



OPHTHALMOLOGY WAIVERS

(Chapter reviewed and updated by MAJ A. Ari, Chief, Optometry, Lyster Army Health Clinic, and LTC J. Cleland, USAARL Vision Sciences Division)

CATARACT (ICD9 366)

AR 40-501 2-12g(2)

AEROMEDICAL CONCERNS: Aircrew members with cataracts are prone to develop uncorrectable visual acuity changes. When the cataract involves the visual axis, visual acuity can be further reduced in bright sunlight and conditions of glare. Cataracts are considered disqualifying once diagnosed even if they are asymptomatic since most are progressive.

WAIVERS:

Initial Flight Applicants: Exception to policy is rare, but will be reviewed on a case-by-case basis.

All Rated and Non-Rated Aircrew (to include Class 2/3/4 Applicants): Waivers for asymptomatic cataracts without visual impairment are reviewed on a case-by-case basis and routinely granted.

Once vision has deteriorated to less than 20/20 correctable or the patient has a positive Glare test, the aircrew member should be disqualified from flying until successful surgical removal of the cataract. This cataract surgery requires resubmission for waiver and is usually granted provided the visual acuity returns to 20/20 corrected, is within refraction limits, and the Glare test is negative (normal). Visual acuity less than that will be reviewed on a case-by-case basis and usually not granted.

INFORMATION REQUIRED:

- Ophthalmology/optometry evaluation is required for initial waiver request.
- Mentor Brightness Acuity Test (BAT, a glare testing device), should be performed prior to and after surgery with visual acuity documented for each eye separately at the low, medium and high settings.
- Confirmation is needed of the exclusion of underlying pathology such as Wilson's disease, diabetes or hypoparathyroidism.

FOLLOW-UP: Annual comprehensive ophthalmologic/optometric evaluation is required unless more frequent follow-up is clinically indicated

TREATMENT: Extracapsular lens extraction with intraocular lens (IOL) implants usually provides a sufficiently acceptable visual acuity result for military flying duties.

DISCUSSION: The visual effect of a cataract depends on its encroachment on the visual axis and the proximity to the nodal point. A posterior subcapsular cataract can have a devastating effect on vision. Two to three episodes of serious dehydration can increase the risk of developing a cataract 21-fold. Surgical success rates of greater than 90% in achieving a 20/40 best corrected VA after 1 year has been reported. The RAF restricts the flying of personnel with IOL from high performance aircraft and helicopters. This is because of the risk of pressure on ciliary body blood vessels under high Gz or vibration and because of the unknown long term effect on the corneal epithelium.

COLOR VISION DEFICITS (ICD9 368.5)

AR 40-501: 2-13f, 4-12a(5)

AEROMEDICAL CONCERNS: Normal color vision is required to accurately identify warning lights and color visual displays in the cockpit, external visual cues including airfield lighting, the Fresnel lens, aircraft formation lights and colored smoke or light signals commonly used in military operations. Interactions with other optical devices, such as laser protective visors, may compound the problem.

WAIVERS:

Initial Flight Applicants: Exception to policy is normally not granted and may be reviewed on a case-by-case basis via Mini-ACAP and/or ACAP after the complete evaluation as outlined below.

Flight Surgeons (to include 2F/2P applicants): Waivers are routinely granted for flight surgeons class.

Rated and Non-Rated Aircrew (to include 2/3/4 applicants): Non-rated aircrew will be restricted to flying with an individual with normal color vision. Waivers for a change in color vision in rated aircrew are usually granted if not due to ocular pathology and with the restriction of flying with an individual with normal color vision.

INFORMATION REQUIRED:

- Pseudoisochromatic Plates or FALANT lantern testing may be used, ensuring proper testing conditions. (See below)
- Ophthalmology evaluation
 - o Determine the color axis and the specific type of deficiency, i.e., tritanomaly, protanomaly, or deuteranomaly
 - o Rule out the existence of an underlying abnormality such as an optic nerve disorder or retinal/macular problem.
- An in-flight evaluation for rated and non-rated aircrew, with Aldis Gun Light sequences from a control tower at a distance of 1/2 to 1 mile (normal traffic pattern, VFR conditions). Three of 5 sequences of 5 lights each will be viewed.

FOLLOW-UP: No follow-up is generally required unless underlying abnormalities exist.

TREATMENT: N/A.

DISCUSSION: Defective color vision is usually congenital, showing the X-linked recessive pattern. In Caucasians, more than 8% of males and 0.5% of women have inherited color defective vision and more than 2% are dichromats with severe deficiency. A tendency toward is termed an -anomaly; a severe condition is called an -opia.. The largest group is actually trichromatic, considered color weak rather than color deficient. Dichromatics are protanopes if they have a red-green deficiency related to red-sensitive cone loss; deuteranopes if they are red-green deficient related to green-sensitive cone loss; and tritanopes if they have blue-yellow deficiency related to blue-sensitive cone loss. Deuteranopes and protanopes have difficulty interpreting VASI lights' red-white color relationship. Protanopes have difficulty interpreting red high speed taxiway exit and runway end marker lights. At night, dichromats may be further reduced to monochromaticity when the physiological phenomenon of small field tritanopia is added; this is of relevance in distinguishing navigation and anti-collision lights. Thus, while some color vision deficiencies are acceptable, the most problematical is obviously red/green abnormalities. Color vision can be affected after optic neuritis or in macular degeneration, central serous retinopathy, multiple sclerosis, as a sequela to heavy metal poisoning, or by a number of medications. No follow-up testing is currently performed after the initial flight physical.

Pseudoisochromatic Plates (PIP): The primary color vision test for the FDME. The plates should be viewed at a distance of 20-30 inches under proper illumination (McBeth easel lamp, indirect sunlight, or fluorescent light). Do not use incandescent lighting as this may allow mild deuteranomalous (green weak) individuals to pass. Each eye should be tested separately. Greater than or equal to 5 errors out of the 14 plate set or greater or equal to 4 errors out of the 17 plate set constitutes a failure of the PIP color vision test. The plates should be shuffled periodically to avoid memorization of the testing sequence and they should be replaced every 1-2 years due to fading. Results should be recorded as Pass or Fail with the number wrong/total (ex. PASS 2/14, FAIL 5/14).

Farnsworth Lantern test (FALANT): Used when an aircrew member fails the PIP test. It is given in normal room light with the patient seated eight feet from lantern. The patient is asked to identify the Red/Green or White pairs of light combinations presented. Nine pairs are initially given to the patient and if all are identified correctly, the patient passes. Record this exam same as above (number wrong/total) (ex. PASS 0/9, FAIL 1/9). If any pair is missed, however, the aircrew member should be sent to the eye clinic. Additional testing with a set of 18 pairs is authorized only if completed by an optometry/ophthalmology clinic. (see ATB: Color Vision Testing).

CONVERGENCE DEFICITS (ICD9 378.83)*AR 40-501: 4-12a(4)(e), 4-12b(3)*

AEROMEDICAL CONCERNS: Most aircrew members with convergence insufficiency are asymptomatic since they are only exophoric at near. Symptomatic aircrew, however, may break down to exotropia with fatigue or stress and complain of asthenopic problems (i.e., tearing, blurring, headache, fatigue, halo images) or frank diplopia. Near point of convergence insufficiency greater than 100 mm is considered disqualifying for Class 1 and cause for evaluation for Class 2/3/4.

WAIVERS:

Initial Flight Applicants: Initial flight applicants with confirmed convergence insufficiency are disqualified; exception to policy is rarely recommended and requests will be reviewed on a case-by-case basis.

Rated and Non-Rated Aircrew (to include Class 2/3/4 applicants): Rated aircrew applicants and members with asymptomatic convergence insufficiency after completing ophthalmologic/optometry evaluation are routinely waived. Symptomatic convergence insufficiency may be granted waiver provided treatment (see below) provides relief of symptoms.

INFORMATION REQUIRED:

Ophthalmology/optometry evaluation is required.

FOLLOW-UP: An annual ophthalmology/optometry evaluation is required. More frequent (every 6 mo.) evaluations may be required as clinically indicated.

TREATMENT: Treatment consists of a regular series of orthoptic exercises which can easily taught by the ophthalmologist or optometrist. Treatment usually takes four to eight weeks and follow-up is usually performed bi-weekly and includes the following exercises:

Base Out Prism Exercises

Consists of viewing near objects (i.e., reading) with a base out prism over one eye for 10 minutes then the other eye for 10 minutes. The exercise should be performed twice daily starting with a prism power equal to the patient's near fusional convergence and steadily increase the power of the prisms until 30-50 PD is reached.

Binocular Push-ups

Consists of viewing a visual acuity chart as close to eyes as possible for 10 minutes twice a day. This exercise is useful if the near point of convergence is abnormal, but is usually not effective without concurrent use of the base out prism exercise.

DISCUSSION: Successful treatment is determined by relief of symptoms, improved near point of convergence, or improved fusional convergence, and can be expected in 90% of the cases.

