienced any headaches or eye fatique during or after flying with LEP?

	FREQ
Yes	229
No	1840



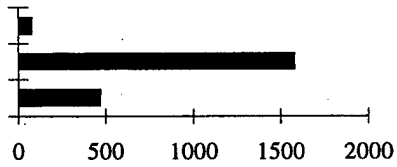
124. Have you ever noticed bothersome visual distortions from your LEP?

	FREQ
Yes	300
No	1779



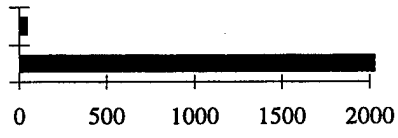
125. Have you ever flown at night using a LEP designed for daytime use only?

	FREQ
Yes	69
No	1572
Do not know	463



126. Have you ever been flash blinded or visually disturbed by a commercial laser light show during flight?

	FREQ
Yes	38
No	2146



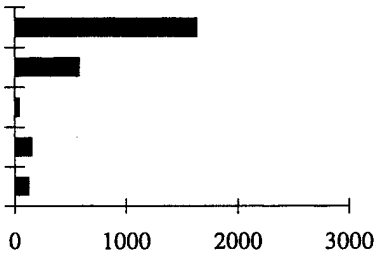
SECTION VIII

NIGHT VISION GOGGLES (NVG)

Questions 127 - 146

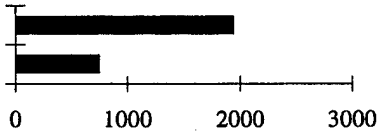
127. Which type of NVG do you primarily use for flying duties?

	FREQ
Don't wear	14011
AN/AVS-6 (ANVIS)	1621
F4949	572
Cats Eyes	30
AN/PVS-5	140
Other	116



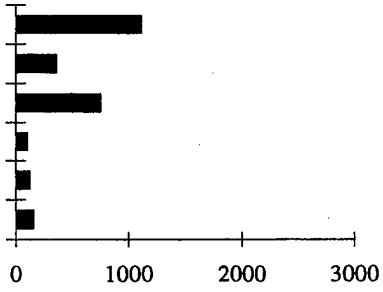
128. Have you ever taken a formal USAF Night vision Device training course?

	FREQ
Yes	1926
No	739



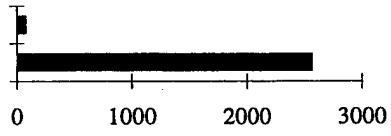
129. What do you feel is the one most significant operational limitation of the NVGs you use?

	FREQ
Insufficient field-of-view	1098
Poor resolution (visual acuity)	351
Reduced depth perception	742
Lack of color contrast (green image)	92
Other	114
No significant operational limitations	148



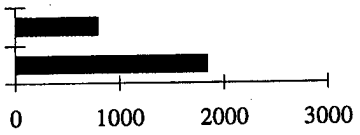
130. Have you ever had an in-flight incident or accident that was due to the operational limitations of NVGs?

	FREQ
Yes	66
No	2554



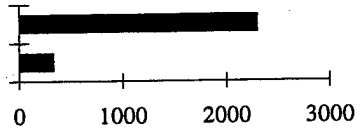
131. Have your NVGs ever electronically malfunctioned in flight?

	FREQ
Yes	783
No	1825



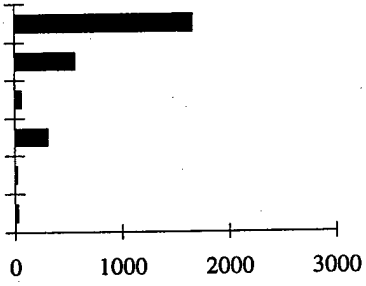
132. Do you feel that you received adequate training on how to properly focus/adjust the NVG before you started flying with them?

	FREQ
Yes	2286
No	322



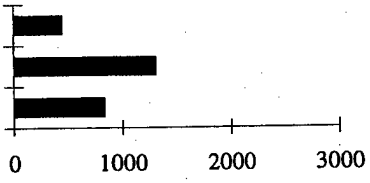
133. What type of eyewear do you wear with NVGs?

	FREQ
None	1646
Standard aircrew prescription spectacles	555
Special safety prescription spectacles	47
Contact lenses	299
Non-Rx ballistic protective goggles	8
Contact lenses & goggles in combination	16



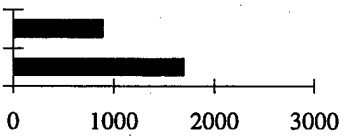
134. If you are NOT required to wear spectacles or contact lenses when you fly, would you wear protective safety spectacles with NVGs if they were available?

	FREQ
Yes	439
No	1295
N/A, I wear prescription spectacles	823



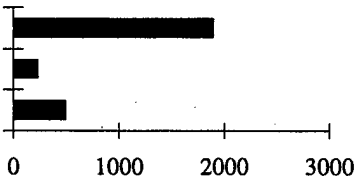
135. If available, would you wear a ballistic protective dust/wind goggle or visor with NVGs?

	FREQ
Yes	879
No	1683



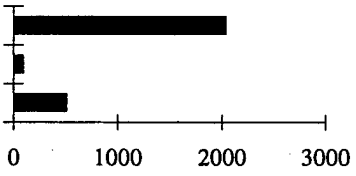
136. Does your unit have a NVG test lane available for you to pre-flight your NVGs?

	FREQ
Yes	1884
Yes, but inadequate	223
No	484



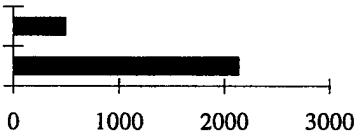
137. If you do have a test lane, do you use it to pre-flight your NVGs?

	FREQ
Yes	2022
No	81
N/A	497



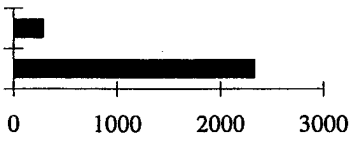
138. Have you ever noticed a change in your vision that required you to refocus your NVGs during an ascent or descent?

	FREQ
Yes	484
No	2123



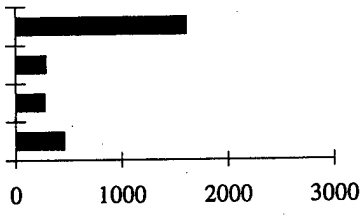
139. Have you ever experienced a decrease in NVG vision with increased altitude that would not improve by refocusing the NVGs?

	FREQ
Yes	277
No	2319



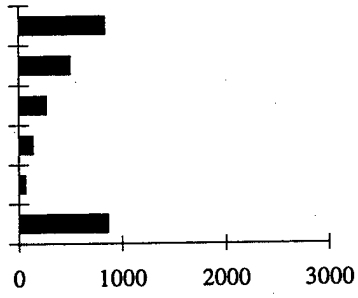
140. During a NVG mission, does your NVG vision normally:

	FREQ
Remain stable throughout the mission	1599
Gradually decrease	277
Gradually increase	263
Fluctuate throughout the mission	446



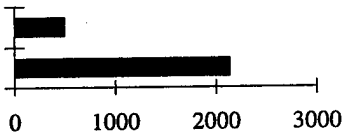
141. How long does it normally take your eyes to adjust to the dark after NVG wear to a point where you can safely land the aircraft?

	FREQ
Less than 1 minute	824
1 but less than 3 minutes	486
3 but less than 6 minutes	255
6-10 minutes	126
More than 10 minutes	50
N/A	849



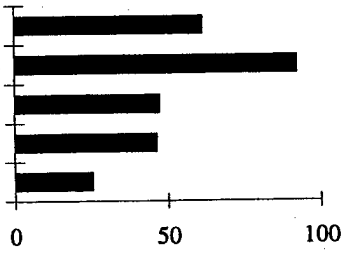
142. Have you ever experienced after-images or altered color vision after a NVG mission?

	FREQ
Yes	244
No	2345



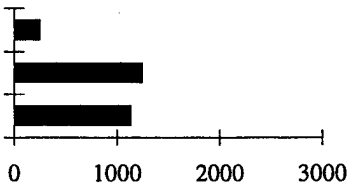
143. If yes, how long does it take for the after-images or altered color vision to disappear?

