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CONSENT

For the consent to participate in a vision screening and research study

Read the following to the Athlete:

I, the undersigned, give my permission for a Sports Vision Screening to be performed on me by the members of the AOA Sports Vision Section Screening Team (AOA SVSST). In granting this permission, I release agents and representatives of the Junior Olympics and the AOA SVSST from any and all liability, which may arise from the screening examinations or tests. I realize that a screening should not be considered a complete examination and that responsibility for any recommended follow-up care is mine alone.

Having come to the AOA SVSST for this screening, I voluntarily consent to allow the information in my record (including test results, photographs and other pertinent information) to be inspected (reviewed) and/or used for the purpose of research, student education, scientific studies or other professional purposes. During my examination, the clinician or optometrist assigned to me will explain the benefits and risks of specific testing procedures to me. I understand that my name will remain confidential (will not be used) if the information in my record is reviewed.

Furthermore, I am aware that I may refuse to allow the use of my record, but that such refusal would in no way affect the level of care to which I am entitled.

Present the above information to the Athlete and allow for questions to be asked.

If the Athlete agrees to the vision screening have him/her to sign in the appropriate location on the recording form. If the athlete is a minor, have their legal guardian sign the form.
**HISTORY**

It is important to get an accurate ocular and medical history in order to fully utilize the screening information. Ask the Athlete the following questions about their ocular and medical health and sport’s involvement. Allow the Athlete to ask questions and offer additional information and record the answers in the appropriate area on the recording form.

**Demographic info:**

Patient initials:

Age (at time of screening):

Sport: record primary competitive sport

1. baseball
2. basketball
3. hockey
4. football
5. volleyball
6. soccer
7. track
8. tennis
9. swimming
10. wrestling
11. golf
12. softball
13. sailing
14. gymnastics
15. karate/martial arts
16. surfing
17. field hockey
18. power lifting
19. jump aerobics
20. water polo
21. other

Male/ Female:

**Competition level:** record highest level achieved

1. grade school
2. jr. high
3. high school
4. jr. college
5. college NCAA division 2/3
6. college NCAA division 1
7. professional (minor league)
8. professional (major league)
9. recreational
10. control
**Rx History**
What was the date of your last eye Exam in an Eye Doctor’s office? What is your Eye Doctor’s name?

Do you wear corrective lenses? If yes, do you wear them for sports?

Ask which of the following describe the Athlete’s current spectacles.
- None
- ASTM f803 approved Eyewear (Prescriptive)
- Plano Polycarbonate Shield
- Standard Spectacle

If the Athlete uses contact lenses ask which of the following applies.
- Soft Sphere Daily Wear
- Soft Sphere Extended Wear
- Soft Disposables
- Soft Toric
- Rigid Gas Permeable

**Ocular Symptoms**
Ask the Athlete if they ever experience or have been told they have any of the following symptoms:

- Difficulty seeing
- Sensitivity to lights
- Lack of Consistency of Play
- Easily Distracted from Visual Target
- Difficulty following moving objects
- Reduced Peripheral Vision
- Reduced Performance as Stress Builds
- Headaches
- Poor Depth Perception
- Blurred Vision After Close Work

Ask the Athlete if they have any reason to believe they have an eye or vision problem.

**Medical History**
Ask the Athlete to describe their current medical health and to list any medications they are currently taking.
LENSOMETRY

Evaluates: The sphere, cylinder, and axis of the Athlete’s current optical prescription. Perform lensometry on the prescription that the Athlete most often uses for sport’s activities.

Basic Components of a Lensometer
All lensometers have the same basic parts and features although the designs vary. These components are:

1. Viewing Telescope
   This allows the image of the target mire formed by the unknown lens to be viewed. The telescope is focused for optical infinity therefore the mire image will appear clear only if light emerging form the unknown lens into the telescope is parallel.

2. Eyepiece
   The eyepiece is where the observer looks into the lensometer. This must be focused to make the internal reticule clear. The reticule is a black crosshair that in some models has a series of concentric circles and/or hashmarks used to measure prism. The reticule must be in focus in order to obtain an accurate neutralization of unknown lenses.

3. Target (Mires)
   These are object lines inside the body of the lensometer, which are focused by turning the power wheel. They are two perpendicular sets of either 2 or 3 lines. The lines of one set are spaced closely together and the lines of the other set are spaced more widely apart.

4. Power Wheel
   This is an external wheel, which is rotated until the internal mire targets are clear. The sphere and cylinder components of the prescription are read off a scale on power wheel when the mires are in focus.

5. Cylinder (axis) Wheel
   This is an external wheel that rotates the mires. It is calibrated in degrees in order to indicate the orientation
of the minus cylinder axis of the lens when the mires are properly positioned.

6. Lens Stage (Table)
   This is a horizontal platform that supports the lower edge of the glasses. It can be moved up or down in order to accommodate different frames.

7. Lens Stop
   The lens to be measured is placed against the lens stop. The area of the lens centered on the lens stop is the area measured.

8. Lens Holder
   This is a spring-loaded arm that holds the lens firmly against the lens stop when it is released.

9. Lens marker
   This is a three dot marking system used to mark a horizontal line across a lens. It is used to mark the optical center of the lens when the mire pattern is centered on the reticule.

10. Prism compensator
    This device is used to compensate for the displacement of the mires from the center of the reticule. A scale on the compensator allows the prism magnitude and direction to be determined. The compensator is set on zero unless prism is being measured.

Preparing the Lensometer:

1. Focus the eyepiece
   First, set the power wheel to zero. Next rotate the eyepiece completely out, counterclockwise, until the reticule is blurred. Then rotate the eyepiece slowly inward until the reticule is clear and distinct. See figure 1

2. Re-set the prism compensator
   If the lensometer has a prism compensator, it must be re-set to zero. When you look into the lensometer if the mire patterns are not centered on the reticule then the prism compensator is not set at zero.
Neutralizing the lenses

1. Always measure the right lens first.

2. Place the pair of glasses in the lensometer with the concave surface away from you. *See figure 2*

3. Center the lens by aligning the target in the center of the eyepiece reticule by moving the lens up, down, to the right, or to the left. Once the lens is centered move the stage so that it supports the bottom of the frame. Carefully release the lens holder so that the lens is held firmly in place.

4. Turn the power wheel to very high plus. Then slowly turn the power wheel towards the minus direction and rotate the axis wheel until the sphere mires (small narrow lines) come into sharp focus. If the cylinder mires (wider lines) come into focus first rotate the axis wheel 90 degrees so that the sphere mires are in focus. If the sphere and cylinder mires come into focus at the same time the lens is spherical.

5. Now find the cylinder power. Do not move the axis wheel. The axis has already been determined. Continue turning the power wheel in the minus direction until the cylinder mires are clear. The difference between the new power reading shown on the power wheel and the original sphere power is the amount of minus cylinder power in the lens. Read the axis of the cylinder from the axis wheel. *See figure 3.*

**Examples**

1. Power wheel reading when the sphere mires are in focus = -1.00 D  
   Axis wheel reading when the sphere mires are in focus = 175 degrees  
   Power wheel reading when the cylinder mires are in focus = -3.00 D  

   \[ Rx = -1.00 -2.00 \times 175 \]

2. Power wheel reading when the sphere mires are in focus = +2.00 D  
   Axis wheel reading when the sphere mires are in focus = 45 degrees  
   Power wheel reading when the cylinder mires are in focus = +0.50 D
Rx = +2.00 -1.50 x 045

Recording

1. Always record the sphere and cylinder power and the axis location as three digits. For example:

   Correct | Incorrect
   +1.00 -0.50 x 045 | +1.00 - .50 x 45

2. If the lens is spherical record “sph” or “DS”. For example:

   -3.00 DS
**VISUAL ACUITY (SNELEN)**

**Evaluates:** The Snellen chart uses minimum separable angle techniques to determine visual acuity. The fraction result that is obtained is the reciprocal of minimum angle of resolution (this is based on one minute of arc).

