BY ORDER OF THE
SECRETARY OF THE AIR FORCE

AIR FORCE PAMPHLET 48-133

1 JUNE 2000

Aerospace Medicine

PHYSICIAL EXAMINATION TECHNIQUES

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OPR: USAFSAM/AF
(CMSgt Stephen W. Smiley)
Supersedes AFR 160-17, 22 Jul 1983

Certified by: AFMOA/CV
(Col Christianson)
Distribution: F/ Pages: 149

This pamphlet applies to all medical personnel who perform portions of physical examinations or preventive health assessments. It outlines step-by-step procedures for proper completion of tests and additional studies usually performed on physical examinations given by the Air Force. All Air Force health care providers must become familiar with its contents. Included are some of the tests and studies required to evaluate an abnormal physical finding or an item that requires further evaluation. Use this publication in conjunction with AFI 36-208, Medical Examination of United States Academy and ROTC Four-Year Scholarship Applicants; AFI 48-123, Medical Examination and Standards; and AFPAM 48-132, Medical Waivers for Aircrew. The use of a name of any manufacturer, commercial product, commodity, or service in this publication does not imply endorsement by the Air Force. This pamphlet is affected by the Privacy Act of 1974. Authority to collect and maintain records is outlined in Section 8013, Title 10, United States Code, and Executive Order 9397. Each form affected by the Privacy Act which is required by this pamphlet either contains a Privacy Act Statement incorporated in the body of the document or is covered by DD form 2005, Privacy Act Statement-Health Care Records. Air Force Privacy Act system notices F044 AF SG E, Medical Records System, and F044 AF SG G, Aircrew Standards Case File, apply. For a list of acronyms and terms used throughout this pamphlet, see attachment 1.

SUMMARY OF REVISIONS

This revision incorporates the requirements, information and procedures formerly in AFR 160-17 and some parts of AFR 160-43, reorganizes text, and changes many requirements and procedures. Due to the broad scope of changes, technicians are encouraged to consult the text on each action.

Chapter 1

GENERAL PROVISIONS

1.1. Introduction to Examining Techniques . This pamphlet outlines the various tests used during physical examinations and preventive health assessments to evaluate and determine an examinees qualification. Though many medical textbooks describe physical examinations in different fashions, the information in this publication must be applied universally in order to obtain a standard finished product. Each chapter contains background information, instructions to examinees, and steps for performing the tests. Technicians must become familiar with the instructions and information provided. There is no substitute for clarity in presenting the instructions, or the attention paid to detail when performing these tests. Keep in mind that when a physical examination or preventive health assessment is reviewed, the patient is not present for evaluation; only the thoroughness of your documentation is available to determine the examinee's qualification.

1.2. Medical Ethics:

1.2.1. The quality of a physical examination/assessment is directly related to your integrity as the examiner. It is very easy to hurry through a test, to skip some of the instructions, or to record a "normal" score without actually performing the test. However, remember that when a test is not performed as required, or its' result is not recorded accurately, you may be allowing an unqualified person to pass. This adversely affects mission effectiveness, operational safety, and the member's well-being.

1.2.2. You have the following obligations when performing the tests on a physical examination/ assessment:

1.2.2.1. To present the proper military image and bearing;

1.2.2.2. To be unhurried, patient, and courteous;

1.2.2.3. To perform each test as outlined in this directive;

1.2.2.4. To accurately record the examinee's responses.

1.3. Malingerers. A malingerer is a person who deliberately hides or exaggerates the symptoms of an illness or injury to reach a consciously desired goal or need. You must be aware of malingering attempts. The most common type of malingering involves faking an injury or illness. However, an examinee may also simulate good health to hide an actual illness. Malingering attempts are frequently seen during initial examinations (enlistment, commissioning, and flying/special duty applications) and examinations for termination of service (voluntary or involuntary separation and retirement).

1.4. Evaluating Abnormal Findings. Do not discuss abnormal findings on any test with the examinee. Note these findings and show them to the examining health care provider at the end of the test. The findings will be evaluated according to AFI 48-123, and additional studies performed as determined by the examining provider.

1.5. Health Care Provider / Physician Guidance:

1.5.1. Methods of performing physical examinations may be found in any number of standard textbooks to which the reader may refer. Although the principles for accomplishing a thorough and com-

plete physical examination are the same in the military as in the civilian sector, there are several differences in exam technique and documentation. You must review AFI 48-123 to understand the special requirements involved with Air Force physical examinations.

1.5.2. The health care provider should review this publication to become familiar with its general content. Although it mainly addresses the technical and paraprofessional portions of the physical examination, this publication will provide the examining provider with useful information about the technician's role in completing the physical examination.

1.6. Documentation of Examination Results:

1.6.1. Results of tests performed will be documented appropriately on the SF 88, Report of Medical Examination; AF Form 1446, Medical Examination - Flying Personnel; DD Form 2351, DOD Medical Examination Review Board (DODMERB) Report of Medical Examination; or other appropriate forms as indicated.

1.6.2. Obviously, there will be some exams described on these forms which are not indicated, based on the type of examination being taken by the examinee. Any item not requiring evaluation or examination will be indicated by dashes (-) in the appropriate block. This helps differentiate between an item not required to be evaluated as opposed to one that may have been inadvertently overlooked.

Chapter 2

SUPPORTING STUDIES

2.1. Dental Examination.

2.1.1. General Information. On all initial physical examinations, a dental officer will examine the mouth, teeth, and supporting structures and summarize the finding on SF 88, Report of Medical Examination. The dental officer will not discuss the significance of dental findings with an applicant for military service, except to give advice on substandard conditions that must be corrected by elective dental treatment for the examinee to meet acceptable dental standards.

2.1.2. Dental X-rays. Dental radiographs are proper for medical forensic purposes, following major changes in oral configuration, or when required by AFI 48-123 or Table 10.1.(Item 44) of this pamphlet. Due to the risk of overexposure to total absorbed radiation, dental X-rays may not be performed as a part of a routine screening (type 3) exam.

2.1.2.1. Radiographs of active duty personnel undergoing Flying Class I or IA physical examinations do not need to be forwarded with the examination to the review and certification authority unless the applicant is disqualified based on the dental radiographs. If disqualified, the original radiographs should be maintained in the examinee's dental record and a copy or additional film should be forwarded.

2.1.3. Dental Exam Type. The type of physical examination/assessment the examinee is undergoing will determine the actual type of dental examination accomplished. Dentists are required to follow examination procedures outlined in AFI 47-101, Management and Administration of the US Air Force Dental Activities. The following is a brief explanation of the types of dental examinations performed for physicals or preventive health assessments, a complete explanation can be found in AFI 47-101.

2.1.3.1. Type 1 - Comprehensive Examination. The most comprehensive dental examination performed. This exam includes full mouth intraoral periapical or panoramic radiographs with posterior bitewing radiographs and an extensive mouth-mirror examination by the dentist.

2.1.3.2. Type 2 - Periodic Oral Examination. A generalized examination is the next most detailed examination. It is mouth-mirror examination by the dentist and new or existing appropriate radiographs.

2.1.3.3. Type 3 - Other Examination. A modified generalized examination that consists of a mouth-mirror examination by the dentist and may include selected area radiographs if indicated.

2.1.3.4. Type 4 - Screening Survey Examination and Type 5 Entry Into Service Screening Examination. These examinations are not normally used in conjunction with physical examinations.

2.1.4. Dental Health Classifications. When a dental examination is performed, it is also necessary to have a means of recording the conditions found. This is simply called the "Dental Class". AFPD 47-1, Dental Services outlines each class as follows:

2.1.4.1. Class 1, indicates no pathologic oral conditions exist and no treatment is required.

2.1.4.2. Class 2, indicates that oral conditions exist that are not expected to require emergency treatment within 12 months.

2.1.4.3. Class 3, reflects the presence of oral conditions that are expected to require emergency treatment within 12 months. Personnel in dental health class 3 require immediate attention and will be considered for a physical profile change.

2.1.4.4. Class 4, indicates dental health is unknown and that a periodic evaluation is required. A physical profile should be completed on personnel in this category assigning the individual a 4T profile as outlined in chapter 10 of this pamphlet.

2.2. Laboratory Examinations . Certain basic clinical laboratory tests are required with all physical examinations, see **Table 10.1.** (Item 19), and preventive health assessments, see Table 10.3. All laboratory tests will be recorded with the results and followed in parenthesis by the local laboratory normal values and unit of measurement (i.e. - Cholesterol 135 mg/dl (140-200 mg/dl)). The following tests are required on all initial accession physical examinations.

2.2.1. Urinalysis. A routine urinalysis to include the specific gravity, tests for albumin and sugar, and a microscopic examination will be performed. Any abnormal findings will be brought to the attention of the examining physician for additional follow-up, as indicated.

NOTE:

Microscopic analysis is unnecessary if multireagent strip screen of urine is normal/negative.

2.2.2. Serology. The two most common serological tests for syphilis are the Rapid Plasma Reagin (RPR) and the Venereal Disease Research Laboratory (VDRL) slide test. Any positive results will be repeated and additional tests or examinations performed as indicated.

2.2.3. Complete Blood Count. Any abnormal results will be brought to the attention of the examining physician and additional tests or examinations ordered to try to determine the cause or other underlying pathophysiology.

2.2.3.1. Hemoglobin (Hgb). The test is used to check for oxygen carrying pigment of the erythrocytes (Red Blood Cells) in the blood. The results will be recorded in grams per deciliters.

2.2.3.2. Hematocrit (Hct). The test is used to determine the percentage of erythrocytes (Red Blood Cells) in the blood. The results will be recorded as a percentage.

2.2.4. Hemoglobin-S (Sickledex). Baseline testing for sickle cell disease and other sickling disorders (anemia) will be performed on all examinees.

2.2.5. Glucose-6 Phosphate Dehydrogenase (G6PD). Baseline testing for G6PD deficiency, which may render the individual unable to receive malaria prophylaxis medications, will be performed on all examinees.

2.2.6. Human Immunodeficiency Virus (HIV). Antibody testing is required on all initial examinations, periodic non-flying examinations and complete flying examinations for national guard and reserve personnel and as indicated by the Preventive Health Assessment Clinical Requirements Grid. Personnel identified as HIV-Positive will be handled in accordance with established protocols.

2.2.7. Lipid Measurements. Lipid measurements of cholesterol, high-density lipoprotein (HDL) cholesterol and triglycerides and counseling are required on all complete medical examinations and as indicated by the PHA Clinical Requirements Grid. The written evaluation results are given to the examinee at the time of the counseling. Any cholesterol of 230 mg/dl or higher and/or total choles-

terol/HDL cholesterol ratio greater than 6.0 must be repeated before qualification can be determined on initial or continued flying duty physicals, see AFI 48-123. Low-density lipoprotein (LDL) cholesterol may also be required for follow up testing.

2.2.8. Other Tests. Other clinical laboratory tests may be required based on the type of physical examination/assessment, examinee's age, etc. Consult AFI 36-2018, AFI 48-123 or other regulations governing physical examinations/assessments for these additional requirements.

2.3. Radiographs of the Chest. An anterior and posterior (A & P) inspiratory radiograph of the chest will be accomplished on all initial flying physical examinations, when medically indicated by history or clinical evaluation, and when required by AFI 48-123 or the PHA Grid. However to prevent overexposure to total absorbed radiation, chest X-rays will not be performed for routine screening on other physical examinations/assessments.

2.3.1. Radiographs of the chest, when accomplished, must be interpreted by one of the following:

2.3.1.1. A physician with one or more years of training in radiology; or

2.3.1.2. Board certified internist or civilian consultant in radiology.

2.3.2. Any X-ray film that shows doubtful shadows or abnormalities will be reviewed by a radiologist or an internist experienced in chest diseases and follow-up examinations ordered to rule out any active pulmonary disease.

2.4. Breast Examination/Papanicolaou Smear. For initial accession examinations all female applicants will undergo a breast examination and pelvic exam with papanicolaou smear. Active duty and ARC female personnel will undergo a breast and pelvic examination with Pap smear annually. After three normal Pap smears are obtained, the examination will be accomplished every two years or more frequently if indicated by the primary care manager and the patient.

2.5. Mammography. A baseline mammogram will be accomplished at age 40 and at two year intervals thereafter for females at normal risk for the development of breast cancer with annual mammography accomplished beginning at age 50. Female personnel determined to be at increased risk in developing breast cancer will undergo baseline mammography at age 35 with mammography annually thereafter.

2.6. Colo-rectal Cancer Testing. Rectal examination with occult blood testing will be accomplished at age 40 and then yearly at age 50. Personnel at increased risk should be screened more frequently and colonoscopy should be performed if indicated.

Chapter 3

IDENTIFICATION AND BODY MEASUREMENTS

3.1. Standing Height.

3.1.1. Standing heights are only accomplished without shoes. Examinees are instructed to stand at the position of attention and keep their head facing directly forward. Be careful not to allow slouching (which will lower a standing height) or standing on the toes and stretching (which will raise a standing height). Note: Individuals with a standing height measurement of less than 64 inches must have a functional reach measurement accomplished for those career fields for which shorter stature is appropriate. (see **3.4.**)

3.1.2. Back-to-hard surface standing height is accomplished by attaching a measuring device to a wall and having the examinees stand with their backs against the measuring device. The back-to-hard surface method is the most accurate and is therefore the required method. The height measuring device attached to most scales will not be used. Record the standing height to the nearest quarter of an inch (see **Figure 3.1.**).

Figure 3.1. Standing Height.

3.2. Sitting Height. This is measured by seating the examinee on a flat, hard table or stool with the back of the examinee's knees touching the edge of the table or stool. The hips, knees, and feet must be flexed at 90 degrees, lower legs dangling free, torso straight, and the head facing directly forward. Measure the distance from the top of the head to the surface of the table or stool and record to the nearest quarter of an inch (see **Figure 3.2.**). A sitting height measuring device can be manufactured locally.

Figure 3.2. Sitting Height Chair.

3.3. Buttock to Knee Measurement. This measurement helps ensure that the examinees knees and distal lower extremities will clear the instrument panel during the ejection sequence. It is measured by seating the examinee on a flat, hard table or stool with the back of the examinee's knees touching the edge of the table or stool. The hips, knees, and ankles must be flexed at 90 degrees, lower legs dangling free, torso straight, and the head facing directly forward. Measure the distance from the rearmost point on the buttocks to the front of the knee.

3.4. Functional Reach. The functional reach will be measured with the individual barefooted. Ask the individual to stand with their feet flat on the floor; to clench their fist and hold their arm straight overhead. Measure from the top of the closed fist (highest point on the knuckles of the hand) directly to the floor (do not measure using an arch). Record to the nearest quarter of an inch above block 51 on the Standard Form 88, Report of Medical Examination. Note: Waiver should be submitted for individuals with stature less than 64 inches if their functional reach is at least 76 inches.

3.5. Body Weight. The member's weight will be measured with shoes off and in basic standard duty uniform, or comparable civilian attire. Remove contents from the pockets and any extraneous equipment or outer clothing that would effect the member's weight. Have the examinee stand still while on the scale

(see **Figure 3.3.**). Read the measurement directly in front or behind the scale. Reading the scale from either side rather than straight on reduces accuracy. Subtract three pounds for clothing for men and women. Weight will be recorded to the nearest quarter pound. Refer to AFI 40-502, The Weight Management Program or AFI 48-123, Physical Examinations and Standards, to determine weight standards. Individuals found to be overweight must be identified to their unit commander or first sergeant for disposition. Scale calibration varies depending on the recommendations of the manufacturer and on current Air Force directives.

Figure 3.3. Body Weight.

3.6. Body Fat Measurements (BFM). BFM measurements are located in AFI 40-502. The maximum allowable weight (MAW) and BFM policy for all Air Force accessions (including those whose training has been delayed): If an applicant is weighed and found to be at or below their MAW, a BFM is not required and processing can continue. If an applicant is above their MAW, a BFM is required and can only be administered by approved medical personnel. If an applicant passes the BFM, processing can continue, and if during subsequent processing the applicant's weight is found to be at or below his/her MAW, no further BFM is required. If the initial BFM is failed, the applicant will be temporarily disqualified until such time that the MAW or BFM is met to continue processing. Commanders may direct a

BFM on any applicant. Active duty and Air Reserve Component members: Those found to exceed their MAW are evaluated In accordance with the Air Force Weight Management Program directive.

3.7. Color of Hair and Eyes. You will determine these colors, not by asking the examinee. Use only the basic colors when recording the findings (i.e. - for hair - black, brown, blonde, red, gray, etc.; for eyes - brown, blue, green, etc.). Do not make a determination as to whether the colors are light or dark.

3.8. Footprints. Personnel on flying status will be footprinted on an AF Form 137, Footprint Record. This is done when a person first enters aviation service; when previous footprints are not on file; are of poor quality; or changed due to scarring. Footprints must be reviewed during each physical examination to determine adequacy and currency.

Figure 3.4. Footprint Plate.

3.8.1. The following supplies are recommended: Plate glass in wood frame (see **Figure 3.4.**), Fingerprint ink, Inking hand roller (or the infant disposable footprinter could be used in place of the first three items), Waterless hand cleaner cream, and alcohol pads.

3.8.2. Use the following procedures:

3.8.2.1. The examinee is seated in a relaxed position to relieve tension on the legs and feet.

3.8.2.2. Clean the examinee's feet of all debris and perspiration. Remove perspiration with alcohol and dry the feet thoroughly.

3.8.2.3. If using the plate glass method, squeeze a small quantity of ink on the plate glass. With the inking roller spread a thin, even film of ink across the plate glass. If using the infant footprinting pad, apply the ink to the foot and toes in a blotting motion.

3.8.2.4. Instruct the examinee to relax and avoid applying pressure against the plate glass. You will apply all the required pressure. A method to relax the examinee's legs and feet is to have the examinee look at the opposite wall, not the feet.

3.8.2.5. Print one foot at a time. Each print will include the toes and upper third of each foot. Place the examinee's foot on the plate glass and apply moderate pressure to all the toes and the ball of the foot. Be careful to avoid movement that will blur or smudge prints.

3.8.2.6. Before trying to record impressions, a few trial runs are done using plain bond paper. This will give you a chance to test the adequacy of the impressions. Too much ink on the plate glass or too much pressure on the feet and toes will leave a blurred impression.

3.8.2.7. Clear impressions reveal accurate pattern differentiation, ridge counting, whorl tracing, and interpretation of whorl types (see **Figure 3.5.**).

Figure 3.5. Example AF Form 137, Footprint Record.

3.8.2.8. After the final footprints are recorded, allow them to dry and complete the identification data on the AF Form 137 before filing the form in the health record.

Chapter 4

CARDIOVASCULAR EVALUATION

4.1. Blood Pressure. Blood pressure (BP) is the force exerted by the blood as it moves through the arteries. A number of factors determine the blood pressure, such as cardiac output, peripheral vascular resistance, volume of blood in the vascular system, viscosity of the blood, and the elasticity of the arterial walls. Of these, peripheral resistance and cardiac output have the greatest influence on BP.

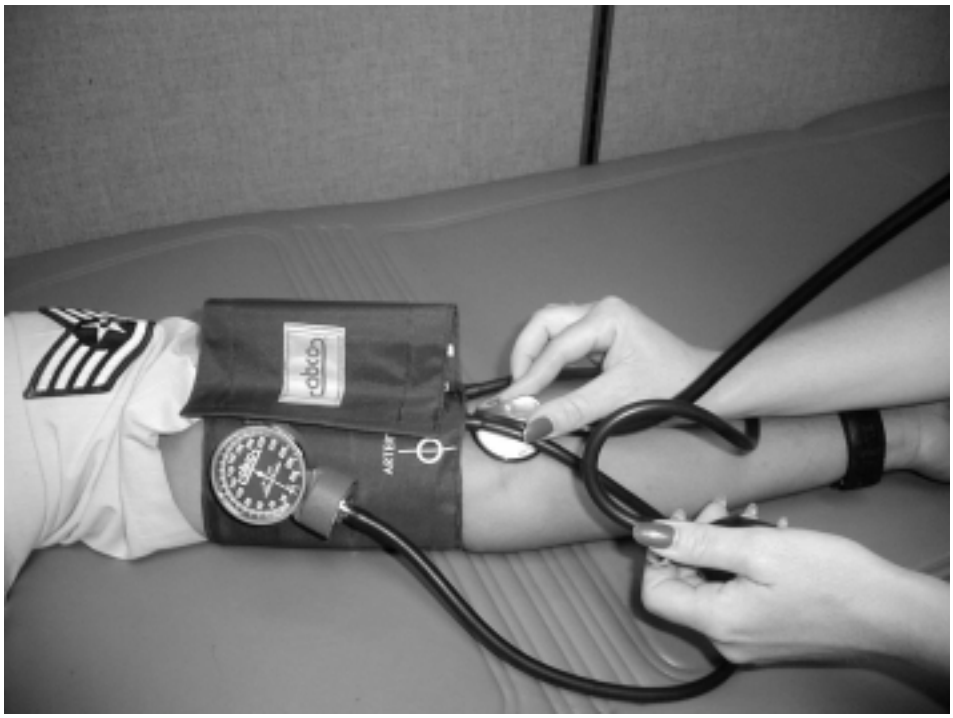
4.1.1. Systolic and Diastolic Pressure. The BP varies in a wave-like pattern, going up as the heart pumps (systole) and falling as the heart relaxes and refills (diastole). Two measurements are recorded during the BP determination. The higher value is the systolic pressure, which peaks during the contraction of the heart. Diastolic pressure, the lower measurement, results from relaxation of the heart.

4.1.2. Preparing the Examinee. Seat the examinee comfortably with their arm unrestricted by clothing or other material. Physiological factors that could alter the BP (anxiety, caffeine, tobacco, physical exertion, etc.) will be noted. The lower edge of the sphygmomanometer (BP cuff) is placed 1 inch above the antecubital space (crease on the inside of the elbow). The center of the inflatable bladder, usually marked with an arrow on the cuff, should cover the patient's brachial artery along the medial aspect of the lower arm at the elbow. Make sure that there is no clothing under the cuff (this will distort the readings). Also make sure the examinee has no constricting clothing and that their legs are uncrossed.

4.1.3. Techniques:

4.1.3.1. The radial artery is usually located on the medial side of the antecubital fossa. Once the artery is found, the center of the BP cuff is placed over the artery (see **Figure 4.1.**) and the cuff is inflated to approximately 170 mm Mercury (mmHg) or until the radial pulse disappears, plus another 30 mm Hg.

Figure 4.1. Measuring Blood Pressure--Palpating Brachial Pulse.



4.1.3.2. The examinee's arm will be held at heart level while the BP is being determined on an examinee who is sitting or standing. Changes of as much as 10mm Hg in both the systolic and diastolic pressure are noted as the arm is raised or lowered from this position. When the examinee is supine, the arm is near enough to heart level so that no adverse effect is noted.

4.1.3.3. The stethoscope is placed in the antecubital space over the brachial artery. The stethoscope will be applied firmly so there is no space between it and the skin. If too much pressure is applied to the stethoscope, the artery will become compressed and may produce distorted sounds. It is a matter of personal preference whether you use either the bell or diaphragm side of the stethoscope.

4.1.3.4. The pressure in the cuff is released at a rate of 2 to 3 mmHg per second. Deflating at a faster or slower rate will result in false pressure readings.

4.1.4. Interpreting BP Sounds:

4.1.4.1. The sounds heard during the BP determination are called Korotkoff's sounds. When the BP cuff is inflated, the walls of the artery relax. As the cuff is deflated, the walls become distended with blood. This distention produces the sounds that are interpreted as the examinee's BP.

4.1.4.2. There are five distinct phases to the Korotkoff's sounds:

4.1.4.2.1. Phase 1 - Beginning of a faint, clear, tapping ("thud") sound which gradually increases in intensity.

4.1.4.2.2. Phase 2 - The sound murmurs, blows, or swishes.

4.1.4.2.3. Phase 3 - The sound is crisper and again increases in intensity.

4.1.4.2.4. Phase 4 - A distinct, abrupt muffling of the sound (soft, blowing quality) is heard.

4.1.4.2.5. Phase 5 - The sound disappears and there is silence.

CAUTION: In some individuals a muffled Phase 5 Korotkoff's sound may be audible all the way to 0 mmHg. This does not mean the diastolic pressure is 0!

4.1.4.3. The systolic pressure is recorded at the beginning of Phase 1 (faint, clear tapping). The diastolic pressure is recorded at the beginning of Phase 4 (distinct, abrupt muffling). Some texts list that beginning of Phase 5 (silence) as the diastolic pressure. However, accurately determining Phase 5 depends on the quality of the stethoscope used, surrounding noise, and your own hearing acuity.

4.1.5. Precautions. Make sure the BP cuff is the proper size! Too narrow a cuff will give falsely high readings. For individuals with very large upper arms, a "thigh" cuff should be used. Make sure that the BP cuff is completely deflated before and after the procedure. If the BP is to be retaken in the same arm, wait a minimum of 1 to 2 minutes before reinflating the cuff. This will allow the release of blood trapped in the veins to enter back into circulation.

4.1.6. Determining BP on Physical Examinations:

4.1.6.1. All physical examinations and certain preventive health assessments require at least a sitting BP reading. Consult AFI 48-123 for a list of additional BP readings to be accomplished for different types of physical examinations.

4.1.6.2. AFI 48-123 identifies the standards for blood pressures on physical examinations or assessments. If an abnormal BP is found, make sure the examining physician is notified. AFI 48-123 also contains the proper procedures to follow in evaluating abnormal BPs.

4.2. Pulse. The pressure wave initiated by the contracting left ventricle and transmitted through the arteries produces a pulse. The pulse can be felt in arteries located close to the skin surface that can be compressed slightly against a bone.

4.2.1. Techniques:

4.2.1.1. The recommended artery to use when determining a pulse on physical examinations is the radial artery. This artery passes over the palm side of the radius on the thumb side of the wrist.

4.2.1.2. You must make sure that you do not use your thumb when determining the examinee's pulse rate because everyone has a pulse in their thumb. As a result, you may be taking your own pulse if the thumb is used. Use the flat portions (pads) of your index and middle fingers or middle and ring fingers to obtain a pulse.

4.2.1.3. The most accurate method of determining an examinee's pulse rate is to count the number of impulses for a full minute. However, other variations are available such as: counting for 30 seconds and doubling the reading or counting for 15 seconds and multiplying the reading by four.

4.2.2. Determining Pulse Readings on Physical Examinations:

4.2.2.1. All physical examinations require at least a sitting pulse. Consult AFI 48-123 for other pulse readings to be accomplished on different types of physical examinations.

4.2.2.2. Physical examinations accomplished for all initial flying classes require five pulse readings to be obtained on the examinee. These pulse readings will be obtained after the BP has been determined.

4.2.2.3. Obtain pulses in this order (DO NOT follow the order presented on SF 88):

4.2.2.3.1. Sitting Pulse: The examinee's sitting pulse rate is obtained first.

4.2.2.3.2. Standing for 3 Minutes: The examinee will be instructed to stand motionless for 3 minutes. At the end of this time obtain the examinee's pulse rate.

4.2.2.3.3. After Exercise: The examinee is then instructed to hop 100 times on one foot, clearing the floor by at least 1 inch on each hop. The number of hops may be altered depending upon the examinee's age, physical condition, etc. An alternative exercise (such as running in place) may be substituted for the hopping. However, if an alternative test is used, note this on the SF 88. The objective of this exercise is to get the pulse above 100 bpm. Immediately after exercise, with the examinee still standing, obtain the examinee's pulse rate again.

4.2.2.3.4. Two Minutes After Exercise: Two minutes after the exercise ends, with the examinee standing for the entire time, obtain the examinee's pulse again. If an unusually elevated pulse rate is sustained after 2 minutes of rest (over 100 bpm), refer the examinee to a physician for further evaluation, which may include an electrocardiogram (EKG) and a cardiac stress test. The objective is to get the pulse near the resting beats per minute.

4.2.2.3.5. Recumbent: Have the examinee lie down and immediately obtain the pulse rate again.

4.2.2.3.6. AFI 48-123 contains the standards for pulse readings on physical examinations. If an abnormal pulse reading is found, the examining physician will be notified.

4.3. Orthostatic Tolerance Test. The orthostatic tolerance test is used to determine if there are adverse effects noted on the examinee's cardiovascular system when the examinee goes from a recumbent to a standing position.

4.3.1. Procedures. With the examinee recumbent, obtain the BP and pulse rate. The examinee is then instructed to stand motionless for 3 minutes and the BP and pulse are obtained again.

4.3.2. Abnormal Responses:

4.3.2.1. Change in BP: A change in systolic or diastolic BP values of 20mmHg or more. For example, a recumbent BP of 120/80 and a standing BP of 100/60.

4.3.2.2. Hypotensive BP: Systolic pressure below 90mmHg or diastolic pressure below 60mmHg.

4.3.2.3. Tachycardiac Pulse: Rate of 120 beats a minute or higher.

4.3.2.4. Syncope: As a result of marked bradycardia or vasovagal response.

4.3.3. Precautions. Abnormal responses must take into consideration the presence or absence or recent illness. If the examinee has recently been ill or has been exposed to long periods of bed rest, the test will be repeated after an adequate period of convalescence.

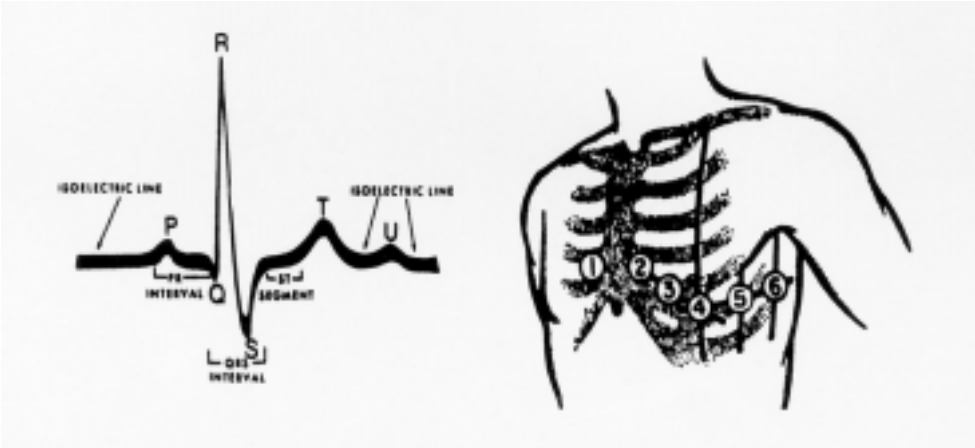
4.4. Electrocardiograms (EKG or ECG). The abbreviations EKG and ECG are used interchangeably and should be considered synonymous. Many of the physiological problems that the body encounters, either directly or indirectly, involve the cardiovascular system. Accordingly, this system must be care-

fully and thoroughly evaluated during a physical examination. One of the most useful tests for this evaluation is the ECG.

4.4.1. Equipment:

4.4.1.1. The electrocardiogram is made by an instrument (electrocardiograph) that picks up and amplifies the electrical current that accompanies the heartbeat. This electrical current is generated by the heart and is picked up by sensors attached to specific areas of the body and recorded by the ECG machine. The cardiac cycle will be represented on the ECG in a fashion similar to that shown in **Figure 4.2.**

Figure 4.2. Heartbeat (Cardiac) Cycle.



4.4.1.2. No single precordial lead electrocardiograph machines should be used since they do not allow simultaneous tracing and potentially miss abnormalities. Microprocessor ECG machines allow for storage and acquisition of tracings at a later date.

4.4.2. Purpose. By measuring the various waves, complexes, intervals, and electrical voltage, a trained person can determine the rate, rhythm, and axis (angle) of the heart, along with any evidence of myocardial hypertrophy or infarction. These determinations, along with other cardiovascular examinations (including BP, pulse determinations, and auscultation of the heart), will give an overall picture of the persons cardiovascular status. The ECG presents an accurate picture of the electrical activity of the heart, not its physical activity; therefore it should not be used as a final determining factor as to a persons cardiovascular status. Rather it should be used as a starting point for further evaluation and testing if any abnormalities are discovered.

4.4.3. On Whom Performed. ECGs are performed on persons at the discretion of the examining physician and as required by AFI 48-123 or the Preventive Health Assessment Clinical Studies Grid.

4.4.4. Procedures:

4.4.4.1. The routine ECG consists of six standard (limb) leads (I, II, III, aVR, aVL, aVF) and six precordial (chest) leads (V1 through V6), and is recorded on paper at a speed of 25mm per second. Since a variety of metabolic changes can occur due to food digestion or the influence of caffeine or nicotine, the ECG will be obtained with the examinee in a smoke-free, fasting state for several hours before obtaining the tracing.

4.4.4.2. Before obtaining an ECG, the technician will make sure that the area where the tracing is to be accomplished is properly prepared and appropriate safety checks carried out on the machine. The technician will be thoroughly familiar with the instruction booklet covering preparation, operation, and the controls for the particular type of machine being used. Items to be checked are:

4.4.4.2.1. Power controls

4.4.4.2.2. Electrical cord not frayed or exposed

4.4.4.2.3. Proper connections for patient cable, telephone line, etc.

4.4.4.2.4. Extra electrocardiograph paper available.

4.4.4.2.5. Extra diskettes for microprocessor machines.

4.4.4.2.6. Machine correctly standardized to 10mm of stylus deflection. (Consult instruction manual for proper procedures.)

4.4.4.2.7. Electrodes and ECG straps out, sanitized and ready.

4.4.4.2.8. Conductive pads or paste available.

4.4.4.2.9. Damp cloth or towel available for examinee's use after completion of ECG.

4.4.4.2.10. Grease pencil or other non permanent means of marking chest position.

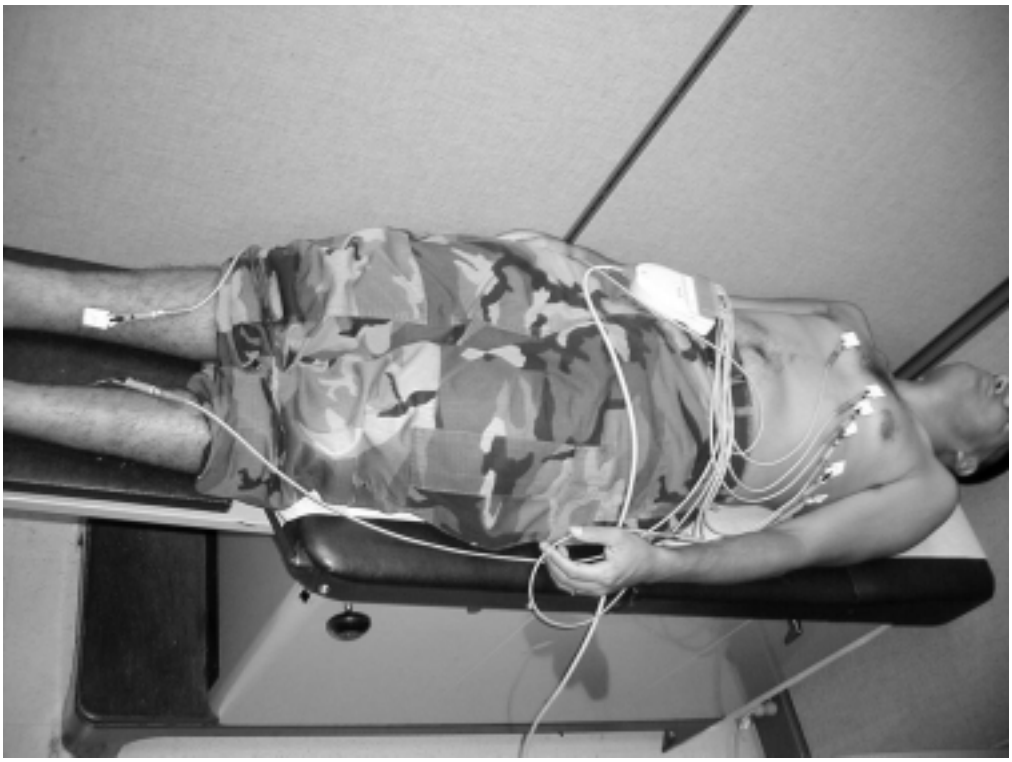
4.4.4.2.11. Material for draping examinee, if required.

4.4.4.3. Examinee Preparation. First, the technician should introduce themselves and reassure the examinee. Give an explanation as to the purpose of the ECG, ensure they understand that all electricity flows from the body to the machine (not vice versa), and that the ECG will be interpreted by a physician at a later time. After the introduction, the examinee should strip from the waist up, remove all watches, bracelets, etc... All female examinees are to be properly draped before lead placement. NOTE: Refer to Air Force and medical treatment facility professional policies, procedures and requirements regarding the ethical and legal implications regarding the use of chaperones while examining members of the opposite sex.

4.4.4.4. Electrodes. Several types of electrodes are available, including self-adhesive pads, suction cups, and strap-on metal electrodes. Consult the operators manual for your machine or the instruction sheets that come with the electrodes for application procedures.

4.4.4.4.1. Limb Leads. Limb electrodes will be placed on the inside of the arm several inches up from the wrist and on the leg several inches up from the ankle (see **Figure 4.3.**). Ensure that retaining bands are snug enough to maintain good contact between the electrode and extremities, yet not so tight that they act as a constricting band and cause the examinee discomfort. Some manufacturers suggest that limb leads can be placed on the torso near the extremity, however, this procedure is NOT acceptable for ECGs performed in conjunction with a physical examination. Incorrect limb lead placement may produce voltage and axis changes when these ECGs are compared to baseline or previously run ECGs.

Figure 4.3. Limb Lead Placement.



4.4.4.4.1.1. Once the electrodes and retaining straps are applied, the ECG cables are attached to the electrodes. Each cable must be double-checked to make sure that it is connected to the proper electrode. Any loose connection will result in an invalid tracing.

4.4.4.4.1.2. Any excess wiring from the cable should be tucked under the examinee so as not to present a safety hazard while working around the examinee, and to prevent inadvertent disconnection of a cable from an electrode.

Figure 4.4. Chest Lead Placement.

4.4.4.4.2. Chest Leads. To obtain a valid ECG tracing, proper placement of the precordial (chest) electrodes is very important (see **Figure 4.4.**). Any variance may result in inconsistent findings or possible false abnormalities. To prevent this, make sure that:

4.4.4.4.2.1. Each chest lead can be marked by some non permanent means, preferably a grease pencil, for easy reference.

4.4.4.4.2.2. The chest electrodes at the V4, V5 and V6 positions are maintained in a straight line, not carried along the curvature of the rib.

4.4.4.4.2.3. Leads V1 and V2 are located in the fourth intercostal space, and V3 is positioned between V2 and V4.

4.4.4.4.2.4. If the electrolyte paste is used, it is not smeared from one precordial space to another. This will cause a 'short-circuit' between the sensors called 'soft bridging'.

4.4.4.5. Identification of the Patient on the Actual Tracing:

4.4.4.5.1. If the tracing is being performed on a microprocessor electrocardiogram, the following patient identification information must be entered (as a minimum):

4.4.4.5.1.1. Name (Last, First, MI)

4.4.4.5.1.2. Rank

4.4.4.5.1.3. Social Security Number

4.4.4.5.1.4. Date of ECG

4.4.4.5.1.5. Base or Examining Facility

4.4.4.5.1.6. Recumbent Blood Pressure

4.4.4.5.1.7. Race

4.4.4.5.1.8. Sex

4.4.4.5.1.9. Height

4.4.4.5.1.10. Weight

4.4.4.5.1.11. Age

4.4.4.5.1.12. Medications recently taken

4.4.4.5.1.13. Reason for Examination (i.e. - routine physical examination, chest tightness, palpitations, etc)

4.4.4.5.1.14. Local Interpretation (usually the one done by the machine and confirmed by a physician)

4.4.4.5.2. If the tracing is not performed on a microprocessor electrocardiograph, the ECG must be attached to a completed SF 520, Clinical Record - Electrocardiograph Record.

4.4.4.6. Running the ECG. Microprocessor electrocardiographs will automatically provide the necessary 12-lead ECG with standardizations and lead markings. Always check that 10mm standardization is used, and adjust the machine according to the manual to acquire this setting. If you are using the older 3-channel machines, the limb leads (I, II, III, aVR, aVL, aVF) will be run first, then the chest leads (V1 through V6) will be obtained.

4.4.4.6.1. Center the stylus on the graph paper and take care to make sure that no part of the tracing is in the top or bottom 5 millimeters (mm) of the graph paper. If the lead cannot be obtained without the tracing being in the top or bottom 5mm, the machine's sensitivity switch should be moved to 1/2 Sensitivity (5mm standardization) and the lead obtained. However, the sensitivity switch must be returned to the normal position (if possible) before accomplishing the next lead. Always mark the tracing immediately highlighting the fact that 1/2 sensitivity was used on the particular lead.

4.4.4.6.2. Each lead will be marked using the automatic machine marker at the beginning of the lead. Leads may be marked by using the lead name or the marking codes which are required when using some of the older machines.

4.4.4.6.3. Standardization: After marking the lead, at least one heartbeat should be recorded, then the lead standardized. This is accomplished on the older machines by pressing the standardization so as to produce a 10mm deflection of the stylus during the pause between the T wave and P wave. Newer machines accomplish this standardization automatically and it is recorded at the beginning of the strip.

4.4.4.6.4. The chest leads (V1 to V6) will be obtained in the same manner as the limb leads. After completing the last lead, the tracing will be removed from the machine and the electrodes disconnected from the examinee. Microprocessor ECGs require some time to analyze the tracing. Avoid disconnecting the examinee until you verify the tracing is of acceptable quality.

4.4.4.7. Recording or Filing the ECG. SF 520, Clinical Record - Electrocardiographic Record, will only be used on ECGs obtained on non-microprocessor based machines. SF 520 will be

attached by the bottom portion of the tracing. The SF 520 will be completed with all of the information contained in paragraph 4.4.4.5.1. along with the local interpretation and the description of any significant ECG details noted. The BP required on the heading of SF 520 will be obtained just before or after accomplishment of the ECG, but while the examinee is still in the recumbent position. The practice of using a BP taken at any other time, or in any other position, does not show the examinee's true cardiovascular status.

4.4.4.8. All ECGs obtained on rated personnel (to include cardiac stress testing, Holter Monitors, cardiac catheterization, etc.) will be forwarded to the USAF Central ECG Library. Send all ECGs done on Rated Flyers (trained pilots, navigators, and flight surgeons), to include; physicals, sick call, emergency room visits, consultations, admissions, etc... If an ECG or other cardiovascular study is performed for any reason, explain why the study was ordered and what the provider was trying to rule out.

4.4.4.8.1. Procedures: There are several rules to be followed for sending tracings to the ECG Library:

4.4.4.8.1.1. Complete the patient identification area on the tracing as previously described.

4.4.4.8.1.2. Send only original tracings. Duplicated (photocopied) tracings are unacceptable as they cannot be placed on microfilm for future reference. Obtain two original ECG tracings; one of the originals will be mailed and the other maintained in the individual's health record.

4.4.4.8.1.3. Send only 12 lead full standard ECGs.

4.4.4.8.1.4. A group of tracings being mailed will include one transmittal letter with all

examinee's names and social security numbers in alphabetical order.

4.4.4.8.2. Follow-up Studies Requested by USAFSAM/AFC. All follow-up studies e.g. Repeat 12-lead ECG, Holter Monitor, Echocardiogram, etc. will be completed and forwarded in a timely manner.

4.4.4.8.3. Mail ECG tracings on rated personnel to: USAFSAM/ AFCI, 2507 Kennedy Cr., Brooks AFB TX, 78235-5117. Ensure that the package contains a cover letter which lists the name, rank and type of ECGs being forwarded for each individual.

Chapter 5

VISION ACUITY TESTING (OPTEC 2300 VISION TESTER {OGT})

5.1. General Information. The Optec 2300 Vision Tester (OVT) combines the testing of several visual functions into one piece of equipment. This machine or its predecessor, the Vision Test Apparatus - Near and Distant (VTA-ND), may be used to complete all physical examinations.

5.2. Tests Accomplished. The test plates used on both machines are identical. The distant and near tests are classified into two categories - standard, and backup. The standard tests are the ones most often accomplished on physical examinations. Backup tests are used when you believe the examinee is malingering or has the tests memorized. NOTE: Optional test plates may be included when the machines are purchased. Individuals requiring these tests should be referred to optometry.

5.2.1. Distant Tests:

5.2.1.1. Standard Tests.

5.2.1.1.1. Far Vertical Phoria, test 1.

5.2.1.1.2. Far Lateral Phoria, test 2.

5.2.1.1.3. Distant Visual Acuity, tests 3 and 4.

5.2.1.1.4. Fusion and Depth Perception, test 5.

5.2.1.2. Backup Tests:

5.2.1.2.1. Distant Visual Acuity, tests 3A and 4A.

5.2.1.2.2. Fusion and Depth Perception, test 5A.

5.2.2. Near Tests: Near Visual Acuity, tests 8 and 9, are the only standard near tests. There are no backup near tests.

5.3. Required Equipment.

5.3.1. OVT Machine. The basic parts are outlined in the owner's manuals. A basic knowledge of these parts is essential for the proper operation of the machine.