	FREQ
Less than 1 minute	61
1 but less than 5 minutes	92
5 but less than 10 minutes	47
10-15 minutes	46
More than 15 minutes	25
N/A	2144



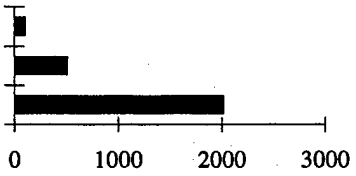
144. Do you ever experience headaches or eye fatigue when flying with NVGs?

	FREQ
Yes, frequently	237
Yes, sometimes	1231
No	1119



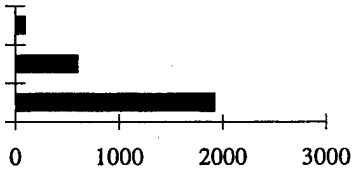
145. Have you ever felt that your depth perception was altered after flying a NVG mission?

	FREQ
Yes, frequently	89
Yes, sometimes	495
No	2000



146. Have you ever felt that your visual acuity was decreased after flying a NVG mission?

	FREQ
Yes, frequently	82
Yes, sometimes	589
No	1908



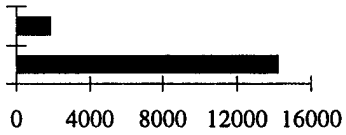
SECTION IX

BALLISTIC PROTECTIVE DUST/WIND GOGGLES

Questions 147 - 150

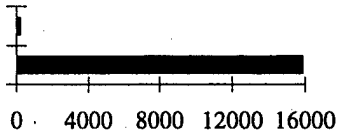
147. Do problems from dust and wind create eye discomfort or affect your vision when flying?

	FREQ
Yes	1794
No	14140



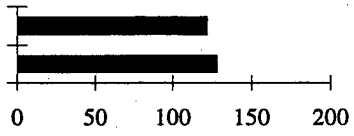
148. Do you currently use a ballistic protective dust/wind goggle?

	FREQ
Yes	118
No	15782



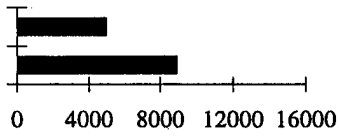
149. If you do use a ballistic protective dust/wind goggle, is it adequate?

	FREQ
Yes	121
No	127
N/A	15293



150. Would you like to see the USAF develop and provide an improved ballistic protective dust/wind goggle?

	FREQ
Yes	4895
No	8849



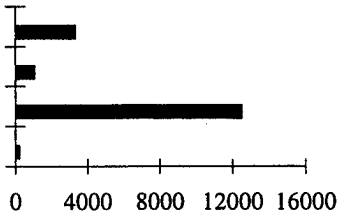
SECTION X

VISION STANDARDS

Questions 151 - 161

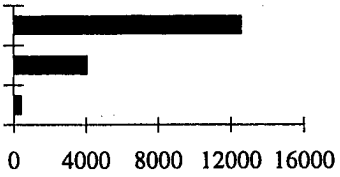
151. In your opinion, who should determine USAF aircrew vision standards?

	FREQ
Rated Corps	3242
Medical Corps	1008
Both	12436
Other	148



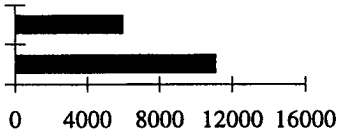
152. Do you believe that the current USAF aircrew vision standards are:

	FREQ
Adequate as written	12494
Too strict	3968
Not strict enough	342



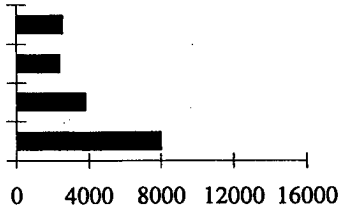
153. Should USAF aircrew vision standards for flying applicants (entry) be more strict than vision standards for current rated aircrew?

	FREQ
Yes	5883
No	10996



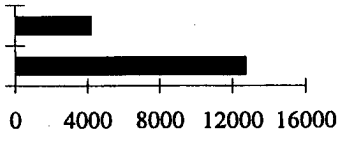
154. If you feel entry and retention standards should be different, when should retention vision standards be applied, i.e., when should aircrew be held to Class II (already trained aircrew) standards?

	FREQ
Before UPT/UNT	2474
During UPT/UNT	2315
After graduation UPT/UNT	3733
N/A, same standard	7937



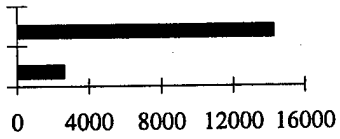
155. Do you believe we should select only UPT/UNT candidates with at least uncorrected 20/20 vision acuity?

	FREQ
Yes	4135
No	12643



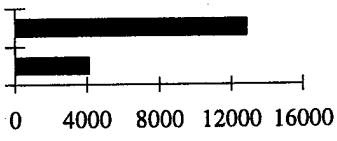
156. Do you believe we should select only UPT/UNT candidates with normal color vision?

	FREQ
Yes	14185
No	2574



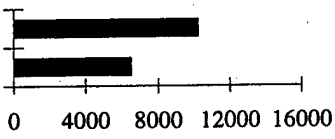
157. Do you believe that color vision plays a key role for your crew position in your aircraft?

	FREQ
Yes	12797
No	4047



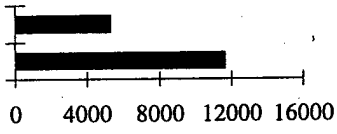
158. Do you believe the USAF should incorporate a strict night visual acuity standard?

	FREQ
Yes	10138
No	6440



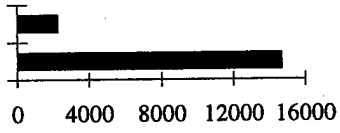
159. Do you believe that pilots and Nav/WSOs should have the same visual qualifications?

	FREQ
Yes	5222
No	11553



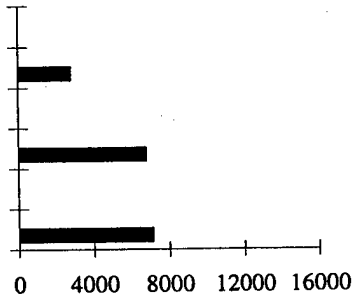
160. Do you believe that pilots and flight surgeons should have the same visual qualifications?

	FREQ
Yes	2199
No	14618



161. All things being equal, which of the following candidates would you select into UPT?

	FREQ
A spectacle or contact lens wearer corrected to 20/20	2749
A non spectacle wearer with normal 20/20 vision	6709
Wearing a vision correction should not be a factor for UPT selection	7050

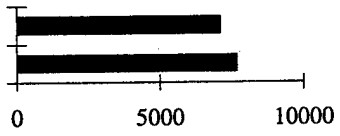


SECTION XI
COMMENTS

COMMENTS/SUGGESTIONS: (Please feel free to comment on any operational vision problems that you may have so that the scientific community might find ways to help solve them and improve your fighting capability.)

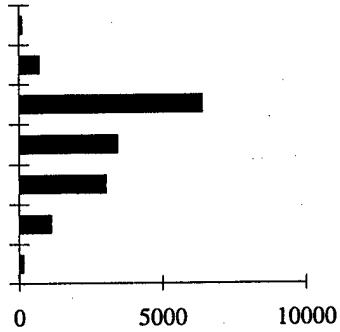
Spectacle Use:

	FREQ
I wear spectacles/contact lenses	7038
I do not wear spectacles/contact lenses	7612



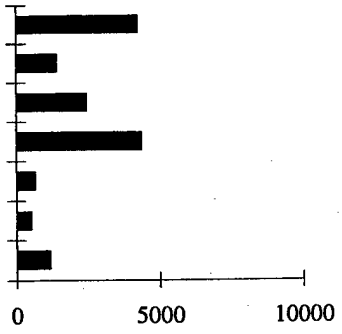
RANK:

	FREQ
O-1	55
O-2	670
O-3	6328
O-4	3408
O-5	2996
O-6	1072
O-7 or above	98



WEAPONS SYSTEM:

	FREQ
Fighter	4197
Bomber	1391
Tanker	2426
Transport	4327
Recon	609
Rotary	476
Other	1129



APPENDIX 3

CROSS-CORRELATIONS

EXAMPLE

WHO SHOULD DETERMINE USAF AIRCREW VISION STANDARDS?