**Test Distance:** 20 feet

**Illumination:** Standard illumination

**Position:** Standing relaxed

**Critical Factors:** Sequence for testing is OD followed by OS

**Criterion:** Crisp 20/20 (1 minute of arc) OD, OS

**Instructional Set:**
“Please cover your left eye and read the row of letters above the red line. Then the smallest line below the red line you can without squinting. Guess if you have too.” Repeat this with the right eye covered.

**Record:** Record BVA (best visual acuity) as the smallest line where the patient gave >50% correct.

**STANDARD CHART ANSWERS**

- 200:E
- 100:F,P
- 70:T,O,Z
- 50:L,P,E,D
- 40:P,E,C,F,D
- 30:E,D,F,C,Z,P
- 25:F,E,L,O,P,Z,D
- 20:D,E,F,P,O,T,E,C
- 15:L,E,F,O,D,P,C,T
- 13:F,D,P,L,T,C,E,O
COVER TEST

Evaluates: This test assesses the presence and magnitude of a phoria or a tropia (strabismus). If motor fusion is present (there is no strabismus) the cover test measures the demand put on the Athlete’s fusional vergence system.

Equipment: Occluder, Snellen chart, near point target, and a prism bar.

Set-up: This test is done at both distance (20 feet) and near (16 inches). The Athlete should wear his/her habitual Rx for the distance being tested. The room illumination should be full. For distance testing the target should be a isolated Snellen letter 2 lines above best visual acuity for the patient’s poorer seeing eye. See figure 1. For near testing the target should be an isolated near target letter. See figure 2.

Instructions: Inform the athlete that this test measures the ability of his/her eyes to work as a team. Instruct the athlete to look at a particular detail of the target letter (“look at the tip of the A”). Tell the athlete to keep that detail clear throughout the entire test. It is very important that the athlete does not look around during this test.

Procedure: 1. First perform the unilateral cover test (UCT). This portion of the test determines if a strabismus (tropia) is present. Begin the UCT with the occluder in the midline position (over the patient’s nose). Cover the patient’s right eye while observing the left eye. Repeat this several times noting any movement of the left eye only. Then cover the patient’s left eye while observing the right eye. Again, repeat this several times noting any movement of the right eye only. Be sure to hold the occluder over the eye for 2-4 seconds to allow the deviating eye (if present) to regain fixation. Note the direction and magnitude of any movement. If no movement is present on this test the athlete does not have a strabismus. Perform the above procedure at both distance and near. See figure 3.
2. Now perform the alternating cover test (ACT). This allows the determination of the presence of a phoria if a tropia has already been ruled out by performing the unilateral cover test. Alternately occlude the right and left eye for at least 5 cycles. Watch the eye that is uncovered as you move the occluder to the other eye. It is important to make sure the athlete is not binocular at any time. The occluder is in place over the eye for 2-4 seconds but it should be moved quickly between the eyes in order to avoid binocularity. Note the direction of the movement of the eye as it is uncovered in order to determine the type of deviation present.

1. If the eye moves in when uncovered = exo deviation (the eye was out)
2. If the eye moves out when uncovered = eso deviation (the eye was in)
3. If the eye moves down when uncovered = hyper deviation (eye was up)
4. If the eye moves up when uncovered = hypo deviation (eye was down)

Also perform the ACT at both distance and near. See figure 4

3. In order to determine the magnitude of the deviation hold the appropriate base prism over 1 eye and perform the alternating cover test.
BO prism for eso
BI prism for exo
BD prism for hyper
BU prism for hypo
Begin with low amounts of prism and increase the amount of prism and repeat alternate occlusion until no motion is seen. The magnitude of the deviation is determined when no motion is noted. See figure 5.

**Recording:**
Phorias: record the magnitude and direction of the deviation.
Tropias: Record the type of deviation, laterality (unilateral or alternating), magnitude of the deviation (in prism diopters), frequency of the deviation (constant or intermittent), and the direction. The prime sign (′) indicates a near deviation.
P = phoria
T= tropia = strabismus  
E= eso deviation  
X = exo deviation  

Examples:  
2 XP = 2 prism diopters of exophoria at distance  
10 EP’ = 10 prism diopters of esophoria at near  
5 CLET = 5 prism diopter constant left esotropia at distance  
30 IAXT’ = 30 prism diopter intermittent alternating exotropia at near  

Referral Criteria:  
Any strabismus that is present.  
A phoria greater than 2 exo or 2 eso at distance.  
A phoria greater than 6 exo or 2 eso at near.  

Figure 3: Unilateral cover test.  
Figure 4: Alternating cover test. Be sure to watch the eye being uncovered. Movement is in the direction of the yellow arrow.
NEAR POINT OF CONVERGENCE (NPC)

Evaluates: The ability of the eyes to converge while maintaining fusion.

Equipment: Near point target, PD ruler

Set-up: The athlete can either sit or stand and should be wearing his/her habitual Rx. The near target should be fully illuminated. Hold the PD ruler with the zero mark at the eye’s center of rotation. See figure 1.

Instructions: Instruct the athlete to look at the near target. Tell the athlete that you are going to be bringing the target in towards his/her nose. Instruct the athlete to report if the target becomes blurry or splits into two targets. Tell the athlete to maintain fixation on the target at all times.

Procedure: Start with the fixation target slightly below the athlete’s eye level at 50cm.

Bring the target slowly up the midline towards the nose. If the patient reports two targets or if the examiner notices an eye turn, note the distance from the eye. This is the break point.

Now bring the target back towards yourself until the patients reports that the target is now one or until you witness the eyes regaining bifixation. This is the recovery point.

Recording: Record the break point and recovery point in centimeters. Also note if diplopia was reported or if the examiner saw an eye deviation. If the athlete maintains bifixation all the way to his/her nose record TN (to nose).

Examples: 5/8 (broke at 5cm and recovered at 8cm)

Referral Criteria: Any break or recovery greater than 12/15cm.
**COLOR VISION**
(Color Vision Testing Made Easy)

**Evaluates:** To detect the presence of any red-green color deficits.

**Test Distance:** 75 cm (30 inches)

**Illumination:** True Daylight Illuminant (TDI), Standard Illumination “C”

**Position:** Sitting or standing

**Critical Factors:**
- Binocular testing

**Criterion:** If the athlete was able to identify 8 out of 9 plates, the test is complete. If the athlete identified the sample plate but scored less than 8, present all of the 9 plates a second time.

**Instructional Set:**
- **Part 1:** “Please tell me if you see a circle (or ball) on these cards.” Present the first card to the binocular athlete and allow 3 seconds per plate. If they fail the first attempt, repeat the test.

- **Part 2:** “Please tell me what object you see on each of these cards. Do you see a dog, boat, balloon, or nothing?”