CONTACT LENS WEAR

AR 40-501: 4-11b(1)

AEROMEDICAL CONCERNS: Soft contact lens wear in place of spectacles is acceptable in all classes of aviation after meeting the unaided and corrected visual standards. The use of non-medical soft contact lenses poses no significant medical risk in the aviation environment while supervised by the military optometrist or ophthalmologist and unit flight surgeon. Contact lenses may introduce certain operational and medical risks and cannot be worn by everyone all of the time. Some personnel may not be able to meet visual standards with contacts and, therefore, would be required to wear spectacles only. Complications of contact lens wear, which include but are not limited to corneal abrasion, corneal ulceration, infection, and transient or permanent loss of vision, can be detrimental in the aviation environment and permanent suspension. Appropriate contact lens fit and visual acuity correction, at both distance and near, are required for safe flight operations.

THE USE OF MONOVISION CONTACT LENSES, HARD (GAS PERMEABLE) CONTACT LENSES OR BIFOCAL CONTACT LENSES IS NOT AUTHORIZED FOR FLIGHT OPERATIONS (AR 40-63)

WAIVERS (INFORMATION ONLY):

All Rated and Non-Rated Aircrew to INCLUDE ALL Applicants: Contact lens wear will be recorded as Information Only on the Initial FDME provided all visual standards are met and appropriate Contact Lens evaluation is performed and reported as below.

INFORMATION REQUIRED: On the initial FDME or the first FDME listing contact lens wear, the following information must be submitted in Remarks section of DD2808, block 73:

- Current contact lens parameters: brand, base curve, diameter, and power
- Visual acuity with lens wear: both distance and near for each eye
- Slit-lamp examination (noting fit, centration, and movement of contact lenses)
- Presence / absence of contact lens related complications
- Keratometry readings for each eye

FOLLOW-UP: All aircrew using contact lenses will have a yearly eye exam to ensure adequacy of function and fit, physiological compatibility, and to monitor for complications. The following information must be included on annual FDME:

- Current contact lens parameters: brand, base curve, diameter, and power
- Visual acuity with lens wear: both distance and near for each eye
- Slit-lamp examination (noting fit, centration, and movement of contact lenses)
- Presence / absence of contact lens related complications. Personnel with repeated complications will be required to use spectacles until resolved and cleared by eye specialist.

DEPLOYMENT REQUIREMENTS: Aviators must train in the same manner as they fight. Aircrew members subject to deployment are responsible for maintaining the following in their personal equipment bag:

- Two pair of clear and one pair of tinted ("sunglass") spectacles with current prescription achieving at least 20/20-1 at both distance and near in each eye.
- If aircraft requires the use of an optical device (currently the AH-64 A/D), one (1) pair of spectacles, adequate for accommodating the optical device, should be maintained in lieu of one of the clear pair of spectacles stated above, if a different or special frame is needed.
- If specifically required by the unit mission, the individual should also maintain one (1) pair of KG-5 laser lenses, with the current spectacle prescription achieving visual standards for flight (these are not intended for wear over contact lenses and are only available in the military-issued "Apache frame").
- Per AR 40-5, Preventive Medicine, contact lens wear is prohibited during gas chamber exercises, field training and combat. However, contact lens wear may be feasible in deployments to areas other than combat (i.e. Honduras-JTF Bravo, or other deployments where clean facilities are available). The only exception to this policy is Apache pilots. Aircrew members who wear soft contact lenses that are not disposable, should maintain two spare sets of soft contact lenses, sealed in their original containers and clearly labeled for left and right eyes (labeling only necessary if the

prescription is not the same in each eye). Aircrew members with disposable soft contact lenses should keep an additional 12 pair of soft contact lenses, in addition to their normal 24-week supply.

- ❑ One spare case for disinfecting soft contact lenses; one spare, sealed case (no vent) for temporary storage and transportation; at least three months and preferably six months current supply of disinfecting solutions. Also, if required per prescribed cleaning regimen, three to six month's current supply of enzymatic solutions, rewetting drops, artificial tears, and/or special cleaners, whichever apply.

TREATMENT: Aircrew members using contact lenses are encouraged to seek medical evaluation for even the most minor eye symptom. Delay may be detrimental—corneal ulceration and scarring may jeopardize visual acuity and flight status! Corneal transplant is permanently disqualifying.

DISCUSSION: The following points should be considered in selecting aircrew to use routine non- medical contact lenses:

- Not all aircrew can be successfully fitted with contact lenses. Therefore, contact lens use should always be considered optional.
- Individuals must meet all vision standards while wearing contact lenses.
- Contact lens wearers should achieve at least 8 hours per day of comfortable and successful lens wear.
- Individuals must be free from eye disease and infections that contraindicate contact lens use.
- Individuals must be available for follow-up care for a minimum of one month after initial contact lens fit to monitor the personal and operational efficacy of their contact lenses and report complications to the Flight Surgeon immediately.
- It is recommended that the unit flight surgeon/APA office maintain records on all of the active aircrew wearing contact lens to include contact lens parameters, related complications, and spectacle back-up prescription data.
- Aircrew should be proficient in removing contact lenses in flight with or without gloves.
- Contact lens wear may be considered for aviation personnel regardless of aircraft type.

With regard to contact lens selection, the following guidelines are provided:

- Darkly tinted contact lenses or lenses to achieve cosmetic alteration of iris colors are not approved, even if the color of the contact is the same natural color of the eye. This can act as a selective waveband filter or a limitation of field of view and can adversely affect color perception or peripheral viewing, respectively. However, a light tint regarded as a “visibility tint” to facilitate location of a dropped contact lens is recommended.
- Monovision fitting with contact lenses is not approved. Such fitting techniques are known to acutely degrade stereopsis, contrast sensitivity, and target acquisition. In non-presbyopes, both eyes must be bilaterally corrected for both distant and near vision at the same time. If reading correction is required this should be provided with a spectacle with the appropriate reading add as a bifocal segment.
- Bifocal and multifocal contact lenses are not approved. Such lenses are difficult to fit, costly, and depend too critically on lens position to achieve optimal visual performance.

With regard to operational Contact lens issues:

- For Apache pilots requiring optical correction, the optometrist should fit a silicone hydrogel, if at all possible. The use of these types of lenses will allow the pilot to safely wear contact lenses for an extended period of time without compromising their ocular health (the use of extended wear may be necessary in a combat environment due to a lack of clean facilities for insertion or removal). Due to material costs, Apache pilots will not be fit with daily disposable contact lenses unless medically necessary. Otherwise, contact lenses should be worn primarily on a daily-wear basis (no more than 16 hours per day). A minimum of six to eight (6-8) hours of time without contacts is recommended between periods of contact lens wear. Wearing a standard contact lens (not a silicone hydrogel) during sleep is highly discouraged as it can lead to oxygen deprivation of the cornea. If operational conditions preclude removal, remove the contact lenses for cleaning at first opportunity in order to minimize the risk of complications.
- Aircrew must be advised of the need to maintain the highest possible standard of lens hygiene. Smoking cessation is strongly recommended for all contact lens wearers to reduce the incidence of serious complications. The potential hazards of contact lens use should be explained by both the consulting optometrist/ophthalmologist and the FS.
- Dislocation or loss of a contact lens while flying is a definite possibility. It is highly advised that aircrew become proficient in removing contact lenses in flight in case one becomes dislodged or the need arises in which contacts must be removed. Should a contact lens dislocate or fall out of the eye, it is usually best to immediately remove the other contact lens and utilize the carried spectacle correction. However, safety and pilot judgment always take precedence in these situations to maneuver the aircraft in the safest manner possible.

IMPORTANT NOTES: Currently, contact lens wear is only required to operate the Apache helicopter. Apache pilots on Active Duty will procure their occupational contact lenses through their servicing optometry clinic as per the Apache Contact Lens Program. Reserve and National Guard Apache pilots DO NOT qualify for government purchased lenses under the Apache Contact Lens Program; they must obtain their lenses through their unit, as they do with other optically necessary devices such as glasses and protective mask inserts. Reserve and National Guard pilots that are activated for deployment will be treated as Active Duty Apache pilots.

Other aircrew members may be fit with contacts at their local optometry clinic if the clinic provides this service; however, the purchase, examination, follow-up care, and supply costs may all be at the aircrew member's own expense.

All aviation personnel wearing contact lenses must be correctable to a minimum 20/20-1 visual acuity or better, at both distance and near in each eye, during contact lens wear.

The use of contacts while flying does not preclude the requirement, for all aviation personnel required to fly with corrective lenses, to carry one pair of corrective spectacle lenses on their person while performing aviation duties. An additional (second) pair of corrective spectacle lenses must be kept either on their person or in the flight bag accompanying the flight.

It is strongly encouraged that the individual units ensure personnel train in both contact lenses and spectacles to maintain proficiency flying with their spectacle prescription. If a near prescription is required for presbyopia, the aircrew member must utilize the prescription that affords them 20/20-1 vision at both distance and near in each eye while performing aviation duties. It is highly advised that any personnel wearing contacts for the first time wear the contacts successfully for a minimum of one month's time prior to flight operations, flight duties, or air traffic control duties to ensure there are no unforeseen complications, eye health concerns, or safety risks.

REFERENCE: [AR 40-63](#), Ophthalmic Services, January 1986.

CORNEAL REFRACTIVE SURGERY (ICD9 V802A/V802B)

AR 40-501: 4-11c, also 2-13d, 2-12c(2)

AEROMEDICAL CONCERNS: Uncomplicated, successful completion of LASIK (laser in-situ keratomileusis), LASEK (Laser Subepithelial Keratomileusis), or PRK (Photo Refractive Keratectomy) to improve visual acuity within pre-surgical standards and post-surgical assessment as outlined below will be qualified as **Information Only**.