Q6 x Q151		AD	ANG	RES	Total
	Rated Corps	2,356	537	349	19%
	Medical Corps	747	146	115	6%
	Both	9,695	1,656	1,085	74%
	Other	86	31	31	1%

"Q6 x Q151" = Question 6 correlated with question 151. See Appendix 1 or 2 for questions.

1995 AIRCREW OPERATIONAL VISION SURVEY

VISION ENHANCEMENT AND EYE PROTECTION INTEGRATED PRODUCT TEAM
HUMAN SYSTEMS CENTER
BROOKS AFB TX

SURVEY SECTIONS	
I.	GENERAL INFORMATION
II.	AIRCREW SPECTACLES
III.	CONTACT LENSES
IV.	CLINIC SUPPORT
V.	SUNGLASSES
VI.	AIRCREW VISORS
VII.	LASER EYE PROTECTION
VIII.	NIGHT VISION GOGGLES
IX.	BALLISTIC AND DUST/WIND PROTECTION
X.	VISION STANDARDS
XI.	COMMENTS

SURVEY POPULATION

Surveys Sent To All 31,205 Total Force Rated Aircrew

	Active Duty	ANG	Reserve
Pilots	15,515	4,069	2,968
Navigators	5,463	1,155	655
Flight Surgeons	874	275	231
	21,852	5,499	3,854

I. GENERAL INFORMATION

SURVEY RETURN RATES *17,282* (55.4%) Total Survey Returns* ** 175 Surveys Did Not Indicate Which AF Component*							
Q6 x Q12		Active Duty		ANG		Reserve	
	Pilots	9,114	(59%)	1,720	(42%)	1,209	(41%)
	Navigators	3,473	(64%)	566	(49%)	298	(45%)
	Flight Surgeons	395	(45%)	112	(41%)	99	(43%)
	Others	94		13		14	
		13,076	(60%)	2,411	(44%)	1,620	(42%)

PERCENT OF TOTAL RETURN BY RANK				
Q4 x Q6		Active Duty	ANG	Reserve
	2nd Lieutenant	< 1%	< 1%	< 1%
	1st Lieutenant	4%	6%	5%
	Captain	46%	28%	36%
	Major	22%	31%	27%
	Lt Colonel	19%	27%	23%
	Colonel	8%	6%	8%
	General Officer	< 1%	< 1%	< 1%

PERCENT OF TOTAL RETURN BY GENDER							
Q3 x Q6		Active Duty		ANG		Reserve	
	Male	12,695	(98%)	2,329	(98%)	1,554	(97%)
	Female	265	(2%)	51	(2%)	46	(3%)

FEMALE RETURN BY RANK				
Q3 x Q4 x Q6		Active Duty	ANG	Reserve
	2nd Lieutenant	3	1	0
	1st Lieutenant	29	8	8
	Captain	145	23	19
	Major	58	12	10
	Lt Colonel	25	5	4
	Colonel	3	2	4
	General Officer	1	0	0

RETURN BY WEAPON SYSTEM *Missing Data = 1,013*				
Q2 x Q6		Active Duty	ANG	Reserve
	Fighter	3,536	833	183
	Bomber	1,398	38	36
	Tanker	1,869	656	254
	Transport	3,230	722	1,018
	Recon	600	27	14
	Rotary	416	38	52
	Other	1,109	38	27

PERCENTAGE ON ACTIVE FLIGHT STATUS				
Q6 x Q12		Active Duty	ANG	Reserve
	Pilot	76%	96%	95%
	Navigator	53%	92%	87%
	Flight Surgeon	69%	97%	86%

PERCENT RETURN BY FLYING HOURS				
Q6 x Q11		Active Duty	ANG	Reserve
	< 200 Hrs	1%	1%	2%
	200 < 1,000 Hrs	11%	12%	6%
	1,000 < 2,500 Hrs	40%	29%	22%
	2,500 < 5,000 Hrs	46%	44%	48%
	5,000 + Hrs	2%	14%	22%

PERCENT FLYING WITH MEDICAL WAIVERS			
Q6 x Q8 x Q9		All Waivers	At Least One Waiver Eye Related
	Active Duty	28%	13%
	ANG	17%	8%
	Reserve	18%	8%

PERCENT OF AIRCREW USING TOBACCO				
Q6 x Q14		Active Duty	ANG	Reserve
	Smoke	4%	6%	6%
	Chew	5%	5%	4%
	Both	< 1%	< 1%	< 1%

PERCENT BY CREW POSITION USING TOBACCO				
Q12 x Q14		Smoke	Chew	Both
	Pilots	4%	6%	< 1%
	Navigators	6%	3%	< 1%
	Flight Surgeons	4%	2%	0%

II. AIRCREW SPECTACLES

PERCENT AIRCREW WEARING SPECTACLES				
Q6 x Q12 x Q15		Active Duty	ANG	Reserve
	Pilot	39.3%	39.9%	39.6%
	Navigator	63.3%	64.8%	65.1%
	Flight Surgeon	76.2%	81.1%	81.4%
	Other	53.0%	45.5%	50.0%

PERCENT FRAME TYPE WORN FOR FLYING				
Q6 x Q16		Active Duty	ANG	Reserve
	DoD Standard	80.8%	66.0%	62.4%
	Civ Approved	5.5%	9.4%	9.6%
	Civ Not Approved	0.5%	1.3%	2.1%
	Civ Do Not Know	12.7%	23.0%	25.5%
	Other	0.5%	0.3%	0.4%

PERCENT SATISFIED WITH DoD AIRCREW FRAME					
Q12 x Q17		Pilots	Navs	FS	Other
	Very Satisfied	2.7	2.8	3.2	5.2
	Satisfied	23.8	21.5	26.0	21.1
	Slightly Sat	8.1	8.2	9.4	7.0
	Neither	9.5	10.5	13.4	12.3
	Slightly Dissat	18.0	18.2	17.3	12.3
	Dissatisfied	22.8	22.0	19.8	26.3
	Very Dissatisfied	15.1	16.8	10.9	15.8

SPECTACLE WEARERS WANTING NEW FLIGHT FRAME					
Q4 x Q19	Rank	No		Yes	
	O-1	4		13	
	O-2	38		212	
	O-3	429		2,295	
	O-4	263		1,482	
	O-5	351		1,675	
	O-6	180		767	
	O-7 Or Above	28		84	
		1,293	(16.5%)	6,528	(83.5%)

COLOR FOR NEW COMBAT AIRCREW FRAME					
Q4 x Q20	Rank	Black	Silver	Gold	Other
	O-1	7	6	1	2
	O-2	115	96	28	10
	O-3	1,427	645	425	214
	O-4	861	328	400	141
	O-5	1,003	399	476	134
	O-6	441	217	205	77
	0-7 Or Above	60	13	24	11
		3,914	1,704	1,559	589

COLOR FOR NEW DRESS AIRCREW FRAME					
Q4 x Q21	Rank	Black	Silver	Gold	Other
	O-1	2	7	5	2
	O-2	29	92	111	13
	O-3	193	892	1,444	189
	O-4	113	435	1,113	86
	O-5	148	519	1,294	77
	O-6	50	232	630	37
	0-7 Or Above	8	16	81	6
		543	2,193	4,678	410

SPECTACLE LENSES FALLING OUT IN-FLIGHT						
Q2 x Q23		No Never	Yes Not Fly	Yes		
				1-5	6-10	>10
	Fighter	1,132	504	371	34	19
	Bomber	369	210	169	9	18
	Tanker	682	309	229	24	18
	Transport	1,192	509	439	52	30
	Recon	162	84	65	6	4
	Rotary	129	64	24	1	1
	Other	279	139	101	11	4
		3,945	1,819	1,398	137	94