**Recording:** Record the number of correct responses attempted out of nine (X/9) by the trial number. Don’t include the demonstration card in this number. Classify any color deficiency.
### STANDARD CHART ANSWERS:

#### Part 1

<table>
<thead>
<tr>
<th>Card No.</th>
<th>Normal Color</th>
<th>Deficient Color Vision</th>
<th>Normal Color</th>
<th>Deficient Color Vision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Nothing</td>
<td></td>
<td>Nothing</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Nothing</td>
<td></td>
<td>Nothing</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Nothing</td>
<td></td>
<td>Nothing</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Nothing</td>
<td></td>
<td>Nothing</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Part 2

<table>
<thead>
<tr>
<th>Normal Color Vision</th>
<th>Deficient Color Vision</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Boat</td>
<td>Nothing</td>
</tr>
<tr>
<td>B Balloon</td>
<td>Nothing</td>
</tr>
<tr>
<td>C Dog</td>
<td>Nothing</td>
</tr>
</tbody>
</table>

If patient responds car, then diagnose as malingering.
COLOR VISION
(Ishihara Color Plates)

Evaluates: Presence of any deficits in sensitivity to various wavelengths of light

Test Distance: 50 cm

Illumination: True Daylight Illuminant (TDI), or Standard illuminant type “C”

Position: Sitting or standing

Critical Factors: Binocular testing

Criterion: The athlete is not allowed to miss any plates binocularly. If any plates are missed, retest monocularly. The first plate is for demonstration and should not be missed by anyone, or the athlete may be malingering. For plates 1-15, only show every other plate (1, 3, 5, etc...), then show plates 16 and 17.

Instructional Set: “Look at the plates and tell me what the dots form.”

Recording: Record the number of correct responses (X/10) per response attempted. Classify person as Red-Green deficiency, Protan, Deutan, or Total Color deficiency.

Example of Color Plate

Example of proper testing position
## Answers for Ishihara Color Plates (Normative and Color Deficient responses):

<table>
<thead>
<tr>
<th>Plate</th>
<th>Normal Person</th>
<th>Person with Red-Green Deficiencies</th>
<th>Person with Total Color Blindness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>3</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>29</td>
<td>70</td>
<td>X</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>2</td>
<td>X</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>5</td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>15</td>
<td>17</td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>74</td>
<td>21</td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>9</td>
<td>45</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>11</td>
<td>7</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>12</td>
<td>16</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>13</td>
<td>73</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>14</td>
<td>X</td>
<td>5</td>
<td>X</td>
</tr>
<tr>
<td>15</td>
<td>X</td>
<td>45</td>
<td>X</td>
</tr>
</tbody>
</table>

### Protan and Deutan Strengths

<table>
<thead>
<tr>
<th></th>
<th>Protan</th>
<th>Deutan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strong</td>
<td>Mild</td>
</tr>
<tr>
<td>16</td>
<td>26</td>
<td>6</td>
</tr>
<tr>
<td>17</td>
<td>42</td>
<td>2</td>
</tr>
</tbody>
</table>
RANDOT STEREOPSIS

Evaluates: Near sensitivity to binocular disparity depth information presented vectographically.

Test Distance: Exactly 40cm

Illumination: Normal room lighting

Position: Sitting or standing.

Critical Factors: Must test the forms located in the six boxes on the right side of book first. All six boxes must be correctly identified before the test is continued. Then test the circles, there must be no head tilting, or turning of the book. Time limit of 5 seconds per line for response. Test at exactly 40 cm. Note: Many patients have difficulty at #6, please encourage guessing until #10.

Criterion: 6/6 on forms and 7/10 dots without hesitation
Norms: 8.71 ± 1.94

Instructional Set: Have the athlete wear vectographic spectacles over habitual Rx. Present the example figures shown below and on the cover of the book to the athlete and have them identify those figures in the six boxes on the right side of the book by asking, “What shapes do you see hidden in each of these panels?” If all figures are seen, present the rows of circles on the left. “Tell me which of the circles, left, middle, or right appears to be floating slightly above the other circles.” Have the judgement made on all ten rows of stimuli.

Record: Record the number of figures identified correctly. The first incorrect response on the circles will be considered the limit of disparity except when the patient identifies two consecutive finer stimuli correctly.

ANSWER KEY

<table>
<thead>
<tr>
<th>Scoring Key</th>
<th>Sec of Arc at 16 in:</th>
<th>Scoring Key</th>
<th>Sec of Arc at 16 in:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ⇒ L</td>
<td>400</td>
<td>6 ⇒ M</td>
<td>50</td>
</tr>
<tr>
<td>2 ⇒ R</td>
<td>200</td>
<td>7 ⇒ L</td>
<td>40</td>
</tr>
<tr>
<td>3 ⇒ L</td>
<td>140</td>
<td>8 ⇒ R</td>
<td>30</td>
</tr>
<tr>
<td>4 ⇒ M</td>
<td>100</td>
<td>9 ⇒ M</td>
<td>25</td>
</tr>
<tr>
<td>5 ⇒ R</td>
<td>70</td>
<td>10 ⇒ R</td>
<td>20</td>
</tr>
</tbody>
</table>
Example of Stereo forms

Example of proper testing position
PUPILS

**Evaluates:** The direct, consensual, and afferent pupillary responses.

**Equipment:** Fixation target with low accommodative demand, transilluminator.

**Set-up:** The athlete is standing with his/her eyes directed at a fixation target 20 feet across the room.

**Instructions:** Explain to the athlete that you are assessing how well his/her eyes react to light. Instruct the athlete to keep fixation on the distant target while you shine the transilluminator in his/her eyes.

**Procedure:** Shine the light into the right eye, without interfering with the athlete’s visual axis, and observe the size of the pupil and the speed of the constriction in the right eye for three cycles. This is the direct response of the right eye.

Continue to shine the light in the right eye, while observing the pupil of the left eye for 3 cycles. This is the consensual response of the left eye.

Shine the light into the left eye and observe the direct response of the left eye for three cycles and the consensual response of the right eye for three cycles.

Check the athlete’s pupils for an afferent pupillary defect (APD) by moving the light alternately between both eyes rapidly, while sustaining a period of 4 seconds per eye. Observe the responses of the eyes as the light moves to each of them. Be sure to indicate for each eye whether or not constriction occurs (normal) or if an initial dilation occurs (abnormal) as the light shines on the eye.

**Recording:** Record the relative appearance of the pupils (pupils equal round: PER), if the pupils were responsive to light (RL), and if a APD is present or not (- or + APD). Be sure to record any difference in size or shape between the two pupils.

**Referral Criteria:** Any abnormal response including diminished light response, presence of an APD, or differences between size and shape.
OCULAR MOTILITIES

Evaluates: This test assesses the athlete’s ability to perform conjugate eye movements.

Equipment: Transilluminator

Set-up: The athlete should stand facing the examiner 50cm away. The room illumination should be full and the athlete should remove his/her habitual Rx.

Instructions: Tell the athlete that you are testing the ability of his/her eyes to move in different directions. The athlete should be instructed to keep their head still and to follow the light with their eyes. See figure 1. Instruct the athlete to report if he/she feels pain or has double vision at any time during the test.

Procedure: Beginning in primary gaze move the penlight into the cardinal positions indicated in the physiological “H” pattern. See figure 2. Be sure to move the penlight to the athlete’s extreme limits of gaze. Throughout the procedure observe the smoothness of movement, the accuracy of following the penlight, and the extent of eye movement. At the extreme limits of a healthy person’s gaze it is normal to observe a low amplitude nystagmus, termed end-point nystagmus.

Recording: If the athlete follows the penlight smoothly and accurately in all positions record FROM (full range of motion). Record the presence of any pain, diplopia, or restriction in the position that it occurred.

Referral Criteria: The presence of any oculomotor restriction.
Figure 2: Physiological H pattern
PURSUITS/SACCADES

Evaluates: The quality of the athlete’s pursuits and saccades.

Equipment: Two near targets of different colors.

Set-up: The athlete should stand facing the examiner 50cm away. Room illumination should be full and the athlete should wear his/her habitual sport’s Rx.

Instructions: - Pursuits: Tell the athlete that you are testing his/her ability to follow a moving near target. Instruct the athlete to look at the target and follow it wherever it goes only using his/her eyes and without moving his/her head.

- Saccades: Tell the athlete that you are assessing his/her ability to change fixation from one target to another. Instruct the athlete to look at one near target and to look at the other target as quickly and accurately as possible when you call the color of the second target.