Cases outside of standards will require a waiver or exception to policy (ETP) request in the form of an Aeromedical Summary (AMS).

Corneal refractive surgery (CRS) is indicated for the correction of refractive error (myopia, hyperopia or astigmatism). Only LASIK, LASEK, and PRK, (including the wavefront techniques) are currently acceptable for all FDME classes, to include applicants.

Alternate procedures, complications, and failure to meet pre/post-op standards will require consultation with USAAMA for consideration on a case-by-case basis.

WAIVERS:

All Rated and Non-Rated Aircrew (to include ALL Applicants): FDMEs with PRK, LASEK or LASIK with an acceptable pre-/post-surgical assessment as outlined below shall be submitted “qualified, information only.” Personnel failing to meet pre-/post-operative standards will be submitted “disqualified” and require an AMS for formal waiver/ETP consideration.

Active duty personnel undergoing refractive surgery must receive authorization from their commanding officer prior to the procedure. Commanders should be advised that the procedures have a 6-12 week recovery period before aviation duties can be resumed (Appendix 1).

INFORMATION REQUIRED on DD 2808, BLOCK 73 for ALL TYPES OF CORNEAL REFRACTIVE SURGERIES:

- Document that at least 3 months (for initial applicants) or 6 weeks (for current aviation personnel) have elapsed since surgery or re-treatment and evidence of stable refractive error is demonstrated by two separate examinations performed at least one month apart. These should reveal successful recovery.
- From the Checklist for Eye Care Provider (Appendix 3):
 - Pre-operative refraction—if completely unavailable, so state. If manifest Rx known, substitute.
 - Type of procedure—LASIK, LASEK, PRK
 - Date(s) of procedure—enhancements that result in optimal outcome within standards is acceptable.
 - Post-op Measurements (≥ 3 mos, applicants/ ≥ 6 wks aircrew)—USAAMA requires only the latest set of measurements:
 - Refraction within standards—Cycloplegic for Class 1 (if not already annotated on FDME); Manifest refraction for all others.
 - Intraocular Pressure—annotate if not reported on FDME, have optometry note otherwise normal if < 8 mm Hg
 - Visual Acuity within standards.
 - Slit Lamp Examination—showing no residual haze
 - Corneal Topography—post-operative, reviewed by Optometrist/Ophthalmologist, reported as “acceptable”
 - Low-Contrast Sensitivity Testing (5% contrast using the Precision Vision backlit chart)—must pass 20/60 or better. If not available at the local optometry/ ophthalmology clinic, so state—will be done at Lyster if selected for Flight School. The preferred test is the 5% contrast test; however, the following tests may be submitted in lieu of the 5% contrast test:
 - BVAT low contrast acuity (set on 5%)
 - Bailey-Lovie 10% low contrast acuity test
 - Pelli-Robson Contrast Sensitivity Test
 - Small Letter Contrast Test
 - VisTech or FACT Contrast Sensitivity Test
- For any part of the evaluation that is out of CRS policy standards, thus requiring an AMS, do the following:

- Pre-operative refraction out of CRS standards: must include ophthalmology/optometry evaluation to include dilated fundoscopic examination to document no retinal strain, tears, or holes as well as corneal pachymetry to insure adequate corneal thickness.
- SLE reveals haze: must include ophthalmology/optometry evaluation documenting no visual impairment, glares, or halos as a result of haze.
- For any other deviations: call USAAMA

FOLLOW-UP: The five year comprehensive FDME must include an optometry/ophthalmology consult with completion of a slit lamp examination of the cornea, manifest refraction, corrected visual acuity and 5% contrast sensitivity test. NOTE: The 5% contrast test is not required for follow-up for classes 2F, 3, and 4 but should be completed if available.

TREATMENT: Per appropriate surgical protocols.

DISCUSSION: Since allowing PRK, LASEK, and LASIK, the trend in AAMA has been that those personnel with good surgical outcomes, passing all of the above post-operative tests and standards have gone on to receive a waiver without subsequent aeromedical problems. Those with a less than favorable outcome have not progressed as easily to receiving a waiver. Corneal refractive surgery will optimally result in less optometric support before and during deployment to Stability and Support Operations as well as combat operations. There is a significant medical logistics “footprint” of combat health support activities providing corrective lenses and protective mask inserts that may be lessened. This is especially important in current rapid deployment, high ops tempo environments. Corneal refractive surgery is an additional benefit in the continuous development of new man-machine interfaced weapons based on routinely updated detailed vision parameters. This is especially important for increasingly complex flight environments where corrective lenses would be a hindrance.

APPENDIX 1. Aviation Commander’s Authorization

APPENDIX 2. Medical Release

APPENDIX 3. Checklist for Eye Care Provider

APPENDIX 4. Refractive Surgery Fact Sheet for Flight School Applicants

Appendix 1: Aviation Commander's Authorization

Memorandum to: Unit Flight Surgeon

CC: Ophthalmology, Refractive Surgeon

Subject: Authorization for Aircrew members to receive refractive surgery under the Aeromedical Policy Letter for Refractive Surgery and the Corneal Refractive Surgery Surveillance Program.

1. _____, SSN _____ is authorized to receive refractive surgery per the guidance outlined in the Aeromedical Policy Letter: Corneal Refractive Surgery.

2. This authorization is based on the following understandings:

a. This authorization does not constitute a medical waiver; it only authorizes the individual to have refractive surgery. The individual will be DNIF for at least 6 weeks, up to a maximum 12 weeks. The medical waiver request will be submitted to USAAMA upon receipt of information from the flight surgeon as to the successful outcome of the individual's surgical procedure. USAAMA will determine if the individual meets the medical waiver requirements when the applicant's eyes and vision meet and retain FDME standards and all requirements for waiver have been met.

b. In approximately 2-3 of every 1,000 refractive surgery procedures (0.2 to 0.3%), the individual will not recover 20/20 best-corrected vision after surgery. Individuals who fall in this category will be evaluated by USAAMA to determine whether a waiver to continue on flight status may be issued. Although slight, there is a possibility the individual may lose his/her flight status in the event of significant visual loss that cannot be resolved.

c. Questions about the updated policy may be directed to USAAMA at 334-255-7430; questions about refractive surgery to the local eye care provider.

d. A copy of this correspondence will be kept on file in the local flight surgeon's office.

3. POC is the undersigned at _____.

Commander's Signature Block

Appendix 2: Request for Release of Medical Records

(To be completed by patient and provided to eye care provider for completion)

From: (enter your information)

Date:

To: (enter eye clinic information)

Subject: Request for records related to refractive surgery procedure

1. Request a copy of records pertaining to my refractive surgery be provided to:
(Enter unit flight surgeon information and address)

2. The following information is needed: (see attached Checklist for Eye Care Provider):

Date of procedure

Type of procedure (PRK, LASEK, or LASIK)

Type of laser (brand name)

Ablation parameters (size of ablation zone, microns of tissue removed, number of pulses, if available)

Amount of correction (sphere, cylinder and axis)

Pre-operative refraction and date (specify manifest or cycloplegic)

Follow- up refractions with visual acuities and dates (most current refraction and as many postoperative refractions as possible)

Slit lamp assessment of cornea (presence or absence of haze or other complications)

Latest **post-operative COLOR** corneal topography (instantaneous or tangential corneal maps)

Contrast Sensitivity (preferred test is the 5% low contrast letter acuity)

Typed or Printed Name

Signature

Appendix 3. Checklist for Eye Care Provider

Demographics Required (Applicant to complete):

Last Name: _____ First Name: _____ M.I. _____

Mailing Address: _____

E-mail Address: _____

Home/Cellular Phone: _____

Date of Birth: _____ SSN: _____

Checklist for Eye Care Provider (Surgeon/Doctor to complete below):

Surgeon/Doctor's Name: _____

Clinic Address: _____

Clinic Phone: _____ Clinic Name: _____

Date of Procedure: _____ Type: (circle one) PRK or LASIK

Laser Used: (Manufacturer) _____ (Model#) _____

Ablation Parameters (Complete below, and if available, attach copies of laser printouts)

OD: Size of ablation: _____ mm Tissue removed: _____ microns # of pulses: _____

OS: Size of ablation: _____ mm Tissue removed: _____ microns # of pulses: _____

Amount of correction programmed into laser

OD: _____ OS: _____

Pre-operative Refraction

OD: _____ OS: _____

Did the applicant require any enhancement procedures? Yes _____ No _____

(If yes, provide details as above & below)

Follow-up Examinations (include most recent and 2 prior examinations—3 total)

<u>Date:</u>	<u>Refraction:</u>	<u>Visual Acuity</u>	<u>Corneal Haze*</u> (circle one)
_____	OD _____ OS _____	OD _____ OS _____	OD 0 1 2 3 4 OS 0 1 2 3 4
_____	OD _____ OS _____	OD _____ OS _____	OD 0 1 2 3 4 OS 0 1 2 3 4
_____	OD _____ OS _____	OD _____ OS _____	OD 0 1 2 3 4 OS 0 1 2 3 4

*Haze 0-4 scale: 0=No Haze, 1=Trace, 2=Minimal, 3=Moderate, 4=Iris details obscured.