5.3.2. Score Card. This is a card containing all of the correct responses to each test. Compare the responses given by the examinee with the score card before recording the result. Either the VTA-ND Score Card or the OVT Score Card can be used interchangeably. There are some arrangement differences between the two score cards. Caution should be used when using score cards since erroneous results can be caused by looking at the wrong section or wrong side of the card.

5.4. Maintenance. Proper maintenance of the OVT gives you the ability to effectively evaluate an examinee's vision. If the machine is not in proper operating order or not clean, the examinee's vision may be interpreted incorrectly. Proper preventative maintenance and cleaning instructions can be found in the manufacturer's users manual.

5.5. Machine and Examinee Preparation. The machine will be placed on a table 28 to 30 inches high, with ample space underneath for the examinee's legs and enough surface area for the machine and for you to record the results.

5.5.1. Each day before using the machine, plug it in and turn it on to determine if the lights work properly. Ensure that all required equipment is available.

5.5.2. While greeting each examinee before testing, you must ask the following questions:

5.5.2.1. Do you wear glasses?

5.5.2.2. Do you wear contact lenses?

5.5.2.3. Do you now or have you ever had any eye problems?

5.5.3. If the examinee states a history of or current eye problems, refer them to a health care provider who will determine if the OVT tests can be performed, or if referral to optometry / ophthalmology is appropriate.

5.5.4. Position the examinee in front of and adjust the machine to the height of the examinee. The adjustment is made with the machine turned on so the examinee can view one of the test slides while adjusting it to a comfortable viewing height. Never raise or lower the machine when the examinee's face is in contact with or close to the machine. Ensure the examinee always faces the machine squarely and looks through the center of the lenses.

5.5.5. If the examinee wears glasses, tests 3 and 4 (distant visual acuity), and tests 8 and 9 (near visual acuity) will be tested first without glasses, and then test both distant and near acuities with glasses on. This is done to ensure the correction for distant vision or near vision does not distort one another below acceptable limits.

5.5.6. While testing each examinee, observe the examinee for any indication of tropia (eye movement shift), signs of the use of contact lenses or glasses, squinting, proper forehead positioning and malingering. Never allow the examinee to view the scoring card.

5.5.7. Contact lenses. Polymethylmethacrylate (PMMA) or gas-permeable (hard) contact lenses will not be worn for at least three months and soft contact lenses will not be worn for at least one month preceding the examination for Flying Class I and IA (IAW AFI 48-123). Also, contact lenses will not be worn during or for 2 weeks preceding an initial examination for Flying Class II or III.

5.5.7.1. Personnel on Flying Status:

5.5.7.1.1. Soft contact lenses (SCL) approved by USAFSAM/AFC, HQ AFMOA/SGOO, and MAJCOM/SG may be worn the day of a periodic examination. SCL will be removed after the corrected distant and near visual acuities have been measured and recorded on the appropriate form.

5.5.7.1.2. Flying personnel who are wearing approved contact lenses will then have their visual acuities measured with their spectacles immediately after removing SCL. The uncorrected visual acuities will then be measured. These results will be recorded on the appropriate form.

5.5.7.2. Ground Based Controllers (including Combat Controllers): Follow the requirements for non-flying examinations.

5.5.7.3. Other types of physical examinations: Contact lenses may be worn the day of the physical. Contact lenses are to be removed after the corrected visual acuities are measured to obtain the uncorrected visual acuities.

5.6. Standard Testing Sequence. The standard distant and near tests are given in the following order:

5.6.1. Test 1 - Far Vertical Phoria.

5.6.2. Test 2 - Far Lateral Phoria.

5.6.3. Test 3 or 4 or both - Distant Visual Acuity.

5.6.4. Test 5 - Fusion and Depth Perception.

5.6.5. Test 8 or 9 or both - Near Visual Acuity.

5.7. Standard Testing Procedures and Scoring. The following procedures are designed to obtain the best possible results from each test. Any deviation from these procedures can render invalid test results.

5.7.1. Test 1 - Far Vertical Phorias. Evaluates an examinee's hyperphorias.

5.7.1.1. Machine Setup: Select the far drum (white button raised), set the test dial to test number 1, and depress both eye test switches (green and orange buttons).

5.7.1.2. Instruct the examinee to place his/her forehead against the forehead rests. Ask them the following questions:

5.7.1.2.1. Do you see a white dotted line?

5.7.1.2.2. Do you see a row of numbered stair steps?

5.7.1.2.3. At what step does the dotted line appear level?

5.7.1.3. If the examinee answers "yes" to the first two questions and gives a result of 1 to 9 to the third question, compare their result with the scoring card to determine the core. A response of "1" will yield a score of 2.0 diopters left hyperphoria and 0 diopters right hyperphoria, and a response of "9" will yield a score of 2.0 diopters right hyperphoria and 0 diopters left hyperphoria. DO NOT leave a blank in the score area. Place the result under either the R.H. or the L.H. of the SF 88, Report of Medical Examination. Since only one (R.H. or L.H.) will have a result, the other should be filled with a "0" (i.e.; R.H. 2 L.H. 0). When recording the results of this test for a PHA the results will be entered on the overprint SF 600. An example is RH 2 LH 0.

5.7.1.4. If the examinee says "no" to the first or second question, occlude the left eye and ask, "Do you see some stair steps?" Then remove the occluder from the left eye, occlude the right eye and ask, "Do you see a white dotted line?" Then remove the occluder from both eyes and ask, "Now do you see both the dotted line and the stair steps?"

5.7.1.4.1. If the examinee says "no" to any of these three questions, test number 1 will be discontinued and an "X" will be recorded for left hyperphoria and right hyperphoria. This examinee must be referred to the optometrist/ophthalmologist for further evaluation.

5.7.1.4.2. If the examinee says "yes" to all three questions, ask "Where does the dotted line intersect the numbered stair steps?", and then follow the procedures in paragraph **5.7.1.3.** above.

5.7.1.5. If the examinee sees the dotted line below step 1 or above step 10, test number 1 will be discontinued and an "X" will be recorded for left hyperphoria and right hyperphoria. This examinee must be referred to the optometrist / ophthalmologist for further evaluation.

5.7.1.6. All responses to stair steps 1, 2, 8, or 9 will be verified by asking the examinee, "Is the dotted line as high as the top (or bottom) of the stair steps?"

5.7.2. Test 2 - Far Lateral Phorias. Evaluates an examinee's esophoria and exophoria.

5.7.2.1. Machine Setup: Select the far drum (white button raised), set the test dial to test number 2, and depress both eye test switches (green and orange buttons).

5.7.2.2. Instruct the examinee to place their forehead on the forehead rest and ask: "To which number does the arrow point?".

5.7.2.3. If the examinee gives an answer of 0 to 22, compare the result with the scoring card to determine the recording score. A response of "0" will yield a score of 11 diopters esophoria / 0 diopters exophoria and a response of "22" will yield a score of 11 diopters exophoria / 0 diopters esophoria. Place the result under either the ESO or the EXO of the SF 88, Report of Medical Examination. Since only one (ESO or EXO) will have a result, the other should be filled with a "0" (i.e.; ESO 2 EXO 0). When the test is performed as part of a PHA enter the results on the overprint SF 600. An example is ESO 2 EXO 0.

5.7.2.4. If the examinee says the arrow does not point to any number, occlude the left eye and ask, "Do you see a row of dots with numbers below?" Then remove the occluder from the left eye and occlude the right eye and ask, "Do you see an arrow with three dots below it?" Now remove the occluder from both eyes and ask, "To which number does the arrow point?" If the examinee gives an answer of 0 to 22, then follow the directions above.

5.7.2.5. The test is discontinued if the examinee still cannot see both the arrow and the numbers at the same time. In this instance, an "X" will be recorded for esophoria and exophoria. This examinee must be referred to the optometrist / ophthalmologist for further evaluation.

5.7.2.6. If the examinee sees the arrow and three dots to the left of the dot 0 or to the right of dot 22, test number 2 will be discontinued and an "X" will be recorded for esophoria and exophoria. This examinee must be referred to the optometrist or ophthalmologist for further evaluation.

5.7.2.7. If the examinee says the arrow moves over a wide range, tell the examinee, "Look closely at the arrow." If the arrow continues to move, cover and then uncover the right eye with the occluder and say, "Look closely at the arrow. Tell me where it is when you first see the numbered dots." Follow the directions above to compute their score.

5.7.3. Tests 3 and 4 - Distant Visual Acuity. These tests simulate evaluating the examinee's visual acuity at 20 feet.

5.7.3.1. Machine Setup: Select the far drum (white button raised), set the test dial to test number 3, and depress the eye test switch of the eye you want to test (green or orange button).

5.7.3.2. Instruct the examinee to place his/her forehead against the forehead rests and give the examinee the following direction, "Read the letters on line 5 at the top of the chart".

5.7.3.3. An examinee must correctly read 7 or more letters of any line or groups of 10 letters to pass that line (only 3 mistakes are allowed). If the examinee is applying for flying duty (Initial

Flying Class I, IA, II or III), they must correctly read all ten of the letters on a given line to be credited with that degree of visual acuity.

5.7.3.4. If the examinee successfully completes line 5, then follow these procedures:

5.7.3.4.1. Instruct the examinee, "Look at the smaller lines of letters on the left and the still smaller ones on the right. What is the smallest line of letters you can read clearly without squinting?"

5.7.3.4.2. Ask the examinee to tell you the number of the line, then read it aloud.

5.7.3.4.3. Ultimately, the best possible vision must be obtained on each examinee. Do not stop this test when the examinee has successfully completed a line of letters until it is determined that the examinee cannot read the next smaller line of letters.

5.7.3.4.4. If an examinee fails a line of letters, move up the chart one line at a time until a line is successfully completed. That will be the examinee's visual acuity. Do not indiscriminately skip around the test slide. The "A" suffixed lines are provided as alternates to the basic lines of letters. They can be used interchangeably with the basic lines. They are also used if you suspect malingering or wish to verify the examinee's final score. Therefore, it is acceptable to skip from an unsuccessful attempt at line 8 to line 7 (skipping line 7A).

5.7.3.4.5. Compare each response on a line of 10 letters with the scoring card. Each line of letters is assigned a given visual acuity. If the smallest line of letters an examinee can read with an eye is line 10, then the visual acuity is 20/17 for that eye. Record the result in the appropriate item of the SF 88, Report of Medical Examination. Record the right eye's uncorrected score to the right of "RIGHT 20/ " and its corrected score to the right of "CORR. TO 20/ ". Record the results for a PHA on the overprint SF 600 in the following manner, Distant Visual Acuity: OD Uncorrected 20/XXX Corrected 20/XX; OS Uncorrected 20/XXX Corrected 20/XX.

5.7.3.4.6. Once a visual acuity is obtained for one eye, switch the occluder to the other eye and follow these same procedures to obtain the visual acuity for that eye. If visual acuity is obtained for both eyes on test 3, then test 4 is eliminated from the test sequence.

5.7.3.5. If the examinee does not successfully complete line 5 with one eye, then follow these procedures before testing the other eye:

5.7.3.5.1. Place the test dial on test number 4 and give the examinee the following direction: "Read the top line of letters first and then continue to read the other lines of letters until you are told to stop." The lines of letters on test 4 are not numbered, therefore we must have them read top to bottom to preclude errors in scoring.

5.7.3.5.2. The examinee must correctly identify two of the three letters to receive credit for the top line of letters. The examinee must correctly identify 7 of the 10 letters to pass the remaining lines. Again, if the examinee is taking the examination for the purpose of initial flying duty, they must correctly identify all the letters on the row to pass that row.

5.7.3.5.3. If the examinee does not successfully complete the top line of test 4, then record a score of "20/0" and refer the examinee to an optometrist for determination of the proper visual acuity. The examination cannot be considered complete until the optometrist has verified their exact visual acuity.

5.7.3.5.4. Stop the test when one of the lines is failed. Their score is that of the last correctly completed line. Compare each response on a line of letters with the scoring card. Each line of letters is assigned a given visual acuity. If the smallest line of letters an examinee can read on test 4 with an eye is the bottom line, then the visual acuity is "20/70".

5.7.3.5.5. Once the visual acuity is obtained for one eye, switch the occluder, and return to test 3. Repeat the procedures for that test and test 4 if needed.

5.7.4. Test 5 - Fusion and Depth Perception. If the examinee is required to wear corrective lenses while performing military duties, test and record only corrected results. All results for test 5 will be recorded in the appropriate block of the SF 88, Report of Medical Examination. Place a dash ("-") in the "UNCORRECTED" box and record the results of the test in the "CORRECTED" box when lenses are worn. The dash ("-") indicates it was not required. When performing the test as part of a PHA you will record the results on the SF 600 as either Corrected or Uncorrected and the results. An example of this would be “Corrected Passes (E)” or “Uncorrected Passes (F)”.

5.7.4.1. Machine Setup: Select the far drum (white button raised), set the test dial to test number 5, and depress both eye test switches (green and orange buttons).

5.7.4.2. Fusion Test. You must test for fusion each time you use test 5 and alternate test 5A.

5.7.4.2.1. Instruct the examinee to place their forehead against the forehead rests. Instruct the examinee, "Describe (or preferably draw) the object you see in the upper left hand corner of this test slide."

5.7.4.2.2. The test determines whether the slightly different test targets presented to the right and left eyes are combined into a single image (fuse), or if the target presented to one eye is not seen. This is a test of fusion or how well the eyes fuse together. If the examinee has normal binocular vision and fusion, they will see in the upper left hand corner of the slide an arrow with a head, a tail, and a circle in the middle of the shaft. If any other response is given, consider the fusion test failed. Record a fusion test failure by placing the entry "OVT - X" in the appropriate item and by dashing the "UNCORRECTED" and "CORRECTED" blocks. Before recording a failing result double check the occluder switches to ensure both were depressed.

5.7.4.2.3. If the examinee passes the test for fusion, continue with the test for depth perception.

5.7.4.3. Depth Perception Test. The "simulated" depth employed in this test can make this examination very difficult to see. Therefore, the depth perception test is probably the most difficult to explain and administer to the examinee. Consequently, complete failure on this test, unless supported by other evidence, is not necessarily indicative of poor depth perception. To reduce the number of "false failures", do not hurry through the demonstration and practice periods that precede the actual test.

5.7.4.3.1. In explaining the test, show the examinee the demonstration device consisting of a transparent piece of plastic with four black circles on the rear surface and one on the front. Explain the test using similar words to these, "The slide used to test depth perception consists of a number of horizontal rows of circles, five circles in each row, one of which should appear slightly nearer to you than the other four. You will be asked to identify the circle in each row which appears closer to you. Identify the closest circle by counting the circles from left to right. In this example, the closest circle is number 3." After the demonstration model has been

shown, tell the examinee to look into the OVT and focus on Group A, the three rows of circles in the upper left corner of the square.

5.7.4.3.2. The first group will be used to further explain the test and allow time for depth perception to adjust. The top row of five circles in group A demonstrates a relatively large difference in depth, the middle row a moderate difference, and the bottom row a small difference. Some examinees may not see any depth for the first minute or so. In such cases, do not hurry through the practice test.

5.7.4.3.3. You may tell the examinee the correct answers to the three rows of group A and instruct them to look at each circle in turn until they can see that one of the five circles in each row is nearer than the others. When you are satisfied that the examinee actually sees depth in at least the top row, proceed to the actual test. This will be given without any help or hints.

5.7.4.3.4. Ask the examinee to indicate, by number, which circle is nearer in the top, the middle and the bottom row of group B. If all three answers are correct, the same questions will be asked for group C, group D, etc. The test will be discontinued when the examinee gives one incorrect answer in any one group beyond group B.

5.7.4.3.5. If any incorrect answer is given in group B, repeat the explanation with group A. Then, if correct answers are given in group B, have the examinee try group C, followed by group D, etc. If they still cannot correctly identify the answers for group B, discontinue the test.

5.7.4.3.6. Record "PASSES" with the letter of the last group successfully completed D, E, or F in the appropriate corrected or uncorrected box. If the examinee successfully completes (no errors) groups B, C, D, E, and F then the correct entry would be: Passes (F).

5.7.4.3.7. The test is failed if the examinee makes a mistake in group B on the second attempt or groups C or D on the first attempt. Record "FAILS" in the appropriate corrected or uncorrected box.

5.7.4.3.8. Test 5 on the OVT machine is the primary depth perception test and will always be recorded in the appropriate item of the SF 88 or on the SF 600. If the examinee fails the test for fusion, or fails depth perception on the OVT or VTA-ND, the examinee will be referred to a competent eye care professional for a full evaluation. This evaluation will include ductions, versions, cover test and alternate cover test in primary and 6 cardinal positions of gaze, AO Vectograph Stereopsis Test at 6 meters, AO Suppression Test at 6 meters, Randot or Titmus Stereopsis Test, and 4 Diopter Base out Prism Test at 6 meters.

5.7.5. Tests 8 and 9 - Near Visual Acuity. These tests evaluate an examinee's visual acuity at a simulated near distance (13 inches):

5.7.5.1. Machine Setup: Select the near drum (white button depressed), set the test dial to test number 8, and depress the eye test switch of the eye you want to test (green or orange button). Instruct the examinee to place his/her forehead against the forehead rests. Follow the procedures outlined for testing Distant Visual Acuity as outlined above. Use test 9 as you would test 4 for distant vision.

5.7.5.2. If bifocals are worn, the examinee may not be able to maintain contact with the forehead rests while completing near tests with glasses. Allow the examinee to tilt their head slightly backward to afford use of the bifocal lenses during testing. If extreme difficulty is experienced main-

taining contact with the forehead rest because of bifocal lenses, depress and hold the override switch located on the side of the OVT.

5.7.5.3. Record near vision results in the appropriate item of the SF 88, Report of Medical Examination. Record the right eye's uncorrected result to the left of "CORR. TO" and its corrected result to the right of "CORR. TO" (i.e.; 20/200, 20/30). The "BY" part of this item will be explained and completed when the examinee's refraction is discussed in **Chapter 6**. When this test is accomplished for a PHA the results will be recorded as described in the distant vision test, see paragraph 5.7.3.4.5 for an example.

5.7.5.4. Armed Forces Near Vision Card. This card will be used for individuals whose best near visual acuity is found to be worse than 20/20 when measured on the OVT or VTA-ND. See **Chapter 6**, paragraph 6-9 of this pamphlet for procedures and USAFSAM Special Report 89-5 for Closest Cockpit Working Distance evaluations.

5.8. Backup Testing Procedures and Scoring. These tests are provided to assist in identifying malingerers who may have memorized the standard tests or to verify results obtained on the standard tests:

5.8.1. Tests 3A and 4A. These are backup tests for tests 3 and 4. Follow the same procedures for tests 3 and 4 above.

5.8.2. Test 5A. This is a backup test for test 5. Follow the same procedures for test 5 above.

Chapter 6

SUPPORTING VISUAL EXAMINATIONS

6.1. Transposition and Ordering Spectacles:

6.1.1. Transposition: Transposition is the process of changing a spectacle prescription from minus to plus cylinder, or the reverse.

6.1.2. The rules of transposing are:

6.1.2.1. Add the sphere "power" to the cylinder power:

6.1.2.1.1. If the signs are the same, add the two powers.

6.1.2.1.2. If the signs are different, subtract the smaller number from the larger and use the sign of the larger of the two numbers.

6.1.2.2. Change the sign of the cylinder (plus to minus / minus to plus).

6.1.2.3. Change the axis by 90 degrees (do not use degrees greater than 180 or less than 0).

6.1.3. Example:

	Sphere	cylinder	axis
Original:	+2.75 s.	-1.75 cx	179
Transposed:	+1.00 s	+1.75 cx	089.

6.1.4. Ordering Spectacles: All lenses, either for single vision or multifocal lenses, are ordered in terms of "minus" cylinder.

6.2. Cycloplegic Refractions: When a determination of the refractive error under cycloplegia is required, the refraction will also include a slit lamp examination for evidence of radial keratotomy and other surgical procedures performed to modify the refractive power of the cornea. Cycloplegic drugs will not be instilled in the eyes until all other optometric/ophthalmological examinations, except ophthalmoscopy, have been completed; also, these drugs will not be used in the presence of eye infection, evidence of increased intraocular tension, or other contraindication. See **Attachment 2** for the advisory statement to be signed by the examinee. The advisory statement may be modified by the Air Force Recruiting Services. It will become a permanent part of the examinees health record.

6.2.1. Contact Lenses: AFI 48-123 states that " Use of polymethyl methacrylate (PMMA) or gas permeable (hard) contact lenses within 3 months before examination or soft contact lenses 1 month before examination is prohibited.". Please question the examinee about recent use of contact lenses before administering cycloplegic drops.

6.2.2. Procedure:

6.2.2.1. For all routine and primary eye examinations, where refractive error is not an issue and the refraction is easy, Tropicamide 1% and Neosynephrine HCL 2-1/2%, used once each, will usu-

ally suffice for cycloplegia. The examinee will be refracted 20-30 minutes after the drops were instilled.

6.2.2.2. For primary eye examinations in which the cycloplegic refraction is potentially or actually a qualification issue (i.e., FCI, FCIA, initial FCII, initial FCIII), use 1% cyclopentolate (Cyclogyl), 2 drops, 5-15 minutes apart. Examination will be performed no sooner than 1 hour after the last drop and within 2 hours of the last drop of cyclopentolate.

6.2.2.3. When refraction is a clinical issue because of difficulty, Cyclogyl 1% and Neosynephrine HCL 2-1/2%, used once each, will usually suffice for cycloplegia. The examinee will be refracted 1-2 hours after the drops were instilled.

6.2.2.4. If no effect or a significantly reduced effect is noted with cyclopentolate, another agent or a new bottle on another day should be considered.

6.2.3. Administration. These drops may be administered by flight medicine or optometry/ophthalmology clinic personnel. When cycloplegic agents are administered, the agent name, strength, time of each drop administered, and examination time will be noted on the examination form (SF 88).

6.2.4. Recording Results. Results of the actual cycloplegic examination will be recorded in the appropriate item of the SF 88 under "Refraction". Additionally, the remarks block will contain a statement including the name of and the concentration of the agent used, times the drops were instilled, and the time the examination was performed. A statement by the examining optometrist/ophthalmologist regarding evidence of radial keratotomy will also be included.

***NOTE: Wear of Corrective Lenses:** If an examinee normally wears corrective lenses while performing duties, they may wear them during testing listed in paragraghs **6.3.** through **6.9.** provided they do not meet any of the following criteria; Color correcting or darkly tinted lenses will not be worn. Contact lenses for cosmetic purposes are allowed provided they are not required for adequate correction.

6.3. Near Point of Convergence: The Near Point of Convergence (PC) evaluates the eye's ability to continue focusing on an object that is moved toward the examinee.

6.3.1. Equipment Required. The equipment required to perform the near PC is the Accommodation Test rule and some type of fixation object (tip of a pen, etc.).

6.3.2. Procedures. Performing the Near PC requires the examinee and yourself to be on an eye-to-eye level so that movement of the examinee's eye is easily detected.

6.3.2.1. The zero (0) end of the Accommodation Test rule is placed 15mm from the anterior corneal surface of the eye on the right side of the nose. The ruler will be held at a slight downward angle (15 to 20 degrees) from the examinee's perpendicular line of sight (see **Figure 6.1.**). This downward angle permits binocular vision.

Figure 6.1. Near Point of Convergence.

6.3.2.2. A fixation object is placed at the far end and on the nasal side of the rule. Instruct the examinee to focus on the object and follow it as you move it toward their eyes.

6.3.2.3. Move the test object slowly toward the examinee's eyes while constantly observing the examinee's eyes for any break in fusion, as indicated by outward movement of either eye. The point of fixation on the pen must be maintained midway between the eyes at all times to ensure even strain on the eyes. Make sure you carefully slide the fixation object along the surface of the ruler, as the vibrations could distract the examinee. Also ensure that the fixation object is brought toward the nose at a steady speed and is not moved up and down in a wave-like motion.

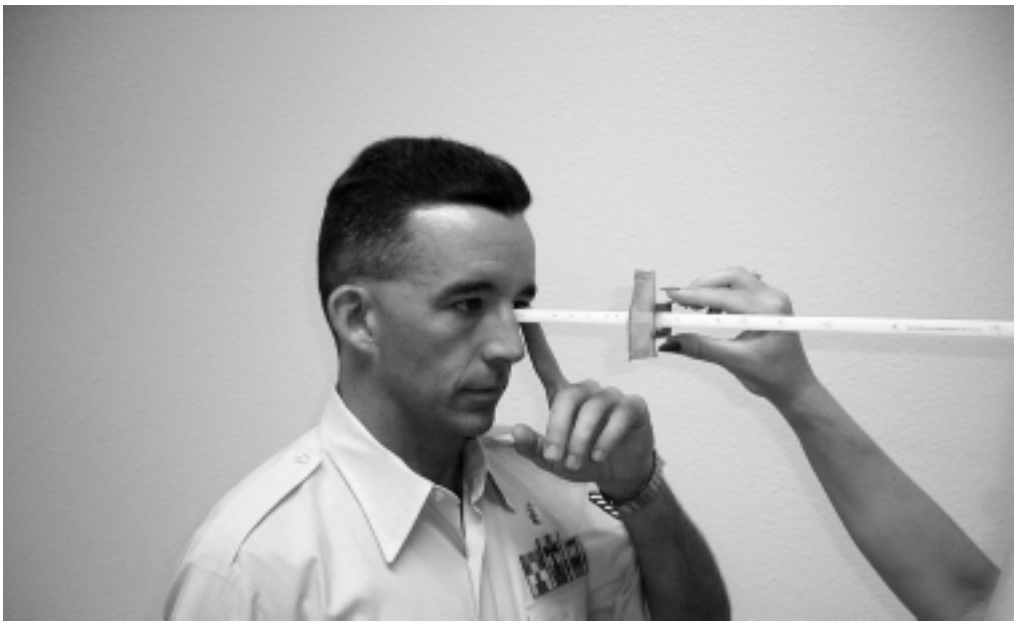
6.3.3. Results. Results of the PC will be determined at the point where fusion on the test object was broken (evidenced by the one of the eyes shifting its' gaze away from the object), and will be recorded in millimeters under "PC", in the appropriate item of the SF 88.

6.3.4. Retesting. Some examinees will be able to focus on the test object the entire length of the test rule. In this case the test will be repeated and the examinee will be instructed to report at which point that test object doubles. If the object does not double, record "0" under PC, in the appropriate item of the SF 88. Passing "score" is 100mm or less. If the result of the initial test exceeds 100mm, the test will be repeated on 2 successive days and the nearest (lowest) reading of the three will be used.

6.4. Near Point of Accommodation. Performance of the Near Point of Accommodation will require an Accommodation Test Rule, accommodation card and card slide holder. The examinee's accommodative power will be obtained by testing each eye separately.

6.4.1. Procedures. The zero end of the rule is placed 15mm from the anterior corneal surface of the opposite eye being tested, with the rule held level to the line of sight and resting against the surface of the nose (see **Figure 6.2.**). This placement of the rule will prevent binocular vision which produces inaccurate results.

Figure 6.2. Near Point of Accommodation.



6.4.2. The accommodation card is placed as close to the eye as possible and centered on the card slide holder. This position will ensure the examinee can not focus on the card or read any of the letters and numbers.

6.4.3. The examinee is instructed to concentrate on the card as it is moved away from the eye and to report when the second line from the bottom (1mm in height) can be read.

6.4.4. Slowly move the card back and stop when the examinee reports the letters can be read. Ask the examinee to read the letters. They must correctly read at least 7 of 10. If they cannot, ensure they understand your instructions, and continue to move the card back until they can correctly read at least 7 of the 10 letters. After the examinee has correctly read at least 7 of the 10 letters, obtain the results (in diopters) from the rule, and repeat the test for the opposite eye.

6.4.5. Care must be taken during administration of the test to ensure that the rule is held straight and level. This prevents the examinee from focusing on and reading the card with the opposite eye. Also, the test card will be replaced if it becomes dirty or the letters become smudged.

6.4.6. If an Accommodation Test rule is not available, diopter values may be obtained by using a standard inch or centimeter rule and the accommodation card. Perform the test as previously described and determine the person's accommodation in inches or centimeters. To obtain diopter values use the following formulas:

To determine diopters from inches: $\frac{40}{\text{measured inches}}$ = diopters

To determine diopters from centimeters: $\frac{100}{\text{measured centimeters}}$ = diopters

6.4.7. Results. Results of the Accommodation Test will be recorded for each eye in diopters in the appropriate item of the SF 88. Passing score is based on the examinee's age (see **Table 6.1.**).

Table 6.1. Accommodation Standards.

AGE	DIOPTERS	AGE	DIOPTERS
17	8.8	32	5.1
18	8.6	33	4.9
19	8.4	34	4.6
20	8.1	35	4.3
21	7.9	36	4.0
22	7.7	37	3.7
23	7.5	38	3.4
24	7.2	39	3.1
25	6.9	40	2.8
26	6.7	41	2.4
27	6.5	42	2.0
28	6.2	43	1.5
29	6.0	44	1.0
30	5.7	45	0.6
31	5.4		

6.5. Color Vision:

6.5.1. Pseudoisochromatic Plate Set (PIP). The standard test for screening color perception is the Pseudoisochromatic Plate set, which consists of a demonstration plate and 14 test plates. This test is formally known as the Vision Test Set - Color Vision (VTS-CV), since the PIP and the VTS-CV are the same test they will also be considered as synonymous terms. In addition to the plate set, an easel with a blue filtered light source (MacBeth Lamp with a 100 watt light bulb or true daylight illuminator) is required to provide proper illumination of the test plates.

6.5.1.1. Procedures.

6.5.1.1.1. Color vision testing for Flying Classes I, IA, II, and III must be performed monocularly (one eye covered) under either a Macbeth easel lamp or the "True Daylight"Æ lamp from Richmond Products. (Ensure that only 100-Watt, clear replacement bulbs and the proper filter is in use with the Macbeth lamp).

6.5.1.1.2. Testing will be done in a dark room with the only light coming from the approved lamp. Patient may wear clear spectacles if required.

6.5.1.1.3. Only the Dvorine, the original version of the American Optical (excludes Richmond PIP version), or the 14 test plate Ishihara will be used. No other PIP versions, such as the Richmond PIP, or Beck Engraving versions, or other tests for color vision are authorized for qualification purposes. Also note that the Farnsworth Lantern (FALANT) is no longer used as a USAF qualifying test.

6.5.1.1.4. Position the patient with his/her eyes 30 inches from the test booklet. Explain the test to the patient by telling them to identify what numbers or figures they see on the test plates within 3 to 5 seconds for each plate. If they do not respond within the specified time, you will automatically move on to the next test plate. The patient should be told not to touch the plates with their fingers as the oils from their skin may effect the colors over time.

6.5.1.1.5. Five or more incorrect responses in either eye (including failure to make a response in the allowed time interval) in reading the 14 test plate versions is considered a failure.

6.5.1.1.6. Results will be recorded on the SF 88 as a ratio of how many plates, out of 14; the patient answered correctly for each eye, followed by "pass" or "fail". Example: if the patient correctly identified 12 of the plates for each eye, you would record as "OD 12/14 Passes" and "OS 12/14 Passes". Again, 10 or more correct responses is considered passing, while 9 or fewer correct is failing.

6.5.1.2. Compromise of Test. To prevent possible memorization or compromise of the plate presentation sequence, the test plates will be shuffled regularly and as a minimum once a week. If there is any suspicion that an examinee may have the sequence memorized, shuffle the cards and administer the test again.

6.5.2. Farnsworth Lantern Test (FALANT). Although not an Air Force qualifying test, the FALANT may be performed to meet other service physical examinations requirements.

6.5.2.1. Pretest Procedures:

6.5.2.1.1. The FALANT will be administered in a normally lit room, free from any direct sunlight or glare.

6.5.2.1.2. Seat the examinee 8 feet in front of the lantern. The lantern will be adjusted so the front aperture is directly within the examinee's line of sight. The lantern is adjusted by a knob located on the rear of the machine.

6.5.2.2. Briefing the Examinee:

6.5.2.2.1. Instruct the examinee to concentrate on the test window.

6.5.2.2.2. Inform them there are only three colors - red, green, and white.

6.5.2.2.3. Explain that two lights are presented at the same time in many combinations.

6.5.2.2.4. Have the examinee name the colors as they are presented, the color on the top first and then the color on the bottom.

6.5.2.3. Test Procedures:

6.5.2.3.1. Again, remind the examinee that there are only three colors (red, green, and white) and to name the top color first.

6.5.2.3.2. The test lights on the FALANT are presented by depressing the button on the top of the machine and are changed by rotating the knob.

6.5.2.3.3. Expose the lights in random order, starting with a red - green or green - red combination (numbers 1 or 5), and continue until all nine combinations have been exposed. Maintain a regular timing of about 2 seconds per exposure.

6.5.2.3.4. If no errors are made on the first presentation of the nine pairs of lights, the examinee has passed the test. It is considered an error when the examinee incorrectly names one or both of the presented lights, or when no response is given within 2 seconds. If an examinee changes a response before the next light or pair is presented, only score the corrected or second response.

6.5.2.3.5. If any errors are made on the first presentation of nine combinations, the examinee must be retested. All nine initial combinations must be presented before starting the retest procedures.

6.5.2.4. Retest Procedures:

6.5.2.4.1. Disregard the results of the initial presentation and retest the examinee with 18 presentations (each combination will be shown twice). Always begin the retest by explaining the test again and ensuring the examinee understands the instructions.

6.5.2.4.2. During the retest, ensure the color pairs are presented in a sequence entirely different from that of the initial test. The retest must also be started with a red - green or green - red combination (numbers 1 or 5).

6.5.2.4.3. If more than two incorrect responses are given out of the 18, the test has been failed and may be discontinued at that time.

6.5.2.5. Recording the Results:

6.5.2.5.1. Results are recorded in the appropriate item of the SF 88.

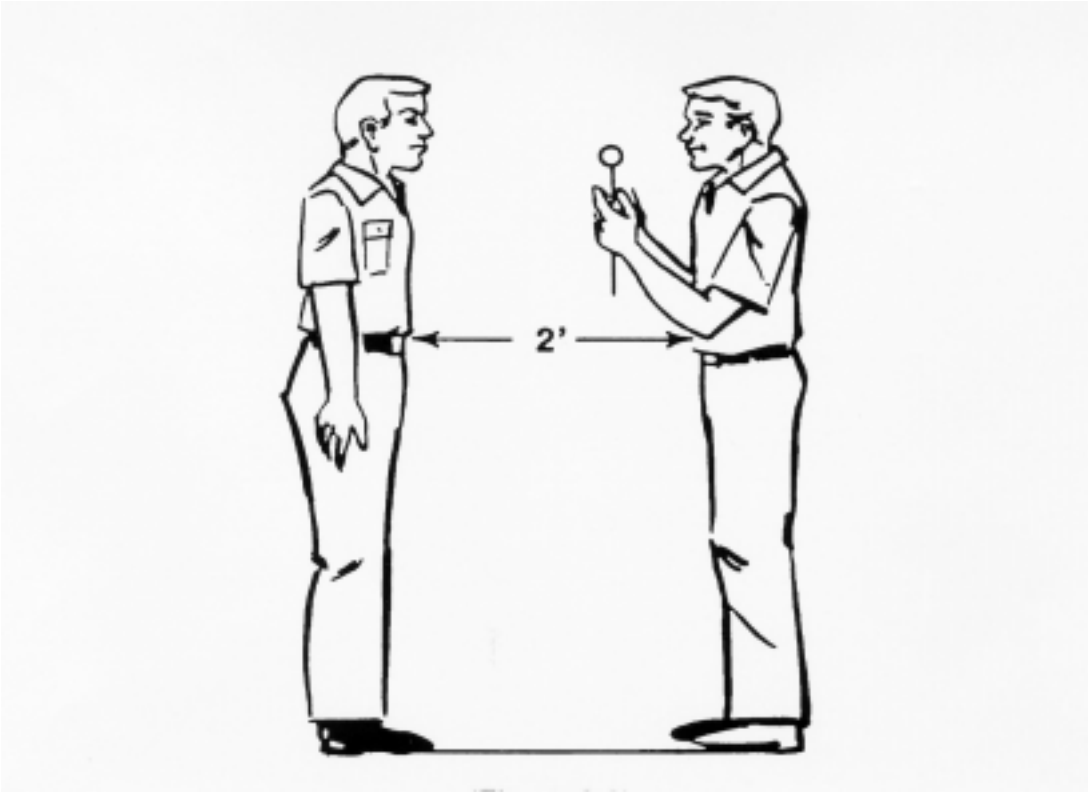
6.5.2.5.2. The entry will be either "FALANT Passes" or "FALANT Fails."

6.6. Confrontation Test. The confrontation test is a peripheral field of vision test. It is used to test an examinee's field of vision (peripheral vision) by comparing it with that of an examiner known to have a normal field of vision.

6.6.1. Test Procedures.

6.6.1.1. This test is administered with the examinee and the examiner facing each other on an eye-to-eye level and with a two foot separation between them (see **Figure 6.3.**).

Figure 6.3. Confrontation Test.

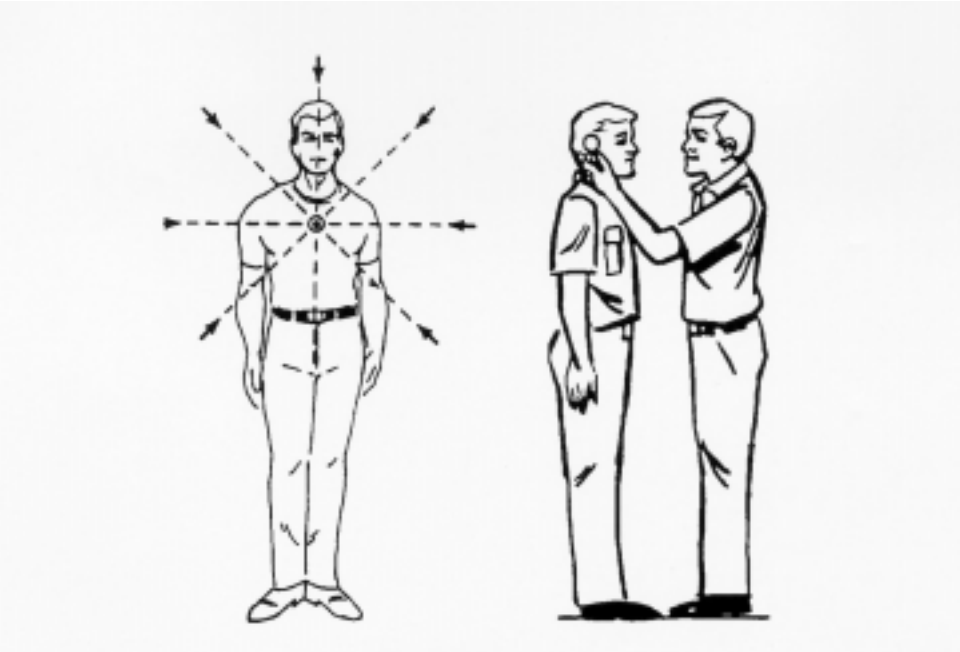


6.6.1.2. Close your right eye while the examinee closes their left eye and concentrate on each others' open eye. This fixation must continue throughout the testing of the examinee's right eye.

6.6.1.3. The test is begun when the examiner places a plain white 3 mm sphere on a wire handle or similar object overhead and on an imaginary plane between them. The test object is lowered along this plane, keeping your hand out of the way, until the examinee reports seeing it. Both of you should see the object about the same time.

6.6.1.4. The test is continued by evaluating the remaining cardinal directions in no set pattern (see **Figure 6.4.**). The examinee's temporal and inferotemporal limits of vision are measured by holding the test wand behind their head and bringing it forward until the 3mm sphere is visible.

Figure 6.4. Cardinal Meridians--Confrontation Test.



6.6.1.5. After all cardinal directions and temporal/inferotemporal planes are measured on the right eye, the test is repeated on the left eye, by having the examinee close the right eye and you closing your left eye.

6.6.2. Results: If the examinee reports seeing the object at or about the same time as the examiner in all directions record "Confrontation Normal" in the appropriate item of the SF 88. If there is any doubt in the mind of the examiner as to whether the examinee has normal or abnormal field of vision, make a referral to optometry or ophthalmology.

6.6.3. Referrals. If the Confrontation Test reveals a constriction of the examinee's field of vision not attributable to prominent facial features or if for any other reason you suspect a visual defect, refer the examinee to an optometrist or ophthalmologist for further testing. In the case of a referral record "See Consultation" in the appropriate item of the SF 88.

6.7. Intraocular Tension. The intraocular tension (IOT) will be determined on all examinees as indicated in **Table 10.1.**, when the medical or family history indicates; or when physical examination suggests abnormal intraocular pressure.

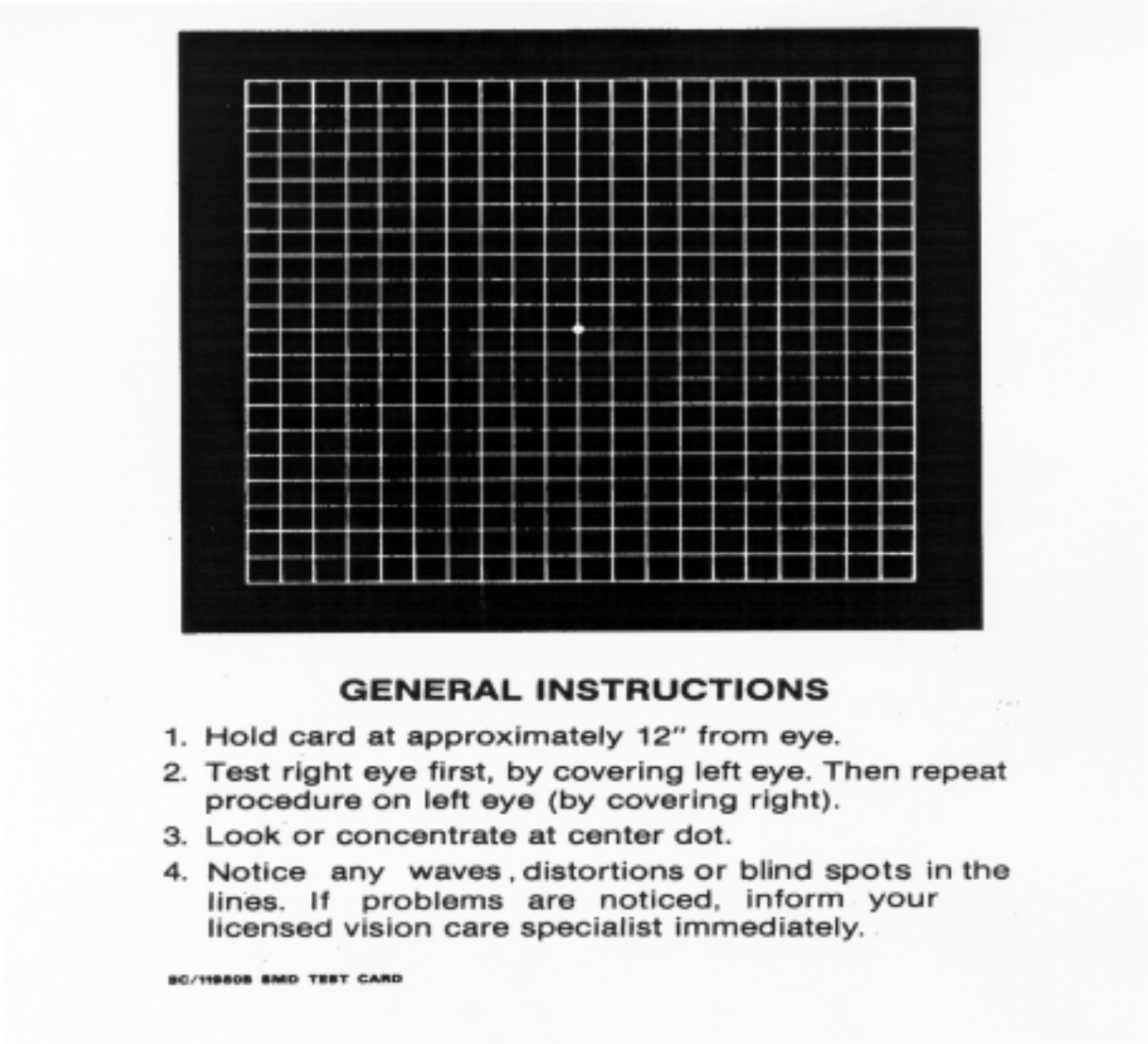
6.7.1. Equipment. There are basically two instruments available for determining the IOT. These are the non contact ("puff") tonometer, and the contact applanation tonometer. Digital palpation of the globes is nearly useless in determining IOT and will not be used.