If any head movement occurs during either test instruct the athlete to try to hold their head still and only move their eyes. If the athlete is unable to resist head movement grade them as a 1 on that section.

Procedure: - Pursuits: Use one near target and move it left to right, right to left, up and down, down and up, and then in a circular pattern. Be sure to maintain the 50cm working distance and not to exceed a pattern greater than the circumference of the athlete’s face. See figure 1.

- Saccades: Use both near targets held at a distance of 10cm apart. Direct fixation from one target to the other for a total of 5 cycles. Be careful not to get into a predictable rhythm. See figure 2.

Recording: Record according to the following scales.

Pursuits: 4+ smooth and accurate
3+ one fixation loss
2+ two fixation losses (fail)
1+ more than two fixation losses or any head movements (fail)
Saccades:  
4+ smooth and accurate  
3+ some slight undershooting  
2+ gross undershooting or overshooting  
or increased latency (fail)  
1+ inability to do task or greatly  
increased latency, any head movements

**Referral criteria:** A score of 2+ or 1+ on either test.
DOMINANT EYE/HAND
(WISCONSIN SPORTS VISION PROJECT [WSVP] DOMINANCE WAND)

Evaluates: To determine the dominant eye and hand.

Test Distance: The examiner is 10 feet from the athlete.

Illumination: Standard illumination

Position: Standing relaxed

Critical Factors:
The athlete is to hold the handle of the WSVP dominance wand with both hands and arms extended, in the midline of the body a few feet below primary gaze. The examiner points to their dominant eye and instructs the athlete to slowly raise their arms in the midline and capture the eye within the circle.

Instructional Set:
“Hold the wand between both hands at the center of your body. Look at the eye I’m pointing to with both eyes open. Bring the wand up and look at my eye through the hole.”

Record:
Record whether the patient is left or right handed. Circle the dominant eye, and record strong, mild/moderate preference, or central or cyclopean tendency, or alternate/undetermined preference. Refer to diagram at station.

STRONG       MILD/MODERATE       CYCLOPEAN

Note: Alternating non-established athletes will appear as mild/moderate with both eyes (eye dominance may switch from one to the other)
DOMINANT EYE/HAND

Evaluates: To determine the dominant eye

Test Distance: An isolated 20/40 letter is placed 6 to 15 feet from the athlete.

Illumination: Standard room

Position: Standard relaxed

Critical Factors: Insure the athlete is looking through the circle aperture and not moving it once the task is understood. The athlete’s body needs to be centered with the target.

Instructional Set: “Look at the target across the room with both eyes open. While holding the circle aperture, bring it up and center the distant object in the circle.” The examiner is to cover up the right eye and ask “Can you still see the object through the circle?” Cover the left eye and ask if the object is still seen.

Recording: The dominant eye sees the object while the other eye is covered. Record OD dominant or OS dominant. Record whether patient is right or left handed.
AUTOREFRACTION

Evaluates: The refractive error objectively with the use of an automated instrument. Either a desk top or a hand held autorefractor can be used.

**DESKTOP**

Set-up: Use standard room illumination. The athlete should be seated with his/her chin in the chin rest and forehead against the forehead rest. The athlete should remove his/her habitual Rx.

Procedure:

- Turn the instrument on.
- Adjust the chin rest and the instrument for the Athlete. Position the instrument to allow for measuring the right eye first. See figure 1.
- Instruct the Athlete to fixate on a specified target.
- Look at the monitor to ensure proper alignment and fixation. Use the instruments landmarks designated for proper alignment. See figure 2.
- Push the button that will begin the objective evaluation.
- The instrument may voluntarily move to the left eye once it is finished testing the right eye. If not, manually adjust the instrument to test the left eye.
- Press the print button in order to receive a readout of the indices found. See figure 3.

**HAND HELD: Nikon Retinomax**

Set-up: Use standard room illumination. The athlete should be seated comfortably with his/her eyes in primary gaze and his/her habitual Rx removed. Focus the eyepiece for the examiner by rotating it until the text inside is clear. Release the forehead by pushing in gently. The rest will then release. The angle of the eyepiece can be adjusted according to both the examiner's and the athlete's height. The adjustments should allow that the instrument is held perpendicular to the athlete's line of sight.
Procedure:

- Direct the athlete to look into the Retinomax. They should see a character riding a rocket to the moon. Ask them to keep looking at this target throughout the testing.

- Begin by testing the right eye. The instrument will assume the right eye is being tested first if it is set on automatic. Hold the instrument so that the line on the left side of the Retinomax lines up with the lateral canthus and the line on the top of the instrument is at midpupil. If the instrument is lined up correctly, the pupil should be centered when you look into the eyepiece.

- The examiner should move in and out until the circle of dots in the center of the eyepiece are focused clearly. Once this is accomplished, press the trigger on the handle and the instrument will automatically begin taking readings.

- Before you start taking readings you will see “R0/L0” on the right in the eyepiece in the lower portion of the screen. This represents the number of readings taken on the right and left eyes. The instrument needs at least eight readings to accurately average the information. As the Retinomax takes reliable readings the number on the right side will increase up to eight. Once you reach “R8/L0” you are ready to test the left eye. The “R0/L0” on the top of the screen takes Keratometry readings. Don’t be concerned with this information at this station.

- The Retinomax will automatically respond to shift to the left eye. Just be sure that you are centered in the middle of the pupil with the circle of dots focused clearly. You do not need to touch the trigger again. Continue to take readings until the screen reads “R8/L8”.

- Aim the Retinomax toward the front of the printer at a distance of no more than 50 centimeters. Press the button located on the top of the Retinomax for 2 to 3 seconds until you hear a beep from the Retinomax and a responsive beep from the printer. The tones are slightly different so that you can distinguish them.
- The printer will begin immediately after the beep. The reading with the asterisk is the averaged reading. Record this value as the autorefraction information on the screening form.
Figure 4: Nikon Retinomax
EXTERNAL EVALUATION

Evaluates: External and anterior segment health of the eye.

Illumination: Dim

Position: Athlete seated. If biomicroscope is available, have athlete put their chin in the chin rest and have their forehead touching the upper bar.

Critical Factors: Steady fixation to a target point as directed by the examiner.

Criterion:

**LIDS**- Look at the edges of the eyelids. Observe for signs of inflammation, discharge, and crusting or debris on the eyelids. If crusting debris is found, the athlete may have blepharitis.

**CONJUNCTIVA**- The peripheral conjunctiva should appear smooth. Note the presence of papillae (a vessel is located in the center) or follicles (a raised bump with out a central vessel). If the papillae are very large, GPC may be present. Common disorders of the bulbar conjunctiva include Pinguecula and Pterygia, these should be noted if the athlete has either or both conditions. Also note if the athlete has any injection (this is graded on a 1+ to 4+ scale).

**CORNEA**- Scan the cornea for any scarring, note location and level within the cornea layer if a scar is found. Infiltrates (made up of Polymorphonuclear leukocytes) should also be noted.

**ANTERIOR CHAMBER**- Look for signs of cell and flare (both are graded on a 1+ to 4+ scale with 1+ being trace and 4+ dense). The depth of the chamber angle is measured by comparing the depth of the anterior chamber with the corneal thickness at the limbus.

**LENS**- Look for any opacifications and note location: anterior of posterior subcapsular, cortex, or nucleus.

Instructional Set: "This procedure evaluates the health of the front of the eye. Place your chin on the rest and forehead against
the bar. Try to keep your head still and hold your eyes on whatever target I direct you to."

**Record:** Record status of lids, conjunctiva, cornea, anterior chamber, and lens.

---

**SLIT LAMP** *(fig. 1)*

- Head Rest
- Beam Width Adjustment Knob
- Magnification Adjustment
- Chin Rest
- Joystick
- Oculars

---

**EXTERNAL EYE** *(fig. 2)*

- Lids
- Conjunctiva
- Cornea
- Anterior Chamber
- Pupil /Lens
INTERNAL EVALUATION

Evaluates: The health of the internal structures of the eyes.