Corneal Topography (include a color copy of most recent post-operative corneal topography using the TANGENTIAL or INSTANTANEOUS map display option)

Topographer Manufacturer: _____
Topographer Model: _____
Date of topographies: _____

Contrast Sensitivity (attach copy of post-operative results, if test available)

Test Manufacturer/Model: _____
Date of contrast test: _____

Test Conditions:
Room Lights On? (circle one) Yes No
Backlit Chart? (circle one) Yes No
Distance to Test? _____ m
% Contrast? (if letters) _____ %

Results:
OD: _____
OS: _____

Does applicant report any subjective visual changes? (I.e. increased glare, starbursts, halos, etc.)

***For Class 1A/1W** (MUST complete a post-operative cycloplegic refraction, noting normal refractive DVA/NVA with best correction, and IOP's if your 1A/1W FDME data was pre-operative.)

Distant Vision	Near Vision
OD 20/____ Corrected to 20/____	20/____ Corrected to 20/____
OS 20/____ Corrected to 20/____	20/____ Corrected to 20/____

Cycloplegic Refraction
OD: _____ OS: _____

Intraocular Tension
OD: _____ OS: _____

Thank you for completing the information. Please return this form and supporting documents to your flight surgeon. This checklist should be placed in the medical record.

Appendix 4: Refractive Surgery Fact Sheet for Flight School Applicants (Update February 2007)

What: LASIK (laser in-situ keratomileusis), LASEK (Laser Subepithelial Keratomileusis), and PRK (Photo Refractive Keratectomy) are now aeromedically acceptable provided the post-surgical outcome meets standards IAW the current Corneal Refractive Surgery APL. It is important for all applicants to do research on the Internet, or elsewhere, about the differences between the types of surgeries. The US Army Aeromedical Research Laboratory (USAARL) study was initiated in February 2001 and was closed to new applicants as of 1 October 2004. A decision was recently made (8 Dec 2005) by the OTSG (Office of the Surgeon General) to allow LASIK to be accepted along with both LASEK and PRK.

Who: The policy applies to individuals applying for flight training. Active duty, Reserve, National Guard, ROTC, Academy cadets, OCS candidates, and civilians are all eligible to submit a flight physical with a history of refractive surgery. You will need to coordinate with your eye surgeon and/or eye clinic to complete the visual exam forms needed for your waiver request (see “Release of Medical Information” form). You will need to provide this to your flight surgeon to complete the Class 1 flight physical. All must be reviewed and commented prior to submission to the US Army Aeromedical Activity (AAMA) at Fort Rucker for review. Having a qualified physical does NOT guarantee a flight school slot; it only verifies your medical eligibility to apply for flight school given the presence of a refractive surgery procedure. You still need to work through the standard channels to apply to flight school with your recruiter and/or the Aviation branch.

How, When and Where: This section describes the steps you will need to accomplish in order to receive a qualified flight physical given a history of LASIK, LASEK or PRK surgery. 1) Complete the Class 1 flight physical—nothing happens without its completion. 2) Include results of all of the required post-operative tests on Block #73 (remarks) of the DD2808—these are post-surgical cycloplegic refraction, 3 visual acuities and manifests, slit lamp examination demonstrating healing without complication, scarring, or adverse haze, color corneal topography, and low contrast sensitivity visual testing. 3) Submit the physical to AAMA. AAMA will review the entire Class 1 Flight Physical and qualify it if all of the criteria listed below are met along with the rest of the standards. If not meeting all of the post-surgical criteria, the flight surgeon shall submit the physical with an Aeromedical Summary requested an Exception to Policy (see below). Your medical qualification is provided to the board or agency working your flight school application, and you are eligible to compete for the slot. A flow diagram is provided to help you work through the process.

Waiver/Exception to Policy: A waiver or exception to policy is required for applicants failing to meet published standards as outlined in AR 40-501, the Aeromedical Policy Letters, or the Aeromedical Technical Bulletin—this is no different for corneal refractive surgery. Similar to any other medical issue, if not meeting the post-surgical standards, applicants must have their flight surgeon request an exception to policy (ETP), submitted in the form of an Aeromedical Summary. ETPs are reviewed on a case-by-case basis and require longer processing time for review. Not all requests for flight school applicants are granted.

Points of Contact:

USAAMA – 334-255-7430 <https://aamaweb.usaama.rucker.amedd.army.mil/>

Recruiting Command www.usarec.army.mil/hq/warrant/warrant.htm

Warrant Officer Flight Training Program (civilians, NG or Reservists)—502-626-0467/1554

Active duty (Army, AF, Navy, marine, Coast Guard)—502-626-0458

Army Branch Officer applying to aviation needing a branch transfer—

<https://www.perscomonline.army.mil/opavn/Branch%20Transfers.htm>

Aviation Proponency – <http://www-rucker.army.mil/ap/default.htm> Or 334-255-3999/2359

QUESTIONS ABOUT SURGERY AND THE EYE INFORMATION: Some common questions are as follows:

a. If I had a surgery other than PRK, LASEK or LASIK, can I still get an exception to policy? No, radial keratotomy (RK), intrastromal corneal rings (Intacs) or any other type of refractive surgery have not been aeromedically approved.

b. If I have NOT had refractive surgery yet, what do I do? Follow the steps in the flowchart. You should consult at least 2 eye surgeons before deciding to get surgery. It is also important to do individual research as to the pros and cons of each type of surgery.

c. How can I verify if I meet the limits of AR 40-501? Consult with your eye doctor or flight surgeon. He/she will review your current eyeglass or contact lens prescription (if you have not had surgery) or records of your eyeglass or contact lens prescription before surgery (if you have already had surgery). Provide your eye doctor with the limits listed in the flowchart to help them in the review (-6.00 diopters myopia, +4.00 diopters hyperopia).

d. My refraction is outside the limits of AR 40-501, is it still possible to apply for flight school? Yes, however you will require an Exception to Policy with your Class 1 Flight Physical.

e. What information do I need to provide about my surgery and where do I get it? All the information needed is listed on the “Release of Medical Information” and “Corneal Refractive Worksheet” forms. Provide the forms to your eye surgeon and/or the eye doctor who is providing your vision care after surgery. You may have to submit multiple forms to get all of the required information.

1. Surgical Information: Your eye surgeon will need to fill out the information about the laser, the type of surgery and the amount of correction.

2. Manifest Refraction: You will need three post-surgical refractions (measures of any residual prescription) and three visual acuities. This information can be a combination of examinations provided by your surgical center, your optometry office and your flight physical.

3. Corneal Exam (Slit-Lamp Exam): You will need verification that your cornea is clear of haze or any other post-surgical complication. Your eye doctor can provide this information.

4. Corneal Topography: This is the corneal map that shows the shape of your cornea after surgery. You must have a color copy of the map, either mailed, e-mailed, or taken to your flight surgeon. FAX'd versions are currently not acceptable because they come through in black and white.

5. LOW Contrast Sensitivity: This is a measure of your vision under low contrast conditions (5% is the preferred method). Normal low contrast is 20/40 or better, but with corrective surgery, acceptable limits are 20/60 or better. Ask your eye doctor about availability of a contrast sensitivity or low contrast acuity test in your area. Examples of acceptable tests are:

VisTech Contrast Grating Test
Functional Acuity Contrast Test (F.A.C.T.)
Pelli-Robson Contrast Sensitivity Test
Bailey-Lovie 10% low contrast acuity chart
ETDRS low contrast acuity chart (5% is preferred)
Mentor BVAT low contrast acuity chart (set on 5%)

f. What do I do if a contrast sensitivity or low contrast acuity test is not available in my area? Your packet can be processed without this test, **if** the other eye information you provide indicates a good outcome from the surgery (specifically the corneal topography and corneal exam). Your local flight surgeon will make this determination. **NOTE:** If not done prior to coming to flight school, you must have it completed with your Rucker flight physical prior to beginning flight training. **Integrity** as a future warrant officer or officer dictates that you disclose this need to the Rucker Physical Exam staff to coordinate having this done. Make sure your eye doctor notes on the form that these tests are not available to you.

g. Where do I send all of my information? Your flight surgeon should collect and submit as much information as possible on AERO. Additional information may be mailed or fax'd to AAMA (USAAMA (MCXY-AER), US Army Aeromedical Center, Building 301, Fort Rucker, AL 36362 or **fax 334 255-7030 or 7606**). Note: the color corneal topography, if needed, must be mailed or emailed to aama@amedd.army.mil.

QUESTIONS ABOUT THE FLIGHT PHYSICAL

a. How long do I have to wait after surgery to get a flight physical? Start your physical so it is completed 3-months after the surgery to be able to complete all of the required post-operative information.