6.7.2. Procedure. No matter which instrument is used, only technicians who have been trained in the proper performance and interpretation of the test will perform the examination. If a qualified technician is not available, the IOT will be done by a physician or an optometrist.

6.8. The Amsler Grid test. The Amsler Grid is a central field of vision test. It is a subjective monocular grid test designed to evaluate the function of the retina in the macular area of each eye, which is where acute 20/20 vision occurs. Each eye should be tested separately.

6.8.1. Equipment Required. Only a standard-sized (10cm by 10cm) Amsler Grid card (white lines on black background or black lines on white background) and the examinee's reading glasses, if required, are necessary to perform this test (see **Figure 6.5.**).

Figure 6.5. Amsler Grid.



6.8.2. Testing Procedures.

6.8.2.1. Seat the examinee in a room sufficiently lit for reading. If appropriate, they should wear and use their reading lenses.

6.8.2.2. Have the examinee hold the Amsler Grid card in their right hand and to cover their left eye with their left palm or the occluder. They should hold the Amsler Grid card 28 - 30 cm (12 inches) from their eye.

6.8.2.3. Ask them to focus on the large dot in the center of the crosshatched grid and to get a visual impression of the surrounding grid lines.

6.8.2.4. They are then asked the questions listed below. The correct answers are in the brackets next to the questions.

6.8.2.4.1. Can you see the central dot? (Yes)

6.8.2.4.2. Can you see the whole grid? (Yes)

6.8.2.4.3. Are all four corners present? (Yes)

6.8.2.4.4. Are all four sides present? (Yes)

6.8.2.4.5. Are all cross-hatched lines present? (Yes)

6.8.2.4.6. Are the vertical and horizontal lines straight and parallel? (Yes)

6.8.2.4.7. Are there any lines that are bent, bowed, or missing? (No)

6.8.2.5. The left eye is then tested in the same manner, while the right eye is covered.

6.8.2.6. Abnormalities: If an abnormality is present, the patient may report seeing either or both of the following:

6.8.2.6.1. Missing lines (scotomas)

6.8.2.6.2. Bent, distorted, non-parallel lines (metamorphopsia)

6.8.2.7. Recording Results: Any abnormalities on this test will be recorded, by the patient, on Amsler Grid chart paper (black or white). This drawing along with a narrative description of the test by the examiner will be given to Optometry or Ophthalmology for a complete evaluation. Test results will be recorded in the appropriate item of the SF 88 if it is not already filled with the confrontation test results. If item is full continue the entry in the appropriate item of the SF 88. If normal record: "Amsler Grid - Normal". If abnormal record: "Amsler Grid - See SF 513" and attach the patient drawn chart and narrative. The baseline results will also be transcribed into the examinee's medical treatment record on the AF form 1480A, Summary of Care.

6.9. Armed Forces Near Visual Acuity Test : The Armed Forces Near Visual Acuity Test (AFNVAT) can be used to determine the examinee's near visual acuity when the Vision Test Apparatus - Near and Distant (VTA-ND) or the Optech 2300 testers are either unavailable or when near vision results obtained on these machines are questionable.

6.9.1. Equipment Required. One AFNVAT chart set, an occluder and the examinee's corrective lenses. The test card does have two sides, however use only the side with the snellen like letters and not the side with the paragraghs.

6.9.2. Testing Procedures. Each eye will be tested separately, first uncorrected and then corrected. Occlude the left eye, have the examinee hold the test card 14 inches from their face and read the smallest line they can read without squinting. Repeat this procedure with the right eye, not allowing the examinee to read the same line twice. This is easily done by using a different card (3 cards in a set) or having them read the line backwards.

6.9.3. Recording Results. Take the result from the card and with the use of **Figure 6.6.** convert it to a Snellen English number. Record this number on the SF 88.

Figure 6.6. Armed Forces Near Visual Acuity Test - Snellen Chart.

Snellen English	Standard Test Chart
20 / 20	14 / 14
20 / 25	14 / 17
20 / 30	14 / 21
20 / 40	14 / 28
20 / 50	14 / 35
20 / 60	14 / 42
20 / 80	14 / 56
20 / 100	14 / 70
20 / 200	14 / 140

Chapter 7

AUDIOMETRIC TESTING

7.1. Testing Auditory Sensitivity. Evaluation of hearing must be accomplished by personnel trained to the Council for Accreditation in Occupational Hearing Conservation (CAOHC) standards. This training is provided for the Air Force at the USAF School of Aerospace Medicine, Brooks AFB, TX. These audiometric technicians insure reliability of testing audiometric threshold by using calibrated equipment and standardized audiometric technique. Threshold for hearing is defined as the lowest level perceived for 50% of trials.

7.1.1. Otoscopic Screening: The first step is to rule out any obstruction of the external ear canal or medical condition requiring attention prior to performing the audiometric test. This is accomplished by performing an otoscopic examination prior to all audiometric testing.

7.1.2. Audiometric Testing: All auditory sensitivity for a medical examination or a hearing conservation evaluation will be determined by the audiometric test. The test evaluates the most sensitive frequencies for human perception in specific units of intensity, decibels (dB). Thresholds (lowest level heard) are determined for each ear and recorded on the SF 88, Report of Medical Examination, and/or the appropriate Hearing Conservation Data form (DD Form 2215, Reference Audiogram, and DD Form 2216, Hearing Conservation Data) in accordance with AFOSH Standard 161-20, Hearing Conservation Program. The procedures for both physical standards and hearing conservation audiometric testing are the same. Test frequencies are expressed in Hertz [(Hz) i.e. - cycles per second], and can be considered in two parts. The combination of both parts makes up the six test frequencies. The two divisions are:

7.1.2.1. Speech Frequencies: 500 Hz, 1000 Hz, 2000 Hz are the frequencies in the speech range.

7.1.2.2. High Frequencies: 3000 Hz, 4000 Hz, 6000 Hz are higher frequencies or the noise affected range.

7.2. Audiogram Testing Environment:

7.2.1. Booth Requirements: It is important to realize that audiometric booths are designed to be sound resistant, not soundproof. All audiograms must be done in an environment that meets Air Force requirements for audiometer booths for medical facilities. This publication sets limits for outside ambient noise no greater than 65 decibel (dBA) and requires inside measurements to be taken with a Type 2 sound level meter (set to slow meter action) and results compared to AFI 41-201. These measurements can be easily accomplished by your local Bioenvironmental Engineering Section. It is also important that this calibration is performed under normal room noise conditions.

7.2.1.1. Excessive Booth Noise: Inspect each audiogram for evidence of excessive booth noise. Excessive booth noise should be suspected and checked any time poor thresholds appear at 500 Hz, especially if hearing appears to be better at 1000 and 2000 Hz. Booth noise must be carefully examined any time these results appear, and the examinee will be retested when any possible excess noise has been eliminated. Improved hearing on the retest would confirm that booth noise was the problem. No change in hearing level would indicate possible active pathology, and the examinee will be referred to an Ear, Nose, and Throat (ENT) Clinic or Hearing Conservation Diagnostic Center (HCDC) for special testing. Common sense is probably the most important

ingredient in avoiding audiometric problems from excessive booth noise. There is no practical electroacoustic or other objective means to continuously monitor ambient noise in the audio test environment. Therefore, the examiner's ears must assume that duty. You must be aware that any "loud" sound is likely to interfere with auditory testing. Note excessive noise conditions and postpone audiometric testing until the noise is reduced to an acceptable level.

7.2.1.2. Frequent Inspection: Frequently inspect seals around doors and inspect all cables and plugs connecting an audiometer to its earphones through an audio booth wall.

7.2.2. Excessive Ambient Noise: Since audiometric booths are only sound resistant, excessive booth noise is usually a direct result of excessive ambient noise. The following list is not all-inclusive and is provided only to cite examples. Be constantly aware that any loud sound, whether it be "noise" or music to someone's ears, is likely to interfere with auditory testing. Excessive ambient noise may be present when:

7.2.2.1. An aircraft is taxiing, running up, taking off, or landing nearby.

7.2.2.2. Building modifications are underway, including sawing, hammering, chipping, drilling, grinding, or other noisy operations.

7.2.2.3. A cart containing glass, metal, or other supplies is pushed down a hallway.

7.2.2.4. A formal or informal group discussion is in progress in close proximity to the audiometric booth area.

7.2.2.5. A noisy truck is loading or unloading nearby.

7.2.2.6. A malfunctioning ventilation fan in the booth.

7.2.3. Re-Assessment of Test Environment: The testing environment must be routinely assessed for ambient noise levels and reassessed each time the booth is moved, dismantled, or at any time there is a change in the routine ambient noise level or character. This situation may arise with some operational change, a change in neighboring activities, or a change in building support equipment, such as air conditioning or heating.

7.3. Audiometers and Start-up Procedures.

7.3.1. Microprocessor Audiometry: The RA-600 Microprocessor Audiometer is the recommended audiometer system and should be ordered when you upgrade your system. This system is driven by "HEARS" (Hearing Evaluation Automated Registry System) software that is tri-service compatible. The data collected for the Hearing Conservation Program can be automatically printed on preprinted or tractor-fed forms and downloaded to disk or modem-transferred to the Hearing Conservation Data Registry (HCDR). In order to understand how the microprocessor audiometer functions, we must first know the manual audiometric technique. It is desirable to have manual audiometry available for back-up to the microprocessor and for alternate testing techniques.

7.3.2. Manual Audiometry: Manual audiometry must be done exactly by the guidelines in this chapter so that standardization exists throughout the Air Force. The technique must be identical, regardless of make and model of the audiometer.

7.3.2.1. Required Audiometer Specifications: The audiometer must have:

7.3.2.1.1. A frequency selector with 500, 1000, 2000, 3000, 4000, and 6000 Hz.

7.3.2.1.2. An intensity control with a range from 0 through 100 dB hearing threshold level (HTL) in 5 dB steps.

7.3.2.1.3. A tone presentation switch (interrupter switch).

7.3.2.1.4. An earphone selector switch.

7.3.2.1.5. While an examinee response indicator and hand switch is not required, it is strongly recommended for consistency when converting to the required HEARS automated audiometer. Manual audiometers approved for USAF audiometric testing are equipped with this feature.

7.3.2.1.6. The only earphone and ear cushion combination presently acceptable is TDH-39, TDH-49, and TDH-50 earphones mounted in MX-41/AR ear cushions in accordance with ANSI S3.6-1989 standards. There is no acceptable calibration standard for any other combination. The TDH-XX with MX-41/AR cushions, and no other enclosures, will remain the only acceptable combination, unless directed otherwise by official notification through Department of the Air Force channels. Any modification must be approved by the HCDR.

7.3.2.2. Unnecessary Features: Many manual audiometers have functions or features that are not necessary for use on physical examinations.

7.3.2.2.1. Extra frequencies: Many units have pure tone frequencies that are not needed; for example, 125 Hz, 250 Hz, 1500 Hz, and 8000 Hz. These extra frequencies should simply be ignored and never used.

7.3.2.2.2. Extra Intensities: Many have an extra 10 dB, or more, in range, for example, -5 and -10 dB or 105 and 110 dB. These extra intensities should not be used. Only the range from 0 dB to 100 dB is proper in physical standards or hearing conservation audiometry.

7.3.2.2.3. Masking: Many manual audiometers also have masking available. This auditory masking is required when indicated during clinical audiometry and is not to be used on physical examinations. Make sure that any such noise is always turned off, or it might interfere with threshold determination.

7.3.2.2.4. Bone Conduction: Bone conduction is also included on many manual audiometers (This function should not only be ignored but should be disconnected, except when used in an ENT clinic). Any attempt to perform bone conduction testing as part of a physical examination is not only unnecessary, but may result in grossly erroneous results that give that appearance of correctness.

7.3.2.2.5. Other Features: Examiners are occasionally required to use a clinical type audiometer for physical examinations. Such units may have several features other than masking and bone conduction that should not be used. These may include two-channel operation, alternate binaural loudness balance, short increment sensitivity index, difference limen, speech capability from microphone, tape recorder, free field (loud speaker) capability, and other strictly clinical functions. Examines who must use such a machine must continuously and carefully make sure that none of the extra function controls are interfering with the pure tone air conduction threshold testing.

7.3.3. Start-up Procedures. The following procedures must be accomplished before the first audiogram on each testing day.

7.3.3.1. Warm-up. Main electrical power must be on for at least 10 minutes before testing begins, even if the audiometer is completely solid-state. This is to give the unit time to stabilize output. Power is left on until testing for the day is complete.

7.3.3.2. Listening Check. The daily listening check will be performed in the CUCEFICS format. CUCEFICS is a standardized format for sequentially performing a comprehensive functional check of an audiometer. At the beginning of each day of testing, the technician will:

7.3.3.2.1. C. (C)lean the earphones as necessary with an alcohol prep pad or equivalent non-drying, disinfectant wipe.

7.3.3.2.2. U. (U)ntangle all cords for headphones and patient response switches.

7.3.3.2.3. C. (C)onnections for earphones and response switch cords are checked for secure connections.

7.3.3.2.4. E. (E)arphones and headband are examined for proper condition.

7.3.3.2.5. F. (F)requency will be checked after the audiometer has been turned on and warmed up. Set the audiometer to the left ear, 1000Hz at 60 dBHL. Slowly change through all the tested frequencies. You should hear a definite change in frequency with no wavering of the tones. Then select the right ear and repeat this procedure.

7.3.3.2.6. I. (I)ntensity [HTL] level will then be set at 0dB at 1000 Hz. Slowly increase the intensity from 0 to 60 dB HTL. You should hear a steady increase in sound level.

7.3.3.2.7. C. (C)rosstalk can only be accomplished if your headphone cable has separate plugs for left and right earphones. Set the audiometer output to 60 dB HTL at 1000 Hz in the left ear. Unplug the left earphone. No tone or other sound should be heard from the right earphone. Reverse the procedure to check the left side. Again, this check cannot be performed if your headphone cable is terminated with only one plug.

7.3.3.2.8. S. (S)tatic is the last item in this checklist. First, set the audiometer to the right ear with 60 dB HTL at 1000 Hz. Starting where the cord connects to the right earphone, hold the cord lightly and slide fingers down the cord. Follow the entire length of the cord from the earphones to the plug. No cracking, static, or breaks in the tone should be heard. Change to the left ear and repeat the same procedure.

7.3.3.3. Daily (Biological) Calibration Check. The first test done each day that the audiometer is used, is done on a person with known hearing levels. Daily calibrations may also be performed using an Electro-Acoustic Ear (Artificial Ear). Procedures for accomplishing the Daily Calibration Check can be found in AFOSH Standard 161-20.

7.3.3.3.1. DD Form 2217, Biological Audiometer Calibration Check. This form will be used to record daily calibration check results. A separate form is used for each person or machine (Electro-Acoustic Ear) who is to serve as a listener in daily calibration checking. If you use more than one audiometer you must establish a different DD form 2217 for each listener selected, on each machine used, due to the slight differences between the audiometers.

7.3.3.3.2. Human Prerequisites: As many persons as are available (at least three) may be selected for this duty. Only one person is needed for each daily check unless a discrepancy emerges on that check. Human listeners must meet the following prerequisites:

7.3.3.3.2.1. Permanent party.

7.3.3.3.2.2. Free from any known ear or hearing disorder.

7.3.3.3.2.3. Not employed in potentially hazardous noise.

7.3.3.3.2.4. Known to have at least fairly good hearing.

7.3.3.3.2.5. Reasonably available at the beginning of the testing day.

7.4. Audiometric Technique.

7.4.1. Seating The Patient: The examinee must not be seated facing either the audiometer or the examiner. In a one-room setting, the best seating arrangement is the examinee facing 90 degrees relative to the audiometer. In a two-room setting, the examinee must not be able to look directly at either you or the audiometer through the window. In the one-room situation, the examiner should sit in a position to look over the audiometer and see the examinee's profile. The examinee cannot look directly at either you or the audiometer. The two-room setup is virtually the same except that a wall with a window is between the examinee and the audiometer. Note that the examinee is facing the audio booth door. These seating arrangements are specifically intended to prevent the examinee from getting visual clues as to when a tone is being presented.

7.4.2. Examinee Briefing. Each examinee must be given explicit, preferably brief, instructions regardless of experience level in taking a hearing test. For example: "I'll be giving you a variety of tones through the earphones. Listen as carefully as you can and press the button (raise your finger) each time you hear a tone, no matter how faint. Do not keep pressing the button (holding up your finger) until the tone disappears. So remember - press (raise your finger) when you hear the tone and release (lower your finger). Demonstrate the response method - button pressing or finger raising. If you are using the RA-600 or similar microprocessor audiometers, you must provide appropriate instructions for proper response with those systems.

7.4.3. Pre-testing Checklist:

7.4.3.1. Obstructions. The first step is to remove any obstructions that might alter the maximum acoustic coupling of earphones to the ears. These include eyeglasses, earrings, chewing gum, and hearing aids. Hearing aid performance can be checked only at HCDC facilities equipped with specialized equipment.

7.4.3.2. Headband. Make sure that headband tension is correct. The headband must hold the earphones firmly against the ears. The tension must be restored before earphone placement on each subject. The tension is restored by simply grasping the headband (not the earphones) and gently twisting the ends over each other. Good headband tension will hold the earphones together when the headset is hanging on a peg. The headset will appear to be "droopy" when tension is inadequate; the headband should be twisted to restore tension. Headband replacement is indicated when proper tension cannot be maintained.

7.4.3.3. Earphone Placement. Place the earphones on the examinee's ears. The earphone must be centered over the ear canal opening and the headband must be properly adjusted. The earphones are color coded: the red should be placed on the right ear and the blue should be placed on the left.

7.4.4. The Test.

7.4.4.1. Left Ear First. The left ear is always tested first so that:

7.4.4.1.1. Standardization is achieved.

7.4.4.1.2. Fewer errors are made in differentiating right from left.

7.4.4.1.3. Commonalty with "automatic" audiometry is achieved.

7.4.4.1.4. However, be careful in entering results on the SF 88, Report of Medical Examination, since arrangement on that form is right over left.

7.4.4.2. Start With 500Hz. For manual audiometry, the sequence of frequencies is always in order from low to high - 500, 1000, 2000, 3000, 4000, and 6000 Hz (Microprocessor audiometers usually test 1000 Hz first then follow the sequence for manual testing). Routine re-testing of a frequency is not necessary. Re-testing is needed only when special problems have arisen.

7.4.4.3. Start With 30dB. The first tone presentation at each frequency, each ear, is at a(HTL) of 30 dB. If a "no" response is judged, the intensity is increased in 15 dB steps until a "yes" response appears.

7.4.4.4. Determining Threshold. The order in which intensities are presented is the most critical aspect of manual audiometry. The guidelines given here must be followed exactly to achieve standardization throughout the Air Force. Each tone is presented for a duration of from 1 to 2 seconds. You must immediately decide whether to judge the examinee's responses as "yes" or "no." "Yes" should be judged when the examinee response is correlated with the tone presentation. No response at all, an uncorrelated response or any questionable response will be judged as "no." The "yes" response is judged when the examinee begins to respond shortly in time after the tone begins. Any other response pattern is uncorrelated and will be judged as "no". As an example, (if the response begins late, allowing for a very short reaction time) it will thus be judged as negative, "no". This pattern is relatively common and will always be judged as negative, "no".

7.4.4.4.1. If "Yes". When a "yes" response appears, the intensity is decreased by 10 dB for the next presentation. (i.e. "Yes" at 20 dB - Next tone presented at 10 dB)

7.4.4.4.2. If "No". When a "no" response appears (after the first "yes" at a frequency), the intensity is raised by 5 dB for the next presentation. (i.e. "No" at 10 dB - Next tone presented at 15 dB). If "no" on first presentation at 30 dB, raise intensity in 15 dB steps until a "yes" response appears.

7.4.4.4.3. Twice at a Threshold: The sequence of "DOWN in 10's and UP in 5's" is continued until "yes" responses following 5 dB ascents have occurred twice at the same Hearing Threshold Level (HTL). That HTL is then identified as their threshold and you will record the result before continuing to the next frequency. The "yes" responses do not need to be a consecutive ascents.

7.4.4.4.4. Thresholds at 0dB. Anytime a "yes" response is judged at 0 dB HTL, the tone is presented again at that same level. If a consecutive "yes" is obtained, then 0 dB HTL is identified as their threshold. A 0 dB HTL must have two consecutive "yes" responses at 0 dB.

7.4.4.4.5. Thresholds Above Range. When "no" responses have been judged up to the maximum limits of the audiometer, the HTL is identified as the maximum level followed by a plus sign; for example, "100 +", "90 +", etc.

7.5. Pitfalls in Audiometry. Testing problems are certain to emerge when audiometric examinations are performed. Some are relatively common and some are relatively rare. Constantly watch for all of these potential problems. The pitfalls described in this chapter are common and representative. However, the list cannot be considered comprehensive since new problems can be expected to emerge at any time. You must work within established guidelines but at the same time, must use common sense and judgment to note and respond to special problems that emerge. Assistance in dealing with these problems may be obtained from USAFSAM/AFE, Brooks AFB, TX 78235-5252.

7.5.1. Testing the Wrong Ear. This error can result from incorrect earphone placement, incorrect audiometer setting, incorrect result recording, or incorrect earphone wire connections. The error may also be in either reversing results for the right and left ears or in testing the same ear twice. Such errors may not be detected for a year or more and cause the examinee to be inadvertently referred to HCDC. It may take 5 months or more and 7 or more audiograms to correct for this error when a simple record review could have resolved it in 5 minutes. Retest the examinee if a "wrong ear" test is suspected.

7.5.2. Visual Clues. Be very careful to avoid any motion that the examinee can see and use as a clue as to when a tone is being presented. A "good poker player" attitude should be adopted. That is, work to avoid hand, arm, or eye movements or facial expressions that betray tone presentations. Virtually any examinee will reflexively take advantage of any obvious visual clues and some may actively seek out this assistance. The problem is potentially greatest when the examinees are concerned that their hearing may not "pass" some criteria.

7.5.3. Rhythmic Tone Presentation. This pitfall is virtually inevitable for the beginning examiner. It is simply presenting tones too fast and too rhythmically. It occurs when the examiner first begins to master the tone intensity presentation sequence and finds the "DOWN in 10s and UP in 5s" pattern easy and routine. When this happens, the examinee soon "picks up the rhythm" and begins to anticipate the tones and responds accordingly. It is often first noticed when periodic and rhythmic responses keep going after the tone presentations have stopped. You must actively work to vary the duration of time between tones. If rhythmic conditions arise, as is common, go back and retest any frequencies where rhythmic tone presentations may have caused incorrect results.

7.5.4. Tinnitus. Practically everyone has some Tinnitus (ringing in the ears). Many people have enough ringing to cause difficulty in distinguishing between test tones and ear noises. This results in responses when no tones are being presented. A new examiner must learn to distinguish between normal and excessive responses. A few excessive responses are to be expected from any examinee.

7.5.4.1. Avoiding Tinnitus Problems: Several precautions can assist in reducing audiometric problems from Tinnitus. First, an examinee must not be left waiting for tones for very long. That is, when instructions have been given and earphones put in place, the tone presentations must begin as soon as possible. The examinee will begin to response to ear noises unless audiometer tones are begun promptly. Second, the intensity presentation sequence, described in this chapter, must be followed exactly. That is, the first intensity presented at each frequency is 30 dB. If no response occurs, the intensity is increased in 15 dB steps until a "yes" response is obtained; after the first "yes", the sequence of "DOWN in 10s and UP in 5s" is followed until the threshold is found then stop. Do not present extra tones to "recheck". If the threshold is in doubt, the entire sequence must be restarted with the 30 dB presentation. Finally, only correlated response to tones must be accepted as affirmative. Any uncorrelated or otherwise doubtful responses must be judged as negative.

7.5.4.2. Combating Tinnitus. Tinnitus cannot be controlled by the patient so you must fight any feelings of anger and frustration toward the examinee who suffers from excessive Tinnitus. Tinnitus is a very real problem that is difficult to deal with and requires patience and understanding. The first step to take when Tinnitus appears to be causing difficulty in finding a threshold is to simply go back and start over at 30dB. Do not belabor with the threshold too long, as this only adds to the frustration. If this fails to result in reasonable threshold determining sequence, the next step is to abandon testing at that frequency, move to another one and return to the problem frequency when testing is progressing more smoothly. Finally, if the number of excessive responses becomes a big problem, open the booth and give the patient a break from testing. After a few minutes continue testing, starting with the last frequency unsuccessfully tested (always start at 30 dB). If a reasonable threshold determination sequence still does not emerge, then serious consideration must be given to arranging for an ENT/HCDC referral. Extreme Tinnitus will be considered a clinical problem that deserves clinical follow-up.

7.5.5. Lateralization or Crossover. When a person has poorer hearing in one ear than in the other ear at the same audiometric frequency, unilateral hearing loss, crossover (or lateralization) must be suspected. This means that tones being delivered to the poorer ear may be heard by the good ear from across the head. This lateralization or crossover must be suspected any time thresholds between ears differ from about 40 through about 70 dB. These threshold differences are possible when one ear has good hearing and the other ear has little or no hearing. Also notice that the poorer ear appears to have some hearing even though it seems very poor. The difference between hearing levels for the two ears before crossover occurs varies considerable from person to person. Also, the low frequencies tend to crossover at smaller differences than do the high frequencies. Your tasks are to recognize possible lateralization, note that finding on the audiometric records and recommend referral to an ENT/HCDC clinic. The clinical audiologist has the sole responsibility for using auditory masking to determine true hearing levels for both ears.

7.5.6. No Response From One Ear. On occasion, an audiogram may reveal reasonably good or normal hearing for one, but no response whatsoever, for the other ear. Recognize that these actual hearing levels are impossible and you must then seek the cause for those results. Good hearing in one ear and no response with the other is not normal since crossover would have taken place and responses would have been obtained with the apparently bad ear. The first possibility to explore is equipment malfunction. The earphone may have become inoperative, the earphone wire may have broken, the phone jack may be unplugged or not completely engaged, or the electronic circuitry may have failed. Carefully check the audiometer's performance by performing a Listening Check. If a defect is found, the examinee must be tested after it is repaired or with another machine. If, however, the audiometer is functioning properly, then try to test the examinee again. If the examinee continues to give no response even though the audiometer is operating properly, then it must be assumed that the examinee may simply be failing to respond even though tones are being heard. Such an examinee may later be found to have a functional/ non-organic hearing loss, or to be a malingerer. Do not confront the examinee, simply note the problem, inform the examining physician, and recommend referral to an HCDC.

7.5.7. Nonorganic Hearing Loss. (Nonorganic hearing loss and functional hearing loss are synonymous terms when dealing with fictitious or exaggerated hearing losses). From time to time a person's HTLs will indicate poorer hearing than is actually present. This may be unilateral or bilateral, partial or complete, and may be superimposed on an actual hearing loss. The reason for this is usually not clear, and even if it is obvious, try not to label the person as a malingerer. Malingering may be suspected under certain circumstances, but is not considered a fact until proven through formal medi-

cal-legal proceedings. The following list is only to show examples and is not comprehensive. There have been cases where the cause for non organic hearing loss was not obvious and was never uncovered. There have been others where symptoms of non-organic hearing loss were glaringly obvious but the person was found to have a true, but unusual, organic hearing problem. Caution is the key.

7.5.7.1. Suspecting Non organic Hearing Loss. There are several circumstances that may arouse suspicions of non-organic hearing loss. These include:

7.5.7.1.1. Hearing Not Matching Behavior. HTLs much poorer than subjective behavior indicates, for example, an audiogram showing total or almost total deafness and the individual converses with no apparent difficulty. Some problems in understanding conversational speech can be expected any time both ears have a speech frequency average (average HTL for 500, 1000, and 2000 Hz) greater than about 30 dB.

7.5.7.1.2. Difference Between Ears. HTLs that differ by 75 dB or more between ears at the same pure tone frequency would indicate a non organic hearing loss. Don't get this confused with lateralization or crossover which occurs with a difference of 40 - 70 dB between ears (see paragraph 7.5.5.).

7.5.7.1.3. Inconsistent Test Results. HTLs that change excessively from one time to another with no apparent organic or medical reason. This can also happen with some relatively serious but subtle hearing related problems and, therefore, should be treated with great caution.

7.5.7.1.4. Dramatization. The examinee exaggerates, dramatizes the "poor hearing." Someone who really has a hearing problem will often fail to understand conversational speech but will almost never make gross exhibitions of painstaking lip reading and cupping a hand behind an ear.

7.5.7.1.5. Clear Motive. There is some apparent reward for hearing loss. This may be a cash settlement, escaping an undesirable present assignment, avoiding an undesired reassignment, or some other desired end result. Here again, exercise discretion and sensitivity and not jump to conclusions.

7.5.7.2. Disposition of Non-organic Hearing Loss. The course of action when non-organic hearing loss is suspected is clear and concise. First alert the examining physician and then recommend immediate referral to an HCDC. Any temptation to further prove the suspicions or to find true organic threshold through pleadings, threats, or craftiness must be completely avoided. Any time non-organic hearing loss is suspected, the problem must immediately be referred to an HCDC. Repetitive and "tricky" testing will almost always make it more difficult for the HCDC to obtain satisfactory results.

7.5.8. Exceeding Your Training. You have been specially trained and given the responsibility for only pure tone air conduction threshold audiometry of adult personnel. Any other requests for audiological tests, such as referrals from other MTF clinics, bone conduction, masked audiograms and speech audiometry, are strictly clinical procedures and are to be done only in special ENT facilities or under the direct supervision of an audiologist. Hearing testing of children is considered a clinical procedure; therefore, you are prohibited from testing children, and will not provide hearing screening testing in kindergarten, nursery, or elementary schools.

7.6. Equipment Calibration. There are four parts to equipment calibration that must be accomplished. The use of non-calibrated audiometric equipment or equipment who's' calibration has expired is strictly forbidden.

7.6.1. Daily Calibration Check. The first test done each day, that the audiometer is used, is done on a person with known hearing levels. Daily calibrations may also be performed using an Electro-Acoustic Ear (Artificial Ear). Procedures for accomplishing the Daily Calibration Check can be found in AFOSH Standard 161-20.

7.6.2. Electroacoustic Calibration. Complete electroacoustic calibration and repair is done by the regional US Air Force Medical Equipment Repair Center (MERC) according to AFI 41-201, Managing Clinical Engineering Programs. This conforms to guidance in the American National Standards Institute (ANSI) Publication S3.6-1989, Specifications for Audiometers. The MERC responsibilities are to calibrate and repair audiometers in its area once every 12 months. In any case, an audiometer must not be used unless it has had the electroacoustic calibration and repair within at least one year. This calibration documentation will be displayed on the audiometer, usually it is printed on a pressure sensitive label.

7.6.3. Test Environment Calibration. The hearing test environment shall be checked annually by the local Bioenvironmental Engineering Services (BES), using a Type 2 sound level meter and octave band analyzer. ANSI Standards S4.1-1983, S1.11-1976, S3.1-1977(R1991), S3.6-1989, and AFOSH 161-20 (soon to be AFI 48-20), Hearing Conservation Program Standard, all apply to the calibration of the test environment and audiometer. This calibration documentation will be displayed on the door of the booth or testing room, usually it is printed on a pressure sensitive label.

7.6.4. Calibration Records. Calibration records (DD form 2217, Biological Audiometer Calibration Check) are maintained by the office having primary responsibility for the audiometer. These records are kept for the life of the audiometer plus 30 years before being destroyed.

7.7. Disposition of Hearing Tests. This section only pertains to the administration and use of the pure tone air conduction threshold audiogram. The audiograms referred to in this section will always be recorded numerically in the proper spaces of SF 88, Report of Medical Examination, and/or the proper hearing conservation data form (DD form 2215 or 2216). Any other application of results is clinical and will not be made.

7.7.1. Determination of Hearing Qualification. This only applies to personnel who are NOT part of the USAF Hearing Conservation Program (HCP). Completed tests will be compared with the standards for the particular type of examination (AFI 48-123). If the standards are not met, a retest sequence may be started. This re-testing might be of particular benefit if there is reason to believe that the examinee may have received a recent excessive noise exposure and is under the influence of temporary threshold shift. The standard re-testing process begins with the noise free audiogram and continues only if necessary.

NOTE:

Prior to any re-testing, an examination by a health care provider will be performed to rule out any ENT disease or process that would possibly interfere with testing.

7.7.1.1. 15-Hour Retest. The first retest must be accomplished after an overnight period of auditory rest (no exposure to noise levels greater than 72 dBA). The noise-free period should be from

the time of the first test until the retest and be a minimum of 15 hours. If hearing standards are still not met further retesting may be necessary.

7.7.1.2. 40-Hour Retest. The second retest must be accomplished after an auditory rest period of at least 40 hours. Another examination by a health care provider is not necessary prior to this audiogram providing it was accomplished before the 15 hour audiogram. If the standards are still not met, referral to an ENT specialist or Audiologist may be necessary to apply for a waiver of the defect.

7.7.2. Hearing Conservation Program Disposition. If the hearing test is being done for hearing conservation purposes, disposition must be according to AFOSH Std 161-20. Except for reference and termination audiograms, all disposition for hearing conservation is based on Standard Threshold Shift (STS). Thus, follow-up is often necessary even though minimum hearing level physical standards are met.

7.7.3. Clinical Referral. Some hearing test result patterns indicate the need for referral to an HCDC / Hearing Conservation Center (HCC) service with special auditory test capability. These facilities are equipped with clinical audiometric test instrumentation and specially trained personnel. They are the only personnel qualified to perform any clinical test procedures, such as bone conduction audiometry, auditory masking, speech audiometry, middle ear audiometry and other such tests.

7.7.3.1. Low Frequency Hearing Loss. Any time hearing test results reveal hearing loss in the low frequencies (500, 1000, 2000 Hz) the examinee must be referred for special audiological evaluation, since such losses are often found to be conductive, making them potentially reversible.

7.7.3.2. Unilateral Hearing Loss. As discussed before, when hearing levels indicate a crossover of hearing between ears, the examinee will be referred for special audiological evaluation even if the problem is only noted in the higher audiometric frequencies. The special audiology evaluation may include the use of masking to determine true hearing levels in the poorer ear and further testing intended to identify the site of the auditory lesion.

7.7.3.3. Suspected Nonorganic Hearing Loss. Any time the examinee's test results or subjective behavior arouse any suspicion of nonorganic hearing loss, a referral for HCDC / HCC evaluation will be made as soon as possible. Again, do not attempt to "breakdown" the examinee through re-testing or other means. Such efforts may be well intended but are likely to further complicate the eventual evaluation at the special test facility, since the examinee will be gaining more advantage through added practice. Suspected nonorganic hearing loss must be dealt with judiciously and discreetly since "symptoms" arousing suspicions of malingering can also be found when VIII Cranial Nerve disorders are present.

7.8. SAM-TR-73-29, Materials and Procedures for In-Flight Assessment of Auditory Function in Aircrewmen . This USAF School of Aerospace Medicine Technical Report was approved for public release in August 1973 and authored by Major Donald C. Gasaway and Mr. Harrell C. Sutherland, Jr. Due to the age of this publication and the increasing difficulty encountered when trying to obtain a copy of this report, we found it necessary to include the contents of this report in this Air Force Pamphlet. The following is an exact copy of this report, however some technical references have changed in the twenty some years since its' publication - to improve its' currency we have added several necessary updates, (*) will identify these updates. Edits were also made to make it gender neutral.

7.8.1. Abstract. The need to assess the ability of aircrew to perceive and understand voiced communications transmitted under headsets during flight conditions has been recognized since the early 1940's. A standardized approach is needed to evaluate the adequacy of auditory function in flyers who fail to pass pure-tone physical profile standards (class II and III examinations). It is this need that prompted the research described in this report. This report describes four sets of 50 phrases extracted from voice communications used in ground and airborne operations, as well as six lists of 50 single-syllable words. These lists have not been evaluated under the conditions proposed for their use.

7.8.2. Introduction. The U.S. Air Force performs a wide range of flight operations. Dependence upon electroacoustic voice communication systems has increased in parallel with the complexity of ground and airborne operations. Flying personnel routinely encounter a variety of environmental stresses that may decrease the overall effectiveness of their hearing, and if protection is not adequate, noise-induced hearing losses may occur.

7.8.2.1. When an aircrew member fails to meet the hearing standards set forth in Air Force Instruction 48-123 for Flying Class II (rated) and Class III (non-rated), a decision must be made whether or not the failure to meet the pure-tone criterion is significant enough to require removal from flying duties. The primary factor governing this decision is the individual's ability to understand voice communications received during actual ground and airborne operations. Using standard measures of auditory function, the aeromedical evaluator cannot determine if an aircrew member has this capability. Experienced pilots may fail to meet Class II pure-tone hearing standards and may have difficulty hearing during everyday situations, yet have no significant problem communicating while in flight. The present clinical tests used to evaluate speech discrimination also fail to identify persons who have difficulty accomplishing listening tasks associated with flight.

7.8.2.2. A proper designed and executed in-flight hearing test would assess the functional hearing and allow an intelligent disposition of flyers with substandard hearing by conventional testing. In-flight hearing tests have been used for approximately 15 years; however, no standard approach to this task has been available.

7.8.2.3. This paper proposes the development, in the following five phases, of an in-flight hearing test: (1) selecting appropriate test materials, (2) arranging materials for standardized administration, (3) establishing tentative pass-fail criteria, (4) evaluating pass-fail criteria by feedback from field testing, and (5) revising and modifying test materials, procedures, and criteria so that standardization can be achieved.

7.8.3. Procedure.

7.8.3.1. Selection of Test Materials. Speech signals encountered within a variety of fixed- and rotary-wing aircraft, during various phases of ground and airborne operation, were recorded on electromagnetic tape. A vocabulary of single-syllable and two-word elements was compiled, from which samples were extracted and developed into test materials as follow. (*we included them as attachment 8)

7.8.3.2. Single-Syllable Words. Tests 1 and 2 contain single-syllable words, each test consisting of three 50-word lists. The three lists of words on Test 1 are arranged by terminal rhyme; for example, No. 1 items for lists 1, 2, and 3 are "late, rate, and date." The lists on Test 2 are arranged by frontal rhyme; for example, No. 1 items are "late, laid, and lane." The answer sheets are

marked by the subject and scored by the aeromedical evaluator. The Test 1 answer sheet can be used for any list on test 1, and the Test 2 answer sheet for any list on Test 2.

7.8.3.3. Two-word Phrases. Test 3 contains four sets of phrases (50 phrases in each set) to be used by the aeromedical evaluator. These phrases were prepared by selecting two-word elements (two single-syllable words) from actual recorded communications. For example, the two-word element of "south west" was used to derive the phrase "You are SOUTH WEST of the field." Each phrase usually can be repeated in less than 3 seconds, using a speaking rate of approximately 120-180 words per minute (normal for males).

7.8.3.4. General Guidance. Many variables beyond those associated with the hearing function of the person being tested can influence test results. The aeromedical evaluator must at least be aware of certain aspects of these variables, such as how the individual enunciates, the characteristics of the microphone and intercom, the output level, the degree of masking present within the aircraft as well as background noise under the headset, the condition of the headsets, and if the listener has any auditory fatigue (temporary threshold shift) as a result of previous noise exposure. Although the evaluator cannot be expected to control all these variables, he must be aware that they may affect the final test result. Our experience has shown that ambient noise will not significantly affect the test results as long as the subject has well-fitted headsets and has control of the volume of the signals he receives. For example, when a person who flies an F-4E aircraft is tested in a C-131E, the difference in the ambient noise will not significantly influence his discrimination. The recommendations below should be followed as closely as possible:

7.8.3.4.1. The aeromedical evaluator should have a minimum of 50 flying hours during which they have monitored voice communications so that they have "learned" to understand their use in flight.

7.8.3.4.2. One complete testing sequence requires approximately 13 minutes. If possible, the tests should be administered aboard a multi-place aircraft where the intercom can be used for at least 15 minutes without interfering with the operation of the aircraft. The individual being tested should not be in primary control of the aircraft during the testing period.

7.8.3.4.3. The evaluator and the subject should use standard Air Force communication headsets and microphones. If an oxygen mask is not required, the H-157 headset (gray) should be used; if an oxygen mask and crash helmet are required, the standard mask fitted with an AIC-M-101 noise-canceling microphone and the HGU-2A/P helmet fitted with H-154 headsets should be used. The evaluator should ensure that both their own and the subject's devices are properly fitted and in good repair, with the microphone positioned so that the speaker can "kiss the microphone." Earplugs should not be worn by either the evaluator or the subject during the testing. Prior to flight, the intercom, including the side tone supplied via the intercom units, should be checked to ensure that it is working properly and that sufficient gain (volume) is available.

7.8.3.4.4. The tests should be administered in a location as close to the flight deck as possible (ideally on the flight deck) so that the evaluator as well as the flight crew can be more readily aware of what is going on and prevent compromise of flight safety.

7.8.3.4.5. Preferably, testing should be done during daylight flights and in areas where the lighting is adequate for the examiner to easily read the tests and the subject to mark his

answers. If testing must be accomplished at night, the examiner should have two flashlights with red lenses to provide proper illumination without interfering with the flight crew.

7.8.3.4.6. Tests should be administered (approximately 15 minutes) only during conditions of level flight and normal cruise. All systems (air conditioning, pressurization, etc.) should be operated normally, and if possible, the commander should request radio silence and attempt to fly within a secure air space during the testing period. Prior top flight, the aircraft commander and the evaluator should establish precise guidelines about the use of the intercom during the test period. The evaluator must know when incoming UHF or VHF messages require that they maintain silence so that the aircrew never compromises flight safety. Usually, the problem of interrupting UHF and/or VHF transmissions can be avoided by letting ground control know of the need for radio silence and maintaining a radar-controlled orbiting flight profile.

7.8.3.4.7. The evaluator should use a "hot mike" during all tests, and during test 3 (phrases), the hot mike is required for the subject as well. If the microphone circuit must be keyed, care must be taken so that all acoustic elements of the test materials are clearly audible and not abbreviated nor cut out by improper use of the microphone button.

7.8.3.4.8. The evaluator should "dry run" the procedures so that the actual testing can be accomplished in a professional manner. Preferably, the dry run should be performed in the aircraft that will be used for the test. The subject selected for the dry run should be accustomed to listening to in-flight communications. The value of practice cannot be overemphasized, since the aeromedical evaluator must be familiar with using the test materials and feel confidence while administering the tests. The dry run should be considered separate from tests performed to establish the range of pass - fail scores (see "Determining adequacy of hearing.")

7.8.3.5. Specific Guidance:

7.8.3.5.1. Tests to be Accomplished. This selection provides three separate lists of materials to be used during the actual evaluation. Generally, three tests are required:

7.8.3.5.1.1. One word list from Test 1,

7.8.3.5.1.2. One word list from Test 2, and

7.8.3.5.1.3. One phrase set from Test 3.

7.8.3.5.2. Responses. Responses to test 1 and 2 are recorded on the proper answer sheet by simply marking through the word heard. Responses to test 3 can be evaluated by noting whether or not the subject correctly repeats the essential content of each phrase. The subject need not repeat the entire message, but they should respond with enough information to clearly indicate that they understood the basic content of the phrase. For example, if the phrases read was "You are off course, correct to the right," then the response "off course, correct right" would be considered adequate. Answer sheets are not required for the phrases; the evaluator need only record the number of incorrect responses and then compute the score (2% for each phrase).

7.8.3.5.3. Presentation of Tests. Before beginning the actual testing, the volume control of the intercom unit should be checked to ensure clearly audible speech reception. Also, the master gain (volume) of the intercom unit used by the subject should be adjusted so that an adequate signal is available. The evaluator should read (*) a paragraph (avoiding actual test materials) aloud while the subject adjusts the gain of there intercom receiver. If necessary, additional

general material can be read so that the subject has an adequate sample of speech to determine his best listening level. The signal should be loud enough to be easily heard, but not so loud that aural distortions occur.

7.8.3.5.3.1. The single-syllable words must be pronounced clearly. Each word is preceded by the appropriate identification number (e.g., No. 1 - "date"), with a slight pause between the identification number and the test word. Approximately 3 seconds should be allowed for the subject to cross through the word they choose from the three words provided on the answer sheet. Words Should not be repeated. If the test word should be made unintelligible by intrusion of extraneous interruptions, simply go to the next word (in sequence) and do not score the interrupted word as a miss. Do not give the subject a direct feedback concerning the correctness of their response. Generally, each of the 50 single-syllable word lists can be accomplished in 4-5 minutes.