SPECTACLE LENSES FALLING OUT IN-FLIGHT ALL AIRCREW COMBINED			
Q23	Never	54%	
	Yes, Not Flying	25%	
	Yes, Flying, 1-5	19%	
	6-10	1.8%	22%
	> 10	1.3%	

SPECTACLE LENSES FALLING OUT IN-FLIGHT BY FRAME SOURCE					
Q16 x Q23		DoD FRAME		CIV FRAME	
	Never	49%		62%	
	Yes, Not Flying	27%		19%	
	Yes, Flying, 1-5	20%		17%	
	6-10	2%	24%	2%	20%
	> 10	2%		1%	

PERCENT OF SPECTACLE WEARERS IN MULTIFOCALS			
Q6 x Q33-42		Multifocal	
	Active Duty	17.6%	(1,058)
	ANG	39.4%	(443)
	Reserve	45.5%	(339)

MULTIFOCALS BASED ON COCKPIT MEASUREMENTS?				
Q6 x Q33		Yes	No	Do Not Know
	Active Duty	168	755	163
	ANG	150	213	94
	Reserve	64	214	65
		382	1,182	322

MULTIFOCALS PROVIDE WIDE ENOUGH FIELD?					
Q12 x Q35		Yes		No	
	Pilots	598	(53%)	539	(47%)
	Navigators	280	(63%)	168	(37%)
	Flight Surgeons	171	(77%)	52	(23%)
	Other	9	(56%)	7	(44%)
		1,058	(58%)	766	(42%)

MULTIFOCAL KEY
Exec = Executive - Multifocal Goes Completely Across The Width Of The Lens
ST = Straight Top - Multifocal Goes Partially Across The Width Of The Lens (22, 25, 28, 35 mm Series)
Prog = Progressive - No Line Multifocal That Progressively Increases In Power As You Go Down The Lens

STYLES OF MULTIFOCALS IN THE COCKPIT					
Q6 x Q36		EXEC	ST	PROG	UNSURE
	Active Duty	98	829	64	67
	ANG	65	300	60	18
	Reserve	39	236	51	13
		202	1,365	175	98

STYLES OF MULTIFOCALS IN THE COCKPIT					
Q12 x Q36		EXEC	ST	PROG	UNSURE
	Pilots	117	881	85	60
	Navigators	58	310	53	35
	Flight Surg	24	165	35	1
	Other	3	9	2	2
		202	1,365	175	98

PREFERRED MULTIFOCALS IN THE COCKPIT								
Q6 x Q37								
	EXEC		ST		PROG		UNSURE	
Active Duty	114		210		542		201	
ANG	63		94		227		65	
Reserve	55		52		185		47	
	232	(13%)	356	(19%)	954	(51%)	313	(17%)

PREFERRED MULTIFOCALS IN THE COCKPIT					
Q12 x Q37		EXEC	ST	PROG	UNSURE
	Pilots	144	215	592	203
	Navigators	54	71	249	85
	Flight Surg	32	65	106	23
	Other	2	5	7	2
		232	356	954	313

PREFERRED MULTIFOCAL AVAILABILITY					
Q6 x Q38		Yes		No	
	Active Duty	526	(50%)	523	(50%)
	ANG	214	(49%)	224	(51%)
	Reserve	138	(41%)	196	(59%)

PREFERRED MULTIFOCAL AVAILABILITY					
Q4 x Q38		Yes		No	
	O-1	0		0	
	O-2	0		0	
	O-3	8		8	
	O-4	43		67	
	O-5	401		462	
	O-6	362		356	
	O-7 Or Above	58		39	
		872	(48%)	932	(52%)

III. CONTACT LENSES

CONTACT LENS WEARERS					
Q12 x Q43		Pilots	Navs	FS	Other
	SCL Program	1,266	865	127	12
	SCL Medical	17	17	2	0
	HCL Medical	8	8	1	0
	Do Not Know	131	133	6	2

CONTACT LENS WEARERS				
Q6 x Q43		Active Duty	ANG	Reserve
	SCL Program	2,000	177	93
	SCL Medical	26	6	4
	HCL Medical	12	3	2
	Do Not Know	176	57	39

ADEQUATE SCL BRIEFING BY FLIGHT SURGEON					
Q6 x Q45		Yes		No	
	Active Duty	2,010	(93%)	141	(7%)
	ANG	184	(84%)	36	(16%)
	Reserve	95	(76%)	30	(24%)

ADEQUATE SCL REMOVAL TRAINING WITH GLOVES					
Q6 x Q49		Yes		No	
	Active Duty	632	(30%)	1,492	(70%)
	ANG	65	(31%)	147	(69%)
	Reserve	30	(25%)	89	(75%)

SQUADRON PAYS FOR SCLS AND SOLUTIONS					
Q6 x Q51		Yes		No	
	Active Duty	713	(33%)	1,418	(67%)
	ANG	9	(4%)	210	(96%)
	Reserve	10	(8%)	111	(92%)

REQUIRED SCLS AND SUPPLIES IN YOUR MOBILITY BAG?			
Q6 x Q50		Yes	No
	Active Duty	42%	58%
	ANG	38%	62%
	Reserve	44%	56%

SHOULD SCLS BE FURNISHED TO AIRCREW?					
Q6 x Q52		Yes		No	
	Active Duty	1,957	(90%)	207	(10%)
	ANG	204	(91%)	19	(9%)
	Reserve	112	(89%)	14	(11%)

SHOULD SCLS BE FURNISHED TO AIRCREW?			
Q4 x Q52		Yes	No
	O-1	0	1
	O-2	94	6
	O-3	1,132	95
	O-4	549	71
	O-5	384	56
	O-6	89	11
	0-7 Or Above	10	0

BACK-UP SPECTACLES CARRIED ON MISSIONS						
Q12 x Q56		Pilots	Navs	FS	Other	Total %
	Always	1,230	807	98	11	83%
	Most Times	79	115	22	3	8%
	Sometimes	39	45	10	3	4%
	Never	71	62	7	0	5%

FREQUENCY OF CL FALLING OUT IN-FLIGHT			
Q59	Never	2,309	(90%)
	1-5 Times	265	(10%)
	6-10 Times	2	(< 1%)
	> 10 Times	1	(< 1%)

FREQUENCY OF CL DISPLACEMENT IN-FLIGHT			
Q60	Never	1,907	(74%)
	1-5 Times	616	(24%)
	6-10 Times	37	(1%)
	> 10 Times	14	(< 1%)

FREQUENCY OF PARTICLES UNDER CL IN-FLIGHT			
Q61	Never	1,809	(71%)
	1-5 Times	706	(27%)
	6-10 Times	38	(1%)
	> 10 Times	11	(< 1%)

REASONS FOR CL REMOVAL IN-FLIGHT			
Q62	Never Had To Remove	1,909	(76%)
	CL Uncomfortable	112	(4%)
	CL Too Dry	204	(8%)
	Particle Under CL	164	(7%)
	Other CL Displaced	65	(3%)
	Other Reasons	49	(2%)

EFFECT OF CL DISPLACEMENT & PARTICLES ON MISSION			
Q63	No Effect	2,340	(98%)
	Mission Affected	56	(2%)

CLS AN OPERATIONAL ADVANTAGE?					
Q12 x Q65		Yes		No	
	Pilots	1,364		28	
	Navigators	994		24	
	Flight Surgeons	132		6	
	Others	15		1	
		2,505	(98%)	59	(2%)

CLS AN OPERATIONAL ADVANTAGE?			
Q2 x Q65		Yes	No
	Fighter	925	12
	Bomber	236	10
	Tanker	281	6
	Transport	541	19
	Recon	108	3
	Rotary	77	2
	Other	189	2

MAJOR CL OPERATIONAL ADVANTAGES					
Q12 x Q66		Pilots	Navs	FS	Other
	No Advantage	18	18	4	1
	L-S Compatibility	106	120	18	6
	Improved Acuity	203	207	21	2
	Improved FOV	471	276	44	2
	Elim Fogging	58	40	6	0
	Elim Reflections	27	11	0	0
	Self-Esteem	5	2	1	0
	No G Slipping	31	14	7	0
	Other	31	27	2	0