Equipment: A direct ophthalmoscope, a distant target

Set-up: The athlete should be seated and the target should be set up at 20 feet. The room illumination should be dim in order to encourage dilation of the pupils.

Instructions: Tell the athlete that you are evaluating the health of the back of his/her eye. Instruct him/her to look at the distance target and continue to look in the direction of the target if you get in the way.

Procedure: Hold the ophthalmoscope with your right hand, placing it over your right eye in order to examine the athlete’s right eye. Position yourself at about 15 degrees off the axis of the athlete’s eye in order to allow the athlete to continue to fixate on the distance target. See figure 1.

Dial in +8.00D to +10.00D in the ophthalmoscope in order to investigate the iris of the athlete.

Slowly reduce the power in the ophthalmoscope (less plus/more minus) in order to focus on the vitreous. Monitor the vitreous for clarity.

Continue to reduce plus in order to focus on the fundus. Look for the red reflex.

Evaluate the optic nerve head including the disc margin, rim tissue (contour and color), and the cup/disc size and depth.

Evaluate the adjacent posterior pole including the macular area and the surrounding vasculature. Note the following: color and clarity of the macular area, presence of a foveal reflex, and the artery/vein (A/V) ratio.

Recording: Record the cup/disc ratio, the A/V ratio, and the macular status.

Referral Criteria: Refer if any abnormal findings are found.
EYE MOVEMENTS- OBER II

Evaluates: This series of tests assesses fixation status, saccadic speed and accuracy, and the quality of pursuits at distance. Test I evaluates the ability to point the eyes accurately. Test II measures how quickly the eyes move from point to point and Test III evaluates the ability to track a moving object.

Set-up: Turn on the computer and click on the “Visa 4.3” icon. Click on the first icon on the Visa home page tool bar. Go to “Input Subject & Test Data”. Enter the name, class (enter ‘JO’), test (enter ‘v’), sex, and date of birth of the athlete. Click on “measure” and prepare to do “Fixation Maintenance”.

The athlete should be standing at a 5 feet test distance and the room illumination should be standard. It is important that the athlete be eye level with the targets. The goggles must be properly adjusted and calibrated to the athlete’s pupillary distance.

Instructions and Procedure:

Test I - Fixation maintenance. Instruct the athlete to look at the center ‘O’ target without moving his/her eyes or head until you tell them to. Allow at least 25 seconds (4 screens) to pass before telling the athlete to stop or move his/her eyes. Press the ‘enter’ key (or click on OK) to begin the test. Click on “stop” to end the test. The software will take you to the next test.

Test II - Motilities - Lateral Saccades. Tell the athlete to move his/her eyes back and forth between the two ‘X’s’ as fast as he/she can. The two ‘X’s’ should be separated by 50 cm. Stress accuracy and speed during this procedure, avoiding head movements. Test this for at least 25 seconds, beginning and ending the procedure the same as for Test I.

Test III - Tracking. Instruct the athlete to again alternate fixations between each ‘X’ for 5-10 seconds. Begin and end this procedure as before.
At the end of these 3 procedures you will be asked if the measurement is OK or you need a retest. Click on OK and you will have a Visual Skills Profile containing the data. If data is not available (only '0's) you will need to repeat the procedure, but you should expect to see 0's in the tracking portion of the results.

Record “fixations” (under Fixation Maintenance) as “Fixation Loss/10 sec.” Record “excursions” (under Motilities) as the “Saccadic Speed/15 sec.” Select the eye (right or left) with the best test results (the lower the number, the better the result). The “Tracking” data is not used.

Note: After every 5 subjects exit the extra subject windows by clicking on the X on the superior right side of the subject windows. Failure to limit the number of open windows will significantly slow down the computer

Pursuits:

Note: The Pursuit section is not routinely done at Junior Olympics

Return to the Visagraph 4.3 toolbar and click on ‘new’ (File menu.) Enter the same data as before in the "Input Subject & Test Data" box (it may already be entered from the initial tests II, III, and I) except enter the word ‘Pursuits’ in the comment section. Click on ‘measure’ to begin the next test.

Test I - Fixation Maintenance (this test is used for ‘Pursuit Fixation Loss’). The athlete views the swinging ball from a distance of 4 feet. Instruct the athlete to fixate on one letter or the black line (switch to another letter if the ball rotates) during the horizontal ball swing, a total lateral swing of ∼50-55 cm. The athlete should view the ball for ∼ 25 seconds. Begin and end the test as before.

Test II - Motility This part of the procedure is only necessary for calculation purposes. Instruct the patient to alternate fixation between each ‘X.’ for ∼ 5-10 seconds before ending the test.

Test III - Tracking This part of the procedure is only necessary for calculation purposes. Follow the identical instructions as for the previous Test II.
At the end of these 3 procedures you will be asked if the measurement is OK or you need a retest. Click on OK and you will have a Visual Skills Profile containing the data. If only '0's are presented, you will need to repeat the procedure.

Record “Pursuit Fixation Losses / 10 sec” as the ‘fixation’ data under the Fixation Maintenance section (lowest for either right or left eye.) The other data is ignored for this test. Close this page when completed and return to Visagraph 4.3 toolbar.

<table>
<thead>
<tr>
<th></th>
<th>Age&lt; 7</th>
<th>Age 7-11</th>
<th>Age 12-15</th>
<th>Age 16-25</th>
<th>Age&gt; 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixation loss 10 sec</td>
<td>10±7</td>
<td>8±6</td>
<td>7±5</td>
<td>6±4</td>
<td>4±3</td>
</tr>
<tr>
<td>Saccadic Speed 15 sec</td>
<td></td>
<td></td>
<td>24±8</td>
<td>28±8</td>
<td>29±6</td>
</tr>
<tr>
<td>Pursuit Fixation Loss 10 sec</td>
<td>26±7</td>
<td>24±6</td>
<td>21±6</td>
<td>17±6</td>
<td>15±6</td>
</tr>
</tbody>
</table>
Threshold Dynamic Visual Acuity

Evaluates:

This test assesses the subject’s ability to resolve a 20/40 Snellen letter while it is in motion.

Testing distance: 10 feet.

Illumination:

Standard room illumination. Caution should be used to minimize glare from computer screen.

Positioning:

The athlete should be standing with feet comfortably apart. Testing is done binocularly with the athlete’s habitual distance prescription.

Standard Parameters:

Track size = 980 pixels X 40 pixels
Stimulus = Landolt C oblique orientation (opening at 45, 135, 225, 315 degrees) with response choices in the oblique positions (1, 7, 9, & 3 on numeric keypad)
Stimulus size = 9mm (30 pixels, or 20/40 equivalent)
Circle size = 47 pixels
Stimulus color = White
Circle color = Light Gray
Field color White
Starting Speed = 10
Stimulus exposure time 200 msec
Number of correct trial to end set = 2
Number of sets = 3
Time to wait before slowing down = 3 sec
Response sequence = First key = response

Instructions and Procedure:

Instructions to athlete:

“Watch the center of the screen. When I start the test, you will see a Gray ball going back and forth on the screen. Follow the ball with your eyes and when you see a “C” flashed on the ball, respond with on the keypad as to the orientation of the opening of the “C”. It will appear in the upper right, upper left,
lower right, or lower left. Press the enter key to run the next trial. The target may speed up or slow down during testing. Continue to follow the target until the trial stop.”

From the computer desktop, click on the “DynamicAcuity” icon. Click on “run session” Program defaults to standard test parameters. Enter patient’s age in field labeled “DOB”. Give patient instructions and press any key to begin test. Test ends automatically and record scores on screen.