7.8.3.5.3.2. After Test 1 and 2 are completed, one of the four phrase sets will be administered to the subject. In scoring the responses to the phrases (Test 3), the evaluator must listen closely and determine the adequacy of each response. As with the single-syllable words, no direct feedback of the accuracy of the subject's responses will be given.

7.8.3.5.4. Scoring Responses. Each single-syllable word list is scored separately, and each correct response counts 2%. For example, if there were four incorrect responses, the score for the entire list of 50 words would be 92%. The phrase sets are scored in the same way.

7.8.3.6. Reporting Results. A format is given below (Figure 7.4) for reporting results of testing, along with other pertinent information. Results from aircrew with both normal and subnormal hearing (by standard testing evaluations) should be reported so that evaluations and revisions of this in-flight assessment can be made.

7.8.3.7. Determining Adequacy of Hearing. The purpose of the in-flight hearing test is to determine the ability of aircrew members to receive and understand speech signals during aircraft operation. The final decision is a clinical determination. The materials and procedures described in this report are intended to assist aeromedical evaluators in accomplishing this task. Until this test is validated, each evaluator should establish the range of scores elicited on at least five experienced flyers with Class II (or better) hearing (* H-2 profile or better). These scores can then serve as a guide and establish an acceptable control/normal range.

7.8.3.7.1. Statistical Procedure. A rapid, uncomplicated statistical procedure described by Dixon and Massey may be used to determine if a particular flyer's score on the test is significantly poorer than scores yielded by the normal hearing group. This procedure would be used only when the flyer with questionable hearing has a score on this test that is poorer than all the scores from the normal-hearing (control) persons. If the subject scores better than any of the normals, he is unquestionably performing in a normal manner. However, if they score poorer than all the normals, a determination must be made as to how significant the difference is. The exact procedure is to (1) subtract the subject's score from the lowest score made by a normal listener, (2) subtract the subject's score from the highest score made by a normal listener, (3) compute the ratio of the two values yielded in step 1 and 2, and (4) compare the ratio to a criterion value. If five normal-hearing flyers are in the control group, then a criterion ratio of .560 can be used to achieve a significance level of 5%. That is, a resultant ratio of .560 or larger indicates that the subject's score was significantly poorer than scores from the known

normal group; conversely, a ratio less than .560 indicates that the subject's score is not significantly different from the normals. For example, if five normal-hearing flyers scored 94%, 88%, 100%, 98%, and 90% and a flyer with questionable hearing scores 72%, our calculations would be:

88 (lowest normal score) 2 (subjects score) = 16 = 5714

100 (highest normal score) 2 (subject's score) = 28 = .560

The ratio (.5714) is larger than our criterion ratio (.560), so the subject's score is significantly poorer than the normal scores.

7.8.3.7.2. To provide an actual example, Test 1 - list 1 and Test 2 - list 1 were administered to five normal hearing subjects who each had considerable flight experience (in excess of 2000 hrs.). The tests were conducted in a reverberation chamber with ambient noise of 107.5 dB C-weighted and 102.5 dB A-weighted. The scores obtained from the five subjects were as follows:

	Test 1 - list 1	Test 2 - list 1
Subject 1	78%	90%
Subject 2	84%	94%
Subject 3	94%	84%
Subject 4	92%	98%
Subject 5	94%	100%

Application of the statistical procedure revealed that for a subject with questionable hearing, 58% on Test 1 would be passing while 56% would be failing.

78 - 58 = 20 = 556 (Passing) 78 - 56 = 22 = .579 (Failing)

94 - 58 = 36 94 - 56 38

On Test 2, a score of 64% would be passing while 62% would be failing.

$\frac{84 - 64}{100 - 64} = \frac{20}{36} = .556$ (passing) $\frac{84 - 62}{100 - 62} = \frac{22}{38} = .579$ (failing)

7.8.3.7.3. This statistical procedure should not be used without reservation. For example, if all normal subjects scored 100%, then a score of 98% from another subject would be failing if the formula was used literally. A reasonable approach would be to consider any score of 90% or more as passing, even though the criterion ratio is exceeded when the scores are processed. In addition, test results should simply be further information to use in arriving at a clinical judgment as to whether or not a waiver for hearing loss should be recommended. This test should not be used as the ultimate basis for making that decision.

7.8.3.7.4. If conditions change so that the previous normal scores are no longer considered valid, a new group of five normal-hearing flyers should be tested. This validity could be lost

if a gross change occurred in conditions under which the test is given. For instance, if normal scores are obtained in the cargo area of a reciprocating engine aircraft and it becomes necessary to test in the cockpit of a jet fighter aircraft, it may be necessary to establish normal scores under the new conditions. Any test condition change that might make scores generally poorer or generally better calls for establishing a new set of normal results.

7.8.4. Conclusions and Recommendations. The materials and procedures described in this report have been carefully selected and are proposed for in-flight assessment of the auditory function of aircrew. Their value can be determined only by application and appraisal of results. We propose an in-flight hearing test that consists of five phases of development. The first three phases are dealt with in this report: selecting test materials, arranging these materials for standardized administration, and establishing tentative pass-fail criteria. The fourth phase of development must be accomplished by aeromedical evaluators who perform the tests and report their findings to the authors so that the final phase of the task can be accomplished, namely, revision and modification of materials, procedures, and criterion so that standardization of the method can be achieved. Since this final phase can be completed only after information is obtained from persons who have actually used the test materials, medical evaluators who use the test materials are urged to report their results so that realistic pass-fail criteria can be established and materials and procedures can be standardized. Test results obtained on aircrew with normal hearing should be reported as well as data on subjects with hearing loss.

7.8.5. Occupational Cockpit Hearing Evaluation.

Figure 7.1. In-Flight Hearing Evaluation Reporting Form.

*Keep on file in medical record the same as any other fitness or risk evaluation

Examiners Name: (*)DSN:

Type Aircraft Used:

Name of Subject: Age: (*)SSAN:

Total Flying Time: AFSC:

Audiometric Results:(*) Audiometer used: Cal Date:

Frequency (Hz)	500	1000	2000	3000	4000	6000
Right						
Left						

In-flight Test Scores (list as Appropriate):

Test1: List 1_____ List 2_____ List 3_____

Test 2: List 1_____ List 2_____ List 3_____

Test 3 Phrase 1_____ Phrase 2_____ Phrase 3_____ Phrase 4_____

Range of scores examiner obtained among normal-hearing flying personnel:

Remarks:

Chapter 8

PULMONARY FUNCTION TESTING

8.1. Screening Examination. Screening type Pulmonary Function Testing (PFT) are not routinely accomplished except in support of the Occupational Medicine Program or at the physicians request. However, when accomplished for any reason, the results will be recorded on AF Form 1226, Pulmonary Function Studies.

8.2. Test Procedure:

8.2.1. During actual testing, attention to detail is essential. The procedure will be explained to the examinee in simple terms. A statement that examinees will be tested on "how hard and how fast they can exhale" may not be physiologically precise, but it may be the only explanation necessary. At least 1 hour should elapse since the examinee last smoked or was administered bronchodilators. PFTs should not be performed within 2 hours of a main meal. Testing should be postponed if the examinee is acutely ill from any cause or has experienced an upper or lower respiratory tract infection during the previous 3 weeks.

8.2.2. Have the examinee remove restrictive clothing or dentures and to stand in front of the spirometer. Their chin should be slightly elevated with the neck slightly extended. Using a nose clip is very important (see **Figure 8.1.**).

Figure 8.1. Position of Nose Clip.

8.2.3. Next, the examinee will take the deepest possible breath, seal their mouth firmly around the mouthpiece and quickly blow into the apparatus as hard, fast, and completely as possible. Common

errors include failing to maintain an airtight seal around the mouthpiece, puckering the lips (as with a musical instrument), or obstructing the mouthpiece with the tongue (see **Figure 8.2.**).

Figure 8.2. Proper Mouthpiece Seal.

8.2.4. After two practice attempts, three tracings will be recorded and assessed for acceptability. If you believe the examinee has not taken a full inspiration before the forced expiration, has not put forth a maximal effort, or has not continued exhaling for at least 5 seconds (or until an obvious plateau in the volume-time curve has occurred), that particular tracing should be repeated. Attempts marred by coughing will also be rejected. The variation between the two largest forced vital capacities of three satisfactory tracings should not exceed 10 percent. From the three satisfactory tracings, the forced vital capacity (FVC) and forced expiratory volume in 1 second (FEV1) will be measured. The largest FVC and FEV1 will be used in the analysis, regardless of the curves on which they occur. For example: in the calculation of FEV1/FVC, the FEV1 and FVC need not be from the same curve.

8.3. Selection and Calculation of Specific Tests:

8.3.1. The test should be effort-independent, or if not, motivation of the examinee should be assessable by a trained examiner.

8.3.2. Useful spirometry measurements include the forced vital capacity(FVC), forced expiratory volume in 1 second (FEV1), and forced expiratory volume in 1 second as a percent of the total forced vital capacity (FEV1/FVC percent).

8.3.3. FVC (Forced Vital Capacity). The FVC is the maximum volume of air that can be exhaled forcefully after a maximal inspiration. For all practical purposes, the VC (vital capacity without force effort) and the FVC are identical in most persons. In examinees with severe bronchopulmonary disease the FVC is often smaller than the VC because of expiratory slowing, air trapping, and hyperinfla-

tion. In the absence of airway obstruction, an abnormal FVC is seen in "restrictive" disease - those conditions characterized by a decrease in lung volume.

8.3.4. FEV1 (Forced Expiratory Volume in 1 second). The FEV1 is the volume of air which can be forcibly expelled during the first second of expiration. In those instruments where the chart recorder is activated before expiration, the zero point for timing the FEV1 must be determined by extrapolating the steepest portion of the volume curve back to the maximal inspiration volume. The FEV1 has been regarded as the most useful overall measurement and is abnormal in obstructive disease.

8.3.5. FEV1/FVC The FEV1 can be expressed as a percent of the predicted normal value for FEV1 or as a percent of the total FVC. By routinely calculating FEV1/FVC percent, you can avoid a common mistake. This occurs in severe pulmonary restrictive disease where a reduction in FVC alone may falsely suggest airways obstruction. As a rule, the examinee should be able to expire 70 to 80 percent of the FVC in 1 second, depending upon age and sex. Caution - FEV1/FVC results of greater than 100% are not possible and should alert you to a calculation problem.

8.3.6. Body Temperature, Pressure Saturated (BTPS). Correction for body temperature, ambient pressure, saturation with water vapor (BTPS) is an important step in calculating spirometric tests. This is necessary because the patient exhales the gas at body temperature (37 degrees C) while the volume recorded by the spirometer is at a somewhat lower ambient temperature. This volume of gas recorded by the spirometer must then be multiplied by a factor to compensate for what it should be at normal body temperature. This usually increases the gas volume recorded by the spirometer by approximately 8 percent, but it may vary from 4 to 10 percent depending on ambient temperature. This correction is particularly important in field studies where ambient temperature may vary considerably. Some manufacturers build in an automatic correction factor; either into the apparatus itself (electronic spirometer) or in the recording paper. Which is acceptable but less desirable than direct calculation of the conversion to BTPS.

8.4. Interpreting Baseline and Follow-up Results: The interpretation of PFT results can be quite subjective and dependant on the purpose of the screening. Consult with a health care provider each time a study falls below the Air Force standard. For follow-up studies, compare the previously recorded highest value for each test. The highest value may not necessarily have occurred during baseline or pre-employment testing. Any abnormalities of either baseline or follow-up pulmonary functions should be verified by repeating spirometry in 2 weeks. If abnormalities persist, clinical assessment is essential. Before labeling any baseline or pre-employment studies as abnormal, they should be repeated in 2 weeks to confirm the abnormality.

8.4.1. Applying Air Force Standards: Determine the predicted normals according to the manufacturers operating manual . According to Air Force standards, abnormal functions are present when the:

8.4.1.1. FEV1 or FVC is less than 80 percent of predicted; or

8.4.1.2. FEV1/FVC ratio is less than .70 (70%).

8.4.2. Adjusting for Race: The FVC and FEV1 of other races are about 15 percent lower than in Caucasians of the same age and height; however differences in the FEV1/FVC percent are not as significant. Allowances for these differences must be made during pre-employment / baseline evaluations to avoid serious error in interpretation. In other races, the predicated FEV1 and FVC for any given person should be multiplied by 0.85 to adjust for this 15 percent difference. No such correction is necessary for the FEV1/FVC percent.

8.4.3. Predictable Variations: The predictable pattern of daily and seasonal variation must also be considered. Measurements of pulmonary function are highest in the afternoon and decline slightly during the evening hours. Values are also higher during the summer than the winter. If annual follow-up studies are contemplated, ideally they should be scheduled during the same shift and month.

8.4.4. Effects of Smoking: In addition to accelerating the normal effects of aging, cigarette smoking may transiently alter certain pulmonary function tests. This effect may be particularly pronounced for an hour after smoking and you should wait this long before performing the spirometry. Fixed airway obstruction eventually occurs in many smokers, so you can generally expect to find lower values for FEV1 and FEV1/FVC percent.

8.5. Instrument Specifications. Various types of spirometers are available; many are technically satisfactory, but a significant minority are not. The following general guidelines on what constitutes an acceptable spirometer have been derived from currently available sources, including the Appalachian Laboratory for Occupational Safety and Health (NIOSH-ALOSH) Pulmonary Function Standards submitted to OSHA in 1977.

8.5.1. Volume. The volume capacity of the instrument should be 7 liters at BTPS. Spirometers should also be capable of accumulating volume for at least 10 seconds.

8.5.2. Accuracy - Linearity. For measuring FEV1 and FVC, the instrument should be accurate within 50 milliliters or within 3 percent of reading, whichever is greater.

8.5.3. Inertia and Resistance. The instrument should have low inertia and offer low resistance to air flow. The combined effect of inertia and resistance may be assessed by measuring the back pressure in the tubing during the performance of the test. In a subject with an FEV1 of at least 3.5 liters, back pressure at the mouthpiece should not exceed 10 cm of H2O for longer than 0-5 seconds and 2 cm H2O during the remainder of the maneuver.

8.5.4. Timing. If equipped, timing units will be accurate to within 3 percent, be capable of calibration in the field and be actuated by exhalation of 50 milliliters or after an expiratory flow of 200 milliliters per second has been achieved. If a chart recorder, or kymograph, is used to determine FEV1, it must be activated at least 1 second before the forced expiration to make sure that it operates at the proper speed.

8.5.5. Conversion to BTPS. The instrument or operator must have a means of correcting volumes to BTPS under conditions of varying ambient temperature.

8.5.6. Providing a Written Tracing. The instrument should provide a tracing or display of either flow versus volume or volume versus time during the entire forced expiration. This is necessary to determine if a patient has performed the test properly. The tracing should be large enough so that hand calculations can be made (7.5 millimeters of chart per liter of volume and 20 mm of chart per second of time).

8.5.7. Calibration. The instrument should be capable of calibration in the field with respect to FEV1 and FVC. Periodic recalibration of the instrument should be performed using a syringe or other known volume source of at least 2 liters. The frequency of this calibration will vary with the use of spirometer. Instruments that provide electrical outputs proportional to volume or flow or both (electronic spirometers) should be calibrated at least daily according to the manufacturer's instructions.

Table 8.1. Predicted Spirometric Standards for Female Caucasians.

Predicted Spirometric Standards for Female Caucasians
First figure is the predicted FEV1. Second figure is the predicted FVC
Formulas: FEV1 = (0.089 x Height in inches) – (0.025 x Age) –1.932
FVC = (0.115 x Height in inches) – (0.024 – Age) – 2.852

Height/Age	20	21	22	23	24	25	26	27	28	29
56	2.55 3.11	2.53 3.08	2.50 3.06	2.48 3.04	2.45 3.01	2.43 2.99	2.40 2.96	2.38 2.94	2.35 2.92	2.33 2.89
58	2.73 3.34	2.71 3.31	2.68 3.29	2.66 3.27	2.63 3.24	2.61 3.22	2.58 3.19	2.56 3.17	2.53 3.15	2.51 3.12
59	2.82 3.45	2.79 3.43	2.77 3.41	2.74 3.38	2.72 3.36	2.69 3.33	2.67 3.31	2.64 3.29	2.62 3.26	2.59 3.24
60	2.91 3.57	2.88 3.54	2.86 3.52	2.83 3.50	2.81 3.47	2.78 3.45	2.76 3.42	2.73 3.40	2.71 3.38	2.68 3.35
61	3.00 3.68	2.97 3.66	2.95 3.64	2.92 3.61	2.90 3.59	2.87 3.56	2.85 3.54	2.82 3.52	2.80 3.49	2.77 3.47
62	3.09 3.80	3.06 3.77	3.04 3.75	3.01 3.73	2.99 3.70	2.96 3.68	2.94 3.65	2.91 3.63	2.89 3.61	2.86 3.58
63	3.18 3.91	3.15 3.89	3.13 3.87	3.10 3.84	3.08 3.82	3.05 3.79	3.03 3.77	3.00 3.75	2.98 3.72	2.95 3.70
64	3.26 4.03	3.24 4.00	3.21 3.98	3.19 3.96	3.16 3.93	3.14 3.91	3.11 3.88	3.09 3.86	3.06 3.84	3.04 3.81
65	3.35 4.14	3.33 4.12	3.30 4.10	3.28 4.07	3.25 4.05	3.23 4.02	3.20 4.00	3.18 3.98	3.15 3.95	3.13 3.93
66	3.44 4.26	3.42 4.23	3.39 4.21	3.37 4.19	3.34 4.16	3.32 4.14	3.29 4.11	3.27 4.09	3.24 4.07	3.22 4.04
67	3.53 4.37	3.51 4.35	3.48 4.33	3.46 4.30	3.43 4.28	3.41 4.25	3.38 4.23	3.36 4.21	3.33 4.18	3.31 4.16
68	3.62 4.49	3.60 4.46	3.57 4.44	3.55 4.42	3.52 4.39	3.50 4.37	3.47 4.34	3.45 4.32	3.42 4.30	3.40 4.27
69	3.71 4.60	3.68 4.58	3.66 4.56	3.63 4.53	3.61 4.51	3.58 4.48	3.56 4.46	3.53 4.44	3.51 4.41	3.48 4.39
70	3.80 4.72	3.77 4.69	3.75 4.67	3.72 4.65	3.70 4.62	3.67 4.60	3.65 4.57	3.62 4.55	3.60 4.53	3.57 4.50
71	3.89 4.83	3.86 4.81	3.84 4.79	3.81 4.76	3.79 4.74	3.76 4.71	3.74 4.69	3.71 4.67	3.69 4.64	3.66 4.62
72	3.98 4.95	3.95 4.92	3.93 4.90	3.90 4.88	3.88 4.85	3.85 4.83	3.83 4.80	3.80 4.78	3.78 4.76	3.75 4.73

Height/Age	30	31	32	33	34	35	36	37	38	39
56	2.30 2.87	2.28 2.84	2.25 2.82	2.23 2.80	2.20 2.77	2.18 2.75	2.15 2.72	2.13 2.70	2.10 2.68	2.08 2.65
57	2.39 2.98	2.37 2.96	2.34 2.94	2.32 2.91	2.29 2.89	2.27 2.86	2.24 2.84	2.22 2.82	2.19 2.79	2.17 2.77
58	2.48 3.10	2.46 3.07	2.43 3.05	2.41 3.03	2.38 3.00	2.36 2.98	2.33 2.95	2.31 2.93	2.28 2.91	2.26 2.88
59	2.57 3.21	2.54 3.19	2.52 3.17	2.49 3.14	2.47 3.12	2.44 3.09	2.42 3.07	2.39 3.05	2.37 3.02	2.34 3.00
60	2.66 3.33	2.63 3.30	2.61 3.28	2.58 3.26	2.56 3.23	2.53 3.21	2.51 3.18	2.48 3.16	2.46 3.14	2.43 3.11
61	2.75 3.44	2.72 3.42	2.70 3.40	2.67 3.37	2.65 3.35	2.62 3.32	2.60 3.30	2.57 3.28	2.55 3.25	2.52 3.23
62	2.84 3.56	2.81 3.53	2.79 3.51	2.76 3.49	2.74 3.46	2.71 3.44	2.69 3.41	2.66 3.39	2.64 3.37	2.61 3.34
63	2.93 3.67	2.90 3.65	2.88 3.63	2.85 3.60	2.83 3.58	2.80 3.55	2.78 3.53	2.75 3.51	2.73 3.48	2.70 3.46
64	3.01 3.79	2.99 3.76	2.96 3.74	2.94 3.72	2.91 3.69	2.89 3.67	2.86 3.64	2.84 3.62	2.81 3.60	2.79 3.57
65	3.10 3.90	3.08 3.88	3.05 3.86	3.03 3.83	3.00 3.81	2.98 3.78	2.95 3.76	2.93 3.74	2.90 3.71	2.88 3.69
66	3.19 4.02	3.17 3.99	3.14 3.97	3.12 3.95	3.09 3.92	3.07 3.90	3.04 3.87	3.02 3.85	2.99 3.83	2.97 3.80
67	3.28 4.13	3.26 4.11	3.23 4.09	3.21 4.06	3.18 4.04	3.16 4.01	3.13 3.99	3.11 3.97	3.08 3.94	3.06 3.92
68	3.37 4.25	3.35 4.22	3.32 4.20	3.30 4.18	3.27 4.15	3.25 4.13	3.22 4.10	3.20 4.08	3.17 4.06	3.15 4.03
69	3.46 4.36	3.43 4.34	3.41 4.32	3.38 4.29	3.36 4.27	3.33 4.24	3.31 4.22	3.28 4.20	3.26 4.17	3.23 4.15
70	3.55 4.48	3.52 4.45	3.50 4.43	3.47 4.41	3.45 4.38	3.42 4.36	3.40 4.33	3.37 4.31	3.35 4.29	3.32 4.26
71	3.64 4.59	3.61 4.57	3.59 4.55	3.56 4.52	3.54 4.50	3.51 4.47	3.49 4.45	3.46 4.43	3.44 4.40	3.41 4.38
72	3.73 4.71	3.70 4.68	3.68 4.66	3.65 4.64	3.63 4.61	3.60 4.59	3.58 4.56	3.55 4.54	3.53 4.52	3.50 4.49

Height/Age	40	41	42	43	44	45	46	47	48	49
56	2.05 2.63	2.03 2.60	2.00 2.58	1.98 2.56	1.95 2.53	1.93 2.51	1.90 2.48	1.88 2.46	1.85 2.44	1.83 2.41
57	2.14 2.74	2.12 2.72	2.09 2.70	2.07 2.67	2.04 2.65	2.02 2.62	2.51 3.05	1.97 2.58	1.94 2.55	1.92 2.53
58	2.23 2.86	2.21 2.83	2.18 2.81	2.16 2.79	2.13 2.76	2.11 2.74	2.60 3.19	2.06 2.69	2.03 2.67	2.01 2.64
59	2.32 2.97	2.29 2.95	2.27 2.93	2.24 2.90	2.22 2.88	2.19 2.85	2.70 3.34	2.14 2.81	2.12 2.78	2.09 2.76
60	2.41 3.09	2.38 3.06	2.36 3.04	2.33 3.02	2.31 2.99	2.28 2.97	2.79 3.49	2.23 2.92	2.21 2.90	2.18 2.87
61	2.50 3.20	2.47 3.18	2.45 3.16	2.42 3.13	2.40 3.11	2.37 3.08	2.88 3.64	2.32 3.04	2.30 3.01	2.27 2.99
62	2.59 3.32	2.56 3.29	2.54 3.27	2.51 3.25	2.49 3.22	2.46 3.20	2.97 3.79	2.41 3.15	2.39 3.13	2.36 3.10
63	2.68 3.43	2.65 3.41	2.63 3.39	2.60 3.36	2.58 3.34	2.55 3.31	3.06 3.93	2.50 3.27	2.48 3.24	2.45 3.22
64	2.76 3.55	2.74 3.52	2.71 3.50	2.69 3.48	2.66 3.45	2.64 3.43	3.16 4.08	2.59 3.38	2.56 3.36	2.54 3.33
65	2.85 3.66	2.83 3.64	2.80 3.62	2.78 3.59	2.75 3.57	2.73 3.54	3.25 4.23	2.68 3.50	2.65 3.47	2.63 3.45
66	2.94 3.78	2.92 3.75	2.89 3.73	2.87 3.71	2.84 3.68	2.82 3.66	3.34 4.38	2.77 3.61	2.74 3.59	2.72 3.56
67	3.03 3.89	3.01 3.87	2.98 3.85	2.96 3.82	2.93 3.80	2.91 3.77	3.43 4.53	2.86 3.73	2.83 3.70	2.81 3.68
68	3.12 4.01	3.10 3.98	3.07 3.96	3.05 3.94	3.02 3.91	3.00 3.89	3.52 4.67	2.95 3.84	2.92 3.82	2.90 3.79
69	3.21 4.12	3.18 4.10	3.16 4.08	3.13 4.05	3.11 4.03	3.08 4.00	3.62 4.82	3.03 3.96	3.01 3.93	2.98 3.91

Height/Age	50	51	52	53	54	55	56	57	58	59
56	1.80 2.39	1.78 2.36	1.75 2.34	1.73 2.32	1.70 2.29	1.68 2.27	1.65 2.24	1.63 2.22	1.60 2.20	1.58 2.17
57	1.89 2.50	1.87 2.48	1.84 2.46	1.82 2.43	1.79 2.41	1.77 2.38	1.74 2.36	1.72 2.34	1.69 2.31	1.67 2.29
58	1.98 2.62	1.96 2.59	1.93 2.57	1.91 2.55	1.88 2.52	1.86 2.50	1.83 2.47	1.81 2.45	1.78 2.43	1.76 2.40
59	2.07 2.73	2.04 2.71	2.02 2.69	1.99 2.66	1.97 2.64	1.94 2.61	1.92 2.59	1.89 2.57	1.87 2.54	1.84 2.52
60	2.16 2.85	2.13 2.82	2.11 2.80	2.08 2.78	2.06 2.75	2.03 2.73	2.01 2.70	1.98 2.68	1.96 2.66	1.93 2.63
61	2.25 2.96	2.22 2.94	2.20 2.92	2.17 2.89	2.15 2.87	2.12 2.84	2.10 2.82	2.07 2.80	2.05 2.77	2.02 2.75
62	2.34 3.08	2.31 3.05	2.29 3.03	2.26 3.01	2.24 2.98	2.21 2.96	2.19 2.93	2.16 2.91	2.14 2.89	2.11 2.86
63	2.43 3.19	2.40 3.17	2.38 3.15	2.35 3.12	2.33 3.10	2.30 3.07	2.28 3.05	2.25 3.03	2.23 3.00	2.20 2.98
64	2.51 3.31	2.49 3.28	2.46 3.26	2.44 3.24	2.41 3.21	2.39 3.19	2.36 3.16	2.34 3.14	2.31 3.12	2.29 3.09
65	2.60 3.42	2.58 3.40	2.55 3.38	2.53 3.35	2.50 3.33	2.48 3.30	2.45 3.28	2.43 3.26	2.40 3.23	2.38 3.21

66	2.69 3.54	2.67 3.51	2.64 3.49	2.62 3.47	2.59 3.44	2.57 3.42	2.54 3.39	2.52 3.37	2.49 3.35	247 3.32
67	2.78 3.65	2.76 3.63	2.73 3.61	2.71 3.58	2.68 3.56	2.66 3.53	2.63 3.51	2.61 3.	2.58 3.46	2.56 3.44
68	2.87 3.77	2.85 3.74	2.82 3.72	2.80 3.70	2.77 3.67	2.75 3.65	2.72 3.62	2.70 3.60	2.67 3.58	2.65 3.55
69	2.96 3.88	2.93 3.86	2.91 3.84	2.88 3.81	2.86 3.79	2.83 3.76	2.81 3.74	2.78 3.72	2.76 3.69	2.73 3.67
70	3.05 4.00	3.02 3.97	3.00 3.95	2.97 3.93	2.95 3.90	2.92 3.88	2.90 3.85	2.87 3.83	2.85 3.81	2.82 3.78
71	3.14 4.11	3.11 4.09	3.09 4.07	3.06 4.04	3.04 4.02	3.01 3.99	2.99 3.97	2.96 3.95	2.94 3.92	2.91 3.90
72	3.23 4.23	3.20 4.20	3.18 4.18	3.15 4.16	.13 4.13	3.10 4.11	3.08 4.08	3.05 4.06	3.03 4.04	3.00 4.01

Table 8.2. Predicted Spirometric Standards for Male Caucasians.

First figure is the predicted FEV1. Second figure is the predicted FVC
Formulas: FEV1 = (0.092 x Height in inches) – (0.032 x Age) – 1.260
FVC = (0.148 x Height in inches) – (0.025 x Age) – 4.241

Height/Age	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**28**
56	3.25 3.55	3.22 3.52	3.19 3.50	3.16 3.47	3.12 3.45	3.09 3.42	3.06 3.40	3.03 3.37	3.00 3.35	2.96 3.32
57	3.34 3.70	3.31 3.67	3.28 3.65	3.25 3.62	3.22 3.60	3.18 3.57	3.15 3.55	3.12 3.52	3.09 3.50	3.06 3.47
58	3.44 3.84	3.40 3.82	3.37 3.79	3.34 3.77	3.31 3.74	3.28 3.72	3.24 3.69	3.21 3.67	3.18 3.64	3.15 3.62
59	3.53 3.99	3.50 3.97	3.46 3.94	3.43 3.92	3.40 3.89	3.37 3.87	3.34 3.84	3.30 3.82	3.27 3.79	3.24 3.77
60	3.62 4.14	3.59 4.11	3.56 4.09	3.52 4.06	3.49 4.04	3.46 4.01	3.43 3.99	3.40 3.96	3.36 3.94	3.33 3.91
61	3.71 4.29	3.68 4.26	3.65 4.24	3.62 4.21	3.58 4.19	3.55 4.16	3.52 4.14	3.49 4.11	3.46 4.09	3.42 4.06
62	3.80 4.44	3.77 4.41	3.74 4.39	3.71 4.36	3.68 4.34	3.64 4.31	3.61 4.29	3.58 4.26	3.55 4.24	3.52 4.21
63	3.90 4.58	3.86 4.56	3.83 4.53	3.80 4.51	3.77 4.48	3.74 4.46	3.70 4.43	3.67 4.41	3.64 4.38	3.61 4.36
64	3.99 4.73	3.96 4.71	3.92 4.68	3.89 4.66	3.86 4.63	3.83 4.61	3.80 4.58	3.76 4.56	3.73 4.53	3.70 4.51
65	4.08 4.88	4.05 4.85	4.02 4.83	3.98 4.80	3.95 4.78	3.92 4.75	3.89 4.73	3.86 4.70	3.82 4.68	3.79 4.65
66	4.17 5.03	4.14 5.00	4.11 4.98	4.08 4.95	4.04 4.93	4.01 4.90	3.98 4.88	3.95 4.85	3.92 4.83	3.88 4.80
67	4.26 5.18	4.23 5.15	4.20 5.13	4.17 5.10	4.14 5.08	4.10 5.05	4.07 5.03	4.04 5.00	4.01 4.98	3.98 4.95
68	4.36 5.32	4.32 5.30	4.29 5.27	4.26 5.25	4.23 5.22	4.20 5.20	4.16 5.17	4.13 5.15	4.10 5.12	4.07 5.10
69	4.45 5.47	4.42 5.45	4.38 5.42	4.35 5.40	4.32 5.37	4.29 5.35	4.26 5.32	4.22 5.30	4.19 5.27	4.16 5.25
70	4.54 5.62	4.51 5.59	4.48 5.57	4.44 5.54	4.41 5.52	4.38 5.49	4.35 5.47	4.32 5.44	4.28 5.42	4.25 5.39
71	4.63 5.77	4.60 5.74	4.57 5.72	4.54 5.69	4.50 5.67	4.47 5.64	4.44 5.62	4.41 5.59	4.38 5.57	4.34 5.54
72	4.72 5.92	4.69 5.89	4.66 5.87	4.63 5.84	4.60 5.82	4.56 5.79	4.53 5.77	4.50 5.74	4.47 5.72	4.44 5.69
73	4.82 6.06	4.78 6.04	4.75 6.01	4.72 5.99	4.69 5.96	4.66 5.94	4.62 5.91	4.59 5.89	4.56 5.86	4.53 5.84
74	4.91 6.21	4.88 6.19	4.84 6.16	4.81 6.14	4.78 6.11	4.75 6.09	4.72 6.06	4.68 6.04	4.65 6.01	4.62 5.99
75	5.00 6.36	4.97 6.33	4.94 6.31	4.90 6.28	4.87 6.26	4.84 6.23	4.81 6.21	4.78 6.18	4.74 6.16	4.71 6.13
76	5.09 6.51	5.06 6.48	5.03 6.46	5.00 6.43	4.96 6.41	4.93 6.38	4.90 6.36	4.87 6.33	4.84 6.31	4.80 6.28
77	5.18 6.66	5.15 6.63	5.12 6.61	5.09 6.58	5.06 6.56	5.02 6.53	4.99 6.51	4.96 6.48	4.93 6.46	4.90 6.43
78	5.28 6.80	5.24 6.78	5.21 6.75	5.18 6.73	5.15 6.70	5.12 6.68	5.08 6.65	5.05 6.63	5.02 6.60	4.99 6.58
79	5.37 6.95	5.34 6.93	5.30 6.90	5.27 6.88	5.24 6.85	5.21 6.83	5.18 6.80	5.14 6.78	5.11 6.75	5.08 6.73
80	5.46 7.10	5.43 7.07	5.40 7.05	5.36 7.02	5.33 7.00	5.30 6.97	5.27 6.95	5.24 6.92	5.20 6.90	5.17 6.87

Height/Age	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**
56	2.93 3.30	2.90 3.27	2.87 3.25	2.84 3.22	2.80 3.20	2.77 3.17	2.74 3.15	2.71 3.12	2.68 3.10	2.64 3.07
57	3.02 3.45	2.99 3.42	2.96 3.40	2.93 3.37	2.90 3.35	2.86 3.32	2.83 3.30	2.80 3.27	2.77 3.25	2.74 3.22
58	3.12 3.59	3.08 3.57	3.05 3.54	3.02 3.52	2.99 3.49	2.96 3.47	2.92 3.44	2.89 3.42	2.86 3.39	2.83 3.37
59	3.21 3.74	3.18 3.72	3.14 3.69	3.11 3.67	3.08 3.64	3.05 3.62	3.02 3.59	2.98 3.57	2.95 3.54	2.92 3.52
60	3.30 3.89	3.27 3.86	3.24 3.84	3.20 3.81	3.17 3.79	3.14 3.76	3.11 3.74	3.08 3.71	3.04 3.69	3.01 3.66
61	3.39 4.04	3.36 4.01	3.33 3.99	3.30 3.96	3.26 3.94	3.23 3.91	3.20 3.89	3.17 3.86	3.14 3.84	3.10 3.81
62	3.48 4.19	3.45 4.16	3.42 4.14	3.39 4.11	3.36 4.09	3.32 4.06	3.29 4.04	3.26 4.01	3.23 3.99	3.20 3.96
63	3.58 4.33	3.54 4.31	3.51 4.28	3.48 4.26	3.45 4.23	3.42 4.21	3.38 4.18	3.35 4.16	3.32 4.13	3.29 4.11
64	3.67 4.48	3.64 4.46	3.60 4.43	3.57 4.41	3.54 4.38	3.51 4.36	3.48 4.33	3.44 4.31	3.41 4.28	3.38 4.26
65	3.76 4.63	3.73 4.60	3.70 4.58	3.66 4.55	3.63 4.53	3.60 4.50	3.57 4.48	3.54 4.45	3.50 4.43	3.47 4.40
66	3.85 4.78	3.82 4.75	3.79 4.73	3.76 4.70	3.72 4.68	3.69 4.65	3.66 4.63	3.63 4.60	3.60 4.58	3.56 4.55
67	3.94 4.93	3.91 4.90	3.88 4.88	3.85 4.85	3.82 4.83	3.78 4.80	3.75 4.78	3.72 4.75	3.69 4.73	3.66 4.70
68	4.04 5.07	4.00 5.05	3.97 5.02	3.94 5.00	3.91 4.97	3.88 4.95	3.84 4.92	3.81 4.90	3.78 4.87	3.75 4.85
69	4.13 5.22	4.10 5.20	4.06 5.17	4.03 5.15	4.00 5.12	3.97 5.10	3.94 5.07	3.90 5.05	3.87 5.02	3.84 5.00
70	4.22 5.37	4.19 5.34	4.16 5.32	4.12 5.29	4.09 5.27	4.06 5.24	4.03 5.22	4.00 5.19	3.96 5.17	3.93 5.14
71	4.31 5.52	4.28 5.49	4.25 5.47	4.22 5.44	4.18 5.42	4.15 5.39	4.12 5.37	4.09 5.34	4.06 5.32	4.02 5.29
72	4.40 5.67	4.37 5.64	4.34 5.62	4.31 5.59	4.28 5.57	4.24 5.54	4.21 5.52	4.18 5.49	4.15 5.47	4.12 5.44
73	4.50 5.81	4.46 5.79	4.43 5.76	4.40 5.74	4.37 5.71	4.34 5.69	4.30 5.66	4.27 5.64	4.24 5.61	4.21 5.59
74	4.59 5.96	4.56 5.94	4.52 5.91	4.49 5.89	4.46 5.86	4.43 5.84	4.40 5.81	4.36 5.79	4.33 5.76	4.30 5.74
75	4.68 6.11	4.65 6.08	4.62 6.06	4.58 6.03	4.55 6.01	4.52 5.98	4.49 5.96	4.46 5.93	4.42 5.91	4.39 5.88
76	4.77 6.26	4.74 6.23	4.71 6.21	4.68 6.18	4.64 6.16	4.61 6.13	4.58 6.11	4.55 6.08	4.52 6.06	4.48 6.03
77	4.86 6.41	4.83 6.38	4.80 6.36	4.77 6.33	4.74 6.31	4.70 6.28	4.67 6.26	4.64 6.23	4.61 6.21	4.58 6.18
78	4.96 6.55	4.92 6.53	4.89 6.50	4.86 6.48	4.83 6.45	4.80 6.43	4.76 6.40	4.73 6.38	4.70 6.35	4.67 6.33
79	5.05 6.70	5.02 6.68	4.98 6.65	4.95 6.63	4.92 6.60	4.89 6.58	4.86 6.55	4.82 6.53	4.79 6.50	4.76 6.48
80	5.14 6.85	5.11 6.82	5.08 6.80	5.04 6.77	5.01 6.75	4.98 6.72	4.95 6.70	4.92 6.67	4.88 6.65	4.85 6.62

Height/Age	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**
56	2.61 3.05	2.58 3.02	2.55 3.00	2.52 2.97	2.48 2.95	2.45 2.92	2.42 2.90	2.39 2.87	2.36 2.85	2.32 2.82
57	2.70 3.20	2.67 3.17	2.64 3.15	2.61 3.12	2.58 3.10	2.54 3.07	2.51 3.05	2.48 3.02	2.45 3.00	2.42 2.97

58	2.80 3.34	2.76 3.32	2.73 3.29	2.70 3.27	2.67 3.24	2.64 3.22	2.60 3.19	2.57 3.17	2.54 3.14	2.51 3.12
59	2.89 3.49	2.86 3.47	2.82 3.44	2.79 3.42	2.76 3.39	2.73 3.37	2.70 3.34	2.66 3.32	2.63 3.29	2.60 3.27
60	2.98 3.64	2.95 3.61	2.92 3.59	2.88 3.56	2.85 3.54	2.82 3.51	2.79 3.49	2.76 3.46	2.72 3.44	2.69 3.41
61	3.07 3.79	3.04 3.76	3.01 3.74	2.98 3.71	2.94 3.69	2.91 3.66	2.88 3.64	2.85 3.61	2.82 3.59	2.78 3.56
62	3.16 3.94	3.13 3.91	3.10 3.89	3.07 3.86	3.04 3.84	3.00 3.81	2.97 3.79	2.94 3.76	2.91 3.74	2.88 3.71
63	3.26 4.08	3.22 4.06	3.19 4.03	3.16 4.01	3.13 3.98	3.10 3.96	3.06 3.93	3.03 3.91	3.00 3.88	2.97 3.86
64	3.35 4.23	3.32 4.21	3.28 4.18	3.25 4.16	3.22 4.13	3.19 4.11	3.16 4.08	3.12 4.06	3.09 4.03	3.06 4.01
65	3.44 4.38	3.41 4.35	3.38 4.33	3.34 4.30	3.31 4.28	3.28 4.25	3.25 4.23	3.22 4.20	3.18 4.18	3.15 4.15
66	3.53 4.53	3.50 4.50	3.47 4.48	3.44 4.45	3.40 4.43	3.37 4.40	3.34 4.38	3.31 4.35	3.28 4.33	3.24 4.30
67	3.62 4.68	3.59 4.65	3.56 4.63	3.53 4.60	3.50 4.58	3.46 4.55	3.43 4.53	3.40 4.50	3.37 4.48	3.34 4.45
68	3.72 4.82	3.68 4.80	3.65 4.77	3.62 4.75	3.59 4.72	3.56 4.70	3.52 4.67	3.49 4.65	3.46 4.62	3.43 4.60
69	3.81 4.97	3.78 4.95	3.74 4.92	3.71 4.90	3.68 4.87	3.65 4.85	3.62 4.82	3.58 4.80	3.55 4.77	3.52 4.75
70	3.90 5.12	3.87 5.09	3.84 5.07	3.80 5.04	3.77 5.02	3.74 4.99	3.71 4.97	3.68 4.94	3.64 4.92	3.61 4.89
71	3.99 5.27	3.96 5.24	3.93 5.22	3.90 5.19	3.86 5.17	3.83 5.14	3.80 5.12	3.77 5.09	3.74 5.07	3.70 5.04
72	4.08 5.42	4.05 5.39	4.02 5.37	3.99 5.34	3.96 5.32	3.92 5.29	3.89 5.27	3.86 5.24	3.83 5.22	3.80 5.19
73	4.18 5.56	4.14 5.54	4.11 5.51	4.08 5.49	4.05 5.46	4.02 5.44	3.98 5.41	3.95 5.39	3.92 5.36	3.89 5.34
74	4.27 5.71	4.24 5.69	4.20 5.66	4.17 5.64	4.14 5.61	4.11 5.59	4.08 5.56	4.04 5.54	4.01 5.51	3.98 5.49
75	4.36 5.86	4.33 5.83	4.30 5.81	4.26 5.78	4.23 5.76	4.20 5.73	4.17 5.71	4.14 5.68	4.10 5.66	4.07 5.63
76	4.45 6.01	4.42 5.98	4.39 5.96	4.36 5.93	4.32 5.91	4.29 5.88	4.26 5.86	4.23 5.83	4.20 5.81	4.16 5.78
77	4.54 6.16	4.51 6.13	4.48 6.11	4.45 6.08	4.42 6.06	4.38 6.03	4.35 6.01	4.32 5.98	4.29 5.96	4.26 5.93
78	4.64 6.30	4.60 6.28	4.57 6.25	4.54 6.23	4.51 6.20	4.48 6.18	4.44 6.15	4.41 6.13	4.38 6.10	4.35 6.08
79	4.73 6.45	4.70 6.43	4.66 6.40	4.63 6.38	4.60 6.35	4.57 6.33	4.54 6.30	4.50 6.28	4.47 6.25	4.44 6.23
80	4.82 6.60	4.79 6.57	4.76 6.55	4.72 6.52	4.69 6.50	4.66 6.47	4.63 6.45	4.60 6.42	4.56 6.40	4.53 6.37

Height/Age	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
56	2.29 2.80	2.26 2.77	2.23 2.75	2.20 2.72	2.16 2.70	2.13 2.67	2.10 2.65	2.07 2.62	2.04 2.60	2.00 2.57
57	2.38 2.95	2.35 2.92	2.32 2.90	2.29 2.87	2.26 2.85	2.22 2.82	2.19 2.80	2.16 2.77	2.13 2.75	2.10 2.72
58	2.48 3.09	2.44 3.07	2.41 3.04	2.38 3.02	2.35 2.99	2.32 2.97	2.28 2.94	2.25 2.92	2.22 2.89	2.19 2.87
59	2.57 3.24	2.54 3.22	2.50 3.19	2.47 3.17	2.44 3.14	2.41 3.12	2.38 3.09	2.34 3.07	2.31 3.04	2.28 3.02
60	2.66 3.39	2.63 3.36	2.60 3.34	2.56 3.31	2.53 3.29	2.50 3.26	2.47 3.24	2.44 3.21	2.40 3.19	2.37 3.16
61	2.75 3.54	2.72 3.51	2.69 3.49	2.66 3.46	2.62 3.44	2.59 3.41	2.56 3.39	2.53 3.36	2.50 3.34	2.46 3.31
62	2.84 3.69	2.81 3.66	2.78 3.64	2.75 3.61	2.72 3.59	2.68 3.56	2.65 3.54	2.62 3.51	2.59 3.49	2.56 3.46
63	2.94 3.83	2.90 3.81	2.87 3.78	2.84 3.76	2.81 3.73	2.78 3.71	2.74 3.68	2.71 3.66	2.68 3.63	2.65 3.61
64	3.03 3.98	3.00 3.96	2.96 3.93	2.93 3.91	2.90 3.88	2.87 3.86	2.84 3.83	2.80 3.81	2.77 3.78	2.74 3.76
65	3.12 4.13	3.09 4.10	3.06 4.08	3.02 4.05	2.99 4.03	2.96 4.00	2.93 3.98	2.90 3.95	2.86 3.93	2.83 3.90
66	3.21 4.28	3.18 4.25	3.15 4.23	3.12 4.20	3.08 4.18	3.05 4.15	3.02 4.13	2.99 4.10	2.96 4.08	2.92 4.05
67	3.30 4.43	3.27 4.40	3.24 4.38	3.21 4.35	3.18 4.33	3.14 4.30	3.11 4.28	3.08 4.25	3.05 4.23	3.02 4.20
68	3.40 4.57	3.36 4.55	3.33 4.52	3.30 4.50	3.27 4.47	3.24 4.45	3.20 4.42	3.17 4.40	3.14 4.37	3.11 4.35
69	3.49 4.72	3.46 4.70	3.42 4.67	3.39 4.65	3.36 4.62	3.33 4.60	3.30 4.57	3.26 4.55	3.23 4.52	3.20 4.50
70	3.58 4.87	3.55 4.84	3.52 4.82	3.48 4.79	3.45 4.77	3.42 4.74	3.39 4.72	3.36 4.69	3.32 4.67	3.29 4.64
71	3.67 5.02	3.64 4.99	3.61 4.97	3.58 4.94	3.54 4.92	3.51 4.89	3.48 4.87	3.45 4.84	3.42 4.82	3.38 4.79
72	3.76 5.17	3.73 5.14	3.70 5.12	3.67 5.09	3.64 5.07	3.60 5.04	3.57 5.02	3.54 4.99	3.51 4.97	3.48 4.94
73	3.86 5.31	3.82 5.29	3.79 5.26	3.76 5.24	3.73 5.21	3.70 5.19	3.66 5.16	3.63 5.14	3.60 5.11	3.57 5.09
74	3.95 5.46	3.92 5.44	3.88 5.41	3.85 5.39	3.82 5.36	3.79 5.34	3.76 5.31	3.72 5.29	3.69 5.26	3.66 5.24
75	4.04 5.61	4.01 5.58	3.98 5.56	3.94 5.53	3.91 5.51	3.88 5.48	3.85 5.46	3.82 5.43	3.78 5.41	3.75 5.38
76	4.13 5.76	4.10 5.73	4.07 5.71	4.04 5.68	4.00 5.66	3.97 5.63	3.94 5.61	3.91 5.58	3.88 5.56	3.84 5.53
77	4.22 5.91	4.19 5.88	4.16 5.86	4.13 5.83	4.10 5.81	4.06 5.78	4.03 5.76	4.00 5.73	3.97 5.71	3.94 5.68
78	4.32 6.05	4.28 6.03	4.25 6.00	4.22 5.98	4.19 5.95	4.16 5.93	4.12 5.90	4.09 5.88	4.06 5.85	4.03 5.83
79	4.41 6.20	4.38 6.18	4.34 6.15	4.31 6.13	4.28 6.10	4.25 6.08	4.22 6.05	4.18 6.03	4.15 6.00	4.12 5.98
80	4.50 6.35	4.47 6.32	4.44 6.30	4.40 6.27	4.37 6.25	4.34 6.22	4.31 6.20	4.28 6.17	4.24 6.15	4.21 6.12

Table 8.3. Predicted Spirometric Standards for Females of Other Races.