MAJOR CL OPERATIONAL DISADVANTAGES					
Q12 x Q67		Pilots	Navs	FS	Other
	None	800	620	84	10
	VA Not Adequate	38	11	3	1
	CLs Dry Out	403	294	38	2
	Uncomfortable	36	13	3	0
	Not G Stable	6	1	0	0
	CL Particles	40	29	5	2
	Other	32	23	2	1

IV. CLINIC SUPPORT

FLIGHT MEDICINE VISION SUPPORT					
Q6 x Q71		AD	ANG	RES	Total %
	Very Satisfied	5,356	888	427	46.7%
	Somewhat Satisfied	2,682	491	334	24.6%
	Neither	1,851	376	283	17.6%
	Somewhat Dissatisfied	629	197	162	6.9%
	Very Dissatisfied	377	115	105	4.2%

EYE CLINIC VISION SUPPORT					
Q6 x Q72		AD	ANG	RES	Total %
	Very Satisfied	5,030	870	397	46.8%
	Somewhat Satisfied	2,499	436	291	24.0%
	Neither	1,667	404	289	17.6%
	Somewhat Dissatisfied	662	168	145	7.2%
	Very Dissatisfied	378	112	103	4.4%

EYE CLINIC CONTACT LENS SUPPORT					
Q6 x Q73		AD	ANG	RES	Total %
	Very Satisfied	957	73	29	37.4%
	Somewhat Satisfied	580	38	24	22.7%
	Neither	409	90	46	19.3%
	Somewhat Dissatisfied	269	34	21	11.5%
	Very Dissatisfied	194	35	30	9.1%

SATISFACTION WITH ACCESS TO EYECARE					
Q6 x Q74		AD	ANG	RES	Total %
	Very Satisfied	5,054	717	344	42.2%
	Somewhat Satisfied	2,808	470	291	24.6%
	Neither	1,851	442	310	17.9%
	Somewhat Dissatisfied	889	276	214	9.5%
	Very Dissatisfied	514	175	155	5.8%

OPERATIONAL KNOWLEDGE OF EYECARE PROFESSIONAL					
Q6 x Q75		AD	ANG	RES	Total %
	Very Satisfied	4,078	795	354	37.0%
	Somewhat Satisfied	2,830	451	297	25.3%
	Neither	2,640	484	374	24.7%
	Somewhat Dissatisfied	838	203	168	8.5%
	Very Dissatisfied	394	131	112	4.5%

COCKPIT EVALUATION OF NEW RX BEFORE FLIGHT?					
Q6 x Q76		Yes		No	
	Active Duty	1,740		4,058	
	ANG	386		737	
	Reserve	168		550	
		2,294	(30%)	5,345	(70%)

EYE CLINIC FIT SPECTACLES TO FLIGHT GEAR?					
Q6 x Q77		Yes		No	
	Active Duty	162	(3%)	5,536	(97%)
	ANG	49	(5%)	1,045	(95%)
	Reserve	24	(3%)	694	(97%)

FSO VISION TESTING ADEQUATE FOR FLYING?					
Q4 x Q79		Yes		No	
	O-1	45		6	
	O-2	694		60	
	O-3	6,187		938	
	O-4	3,255		655	
	O-5	2,784		675	
	O-6	1,003		269	
	0-7 Or Above	98		27	
		14,066	(84%)	2,630	(16%)

FSO VISION TESTING ADEQUATE FOR FLYING?					
Q15 x Q79		Spectacle Wearers		Non Spectacle Wearers	
	Yes	6,205	(80%)	7,667	(88%)
	No	1,587	(20%)	1,013	(12%)

ANNUAL EXAM BY USAF EYECARE PROFESSIONAL?					
Q4 x Q80		Yes		No	
	O-1	34		16	
	O-2	400		352	
	O-3	4,295		2,829	
	O-4	2,457		1,460	
	O-5	2,385		1,079	
	O-6	929		344	
	0-7 Or Above	102		24	
		10,602	(63%)	6,104	(37%)

V. AIRCREW SUNGLASSES

AIRCREW WEARING SUNGLASSES IN-FLIGHT **Only 20% of plano sunglass wearers use those provided by theDoD*					
Q6 x Q82		AD	ANG	RES	Total
	Do Not Wear	6,397	1,103	431	7,931
	DoD Rx	2,426	430	335	3,191
	DoD Plano	735	128	114	977
	Commercial Rx	355	130	104	589
	Commercial Plano	2,867	565	578	*4,010

MOST POPULAR TINT FOR COMMERCIAL SUNGLASSES			
Q83	Tint	Number Wearing	
	Gray	1,821	(35.3%)
	Green	1,361	(26.4%)
	Brown	1,056	(20.5%)
	Yellow	308	(6.0%)
	Orange	188	(3.6%)
	Other	425	(8.2%)

DoD PROVIDED SUNGLASSES IN-FLIGHT *64% of aircrew think they are just right					
Q12 x Q84		Pilots	Navs	FS	Other
	Too Dark	1,413	274	49	7
	Just Right	4,069	1,183	285	33
	Too Light	1,087	254	40	8

DoD PROVIDED SUNGLASSES IN-FLIGHT *26% Of Fighter Aircrew - Lenses Too Dark				
Q2 x Q84		Too Dark	Just Right	Too Light
	Fighter	251	612	100
	Bomber	60	361	97
	Tanker	395	1,214	319
	Transport	781	2,342	627
	Recon	65	213	42
	Rotary	19	122	32
	Other	98	366	101

SUNGLASSES AND SUN VISOR WORN TOGETHER						
Q12 x Q86		Pilots	Navs	FS	Other	Total %
	Always	221	34	15	1	3%
	Often	1,272	151	57	11	17%
	Seldom	1,347	328	97	13	20%
	Never	3,908	1,222	203	30	60%

SUNGLASSES AND SUN VISOR WORN TOGETHER			
Q12 x Q86		Fighter Aircrew Only	
	Always	40	(4%)
	Often	197	(4%)
	Seldom	380	(38%)
	Never	375	(38%)

SUNGLASSES AND LASER VISOR WORN TOGETHER					
Q12 x Q87		Pilots	Navs	FS	Other
	Always	13	2	2	0
	Often	46	13	4	0
	Seldom	147	49	12	2
	Never *	6,402	1,660	347	48
	**97% Have Not Worn Together*				

VI. AIRCREW VISORS

VISORS WORN BY AIRCREW					
Q12 x Q89		Pilots	Navs	FS	Other
	No Visor Worn	5,845	2,699	289	68
	Clear Only	149	302	15	10
	Sun Only	2,155	334	100	10
	HCV Only	207	15	1	0
	Clear & Sun	2,376	656	159	13
	Clear & HCV	37	8	0	0
	Sun & HCV	187	9	4	2
	All Three	493	103	16	5

VISORS WORN BY AIRCREW				
Q2 x Q89		Fighter	Bomber	Rotary
	No Visor Worn	238	391	27
	Clear Only	88	225	15
	Sun Only	1,657	155	118
	HCV Only	214	0	0
	Clear & Sun	1,310	611	313
	Clear & HCV	42	1	0
	Sun & HCV	180	2	1
	All Three	566	9	2

CLEAR VISOR WORN AT NIGHT FOR PROTECTION?					
Q12 x Q93		Yes		No	
	Pilots	3,559		2,100	
	Nav	939		508	
	FS	200		98	
	Other	27		12	
		4,725	(63.5%)	2,718	(36.5%)

CLEAR VISOR WORN AT NIGHT FOR PROTECTION?					
Q2 x Q93		Yes		No	
	Fighter	2,606	(64%)	1,443	(36%)
	Bomber	736	(73%)	266	(27%)
	Rotary	187	(41%)	264	(59%)

SUN VISOR DARKNESS IN-FLIGHT					
Q12 x Q94		Pilots	Navs	FS	Other
	Much Too Dark	95	21	2	0
	Some Too Dark	916	192	25	8
	Just Right	3,964	1,048	228	20
	Some Too Light	608	123	44	6
	Much Too Light	23	3	0	0