**Responses and Recording.**
When the athlete calls out a letter, press the space bar on the keyboard. Enter the letter that the athlete called out. Press enter to run next trial.

The software will stop automatically when a threshold is reached; Record the Mean, Median, and Standard Deviation Dynamic Acuity Scores that are displayed on the screen.
To abort a trial press F2

**Norms:**
ACUVISION 1000 EYE HAND COORDINATION

Evaluates: The ability to visually direct the hand to a target in an efficient manner.

Test Distance: The athlete is 30 inches from the front of the instrument. The center green target light of the instrument should be at eye level.

Illumination: Medium room illumination. Faceplate illumination ranges between 0.65ft candles at the center to 2.50ft candles at the peripheral portions of the faceplate.

Positioning: The athlete should be standing, centered equidistant from right to left edge of the instrument. The athlete should wear appropriate athletic footwear.

Testing Sessions:

\[
\text{Speed} = 7/\text{Mode} = \text{FF120}/\text{Fixation} = \text{Off}/\text{Brite} = 9/\text{Map} = \text{Ne}/\text{Sound 9}
\]

For ages less than 7, use the following parameters:

\[
\text{Speed} = 7/\text{Mode} = \text{rF60}/\text{Fixation} = \text{Off}/\text{Brite} = 9/\text{Map} = \text{Ne}/\text{Sound 9}
\]

Instructional Set:

"This device assesses your ability to use your eyes to guide hand movements in space. While you are watching the board, red lights will appear in your peripheral vision. Using the fingertips of either hand, attempt to press the red lights as they appear. There will be a total of 120 test lights (ages <7 have 60 lights). The light will move to the next location after about 1 second if you don’t press it. If you correctly press a light, it will immediately appear at another location. Try to find the lights with yours eyes as fast as you can, but try not to move your head.

Criterion: During each trial monitor the presence or absence of head movement and body movement. Rate this on a scale of 0 to 4 with 4 being excessive movement of the head or body.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Acu#</td>
<td>30±17</td>
<td>52±12</td>
<td>67±13</td>
<td>55±28</td>
<td>53±22</td>
</tr>
<tr>
<td>Acu-Late</td>
<td>29±12</td>
<td>35±8</td>
<td>25±11</td>
<td>34±24</td>
<td>27±12</td>
</tr>
<tr>
<td>Acu-Time</td>
<td>95±12</td>
<td>88±5</td>
<td>82±7</td>
<td>80±2</td>
<td>87±11</td>
</tr>
</tbody>
</table>

For each trial, record the # of correct hits, the number of late responses, and the time used to complete the trial. Print out a hard copy of the distribution of points after the trial.
Speed/Mode/Fixation/Brite/Map/Sound buttons
WAYNE FOOTSPEED

Evaluates:  Perceptual reaction time and motor footspeed.

Test Distance:  7 feet.

Illumination:  Standard room (Approx. 7ft candles)

Position:  Athlete stands with left foot on the center footplate, knees bent in a ready position.

Critical Factors:
Do not allow athlete to put pressure on left footplate until instructional set is completed. Footplates are secured horizontally separated by 7 feet on a hard surface. Push Enter-9-99-Enter to program the test.

Criterion:  Junior Olympics 1997

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Footspeed</td>
<td>.66+.6</td>
<td>.49+.18</td>
<td>.48+.19</td>
<td>.55+.39</td>
<td>.54+.29</td>
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<tr>
<td>Release</td>
<td>1.5+.6</td>
<td>1.2+.6</td>
<td>1.2+.3</td>
<td>1.6+.9</td>
<td>1.3+.5</td>
</tr>
<tr>
<td>Footspeed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Instructional Set:
“This test evaluates reaction time and footspeed. When you place your weight on the center footplate a green light will illuminate on the board in front of you. After about 3 seconds a beep will sound and a red light will appear on the board at the 12:00, 3:00, 6:00, or 9:00 position. If a light appears at 12:00 move to the front footplate as fast as you can. 3:00 to the right, 6:00 behind you, 9:00 to the left. As soon as you hear the beep and see the light change, move as fast as you can and touch the other footplate with your right foot. We will do this three times.”

Record:  Record the release time first followed by footspeed. Two numbers will flash, the footspeed number is followed by a period. Record the direction of movement by checking a box on the score sheet for each of the trials. Enter the trials for each position in the computer.

Reprogram Codes:  1 => 13
2 => 0
3 => 0
4 => 3
5 => 4
6 => 0
WAYNE SACCADIC FIXATOR

Test Distance:  30 inches


Illumination:  20 foot candles incident on the instrument in a dimly lit room.

Position: Center of instrument at eye level. Subject should be able to reach top and bottom of instrument without changing the test distance.

Critical Factors:
Illumination and the test distance are critical. Testing is conducted using one finger of the dominant hand. Both sub-tests one and two run for 30 seconds. Allow a demonstration of the task by allowing the athlete to correctly press 5 lights then restart the test by touching the green light.

Sub-test 1 (Proaction): Enter; 9,1,<enter>
Sub-test 2 (Reaction): Enter; 9,21,<enter>

Criterion:
Proaction: Mean= 42 Std. Dev.=5
Reaction: Mean= 27 Std. Dev.=4
Speed: Mean= 94 Std. Dev.=13

Instructional Set:
“This instrument measures eye-hand coordination and hand speed. For the first test, using either hand, I want you to touch the lighted circles. As soon as you touch another circle will light up in another random position. Touch as many circles as you can in 30 seconds.”

“The second test is similar to the first except the light may not wait for you. If you don’t get it in time the light is going to move to a new location so keep on trying to touch it. The faster you start going the faster the lights will start moving. Try to get as many as you can in 30 seconds.”

Recording:
Sub-test 1: Record # of buttons touched (from display)
Sub-test 2: Record # of buttons touched and presentation speed. Hit #3 to access presentation speed.
<table>
<thead>
<tr>
<th>Program Codes:</th>
<th>Proaction</th>
<th>Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ⇒ 1</td>
<td>1 ⇒ 14</td>
<td></td>
</tr>
<tr>
<td>2 ⇒ 30</td>
<td>2 ⇒ 30</td>
<td></td>
</tr>
<tr>
<td>3 ⇒ 0</td>
<td>3 ⇒ 57</td>
<td></td>
</tr>
<tr>
<td>4 ⇒ 3</td>
<td>4 ⇒ 3</td>
<td></td>
</tr>
<tr>
<td>5 ⇒ 1</td>
<td>5 ⇒ 1</td>
<td></td>
</tr>
<tr>
<td>6 ⇒ 0</td>
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<td>7 ⇒ 0</td>
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<td>8 ⇒ 0</td>
<td>8 ⇒ 0</td>
<td></td>
</tr>
<tr>
<td>9 ⇒ 0</td>
<td>9 ⇒ 0</td>
<td></td>
</tr>
</tbody>
</table>
WAYNE SACCADIC FIXATOR (HAND SPEED)

Evaluates: Visual motor response to visual stimuli based on a precise, visually guided motor response (finger pressing a lighted target). Also measures eye-hand coordination and hand speed.

Test Distance: At comfort of the subject

Illumination: Critical at 40-70 cd/M² incident on the instrument in a dim room.

Position: Center of instrument at eye level. Subject should be able to reach 3:00 and 9:00 position of instrument without changing the test distance.

Critical Factors: Illumination and the test distance are critical. The subjects gaze their eyes at one point or follow the stimulus and the subject may only use one hand but any finger.

Sub-test 3 (Hand-Speed): Enter; 9,18,<enter>

Criterion: Hand-Speed: 0.28 ± 0.07

Instructional Set: “This instrument measures eye-hand coordination and hand speed. You can use all your fingertips of any one hand. I want you to touch this button (9:00), then touch this button (3:00). Do this only on time.” Record speed. “Do it again.” Record speed. “One last time. Now, try to do it faster” Record again.