First figure is the predicted FEV1. Second figure is the predicted FVC
Formulas: FEV1 = ((0.115 x Height in inches) – (0.025 x Age) – 1.932) x 0.85
FVC = ((0.115 x Height in inches) – (0.024 x Age) – 2.852) x 0.85

Height/Age	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**
56	2.17 2.64	2.15 2.62	2.13 2.60	2.11 2.58	2.08 2.56	2.06 2.54	2.04 2.52	2.02 2.50	2.00 2.48	1.98 2.46
57	2.24 2.74	2.22 2.72	2.20 2.70	2.18 2.68	2.16 2.66	2.14 2.64	2.12 2.62	2.10 2.60	2.07 2.58	2.05 2.56
58	2.32 2.84	2.30 2.82	2.28 2.80	2.26 2.78	2.24 2.76	2.21 2.74	2.19 2.71	2.17 2.69	2.15 2.67	2.13 2.65
59	2.40 2.94	2.37 2.91	2.35 2.89	2.33 2.87	2.31 2.85	2.29 2.83	2.27 2.81	2.25 2.79	2.23 2.77	2.20 2.75
60	2.47 3.03	2.45 3.01	2.43 2.99	2.41 2.97	2.39 2.95	2.37 2.93	2.34 2.91	2.32 2.89	2.30 2.87	2.28 2.85
61	2.55 3.13	2.53 3.11	2.50 3.09	2.48 3.07	2.46 3.05	2.44 3.03	2.42 3.01	2.40 2.99	2.38 2.97	2.36 2.95
62	2.62 3.23	2.60 3.21	2.58 3.19	2.56 3.17	2.54 3.15	2.52 3.13	2.50 3.11	2.47 3.09	2.45 3.07	2.43 3.04
63	2.70 3.33	2.68 3.31	2.66 3.29	2.64 3.26	2.61 3.24	2.59 3.22	2.57 3.20	2.55 3.18	2.53 3.16	2.51 3.14
64	2.77 3.42	2.75 3.40	2.73 3.38	2.71 3.36	2.69 3.34	2.67 3.32	2.65 3.30	2.63 3.28	2.60 3.26	2.58 3.24
65	2.85 3.52	2.83 3.50	2.81 3.48	2.79 3.46	2.77 3.44	2.74 3.42	2.72 3.40	2.70 3.38	2.68 3.36	2.66 3.34
66	2.93 3.62	2.90 3.60	2.88 3.58	2.86 3.56	2.84 3.54	2.82 3.52	2.80 3.50	2.78 3.48	2.76 3.46	2.73 3.44
67	3.00 3.72	2.98 3.70	2.96 3.68	2.94 3.66	2.92 3.64	2.90 3.62	2.87 3.59	2.85 3.57	2.83 3.55	2.81 3.53
68	3.08 3.81	3.06 3.79	3.03 3.77	3.01 3.75	2.99 3.73	2.97 3.71	2.95 3.69	2.93 3.67	2.91 3.65	2.89 3.63

69	3.15 3.91	3.13 3.89	3.11 3.87	3.09 3.85	3.07 3.83	3.05 3.81	3.03 3.79	3.00 3.77	2.98 3.75	2.96 3.73
70	3.23 4.01	3.21 3.99	3.19 3.97	3.16 3.95	3.14 3.93	3.12 3.91	3.10 3.89	3.08 3.87	3.06 3.85	3.04 3.83
71	3.30 4.11	3.28 4.09	3.26 4.07	3.24 4.05	3.22 4.03	3.20 4.01	3.18 3.99	3.16 3.97	3.13 3.94	3.11 3.92
72	3.38 4.21	3.36 4.19	3.34 4.17	3.32 4.14	3.29 4.12	3.27 4.10	3.25 4.08	3.23 4.06	3.21 4.04	3.19 4.02

Height/Age	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**
57	2.03 2.54	2.01 2.52	1.99 2.49	1.97 2.47	1.95 2.45	1.93 2.43	1.90 2.41	1.88 2.39	1.86 2.37	1.84 2.35
58	2.11 2.63	2.09 2.61	2.07 2.59	2.04 2.57	2.02 2.55	2.00 2.53	1.98 2.51	1.96 2.49	1.94 2.47	1.92 2.45
59	2.18 2.73	2.16 2.71	2.14 2.69	2.12 2.67	2.10 2.65	2.08 2.63	2.06 2.61	2.03 2.59	2.01 2.57	1.99 2.55
60	2.26 2.83	2.24 2.81	2.22 2.79	2.20 2.77	2.17 2.75	2.15 2.73	2.13 2.71	2.11 2.69	2.09 2.67	2.07 2.65
61	2.33 2.93	2.31 2.91	2.29 2.89	2.27 2.87	2.25 2.84	2.23 2.82	2.21 2.80	2.19 2.78	2.16 2.76	2.14 2.74
62	2.41 3.02	2.39 3.00	2.37 2.98	2.35 2.96	2.33 2.94	2.30 2.92	2.28 2.90	2.26 2.88	2.24 2.86	2.22 2.84
63	2.49 3.12	2.47 3.10	2.44 3.08	2.42 3.06	2.40 3.04	2.38 3.02	2.36 3.00	2.34 2.98	2.32 2.96	2.30 2.94
64	2.56 3.22	2.54 3.20	2.52 3.18	2.50 3.16	2.48 3.14	2.46 3.12	2.43 3.10	2.41 3.08	2.39 3.06	2.37 3.04
65	2.64 3.32	2.62 3.30	2.60 3.28	2.57 3.26	2.55 3.24	2.53 3.22	2.51 3.20	2.49 3.17	2.47 3.15	2.45 3.13
66	2.71 3.42	2.69 3.39	2.67 3.37	2.65 3.35	2.63 3.33	2.61 3.31	2.59 3.29	2.56 3.27	2.54 3.25	2.52 3.23
67	2.79 3.51	2.77 3.49	2.75 3.47	2.73 3.45	2.70 3.43	2.68 3.41	2.66 3.39	2.64 3.37	2.62 3.35	2.60 3.33
68	2.86 3.61	2.84 3.59	2.82 3.57	2.80 3.55	2.78 3.53	2.76 3.51	2.74 3.49	2.72 3.47	2.69 3.45	2.67 3.43
69	2.94 3.71	2.92 3.69	2.90 3.67	2.88 3.65	2.86 3.63	2.83 3.61	2.81 3.59	2.79 3.57	2.77 3.55	2.75 3.52
70	3.02 3.81	2.99 3.79	2.97 3.77	2.95 3.75	2.93 3.72	2.91 3.70	2.89 3.68	2.87 3.66	2.85 3.64	2.82 3.62
71	3.09 3.90	3.07 3.88	3.05 3.86	3.03 3.84	3.01 3.82	2.99 3.80	2.96 3.78	2.94 3.76	2.92 3.74	2.90 3.72
72	3.17 4.00	3.15 3.98	3.12 3.96	3.10 3.94	3.08 3.92	3.06 3.90	3.04 3.88	3.02 3.86	3.00 3.84	2.98 3.82

Height/Age	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**
56	1.74 2.23	1.72 2.21	1.70 2.19	1.68 2.17	1.66 2.15	1.64 2.13	1.62 2.11	1.60 2.09	1.57 2.07	1.55 2.05
57	1.82 2.33	1.80 2.31	1.78 2.29	1.76 2.27	1.73 2.25	1.71 2.23	1.69 2.21	1.67 2.19	1.65 2.17	1.63 2.15
58	1.90 2.43	1.87 2.41	1.85 2.39	1.83 2.37	1.81 2.35	1.79 2.33	1.77 2.31	1.75 2.29	1.73 2.27	1.70 2.25
59	1.97 2.53	1.95 2.51	1.93 2.49	1.91 2.47	1.89 2.45	1.86 2.43	1.84 2.40	1.82 2.38	1.80 2.36	1.78 2.34
60	2.05 2.62	2.03 2.60	2.00 2.58	1.98 2.56	1.96 2.54	1.94 2.52	1.92 2.50	1.90 2.48	1.88 2.46	1.86 2.44
61	2.12 2.72	2.10 2.70	2.08 2.68	2.06 2.66	2.04 2.64	2.02 2.62	1.99 2.60	1.97 2.58	1.95 2.56	1.93 2.54
62	2.20 2.82	2.18 2.80	2.16 2.78	2.13 2.76	2.11 2.74	2.09 2.72	2.07 2.70	2.05 2.68	2.03 2.66	2.01 2.64
63	2.27 2.92	2.25 2.90	2.23 2.88	2.21 2.86	2.19 2.84	2.17 2.82	2.15 2.80	2.13 2.78	2.10 2.75	2.08 2.73
64	2.35 3.02	2.33 3.00	2.31 2.98	2.29 2.95	2.26 2.93	2.24 2.91	2.22 2.89	2.20 2.87	2.18 2.85	2.16 2.83
65	2.43 3.11	2.40 3.09	2.38 3.07	2.36 3.05	2.34 3.03	2.32 3.01	2.30 2.99	2.28 2.97	2.26 2.95	2.23 2.93
66	2.50 3.21	2.48 3.19	2.46 3.17	2.44 3.15	2.42 3.13	2.39 3.11	2.37 3.09	2.35 3.07	2.33 3.05	2.31 3.03
67	2.58 3.31	2.56 3.29	2.53 3.27	2.51 3.25	2.49 3.23	2.47 3.21	2.45 3.19	2.43 3.17	2.41 3.15	2.39 3.13
68	2.65 3.41	2.63 3.39	2.61 3.37	2.59 3.35	2.57 3.33	2.55 3.30	2.52 3.28	2.50 3.26	2.48 3.24	2.46 3.22
69	2.73 3.50	2.71 3.48	2.69 3.46	2.66 3.44	2.64 3.42	2.62 3.40	2.60 3.38	2.58 3.36	2.56 3.34	2.54 3.32
70	2.80 3.60	2.78 3.58	2.76 3.56	2.74 3.54	2.72 3.52	2.70 3.50	2.68 3.48	2.65 3.46	2.63 3.44	2.61 3.42
71	2.88 3.70	2.86 3.68	2.84 3.66	2.82 3.64	2.79 3.62	2.77 3.60	2.75 3.58	2.73 3.56	2.71 3.54	2.69 3.52
72	2.95 3.80	2.93 3.78	2.91 3.76	2.89 3.74	2.87 3.72	2.85 3.70	2.83 3.68	2.81 3.66	2.78 3.63	2.76 3.61

Height/Age	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**
56	1.53 2.03	1.51 2.01	1.49 1.99	1.47 1.97	**1.45 1.95**	**1.43 1.93**	**1.40 1.91**	**1.38 1.89**	**1.36 1.87**	**1.34 1.85**
57	1.61 2.13	1.59 2.11	1.56 2.09	1.54 2.07	1.52 2.05	1.50 2.03	1.48 2.01	1.46 1.98	1.44 1.96	1.42 1.94
58	1.68 2.23	1.66 2.20	1.64 2.18	1.62 2.16	1.60 2.14	1.58 2.12	1.56 2.10	1.53 2.08	1.51 2.06	1.49 2.04
59	1.76 2.32	1.74 2.30	1.72 2.28	1.69 2.26	1.67 2.24	1.65 2.22	1.63 2.20	1.61 2.18	1.59 2.16	1.57 2.14
60	1.83 2.42	1.81 2.40	1.79 2.38	1.77 2.36	1.75 2.34	1.73 2.32	1.71 2.30	1.69 2.28	1.66 2.26	1.64 2.24
61	1.91 2.52	1.89 2.50	1.87 2.48	1.85 2.46	1.82 2.44	1.80 2.42	1.78 2.40	1.76 2.38	1.74 2.36	1.72 2.33
62	1.99 2.62	1.96 2.60	1.94 2.58	1.92 2.56	1.90 2.53	1.88 2.51	1.86 2.49	1.84 2.47	1.82 2.45	1.79 2.43
63	2.06 2.71	2.04 2.69	2.02 2.67	2.00 2.65	1.98 2.63	1.96 2.61	1.93 2.59	1.91 2.57	1.89 2.55	1.87 2.53
64	2.14 2.81	2.12 2.79	2.09 2.77	2.07 2.75	2.05 2.73	2.03 2.71	2.01 2.69	1.99 2.67	1.97 2.65	1.95 2.63
65	2.21 2.91	2.19 2.89	2.17 2.87	2.15 2.85	2.13 2.83	2.11 2.81	2.09 2.79	2.06 2.77	2.04 2.75	2.02 2.73
66	2.29 3.01	2.27 2.99	2.25 2.97	2.22 2.95	2.20 2.93	2.18 2.91	2.16 2.88	2.14 2.86	2.12 2.84	2.10 2.82
67	2.36 3.11	2.34 3.08	2.32 3.06	2.30 3.04	2.28 3.02	2.26 3.00	2.24 2.98	2.22 2.96	2.19 2.94	2.17 2.92
68	2.44 3.20	2.42 3.18	2.40 3.16	2.38 3.14	2.35 3.12	2.33 3.10	2.31 3.08	2.29 3.06	2.27 3.04	2.25 3.02

69	2.52 3.30	2.49 3.28	2.47 3.26	2.45 3.24	2.43 3.22	2.41 3.20	2.39 3.18	2.37 3.16	2.35 3.14	2.32 3.12
70	2.59 3.40	2.57 3.38	2.55 3.36	2.53 3.34	2.51 3.32	2.48 3.30	2.46 3.28	2.44 3.26	2.42 3.24	2.40 3.21
71	2.67 3.50	2.65 3.48	2.62 3.46	2.60 3.43	2.58 3.41	2.56 3.39	2.54 3.37	2.52 3.35	2.50 3.33	2.48 3.31
72	2.74 3.59	2.72 3.57	2.70 3.55	2.68 3.53	2.66 3.51	2.64 3.49	2.61 3.47	2.59 3.45	2.57 3.43	2.55 3.41

Table 8.4. Predicted Spirometric Standards for Males of Other Races.

First figure is the predicted FE1. Second figure is the predicted FVC.
Formulas: FEV1 = (((0.092 x Height in inches) – (0.032 x Age) – 1.260) x 0.85)
FVC = (((0.148 x Height in inches) – (0.025 x Age) – 4.241) x 0.85)

Height/Age	20	21	22	23	24	25	26	27	28	29
56	2.76 3.01	2.74 2.99	2.71 2.97	2.68 2.95	2.66 2.93	2.63 2.91	2.60 2.89	2.57 2.87	2.55 2.84	2.52 2.82
57	2.84 3.14	2.82 3.12	2.79 3.10	2.76 3.08	2.73 3.06	2.71 3.03	2.68 3.01	2.65 2.99	2.62 2.97	2.60 2.95
58	2.92 3.27	2.89 3.25	2.87 3.22	2.84 3.20	2.81 3.18	2.78 3.16	2.76 3.14	2.73 3.12	2.70 3.10	2.68 3.08
59	3.00 3.39	2.97 3.37	2.94 3.35	2.92 3.33	2.89 3.31	2.86 3.29	2.84 3.26	2.81 3.24	2.78 3.22	2.75 3.20
60	3.08 3.52	3.05 3.50	3.02 3.48	3.00 3.45	2.97 3.43	2.94 3.41	2.91 3.39	2.89 3.37	2.86 3.35	2.83 3.33
61	3.16 3.64	3.13 3.62	3.10 3.60	3.07 3.58	3.05 3.56	3.02 3.54	2.99 3.52	2.96 3.50	2.94 3.47	2.91 3.45
62	3.23 3.77	3.21 3.75	3.18 3.73	3.15 3.71	3.12 3.68	3.10 3.66	3.07 3.64	3.04 3.62	3.02 3.60	2.99 3.58
63	3.31 3.90	3.28 3.87	3.26 3.85	3.23 3.83	3.20 3.81	3.18 3.79	3.15 3.77	3.12 3.75	3.09 3.73	3.07 3.70
64	3.39 4.02	3.36 4.00	3.34 3.98	3.31 3.96	3.28 3.94	3.25 3.92	3.23 3.89	3.20 3.87	3.17 3.85	3.15 3.83
65	3.47 4.15	3.44 4.13	3.41 4.10	3.39 4.08	3.36 4.06	3.33 4.04	3.30 4.02	3.28 4.00	3.25 3.98	3.22 3.96
66	3.55 4.27	3.52 4.25	3.49 4.23	3.46 4.21	3.44 4.19	3.41 4.17	3.38 4.15	3.36 4.12	3.33 4.10	3.30 4.08
67	3.62 4.40	3.60 4.38	3.57 4.36	3.54 4.34	3.52 4.31	3.49 4.29	3.46 4.27	3.43 4.25	3.41 4.23	3.38 4.21
68	3.70 4.52	3.68 4.50	3.65 4.48	3.62 4.46	3.59 4.44	3.57 4.42	3.54 4.40	3.51 4.38	3.49 4.35	3.46 4.33
69	3.78 4.65	3.75 4.63	3.73 4.61	3.70 4.59	3.67 4.57	3.64 4.54	3.62 4.52	3.59 4.50	3.56 4.48	3.54 4.46
70	3.86 4.78	3.83 4.75	3.80 4.73	3.78 4.71	3.75 4.69	3.72 4.67	3.70 4.65	3.67 4.63	3.64 4.61	3.61 4.58
71	3.94 4.90	3.91 4.88	3.88 4.86	3.86 4.84	3.83 4.82	3.80 4.80	3.77 4.77	3.75 4.75	3.72 4.73	3.69 4.71
72	4.02 5.03	3.99 5.01	3.96 4.99	3.93 4.96	3.91 4.94	3.88 4.92	3.85 4.90	3.83 4.88	3.80 4.86	3.77 4.84
73	4.09 5.15	4.07 5.13	4.04 5.11	4.01 5.09	3.98 5.07	3.96 5.05	3.93 5.03	3.90 5.00	3.88 4.98	3.85 4.96
74	4.17 5.28	4.14 5.26	4.12 5.24	4.09 5.22	4.06 5.19	4.04 5.17	4.01 5.15	3.98 5.13	3.95 5.11	3.93 5.09
75	4.25 5.41	4.22 5.38	4.20 5.36	4.17 5.34	4.14 5.32	4.11 5.30	4.09 5.28	4.06 5.26	4.03 5.24	4.01 5.21
76	4.33 5.53	4.30 5.51	4.27 5.49	4.25 5.47	4.22 5.45	4.19 5.42	4.17 5.40	4.14 5.38	4.11 5.36	4.08 5.34
77	4.41 5.66	4.38 5.64	4.35 5.61	4.32 5.59	4.30 5.57	4.27 5.55	4.24 5.53	4.22 5.51	4.19 5.49	4.16 5.47
78	4.48 5.78	4.46 5.76	4.43 5.74	4.40 5.72	4.38 5.70	4.35 5.68	4.32 5.66	4.29 5.63	4.27 5.61	4.24 5.59
79	4.56 5.91	4.54 5.89	4.51 5.87	4.48 5.84	4.45 5.82	4.43 5.80	4.40 5.78	4.37 5.76	4.35 5.74	4.32 5.72
80	4.64 6.03	4.61 6.01	4.59 5.99	4.56 5.97	4.53 5.95	4.51 5.93	4.48 5.91	4.45 5.89	4.42 5.86	4.40 5.84

Height/Age	30	31	32	33	34	35	36	37	38	39
56	2.49 2.80	2.47 2.78	2.44 2.76	2.41 2.74	2.38 2.72	2.36 2.70	2.33 2.67	2.30 2.65	2.27 2.63	2.25 2.61
57	2.57 2.93	2.54 2.91	2.52 2.89	2.49 2.86	2.46 2.84	2.43 2.82	2.41 2.80	2.38 2.78	2.35 2.76	2.33 2.74
58	2.65 3.05	2.62 3.03	2.59 3.01	2.57 2.99	2.54 2.97	2.51 2.95	2.49 2.93	2.46 2.91	2.43 2.88	2.40 2.86
59	2.73 3.18	2.70 3.16	2.67 3.14	2.65 3.12	2.62 3.09	2.59 3.07	2.56 3.05	2.54 3.03	2.51 3.01	2.48 2.99
60	2.81 3.31	2.78 3.28	2.75 3.26	2.72 3.24	2.70 3.22	2.67 3.20	2.64 3.18	2.61 3.16	2.59 3.14	2.56 3.11
61	2.88 3.43	2.86 3.41	2.83 3.39	2.80 3.37	2.77 3.35	2.75 3.33	2.72 3.30	2.69 3.28	2.67 3.26	2.64 3.24
62	2.96 3.56	2.93 3.54	2.91 3.51	2.88 3.49	2.85 3.47	2.83 3.45	2.80 3.43	2.77 3.41	2.74 3.39	2.72 3.37
63	3.04 3.68	3.01 3.66	2.99 3.64	2.96 3.62	2.93 3.60	2.90 3.58	2.88 3.56	2.85 3.53	2.82 3.51	2.79 3.49
64	3.12 3.81	3.09 3.79	3.06 3.77	3.04 3.75	3.01 3.72	2.98 3.70	2.95 3.68	2.93 3.66	2.90 3.64	2.87 3.62
65	3.20 3.93	3.17 3.91	3.14 3.89	3.11 3.87	3.09 3.85	3.06 3.83	3.03 3.81	3.01 3.79	2.98 3.76	2.95 3.74
66	3.27 4.06	3.25 4.04	3.22 4.02	3.19 4.00	3.17 3.98	3.14 3.95	3.11 3.93	3.08 3.91	3.06 3.89	3.03 3.87
67	3.35 4.19	3.33 4.17	3.30 4.14	3.27 4.12	3.24 4.10	3.22 4.08	3.19 4.06	3.16 4.04	3.13 4.02	3.11 4.00
68	3.43 4.31	3.40 4.29	3.38 4.27	3.35 4.25	3.32 4.23	3.29 4.21	3.27 4.18	3.24 4.16	3.21 4.14	3.19 4.12
69	3.51 4.44	3.48 4.42	3.45 4.40	3.43 4.37	3.40 4.35	3.37 4.33	3.35 4.31	3.32 4.29	3.29 4.27	3.26 4.25
70	3.59 4.56	3.56 4.54	3.53 4.52	3.51 4.50	3.48 4.48	3.45 4.46	3.42 4.44	3.40 4.41	3.37 4.39	3.34 4.37
71	3.67 4.69	3.64 4.67	3.61 4.65	3.58 4.63	3.56 4.60	3.53 4.58	3.50 4.56	3.47 4.54	3.45 4.52	3.42 4.50
72	3.74 4.82	3.72 4.79	3.69 4.77	3.66 4.75	3.63 4.73	3.61 4.71	3.58 4.69	3.55 4.67	3.53 4.65	3.50 4.62
73	3.82 4.94	3.79 4.92	3.77 4.90	3.74 4.88	3.71 4.86	3.69 4.83	3.66 4.81	3.63 4.79	3.60 4.77	3.58 4.75
74	3.90 5.07	3.87 5.05	3.85 5.02	3.82 5.00	3.79 4.98	3.76 4.96	3.74 4.94	3.71 4.92	3.68 4.90	3.66 4.88
75	3.98 5.19	3.95 5.17	3.92 5.15	3.90 5.13	3.87 5.11	3.84 5.09	3.81 5.07	3.79 5.04	3.76 5.02	3.73 5.00
76	4.06 5.32	4.03 5.30	4.00 5.28	3.97 5.25	3.95 5.23	3.92 5.21	3.89 5.19	3.87 5.17	3.84 5.15	3.81 5.13
77	4.13 5.44	4.11 5.42	4.08 5.40	4.05 5.38	4.03 5.36	4.00 5.34	3.97 5.32	3.94 5.30	3.92 5.27	3.89 5.25
78	4.21 5.57	4.19 5.55	4.16 5.53	4.13 5.51	4.10 5.49	4.08 5.46	4.05 5.44	4.02 5.42	4.00 5.40	3.97 5.38
79	4.29 5.70	4.26 5.67	4.24 5.65	4.21 5.63	4.18 5.61	4.15 5.59	4.13 5.57	4.10 5.55	4.07 5.53	4.05 5.50
80	4.37 5.82	4.34 5.80	4.31 5.78	4.29 5.76	4.26 5.74	4.23 5.72	4.21 5.69	4.18 5.67	4.15 5.65	4.12 5.63

Height/Age	40	41	42	43	44	45	46	47	48	49
56	2.22 2.59	2.19 2.57	2.17 2.55	2.14 2.53	2.11 2.50	2.08 2.48	2.06 2.46	2.03 2.44	2.00 2.42	1.98 2.40
57	2.30 2.72	2.27 2.69	2.24 2.67	2.22 2.65	2.19 2.63	2.16 2.61	2.14 2.59	2.11 2.57	2.08 2.55	2.05 2.52
58	2.38 2.84	2.35 2.82	2.32 2.80	2.30 2.78	2.27 2.76	2.24 2.74	2.21 2.71	2.19 2.69	2.16 2.67	2.13 2.65
59	2.45 2.97	2.43 2.95	2.40 2.92	2.37 2.90	2.35 2.88	2.32 2.86	2.29 2.84	2.26 2.82	2.24 2.80	2.21 2.78
60	2.53 3.09	2.51 3.07	2.48 3.05	2.45 3.03	2.42 3.01	2.40 2.99	2.37 2.97	2.34 2.94	2.32 2.92	2.29 2.90
61	2.61 3.22	2.58 3.20	2.56 3.18	2.53 3.16	2.50 3.13	2.48 3.11	2.45 3.09	2.42 3.07	2.39 3.05	2.37 3.03
62	2.69 3.34	2.66 3.32	2.64 3.30	2.61 3.28	2.58 3.26	2.55 3.24	2.53 3.22	2.50 3.20	2.47 3.17	2.44 3.15
63	2.77 3.47	2.74 3.45	2.71 3.43	2.69 3.41	2.66 3.39	2.63 3.36	2.60 3.34	2.58 3.32	2.55 3.30	2.52 3.28
64	2.85 3.60	2.82 3.58	2.79 3.55	2.76 3.53	2.74 3.51	2.71 3.49	2.68 3.47	2.66 3.45	2.63 3.43	2.60 3.41
65	2.92 3.72	2.90 3.70	2.87 3.68	2.84 3.66	2.82 3.64	2.79 3.62	2.76 3.59	2.73 3.57	2.71 3.55	2.68 3.53

66	3.00	3.85	2.98	3.83	2.95	3.81	2.92	3.78	2.89	3.76	2.87	3.74	2.84	3.72	2.81	3.70	2.78	3.68	2.76	3.66
67	3.08	3.97	3.05	3.95	3.03	3.93	3.00	3.91	2.97	3.89	2.94	3.87	2.92	3.85	2.89	3.83	2.86	3.80	2.84	3.78
68	3.16	4.10	3.13	4.08	3.10	4.06	3.08	4.04	3.05	4.01	3.02	3.99	3.00	3.97	2.97	3.95	2.94	3.93	2.91	3.91
69	3.24	4.23	3.21	4.20	3.18	4.18	3.16	4.16	3.13	4.14	3.10	4.12	3.07	4.10	3.05	4.08	3.02	4.06	2.99	4.03
70	3.32	4.35	3.29	4.33	3.26	4.31	3.23	4.29	3.21	4.27	3.18	4.24	3.15	4.22	3.12	4.20	3.10	4.18	3.07	4.16
71	3.39	4.48	3.37	4.46	3.34	4.43	3.31	4.41	3.28	4.39	3.26	4.37	3.23	4.35	3.20	4.33	3.18	4.31	3.15	4.29
72	3.47	4.60	3.44	4.58	3.42	4.56	3.39	4.54	3.36	4.52	3.34	4.50	3.31	4.48	3.28	4.45	3.25	4.43	3.23	4.41
73	3.55	4.73	3.52	4.71	3.50	4.69	3.47	4.66	3.44	4.64	3.41	4.62	3.39	4.60	3.36	4.58	3.33	4.56	3.30	4.54
74	3.63	4.85	3.60	4.83	3.57	4.81	3.55	4.79	3.52	4.77	3.49	4.75	3.46	4.73	3.44	4.71	3.41	4.68	3.38	4.66
75	3.71	4.98	3.68	4.96	3.65	4.94	3.62	4.92	3.60	4.90	3.57	4.87	3.54	4.85	3.52	4.83	3.49	4.81	3.46	4.79
76	3.78	5.11	3.76	5.08	3.73	5.06	3.70	5.04	3.68	5.02	3.65	5.00	3.62	4.98	3.59	4.96	3.57	4.94	3.54	4.91
77	3.86	5.23	3.84	5.21	3.81	5.19	3.78	5.17	3.75	5.15	3.73	5.13	3.70	5.10	3.67	5.08	3.64	5.06	3.62	5.04
78	3.94	5.36	3.91	5.34	3.89	5.32	3.86	5.29	3.83	5.27	3.80	5.25	3.78	5.23	3.75	5.21	3.72	5.19	3.70	5.17
79	4.02	5.48	3.99	5.46	3.96	5.44	3.94	5.42	3.91	5.40	3.88	5.38	3.86	5.36	3.83	5.33	3.80	5.31	3.77	5.29
80	4.10	5.61	4.07	5.59	4.04	5.57	4.02	5.55	3.99	5.52	3.96	5.50	3.93	5.48	3.91	5.46	3.88	5.44	3.85	5.42

Height/Age	**50**		**51**		**52**		**53**		**54**		**55**		**56**		**57**		**58**		**59**	
56	1.95	2.38	1.92	2.36	1.89	2.33	1.87	2.31	1.84	2.29	1.81	2.27	1.79	2.25	1.76	2.23	1.73	2.21	1.70	2.19
57	2.03	2.50	2.00	2.48	1.97	2.46	1.94	2.44	1.92	2.42	1.89	2.40	1.86	2.38	1.84	2.35	1.81	2.33	1.78	2.31
58	2.10	2.63	2.08	2.61	2.05	2.59	2.02	2.57	2.00	2.54	1.97	2.52	1.94	2.50	1.91	2.48	1.89	2.46	1.86	2.44
59	2.18	2.75	2.16	2.73	2.13	2.71	2.10	2.69	2.07	2.67	2.05	2.65	2.02	2.63	1.99	2.61	1.97	2.58	1.94	2.56
60	2.26	2.88	2.23	2.86	2.21	2.84	2.18	2.82	2.15	2.80	2.13	2.77	2.10	2.75	2.07	2.73	2.04	2.71	2.02	2.69
61	2.34	3.01	2.31	2.99	2.28	2.96	2.26	2.94	2.23	2.92	2.20	2.90	2.18	2.88	2.15	2.86	2.12	2.84	2.09	2.82
62	2.42	3.13	2.39	3.11	2.36	3.09	2.34	3.07	2.31	3.05	2.28	3.03	2.25	3.00	2.23	2.98	2.20	2.96	2.17	2.94
63	2.50	3.26	2.47	3.24	2.44	3.22	2.41	3.19	2.39	3.17	2.36	3.15	2.33	3.13	2.31	3.11	2.28	3.09	2.25	3.07
64	2.57	3.38	2.55	3.36	2.52	3.34	2.49	3.32	2.47	3.30	2.44	3.28	2.41	3.26	2.38	3.24	2.36	3.21	2.33	3.19
65	2.65	3.51	2.62	3.49	2.60	3.47	2.57	3.45	2.54	3.42	2.52	3.40	2.49	3.38	2.46	3.36	2.43	3.34	2.41	3.32
66	2.73	3.64	2.70	3.61	2.68	3.59	2.65	3.57	2.62	3.55	2.59	3.53	2.57	3.51	2.54	3.49	2.51	3.47	2.49	3.44
67	2.81	3.76	2.78	3.74	2.75	3.72	2.73	3.70	2.70	3.68	2.67	3.66	2.65	3.63	2.62	3.61	2.59	3.59	2.56	3.57
68	2.89	3.89	2.86	3.87	2.83	3.84	2.81	3.82	2.78	3.80	2.75	3.78	2.72	3.76	2.70	3.74	2.67	3.72	2.64	3.70
69	2.96	4.01	2.94	3.99	2.91	3.97	2.88	3.95	2.86	3.93	2.83	3.91	2.80	3.89	2.77	3.86	2.75	3.84	2.72	3.82
70	3.04	4.14	3.02	4.12	2.99	4.10	2.96	4.07	2.93	4.05	2.91	4.03	2.88	4.01	2.85	3.99	2.83	3.97	2.80	3.95
71	3.12	4.26	3.09	4.24	3.07	4.22	3.04	4.20	3.01	4.18	2.99	4.16	2.96	4.14	2.93	4.12	2.90	4.09	2.88	4.07
72	3.20	4.39	3.17	4.37	3.15	4.35	3.12	4.33	3.09	4.31	3.06	4.28	3.04	4.26	3.01	4.24	2.98	4.22	2.95	4.20
73	3.28	4.52	3.25	4.49	3.22	4.47	3.20	4.45	3.17	4.43	3.14	4.41	3.11	4.39	3.09	4.37	3.06	4.35	3.03	4.32
74	3.36	4.64	3.33	4.62	3.30	4.60	3.27	4.58	3.25	4.56	3.22	4.54	3.19	4.51	3.17	4.49	3.14	4.47	3.11	4.45
75	3.43	4.77	3.41	4.75	3.38	4.73	3.35	4.70	3.33	4.68	3.30	4.66	3.27	4.64	.24	4.62	3.22	4.60	3.19	4.58
76	3.51	4.89	3.49	4.87	3.46	4.85	3.43	4.83	3.40	4.81	3.38	4.79	3.35	4.77	3.32	4.74	3.29	4.72	3.27	4.70
77	3.59	5.02	3.56	5.00	3.54	4.98	3.51	4.96	3.48	4.93	3.45	4.91	3.43	4.89	3.40	4.87	3.37	4.85	3.35	4.83
78	3.67	5.15	3.64	5.12	3.61	5.10	3.59	5.08	3.56	5.06	3.53	5.04	3.51	5.02	3.48	5.00	3.45	4.98	3.42	4.95
79	3.75	5.27	3.72	5.25	3.69	5.23	3.67	5.21	3.64	5.19	3.61	5.16	3.58	5.14	3.56	5.12	3.53	5.10	3.50	5.08
80	3.83	5.40	3.80	5.38	3.77	5.35	3.74	5.33	3.72	5.31	3.69	5.29	3.66	5.27	3.63	5.25	3.61	5.23	3.58	5.21

Chapter 9

MISCELLANEOUS EXAMINATIONS

9.1. Adaptability Rating (AR).

9.1.1. Rating Explained. This interview, when conducted for assessing an individual's suitability for special types of military duty, is known as an Adaptability Rating (item 41, SF 88). It differs from the psychiatric evaluation (item 17AA, SF 88) in that it assesses quality of motivation and temperament or personality, rather than the presence or absence of psychopathology. An Adaptability Rating is required as part of the selection physical examination for the following categories of personnel prior to training or duty: pilot and navigator trainees, flight surgeons, missileers, marine divers, nuclear weapons specialists, air refueling operators, ground based controllers, radar operators (if control of aircraft is involved), and such other categories as may be specified in other directives. It is required once prior to training or assignment, and not routinely thereafter. However, the ARMA may be conducted at any point in an aircrew member's flying career if the flight surgeon determines that to be an appropriate course of action. (see **9.1.7.**) The AR must be re-accomplished prior to retraining in a new field for which it is required. The Adaptability Rating is a part of the medical examination, and as such, is performed in addition to other personnel selection criteria as required for specific career fields (educational level, aptitude scores, and special psychological screening tests). When the rating is determined for flying training, it is performed by a flight surgeon and called the Adaptability Rating for Military Aviation (ARMA). When the AR is performed to determine suitability for other fields, it is described in terms of the appropriate field, for example: Adaptability Rating for Air Traffic Control (AR-Ground Based Control), Adaptability Rating for Space and Missile Duty (AR-Space and Missile Duty). Any other special operational duty must also have an Adaptability Rating accomplished.

9.1.2. Important Factors. The AR derives information from the medical/psychiatric history as well as from the general physical and special examinations. It is an assessment that pursues an exploratory course in which the examiner attempts to assess the applicant's "suitability" for the desired career field. Sufficient data must be obtained about the examinee's biography, attitudes, and habitual modes of behavior to permit evaluation of his emotional control and stability, motivation, presence of mind, perseverance, maturity, interest, and character. This includes exploration of the examinee's potential and limitations under routine conditions as well as in situations of special stress.

9.1.3. The Interview. Information for the AR must be gathered by the flight surgeon during the course of the interview and examination. A properly performed AR is critical to meeting the purpose on an initial qualification physical examination. The AR should occupy a significant amount of the time a flight surgeon spends with an applicant. Enough information in the following areas should be elicited to yield clinical confidence in the AR determination. Although the following areas are arranged in such order that they may be used as a checklist if desired, it is not necessary to cover them in sequence and clinical judgment should be paramount. Some information may be gathered during the physical examination process, thus shortening the actual interview time.

9.1.3.1. Areas of inquiry

9.1.3.1.1. Interest or experience in duty for which examined

9.1.3.1.2. Previous military experience

9.1.3.1.3. Past History:

9.1.3.1.3.1. Family history (early environment, attitude toward parents or siblings)

9.1.3.1.3.2. Childhood personality traits

9.1.3.1.3.3. School record

9.1.3.1.3.4. Achievements

9.1.3.1.3.5. Employment

9.1.3.1.3.6. Personal medical history; accidents and injuries

9.1.3.1.4. Present Adjustment:

9.1.3.1.4.1. Social activities, sports, hobbies

9.1.3.1.4.2. Habits

9.1.3.1.4.3. Stability of relationships/marriage

9.1.3.1.4.4. Disciplinary problems

9.1.3.1.4.5. Personal goals

9.1.3.1.5. Mental Status:

9.1.3.1.5.1. Thought content

9.1.3.1.5.2. Behavior during interview

9.1.3.1.5.3. Mood (level of anxiety, depression, etc.)

9.1.3.1.5.4. Appearance

9.1.3.2. Pertinent Questions. During the course of the AR some important questions to consider are:

9.1.3.2.1. Are the applicant's long range goals realistic and in keeping with their potential? Is the applicant's motivation for the special duty based on realistic knowledge of its difficulties and disadvantages as well as its advantages? Is the applicant's motivation based upon thoughtful consideration and not over-determined, impulsive, or an attempt to avoid some current situation?

9.1.3.2.2. Some special duty assignments have an elevated risk of death or injury and/or the possibility of killing or maiming other human beings. Has the applicant appropriately considered these possibilities?

9.1.3.2.3. If applicable, has the applicant adjusted and progressed well during prior military experience?

9.1.3.2.4. Has the applicant safely and successfully participated in stressful activities?

9.1.3.2.5. Does the applicant have a history of accidents, clumsiness, carelessness, or proneness to injury?

9.1.3.2.6. Two interview factors may correlate with success in flying: a history of past accomplishments and poise during the interview. Has the applicant finished what they began in life? Does their scholastic history indicate inconsistent motivation, failures, or disciplinary prob-

lems? If they have been employed, has their work record been steady with good reason for job changes?

9.1.3.2.7. Does the applicant have a satisfactory range of social outlets and interests?

9.1.3.2.8. Does the applicant have any history of substance misuse or abuse?

9.1.3.2.9. Does it appear that the applicant was psychologically well adjusted during childhood?

9.1.3.2.10. During the interview, is the applicant poised, free of undue anxiety, and able to express himself/herself in a clear and forthright manner? Is there any evidence of dejection, hopelessness, anger, resentment, impatience, or any other feeling out of keeping with the content of the interview? Does the applicant maintain good eye contact and speak well of himself/herself?

9.1.3.2.11. Does the individual have any medical condition or require the use of medication that would cause a decrement in alertness (i.e., antihistamines, tranquilizers, narcotics, sedatives, etc.)?

9.1.3.3. Example of interview questioning style and flow: Examples of “good” answers include applicant having thought issues through. Examples of “bad” answers include applicant being surprised by questions or indicating “never thought about it”. With flying as an example, ask:

9.1.3.3.1. “How did you become interested in flying?” (How old, where, what aircraft, actual experiences, combat, accidents, etc.)

9.1.3.3.2. "What do you think about the dangers of flying?" (Look for healthy denial, suppression, and rationalization, e.g., "You can get killed just crossing the street" is a common sort of answer, followed by comments on the value of training, redundant systems, ejection seats, etc.).

9.1.3.3.3. "What do your parents (or spouse, girlfriend, boyfriend) think of your flying?" "Are they afraid you might get killed?" (Look for the reality with which this issue has been considered and discussed; also for evidence of anxiety projected onto others).

9.1.3.3.4. "How do you feel about combat flying?" (Usual answers concern duty, following orders, rationalization, denial, suppression, or just not thinking about it. Many fliers regard this as an abstraction -- hitting a target. Be wary of the person who expresses pleasure at the prospect. Follow up with questions about aggressive activities: fights at school, use of weapons, or unusual expressions of anger. Vivid fantasies about combat are unusual and warrant further evaluation. Beware of individuals who are fascinated by violence.) Has the individual considered they may kill or maim others and what is their reaction to this possibility?