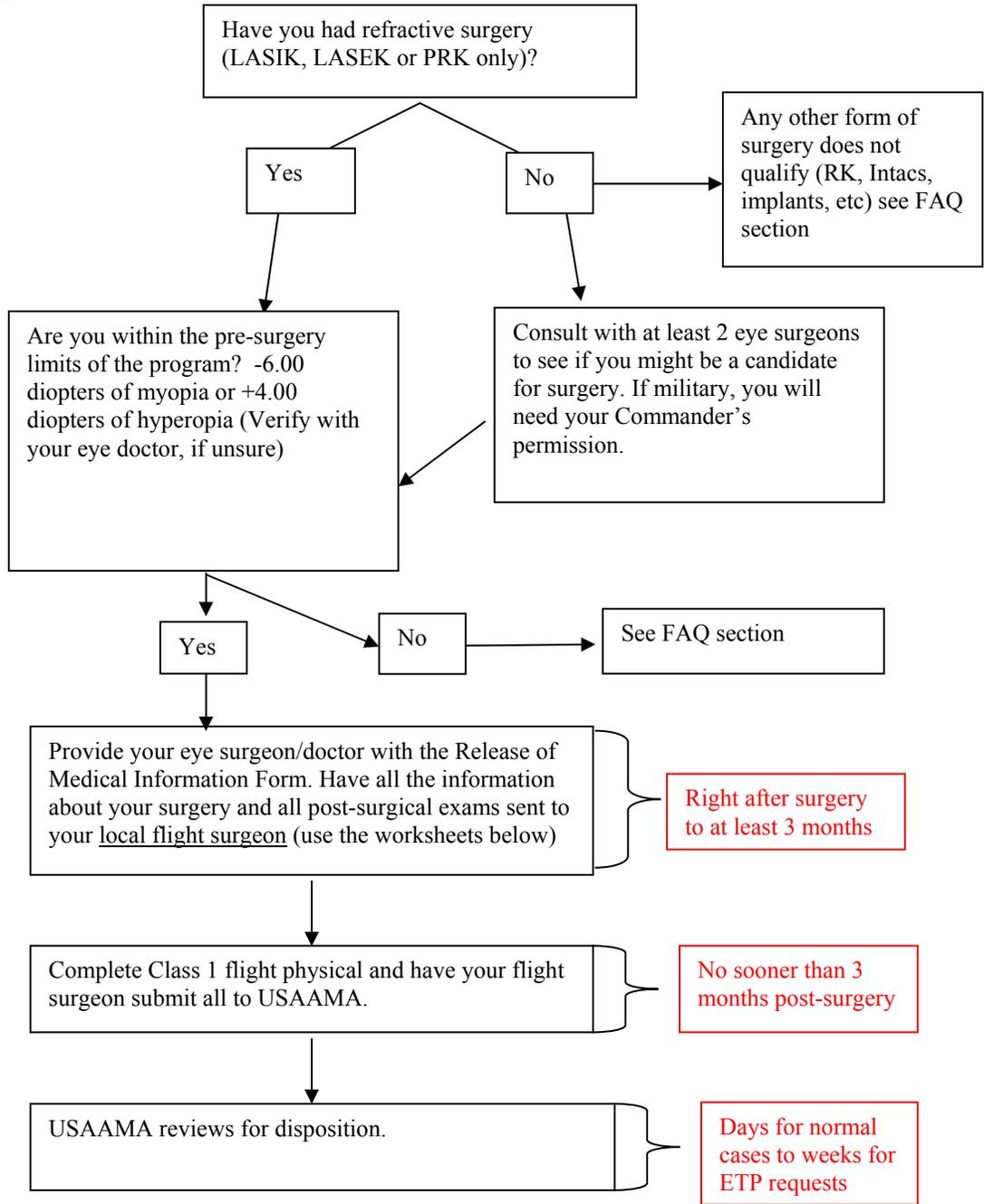
b. I already took a flight physical before surgery; do I have to take another physical? No, as long as your initial Class 1 flight physical is still valid (up to 18 months). You **MUST** repeat the eye exam portion of the flight physical after surgery, however, and submit the required information. Coordinate this through your flight surgeon and the supporting eye clinic.

c. I have not taken a general military entrance physical yet; do I have to do that first? Yes, if you have not taken the MEPS, ROTC or other entrance physical, you will have to complete that physical before scheduling your flight physical. The entrance physicals require a 90-day waiting period after refractive surgery. Therefore you will have to wait **3 months** after surgery, take the entrance physical, and then you can schedule to take the flight physical. You will have to coordinate this with your recruiter. Go to the link “Refractive Surgery” on the USAARL website (www.usaarl.army.mil) to find the current Army Surgeon General’s policy.

d. I still need to wear glasses after surgery; does that mean I will fail the flight physical? No, as long as you meet the general entry standards for Class 1 which include 20/50 or better uncorrected visual acuity, and no more than -1.50 diopters

of myopia or +3.00 diopters of hyperopia or 1.00 diopters of astigmatism. If you are outside of these limits, however, you will need an ETP. You should consult with your eye doctor and flight surgeon if this is the case.

Flowchart:



****ATTENTION ALL APPLICANTS: ALL REQUIRED INFORMATION SENT TO USAAMA MUST BE COMPLETE!** You will be subject to a returned/delayed packet if you do not follow these instructions.**

DECREASED VISUAL ACUITY (ICD9 367.9)

AR 40-501: 4-12a, 4-12b

AEROMEDICAL CONCERNS: Decreased visual acuity degrades look-out and target acquisition, two important factors in successful outcomes of aviation combat operations.

WAIVERS:

Initial Flight Applicants: Failure to meet Class 1 visual standards will be considered for exception to policy on a case-by-case basis in the age of Refractive Surgery and considering the needs of the Army. Applicants must correct to 20/20, both near and distant. Uncorrected distant visual acuity must be 20/70 or better. Uncorrected near visual acuity must be better than 20/40. Cycloplegic refraction within 3/4 diopter of standards will be considered.

Rated and Non-rated Aircrew (to include Class 2/3/4 applicants): Waivers are required for anyone with uncorrected distant or near visual acuity of greater than 20/400 in any eye, provided correction to 20/20. Restrictions require flight with spectacles or contact lenses that correct to 20/20 and must have in possession a backup pair of spectacles. Waiver for visual acuity outside standards will be considered on a case-by-case basis in designated individuals provided the central and peripheral retina is normal, no other ocular conditions exist, and all other visual standards are met.

INFORMATION REQUIRED:

- Optometry/ophthalmology consultation.
- Optometry/ophthalmology evaluation must include dilated fundus examination for cases of decreased visual acuity not due to simple myopia, hypermetropia (hyperopia), astigmatism or presbyopia.
- Retinal evaluation must be obtained refractive errors corrections greater than ± 5.5 diopters.
- Patients with progressive astigmatism should be evaluated to exclude keratoconus.
- Class 1 applicants shall submit three cycloplegic refractions completed IAW [ATB-5 \(Cycloplegic Refraction\)](#)

TREATMENT: Refraction by spectacles is allowed within the limits set by [AR 40-501](#), Chapter 4. See APL Corneal Refractive Surgery.

FOLLOW-UP: Depending on the findings, annual follow-up requirements may range from annual vision screening with FDHS/FDME to annual optometric/ophthalmologic evaluation.

DISCUSSION: Myopes (persons with elongated globes) have a risk of further myopic progression, which rises with the degree of myopia regardless of age. High myopes have considerable visual distortion at the periphery of their spectacle lenses. In addition, they may see halos or flares around bright lights at night and are at increased risk of night blindness. Whereas myopes have an increased risk of retinal detachment and lattice degeneration of the retina, exposure to routine G-forces in flying has not been shown to increase these risks. Myopia is usually a progressive condition, stabilizing for individuals around the age of 30. Whenever a prescription is changed, aircrew should be warned about transient visual distortion and counseled on the period of adjustment necessary. Evidence suggests that there is no difference in civil accident rates or in naval carrier landing accidents in pilots who require visual correction. Severe myopia tends to be a problem pertaining to Class 2 personnel since the entry requirements for other aircrew tend to be sufficiently stringent to exclude those whose vision would deteriorate that much.

Hyperopes with +3.0D or more of correction may experience problems with vision after treatment with anticholinergic agents. Hyperopes also have more problems with visual aids such as night vision goggles when they develop presbyopia. The interposition of another layer of transparency (spectacle lenses) between the aircrew and the outside world increases the risk of internal reflections, fogging and reduces the light reaching the retina by about 6%. Finally, spectacle frames interfere with look-out, cause hot spots and create unacceptable interactions with items of aircrew equipment. Decreased visual acuity is often associated with other visual performance degradation such as decreased stereopsis.

DEPTH PERCEPTION FAILURE (ICD9 368.33)**AR 40-501: 4-12a(6)**

AEROMEDICAL CONCERNS: Stereopsis is important for the aviator to maintain proper visual references. Defective stereopsis may make certain aviation duties such as hover, taxiing, landing, formation flying, aerial refueling, hoist and rescue equipment operations, significantly more difficult.

WAIVERS:

Initial Flight Applicants: Exception to policy is considered on a case-by-case basis after review of work-up below.

Rated and Non-rated Aircrew (to include Class 2/3/4 applicants): Waivers will be considered for selected aircrew such as flight surgeons, physiologists, and Air Traffic Controllers. Waivers for aviators are considered on a case-by-case basis with a restriction of flying with another fully qualified pilot, rated in the type and model of the aircraft being flown. No waivers will be considered for aviators in solo control of aircraft.