Recording: Record all three trials. Circle the best one and enter it into the computer.

Program Codes:  
1 ⇒ 11  
2 ⇒ 0  
3 ⇒ 3600  
4 ⇒ 4  
5 ⇒ 1  
6 ⇒ 0  
7 ⇒ 0  
8 ⇒ 0  
9 ⇒ 0
Evaluates: Visually directed balance

Test Distance: 7 feet

Illumination: Standard room

Position: Standing on balance board facing the Wayne Saccadic Fixator

Critical Factors:
Good balance to start procedures. Stable position. Allow the athlete to move the board in the various directions to get a feel of the balance shifts required.

Enter; 9,26,<enter>

Criterion: To be determined

Instructional Set:
“This instrument measures visually directed balance. While you balance on the board, a light will appear at the 12:00, 3:00, 6:00, or 9:00 positions. If it appears at the 12:00 position, tilt the board forward, if 3:00, tilt right, if 6:00, tilt back, and if 9:00 tilt left. Be very careful not to go in the wrong direction, since any wrong move will lose all your points. The task will continue for 30 seconds.”

Record: Record the number attained after 30 seconds.

Program Codes: 1 ⇒ 11
2 ⇒ 0
3 ⇒ 0
4 ⇒ 3
5 ⇒ 1
6 ⇒ 121
7 ⇒ 0
8 ⇒ 0
9 ⇒ 0
WAYNE PERIPHERAL AWARENESS TESTER (P.A.T.)

Evaluates: Visual motor response time (via lever press) to peripheral stimuli in eight visual field locations.

Test Distance: 30 inches

Illumination: 3-5 foot candles

Position: Standing relaxed with center of Wayne Saccadic Fixator at the subjects eye level. Alignment is especially critical with those athletes whose spectacle Rx might restrict their visual field.

Critical Factors: All PAT screening should be performed in accordance with PAT diagnostic testing protocols: Instrument should be mounted against a neutral light-colored background. It is critical that the patient fixates on the red center light of the unit continuously during the testing procedure.

Enter; 9,125,<enter>

Criterion: Criteria < 0.6 sec per location.

Instructional Set: “This instrument measures peripheral vision. I’d like you to always keep your eyes on this center yellow light. When you see a light at any one of the edges, move the joystick quickly in the direction of that light and release it. One of the lights will turn on every 2-4 seconds.”
TACHISTOSCOPE

Evaluates:  Speed and span or recognition

Test Distance:  Athlete is 10 feet from the screen

Illumination:  35 foot/candles

Position:  Standing comfortable

Critical Factors:  Numbers must be 3.5 cm high (20/80 acuity). There will be 6 numbers per set and each set is shown at 0.05 sec.

Criterion:  Junior Olympics 1997

<table>
<thead>
<tr>
<th>Grade school</th>
<th>Jr. High</th>
<th>High School</th>
<th>Cntrl./coaches</th>
<th>entire pop.</th>
</tr>
</thead>
<tbody>
<tr>
<td>9+4</td>
<td>12+3</td>
<td>13+3</td>
<td>13+2</td>
<td>12+4</td>
</tr>
</tbody>
</table>

Instructional Set:
“On the wall between the 2 stickers there will appear a set of numbers such as these.” Push the external shutter to show 6 numbers. “They will appear this fast.” Push shutter initiate to show how fast they will appear. “Look between the 2 stickers, remember the numbers in order and recite them back to me.” Each athlete has 3 trials (18 total numbers).

Record:  Number correct out of 18 (three trials).

Scoring:  Subject allowed one transposition per slide, example: numbers as they appear (123456) they recite (123465) number correct equals 5 out of 6 because 4 were correct plus 1 point for transposition.

Answers:

<table>
<thead>
<tr>
<th>Set 1:</th>
<th>Set 2:</th>
<th>Set 3:</th>
<th>Set 4:</th>
<th>Set 5:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demo:</td>
<td>1:</td>
<td>2:</td>
<td>3:</td>
<td></td>
</tr>
<tr>
<td>360842</td>
<td>842907</td>
<td>728053</td>
<td>264073</td>
<td>739201</td>
</tr>
<tr>
<td>254698</td>
<td>302658</td>
<td>394625</td>
<td>628149</td>
<td>583902</td>
</tr>
<tr>
<td>628407</td>
<td>620174</td>
<td>873142</td>
<td>802476</td>
<td>831927</td>
</tr>
<tr>
<td>602391</td>
<td>905281</td>
<td>984527</td>
<td>219684</td>
<td>730159</td>
</tr>
</tbody>
</table>
TACHISTOSCOPE CONTROL PANEL

Shutter Initiate  Shutter Time  Interval Timer  External Shutter
VECTORVISION CONTRAST SENSITIVITY

Evaluates: Visual contrast sensitivity; visual discrimination ability.

Test Distance: 12.5 feet

Illumination: Test is backlit with an internal light source.

Position: Standing relaxed

Critical Factors: Test only OD, OS

SPATIAL FREQUENCY EXAMPLES FOR VARIOUS TESTING DISTANCES IN CYCLES/DEGREE

<table>
<thead>
<tr>
<th></th>
<th>ROW A</th>
<th>ROW B</th>
<th>ROW C</th>
<th>ROW D</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Feet</td>
<td>3</td>
<td>6</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>10 Feet</td>
<td>3.75</td>
<td>7.5</td>
<td>15</td>
<td>22.5</td>
</tr>
<tr>
<td>12.5 Feet</td>
<td>4.7</td>
<td>9.4</td>
<td>18.75</td>
<td>28.1</td>
</tr>
</tbody>
</table>

Criterion:

<table>
<thead>
<tr>
<th></th>
<th>Grade School</th>
<th>Jr. High</th>
<th>High School</th>
<th>control/coache</th>
<th>entire pop</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSFOD1</td>
<td>6+2</td>
<td>6+1</td>
<td>6+1</td>
<td>6+2</td>
<td>6+2</td>
</tr>
<tr>
<td>CSFOD2</td>
<td>6+2</td>
<td>6+2</td>
<td>6+2</td>
<td>6+2</td>
<td>6+2</td>
</tr>
<tr>
<td>CSFOD3</td>
<td>6+2</td>
<td>6+2</td>
<td>6+2</td>
<td>5+6</td>
<td>6+2</td>
</tr>
<tr>
<td>CSFOD4</td>
<td>6+2</td>
<td>6+2</td>
<td>6+2</td>
<td></td>
<td>6+2</td>
</tr>
</tbody>
</table>

Instructional Set:

“On each panel there are two rows of circles, for each pair one of the circles will contain some lines. Tell me for each pair whether the top or bottom contains the lines. Some of the lines will be faint, try to guess if you’re unsure.”

Record: Record the number or grids called correctly in each of the four plates on the Vectorvision chart.
HOWARD DOLMAN STEREOACUITY TEST

Evaluates: Stereoacuity or depth perception at distance.

Test Distance: The athlete is 6 meters from the zero point of the scale on top of the apparatus to the athlete’s eye.

Illumination: Normal Room Illumination

Positioning: Athlete should be seated in front and level with the apparatus. The athlete should be wearing appropriate sports vision correction. Be sure the athlete cannot see the guide tracks on top and bottom on the inside of the box. Adjust chair accordingly.