9.1.3.3.5. “What will you do if you don’t fly?” (Look for strength of motivation). Some applicants will talk with enthusiasm about an alternate career. Do they want to fly to fulfill someone else’s dream? Be wary of individuals who feel they must fly in order to prove themselves, especially if they emphasize a history of daring, risk taking, sensation-seeking activities, or multiple motor vehicle accidents. Such counter-phobic behavior may indicate a pathologic need to prove the absence of fear.

9.1.4. Adaptability Rating for Space and Missile Duty (AR-Space and Missile Duty).The AR-Space and Missile Duty is necessary to determine “suitability” for Space and Missile Duty.

9.1.4.1. Special issues to be addressed during the AR-Space and Missile Duty:

9.1.4.1.1. Does the applicant have reservations about using nuclear weapons? Listen for realistic assessment of reservations. (Carefully follow up the absence of concern or an extensive list of concerns.)

9.1.4.1.2. Has the individual experienced prolonged periods of isolation, confinement, immobility, and stress? (If so, have the applicant expand on the circumstances enough to enable assessment of their ability to deal with these issues. If not, has the applicant avoided these circumstances for reasons that would negatively effect their suitability for the special duty?)

9.1.4.1.3. What is the individual's motivation toward space and missile duty? For example, does it appear the individual is avoiding other "less desirable" duty/assignment/location or only using this avenue to obtain officer status, and could undergo a change of heart after commissioning?

9.1.5. Recording Rating. The results of the AR will be recorded in item 41, SF 88, as satisfactory (SAT) or unsatisfactory (UNSAT). No numerical rating is necessary. If unsatisfactory, the reason will be fully explained in item 42, SF 88. If a psychiatric diagnosis is cited as reason for the UNSAT, this diagnosis, obtained from an appropriately qualified mental health provider, will be entered in item 43.

9.1.6. Questionable Results. Whenever the results of the AR are questionable, the situation should be discussed with another experienced flight surgeon, if possible, who can validate concerns by conducting another AR. (This is helpful because an "Unsat AR" may be challenged.) If the AR remains questionable, the final decision should be deferred pending psychiatric consultation, to include psychological testing when appropriate. Be aware that a mental health evaluation will address psychopathology in terms of diagnosis, or lack thereof, and may not fully investigate "suitability" issues. Please remember that your MAJCOM flight surgeon and the Aeromedical Consultation Service at USAFSAM are available for further consultation.

9.1.7. In flying settings, the concept of "temporary ARMA Unsat" provides another method for removing someone from full operational duties on a temporary basis. This method may be used instead of temporary grounding based on an "adjustment disorder < 60 days" or through the informal method of having the flyer removed from the flying schedule temporarily by his squadron. There are many situational permutations and variables involved with these options and the flight surgeon should ponder the choices carefully and consider consultation as needed.

9.2. Reading Aloud Test (RAT). This test is administered to detect speech abnormalities. The RAT will be administered to all service academy applicants and any other examinees whose potential duties require clear enunciation.

9.2.1. Procedures. Have the examinee face you and read the test paragraph aloud, it must be read loud enough to be heard across the room. If they pause during testing, have them start again from the first word. The examinee should not be allowed to pre-read or study the paragraph prior to testing. This test may be re-administer however its' effectiveness lessens with every administration.

9.2.2. The test paragraph:

"You wish to know all about my grandfather. Well, he is nearly 93 years old; he dresses himself in an ancient black frock coat, usually minus several buttons; yet he still thinks as swiftly as ever. A long flowing beard clings to his chin, giving those who observe him a pronounced feeling of the utmost

respect. When he speaks, his voice is just a bit cracked and quivers a trifle. Twice each day he plays skillfully and with zest upon our small organ. Except in winter when the ooze of snow or ice is present, he slowly takes a short walk each day. We have often urged him to walk more and smoke less, but he always answers 'Banana Oil!' Grandfather likes to be modern in his language."

9.2.3. Interpreting the RAT. Interpreting the test is usually easy since most people do not have speech disorders. If no speech abnormalities are observed record the test results as satisfactory. It becomes difficult to interpret when an examinee frequently pauses during testing or repeats words and/or phrases. Obvious speech disorders should be discovered prior to accomplishing this test. The less obvious ones will more than likely show themselves during testing. It is not important that you be able to diagnose speech disorders but you should be able to identify that there is a speech abnormality which may need further evaluation. In this case record the test results as unsatisfactory until the examinee is cleared by a speech pathologist. The following is an incomplete list of speech abnormalities which could be displayed during testing.

9.2.3.1. Alexia (Word Deafness/Blindness). Inability to comprehend written words, not related to loss of visual acuity. It is a form of aphasia.

9.2.3.2. Childish Indistinctness. May be persistent in feeble minded adults. We might refer to this as "baby talk" (i.e. "r's" replaced with "w's").

9.2.3.3. Dysarthria. Difficult and defective speech due to impairment of the tongue or other muscles essential to speech. Or the inability to speak in which there is no defect in the ability to understand, read, or write.

9.2.3.4. Labialism. Defective speech in which labial (lip) sounds are stressed.

9.2.3.5. Lallation. A babbling form of stammering (see stammering).

9.2.3.6. Paresis. Partial or incomplete paralysis. This paralysis can cause facial tremors, tremors of the lips and tongue, and speech disturbances. Often characterized by slurred speech with letters and syllables often omitted.

9.2.3.7. Stammering. Hesitant or faltering speech, may be due to hesitation, mispronunciation, transposing the letters (l, r, or s), or repetition. Condition may be worse during periods of anxiety or fear. A stammers will usually hesitate on the same phrase or syllable each time the paragraph is read.

9.2.3.8. Stereotypy. Persistent repetition of words, posture, or movement without meaning. Commonly seen in catatonic partial stupors.

9.2.3.9. Stuttering. Defect in which there is stumbling and spasmodic repetition of the same syllable.

9.2.4. Recording and Referral. The result of a Reading Aloud Test (RAT) is entered in the appropriate block on the SF 88. This entry is made in the following format "RAT - SAT" for satisfactory a results or "RAT - UNSAT" for an unsatisfactory result. An unsatisfactory result should be followed up with a referral to a speech pathologist.

Chapter 10

PHYSICAL EXAMINATION FORMS

10.1. Standard Form 88 - Report of Medical Examination:

10.1.1. The results of complete medical examinations are recorded on SF 88 in a standard

format. This chapter gives an explanation of the required entry, examples of entries in the required format, and on which type of examinations you must complete the item.

10.1.2. The medical record is a medical and legal document. Accuracy and completeness in each entry is essential.

10.1.3. Use the following legend to determine which medical examination requires an item entry to be completed:

10.1.3.1. A = Enlistment/Commission

10.1.3.2. B = Separation/Retirement (IAW AFI 48-123)

10.1.3.3. C = Initial Flying Class I/IA, II, III/US Service Academies

10.1.3.4. D = Periodic Flying/Nonflying (Personnel reporting to UFT and ARC members only IAW AFI 48-123)

10.1.3.5. E = Initial Missile/Space Operations Duty

10.1.3.6. F = Initial Ground Based Controller Duty

10.1.3.7. G = Initial CCT/PJ (FCIII + Marine Diving Duty)

10.1.3.8. H = Initial Physiological Training/Hyperbaric Chamber/Operational Support Duty

10.1.4. SF 88 submitted to higher authorities for review/certification action must be typed.

10.1.4.1. When supplementing a previously accomplished medical examination for higher authority review, submit a SF 88 with the following information:

10.1.4.1.1. Items 1-3, 5, 6 (purpose will be “Supplemental”)

10.1.4.1.2. Items being supplemented

10.1.4.1.3. Items 73-78

10.1.4.1.4. Items 79 & 80

10.1.4.1.5. Attach applicable consultations, test results, aeromedical summary, AF Form 1042, etc.

Table 10.1. Medical Examination Accomplishment and Recording Standard Form 88, Report of Medical Examination.

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
	ABC DEFG H	**DATE OF EXAMINATION** Enter the date examination was begun. Use military format.	12 Oct 95
1	ABC DEFG H	**LAST NAME - FIRST NAME - MIDDLE NAME** If examinee has a middle initial only, enter the initial without a period. If examinee does not have a middle name or middle initial, enter a dash after the first name. Enter Jr., III, etc., when appropriate, as the last entry.	Jones, John Paul Smith, Robert T Johnson, Bruce Endres, James Allen Jr.
2	ABC DEFG H	**IDENTIFICATION NUMBER** Enter examinee's social security account number. Use the appropriate prefix (enlisted) or suffix (officers): "FR" for active-duty, "FG" for ANG, "FV" for USAFR.	FR012-34-5678 012-34-5678FR
3	ABC DEFG H	USAFR or ANG indicates air reserve components (ARC). Enter Medical Service Corps identifiers in parentheses when applicable.	Major USAF Capt. USAFR 1Lt (NC) USAF
4	ABC DEFG H	**HOME ADDRESS** Record complete permanent home of record with zip code.	100 Main ST Anywhere TX 78213
5	ABC DEFG H	**EMERGENCY CONTACT** Enter name and complete address . This is the person to be notified in case of emergency or death. If address is the same as in item 4, state so. Enter "none" if not applicable.	Mrs. Mary Jones Same as item 4
6	ABC DEFG H	**DATE OF BIRTH** Use military format.	25 Jun 75
7	ABC DEFG H	**AGE** Self explanatory.	
8	ABC DEFG H	**SEX** Self-explanatory.	
9	ABC DEFG H	**RELATIONSHIP OF CONTACT** This refers to item 5.	Spouse
10	ABC DEFG H	**PLACE OF BIRTH** Enter city and state where examinee was born. Enter county and state if not born in a city. Enter city and country if born in a foreign land.	Providence, RI Pima County, AZ London, England

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
11	ABC DEFG H	**RACE** Self-explanatory.	
12a	ABC DEFG H	**AGENCY** Enter examinee's branch of military service or civilian agency. Enter a dash for all others.	DAF DA CIA FBI USPHS
12b	ABC DEFG H	**ORGANIZATION UNIT** Enter examinee's present organization, MAJCOM in parentheses, and base of assignment. Do not enter zip code. Enter a dash for all civilian examinees.	
13	ABC DEFG H	**TOTAL YEARS OF GOVERNMENT SERVICE MILITARY/CIVILIAN** Enter total active-duty and/or full-time Civil Service time. Express number of years next to months over 12. Enter dashes if not applicable.	14 6/12 3/12
14	ABC DEFG H	**EXAMINING FACILITY OR EXAMINER AND ADDRESS** Enter official designation and complete address of medical treatment facility.	12th AMDS (AETC) Randolph AFB TX 78150-4801
15	BDEG H	**RATING OR SPECIALTY OF EXAMINER** Use AFI 48-123 as a reference.	Senior Flight Surgeon Physician Assistant
16	ABC DEFG H	**PURPOSE OF EXAMINATION** Explain the purpose of examination in a few words. State if for more than one purpose. Indicate Air Force Specialty Code (AFSC) if applying for flying class III or special operational duty. Enter "RPW" for repatriated prisoner of war exams.	Flying Training Periodic Flying Periodic Nonflying Initial Flying Class III(1A0X1)
		CLINICAL EXAMINATION Item 17 Record findings identified by examination techniques (i.e., inspection, palpation, auscultation, etc.) only. Precede each entry with the number of the item being referenced. The blank area to the bottom of these items is where any certification/waiver stamp will be located. Minimum certification/waiver information is: authority designation, date action taken, class, diagnoses (if applicable), and expiration date (if applicable).	

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
A	ABC DEFG H	**HEAD, FACE, NECK, AND SCALP**Carefully inspect and palpate injury or other deformity. Palpate cervical lymph nodes. Describe these areas for evidence of residuals of lymphadenopathy in detail, and record a clinical opinion of etiology. Skin rashes, cysts, and scarring require a statement regarding interference with wearing an oxygen mask or protective helmet on all flying examinations.	A. Three discreet, firm, movable, 1.5 cm nodes, right anterior cervical chain, probably benign. 18. Moderate facial acne, will not interfere with wear of oxygen mask.
B	ABC DEFG H	**EARS - GENERAL (Internal Canals)** *Auditory Acuity under item 40 Inspect external ears and mastoid regions and palpate for signs of scars/disease. Inspect external auditory canals. Remove cerumen (if present) before attempting to visualize tympanic membranes and before determining auditory acuity. Perform X-ray studies, caloric tests of vestibular sensitivity, or tuning fork tests when indicated by history or findings.	B. Severe swelling, injection, and tenderness of external canals, bilateral.
C	ABC DEFG H	**DRUMS (Perforation)** Visualize both drums. Record mobility and percentage of membrane involved if scarred. Record a definite statement concerning valsalva maneuver for all flying examinations.	C. Valsalva Normal Bilateral. C. Slight injection of pars flaccida, right ear. No bulging or fluid levels seen.
D	ABC DEFG H	**NOSE** Inspect anterior and posterior nares. Note residuals of deviation, enlarged turbinates, or spurs if present. Record estimated percentage of air flow obstruction if applicable.	D. 20% obstruction on right due to septal deviation.
E	ABC DEFG H	**SINUSES** Accomplish transillumination, X-ray, and/or cytological study of nasal secretions (when indicated).	E. Marked tenderness over left maxillary sinus. Transillumination poor. X-ray shows fluid level. Nasal smear neg for eosinophils.
F	ABC DEFG H	**MOUTH AND THROAT**Carefully examine nasopharynx, pharynx, and, when indicated, the larynx. Enucleated tonsils are considered “abnormal”. Do not record “WHNS” (well healed, not symptomatic) after “tonsils enucleated.”	F. Tonsils enucleated.

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
G	ABC DEFG H	**EYES- - GENERAL** *Visual acuity and refraction under items 59, 60 and 61 Inspect and palpate the anterior portions of the eyeballs and their adnexa. Record a statement addressing cause and amount of visual interference regarding any ptosis present. Describe encroachment (in millimeters), progression, and vascularity of pterygiums onto the cornea. Record results of initial Amsler Grid and Ocular Fundus Exams here.	G. Pterygium, OS. Does not encroach onto cornea; nonprogressive; avascular. G. Amsler Grid-Passes G. Ocular Fundus-Normal
H	ABC DEFG H	**OPTHALMOSCOPIC** Examine media first with a plus 6.00 diopter ophthalmoscopic lens at an approximate distance of 45 centimeters. Localize and describe any opacity appearing in the red reflex examination or on movement of the eye. Examine fundus with the strongest plus or weakest minus lens necessary to bring the optic disc into sharp focus. Pay particular attention to the color, surface, and margin of the optic disc; presence of any hemorrhages, exudates, or scars throughout the retina; any abnormal pigmentation or retinal atrophy; evaluation of the retina; and the condition of the retinal vascular bed. Specifically examine the macula for any change. Record all observed abnormalities. Flying Training applicants require a cycloplegic refraction by Optometry. Dilation on all other examinations is at the discretion of the examiner.	H. Increased pigmentation, right macula, possibly due to solar burns. No impairment of visual function. No evidence of active or progressive disease.
I	ABC DEFG H	**PUPILS (Equality and reaction)** Observe size, shape, and equality of pupils, and pupillary reactions (direct, consensual, and accommodative). Record and investigate any abnormalities.	I. Left pupil 3mm, Right pupil 5mm, Pupils round and normal reaction to light and accommodation. Inequality considered physiologic.
J	ABC DEFG H	**OCULAR MOTILITY (Associated parallel movements or nystagmus)** Observe gross ocular mobility to determine concomitant movement of the eyes in the six cardinal directions, and to detect nystagmus or nystagmoid movements. Refer to items 31 through 37 for similar ocular motility tests.	J. Very fine nystagmoid movements of both pupils at rest and in all directions of gaze. Fast component to the right. Examinee not aware of this. Probably congenital.

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
K	ABC DEFG H	**LUNGS AND CHEST** Examine chest and lungs in a systematic fashion as described in a standard textbook of physical diagnosis. Direct special attention to detecting and evaluating conditions which appreciably limit respiratory functional ability; conditions which can reasonably be expected to progress to a state of chronic disability or cause frequent periods of recurrent acute disability; all infectious diseases in an active stage; and benign or malignant tumors. Three conditions that are disqualifying for military service are most often inadequately evaluated. These are asthma (including asthmatic bronchitis), bronchiectasis, and tuberculosis. Refer examinee to a qualified consultant in chest diseases for a detailed evaluation and recommendation when these conditions are discovered or suspected on the basis of history or examination. Perform and record screening PFT on AF Form 1226 when clinically indicated or medical history dictates further investigation. Attach copy of AF Form 1266 to examination package. Spirometry tracing may be destroyed after posting results on AF Form 1226. Computer PFT readouts may be used; attach to a properly completed AF Form 1226.	K. Musical rales heard over both posterior lower lung fields. Disappears after coughing. No wheezes. Finding consistent with history of asthmatic bronchitis. K. See attached AF Form 1226 for pulmonary function test results.
L	ABC DEFG H	**HEART (Thrust, size, rhythm, sounds)** Examine for diseases or disorders that may restrict activity, be subject to aggravation, or be expected to cause circulatory failure or embarrassment under stress. If a murmur is heard, record the time in the cardiac cycle it occurs, intensity by grade (along with the basis IV or VI of the grade), location, transmission, effects of respiration or change in position, and an opinion whether it is organic or functional.	L. Grade II/VI soft systolic murmur heard only in pulmonic area and on recumbency. Not transmitted. Disappears on exercise and deep inspirations. Probably functional.
M	ABC DEFG H	**VASCULAR SYSTEM (Varicosities, etc.)** Inspect and palpate to detect evidence of arterial or venous insufficiency. Palpate carotid, radial, femoral, popliteal, and pedal pulses. Record absent or unequal pulses, or the presence of a bruit over any artery. Record location, severity, and evidence of venous insufficiency of any vericose veins.	M. Mild vericose veins, posterior superficial veins, both lower legs. No evidence of venous insufficiency.

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
N	ABC DEFG H	**ABDOMEN AND VISCERA (Include hernia)** Describe any organomegaly or masses detected.	N. 5cm linear diagonal scar, RLQ, WHNS.
O	ABC DEFG H	**PROSTRATE (Over 40 or clinically indicated)** Digital examination of the prostrate is required on all male examinees age 39 and older, and initial combat control/ pararescue examinations.	O. Prostrate normal to digital exam.
P	ABC DEFG H	**TESTICULAR** Describe size, shape, masses, and tenderness.	P. Testicles normal to digital exam.
Q	ABC DEFG H	**ANUS AND RECTUM (Hemorrhoids, Fistula)** *Hemocult Results Digital examination of the rectum is required on all male examinees age 39 and older, and initial combat control/ pararescue examinations. Describe fissures, fistulas, cysts, etc. Make note of hemorrhoids in regards to number, size, location, and severity. Test for occult blood.	Q. Small external hemorrhoids at 3 and 9 o'clock, asymptomatic. Q. Rectum normal to digital exam. Stool negative for occult blood.
R	ABC DEFG H	**ENDOCRINE SYSTEM** Observe for any stigmata of endocrine disorder, such as unusual fat or hair distribution, skin changes, etc. Palpate thyroid gland carefully for asymmetry, enlargement, or nodules.	R. Slightly soft, non-tender enlargement of both lobes of thyroid gland. No other stigmata of thyroid disease. Considered to be within normal limits.
S	ABC DEFG H	**G-U SYSTEMS** Search for evidence of venereal disease and malformations. Describe varicoceles and hydroceles in terms of size and painfulness. Record the location of an undescended testicle in relation to the inguinal canal. Circumcisions must be recorded as abnormal.	S. Left varicocele, 3cm x 5cm, asymptomatic. S. Circumcised, WHNS.
T	ABC DEFG H	**UPPER EXTREMITIES (Strength, range of motion)** Record deformities or other abnormal appearances, limitations of strength or range of motion, and any evidence of previous surgery.	T. History of fracture of left ulna, No weakness, deformity, or limitation of motion.
U		**FEET** Record a description of foot stability, symptoms, presence of eversion, and marked bulging of the inner border due to rotation of the talus for cases of flat feet.	U. Moderate flat feet, stable, asymptomatic. No eversion or bulging.

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
V	ABC DEFG H	**LOWER EXTREMITIES (Strength, range of motion)** *Except feet Record deformities or other abnormal appearances, limitations of strength or range of motion, and any evidence of previous surgery. Although "normal" is checked, make a statement on the condition of the extremity or joint when there is a history of previous fracture or dislocation.	V. History of fracture of right femur, No weakness, deformity, or limitation of motion.
W	ABC DEFG H	**SPINE, OTHER MUSCULOSKELETAL** Evaluate general flexibility of entire spine, including sacroiliac and lumbosacral joints and pelvis. State degree, amount, and location of any scoliosis detected using the Cobb method after appropriate X-ray study of the spine.	W. Thoracolumbar dextroscoliosis, 17 degrees as measured by Cobb method.
X	ABC DEFG H	**IDENTIFYING BODY MARKS, SCARS, TATTOOS** Record only marks or traumatic scars of purely identifiable significance greater than 2.5 cm. Record surgical scars in the item that includes their location. Describe by length in centimeters, direction, location, and condition.	X. 2.5cm vertical linear scar, anterior left forearm, WHNS. Tattoo, "MOTHER," in blue, surrounded by red heart, anterior right forearm,WHNS.
Y	ABC DEFG H	**SKIN, LYMPHATICS** Inspect examinee's entire skin in a well-lighted room. Direct particular attention to any cutaneous manifestations of systemic disease. Describe any pilonidal cysts or sinuses. Record chronicity and prior response to treatment of any skin diseases present on SF 93 Skin rashes, cysts, or scarring of torso or extremities require a statement whether they will interfere with wear of personal protective equipment or parachute harness.	Y. Multiple pilonidal tracts, currently asymptomatic. Very mild pitting over cheeckscaused by old acne, no evidence of activity; will not interfere with wear of protective equipment or parachute harness.
Z	ABC DEFG H	**NEUROLOGIC (Equilibrium tests under item 72)** Conduct a general neurological examination, to include cranial nerves, on all examinees. Record any abnormalities in the sensory or motor modalities, as well as any inequalities in the reflexes. CCT/PJ examinations require a complete evaluation by a flight surgeon. All the following items must be listed as part of the SF 88 with a finding annotated for each:	Z. Decreased sensation (light touch and pin prick) over fifth lumbar and first sacral nerve roots on right. No apparent atrophy of right leg. Extensors of right great toe weaker than left.

Item	Exam Type	Title/Explanatory Notes		Sample Entry Format
		Cranial Nerves Serial 7s Heel-Toe Romberg Gait Muscle Strength Deltoid Bicep Tricep Grip	Toe Raises Heel Raises Knee Flex Deep Tendon Reflexes Bicep Tricep Patellar Achilles Heel-Shin Slide	Deep tendon reflexes equal and active, except ankle jerk on right is diminished.
AA	ABC DEFG H	**PSYCHIATRIC (Specify any personality deviation)** The examiner conducts this evaluation, which depends greatly on his or her experience and judgement. Even a brief examination, properly conducted, will succeed in identifying those individuals with psychiatric problems or symptoms of a degree which might impair their effective performance of military duty. With the examination accomplished, and the examinee at ease, obtain a sufficient personal history to estimate how effectively the examinee has functioned in the past. School and occupational history, and the examinee's ability to live in harmony with others, are particularly pertinent subjects. During the interview, observe the examinee's behavior and estimate their general intelligence. When appropriate, record a diagnosis of psychiatric or character behavior. Otherwise, brief, descriptive remarks are acceptable, such as "antisocial trends," "poor achievement record," or "emotionally immature and very dependent." In questionable cases, a board eligible or certified psychiatrist should conduct a more thorough psychiatric evaluation. Remember that nonmedical personnel may have occasion to read medical records, so be careful to protect sensitive information from unauthorized disclosure.		AA. Neurological examination normal. AA. See attached psychiatric evaluation.
BB	ABC DEFG H	**BREASTS** Perform a breast examination on all female examinees with the examinee properly draped and a female attendant present.		BB. 1cm x 1.5 cm smooth, firm, mobile, nontender mass, peripheral LRQ, right breast.

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
CC	ABC DEF H	**PELVIC (Females only)** Perform a pelvic examination on all females. Examination will include bimanual palpation, visual inspection of the vaginal canal and cervix, and papanicolaou smear (unless one has been accomplished within the last 11 months or IAW PHA Grid). Perform a rectal examination (record the method) if there is an imperforate hymen or other contraindication to vaginal examination.	CC. Very slight reddening of vaginal wall and cervix with small amount of exudate. CC. Grade I Pap smear (6 Mar 95).
18	ABC GH	**DENTAL (Place appropriate symbols, shown in examples, above or below number of upper or lower teeth)** A dental officer examines the mouth, teeth, and supporting structures and summarizes their findings. Enter examination type, classification, and state whether examinee is qualified in the "Remarks" section. Include a statement of denture serviceability when examinee has artificial dentures (removable or fixed). (A serviceable denture must satisfactorily restore masticatory function, appearance, and clear speech. Oral tissues supporting the prosthesis must be in good health). Comment as to incisal and masticatory functions for an ordinary diet, and degree of facial deformity with the jaw in natural position, if a malocclusion is noted. All initial flying training (FCI/IA) require full mouth X-ray survey (Type I exam). CCT/PJ, commissioning, and US Service Academy entrance examinations require bite-wing X-rays only (Type II exam). Hyperbaric Chamber Duty examinations require a Type III dental examination. Air Force Academy Cadets and personnel on active-duty are required to have periodic dental examinations (Type II exam) (unless one has been accomplished within the last 11 months). Enter a dash in this item when not used.	Type I, Class II, Not Qualified Type II, Class I, Qualified Fixed artificial dentures, #5 -12, serviceable. Satisfactorily restores masticatory function, appearance, and clear speech. Supporting tissues in good health.
		<u>TEST RESULTS</u>Item 19 Record findings of identified laboratory or radiological techniques.	

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
A	ABC DEFG H	**URINALYSIS:** **A. SPECIFIC GRAVITY** **B. ALBUMIN** **C. SUGAR** Perform routine urinalysis (specific gravity, protein, sugar, and microscopic study) on all complete examinations. Record all findings and additional follow-up. Microscopic analysis is unnecessary if multireagent strip screen on urine is normal or negative. Routine urinalyses are not required on nonflying periodic ARC examinations.	Specific Gravity:1.014 (1.003-1.035) Protein: Negative Sugar: Negative Microscopic: 0-2 WBC
B	CGH	**CHEST X-RAY (Place, date, film number and result)** Record film size, date and place film was made, film identification number, and results. A 14x17 PA chest film is standard and serves as a permanent record. Photoroentgenograms are discouraged. Accomplish chest X-ray examinations on all initial flying medical examinations. Do not obtain chest X-ray examinations for routine screening purposes as part of periodic, separation, retirement, and indefinite reserve status examinations unless clinically indicated. Chest X-rays are not required for applicants of military service, military academies, and Reserve Officer Training Corps programs who reside in the Continental US, Alaska, and Puerto Rico, unless clinically indicated.	14x17, #95-1234, 15 Mar 95, Normal, 12th Medical Group, Randolph AFB TX
C	ACG H	**SEROLOGY (Specify test used and result)** Perform a standard serological test for syphilis on all accession medical examinations. Repeat all positive results and perform additional tests or examinations, if indicated.	RPR: Nonreactive VDRL: Reactive (see attached report)

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
D	ABC DEFG H	**EKG** Record "normal" or a reference to the document that completely describes the abnormality. A physician must over-read EKGs done for CCT/PJ application and those submitted to higher authority as part of a waiver request. Enlistment examinations do not require an EKG unless medical history or clinical findings are suggestive of cardiac abnormality, resting pulse is 50 beats per minute or less, or there is an unusual or unfavorable response to exercise. Send an EKG tracing on any AF member in which there is a substantial difference of opinion as to interpretation, or when interpretation is not clear, to USAFSAM/AFCI for interpretation. Transmit by letter.	Normal Normal Variant Abnormal Borderline See attached tracing
E	ABC DEFG H	**BLOOD TYPE AND RH FACTOR**Results may be taken from previous examinations and posted "by record."	A Pos B Neg by record

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
F	ABC DEFG H	**OTHER TESTS** HIV testing is required on ALL complete examinations. Hemoglobin is required on ALL examinations. HCT is required on ALL examinations. Initial CCT/PJ examinations require a complete CBC attached to SF 88 or identified here. Record G6PD and Hemoglobin-S (sickledex) results on all examinations. Results may be copied from previous examinations and posted "by record." A baseline cholesterol determination is required for all initial flying class examinations. Accomplish serum cholesterol, triglycerides, and high density lipoprotein (HDL) on periodic flying and nonflying ARC examinations. A 12 to 14-hour fast is required before any blood lipid determination. Determine fasting blood sugar for all examinees with a family history of diabetes. Other hematological or blood chemistry studies may be accomplished at the discretion of the examining physician or when required by other directives. Include local laboratory normal values for each test value reported. Laboratory reports may be destroyed after posting results on appropriate form(s). When additional laboratory results are obtained concurrent with a required test, and not transferred to SF 88, file report in the medical record. Record accomplishment of DNA analysis.	HTLV-III antibody ELISA Pos, Western Blot neg Hgb - 14.2 (14-18) HCT – 40 (36-47) WBC - (3.5-15) Hgb-S Neg (by record) G6PD Neg (by record) Chol - 185 (140-200) HDL - 47 Trig - 90 (35-160 FBS - 95 (70-110) DNA - 25 Aug 95
20	ABC DEFG H	**HEIGHT** Record standing height to the nearest quarter inch. Record sitting height in parentheses to the nearest quarter inch for all initial flying classes, USAF Academy, and Aerospace Medicine Primary (AMP) applicants.	70 1/4 70 1/4 (36 3/4)
21	ABC DEFG H	**WEIGHT** Record weight to the nearest pound on all examinations.	186

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
22	ABC DEFG H	**COLOR HAIR** Self-explanatory. Do not abbreviate.	Blond
23	ABC DEFG H	**COLOR EYES** Self-explanatory. Do not abbreviate.	Green
24		**BUILD (SLENDER, MEDIUM, HEAVY, OBESE)** This item is no longer used. Enter a dash on all examinations.	
25		**TEMPERATURE** Do not determine body temperature unless clinically indicated. Enter a dash on all examinations.	
26	ABC DEFG H	**BLOOD PRESSURE (Arm at heart level)** A. SITTING B. RECUMBENT C. STANDING Complete entire item on examinations for entry to US Service Academies and all initial flying classes. Determine only a sitting blood pressure on periodic flying and nonflying ARC examinations. Complete entire item if disqualifying blood pressure readings are found. Enter dashes in blocks not used. Perform a 5-day blood pressure check if disqualifying pressures are found on any examination. Record results of each reading and 5-day average in item 42.	130/80
27	ABC DEFG H	**PULSE (Arm at heart level)** A. SITTING B. AFTER EXERCISE C. 2 MIN. AFTER D. RECUMBENT E. AFTER STANDING 3 MIN. Complete entire item on all initial flying classes. Take pulses in A, E, B, C, D order. Enter dashes in blocks not used.	72 80 112 88 76 84

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
28	ABC DEFG H	**DISTANT VISION** RIGHT 20/ CORR. TO 20/ LEFT 20/ CORR. TO 20/ Applicants for all initial flying classes must correctly name ALL 10 letters on a given line to be credited with that degree of visual acuity. Record the best uncorrected vision of each eye. Flyers must be able do demonstrate 20/20 vision immediately after contact lens removal with aviator glasses.	20/20 20/20 20/100 20/15 20/70 20/20
29	ABC DEFG H	**REFRACTION** Record prescription in positive cylinder. Transpose, if necessary, disqualifying transpositions will be recorded in item 43. Flying class I/IA examinations require cycloplegic refraction to 20/20 visual acuity. Complete for all other examinations only if distant visual acuity is less than 20/20. Enter prescription that gives the best corrected vision and record the means of deriving after the word “refraction.” Entry may be “cycloplegic,” “manifest,” or “by lens.”	By S. Cx +0.25 +0.25 090 -0.25 +0.25 180

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
30	ABC DEFG H	**NEAR VISION** CORR. TO BY CORR. TO BY Applicants for all initial flying classes must correctly name ALL 10 letters on a given line to be credited with that degree of visual acuity. Record the best uncorrected vision of each eye. Active flying personnel must meet near vision requirements compatible with the closest working distance for their specific weapon system. Test active flyers who cannot pass the 20/20 near vision test on the VTA-ND or the OVT without corrective lenses using the standard Armed Forces Near Visual Acuity Test Chart held at the appropriate distance which corresponds to the flyer's type of aircraft and crew position. Record "Near vision tested at the nearest distance for the (type aircraft)." Determine refractive prescription that gives the best corrected near vision if uncorrected near vision is less than 20/20. Enter "same" after "by" if the prescription which corrects near visual acuity is the same as that which corrects distant visual acuity. If there is a presbyopic correction, enter the amount of correction needed, for example, "+1.50."	20/20 20/20 20/30 20/20 20/40 20/40 Same 20/40 20/40 Same 20/70 20/20 +1.50 20/70 20/20 +1.50
31	CD FG	**HETEROPHORIA (Specify distance)** ES EX R.H. L.H.. PRISM DIV. PRISM CONV. PC PD Phorias are measured using the distant drum of the VTA-ND or OVT machines. Record "VTA-ND (Far)" or "OVT (Far)" after the statement "Specify Distance". Line through PRISM CONV, and enter a dash under PRISM DIV and PD on all examinations. Record "Ortho" after CT if eyes are orthophoric. Record specific deviations by amount and character in item J. Near point of convergence (PC) is only required on initial flying classes I/IA, II, and III (inflight refuelers). Enter results (in millimeters) below PC. Enter a dash for all other examinations.	Ortho Esophoria
32	C	**ACCOMMODATION** Enter a dash when test is not accomplished.	Left 10.0 Right 9.0

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
33	ABC DE	**COLOR VISION (Test used and result)** The standard screening test is the Pseudoisochromatic Plate set (PIP). This test is required for all initial flying and non-flying examinations. Test results "by record" or "on record" are not acceptable for initial examinations! Record "PIP Passes" if examinee passes. Record "PIP Fails - (Number of plates missed)" if examinee fails. Record results of Farnsworth Lantern Test (flying class III examinations only) in item 42. Repeat color vision screening on subsequent examinations only if indicated by some type of eye or central nervous system (CNS) disorder.	PIP Passes PIP Fails (6) VTS-CV Passes by record
34	CDFG	**DEPTH PERCEPTION (Test used and result)** **UNCORRECTED** **CORRECTED** Depth perception is measured using the distant drum of the VTA-ND or OVT machines only. This test is required on all flying classes I/IA, II, III (inflight refueling), ground based controller duty, and initial CCT examinations. Other special operational duty examinations may require screening, as specified. Record result and last full group completed. Enter dashes when test is not accomplished. The Depth Perception Apparatus - Verhoeff (DPA-V) is not an acceptable test for initial depth perception screening! Failure on initial screening requires a full optometry or ophthalmology evaluation, to include: ductions, versions, cover test and alternate cover test in primary and six cardinal positions of gaze, AO Vectograph Stereopsis Test at six meters, AO Suppression Test at six meters, Randot Stereopsis Test, and 4 Diopter Base out Prism Test at six meters. These tests are designed to identify motility disorders, particularly microtropias and monofixation. New failure of screening when previously passed requires optometry or ophthalmology evaluation to rule out correctable causes, such as refractive error, anisometropia, or macular disease. If member has previously failed VTA-ND and passed the near stereopsis test (DPA-V or Randot), no further work-up is required.	UNCORRECTED OVT Passes (D) VTA-ND Passes (D) CORRECTED OVT Passes (F) VTA-ND Passes (F)
35	CDF GH	**FIELD OF VISION** This test is required on all initial flying classes and periodic flying ARC personnel. Enter a dash when test is not accomplished.	Confrontation - Normal

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
36	ABC DE	**NIGHT VISION (Test used and result)** Enter "NIBH" (not indicated by history) if night vision deficiency is not suspected. Night vision testing is not routinely accomplished unless there is reason to suspect a night vision deficiency based upon personal or family history, fundus changes, behavior in dim light, etc.	NIBH
37	C	**RED LENS TEST** Enter a dash when test is not accomplished.	Passes Diplopia, Meridian 3, 8"
38	ABC DEFG H	**INTRAOCULAR TENSION** Determine intraocular tension on all examinees who are age 39 or older or IAW PHA. Determine intraocular tension on all rated members beginning at age 29. Enter a dash when test is not accomplished. Confirm abnormal readings obtained from noncontact "puff" tonometry with Applanation or Schiotz tonometry.	14 OU 13 OD 16 OS
39		**HEARING** RIGHT WV /15 SV /15 LEFT WV /15 SV /15 Whispered and spoken voice hearing tests are not routinely performed. Enter dashes on all examinations.	
40	ABC DEFG H	**AUDIOMETER** 250 500 1000 2000 3000 4000 6000 8000 RIGHT LEFT Determine examinee's hearing and complete necessary ancillary forms. Enter dashes in the 250 and 8000 frequency blocks as these are not tested. Record machine type after the item number and calibration standard used after the item title.	Tremetrics ANSI-69 - 5 5 5 10 10 10 - - 5 10 10 15 15 5 -

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
41	CEF G	**PSYCHOLOGICAL AND PSYCHOMOTOR (Test used and result)** The adaptability rating (AR) attempts to assess examinee's suitability for special types of military duty, rather than for general military service. It differs from the psychiatric evaluation in that it assesses the quality of motivation and temperament or personality, rather than the presence or absence of psychopathology. Evaluate for all classes of flying duty, ground based controller duty, space and missile duty, marine diving duty, hyperbaric chamber duty, and other categories as may be specified. When AR is determined for flying duty, it is called ARMA (Adaptability Rating for Military Aviation). In other cases, note the duty for which the AR is to be determined (e. g., "AR-Space and Missile Duty"). Record results as satisfactory of unsatisfactory. Enter a full explanation in item 43 if results are unsatisfactory.	ARMA - Satisfactory AR-Space and Missile Duty - Unsatisfactory RAT - Satisfactory
	CEF GH	Initial CCT/PJ examinations require an AR-Marine Diving Duty and RAT. The interview does not have a formal structure, but the physician will explore at least the level of realistic knowledge about the proposed career and the congruence of the career with long-term personal (and perhaps family) goals. The RAT is performed as necessary to include aerial vehicle operators who do require a RAT. Enter a dash on all other examinations.	

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
42	ABC DEG	**NOTES AND SIGNIFICANT OR INTERVAL HISTORY** Record the statement "No evidence of radial keratotomy," and signature (with typed signature block) of the optometrist or ophthalmologist performing the cycloplegic examination for flying training. These are the first entries of this item, when applicable. This signature certifies that item 29 is correct, and there is no evidence of keratorefractive surgery. List (by item number) any previous entries that had to be continued. Record past or current waiver information. Include date waiver granted, waiver class, authority, diagnosis, and expiration date. Record the results of: - cockpit near vision test - Farnsworth Lantern Test (FALANT) - inflight hearing test Initial CCT/PJ examinations require the following two statements: "Applicant possesses no fear of heights, depths, dark, or confined places." "Applicant possesses the ability to hold breath for 60 seconds subsequent to deep breathing." Record the statement: "See SF 93 for complete medical or surgical history." The signature (and typed signature block) of the Chief, Aerospace Medicine is the last entry in this item for flying training examinations. This is in addition to the signatures in items 48 through 51. Use SF 507, Clinical Record Continuation, if more space is needed.	No evidence of radial keratotomy, signature and signature block 30. Near vision tested at nearest working distance for the F-16. 33. FALANT Passes

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
43	ABC DEFG H	**SUMMARY OF DEFECTS AND DIAGNOSES (List diagnoses by item number)** Summarize significant defects, or those requiring further consideration/evaluation (nonstatic defects which may worsen or the waiver/disqualification diagnosis). Enter only the item number and a short, concise diagnosis.	18. Dental Caries 28. Defective distant visual acuity, OU, corrected to 20/20, OU.
44	ABC DEFG H	**RECOMMENDATIONS - FURTHER SPECIALIST EXAMINATIONS INDICATED (Specify)** Make recommendations based upon information recorded in item 43. Do not reiterate specialist examinations and consultant reports that support this examination, as they will have been done before the examination is considered complete. Request or recommend waiver for defects when there would be no compromise of safety, individual well being, or effective duty performance on a worldwide basis.	Correction of dental caries. Waiver for history of renal calculus. Continue waiver for Hx of LOC w/ post-traumatic syndrome.
45A	ABC DEFG H	**PHYSICAL PROFILE** P U L H E S Make an entry on all examinations except those done for retirement.	
45B		**PHYSICAL CATEGORY** A B C D This item is no longer used. Enter a dash on all examinations.	

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
46	ABC DEFG H	**EXAMINEE (Check)** A. IS QUALIFIED FOR B. IS NOT QUALIFIED FOR Check the appropriate block and enter purpose or examination category. All examinations address examinee's qualification for worldwide service, in addition to qualification for any given special duty (e.g., flying, ground based control). If examinee is found qualified for special duty, qualification for worldwide service will be presumed since medical standards for the former are over-and-above those of the latter. If "Qualification for worldwide service is questionable," findings must be supported by sufficient evaluation (including MEB or PEB processing) for reviewing authorities to resolve the question. A finding of "Is not qualified for worldwide service" is prohibited unless the defect is temporary and profiled accordingly, or HQ AFMPC has authorized limited assignment status (LAS). Enter "Is acceptable with waiver for (purpose of examination)" when a previously granted waiver is still valid, if no other disqualifying defect(s) exist. For waiver renewal actions where the previous waiver is valid at the time of submission, but will expire during the period for which the renewal request is for, check "(IS NOT)." In this case, the purpose of the examination is to obtain a waiver for a disqualifying condition; the waiver authority's stamp on the front of the SF 88 will render the applicant acceptable with waiver at that level of review. For retirement or separation examinations, the entry is expressed in terms of worldwide service even though examinee's departure is imminent. State whether examinee is "Qualified for worldwide service" or enter "Qualification for worldwide service questionable." Follow the latter finding with sufficient evaluation for reviewing authorities to resolve the question for a disposition. An entry of "Is" or "Is not qualified for separation / retirement" is not appropriate, as there are no medical standards for these categories. CCT/PJ application examinations require the following statement: "(IS) Initial Flying Class III/Airborne/Combat Control (or Pararescue)/Marine Diving Duty."	(Is) Worldwide Service (Is) Flying Class II (Is Not) Flying Class III/ 1A2X1 (Loadmaster)

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
47	ABC DEFG H	**IF NOT QUALIFIED, LIST DISQUALIFYING DEFECTS BY ITEM NUMBER** List item number only. List item number of defect if worldwide service is questionable. Enter a dash if qualified.	18, 19F, 28, 42
		SIGNATURES(Items 48 through 51) Signature stamps are not acceptable. Signatures must be that of the individual identified in the signature block; one individual may not sign "for" another. Carbon signatures on duplicate copies are acceptable. Enter the date examination was signed in both items 48 and 49.	
48	ABC DEFG H	**TYPED OR PRINTED NAME OF PHYSICIAN** * Change item 48 to read: "NAME OF REVIEWER" in lieu of "NAME OF PHYSICIAN". Reserve this block for the examining section supervisor (normally the PES Supervisor) who is responsible for technical and clerical aspects of the examination. This signature certifies accuracy and completeness of items 1 through 16, 18 through 40, and 43.	
49	ABC DEFG H	**TYPED OR PRINTED NAME OF PHYSICIAN** Reserve this block for the individual who performed the professional aspects of the examination (physician, physician's assistant, primary care nurse practitioner). This signature certifies the accuracy and completeness of items 17, 41, 46, and complete review of all items (1 through 47).	
50	ABC GH	**TYPED OR PRINTED NAME OF DENTIST OR PHYSICIAN** (Indicate which) Self-Explanatory. Enter a dash when not required.	

Item	Exam Type	Title/Explanatory Notes	Sample Entry Format
51	ABC GH	**TYPED OR PRINTED NAME OF REVIEWING OFFICER OR APPROVING AUTHORITY** The AMDS or AMS Commander reviews and signs separation, retirement, and all examinations submitted to higher headquarters for review. If the AMDS or AMS Commander is not a Medical Corps officer, the Chief, Flight Medicine, Hospital or Clinic Services will sign. The AMDS or AMS Commander reviews and signs all flying training examinations. This will not be delegated even if the Commander is not a Medical Corps officer. Area and regional hospital commanders may delegate review and signature authority for separation and retirement examinations to an experienced medical officer other than their Chief, Hospital or Clinic Services. The State Air Surgeon will review and sign examinations for ANG personnel.	

10.2. Standard Form 93 - Report of Medical History:

10.2.1. General Information. One of the most important tasks on a physical examination is obtaining, writing and recording the examinee's medical history. An item of medical history often determines the examinee's qualification for the type of physical examination being taken. Accomplishing a medical history correctly and accurately is one of the most complex and difficult tasks we do. An understanding of anatomy and physiology as well as pathophysiology is needed so that the right questions may be asked to obtain all the necessary information. This task is not easily learned and requires much practice to become proficient.