SUN VISOR DARKNESS IN-FLIGHT				
Q2 x Q94		Fighter	Bomber	Rotary
	Much Too Dark	*88	13	1
	Some Too Dark	*863	82	27
	Just Right	2,751	718	345
	Some Too Light	314	137	74
	Much Too Light	5	5	0
	** "Too Dark" Equals 24% Of Fighter Responses*			

DIFFICULTY SEEING COCKPIT DISPLAY WITH SUN VISOR?							
Q12 x Q95		Yes		No		N/A	
	Pilots	1,480	(26.2%)	4,062	(71.8%)	115	(2.0%)
	Nav	330	(22.8%)	913	(63.0%)	206	(14.2%)
	FS	56	(18.7%)	225	(75.3%)	18	(6.0%)
	Other	8	(21.6%)	25	(67.6%)	4	(10.8%)

DIFFICULTY SEEING COCKPIT DISPLAY WITH SUN VISOR?							
Q2 x Q95		Yes		No		N/A	
	Pilots	1,480	(26.2%)	4,062	(71.8%)	115	(2.0%)
	Fighter	1,044	(25.7%)	2,959	(72.9%)	56	(1.4%)
	Bomber	320	(32.0%)	543	(54.3%)	137	(13.7%)
	Rotary	136	(30.2%)	310	(68.9%)	4	(0.9%)

WOULD YOU LIKE MORE THAN ONE DARKNESS OF SUN VISOR?					
Q12 x Q96		Yes		No	
	Pilots	3,557		2,087	
	Nav	778		647	
	FS	184		115	
	Other	26		11	
		4,545	(61.4%)	2,860	(38.6%)

WOULD YOU LIKE MORE THAN ONE DARKNESS OF SUN VISOR?					
Q2 x Q96		Yes		No	
	Fighter	2,664	(65.8%)	1,382	(34.2%)
	Bomber	548	(55.6%)	438	(44.4%)
	Rotary	247	(54.9%)	203	(45.1%)

EVER WORN THE HIGH CONTRAST VISOR (HCV)?					
Q12 x Q99		Yes		No	
	Pilots	1,745		4,390	
	Nav	235		1,445	
	FS	39		276	
	Other	9		37	
		2,028	(25%)	6,148	(75%)

EVER WORN THE HIGH CONTRAST VISOR (HCV)?					
Q2 x Q99		Yes		No	
	Fighter	1,852	(43%)	2,427	(57%)
	Bomber	30	(3%)	1,046	(97%)
	Rotary	19	(4%)	456	(96%)

HCV IMPROVES TARGET ACQUISITION					
Q12 x Q103		Yes		No	
	Pilots	1,286	(72.9%)	477	(27.1%)
	Nav	187	(75.1%)	62	(24.9%)
	FS	24	(58.5%)	17	(41.5%)
	Other	8	(88.9%)	1	(11.1%)
Q2 x Q103	Fighter	1,372	(73.8%)	486	(26.2%)

DIFFICULTY SEEING COCKPIT DISPLAY WITH HCV?					
Q12 x Q106		Yes		No	
	Pilots	261	(14.8%)	1,497	(85.2%)
	Nav	56	(22.5%)	193	(77.5%)
	FS	6	(14.3%)	36	(85.7%)
	Other	1	(10.0%)	9	(90.0%)
Q2 x Q106	Fighter	296	(15.9%)	1,562	(84.1%)

TROUBLE DETECTING GROUND TARGET COLORS WITH HCV?					
Q12 x Q107		Yes		No	
	Pilots	408	(23.7%)	1,316	(76.3%)
	Nav	50	(20.2%)	198	(79.8%)
	FS	6	(15.0%)	34	(85.0%)
	Other	1	(11.1%)	8	(88.9%)
Q2 x Q107	Fighter	425	(23.3%)	1,402	(76.7%)

AWARE THAT HCV DOES NOT PROVIDE LASER PROTECTION?					
Q109		Yes		No	
	All Aircrew Who Wear HCV	1,681	(81.9%)	371	(18.1%)

RATE THE COMBAT EFFECTIVENESS OF THE HCV						
Q12 x Q110		Pilots	Navs	FS	Other	Total
	Very Effective	345	57	2	4	408
	Somewhat	728	105	19	3	855
	Minimally	450	56	13	1	520
	Not Effective	227	30	6	0	263

RATE THE COMBAT EFFECTIVENESS OF THE HCV			
Q2 x Q110		Fighter	
	Very Effective	374	(20.2%)
	Somewhat Effective	777	(41.9%)
	Minimally Effective	463	(25.0%)
	Not Effective	240	(12.9%)

VII. LASER EYE PROTECTION

WITH WHAT LEP* HAVE YOU HAD THE MOST EXPERIENCE? *1,029 Listed PLZT As The LEP Of Most Experience			
Q111		All Aircrew	
	Never Worn Lep	13,964	(92.2%)
	Do Not Know	429	(2.8%)
	Barnes	282	(1.9%)
	FV-4	137	(0.9%)
	EEK	111	(0.7%)
	Gentex	103	(0.6%)
	FV-2	25	(0.2%)
	Army-2n	23	(0.2%)
	KG3	12	(0.1%)
	Army-3n	9	(0.1%)
	Other	43	(0.3%)

AIRCREW WITH PLZT EXPERIENCE			
Q2 x Q111	Weapon System	Aircrew	
	Fighter	16	(1.6%)
	Bomber	157	(16.1%)
	Tanker	613	(62.9%)
	Transport	65	(6.6%)
	Recon	62	(6.4%)
	Rotary	0	(0.0%)
	Other	62	(6.4%)

AIRCREW WITH LEP EXPERIENCE			
Q2 x Q111	Weapon System	Aircrew	
	Fighter	823	(73.4%)
	All Others	299	(26.6%)

LEP WORN DURING COMBAT?				
Q113		Yes	No	Combat
	Barnes	70	140	69
	EEK	5	66	39
	FV-4	35	65	34
	Gentex	24	49	29
	Do Not Know	53	212	132

LEP WORN DURING TRAINING EXERCISES INVOLVING LASERS?					
Q6 x Q115		Yes		No	
	Active Duty	250	(13%)	1,685	(87%)
	ANG	37	(11%)	307	(89%)
	Reserve	14	(12%)	103	(88%)
		301	(13%)	2,095	(87%)
Q2 x Q115	All Fighter	199	(21.8)	712	(78.2)

AEROMEDICAL BRIEFING ON LASER EYE INJURY OR FLASH BLINDNESS?					
Q6 x Q116		Yes		No	
	Active Duty	1,694	(85.4%)	290	(14.6%)
	ANG	312	(87.6%)	44	(12.4%)
	Reserve	102	(83.6%)	20	(16.4%)
Q2 x Q116	All Fighter	847	(90.0%)	95	(10.0%)

DIFFICULTY SEEING OTHER AIRCRAFT WHEN WEARING LEP?					
Q111 x Q119		Yes		No	
	Barnes	47	(16.9%)	232	(83.1%)
	EEK	14	(13.5%)	90	(86.5%)
	FV-4	26	(19.4%)	108	(80.6%)
	Gentex	14	(13.9%)	87	(86.1%)
	Do Not Know	42	(12.0%)	309	(88.0%)
Q2 x Q119	All Fighter	136	(16.0%)	712	(84.0%)

DIFFICULTY SEEING OTHER AIRCRAFT'S LIGHTS WHEN WEARING LEP?					
Q111 x Q120		Yes		No	
	Barnes	55	(20.3%)	216	(79.7%)
	EEK	14	(13.9%)	87	(86.1%)
	FV-4	29	(22.1%)	102	(77.9%)
	Gentex	14	(14.0)	86	(86.0%)
	Do Not Know	48	(14.0%)	295	(86.0%)
Q2 x Q120	All Fighter	148	(17.9%)	679	(82.1%)