Testing Sessions:
Four trials should be done for each rod separation in front and behind. Trials are done at 9, 6, 4, 2 and 1 cm separation. Four trials are performed at each separation distance, two trials with the right rod in front and two trials with the left rod in front. Start with the largest separation first. Only move to the next shorter separation if the athlete correctly identifies the movable rod in front or behind the stationary rod 3 out of the 4 trials. When moving the rod in front or behind, stand in front of the box. Stereoacuity is recorded as the last trial that was correctly identified 3 out of 4 times. The athlete should only be given approximately three to five seconds for each response, and he/she shouldn’t move their head during the test. After three seconds, urge the patient to answer. If they do not answer, then consider that a fail for that trial. Do not inform the patient of the number of trials or the number of times the left or right rod is in front. Do not pause between testing of different separations. Do not test strabismics or amblyopes.

Instructional Sets:
“This device helps to measure your distance depth perception. There are two rods in the box in front of you. When you see the rods, immediately tell me which one is in front; either left or right.”

Test Results:

<table>
<thead>
<tr>
<th>Separation Distance</th>
<th>Stereoacuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>9cm</td>
<td>30.94”</td>
</tr>
<tr>
<td>6cm</td>
<td>20.63”</td>
</tr>
<tr>
<td>4cm</td>
<td>13.75”</td>
</tr>
<tr>
<td>2cm</td>
<td>6.88”</td>
</tr>
<tr>
<td>1cm</td>
<td>~3.44”</td>
</tr>
<tr>
<td>Record:</td>
<td>Separation Distance</td>
</tr>
<tr>
<td>--------</td>
<td>---------------------</td>
</tr>
<tr>
<td></td>
<td>9cm</td>
</tr>
<tr>
<td></td>
<td>6cm</td>
</tr>
<tr>
<td></td>
<td>4cm</td>
</tr>
<tr>
<td></td>
<td>2cm</td>
</tr>
<tr>
<td></td>
<td>1cm</td>
</tr>
</tbody>
</table>
BASSIN ANTICIPATION TIMER

**Evaluates:** Visual anticipation skills; the ability to anticipate the arrival of the lights at the end of the track.

**Test Distance:** 3 feet away from the end of the track.

**Illumination:** 6-7 L (dim room)

**Protocol:** The patient demonstration is conducted with the speed at 10 mph. Do 1 trial at this speed. When the patient understands the task, increase the speed to 50 mph. Record the results of the next three trials.

**Record:** When the light is reacted to before it arrives, it is recorded with a plus sign. If reacted to late, it is recorded with a minus.

**Position:** Standing relaxed with track perpendicular to shoulders

**Critical Factors:** Athlete understands to stop the light on at the last position

**Criterion:** Computer average + sign for early / - sign for late

**Instructional Set:**

The patient is instructed that the row of lights represent a target that is approaching you. The athlete's task is to stop the light exactly at the end of the track by pushing the hand held trigger. "I will let you practice on the slow balls, so you will learn how it works, then we will speed it up".
Évalué : This test is used to evaluate phoric posture

Configuration : The athlete should be standing with his/her head straight. The test should be performed at a near distance of 16 inches and a far distance of 10 feet. Standard room illumination should be used and the athlete should wear vectograph glasses.

Procédure : Turn on the mallot box and instruct the athlete to look at the box. Ask the athlete to watch the bottom arrow and notice if the top arrow is to the right, left, or directly above the bottom arrow. Next, have the athlete look at one of the horizontal arrows and notice if the other horizontal arrow is above, below, or horizontally aligned with the arrow of fixation.

Enregistrement : Record the associated phoria. Note that with standard vectograph glasses the top arrow to the right indicates eso posture and the top arrow to the left indicates exo posture. In addition, the right arrow higher indicates left hyperphoria.

Criteres de réfèrence : Eso or exo greater than one or any vertical deviation.
<table>
<thead>
<tr>
<th></th>
<th>F.D. (MIN. ARC)</th>
<th>F.D. (MIN. ARC)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RED</strong></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>½</td>
<td>4.3'</td>
<td>6.9'</td>
</tr>
<tr>
<td><strong>GREEN</strong></td>
<td>1</td>
<td>8.6'</td>
</tr>
<tr>
<td>1½</td>
<td>12.9'</td>
<td>20.6'</td>
</tr>
<tr>
<td><strong>ORANGE</strong></td>
<td>2</td>
<td>17.2'</td>
</tr>
<tr>
<td><strong>BLACK</strong></td>
<td>3</td>
<td>25.8'</td>
</tr>
<tr>
<td><strong>BLACK</strong></td>
<td>4</td>
<td>34.4'</td>
</tr>
</tbody>
</table>

**ESO F.D.: ARROW TO LEFT**
**EXO F.D.: ARROW TO RIGHT**

*Smash empty safe stone*
VISION AND BALANCE

Evaluates: Visual factors involved in maintaining gross motor balance under various conditions.

Set-up: Standard room illumination is used and test distance is not applicable except for the eye movement sequence and then a 40 cm distance should be used. The athlete should remove his/her shoes and stand on the flat edge of a standard 4 X 4 (3 5/8” X 3 5/8” X 10 ft.). The athlete should place feet heel to toe, parallel to the long dimension of the beam.

Critical Factors: The examiner should read and memorize the scaling definitions in order to avoid the need for reference during screening. Use different colored targets to test eyes.

Scaling Definitions:

1. Highly stressed, tremendous body wavering and struggling. Obvious difficulty staying on the beam. Unable to stay on any longer than 2-3 seconds during tasks.

2. Stressed, with considerable struggling and wavering present; falls off the beam two or more times during the task.

3. Significant wavering, but able to recover. Falls off the board no more than one time during a task. Excessive wavering and struggling (to the point where barely recovers) with no falls.

4. Slight noticeable lean with minimal wavering. No falls or near falls. Maintains a high level of stability during the majority of the task.

5. No wavering and no falls. Maintains a high level of stability throughout the task.

Instructional Set: The vision and balance testing consists of five subtests, each of which should be carefully scored in accordance with the criteria listed above.
A. “Stand heel to toe and maintain balance while looking straight ahead with arms at your side (demonstrate). You may use whichever foot you prefer in the forward position.” Score 10 seconds.

B. “Now close your eyes.” Score for 10 seconds beginning the moment the athlete closes his/her eyes.

C. “Open your eyes. I want you to follow this target (bead) with your eyes only. Do not use head movement.” Use the following four eye movement probes:

1. Two slow NPC’s to nose (break and recovery) over 15 seconds total. One slow NPC 6” from the patients right to nose (break and recovery) over 8 seconds and one slow NPC 6” from the patients left to the nose (break and recovery) over 8 seconds.

2. Rapid saccades between opposite cardinal points at a test distance of 40 cm with the beads separated by approximately 75 cm. Two times each point.

3. Rapid near-far saccades, 3 feet away to 6” away.

4. Smooth eye movements at a 40 cm target distance. Lateral pursuits 2 X 2 round trips full range, oblique pursuits 2 X each, vertical pursuits 2 X each, rotation 1 X each.

D. Dynamic: Eyes open - “Walk forward to the end of the beam and back using heel to toe. Try to keep your eyes pointed straight ahead.”

E. Dynamics: Eyes closed - “Walk forward to the end of the beam, I will tell you when you are at the end, then reverse and stop.

Recording: Record the performance scale rating on each subtest.

Criterion: The athlete should score a grade 3 on all phases of the screening. The total score is related to computer averages.
Mean = 18
Standard Deviation = 2

Scoring criteria:
(low) 1  2  3  4  5(high)

Example: An athlete shows good balance with slight wavering during the first test. When the patient closes his/her eyes, he/she has to use a toe touch to keep balanced, but then shows steady balance for the remainder of the test. The athlete falls once when performing eye movements. The athlete uses two toe touches when walking with eyes open, and wavers and struggles to keep balance when walking with eyes closed. The athlete also falls twice during the last test.

Record:
1. 5
2. 3
3. 3
4. 3
5. 2
TOTAL = 16