10.2.1.1. A SF 93 is required to be "on record" in all active duty, guard, and reserve military medical records. This should have been accomplished prior to entry into military service; however, if one is not "on record" establish one (in accordance with this publication) at the first possible opportunity.

10.2.1.2. During each PHA, make an addendum to the most current/complete SF 93 by adding any significant items of interval history.

10.2.2. Interval Medical History. A complete medical history is only required once in an examinee's career. It is only required when SF 93, Report of Medical History, is completed. When a SF 93 is not completed, only significant items of medical history since the last update or assessment are recorded - this is defined as the interval medical history and applies to active duty and ARC.

10.2.2.1. As a general rule, record only significant items of medical history, i.e. any medical condition that required hospitalization, or required excusal, grounding, profile change or suspension from flying status. Do not record "routine" items such as URIs, viral illnesses, etc., unless hospitalization or grounding was required or the illness is of a frequent or chronic nature. The informa-

tion concerning the interval medical history may be obtained by asking the person and by a thorough review of the examinee's medical records. See paragraphs **10.2.3.** and **10.2.4.**, and Attachment 5 for the correct format to use when writing the medical history.

10.2.2.2. Reference each update to the SF 93 with the current date, "ADDENDUM:" followed by the significant items of medical history. When an interval history is required, update the most current SF 93 with an interval history addendum and attach it to the SF 88 or AF Form 1446. All continuations (SF 507, Clinical Record Continuation) must be attached to the most recent SF 93 and/or previous continuation sheets.

10.2.2.2.1. Example: 13 Jul 98, ADDENDUM: URI, Feb 98, DNIF 10 days, Tx with Entex with full recovery, NCNS.

10.2.2.3. After recording the interval medical history, the following denial statement will be recorded: "No other significant medical or surgical history to report since the last SF 93 update. (enter the date of that SF 93 update here in parentheses)".

10.2.2.4. If the examinee had no interval medical history, record the above statement, omitting the word "other."

10.2.3. Special Requirements for Writing A Medical History. The following are general format and style requirements for medical histories. You may find it useful to brief your examinees on these to help expedite the process of obtaining and writing their medical history.

10.2.3.1. Items of medical history are recorded in chronological order, starting from birth and progressing to the present.

10.2.3.2. If an item of medical history occurred when the examinee was age 11 or younger, it is said to have occurred in childhood. If an item occurred from age 12 to the present, record the year of occurrence unless it has happened within the last year, in this case record the month and year.

10.2.3.3. NCNS: The abbreviation "NCNS" (No Complication, No Sequela) is used in a medical history, when applicable. Complication refers to a disease condition that is concurrent with another disease. Sequela is a disease condition followed or caused by another disease (that is, any residual effects from a disease).

10.2.3.4. Information must be solicited for every item checked affirmatively on SF 93 (no comment needs to be made concerning the affirmative answer to the second item in block 10 - Do you have vision in both eyes). To ensure patient sensitivity, the history should be obtained in private, as the examinee will be more willing to provide the desired information if no other people are around.

10.2.3.5. As stated previously, the medical history is recorded in chronological order. To avoid confusion and the chance of overlooking an affirmative answer, SF 93 should be screened systematically, with the information written as the form is reviewed. Obviously, by using this method, the information will not necessarily be written chronologically. Therefore, the medical history is written first in rough draft. The items can then be rearranged into chronological order and recorded in the correct format.

10.2.4. Procedures for Writing a Complete Medical History. Paragraph 10.2.5. and **Attachment 5** contain basic instructions that should be followed when recording affirmative answers to questions

concerning the medical history. The instructions in Attachment 5 are in alphabetical order, using the wording as it appears on the SF 93.

10.2.4.1. Preliminary Questions: Once you are alone with the examinee and before you review the SF 93, ask the examinee the questions below. Do not record negative responses to any of these questions:

10.2.4.1.1. What childhood diseases did you have? (see **Attachment 5**, paragraph 12.)

10.2.4.1.2. Did you have any operations as a child, and if so, what were they for? (See attachment 5, paragraph 13.)

10.2.4.1.3. Do you have any scars that are 1-inch long or longer from any time in your life? (See attachment 5, paragraph 50.)

10.2.4.2. SF 93 Review: You are now ready to review SF 93. In item 8, if the examinee's health is less than "good," or if they are currently taking any medications, a comment is needed in the medical history (see Attachment 5, paragraph 57 and 67). Note: If the examinee is not presently taking any medications, the statement "No Medications" must be recorded in item 8. For items 9 through 12, record the necessary information for any item answered affirmatively (except for block 10, item 2). Comments are also needed for any item checked "DON'T KNOW". Although the examinee has explained affirmative responses to items 15 through 24, you must elaborate further in the medical history.

10.2.4.3. Closing Questions: After reviewing SF 93, ask the examinee the following additional questions: (sometimes referred to as the denial questions).

10.2.4.3.1. Is there a history of diabetes in yourself or in you family (parent, sibling, or more than one grandparent)?

10.2.4.3.2. Is there a history of psychosis (mental illness) in yourself or in your family (parent or sibling)?

10.2.4.3.3. Do you now or have you ever worn contact lenses?

10.2.4.3.4. Have you ever had irradiation therapy?

10.2.4.3.5. Have you ever experienced motion sickness or disturbance or consciousness?

10.2.4.3.6. Are there any other items of medical or surgical history that you have not mentioned?

10.2.5. Recording the Medical History. The complete medical history is typed in item 25 of SF 93 (SF 507 should be used if you run out of space), in the following order:

10.2.5.1. Record Significant Childhood Items in the Following Order:

10.2.5.1.1. Common childhood diseases (measles, mumps and chickenpox) may be grouped together, but each must be named.

10.2.5.1.2. Significant traumatic scars resulting from childhood injuries.

10.2.5.1.3. List each operation the examinee had before reaching age 12.

10.2.5.2. List all items of medical history obtained from SF 93 in chronological order, no matter what the condition. In other words, do not list all diseases together, all operations together, etc. The deciding factor in recording the medical history here is the date, not the condition.

10.2.5.3. Denial Statement: All complete medical histories get one.

10.2.5.3.1. If the examinee responded with only negative replies to any medical history questions, record the denial statement as follows. "Examinee denies personal or family history of diabetes or psychosis, use of contact lenses, history of motion sickness or disturbances of consciousness, irradiation therapy, and all other significant medical or surgical history."

10.2.5.3.2. If the examinee had an affirmative reply to any questions in **10.2.4.3.**, record the reply in the medical history and omit the corresponding phrase from the denial statement. For example, if the examinee gave a family history of diabetes and a personal history of motion sickness, the following denial statement would be recorded. "Examinee denies personal history of diabetes, personal or family history of psychosis, use of contact lenses, history of disturbances of consciousness, irradiation therapy, and all other significant medical or surgical history."

10.3. AF Form 422 - Physical Profile Serial Report: Additional information on physical profiles can be found in AFI 48-123.

10.3.1. Purpose. The AF Form 422 is a device for communicating information to non-medical authorities on the general physical condition or specific duty limitation of military members. The profile system exists to facilitate certain personnel, training or command actions (i.e. - clearing an individual for worldwide service, effecting a temporary occupational duty restriction, effecting retraining, effecting a temporary assignment limitation, and reporting substance abuse).

10.3.2. Preparation: The AF Form 422 will be completed as follows:

10.3.2.1. Patient ID: If ID plate (embossing card) is available, stamp here; otherwise enter: Last Name, First Name, Middle Initial. Also enter the members duty phone number in the bottom left-hand corner of this block.

10.3.2.2. Grade: Enter the patient's grade. Example -- TSgt, Maj., etc. Use of military pay grade is acceptable, especially when dealing with patients from other branches of the services or allied nation military personnel.

10.3.2.3. Date: Enter the effective date in military style . The date that this profile was recommended by a health care provider must be the same as this block.

10.3.2.4. AFSC: Enter the patient's duty AFSC.

10.3.2.5. SSN: Enter the patient's Social Security Number.

10.3.2.6. Unit: Enter the patient's organizational address.

10.3.2.7. Base: Enter the patient's base, state, and Zip Code.

10.3.2.8. Previous Profile: Enter their previous profile taken from last AF 422 or SF 88. You must comply with paragraphs **10.3.2.9.** through 10.3.2.10. if there is a "4" in this block.

10.3.2.9. Revised Temporary: Do not revise for only minor temporary injuries or illnesses. Use this block if the defect will render the member not qualified for worldwide service or is not

expected to resolve within 60 calendar days. Enter a "4" under one or more factors to indicate the member is not qualified for worldwide service. DO NOT complete this section unless it contains at least one "4". If unused dash the items.

10.3.2.9.1. A "T" can only be assigned with a "4".

10.3.2.9.2. A "4-T" can only be carried for up to 12 months. If it appears that the restrictions will last a year from the date of injury or illness, start Medical Board actions early enough as to ensure the 12 month time period will not expire. This time frame of 12 months applies to each illness and injury whether a profile was maintained the entire time of non-availability for worldwide service or not (i.e. profiles for the same injury of 3 months, followed by a profile for 6 months, and followed by another profile for 6 months exceeds the maximum allowable time frame, even if there were short interval periods without a valid temporary profile). Injuries and illnesses must be satisfactorily resolved before the end of the 12 month or a medical board must convene on the case.

10.3.2.9.3. A "4" requires a copy of AF Form 422 to be sent to the servicing Military Personnel Flight (MPF) to update the personnel files to reflect that the member's qualification for worldwide service is questionable.

10.3.2.10. Revised Permanent: This section is completed when a previous or revised temporary factor is changed to a permanent factor. This section CAN NOT contain any "4" unless authorized by AFMPC/DPMMM. If unused dash the item.

10.3.2.10.1. In some cases, a suffix of "T" may be entered here to reflect an Assignment Limitation Code - C status, but this suffix can ONLY be entered in the Revised Permanent block when approved and directed by Physical Evaluation Board personnel at HQ AFMPC/DPMMM. The "C" code is the code used by the MPF in their personnel computer system, don't put a "C" suffix in this block. A "T" in this block also requires an entry in the remarks section of this form.

10.3.2.10.2. In the case of an individual who has been assigned an Assignment Limitation Code "C" (ALC-C) by AFMPC/DPMMM, the "4T" profile will remain permanently until the ALC-C has been removed by AFMPC/DPMMM. The placement of a "4T" in this block allows and requires monthly reviews for significant changes in the member's status.

10.3.2.11. Blood Group Data: The following blood group data should be transcribed onto the AF Form 422 each time the form is completed for the purpose of reclassifying the member for a change in duty (i.e. retraining or special duty request, remote or isolated duty clearances, etc.); Type and RH, G6PD Deficiency, and Hemoglobin-S Trait.

10.3.2.12. Release Date of Temporary Restriction: Enter date the health care provider indicates the duty restrictions should be released (in military format).

*NOTE: In no case will this date extend beyond 12 months (see paragraph 10.3.2.9.2.

10.3.2.13. World - Wide Qualified: Check appropriate block:

10.3.2.13.1. YES -- Means individual profile does not contain any "4".

10.3.2.13.2. NO -- Means individual has a "4-T" profile or an ALC-C "4-T" , see paragraph 10.3.2.9.3

10.3.2.14. Individual Defects or Restrictions: A brief, non-technical description of defect(s) and restriction(s) [i.e.: Broken right leg in walking cast, no prolonged standing, no prolonged walking, no running, no driving]. Ensure that the descriptions are in layman's terms. Restrictions must focus on what CANNOT be done, rather than what can be performed. Use caution when diagnosis may be of a sensitive nature (i.e.: Status post vasectomy, post abortion, anxiety disorders, HIV patients, etc.), in such cases general terms such as "Operative Procedure" or "Infectious Process" may provide better patient sensitivity.

10.3.2.14.1. Drug Abuse Reporting - The DBMS should use the AF 422 to notify commanders, social actions officers, and other responsible parties of active duty personnel who have been identified as being drug experimenters, users, or addicts. This is annotated in this section as follows; "Identified as a (fill in appropriate title) Drug Addict, This Document Should Never Be Removed From This Medical Record." This AF 422 will be signed by the PES Manager and the DBMS only.

10.3.2.15. Passes Color Vision: Complete this section only on initial profiling or when verification of color vision is required for the purpose of reclassifying the member for a change in duty (i.e. retraining or special duty request, remote or isolated duty clearances, etc.). Only record new test results, this entry CANNOT be by record or history.

10.3.2.15.1. Defective color vision is defined as the inability to pass the Pseudoisochromatic Plate (PIP) set. However, some specialties allow alternate testing to determine acceptability (see AFI 48-123), in these cases the fact that the member was found to have acceptable/unacceptable color vision for the specific duty requested should be noted in the remarks section of this form.

10.3.2.16. Medical Defect/Condition Requires MEB or PEB Processing. Assignment Availability Code (AAC) 37 Applies. Check this block if the defect or condition requires MEB action or restrictions will last longer than 12 months.

10.3.2.17. As shown by examination or review of Health Record or current course of treatment, Individual is Cleared For: Check the appropriate box if it applies.

10.3.2.18. Remarks: To be used for additional data that clarifies the action recommended or this space can be used to continue any other block, as needed. Use this section to document the assignment or removal of an ALC-C by AFMPC/DPMMM. In this case, state the date of the PEB, recommended actions and frequency of required reevaluations.

10.3.2.19. Typed or Printed Name and Grade of Profile Officer: Self-explanatory. Designated profile officer who reviews and signs form, attesting to its validity. Only needs to be accomplished on AF 422s processed to change the temporary or permanent profile serial or for those which were initiated by record review or requested by the MPF. Signature IS NOT required for temporary occupational (duty) restrictions less than 60 days.

10.3.2.19.1. Every AF 422 must be signed by the PES manager (or designated representative) and at least one health care provider.

10.3.2.19.2. Qualified Profile officers should be designated by the Medical Treatment Facility Commander by letter in sufficient numbers as to allow easy access during all normal duty days. Qualifications to be a profile officer include; mandatory training in physical standards

and profile requirements (training can be provided by any 4F071 or higher, or Chief of Aeromedical Services), and must be a health care provider.

10.3.2.19.3. All Assignment Limitation Code - C (Permanent 4-T) profiles must be signed by the profile officer.

10.3.2.19.4. Any profile which recommends retraining for medical reasons must be signed by the DBMS or senior profile officer.

10.3.3. Distribution. Distribution is made to all agencies listed on the bottom right hand corner of the form. DO NOT send Copy 2 - CBPO to the Military Personnel Flight on profiles with temporary restrictions of less than 60 days.

10.3.4. Use of the Department of the Army (DA) Form 3349. DA Form 3349, Physical Profile Serial, is acceptable in lieu of AF form 422. However, review any entry in DA Form 3349 which recommends temporary or permanent geographic or climate assignment restrictions. The Army "3" profile is not compatible with worldwide assignability in the Air Force and must be converted to a "4" profile. DA Form 3349 can be obtained from: Department of the Army , US Army Publication Distribution Center, 2800 Eastern Blvd., Baltimore, MD 21220-2896.

10.4. AF Form 1446 - Medical Examination - Flying Personnel:

10.4.1. General Information. The AF Form 1446 is used to record examination findings during years when a complete medical examination (SF 88) is not required for ARC personnel. This form is used for all ARC personnel on flying status or performing the following duties; missile launch crew, space operations, physiological training, hyperbaric chamber, marine diving, ground based control, and parachute.

10.4.2. Preparation. Instructions are outlined on the top of the form, and are essentially the same entries as required on the SF 88.

10.5. AF Form 1485 - Flight Medicine Follow-Up Suspense Card:

10.5.1. General Information. Aeromedical Services at each base are required to maintain a waiver action suspense file of all personnel who are on a medical waiver for flying or special operational duty, regardless of branch of service. This suspense file will be established and maintained using AF Form 1485, Flight Medicine Follow-Up Suspense Card, or a HQ AFMOA/SGPA approved microcomputer based program.

10.5.1.1. Unless otherwise indicated, entries on the card may be typed or printed in ink. Pencil entries are indicated for those entries which are subject to change (expiration dates, organization changes due to PCS or PCA, etc.).

10.5.1.2. Suspense files (AF Form 1485 or computer entry) are not required for indefinite waivers.

10.5.2. Preparation: The following are block by block instructions for the completion of AF Form 1485.

10.5.2.1. Name. Record member's last name, first name, middle initial.

10.5.2.2. Grade. Pencil entry. Enter member's rank or pay grade (this may be helpful in tracking waivers for members of other branches of the service or allied services).

10.5.2.3. SSN. Self-explanatory.

10.5.2.4. Suspense Month. Pencil entry. The suspense month is determined by the reviewing flight surgeon, based on the member's waiver action data. For example, a renewal of waiver for hypertension may need to be scheduled only 2 months prior to expiration. However, if the member requires an "ACS (Aeromedical Consultation Service) Evaluation" to renew the waiver, the suspense month should be 4 or more months prior to certification expiration.

10.5.2.5. Organization. Pencil entry. Self-explanatory.

10.5.2.6. Duty Phone. Pencil entry. Self-explanatory.

10.5.2.7. MAJCOM. Pencil entry. Enter the member's current MAJCOM.

10.5.2.8. Date of Birth. Enter the member's date of birth in military format.

10.5.2.9. Waiver/CARE. This card is now used explicitly for tracking waiver data. Place an "X" in the appropriate box.

10.5.2.10. Crew Position. Pencil Entry. Obtain information from the individual (i.e. - Senior Pilot, Master Navigator, Flight Engineer, Ground Based Controller).

10.5.2.11. ASC (Aviation Service Code). Pencil Entry. Obtain from the individual, a current copy of their aeronautical orders, or from the Host Operations Systems Management (HOSM) office. (i.e.: 2A, 3J, 9D, etc.)

10.5.2.12. Date Initial Waiver Granted. Enter the action date from the certification information stamped on the front of the SF 88 used to initially grant the member's medical waiver. Enter date in military format.

10.5.2.13. Initial Waiver Granted By. Record the certification authority (USAF, USAFA, AETC, AMC, AFMC, etc.) which initially granted the waiver.

10.5.2.14. Date Last Waiver Granted. Pencil entry. Information is obtained from the certification information on the front of the last certified SF 88. Enter date in military format.

10.5.2.15. Last Waiver Granted By. Pencil entry. Record the certification authority (AFMOA, USAFA, AETC, AMC, AFMC, etc.) which last granted the member's medical waiver.

10.5.2.16. Expiration Date. Pencil entry. Enter the expiration date as determined by the last certification authority and recorded on the last certified SF 88. Record date in military format.

10.5.2.17. Date Last SAM Evaluation. Pencil entry. If member has previously been evaluated at the Aeromedical Consultation Service at Brooks AFB, record the date of that evaluation in military format.

10.5.2.18. Date Next SAM Evaluation Needed. Pencil entry. If a previous "ACS Evaluation" recommended a reevaluation, enter that date in this block. Only the month and year need to be entered.

10.5.2.19. Diagnosis. Enter the member's diagnosis(es) as determined by the last certification authority and recorded on the applicable SF 88. Continue information on the back of the card if more space is needed.

10.5.2.20. Required Interim Evaluations for Next Waiver Renewal. Pencil entry. This information will be determined by applicable directives (AFI 48-123 and AFPAM 48-132, Medical Waiv-

ers for Aircrew), the certification authority, or the examining flight surgeon when the certified package is returned. Examples include quarterly blood pressure checks, quarterly intraocular tensions, monthly SGOTs. For quarterly blood pressure checks, record only the 5-day average if a 5-day check is required by the physician. The actual 5-day check will be recorded and filed in the member's medical records. Continue on the back of the card if more space is needed.

10.5.2.21. Recorded By. Pencil entry. Each time waiver information is entered or updated, the waiver monitor will sign the card in this block. If the waiver monitor is different from the PES Manager, the PES Manager will initial the block.

10.5.2.22. Flight Surgeon Review. Pencil entry. Each time waiver information is entered or changed, the examining flight surgeon will sign the card in this block.

10.5.2.23. Care Follow-up Data: This data is no longer required and should be marked through.

10.5.3. Disposition of the Form. The AF Form 1485 will be forwarded to the new base when a member is transferred by permanent change of station action. The card will be destroyed upon termination of military service or when no longer needed (i.e.: condition resolved, waiver changed to indefinite, medically disqualified, etc.). Be sure to notify the member's MAJCOM/SGP of any of these changes so they can update the WAVR File.

10.6. Accomplishment and Recording of AF Form 1042, Medical Recommendation for Flying or Special Operational Duty. For more information on the AF Form 1042 see AFI 48-123.

10.6.1. General Information: Use AF Form 1042 to convey medical qualification for flying or special operational duty.

10.6.1.1. May be replaced with RTFS or more current physical / assessment AF Form 1042.

10.6.2. Preparation: The following are block by block instructions for the completion of an AF Form 1042. (This form must be typed when submitted as part of a medical examination package for waiver consideration by higher headquarters).

10.6.2.1. TO: For flyers, enter the addresses of the HOSM office and the members assigned or attached flying unit. If not assigned or attached to a flying unit (inactive flyers), the HOSM address is the only entry needed. For non-flying special operational personnel, enter the address of their unit.

10.6.2.2. FROM: Enter the complete official mailing address of Flight Medicine.

10.6.2.3. DATE: Enter the date in military style when this form was initiated.

*NOTE: This date and the dates of the signatures must be the same or the last date entered will be the official date cleared.

10.6.2.4. NAME: Enter the examinee's name (Last, First, Middle Initial).

10.6.2.5. GRADE: Enter the examinee's grade (Col, Maj, CMSgt, A1C, etc.).

10.6.2.6. SSN: Enter the examinee's social security number (111-11-1111).

10.6.2.7. RATING \ FLYING OR SPECIAL OPERATIONAL DUTY: Enter the examinee's job title (Command Pilot, Flight Surgeon, Ground Based Controller, etc.).

10.6.2.8. ASC: Enter the Aviation Service Code (ASC) for all flying personnel and dash the item if they do not have an ASC.

10.6.2.9. ACTIVE FLYING YES/NO: Check the appropriate box. This response must correspond with the ASC.

10.6.2.10. ORGANIZATION: Enter the member's unit.

10.6.2.11. MAJCOM: Enter the major command of their assignment.

10.6.2.12. THE ABOVE INDIVIDUAL HAS BEEN FOUND. (Check appropriate boxes): Mark all appropriate blocks to include the 180 day or 90 day statement when applicable.

10.6.2.13. ACTUAL DATE FOUND DNIF: Enter the date (in military style) the flight surgeon discovers the individual does not meet medical standards for flying or special operational duty. The term - Duties Not Involving Flying (DNIF) - can also be used to indicate duties not involving controlling or any other special operational duty.

10.6.2.14. ESTIMATED DURATION OF DNIF: Enter in terms of days (10 days).

10.6.2.15. ACTUAL DATE FOUND MEDICALLY CLEARED: Enter the date (in military style) the flight surgeon cleared the individual to Return to Flying Status (RTFS) or return to special operational duties. For our purposes RTFS can be used for both flyers and special operational duty personnel. If this block is completed the date should be the same as the date signed.

10.6.2.16. TOTAL DAYS DNIF THIS ILLNESS\INJURY: Count the number of days starting with the "Actual Date Found DNIF" and ending with the day before "Actual Date Found Medically Cleared". Do not count the day of RTFS since the individual can fly that same day. (DNIF on 1 March and RTFS on 5 March would equal 4 total days DNIF)

10.6.2.17. REMARKS: Enter appropriate administrative information, such as medical certification or waiver stamps and restrictions for physiology training duties or categorical flying waivers. If this form is used for two purposes, for example to RTFS and clear an individual following a periodic medical examination, alert readers by placing the statement "DUAL PURPOSE AF 1042, RTFS AND PE". Do not enter medical information or diagnosis, such an entry would violate the patient privacy rights.

10.6.2.18. DATE MEDICAL CLEARANCE EXPIRES: This date will normally be the last day of the individual's birth month, but may be earlier if deemed appropriate by the flight surgeon. An entry in this item is required every time this form is completed.

10.6.2.19. MEDICAL EXAMINATION MAY BE ACCOMPLISHED IN THE MONTH AND YEAR INDICATED: Enter the month and year the individual will enter the acceptable window for their next flight physical. See AFI 48-123, attachment 8. Caution should be taken when calculating when the next examination is due for individuals with ASCs 7J, 7K, 7L, or 7T since they are due biannually.

10.6.2.20. TYPED OR PRINTED NAME AND GRADE OF FLIGHT SURGEON: Self-explanatory.

10.6.2.21. SIGNATURE: Self-explanatory. When submitting a waiver or disqualification package to higher headquarters do not have the flight surgeon or individual sign this form until final action by higher headquarters has been annotated.

10.6.2.22. DATE: Enter the date signed.

*NOTE: This date and the date of the individual's signature should be the same as the date of this form (top right corner).

10.6.2.23. I CERTIFY THAT I HAVE BEEN NOTIFIED AND UNDERSTAND THE ABOVE ACTIONS AND RECOMMENDATIONS, I DO /DO NOT WEAR CONTACT LENSES WHILE PERFORMING FLYING OR SPECIAL OPERATIONAL DUTY, SIGNATURE OF FLYER OR INDIVIDUAL: Self-explanatory. The signature of the individual is required on each form accomplished. The use of the phrase "Individual Aware of Action" is prohibited except when the individual is physically or mentally incapable of signing the form. The use of this phrase will require the flight surgeon to brief the individual's commander and enter a statement in the remarks section to include the date, time and name of the individual briefed.

10.6.2.24. DATE: Enter the date signed.

*NOTE: This date and the date of the flight surgeon's signature should be the same as the date of this form (top right corner).

10.7. Accomplishment and Recording of AF Form 1041, Medical Recommendation for Flying or Special Operational Duty Log. For more information on the AF Form 1041 see AFI 48-123.

10.7.1. General Information: Each time a flyer or special operational duty person has an AF Form 1042 accomplished for the purpose of DNIF or RTFS the AF Form 1041 must be used to log this action. The AF Form 1041 is used to log and track all individuals temporarily disqualified for flying or special operational duties. Do not enter routine clearance actions, such as those following periodic medical examination, reporting to a new station and so forth, on the AF Form 1041. This form must be maintained on a monthly basis, starting a new form on the first day of each month. Bring forward from the previous month's log all information pertaining to individuals who remain in a medically restricted status. Dispose of AF Form 1041 as specified by current directives. Since this form contains sensitive medical information, it must be protected the same as any medical health record.

10.7.2. DNIF (Grounding) Management: Because of the direct impact on the availability of crew members, the AF Form 1041 must be reviewed daily by the NCOIC of Flight Medicine and at least weekly by the OIC of Flight Medicine. Squadron Flight Surgeons should review the AF Form 1041 periodically to remain alert for squadron trends. These reviews are necessary to identify those flyers or special operational duty personnel who, for whatever reason, failed to follow-up upon the expiration of their "Estimated Duration" date. Every effort must be made to correct any delinquently DNIFed individuals.

10.7.3. Preparation: The following are block by block instructions for the completion of an AF form 1041.

10.7.3.1. MONTH AND YEAR: Enter the month and year that this AF Form 1041 will cover. This is normally accomplished on the first day of each month. However if this day falls on a non-duty day, start the AF Form 1041 on the first duty day ensuring that all actions accomplished prior to that day of the same month are annotated in chronological order.

10.7.3.2. MEDICAL FACILITY: Enter the complete address of your medical facility.

10.7.3.3. INDIVIDUAL ACTIONS: Transfer any individual action information from the previous month's AF 1041 log which has not been qualified. All entries in this section must be in chro-

nological order by date disqualified. Continue on another AF Form 1041 if necessary. It is sometimes advantageous to dedicate one AF Form 1041 for each active flying squadron for DNIF Management purposes. This is acceptable as long as all AF Form 1041s for a particular month are maintained together. All entries must be either typed or printed in ink, unless otherwise directed by this pamphlet.

10.7.3.3.1. LAST NAME: Enter the individual's last name and in the case of a common name, the first name.

10.7.3.3.2. GRADE: Enter the individuals grade.

10.7.3.3.3. SSAN: Enter the individuals complete Social Security Number.

10.7.3.3.4. RATING: Enter the members rating.

10.7.3.3.5. ASC: Enter their Aviation Service Code, if applicable.

10.7.3.3.6. UNIT-MAJCOM: Enter the individuals unit designation and major command. Abbreviations will be necessary in this block

10.7.3.3.7. DATE DISQUALIFIED: Enter the actual date that the individual was found to be disqualified for flying or special operational duty. Also called "date placed DNIF" or "date grounded".

10.7.3.3.8. ESTIMATED DURATION: Enter in terms of days (10 days). Allow room in this block to update.

10.7.3.3.9. DATE QUALIFIED: Between the date disqualified and the actual date qualified, this item must be filled in with the estimated date of requalification (in pencil). This is easily calculated by adding the "Estimated Duration" days to the "Date Disqualified". This allows for easy identification of individuals who are delinquent in returning for follow-up. Once re-qualified, complete this item in ink with the actual date re-qualified for flying or special operational duty.

10.7.3.3.10. DIAGNOSIS(ES): Enter a short diagnosis(es). There is no need to be elaborate since the medical record can be reviewed if more information is necessary. Standard medical abbreviations are acceptable.

10.8. Accomplishing and Recording the DD Form 2697 - Report of Medical Assessment. For more information on the DD Form 2697 see AFI 48-123

10.8.1. General Information: Complete the DD Form 2697 on individuals undergoing processing for Separation or Retirement that meet the requirements outlined in AFI 48-123 and do not require a complete physical examination.

10.8.2. Preparation: The following are block by block instructions for the completion of a DD Form 2697.

10.8.2.1. NAME: Enter the individual's last name, first name and middle initial.

10.8.2.2. SSAN: Enter the individuals complete Social Security Number.

10.8.2.3. RANK: Enter the individuals rank.

10.8.2.4. COMPONENT: Enter the individuals component.

10.8.2.5. UNIT OF ASSIGNMENT: Enter the individuals unit of assignment.

10.8.2.6. ADDRESS

10.8.2.6.1. HOME STREET ADDRESS: Enter the individuals home street address or RFD, including apartment number.

10.8.2.6.2. CITY: Self-explanatory.

10.8.2.6.3. STATE: Self-explanatory.

10.8.2.6.4. ZIP CODE: Self-explanatory.

10.8.2.7. HOME TELEPHONE NUMBER: Enter the individuals home telephone number, including area code.

10.8.2.8. DATE OF LAST PHYSICAL EXAMINATION BY THE MILITARY: Self -explanatory.

10.8.2.9. DATE ENTERED ON CURRENT ACTIVE DUTY: Self-explanatory.

10.8.2.10. COMPARED TO MY LAST MEDICAL ASSESSMENT/PHYSICAL EXAMINATION, OVERALL HEALTH IS: X one. If "Worse" have the individual provide an explanation including all pertinent information.

10.8.2.11. SINCE YOUR LAST MEDICAL ASSESSMENT/PHYSICAL EXAMINATION, HAVE YOU HAD ANY ILLNESSES OR INJURIES THAT CAUSED YOU TO MISS DUTY FOR LONGER THAN 3 DAYS? X one. If "Yes" have the individual provide an explanation including all pertinent information.

10.8.2.12. SINCE YOUR LAST MEDICAL ASSESSMENT/PHYSICAL EXAMINATION, HAVE YOU BEEN SEEN BY OR BEEN TREATED BY A HEALTH CARE PROVIDER, ADMITTED TO A HOSPITAL, OR HAD SURGERY? X one. If "Yes" have the individual provide an explanation including all pertinent information.

10.8.2.13. HAVE YOU SUFFERED FROM ANY INJURY OR ILLNESS WHILE ON ACTIVE DUTY FOR WHICH YOU DID NOT SEEK MEDICAL CARE? X one. If "Yes" have the individual provide an explanation including all pertinent information.

10.8.2.14. ARE YOU NOW TAKING ANY MEDICATIONS? X one. If "Yes" have the individual provide an explanation including all pertinent information.

10.8.2.15. DO YOU HAVE ANY CONDITIONS WHICH CURRENTLY LIMIT YOUR ABILITY TO WORK IN YOUR PRIMARY MILITARY SPECIALTY OR REQUIRE GEOGRAPHIC OR ASSIGNMENT LIMITATIONS? X one. If "Yes" have the individual provide an explanation including all pertinent information.

10.8.2.16. DO YOU HAVE ANY DENTAL PROBLEMS? X one. If "Yes" have the individual provide an explanation including all pertinent information.

10.8.2.17. DO YOU HAVE ANY OTHER QUESTIONS OR CONCERN ABOUT YOUR HEALTH? X one. If "Yes" have the individual provide an explanation including all pertinent information.

10.8.2.18. AT THE PRESENT TIME, DO YOU INTEND TO SEEK DEPARTMENT OF VETERANS AFFAIRS (VA) DISABILITY? X one. If "Yes" have the individual provide an explanation including all pertinent information.

10.8.2.19. CERTIFICATION

10.8.2.19.1. SIGNATURE OF SERVICE MEMBER: Self-explanatory.

10.8.2.19.2. DATE SIGNED: Self-explanatory.

10.8.2.20. HEALTH CARE PROVIDER COMMENTS: The health care provider is to explain all patient complaints during the individuals visit and assessment.

10.8.2.21. WAS THE PATIENT REFERRED FOR FURTHER EVALUATION? X one. If "Yes", the health care provider is specify where or which specialty the individual is referred to for evaluation.

10.8.2.22. PURPOSE OF ASSESSMENT: Self-explanatory.

10.8.2.23. MEDICAL FACILITY: Self-explanatory.

10.8.2.24. DATE OF ASSESSMENT: Self-explanatory.

10.8.2.25. HEALTH CARE PROVIDER

10.8.2.25.1. NAME: Enter the health care provider's last name, first name, and middle initial.

10.8.2.25.2. GRADE/RANK: Enter the health care provider's grade/rank (i.e. Col, Capt, etc.).

10.8.2.25.3. SIGNATURE: Self explanatory.

10.9. Accomplishing and Recording of SF Form 502, Narrative Summary (Aeromedical).

10.9.1. General Information: The SF 502 is used to prepare an aeromedical summary for inclusion with a waiver request. An Aeromedical Summary may be submitted alone for waiver consideration and certification by the appropriate certification and waiver authority as outlined in AFI 48-123.

10.9.2. Preparation: The following are section by section instructions for completing an aeromedical summary using a SF 502.

10.9.3. Section I - Introduction (Patient Identification/Duty Information/Purpose of Submission). As a minimum, the following information should be included in the introductory paragraph of every Aeromedical Summary (AMS).

10.9.3.1. Name, Rank, SSAN of the patient.

10.9.3.2. Organization, MAJCOM, and current base of assignment.

10.9.3.3. Crew position, ASC, type of aircraft, number of hours logged, and duty AFSC.

10.9.3.4. Purpose of this submission. What action are you requesting.

10.9.3.5. A typical opening to the summary might read:

10.9.3.5.1. Col Jet, 012-34-5678, is a 42-year-old, active duty, command pilot in the T-38, (ASC: 3A, DAFSC: 18A5) with 22 years of active duty service and a total of 3500 flying hours (800 civilian, B-737), 50 of which have been logged in the past six months. He is cur-

rently the Operations Group Commander for the 12th FTW, Randolph AFB, TX. Reevaluation at the Aeromedical Consultation Service is now required in accordance with the Surgeon General's MVP Management group, as specified on his last waiver.

10.9.3.6. Include any additional information you think we should be aware of, i.e. pending PCS, change in assigned aircraft, etc.

10.9.3.7. Specify the date of the most recent DNIF recommendation, if appropriate.

10.9.4. Section II - History (Significant Medical History):

10.9.4.1. Describe in detail the circumstances surrounding the discovery and evaluation of the current medical issue (if this is a re-evaluation, a more concise description may be sufficient).

10.9.4.2. In any AMS requesting waiver action for a new condition, include names and phone numbers of witnesses, EMS personnel, or hospital emergency rooms, if any were involved.

10.9.4.3. Include previous surgeries and any other significant medical problems.

10.9.4.4. List previous/current waivers, the diagnosis, date of initial and current waiver, waiver authority, and date of the current waiver's expiration.

10.9.4.5. An example of this section follows:

10.9.4.5.1. A physical examination was recently completed on Colonel Johnny Jet who holds a Flying Class IIC waiver for mitral valve prolapse (MVP), granted initially on 14 December 1988 by HQ USAF/SGPA, most recently renewed on 31 December 1993 by HQ ACC/SGPA, and which expires on 31 December 1996.

10.9.5. Section III - Physical (Current Physical Examination Results and Objective Data):

10.9.5.1. Include the results of any specialty consultations obtained.

10.9.5.2. Describe your hands on examination of the patient, being certain your examination is thorough enough to adequately evaluate the problem being addressed.

10.9.5.3. Include the results of diagnostic studies to include local laboratory normal values.

10.9.5.4. Review AFPAM 48-132, Medical Waivers for Aircrew, to ensure all requirements have been addressed. The ACC/SGPA Tactics Book is another valuable resource for many medical conditions.

10.9.6. Section IV - Diagnoses:

10.9.6.1. List all aeromedically significant diagnoses.

10.9.6.2. List any clinically interesting findings.

10.9.6.3. Identify any permanent/indefinite waivers held.

10.9.6.4. Specify those diagnoses requiring waiver or re-waiver at this time.

10.9.7. Section V - Recommendations:

10.9.7.1. What action do you want the certification/waiver authority to take? Waiver? Disqualification? Make a recommendation and justify it.

10.9.7.2. Justification! Why should a waiver be granted? What can or cannot the examinee do? What impact is there on the individual's health, flight safety, or mission accomplishment? Is the aviator's medical condition stable AND is he or she now ready to return to flying status?

10.9.7.3. Including a squadron or wing commander's recommendation can be of great benefit in cases where a period of observation for diagnoses in which performance related issues are of concern.

10.9.7.4. Refer to AFI 48-123 or AFPAM 48-132, for the general criteria a medical condition must meet in order to be considered "waiverable".

10.9.7.5. References to current medical literature in support of your recommendation are extremely helpful, particularly in controversial or potentially precedent setting cases.

PAUL K. CARLTON, Lt General, USAF, MC
Surgeon General

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

Abbreviations and Acronyms

ACC—Air Combat Command

ACS—Aeromedical Consultation Service

ADT—Active Duty tour

AETC—Air Education and Training Command

AFA—Air Force Academy

AFIP—Armed Forces Institute of Pathology

AFELM—Air Force Element

AFMOA—Air Force Medical Operations Agency

AFPC—Air Force Personnel Center

AFNVAT—Armed Forces Near Vision Acuity Test

AFROTC—Air Force Reserve Officer's Training Corps

AFSC—Air Force Specialty Code

AL/AOC—Armstrong Laboratory/Aerospace Medicine Directorate, Clinical Sciences Division

AL/AOCAB—Armstrong Laboratory/Aerospace Medicine Directorate, ECG Library

AL/AOCI—Armstrong Laboratory/Aerospace Medicine Directorate, Flight Medicine

AL/AOCO—Armstrong Laboratory/Aerospace Medicine Directorate, Ophthalmology

AMC—Air Mobility Command

AME—Aviation Medicine Examiner

AMP—Aerospace Medicine Primary (course)

ANG—Air National Guard

ANGRC—Air National Guard Reserve Center

ANSI—American National Standards Institute

AR—Adaptability Rating

ARC—Air Reserve Component

AR Space and Missile Duty—Adaptability Rating Space and Missile Duty

ARF—Air Reserve Forces

ARMA—Adaptability Rating Military Aviation

ARPC—Air Reserve Personnel Center

ASMRO—Armed Services Medical Regulating Officer

AV—Atrioventricular

AWOL—Absent Without Official Leave

BES—Bioenvironmental Engineering Section

BSC—Biomedical Sciences Corps

CBPO—Consolidated Base Personnel Office

CCPO—Consolidated Civilian Personnel Office

cm—Centimeter

CNS—Central Nervous System

CONUS—Continental United States

CSAF—Chief of Staff United States Air Force

CT—Cover test

DAF—Department of the Air Force

DAFSC—Duty Air Force Specialty Code

dB—Decibel

DBMS—Director of Base Medical Services

DC—Dental Corps

DEROS—Date Eligible for Return from Overseas

DNIF—Duties Not Involving Flying

DOD—Department of Defense

DODMERB—Department of Defense Medical Examination Review Board

DOS—Date of separation

DPA-V—Depth Perception Apparatus - Verhoeff

DSM—Diagnostic and Statistical Manual

EAD—Extended active duty

ECG or EKG—Electrocardiogram

EFS-M—Enhanced Flight Screening - Medical

ELISA—Enzyme-Linked Immunosorbent Assay

ENT—Ear, nose, and throat

EPTS—Existed prior to service

ETS—Expiration of term of service

FAA—Federal Aviation Administration

FALANT—Farnsworth Lantern test

FAR—Federal Air Regulation

FMO—Flight Management Officer

FTS-ABS—Fluorescent Treponemal Antibody Absorption

GBC—Ground Based Controller

GLC—High G induced loss of consciousness

G6PD—Glucose 6 Phosphate Dehydrogenase

HDL—High Density Lipoprotein

HPSP—Health Professions Scholarship Program

HCDC—Hearing Conservation Data Center

HCDR—Hearing Conservation Data Registry

HIV—Human Immunodeficiency Virus

HOSM—Host Operations System Management

HTL—Hearing Threshold Level

IDT—Inactive duty for training

IOT—Intraocular Tension

IMA—Individual Mobilization augmentee

ISO—International Standards Organization

LAS—Limited assignment status

LOC—Loss of consciousness

LOD—Line of duty

MAJCOM—Major command

MC—Medical Corps

MEB—Medical Evaluation Board

MEPS—Military Entrance Processing Station

MERC—Medical Equipment Repair Center

mm—Millimeter

mmHg—Millimeters of mercury

MPF—Military Personnel Flight

MSC—Medical Service Corps

MTF—Medical Treatment Facility

MVP—Mitral Valve Prolapse

NATO—North Atlantic Treaty Organization

NC—Nurse Corps

NCNS—No Complications, No Sequelae

NIBH—Not indicated by history

NOK—Next of kin

NVG—Night vision goggles

OTS—Officer Training School

OVT—Optec Vision Tester

PA—Physician's Assistant

PC—Point of convergence

PCA—Permanent change of assignment

PCS—Permanent change of station

PEB—Physical Evaluation Board

PEBRH—Physical Evaluation Board Referral Hospital

PES—Physical Examination and Standards

PFT—Pulmonary function test

PH—Public Health

PIP—Pseudoisochromatic Plate

PMMA—Polymethyl Methacrylate

PTT—Permanent Threshold Shift

RAT—Reading Aloud Test

Rated Officer—Trained pilot, navigator, or flight surgeon

RBC—Red blood cell

RD—Reinforcement designees

ROTC—Reserve Officer Training Corps

RPR—Rapid Plasma Reagin

RTFS—Return To Flying Status

RTS—Return To Status

SMOD—Space and Missile Operations Duty

SPACECOM—Space Command

SSN—Social security number

STS—Standard Threshold Shift

TDY—Temporary duty

TTS—Temporary Threshold Shift

UNT—Undergraduate navigator training

UPT—Undergraduate pilot training

USAFR—US Air Force Reserve

USUHS—Uniformed Services University of Health Sciences

VASCI—Veterans administration spinal cord injury

VDRL—Venereal Disease Research Laboratory

VTA-ND—Vision Test Apparatus, Near and Distant (same tests as OVT)

VTS-CV—Vision Test Set, Color Vision (also known as PIP)

WAVR-File—Centralized waiver repository

WHNS—Well Healed, Non Symptomatic

Attachment 2

CYCLOPLEGIC REFRACTION ADVISORY STATEMENT

(Letterhead Stationary)

MEMORANDUM FOR [Patients name]

FROM: [Your facilities

complete address]

SUBJECT: Cycloplegic Eye Examination

- ACTION MEMORANDUM

1. A cycloplegic eye examination is required as part of your physical examination for pilot or navigator training according to Air Force Instruction 48-123. A cycloplegic is a drug that dilates the pupil, limiting the eyes ability to focus at various distances. Although it is not harmful, this drug may affect the eye for 18 hours or longer.

2. You are advised that operating a motor vehicle or other machinery following this examination, and within an 18- to 20-hour period, could be hazardous. We recommend that you arrange for someone to drive you home when you have completed your physical examination. This person should not be undergoing a similar examination. Also, you should bring a pair of sunglasses, because bright light may cause some discomfort after the cycloplegic eye examination.

3. Please return this document to us after you have acknowledged receipt of this information by signing and dating the following statement. If you have any additional questions please notify the medical technician.