DIFFICULTY SEEING GROUND TARGETS WHEN WEARING LEP?					
Q111 x Q121		Yes		No	
	Barnes	55	(20.5%)	213	(79.5%)
	EEK	20	(19.8%)	81	(80.2%)
	FV-4	25	(19.1%)	106	(80.9%)
	Gentex	15	(15.0%)	85	(85.0%)
	Do Not Know	40	(11.7%)	303	(88.3%)
Q2 x Q121	All Fighter	149	(18.1%)	673	(81.9%)

DIFFICULTY SEEING COCKPIT DISPLAYS WHEN WEARING LEP?					
Q111 x Q122		Yes		No	
	Barnes	132	(48.0%)	143	(52.0%)
	EEK	34	(33.0%)	69	(67.0%)
	FV-4	68	(51.5%)	64	(48.5%)
	Gentex	36	(35.6%)	65	(64.4%)
	Do Not Know	102	(29.6%)	243	(70.4%)
Q2 x Q122	All Fighter	354	(42.7%)	476	(57.3%)

FLASH BLINDED BY COMMERCIAL LASER LIGHT SHOW IN-FLIGHT?					
Q126		Yes		No	
	All Aircrew Using LEP	38	(2%)	2,146	(98%)
	**May Be Underestimated As Question Was Asked Of LEP Wearers Only*				

VIII. NIGHT VISION GOGGLES

AIRCREW FLYING WITH NVG				
Q127	Fly With NVG		Do Not Fly With NVG	
	2,479	(15%)	14,011	(85%)

TYPE OF NVG PRIMARILY USED FOR FLYING DUTIES						
Q6 x Q127		AD	ANG	RES	Total	
	ANVIS	1,308	185	128	1,621	(65.4%)
	F4949	433	95	44	572	(23.1%)
	Cats Eyes	10	18	2	30	(1.2%)
	AN/PVS-5	122	11	7	140	(5.6%)
	Other	96	12	8	116	(4.7%)

TYPE OF NVG PRIMARILY USED FOR FLYING DUTIES				
Q2 x Q127		Fighter	Bomber	Tanker
	ANVIS	164	283	130
	F4949	189	3	11
	Cats Eyes	18	1	7
	AN/PVS-5	12	24	20
	Other	14	22	44
		397	333	212

TYPE OF NVG PRIMARILY USED FOR FLYING DUTIES					
Q2 x Q127		Trans	Recon	Rotary	Other
	ANVIS	618	2	215	123
	F4949	117	0	183	56
	Cats Eyes	4	0	0	0
	AN/PVS-5	61	1	8	7
	Other	19	1	1	5
		819	4	407	191

FORMAL NVG TRAINING COURSE TAKEN?					
Q6 x Q 128		Yes		No	
	Active Duty	1,566	(74.1%)	546	(25.9%)
	ANG	222	(62.4%)	134	(37.6%)
	Reserve	138	(70.0%)	59	(30.0%)

MOST SIGNIFICANT OPERATIONAL LIMITATION OF NVGS							
Q127 x Q129		Small FOV		Visual Acuity		Depth	
	ANVIS	670		222		489	
	F4949	257		57		132	
	Cats Eyes	12		5		5	
	AN/PVS-5	45		28		50	
	Other	41		20		23	
	Total	1,025	(43.0%)	332	(13.9%)	699	(29.3%)

MOST SIGNIFICANT OPERATIONAL LIMITATION OF NVGS (Cont)							
Q127 x Q129		Lack of Color		Other		No Sig. Limits	
	ANVIS	47		67		72	
	F4949	35		23		52	
	Cats Eyes	1		0		2	
	AN/PVS-5	3		3		3	
	Other	3		13		5	
	Total	89	(3.7%)	106	(4.4%)	134	(5.7%)

IN-FLIGHT ACCIDENT OR INCIDENT DUE TO NVG LIMITATIONS					
Q6 x Q130		Yes		No	
	Active Duty	57	(2.8%)	2,012	(97.2%)
	ANG	6	(1.7%)	348	(98.3%)
	Reserve	3	(1.5%)	194	(98.5%)

IN-FLIGHT ACCIDENT OR INCIDENT DUE TO NVG LIMITATIONS			
Q127 x Q130		Accidents or Incidents	% Of Total
	ANVIS	40	65.6%
	F4949	15	24.6%
	Cats Eyes	0	0.0%
	AN/PVS-5	3	4.9%
	Other	3	4.9%

IN-FLIGHT ACCIDENT OR INCIDENT DUE TO NVG LIMITATIONS			
Q2 x Q130		Accidents or Incidents	% Of Total
	Fighter	4	6.6%
	Bomber	11	18.0%
	Tanker	2	3.3%
	Transport	12	19.7%
	Recon	0	0.0%
	Rotary	22	36.0%
	Other	10	16.4%

NVGS EVER ELECTRONICALLY MALFUNCTION IN-FLIGHT?					
Q127 x Q131		Yes		No	
	ANVIS	523	(33%)	1,079	(67%)
	F4949	140	(25%)	424	(75%)
	Cats Eyes	5	(18%)	23	(82%)
	An/PVS-5	41	(29%)	99	(71%)
	Other	30	(27%)	80	(73%)

ADEQUATE NVG FOCUS TRAINING BEFORE FLIGHT?					
Q6 x Q132		Yes		No	
	Active Duty	1,801	(87%)	265	(13%)
	ANG	320	(92%)	26	(8%)
	Reserve	165	(84%)	31	(16%)

UNIT NVG TEST LANE AVAILABLE FOR PRE-FLIGHT?							
Q6 x Q136		Yes		Yes, but Inadequate		No	
	Active Duty	1,442		186		418	
	ANG	304		19		26	
	Reserve	138		18		40	
		1,884	(72.7%)	223	(8.6%)	484	(18.7%)

UNIT NVG TEST LANE AVAILABLE FOR PRE-FLIGHT?				
Q10 x Q136		Yes	Yes, but Inadequate	No
	ACC	840	129	129
	AFSOC	411	18	9
	AMC*	125	17	201
	AETC	177	15	44
	PACAF	110	12	6
	USAFE	29	8	15
**59% Of AMC NVG Wearers Report No Lane For Pre-Flight*				

TEST LANE USED TO PRE-FLIGHT NVGS?							
Q6 x Q137		Yes		No		NA	
	Active Duty	1,555		69		430	
	ANG	316		5		28	
	Reserve	151		7		39	
		2,022	(77.8%)	81	(3.1%)	497	(19.1%)

TEST LANE USED TO PRE-FLIGHT NVGS?				
Q10 x Q137		Yes	No	NA
	ACC	937	21	140
	AFSOC	412	7	21
	AMC	125	27	188
	AETC	191	7	41
	PACAF	119	2	8
	USAFE	34	4	14

REFOCUS CHANGE REQUIRED DURING ASCENT OR DESCENT?					
Q127 x Q138		Yes		No	
	ANVIS	315	(20%)	1,290	(80%)
	F4949	94	(17%)	474	(83%)
	Cats Eyes	5	(17%)	25	(83%)
	AN/PVS-5	29	(21%)	110	(79%)
	Other	18	(17%)	90	(83%)

DOES YOUR NVG VISION CHANGE DURING A MISSION?									
Q127 x Q140		Stable		Gradual Decr.		Gradual Incr.		Fluctuates	
	ANVIS	943	(60%)	199	(12%)	161	(10%)	291	(18%)
	F4949	398	(71%)	41	(7%)	50	(9%)	74	(13%)
	Cats Eyes	21	(70%)	0	(0%)	6	(20%)	3	(10%)
	AN/PVS-5	76	(56%)	16	(12%)	16	(12%)	28	(20%)
	Other	65	(60%)	7	(7%)	13	(12%)	23	(21%)

AFTER-IMAGES OR ALTERED COLOR VISION AFTER NVG MISSION?					
Q127 x Q142		Yes		No	
	ANVIS	145	(9%)	1,446	(91%)
	F4949	59	(10%)	506	(90%)
	Cats Eyes	0	(0%)	30	(100%)
	AN/PVS-5	17	(12%)	121	(88%)
	Other	4	(4%)	105	(96%)