INFORMATION REQUIRED:

- Ophthalmologist/optometrist evaluation. The evaluation should address any history of diplopia or previous eye surgery and include the following tests, as clinically indicated:
 - o Full ocular muscle balance testing,
 - o Testing for diplopia in the nine cardinal directions,
 - o Pupillary exam
 - o Cover test (both near and far)
 - o Red lens test
 - o Maddox Rod test
 - o Worth four-dot exam
 - o AO vectograph.
- Completion of the pre-printed ocular motility worksheet (available under Excessive Phoria APL below).
- Submit AMS with information. If need be, fax or e-mail Ocular Motility worksheet. If there is an obvious defect, such as a frank tropia, it is not strictly necessary to fill in every block in the motility worksheet since no waiver is possible.

TREATMENT: N/A

FOLLOW-UP: Depending on the findings, annual follow-up requirements may range from annual vision screening with FDHS/FDME to annual optometric/ophthalmologic evaluation.

DISCUSSION: Defective stereopsis can be innate. Several sources of defective stereopsis include: defective ocular muscle balance, amblyopia, anisometropia, microtropia, and monofixation syndrome. All of these possible etiologies should be evaluated in the ophthalmology/optometry evaluation. The most common causes of a recent loss of stereopsis are a change in refraction or presbyopia. The visual cues to the perception of depth are both monocular and binocular. The monocular cues are learned and some investigators feel that they can be improved by study and training. Monocular cues are ones that can be the most easily fooled by illusions. Binocular cues (stereopsis) are innate and are not easily fooled by illusion. Stereopsis is not an absolute must in flying an aircraft, and in fact, the FAA does not require this to be tested. Through mathematical derivation, it has been shown that true stereopsis does not exist beyond approximately 200 meters; some believe it does not actually work beyond 20 meters. Numerous civilian individuals and past military aviators who lacked stereopsis have still made good aviators. However, the visually demanding environment of nap of the earth (NOE), pinnacle landings, and other various military operations requires the optimal senses.

DETACHED RETINA (ICD9 361.9) and OTHER RETINAL CONDITIONS*AR 40-501: 4-11e*

AEROMEDICAL CONCERNS: A detached or torn retina can lead to visual impairment. Severity of the condition depends on the part of the retina involved and the success of therapy. Routine exposure to G-forces has not been shown to increase the risk of retinal detachment. Other retinal conditions or abnormalities likewise can lead to visual impairment and are of concern. Detached retina and other retinal abnormalities are disqualifying for aviation service.

WAIVERS:

Initial Flight Applicants: Detached retina and other retinal conditions are disqualifying with Exception to Policy rarely granted on a case-by-case basis after review of the information below.

Rated and Non-Rated Aircrew to Include Class 2/3/4 Applicants: Waiver may be considered if the applicant has normal vision without complications.

INFORMATION REQUIRED:

- Complete Ophthalmologic evaluation is required in all cases, but particularly for retinoschisis, retinal tears, or central serous retinopathy.

TREATMENT: Diathermy, photocoagulation, cryotherapy, scleral buckling or laser therapy are acceptable treatments for retinal detachment or tears. The duration of central serous retinopathy may be shortened and the incidence of further attacks reduced by laser photocoagulation. Usually no treatment is required for retinoschisis unless rhegmatogenous detachment occurs.

FOLLOW-UP: Annual optometric/ophthalmologist evaluation is required. More frequent (every 6 months) evaluations may be required in some cases. Additional testing may be required at the recommendation of the treating practitioner and with consultation of the Aviation Ophthalmology/Optomety consultants.

DISCUSSION: A retinal detachment is the separation of the neuro-sensory retina from the underlying retinal pigment epithelium, usually with accumulation of fluid between them. There are three types: (1) rhegmatogenous, (2) exudative, and (3) traction. The incidence is approximately 10 per 100,000. This incidence increases with myopia, diabetes, age, and trauma. Certain vitreoretinal degenerations such as lattice degeneration increase the risks of retinal detachment. With surgical treatment, there will be permanent reattachment in up to 90 percent of uncomplicated cases. If the macula is involved, the resulting vision in that eye is likely to be on the order of 20/200. The risk of the occurrence of a retinal detachment in the other eye is as high as 12 percent and is most likely to occur within 5 years of the initial detachment. Retinoschisis occurs in 3 percent of the population, with increasing frequency from the second decade. The final outcome of central serous retinopathy (choroidopathy) seems unaffected by the duration of the condition, the initial visual acuity or the age of the patient. Recurrences are frequent and approximately 20 percent of patients have the condition for more than 6 months.

REFERENCE: Emedicine: <http://www.emedicine.com/emerg/topic504.htm>

EXCESSIVE PHORIAS/TROPIAS/AMBLYOPIA (ICD9 378.4)*AR 40-501: 4-12a(4)*

AEROMEDICAL CONCERNS: Excessive phorias are frequently associated with defective stereopsis and/or diplopia, a devastating state if this occurs during a critical phase of flight. Excessive esophoria/exophoria (>8 prism diopters), hyperphoria (> 1 prism diopters,) heterotropia of any degree, or a history of extraocular surgery after age 4 (to include before age 4 if other residual ocular abnormalities exist) are disqualifying for flight duties.

WAIVERS (Rated and Non-Rated Aircrew to Include ALL Applicants): Exceptions to policy or waiver requests are reviewed on a case-by-case basis and not normally recommended due to the relative high risk of developing of diplopia during extended operations and night or reduced ambient light flights.

ICD9 Code	Condition
378.41	Esophoria
378.42	Exophoria
378.40	Hypophoria/Hyperphoria

INFORMATION REQUIRED:

- Ophthalmology/optometry evaluation. The evaluation should address any history of amblyopia (lazy eye) or diplopia, any patching of one/both eyes, or previous eye surgery, and include the following tests, as clinically indicated:
 - o Full ocular muscle balance testing,
 - o Testing for diplopia in the nine cardinal directions with vision testing apparatus (VTA), or Randot depth perception testing
 - o Pupillary exam
 - o Cover test (both near and far), alternate cover test
 - o Near point of conversion (NPC)
 - o Red lens test
 - o Maddox Rod test
 - o Worth four-dot exam
 - o AO vectograph.
- The pre-printed **Ocular Motility Worksheet** shall be completed and sent in along with the waiver request
- Cranial nerve palsies must be ruled out by this evaluation.

TREATMENT: N/A

FOLLOW-UP: Depending on the findings, annual follow-up requirements may range from annual vision screening with FDHS/FDME to annual optometric/ophthalmologic evaluation.

DISCUSSION: A phoria is a latent deviation of an eye which is present (at least to a slight degree) in nearly 100% of the population. When the phoria is in excess of the standards of [AR 40-501](#), a large neuromuscular effort would be required to maintain fusion and binocular vision. Such individuals often break fusion during extreme fatigue or when flying at night with loss of external fixation points. Rapid instrument scanning is interfered with and flight students often are not able to overcome this handicap, resulting in elimination from the program. Any added stress might cause a breakdown of fusion, leading to diplopia and loss of stereopsis. Tropias (manifest ocular deviations) are present in approximately 3% of the population and may not be clinically obvious on examination. Subclinical tropia patients may be reluctant to divulge a history of double vision or decreased visual acuity in the affected eye.

Ocular Motility Worksheet

(Exam and the reporting of results must conform with the instructions in the APL)

Pertinent History

Distant Visual Acuity	OD 20/ OS 20/	Manifest Refraction	OD OS	Corrected to 20/ Corrected to 20/
Cycloplegic Refraction	OD OS		20/ 20/	Habitual Rx OD OS

Correction used for remainder of examination: Habitual Manifest None

Cover Test

<p style="text-align: center;">Far (all gazes)</p> <table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td style="width: 30px; height: 20px;"></td><td style="width: 30px; height: 20px;"></td><td style="width: 30px; height: 20px;"></td></tr> <tr><td style="width: 30px; height: 20px;"></td><td style="width: 30px; height: 20px;"></td><td style="width: 30px; height: 20px;"></td></tr> <tr><td style="width: 30px; height: 20px;"></td><td style="width: 30px; height: 20px;"></td><td style="width: 30px; height: 20px;"></td></tr> </table>										<p style="text-align: center;">Near (all gazes)</p> <table border="1" style="margin: auto; border-collapse: collapse;"> <tr><td style="width: 30px; height: 20px;"></td><td style="width: 30px; height: 20px;"></td><td style="width: 30px; height: 20px;"></td></tr> <tr><td style="width: 30px; height: 20px;"></td><td style="width: 30px; height: 20px;"></td><td style="width: 30px; height: 20px;"></td></tr> <tr><td style="width: 30px; height: 20px;"></td><td style="width: 30px; height: 20px;"></td><td style="width: 30px; height: 20px;"></td></tr> </table>									

Extraocular Motility	Maddox Rod or Von Graeffe	Stereopsis
Worth 4 Dot	Vectograph (anti-suppression)	Red Lens
4^v Base Out (if applicable)	Other test results (if applicable)	

Impression Qualified Disqualified

Provider Signature Block	Provider Phone Number:
SPECIALTY:	LOCATION:
Date of Exam:	

Patient Name	SSN:	
Rank	Flight Class (circle one):	Unit Address:
	<p>1 2 3 4</p>	

INSTRUCTIONS FOR OCULAR MOTILITY WORKSHEET

PERTINENT HISTORY: Explain why the work-up is being done. For example: "scored 7 esophoria on VTA" or "muscle surgery OS at age 6 years."

REFRACTION: All Class 1 flight applicants require a cycloplegic refraction recorded; all others require a manifest refraction. Those applicants with less than 20/20 unaided also require a manifest refraction.