[Chief of AMS or OIC signature and

signature block]

1st Ind, Patient

To: [Your facility]

I have been advised and fully understand that my flying training physical examination requires a cycloplegic eye examination which may impair my vision for approximately 18 to 20 hours. I acknowledge that I should not operate a vehicle or machinery under these conditions, for it could prove hazardous. I have been advised of the need for me to bring a pair of sunglasses since bright light may cause me some discomfort following the examination.

_____ _____

Applicant's Signature Date Signed

Attachment 3

INSTRUCTIONS FOR CALCULATING PULMONARY FUNCTION MEASUREMENTS

A3.1. The measurements for the actual FVC, FEV1, and FEV1/FVC are meaningful only if they are corrected to body temperature, pressure saturated (BTPS). To compensate for the change from body temperature to room temperature, multiply the BTPS factor found below by the measured FVC and FEV1 as the formula in paragraph 3 below indicates (temperatures are listed as Celsius / Fahrenheit)

Room Temp	BTPS Factor	Room Temp	BTPS Factor
18 / 64.4	1.113	24 / 75.2	1.080
19 / 66.2	1.108	25 / 77.0	1.075
20 / 68.0	1.102	26 / 78.8	1.069
21 / 69.8	1.096	27 / 80.6	1.063
22 / 71.6	1.091	28 / 82.4	1.057
23 / 73.4	1.085	29 / 84.2	1.051

A3.2. Instruction for using the Tables:

A3.2.1. The tables are broken out for sex and Caucasian / other race examinees. For other race examinees, the 15% reduction in lung capacity has already been factored in.

A3.2.2. Read across the top of the chart for the examinee's age and along the side for their height in inches. The intersection will provide two numbers for their predicted spirometry values (FEV1 first, then the FVC).

A3.2.3. In the event that the examinee's values cannot be determined (too young, too old, too short or too tall), the formulas for determining the predicted values are listed on the tables.

A3.3. Formulas: To calculate the percent for FVC, FEV1, and FEV1/FVC, use the following formulas (the answers will be given in terms of percent):

$$\frac{\text{measured FVC} \times \text{BTPS Factor} \times 100}{\text{predicted FVC}} = \text{FVC Percent}$$

$$\frac{\text{measured FEV1} \times \text{BTPS Factor} \times 100}{\text{predicted FEV1}} = \text{FEV1 Percent}$$

$$\frac{\text{measured FEV1}}{\text{measured FVC}} \times 100 = \text{FEV1/FVC}$$

*NOTE: While it is normal for other races to have pulmonary function values 15 percent lower than Caucasians, their FEV1/FVC ratio should be 75 percent or greater.

Attachment 4

AMPLIFICATION OF POSITIVE MEDICAL HISTORY ITEMS, STANDARD FORM 93

On the following pages you will find basic recommended instructions and examples to follow when explaining answers to items checked "YES" or "DON'T KNOW" on Standard Form 93. It is more important to ensure the item of medical history is explained clearly rather than explained briefly. The following items are in alphabetical order, using the wording as it appears on the SF 93. Related items only need one entry and should be tied together. Refer to AFI 48-123 for further studies that may have to be accomplished because of a specific item of medical history.

1. Adverse Reaction To Serum, Drug, or Medicine: Diagnosis (Dx), dates, manifestations, treatment (Rx), recurrence, use of agents since, complications, sequelae. *Example:* Adverse reaction to penicillin in childhood, manifested by urticaria, no recurrence, none taken since, NCNS.

2. Arthritis, Rheumatism, or Bursitis: Dx, joint affected, dates, recurrence, cause, manifestations, Rx, complications, sequelae.

Example: Arthritis of both ankles and knees, first occurred 1975, (last symptoms 1979), manifested by joint pain after exercise, relieved by weight reduction, aspirin, and heat, NCNS.

3. Asthma: Dx, dates, Rx, history, recurrence, complications, sequelae.

Example: Asthma in childhood, treated symptomatically with Azmacort, no recurrence after age twelve, NCNS.

4. Attempted Suicide: Statement, dates, how attempted, reasons, any further attempts, any follow-up Rx.

Example: Attempted suicide once, 1978, drug overdose, due to family and financial problems, no further attempts, seen in mental health 2 months and released.

5. Bed Wetting Since Age 12: Dx, dates, recurrence, number of episodes since age 12, cause (organic or psychological), Rx.

Example: Enuresis, 1978, occurred 14 times in 16 days, only episode since age 12, no organic disease found, attributed to emotional conflict with parents, no treatment or recurrence.

6. Been a Sleepwalker: Dx, dates, recurrence, total number of episodes, statement of any episodes during the year before the examination, Rx.

Example: Sleepwalking, 1966 - 1976, total of three episodes, no recurrence within 3 years of examination, no treatment.

7. Been Treated for a Female Disorder: Dx, dates, Rx, recurrence, complications, sequelae.

Example: Dysmenorrhea, 1977, treated with physical activity, no recurrence, NCNS.

8. Bled Excessively After Injury or Tooth Extraction: Dx, dates, cause, Rx, recovery, complications, sequelae.

Example: Bled excessively after extraction of two lower molars, 1978, repacked by dentist, full recovery, NCNS.

9. Bone, Joint, or Other Deformity: Dx, area affected, dates, cause, Rx, interference with function or circulation, complications, sequelae.

Example: Congenitally deformed left ankle, treated with cast for 6 months and corrected, no current interference with function or circulation, NCNS.

10. Broken Bones: Dx (to include location), dates, cause, Rx, recovery, complications, sequelae.

Example: Fractured left femur, 1975, due to football injury, treated with cast for 10 weeks, full recovery, NCNS.

11. Car, Train, Sea or Air Sickness: Dx, dates, environmental or psychological factors, Rx, exposure to cause since.

Example: Air sickness, 1977 to present, air sick on all exposures to flying, Treated with Dramamine with minimal results.

Example: Sea sickness, 1978, during rough weather, many other passengers also were sick, no treatment, several boat trips since without sickness.

12. Childhood Diseases: Common ones (mumps, measles, and chickenpox) may be grouped together. Dx, date, Rx, complications, sequelae.

Example: Measles, mumps, and chickenpox in childhood, NCNS.

Example: Pertussis in childhood, NCNS.

13. Childhood Injuries: Statement, location, dates, Rx, recovery, complications, sequelae.

Example: Small irregular traumatic scar, posterior left thigh, in childhood, sutured, NCNS.

14. Childhood Operations: List each separately. Operation, date, complications, sequelae.

Example: Tonsillectomy in childhood, NCNS.

Example: Right inguinal herniorrhaphy in childhood, NCNS.

15. Chronic Cough: Dx, dates, cause, Rx, recovery, recurrence, complications, sequelae.

Example: Chronic cough, 1969 to 1974, associated with cold weather, treated symptomatically with inhaler, full recovery, no recurrence, NCNS.

16. Chronic or Frequent Colds: Dx, frequency, severity, dates, geographical influence, Rx, recovery, recurrence, complications, sequalae.

Example: Frequent colds, 10 times a year, mild to sever, from 1970 to 1976, only while living in Wisconsin, treated symptomatically, full recovery, no recurrence, NCNS.

17. Contact Lenses: Type, reason worn, date first used, date last worn.

Example: Colored soft contacts worn for cosmetic purposes since 1992, sot worn for 3 months prior to this examination.

Example: Hard lens contacts for Orthokeratology since 1990, contacts removed 72 hours prior to this examination.

*NOTE: Orthokeratology is the use of special contact lenses to treat myopia by altering the curvature of the cornea.

18. Coughed up Blood: Dx, cause, dates, Rx, recovery, recurrence, complications, sequelae.

Example: Coughed up blood, due to acute pneumonia, 1977, hospitalized for 2 weeks, no recurrence, NCNS.

19. Cramps in Legs: Dx, dates, cause, Rx, recovery, complications, sequelae.

Example: Cramps in legs, 1976 to 1977, following athletic exercise, subsided with rest, full recovery, NCNS.

20. Depression or Excessive Worry: Dx, dates, cause, frequency, Rx.

Example: Depression, 1975, due to family problems, lasted 2 weeks, resolved with the resolution of the family problem, no professional treatment, no recurrence.

21. Diabetes (Personal or Family): Statement, relationship (if not the examinee), Rx, present health, results of tests on examinee.

Example: Father has adult onset diabetes mellitus, treated with Insulin, good health, examinee's fasting blood sugar (or Glucose Tolerance Test) are normal (see item #50).

22. Disturbance of Consciousness: Dx, dates, cause, time period, Rx (to include hospitalization and results of neurological evaluation), recovery, complications, sequelae.

Example: Loss of consciousness, 1979, due to blow to head with baseball bat, unconscious for approximately 10 minutes, admitted to hospital overnight for observation, neurological evaluation and CT scan were normal, full recovery, NCNS.

23. Dizziness or Fainting Spells: Dx, dates, body position, symptoms before fainting or dizziness, time of unconscious, post-unconsciousness mental state, contributing factors or associated stresses, Rx.

Example: Syncopal episode, 1986, had symptoms of influenza for 3 days before, unconscious for 2 minutes, well oriented upon gaining consciousness, attributed to viral illness, no treatment.

Example: Dizziness, 1984, standing up quickly from a sitting position, no loss of consciousness, no known contributing factors or associated stresses, no treatment.

24. Ear, Nose, or Throat Trouble: Dx, dates, causes, Rx, recovery, recurrence, complications, sequelae.

Example: Ear trouble in childhood, due to chronic otitis media, treated with Penicillin and PE tubes, tubes removed in 1979, full recovery, no recurrence, NCNS.

25. Epilepsy or Fits: Dx, dates, cause, manifestations, frequency, Rx, complications, sequelae.

Example: Idiopathic epilepsy, 1979, manifested by petit mal seizure, lasted for 5-7 months, treated with Dilantin for 1 year, no recurrence since, NCNS.

26. Eye Trouble: Dx, dates, Rx, recurrence, recovery, complications, sequelae.

Example: Pterygium, left eye, 1974, surgically corrected, full recovery, no recurrence, NCNS.

27. Foot Trouble: Dx, dates, cause, Rx, complications, sequelae.

Example: Hammer toe, left 2nd toe in childhood, residual of poliomyelitis, surgically corrected in 1972, full recovery, NCNS.

28. Frequent Indigestion: Dx, dates, cause, Rx, recurrence, complications, sequelae.

Example: Frequent indigestion secondary to hiatal hernia, 1987, treated with Maalox and staying away from spicy foods, no symptoms since 1989, examinee still uses antacids and watches diet, NCNS.

29. Frequent or Painful Urination: Dx, dates, cause, Rx, recurrence, complications, sequelae.

Example: Painful urination, 1988, secondary to urinary tract infection, treated with sulfa drugs, no recurrence, NCNS.

30. Frequent or Severe Headaches: Dx, dates, frequency, cause, disability during attacks, Rx, complications, sequelae.

Example: Severe migraine headaches, 1980 - 1984, weekly occurrence, disabling, relieved with Cafergot, NCNS.

31. Frequent Trouble Sleeping: Dx, dates, cause, frequency, Rx.

Example: Insomnia, 1987, due to scholastic problems, lasted for 1 week, no recurrence, no treatment.

32. Gall Bladder Trouble or Gallstones: Dx, dates, Rx, recurrence, complications, sequelae.

Example: Cholelithiasis, 1989, surgically removed, full recovery, no recurrence, NCNS.

33. Had a Change in Menstrual Pattern: Dx, dates, cause, recurrence, complications, sequelae.

Example: Irregular menses, 1990, due to emotional problems, regular cycle since, NCNS.

34. Have Vision in Both Eyes (NEGATIVE RESPONSES ONLY): Dx, date vision or eye was lost, cause, Rx, complications, sequelae.

Example: Lost vision in left eye, 1990, secondary to industrial accident, no treatment, NCNS.

Example: Enucleated right eye, 1987, in automobile accident, treated with prosthetic device, NCNS.

35. Have You Consulted or Been Treated by Clinics, Physicians, Healers, or Other Practitioners Within the Past 5 Years for Other Than Minor Illnesses? If the disease mentioned is already described in this attachment, record the entry according to those directions.

Example If not described; record the Dx, dates, cause, manifestations, Rx, recovery, recurrence, complications, sequelae.

36. Have You Ever Been a Patient in Any Type of Hospital? Statement, dates, reason, complications, sequelae. Related items only need one entry and should be tied together.

Example: Admitted to hospital, 1989, appendectomy, NCNS.

37. Have You Ever Been Denied Life Insurance? Statement and reason, dates, subsequent Rx, results.

Example: Denied life insurance because of recent glomerulonephritis, 1988, obtained insurance from the same company in 1989 after follow-up examination were negative for renal disease or dysfunction.

38. Have You Ever Been Discharged From Military Service Because of Physical, Mental, or Other Reason? Type of discharge, service discharge from, dates, reason, disability received.

Example: Honorably discharged from US Air Force in 1982 following expiration of term of service, no disability received.

39. Have You Ever Been Refused Employment or Been Unable to Hold a Job or Stay in School Because of; Sensitivity to Chemicals, Dust, Sunlight, etc.; Inability to Perform Certain Motions; Inability to Assume Certain Positions; Other Medical Reasons? Reason, dates, Rx, complications, sequelae.

Example: Was unable to hold a job on a farm because of pollen sensitivity (hay fever), 1987, received desensitization, full recovery, no recurrence.

Example: Unable to hold job as computer operator because of limitation of flexion of fingers (left hand) following injury in 1989, no treatment required.

Example: Unable to hold job as control tower operator because of duodenal ulcer, 1987, treated with medication, good recovery, no recurrence, NCNS.

40. Have You Ever Been Rejected for Military Service Because of Physical, Mental, or Other Reasons? Statement, branch of service, dates, reason.

Example: Rejected for service with the US Navy, 1990, for history of chronic motion (sea) sickness.

41. Have You Ever Been Treated for a Mental Conditions? Dx, dates, Rx, recovery, recurrence, complications, sequelae.

Example: Chronic anxiety reactions, 1988, hospitalized for 3 month, no maintenance medications, full recovery, no recurrence, NCNS.

42. Have You Ever Had Any Illness or Injury Other Than Those Already Noted? Dx, dates, cause, Rx, complications, sequelae.

Example: Pneumonia, 1986, hospitalized for 3 days, full recovery, no recurrence, NCNS.

43. Have You Had, or Have You Been Advised to Have, Any Operations? Operation, dates, recovery, complications, sequelae.

Example: Vasectomy, 1990, hospitalized 3 days for testicular edema, full recovery, NCNS.

44. Have You Received, Is There Pending, or Have You Applied for Pension or Compensation for Existing Disability? Pension, pending or received, dates, reason, amount of pension.

Example: Receiving disability pension since 1980, for symptomatic ankylosing spondylitis, 30 percent.

Example: Intends to apply for disability pension for hearing loss, no action taken to date.

Example: Received 15 percent disability pension, 1981 to 1984, for duodenal ulcer, disability waivered in 1984 upon return to active duty, has been asymptomatic since 1984, does not intend to reapply.

45. Hay Fever: Dx, frequency, severity, dates, geographical influence, Rx, recovery, recurrence, complications, sequelae.

Example: Allergic rhinitis, seasonal (spring), mild, 1982 to 1986, while living in Montana, treated with antihistamines, no recurrence since leaving Montana, NCNS.

46. Head Injury: Dx (indicate whether injury was closed or penetrating), dates, cause, Rx (including diagnostic studies and results), hospitalization, loss of consciousness, recovery, complications, sequelae.

Example: Moderate laceration to left forehead and non penetrating, non displaced skull fracture, 1988, due to hitting windshield during automobile accident, laceration closed with sutures, hospitalized for 3 days, CT-Scan revealed epidural hemorrhage, no loss of consciousness, full recovery, NCNS.

47. Hearing Loss: Dx, dates, cause, Rx, results.

Example: Bilateral high frequency hearing loss, first noted 1986, attributed to working on flightline without ear plugs, has worn hearing aid since 1988 with good results.

48. Heart Trouble: Dx, dates, cause, Rx, recovery, recurrence, complications, sequelae.

Example: Systolic ejection murmur, Grade II/IV, since childhood, due to rheumatic fever, no treatment, still present.

49. High or Low Blood Pressure: Dx, dates, cause, Rx, recurrence, complications, sequelae.

Example: Hypertension, 1989, familial, treated with low salt diet and weight reduction with fair results, started on Hydrochlorothiazide in 1991 with good results, NCNS.

50. Irradiation Therapy: Statement, dates, reason, complications, sequelae.

Example: Irradiation therapy to thyroid gland for control of hyperthyroidism, in childhood, good results and normal follow-ups, NCNS.

Example: Carcinoma right breast, 1987, treated with radial mastectomy and irradiation therapy, follow-up evaluations have been normal, NCNS.

51. Jaundice or Hepatitis: Dx, dates, cause, Rx, recurrence, complications, sequelae.

Example: Jaundice, 1983, due to infectious hepatitis, treated with bed rest and diet for 4 weeks, full recovery, no recurrence, NCNS.

52. Kidney Stone or Blood in Urine: Dx, dates, Rx (including diagnostic tests and results), recurrence, complications, sequelae.

Example: Right unilateral renal calculus, 1984, hospitalized 3 days, passed spontaneously, intravenous pylogram (IVP) normal after passing, no recurrence, NCNS.

Example: Hematuria, 1987, exercise induced, no hospitalization, cystoscopy is normal, cleared spontaneously, no recurrence, NCNS.

53. Lameness: Dx, dates, cause, Rx, complications, sequelae.

Example: Lameness, 1988, secondary to total traumatic amputation of left great toe, following lawn mowing accident, well healed, does not interfere with activities, runs 3 mile 3 times a week, NCNS.

54. Lived With Anyone Who Had TB? Person lived with, length of time, results of tuberculin testing on examinee.

Example: Mother with tuberculosis, examinee lived with her for 6 months, chest x-ray and IPPD tests were normal/negative on examinee.

55. Loss of Finger or Toe: Dx, dates, cause, Rx, complications, sequelae.

Example: Traumatic amputation of distal phalanx, right 4th finger, 1988, secondary to farming accident, sutured, NCNS.

56. Loss of Memory or Amnesia: Dx, dates, duration, cause, unconsciousness, Rx, complications, sequelae.

Example: Amnesia, 1987, 2 months duration, psychogenic reaction to physical abuse, no loss of consciousness, entered in mental health support program for 4 months, NCNS.

57. Medication Use: Medication (include both prescription and over the counter), reason for taking, amount taken, date of last usage.

Example: Examinee is currently self medicating with Dristan for congestion, 3 times a day, none taken day of physical examination.

58. Motion Sickness: Dx, dates, environmental or psychological factors, Rx, exposure to cause since. (see item 11 of this attachment)

Example: Air sickness, 1988 to present, air sick on all exposures to flying while in pilot training, administratively removed from UPT in 1988, no treatment.

59. Nervous Trouble of Any Sort: Dx, dates, duration, Rx, complications, sequelae.

Example: Nervous trouble, 1986, due to job pressure, lasted for 2 weeks, cleared when quit job, no treatment, no recurrence, NCNS.

60. Neuritis: Dx, dates, cause, Rx, recovery, recurrence, complications, sequelae.

Example: Guillain-Barre syndrome, 1971, following influenza vaccine, hospitalized 3 months, full recovery, no recurrence, NCNS.

61. Pain or Pressure in Chest: Dx, dates, cause, Rx, recovery, complications, sequelae.

Example: Chest pain, 1980, due to epidemic pleurodynia, treated by taping chest and bed rest, full recovery, NCNS.

62. Painful or "Trick" Shoulder or Elbow: Dx, dates, cause, frequency, manifestations, severity, disability, Rx.

Example: Painful left shoulder, 1988, football injury, 2 occasions, manifested by joint swelling, minimal disability, treated with physical therapy, no recurrence, NCNS.

63. Palpitation or Pounding Heart: Dx, dates, cause, Rx, recovery, complications, sequelae.

Example: Palpitations, 1990, following prolonged exertion, subsided after short rest period, follow-up evaluation revealed normal cardiovascular systems, NCNS.

64. Paralysis (including infantile): Dx, dates, cause, Rx, recovery, complications, sequelae.

Example: Paralytic poliomyelitis, 1960, hospitalized for 6 weeks, has mild residual weakness of muscles of left leg, otherwise NCNS.

65. Periods of Unconsciousness: Dx, dates, cause, time period, Rx (include hospitalization and results of neurological evaluation), recovery, complications, sequelae.

Example: Unconscious, 1989, after blow to head with lead pipe, unconscious for 20 minutes, post traumatic seizure observed, hospitalized for 3 days, neurological evaluation at that time was normal, full recovery, NCNS.

66. Piles or Rectal Disease: Dx, location, dates, Rx, recurrence, complications, sequelae.

Example: External hemorrhoids, 1985, treated with sitz baths, no recurrence, NCNS.

67. Present Health: Statement (in terms of; excellent, good, fair, or poor), reason (if fair or poor).

Example: Examinee feels present health is poor due to heart condition listed in the medical history.

68. Psychosis (Personal or Family): Relationship (if not the examinee), Dx, dates, Rx, present status.

Example: Father with history of chronic manic depressive reaction, institutionalized in 1987.

Example: Obsessive compulsive disorder, 1989 to present, presently under the care of a psychiatrist.

69. Recent Gain or Loss of Weight: Dx, dates, amount of weight lost or gained, cause, Rx.

Example: Lost 30 pounds, January to May 1994, due to dieting, no treatment.

70. Recurrent Back Pain: Dx, dates, cause, Rx, duration, disability, recovery, recurrence, complications, sequelae.

Example: Back pain, 1990, while lifting heavy weights, wore back brace for 2 weeks, minimal disability, full recovery, no recurrence, NCNS.

71. Rheumatic Fever: Dx, dates, manifestations, recurrence, complications, sequelae.

Example: Rheumatic fever, in childhood, manifested by heart murmur, no recurrence, NCNS.

72. Rupture or Hernia: Dx, location, dates, Rx, recurrence, complications, sequelae.

Example: Right inguinal hernia, 1990, surgically corrected, no recurrence, NCNS.

73. Scarlet Fever, Erysipelas: Dx, dates, complications, sequelae.

Example: Erysipelas, childhood, treated with penicillin, NCNS.

74. Severe Tooth or Gum Trouble: Dx, dates, cause, Rx, complications, sequelae.

Example: Tooth trouble, 1986, five teeth extracted, full recovery, NCNS.

75. Shortness of Breath: Dx, dates, cause, Rx, complications, sequelae.

Example: Shortness of breath, 1987 - 1988, following prolonged exertion during athletic competition, resolved with short rest periods, NCNS.

76. Skin Diseases: Dx, dates, cause, Rx, recovery, recurrence, complications, sequelae.

Example: Urticaria, 1988, due to unknown allergen, cleared spontaneously, no recurrence, NCNS.

77. Sinusitis: Dx, frequency, severity, duration, dates, geographical influence, Rx, complications, sequelae.

Example: Acute sinusitis, average of 4 episodes a year, severe reaction, lasted 10 to 14 days each episode, 1980 - 1985, occurred while living in Kansas, no recurrence since leaving Kansas, treated with antibiotics, full recovery, NCNS.

78. Stomach, Liver, or Intestinal Trouble: Dx, dates, Rx, recurrence, complications, sequelae.

Example: Duodenal ulcer, 1989, treated with mylanta, no recurrence, NCNS.

79. Stutter or Stammer Habitually: Dx, dates, duration, Rx.

Example: Stuttered in childhood, 1978 - 1981, recurs under stressful situations, treated with speech therapy.

80. Swollen or Painful Joints: Dx, dates, cause, recurrence, complications, sequelae.

Example: Swollen right ankle, 1989, caused by trauma, no treatment, no recurrence, NCNS.

81. Sugar or Albumin in Urine: Dx, dates, cause, Rx, recurrence, complications, sequelae.

Example: Sugar in urine, 1987, diagnosed as Diabetes Mellitus, adult onset, treated with oral medication and diet, controlled well, routine follow-up evaluations have been normal.

82. Thyroid Trouble: Dx, dates, Rx, recovery, recurrence, complications, sequelae.

Example: Hypothyroidism, 1976, treated with Synthroid, well controlled, no problems noted.

83. "Trick" or Locked Knee: Dx, dates, cause, frequency, manifestations, severity, Rx.

Example: Anterior cruciate ligament tear left knee, 1984, while playing racquetball, moderate instability, treated with arthroscopy surgery and physical therapy, full recovery, NCNS.

84. Tuberculosis: Dx, dates, Rx, follow-up studies, complications, sequelae.

Example: Pulmonary tuberculosis and minimal therapeutic pneumothorax, 1982, full recovery, no complications, follow-up studies to date have been negative for active disease, NCNS.

85. Tumor, Growth, Cyst, Cancer: Dx, location, dates, Rx, recurrence, complications, sequelae.

Example: Pilonidal cyst, 1988, surgically excised, no recurrence, NCNS.

86. VD - Syphilis, Gonorrhea, etc.: Dx, dates, Rx, recovery, complications, sequelae.

Example: Gonorrhea, 1974, treated with antibiotics, full recovery, NCNS.

87. Wear a Brace or Back Support: Dx, dates, cause, duration worn, recurrence, complications, sequelae.

Example: Back strain, 1990, while lifting heavy boxes, wore back brace for 6 weeks, no recurrence, NCNS.

88. Wear a Hearing Aid: Dx, dates, how long worn, results.

Example: Neurosensory hearing loss, 1989, bilateral, has worn hearing aid since 1989 with good results.

89. Wear Glasses or Contact Lenses: Statement, dates, statement as to adequacy of present prescription.

Example: Glasses worn since 1986 to correct distant visual acuity, current prescription is adequate.

Attachment 5

IN-FLIGHT HEARING TEST WORD AND PHRASE LIST
TEST 1: EXAMINER'S TEST SHEET

LIST 1	LIST 2	LIST 3
1. LATE	1. RATE	1. DATE
2. PUMP	2. BUMP	2. DUMP
3. KEEP	3. BEEP	3. DEEP
4. BASE	4. RACE	4. CASE
5. RUT	5. CUT	5. NUT
6. BLIP	6. SHIP	6. FLIP
7. HAZE	7. BLAZE	7. RAISE
8. CHOP	8. STOP	8. FLOP
9. LUMP	9. SUMP	9. CLUMP
10. DIP	10. RIP	10. SKIP
11. DASH	11. FLASH	11. CRASH
12. FILL	12. SPILL	12. STILL
13. FIVE	13. LIVE	13. DIVE
14. FLAP	14. SLAP	14. SNAP
15. GUN	15. SUN	15. RUN
16. GEAR	16. NEAR	16. REAR
17. PURGE	17. SURGE	17. MERGE
18. LATCH	18. HATCH	18. BATCH
19. GROUP	19. SWOOP	19. LOOP
20. JET	20. GET	20. WET
21. HULL	21. NULL	21. GULL
22. HOOK	22. LOOK	22. CROOK
23. PHASE	23. DAZE	23. PAYS
24. CAGE	24. STAGE	24. PAGE
25. CODE	25. LOAD	25. NODE
26. CALL	26. STALL	26. FALL
27. LOG	27. FOG	27. SMOG
28. PITCH	28. WHICH	28. DITCH
29. LAST	29. BLAST	29. FAST
30. MIKE	30. STRIKE	30. LIKE
31. POD	31. SOD	31. ROD
32. SEAT	32. FLEET	32. NEAT

LIST 1	LIST 2	LIST 3
33. SIGHT	33. RIGHT	33. LIGHT
34. SCOPE	34. SLOPE	34. GROPE
35. SLIP	35. GRIP	35. STRIP
36. SPEED	36. NEED	36. BLEED
37. TAKE	37. BRAKE	37. LAKE
38. SENT	38. VENT	38. WENT
39. DECK	39. SPECK	39. WRECK
40 CLASH	40. BASH	40. TRASH
41. DWELL	41. SWELL	41. SMELL
42. MADE	42. BLADE	42. FADE
43. WILL	43. KILL	43. HILL
44. REELS	44. FEELS	44. MEALS
45. SCAN	45. SPAN	45. FAN
46. COARSE	46. FORCE	46. SOURCE
47. RIDE	47. SLIDE	47. GUIDE
48. RED	48. HEAD	48. LED
49. LOCKED	49. CLOCKED	49. BLOCKED
50. MIST	50. LIST	50. TWIST

Attachment 6

TEST 1: ANSWER SHEET

List Number: _____

SSAN: _____ NAME: _____ DATE:_____

INSTRUCTION: Mark through word heard. If not certain, guess.

1.	LATE	DATE	RATE	26.	STALL	FALL	CALL
2.	DUMP	PUMP	BUMP	27.	LOG	SMOG	FOG
3.	BEEP	KEEP	DEEP	28,	DITCH	WHICH	PITCH
4.	RACE	BASE	CASE	29.	BLAST	LAST	FAST
5.	RUT	CUT	NUT	30.	MIKE	STRIKE	LIKE
6.	FLIP	BLIP	SHIP	31.	POD	SOD	ROD
7.	BLAZE	HAZE	RAISE	32.	NEAT	SEAT	FLEET
8.	STOP	FLOP	CHOP	33.	SIGHT	RIGHT	LIGHT
9.	LUMP	CLUMP	SUMP	34.	GROPE	SLOPE	SCOPE
10.	SKIP	DIP	RIP	35.	GRIP	SLIP	STRIP
11.	DASH	CRASH	FLASH	36.	NEED	SPEED	BLEED
12.	STILL	FILL	SPILL	37.	TAKE	LAKE	BRAKE
13.	FIVE	DIVE	LIVE	38.	SENT	VENT	WENT
14.	SLAP	SNAP	FLAP	39.	WRECK	SPECK	DECK
15.	SUN	RUN	GUN	40.	TRASH	CLASH	BASH
16.	GEAR	REAR	NEAR	41.	SWELL	SMELL	DWELL
17.	SURGE	PURGE	MERGE	42,	FADE	BLADE	MADE
18.	BATCH	HATCH	LATCH	43.	WILL	HILL	KILL
19.	GROUP	SWOOP	LOOP	44.	FEELS	REELS	MEALS
20.	GET	JET	WET	45.	SCAN	FAN	SPAN
21.	NULL	GULL	HULL	46.	COARSE	FORCE	SOURCE
22.	HOOK	CROOK	LOOK	47.	SLIDE	GUIDE	RIDE
23.	PAYS	DAZE	PHASE	48.	LED	HEAD	RED
24.	STAGE	CAGE	PAGE	49.	CLOCKED	BLOCKED	LOCKED
25,	CODE	LOAD	NODE	50.	MIST	TWIST	LIST

SCORE 2% for each word (All correct: 100%) Score _____% Examiner's Initials _____

Attachment 7

TEST 2: EXAMINER'S TEST SHEET

LIST 1	LIST 2	LIST 3
1. LATE	1. LAID	1. LANE
2. LEAN	2. LEAD	2. LEAK
3. HAD	3. HATCH	3. HASH
4. SPEED	4. SPEECH	4. SPEAK
5. GROSS	5. GROPE	5. GROVE
6. BUST	6. BUDGE	6. BUMP
7. REEL	7. READ	7. REACH
8. SLAP	8. SLAM	8. SLAB
9. HALF	9. HAVE	9. HANG
10. CHASE	10. CHANGE	10. CHAIN
11. GRADE	11. GRAZE	11. GREAT
12. TRIP	12. TRICK	12. TRIM
13. CREEP	13. CREAM	13. CREEK
14. FADE	14. PHASE	14. FACE
15. SUN	15. SUNK	15. SUB
16. PLACE	16. PLANE	16. PLATE
17. CAME	17. CASE	17. CAGE
18. CHICKS	18. CHIPS	18. CHILLS
19. SLANT	19. SLASH	19. SLACK
20. LEG	20. LED	20. LESS
21. MAZE	21. MAIN	21. MAKE
22. RAISE	22. RAID	22. RATE
23. HUT	23. HUNG	23. HUNT
24. JUDGE	24. JUNK	24. JUMP
25. LATCH	25. LAND	25. LAP
26. NET	26. NEST	26. NEXT
27. FLANK	27. FLAP	27. FLAT
28. SEAT	28. SEEM	28. CEASE
29. KEEN	29. KEEP	29. KEYS
30. WISH	30. WIND	30. WING
31. CLASP	31. CLAMP	31. CLAP
32. SUMP	32. SUCH	32. SOME
33. PATH	33. PAD	33. PAST

LIST 1	LIST 2	LIST 3
34. BLADE	34. BLAZE	34. BLAME
35. FAN	35. FAT	35. FAST
36. LOOSE	36. LOOP	36. LUBE
37. CHAFF	37. CHAP	37. CHAT
38. FEET	38. FIELD	38. FEED
39. CRASHED	39. CRACKED	39. CRAMPED
40. HOLD	40. HOSE	40. HOME
41. NODE	41. NOTE	41. NOSE
42. GATE	42. GAZE	42. GAIN
43. FIN	43. FILL	43. FIFTH
44. SKIP	44. SKIM	44. SKID
45. PACE	45. PAVE	45. PAYS
46. MADE	46. MATE	46. MALE
47. GULPS	47. GUNS	47. GULLS
48. MIST	48. MIX	48. MID
49. LID	49. LINK	49. LIFT
50. SURF	50. SURGE	50. SEARCH

Attachment 8

TEST 2: ANSWER SHEET

List Number: _____

SSAN: _____ NAME: _____ DATE:_____

INSTRUCTION: Mark through word heard. If not certain, guess.

1. LAID	LATE	LANE	26. NET	NEST	NEXT
2. LEAN	LEAD	LEAK	27. LAP	FLAT	FLANK
3. HASH	HATCH	HAD	28. SEEM	CEASE	SEAT
4. SPEECH	SPEAK	SPEED	29. KEEP	KEEN	KEYS
5. GROSS	GROVE	GROPE	30. WISH	WIND	WING
6. BUST	BUDGE	BUMP	31. CLASP	CLAP	CLAMP
7. READ	REEL	REACH	32. SOME	SUMP	SUCH
8. SLAB	SLAP	SLAM	33. PATH	PAD	PAST
9. HANG	HALF	HAVE	34. BLADE	BLAZE	BLAME
10. CHASE	CHANGE	CHAIN	35. FAT	FAN	FAST
11. GRAZE	GREAT	GRADE	36. LOOSE	LUBE	LOOP
12. TRIP	TRIM	TRICK	37. CHAP	CHAFF	CHAT
13. CREEP	CREAM	CREEK	38. FEET	FIELD	FEED
14. HASE	FACE	FADE	39. CRAMPED	CRACKED	CRASHED
15. SUN	SUNK	SUB	40. HOSE	HOLD	HOME
16. PLATE	PLACE	PLANE	41. NODE	NOSE	NOTE
17. CASE	CAME	CAGE	42. GATE	GAZE	GAIN
18. CHICKS	CHIPS	CHILLS	43. FIFTH	FILL	FIN
19. SLACK	SLASH	SLANT	44. SKIM	SKID	SKIP
20. LESS	LED	LEG	45. PACE	PAVE	PAYS
21. MAZE	MAKE	MAIN	46. MALE	MADE	MATE
22. RAID	RATE	RAISE	47. GUNS	GULPS	GULLS
23. HUNG	HUT	HUNT	48. MIST	MIX	MID
24. JUDGE	JUNK	JUMP	49. LIFT	LINK	LID
25. LAP	LAND	LATCH	50. SURF	SURGE	SEARCH

SCORE 2% for each word (All correct : 100%) Score _____% Examiner's Initials _____

Attachment 9

TEST 3: EXAMINER'S TEST SHEET

PHRASE SET 1

1. Begin your BOMB RUN at twenty-five hundred feet.
2. Careful of Turbulence due to PROP WASH.
3. Increase power to reduce SINK RATE.
4. Move lever to WHEELS UP position.
5. TURN LEFT to course two one zero.
6. Would you repeat time of HIGH TIDE.
7. Attempt to hold FAST CRUISE flight.
8. Pull the MAIN SWITCH on the left.
9. Use caution when passing the TRIM PAD.
10. This is TEST FLIGHT two four zero.
11. Careful to check PINS OUT.
12. Attempt to SLOW DOWN airspeed.
13. Insure that BOMB BAY is clear.
14. You are OFF COURSE, correct to the right.
15. Look on the LEFT SIDE of the console.
16. It should be a DOWN HILL run from here.
17. Use UHF master control on the RIGHT SIDE.
18. The FREEZE LINE is fifty miles south of base.
19. Ask vehicle to DIM LIGHTS.
20. Main BUS BOX is below right console.
21. We have a BRISK WIND from the north.
22. BREAK OFF and climb to fifteen thousand.
23. You are SOUTH WEST of the field.
24. I see an AIR PLANE at four o'clock, three miles.
25. Reduce AIR SPEED to three fifty knots.
26. We have LIGHT SNOW with mild wind.
27. Extend lever into LOW BOOST range.
28. You should encounter CLOUD LAYER at eight thousand.
29. I have the CHASE PLANE in sight.

30. Adjust prop to LOW PITCH.
31. The Gas GAUGE appears to be faulty.
32. Come to NEW COURSE of two six zero.
33. I see GUN FIRE on the left at one mile.
34. It appears to be a PROP JET aircraft.
35. See if you can get an AIR START.
36. Do you have your PINS OUT?
37. Below GLIDE PATH, adjust rate of descent.
38. Retract TAIL HOOK into locked position.
39. Execute a SLOW ROLL to the left.
40. You can expect a fifty knot HEAD WIND.
41. Use the HAND CRANK, if necessary.
42. That's a NO JOY.
43. I am picking up GROUND FIRE.
44. After climb out, BREAK LEFT.
45. You should encounter CALM WIND above.
46. I passed through CLEAR AIR during climb out.
47. Move prop control to HIGH PITCH.
48. Do you have SAFE GUNS?
49. BREAK RIGHT after climb out.
50. You are ON COURSE, slightly above glide path.

Attachment 10

TEST 3: EXAMINER'S TEST SHEET
PHRASE SEST 2

1. Execute MID COURSE correction.
2. Caution, TAKE CARE when taxiing by tanker.
3. Attempt to HOLD COURSE throughout descent.
4. She attempts to slide off when I BANK RIGHT.
5. Move the switch into the HOT MIKE Position.
6. I do not have the DRAG CHUTE in sight.
7. We have heavy fog with LIGHT MIST.
8. Make a TIGHT TURN to the right.
9. SET COURSE to two seven zero.
10 Reduce power and maintain SLOW CRUISE.
11. ON TOP at twenty-one thousand.
12. I do not have a GEAR UP condition.
13. We have a hold on your FLIGHT PLAN.
14. We have fog and LIGHT HAZE.
15. Am encountering MILD CHOP.
16. The clouds tend to BREAK UP over to the left.
17. Check CODE BOOK for proper identification.
18. We have Ten minutes before DAY BREAK.
19. Engines DRINK FUEL at an excessive rate.
20. JOIN UP to the left on the flight leader.
21. Turn FLOOD LIGHT off.
22. We have DENSE FOG over the base.
23. O.K. pull FLAPS UP.
24. Rendezvous for LINK UP with tanker.
25. Validate LIVE FUSE condition.
26. Should be about five minutes to TOUCH DOWN.
27. I have a negative BLADE PITCH indication.
28. STEER COURSE three one zero.

29. It appears to have hit the TAIL WHEEL.
30. You are intersecting the BASE LEG now.
31. The CLOUD DECK extends to eighteen thousand.
32. Be advised you have a FLAT TIRE on the left main gear.
33. We have dense smoke in the FLIGHT DECK.
34. On my command, DUMP STORES.
35. Do not place BOARDS OUT above three hundred and fifty knots.
36. There's a BIG BLOW off to the west.
37. The FUEL FLOW indicator is defective.
38. Attempt to DUMP FUEL over the water.
39. I am encountering LIGHT RAIN.
40. Do you have a target SOUTH BOUND at four miles?
41. The AIR BRAKE will not extend.
42. On my command, execute a LEFT TURN.
43. We can expect HIGH WIND after sunset.
44. Do not attempt a SIDE SLIP.
45. Your target is to the left of the large ICE BERG.
46. You can expect THICK CLOUDS with intermittent showers.
47. Give me HALF FLAPS.
48. Check to see that LAP BELT is secure.
49. Form up with aircraft headed NORTH WEST.
50. You are cleared to depart active at NEXT TURN.

Attachment 11

TEST 3: EXAMINER'S TEST SHEET
PHRASE SET 3

1. We have a CODE THREE on board.
2. You are on final at FOUR MILES.
3. Execute a WIDE TURN to the right.
4. Tower, give me a TIME HACK.
5. Fuel is expended from DROP TANKS.
6. Go ahead and WARM UP radar.
7. Four -six- zero, FROM RIGHT.
8. I am unable to maintain HIGH BOOST.
9. The target area is complete BURNED OUT.
10. The SQUALL LINE is just north of the base.
11. I have three gears LOCKED DOWN.
12. I am approaching COAST LINE.
13. Pass to the FRONT SIDE of the vehicle.
14. Look below left main WHEEL WELL.
15. Did you meet your BLOCK TIME?
16. Next to the left FUSE BOX.
17. You are slightly below FLIGHT PATH.
18. Put your FACE PLATE down.
19. Traffic is WEST BOUND at two miles.
20. Retract SPEED BRAKE and recycle gear.
21. Perform a SPLIT-S maneuver.
22. Just passing the FAR SIDE of the field.
23. I am close to having DRY TANKS.
24. Perform a SNAP ROLL to the right.
25. We have a FLAME OUT on number two.
26. Do not exceed FIVE G's.
27. Careful during descent, we have a CALM SEA.
28. The STORM LINE is fifty miles south.
29. I was AIR BORNE at fifteen-thirty.

30. Affirmative, it belongs to an AIR LINE.
31. It is powered by FAN JET engines.
32. You are slightly on the HIGH SIDE.
33. About to intersect the DOG LEG.
34. Move up and FORM LEFT of leader.
35. BANK LEFT and you can see it.
36. It appears to be a defective FUEL PUMP.
37. Give me FULL FLAPS.
38. Start your RUN UP on my command.
39. Passed below me at FULL SPEED.
40. Try to KEEP PACE with lead ship.
41. Execute a RIGHT TURN at next taxi-way.
42. Fuel in WING TANKS is expended.
43. Just west of the SHORE LINE.
44. Follow in a STEEP TURN to the left.
45. THANK YOU for your assistance.
46. Check breaker on BLEED AIR mechanism.
47. I have THREE LIGHTS in the green.
48. Careful to KEEP CLEAR of exhaust.
49. Remove safety and CHARGE GUNS.
50. Five hundred feet above TREE TOPS.

Attachment 12

TEST 3: EXAMINER'S TEST SHEET
PHRASE SET 4

1. Do not CHANGE SPEED during initial.
2. Wait for engine to SPOOL DOWN.
3. The FUEL FEED mechanism is faulty.
4. We will approach during LOW TIDE.
5. Thrust is on the LOW SIDE.
6. Set scope for HIGH GAIN.
7. The aircraft is twelve miles, EAST BOUND.
8. I have a red light for the NOSE GEAR.
9. Let go of the JOY STICK.
10. Your target is in the MARSH LAND.
11. Arm and blow TIP TANKS.
12. ALL's CALM to the southwest.
13. The HATCH CLOSED, but I have a red light.
14. Attempt to contact WING MAN again.
15. Lightning off to the NORTH EAST.
16. Give me a SLOW COUNT.
17. Unable to FILL TANKS.
18. Off to the LEFT FLANK.
19. Break off if you DRAW FIRE.
20. Make a LOW RUN over the area.
21. Remove safety and ARM GUNS.
22. Remove FACE MASK and check hose.
23. I see a BRIGHT LIGHT below and to the left.
24. Lower airspeed and put GEAR DOWN.
25. Park on EAST SIDE of ramp.
26. Do not park DOWN WIND from sprayers.
27. Thanks for assistance, GOOD BYE.
28. Put BRAKE OUT to control airspeed.
29. The DOME LIGHT is not operating.

30. O.K. number six, YOU'RE HOT.
31. Begin evasive maneuver when IN RANGE.
32. I have the HOOK DOWN and locked.
33. My instruments indicate DRY TANKS.
34. He is on final with WHEELS DOWN.
35. Do you have visual on NORTH BOUND traffic.
36. I have ice build-up on PORT SIDE.
37. You're number two following LEAD SHIP.
38. I see the FUEL POD on the right.
39. I have an unsafe indication for the right MAIN GEAR.
40. Go ahead and put FLAPS DOWN.
41. Try to pull up with minimum G-FORCE.
42. Attempt once more to PURGE TANKS.
43. Your pigeons are in HOME PLATE.
44. Give me a CALL BACK on channel five.
45. DROP DOWN to ten thousand feet.
46. Contact squadron before you SHUT DOWN.
47. Just a little further, you are in HOME STRETCH.
48. The left windshield is ICED UP.
49. I will enter area from SOUTH EAST.
50. The FUEL GAUGE indicates six hundred pounds.