HOW LONG DO AFTER-IMAGES OR ALTERED COLOR VISION LAST?				
Q127 x Q143		ANVIS	F4949	AN/PVS-5
	< 1 Min	24	10	3
	1 < 5 Min	46	19	10
	5 < 10 Min	27	8	4
	10-15 Min	26	15	0
	> 15 Min	16	6	0

HEADACHES OR EYE FATIGUE AFTER NVG MISSION?							
Q127 x Q144		Yes, Frequent		Yes, Sometimes		No	
	ANVIS	162	(10%)	800	(50%)	628	(40%)
	F4949	47	(8%)	288	(51%)	229	(41%)
	Cats Eyes	0	(0%)	5	(17%)	25	(83%)
	AN/PVS-5	11	(8%)	55	(40%)	72	(52%)
	Other	4	(4%)	34	(31%)	72	(65%)

IX. BALLISTIC PROTECTIVE DUST/WIND GOGGLES

DUST/WIND CREATE EYE DISCOMFORT OR AFFECT VISION?					
Q12 x Q147		Yes		No	
	Pilots	1,243	(11.1%)	9,938	(88.9%)
	Nav	446	(10.9%)	3,634	(89.1%)
	FS	90	(15.7%)	483	(84.3%)
	Other	15	(15.0%)	85	(85.0%)
Q2 x Q147		Yes		No	
	Fighter	551	(13.0%)	3,683	(87.0%)
	Bomber	157	(11.2%)	1,242	(88.8%)
	Tanker	207	(8.0%)	2,381	(92.0%)
	Transport	411	(8.9%)	4,217	(91.1%)
	Recon	66	(11.1%)	528	(88.9%)
	Rotary	180	(37.0%)	307	(63.0%)
	Other	123	(11.3%)	966	(88.7%)

CURRENTLY USE DUST/WIND GOGGLE?					
Q6 x Q148		Yes		No	
	Active Duty	80	(0.6%)	12,156	(99.4%)
	ANG	21	(1.0%)	2,173	(99.0%)
	Reserve	17	(1.2%)	1,453	(98.8%)

CURRENTLY USE DUST/WIND GOGGLE?					
Q2 x Q148		Yes		No	
	Fighter	25		4,201	
	Bomber	6		1,385	
	Tanker	8		2,578	
	Transport	48		4,558	
	Recon	6		581	
	Rotary	15		476	
	Other	5		1,097	
		113	(< 1%)	14,876	(>99%)

DEVELOP AN IMPROVED DUST/WIND GOGGLE?					
Q6 x Q150		Yes		No	
	Active Duty	3,704	(35.0%)	6,889	(65.0%)
	ANG	698	(37.1%)	1,182	(62.9%)
	Reserve	493	(38.8%)	778	(61.2%)
Q2 x Q150			Yes	No	
	Fighter	1,116	(31.0%)	2,485	(69.0%)
	Bomber	432	(34.5%)	822	(65.5%)
	Tanker	704	(31.5%)	1,533	(68.5%)
	Transport	1,461	(37.0%)	2,487	(63.0%)
	Recon	176	(35.0%)	327	(65.0%)
	Rotary	358	(75.1%)	119	(24.9%)
	Other	349	(36.6%)	604	(63.4%)

X. VISION STANDARDS

WHO SHOULD DETERMINE USAF AIRCREW VISION STANDARDS?					
Q6 x Q151		AD	ANG	RES	Total
	Rated Corps	2,356	537	349	19%
	Medical Corps	747	146	115	6%
	Both	9,695	1,656	1,085	74%
	Other	86	31	31	1%

WHO SHOULD DETERMINE USAF AIRCREW VISION STANDARDS?					
Q4 x Q151		Rated	Medical	Both	Other
	0-1	5	1	45	0
	0-2	167	21	562	7
	0-3	1,498	398	5,190	64
	0-4	743	252	2,885	46
	0-5	602	235	2,607	28
	0-6	185	88	995	3
	0-7 Or Above	22	5	96	0

WHO SHOULD DETERMINE USAF AIRCREW VISION STANDARDS?					
Q15 x Q151		Spectacle Wearers		Non Spectacle Wearers	
	Rated Corps	1,399	(18%)	1,769	(20%)
	Medical Corps	538	(7%)	451	(5%)
	Both	5,769	(74%)	6,439	(74%)
	Other	61	(1%)	84	(1%)

CURRENT USAF VISION STANDARDS ARE:					
Q6 x Q152		AD	ANG	RES	Total
	Adequate	9,742	1,679	1,073	74%
	Too Strict	2,837	651	480	24%
	Too Lenient	278	39	25	2%

CURRENT USAF VISION STANDARDS ARE:					
Q12 x Q152		Pilots	Navs	FS	Other
	Adequate	9,290	2,666	465	73
	Too Strict	2,330	1,504	106	28
	Too Lenient	217	95	21	9

UFT CANDIDATES SHOULD HAVE AT LEAST 20/20 UNCORRECTED VA					
Q155		Yes		No	
	Pilots	3,210	(27.2%)	8,613	(72.8%)
	Nav	638	(15.0%)	3,629	(85.0%)
	FS	264	(45.5%)	316	(54.5%)
	Other	23	(21.3%)	85	(78.7%)

UFT CANDIDATES SHOULD HAVE NORMAL COLOR VISION					
Q156		Yes		No	
	Pilots	9,991	(84.6%)	1,820	(15.4%)
	Nav	3,595	(84.4%)	663	(15.6%)
	FS	510	(87.6%)	72	(12.4%)
	Other	89	(82.4%)	19	(17.6%)

SHOULD USAF HAVE A STRICT NIGHT VA STANDARD?					
Q12 x Q158		Yes		No	
	Pilots	6,783	(58.1%)	4,894	(41.9%)
	Nav	2,846	(67.6%)	1,366	(32.4%)
	FS	442	(75.7%)	142	(24.3%)
	Other	67	(63.8%)	38	(36.2%)

SHOULD PILOTS AND NAV HAVE THE SAME VISUAL QUALIFICATIONS?					
Q12 x Q159		Yes		No	
	Pilots	3,165	(26.8%)	8,647	(73.2%)
	Nav	1,797	(42.1%)	2,471	(57.9%)
	FS	215	(36.7%)	371	(63.3%)
	Other	45	(41.3%)	64	(58.7%)

SHOULD PILOTS AND FS HAVE THE SAME VISUAL QUALIFICATIONS?					
Q12 x Q160		Yes		No	
	Pilots	1,432	(12.1%)	10,420	(87.9%)
	Nav	647	(15.2%)	3,614	(84.8%)
	FS	95	(16.0%)	498	(84.0%)
	Other	25	(22.5%)	86	(77.5%)

ALL EQUAL, WHICH CANDIDATE WOULD YOU SELECT INTO UPT?					
Q12 x Q161		Pilots	Navs	FS	Other
	Corrected to 20/20 by CLs or spectacles	1,748	907	73	21
	Normal 20/20 without correction	5,007	1,318	346	38
	Vision correction should not be a factor	4,883	1,964	158	45

XI. COMMENTS

Approximate Numbers of Returns With Comments				
Q15	Spectacle Wearers		Non Spectacle Wearers	
	2,200	(28%)	1,230	(14%)

Most Frequently Reported Comments

The current silver aircrew frame must go
The frame is too small
Poor quality - the screws are always backing out
Flat temples cause hot spots

It still takes too long to obtain prescription flight spectacles through the eye clinics

The current issue sunglass is too small
Excessive peripheral glare
Plastic lens tints are not consistent - (this is a persistent problem)
We would like to see more wrap-around sunglass styles for cockpit use

The USAF soft contact lens program is a universal hit with aircrew
Operationally they are a must
The USAF needs to buy SCLs and supplies for all SCL wearing aircrew

What about corneal refractive surgery for aircrew?

Aircrew are concerned about UV protection at altitude - most unaware of windscreen and visor UV protection

Aircrew should be able to see a USAF eyecare professional whenever needed

Please publish the results of this survey

Thanks for asking and for your interest in aircrew vision needs

**The numerous survey comments will be sorted and analyzed in a future publication.