HABITUAL RX: Record the subject's habitual Rx here if different from the manifest. If none is used, or the subject wears contact lenses, please note on the form.

COVER TEST: Report numerical values. Use a prism bar or loose prisms. Do horizontal and/or vertical as applicable to the case. Horizontal limits are approximately 45 degrees to the left and right of center. Vertical limits are approximately 25 degrees above and 35 degrees below center. Limits may need to be modified as dictated by the size of the nose and brow.

EXTRAOCULAR MOTILITY: Give description, such as "smooth and full."

MADDOX ROD/VON GRAEFE: Report numerical values for both horizontal and vertical phorias. Fixation target must be at 20 feet.

STEREOPSIS: RANDOT done at 16 inches in a normally lit room. Neither the device nor the patient should move during the test.

WORTH 4 DOT: Perform at both distance and near. Report "fusion," "diplopia," or "suppression OD/OS."

VECTOGRAPH: Test on the 20/40 (V O C S R K 4) line of the A.O. Vectographic slide. Report any suppression and which eye is suppressing. If there is no suppression, state so.

RED LENS TEST: Test all 9 positions of gaze, just like the cover test. Report any diplopia. If no diplopia is reported, state so.

4ⁱ BASE OUT TEST: Used to augment the A.O. Vectograph in the diagnosis of microstrabismus. This test is not always applicable and may be left blank if not used.

PROVIDER PHONE NUMBER: Indicate both commercial and DSN.

FLIGHT CLASS:

- 1 Flight Student Applicant
- 2 Rated aviator (pilot), Flight Surgeon/APA
- 3 Crew Chief, Flight Medic, Flight Engineer (Non-Rated Aircrew)
- 4 Air Traffic Controller

GLAUCOMA & OCULAR HYPER/HYPOTENSION (ICD9 365/365.04)

AR 4-501: 4-11h(1 or 2)

AEROMEDICAL CONCERNS: Glaucoma and ocular hypertension (IOP of 22.0 mm Hg or higher), or a persistent difference of 4 or more mm Hg tension between the two eyes when confirmed by applanation tonometry, are disqualifying. Glaucoma is typically asymptomatic, but early signs may include a slow progressive loss of contrast sensitivity and loss of central or peripheral visual fields. Patients with Acute Angle Closure Glaucoma may present with night vision problems, such as halos and flares around lights or with a sudden painful, red eye with an edematous cornea, fixed, mid-dilated pupil, and markedly decreased visual acuity. Low intraocular pressure (IOP) may be present after some significant pathology such as retinal detachment, chronic uveitis, or status post corneal refractive surgery or glaucoma filtering surgery. Determination of the underlying condition is more critical than the presence of low pressure.

WAIVER:

ALL Rated and Non-Rated Aircrew (to Include ALL Applicants): Exception to policy or waiver will be considered on a case-by-case basis, especially with no visual field loss and IOP is controlled at normal levels. Miotic drugs are incompatible with night operations due to the inability of the pupil to dilate to admit sufficient light. No waiver is required for low IOP (IOP of 7.0 mm Hg or lower) and will be filed as *Information Only* after a normal investigation below.

INFORMATION REQUIRED:

- The first step in assessment of either high IOP or low IOP is confirmation that the measurement is correct. An optometrist or ophthalmologist should confirm the IOP with applanation tonometry.

Elevated IOP:

- Ophthalmology/optometry evaluation is required anytime there is any one of the following:
 - o one or more documented IOPs > or equal to 22 mmHg;
 - o IOP difference between the eyes of 4 mmHg or greater;
 - o optic nerve cup-to-disc ratio > 0.5, or an asymmetrical cup-to-disc ratio between eyes with a difference of > 0.2;
 - o a visual field deficit is suspected;
 - o when there is a recent change of visual acuity, ocular trauma, uveitis, or iritis.
- IOPs must be documented from a Goldman's Applanation Tonometer, not from a non-contact tonometer "puff test" or Tono-pen, and must be obtained in the AM and PM for two days.
- Dilated fundus examination (to include comment on the cup-to-disc ratio)
- Humphrey visual field test battery (30-2 or 24-2),
- Slit lamp examination,
- Gonioscopy
- Corneal Pachymetry
- Bilateral color photographs of the optic disks or drawings of the optic nerve head.

Low IOP:

- If a low IOP of 7 mm Hg or less is confirmed by Goldman's Applanation Tonometry done by an optometrist or ophthalmologist, then document the following:
 - o Corneal Pachymetry
 - o Slit lamp examination to rule out underlying pathology or refractive surgery.

FOLLOW-UP: The patient should be evaluated every 6 months by an ophthalmologist or optometrist for those aviators labeled with ocular hypertension or glaucoma suspect. Aircrew members with proven glaucoma should be evaluated quarterly at least for the first year of treatment unless the consultant ophthalmologist specifies less frequent assessment.

No follow-up is required for ocular hypotension (low IOP). Persistent ocular hypotension on future FDME/FDHS will be listed as "Information Only" if the initial evaluation is normal.

TREATMENT: The decision to treat aircrew members with ocular hypertension with IOPs between 22-27 mm Hg will be decided on a case-by-case basis after all risk factors are considered by the ophthalmologist/optometrist. Those patients with

anatomically thick corneas, as measured with corneal pachymetry with no other risk factors for glaucoma will be classified as ocular hypertensives (as defined by OHTS). Annual requirements for these patients will include Goldmann tonometry and a dilated fundus exam (DFE). Those with ocular hypertension with IOPs greater than or equal to 28 mmHg should be treated regardless of other concomitant risk factors. Aircrew members with definitive glaucomatous optic atrophy and characteristic visual field changes require treatment. For open angle glaucoma and ocular hypertension, the first choice agents are topical beta-adrenergic blockers such as timolol (Timoptic), levobunolol (Betagan), or betaxolol (Betoptic). Other acceptable treatments include brimonidine (Alphagan), latanaprost (Xalatan), Dipivefrin (Propine) and the carbonic anhydrase inhibitor dorzolamide (Trusopt) provided there are no aeromedically significant side effects. Side effects may be minimized by pinching off the lacrimal duct on administration in order to limit systemic absorption. Other options for treatment include argon laser trabeculoplasty (ALT) or selective laser trabeculoplasty (SLT). Waiver can be considered for successful surgical treatment of closed angle glaucoma.

DISCUSSION: As stated above, not all cases of ocular hypertension (IOP of 22 or higher) require treatment. Approximately 4% of the population has IOP greater than 21, yet many of these individuals never develop glaucomatous optic neuropathy with characteristic visual field loss. Conversely, some individuals do indeed develop frank glaucoma despite never having any IOP measurement greater than 21. Thus elevated intraocular pressure is only one, albeit probably the most important, risk factor for the development of glaucoma. Other risk factors for glaucoma include age greater than 40, black race, positive family history of glaucoma, myopia, enlarged cup to disc ratio, and diabetes. The recently released data from the Ocular Hypertension Treatment Study concluded that topical anti- glaucoma medications delay the onset of primary open angle glaucoma (POAG) in those patients with elevated intraocular pressure. But, it was also the conclusion of this study that not all patients with elevated IOP require treatment, and the decision to treat is based on an individual's combined risk factors. Applying evidence-based medicine, The Ocular Hypertension Treatment Study (OHTS), completed in 2002, was designed to determine the effect of IOP reduction in patients not with glaucoma per se, but those with ocular hypertension. Goals of this study were to evaluate the safety of ocular hypertensive medications in delaying or preventing Primary Open Angle Glaucoma (POAG) and to identify baseline factors that predict the development of POAG. A major finding of the OHTS was the increased risk of POAG associated with thinner central corneal measurements. Subjects with the highest IOPs and the thinnest central corneal thicknesses (CCT) were at the highest risk (36%) over 6 years. Given the clear-cut association between CCT and risk that was shown by this study, CCT should be measured in all patients with ocular hypertension or glaucoma. Even in those cases of definite primary open angle glaucoma, the progression of visual field loss can be delayed or halted in most cases with available therapeutic ocular medications. ALT or SLT laser treatment may be an effective option in ocular hypertension/preglaucoma patients and may obviate or delay the need for ocular glaucoma medications for up to a decade or more in some cases. In aircrew members with narrow anterior chamber angles, prophylactic laser peripheral iridotomy may be necessary to decrease the risk of acute angle closure glaucoma.

Relationship Between Ocular Parameters and Progression to POAG in OHTS

	High Risk	Moderate Risk	Low Risk
IOP (mm Hg)	>25.75	>23.75 to ≤ 25.75	≤23.75
CCT (microns)	≤555	>555 to ≤588	>588
Vertical C/D	≥0.5	>0.3 to <0.5	≤0.3

REFERENCE:

Glaucoma at: <http://www.nlm.nih.gov/medlineplus/glaucoma.html>

Gordon MO, Beiser JA, Brandt JD, Heuer DK, Higginbotham EJ, Johnson CA, Keltner JL, Miller JP, Parrish RK 2nd, Wilson MR, Kass MA. The Ocular Hypertension Treatment Study: baseline factors that predict the onset of primary open-angle glaucoma. Arch Ophthalmol. 2002 Jun;120(6):714-20; discussion 829-30.

KERATOCONUS (ICD9 371.60)*AR 40-501: 2-12c(1)*

AEROMEDICAL CONCERNS: Keratoconus is considered disqualifying for all classes of aviation duty. Blurred vision can interfere with flying. There is a long term risk of corneal scarring.

WAIVERS:

Initial Flight Applicants: Initial applicants are not considered favorably for exception to policy.

Rated and Non-Rated Aircrew to Include Class 2/3/4 Applicants: Waiver may be possible for all other aviation classes in the early stages of keratoconus provided visual standards are met.

Note: Keratoconus “suspects” who do not have definitive keratoconus will be reviewed on a case-by-case basis for waiver or exception to policy.

INFORMATION REQUIRED:

- An optometry or ophthalmology consult with corneal topography
- Exclusion of connective tissue disorders such as Marfan's or Ehlers-Danlos syndromes may be indicated.
- Patients whose best corrected acuity falls below 20/20 or those requiring corneal transplant will be disqualified from flying.

FOLLOW-UP: Annual eye exam by an optometrist or ophthalmology is required.

TREATMENT: Spectacles and/or hard contact lenses may be necessary to restore visual acuity to acceptable standards. Hard contact lens wearers must have in possession a pair of spectacles with corrected vision to 20/20.

DISCUSSION: The syndrome is usually bilateral but may rarely affect one side only. The symptoms usually start during adolescence. The condition has been reported to be slowly progressive in 22.5% of cases but stabilization can occur at any time. It is very difficult to diagnose keratoconus in the early stages unless a corneal topographic mapping apparatus is used. Aviators with rapidly increasing myopia or astigmatism may warrant such testing.

OCULAR HISTOPLASMOSIS (ICD9 115.02)*AR 40-501: 4-11c(1)*

AEROMEDICAL CONCERNS: The maculopathy that occurs in ocular histoplasmosis syndrome can lead to legal blindness. Performing the Valsalva maneuver can cause leakage into the macula. Hemorrhages can occur in the fundus at high altitudes.

WAIVERS:

Initial Applicants (All Classes): Cases involving the macular area will rarely be granted an exception to policy. Exceptions to policy will be considered on a case-by-case basis provided visual acuity is normal.

Rated Aviation Personnel (All Classes): Waivers will be considered on a case-by-case basis. Waiver is possible provided visual acuity is normal. If histoplasmosis spots are present in the macular area, the aircrew member should be grounded until case review is complete. Restriction from unpressurized flight over 8,000 feet must be considered in cases with histoplasmosis spots.

INFORMATION REQUIRED:

Ophthalmology/optometry evaluation. Questionable macular findings will be referred to an ophthalmologist for possible fluorescein angiography.

FOLLOW-UP: Annual ophthalmology consultation is required. If histoplasmosis spots are in the vicinity of the disc or macula reevaluation may be required every six months. Macular histoplasmosis involvement should be followed daily by the individual aircrew member using an Amsler grid. Peripheral manifestations of histoplasmosis are usually asymptomatic and clinically irrelevant, requiring less frequent follow-up.

TREATMENT: Laser photocoagulation to limit exudation and prevent serous retinopathy is compatible with flying status. Patients should not be flying while on steroid therapy and may return to flying duty within 72 hours after completion of treatment if asymptomatic. An eye care provider must perform a thorough evaluation after completion of any therapy to include a slit lamp examination and biomicroscopy. Complications of treatment include recurrence of retinal neovascularization and elevation of IOP.

DISCUSSION: Over 99 percent of histoplasmic infections are benign. Up to 2 percent of adults in the Midwest have histoplasmosis spots disseminated in the fundus. The spots are more frequent in left than right eyes, but they are bilateral in 67 percent of patients. Some studies have reported 60 percent of patients with macular involvement become legally blind. If spots are present in the area of the disc, the risk of a symptomatic attack in the next 3 years is 20 percent; if none are present, the risk declines to 2 percent.

REFERENCE: Presumed Ocular Histoplasmosis Syndrome; <http://www.revoptom.com/handbook/sect5o.htm>

OPTIC NEURITIS (ICD9 377.30)*AR 40-501: 2-12f(1)*

AEROMEDICAL CONCERNS: Optic neuritis causes a decrease in visual acuity which may progress rapidly over 1-3 days to a level of counting fingers. The symptoms may be worsened on exercise or exposure to high environmental temperatures. In some cases, the condition may be an early indication of multiple sclerosis (MS).

WAIVER: Waiver may be considered provided MS has been definitively excluded and provided that the patient has recovered and is clinically stable with normal visual acuity, stereopsis and color vision.

INFORMATION REQUIRED:

- Complete Ophthalmology/optometry evaluation
- Complete Neurology evaluation. MRI and lumbar puncture may be required to definitively rule-out MS.

FOLLOW-UP: An annual comprehensive eye examination is required, noting specifically visual acuity, stereopsis, and color vision.

TREATMENT: N/A

DISCUSSION: An Air Force study group has shown that over 90% of patients had the condition in only 1 eye. Approximately 17% of the patients had a recurrence. Up to 93% eventually recovered to a visual acuity of 20/40 with 87% achieving 20/20. A total of 30% of patients eventually progressed to MS within a time span of 3 months to 6 years. While this percentage is much less than reported elsewhere, it is worth noting that the females are 3 times as likely as males to develop MS.

RETINAL ARTERY/VEIN OCCLUSION (ICD9 362.30)*AR 40-501: 2-12e(1)*

AEROMEDICAL CONCERNS: Symptoms range from mild peripheral visual blurring to severe visual field loss.

WAIVER: The granting of a waiver will depend on the resultant visual acuity and the absence of other pathology.

INFORMATION REQUIRED:

- Ophthalmology/optometry evaluation
- Evaluation must address that the visual acuity meets aeromedical standards and that neovascular glaucoma has not developed.
- Exclusion of other pathology such as hypertension, diabetes, blood dyscrasias, multiple myeloma and dysgammaglobulinemia is required. Work-up may need to include studies to rule-out valvular and carotid disease.

FOLLOW-UP: An annual ophthalmology/optometry evaluation is required.

TREATMENT: Photocoagulation is sometimes useful in central retinal vein thrombosis and in long-standing cases of branch retinal vein occlusion.

DISCUSSION: Macular edema occurs in 57% of cases of occlusion of the temporal branch of the retinal vein. Visual acuity improves in 60% of patients with branch retinal vein occlusion and 50% achieve visual acuity of 20/40 or better within 1 year. In central retinal vein occlusion, neovascular glaucoma develops in 15% of cases.

UVEITIS/IRIDOCYCLITIS (ICD9 364.3)

AR 40-501: 2-12d, 4-11d(2)

AEROMEDICAL CONCERNS: The acute condition can cause distracting pain in the eye, floaters, excessive tearing, photophobia, and blurred vision. Long term sequelae include cataract, glaucoma, retinal damage, corneal band keratopathy, and loss of vision. Uveitis is often associated with other autoimmune and infectious diseases.

WAIVERS:

Initial Applicants (All Classes): More than one episode of any form of uveitis is rarely granted exception to policy or waiver. When transient uveitis is due to a traumatic event, this will be filed as *Information Only* provided symptoms completely resolve, visual acuity returns to baseline and is within current aeromedical standards. A single nontraumatic episode requires an ophthalmology evaluation only. Multiple nontraumatic episodes require evaluation as listed below to exclude underlying systemic diseases.

Rated Aviation Personnel (All Classes):

Waiver may be considered for chronic or recurrent cases, but is rarely granted. When transient uveitis is a single episode or due to a traumatic event, this will be filed as *Information Only* provided symptoms completely resolve and visual acuity returns to baseline and is within current aeromedical standards. More than one nontraumatic episode requires the evaluation as listed below to exclude underlying systemic diseases.

INFORMATION REQUIRED:

- Ophthalmology/optometry evaluation
- Associated diseases causing uveitis, such as sarcoidosis, ankylosing spondylitis, tuberculosis, syphilis and toxoplasmosis should be excluded and the following initial studies should be completed:
 - ANA
 - Angiotensin Converting Enzyme
 - HLA B 27
 - Lyme serology
 - PPD
 - Syphilis Serology
 - CXR
 - Other tests as indicated by history/physical and ophthalmology consultant.

FOLLOW UP: Annual comprehensive eye exam may be required.

TREATMENT: Patients should be grounded during the active phase of the disease and during treatment.

DISCUSSION: Uveitis is any condition that involves inflammation of the uveal tract (iris, ciliary body, choroid) or adjacent structures. The key features of the condition are inflammatory cells in the anterior chamber and/or vitreous cavity. Associated features include pain, redness, photophobia, and anterior and posterior synechiae. Following traumatic iridocyclitis, the most common causes of anterior uveitis are idiopathic (38-56%), the seronegative spondyloarthropathies (21-23%), juvenile rheumatoid arthritis (9-11%), and herpetic keratouveitis (6-10%). The vast majority of cases of intermediate uveitis are idiopathic. Toxoplasmosis is the most common cause of posterior uveitis, and the most common causes of panuveitis are idiopathic (22-45%) and sarcoidosis (14-28%).

REFERENCE:

Foster, D. "General Approach to Uveitis Patient and Treatment Strategies," in *Ophthalmology*, Yanoff, Ed., 1st Ed., Mosby International, 1999.