Vision Screening with the VS-II Model 1135A and 1136A with Standard Tests

KEYSTONE VIEW
DIVISION OF MAST DEVELOPMENT COMPANY
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IMPORTANT NOTICE: The instrument is held closed by a magnetic latch. To free the latch, place thumbs on top edge of base and press up on bottom of chassis (see illustration).

DO NOT lift up on black eyeshield assembly.
INTRODUCTION

No skill is so important as that of vision. It provides the individual with control over his/her relationship to the environment.

Adequate vision is important to the child for proper normal development, normal learning. Nearly all the information we learn over the years comes to us through our eyes.

Good vision is important to the adult in many ways. For driving, for entertainment, for safety, and for satisfactory job performance. Yet, it has been reliably estimated that at least 40% of the United States population is handicapped by some visual dysfunction.

More unfortunately is that sub-standard vision need not penalize most otherwise-healthy persons. Experts agree that 95% of those with deficient sight skills can attain adequate vision for school or job if professional eye care is obtained when needed.

This is why vision screening assumed an increasingly important role in schools and industry, as well as with physicians, psychologists, and vision specialists. It quickly indicates if an individual’s vision falls within accepted norms of good seeing... or if aid would benefit from a professional analytical examination and therapy.

Screening has many applications

In industry, a comprehensive screening program can provide a general census of employee visual disorders, detecting those where corrective action should be taken. It is useful, too, in determining a job’s visual requirements... and provides a basis for employee selection and placement. It can predict the data of considerable medico-legal significance, such as determining the extent of damage in case of injury.

Educators have long recognized visual screening as an important method of determining if children have learning problems because of vision problems. It can aid reading directors by accurately defining sight skills and weaknesses in reading diagnosis. In addition, examination spotlights visual abnormalities that can hinder development of art, athletic, and technical abilities. And it can be very useful in vocational and educational guidance.

Psychologists and child development specialists employ vision screening in diagnosing behavior and personality adjustment cases and for assessing developmental abnormalities. Further, screening can be a valuable adjunct to aptitude testing... showing how vision can strongly affect other skills areas.

Physicians find vision screening can add important dimensions to regular physical examinations. It also plays a role in preventive health examinations and can qualify subjective complaints in headaches and eyestrain cases. A comprehensive screening can also reveal pertinent data in insurance-related physical surveys and sports-related physicals.

Advantages of VS-II Screening

With the introduction of the VS-II, screening becomes more complete and more convenient than ever before. Eight stereoscopic targets and a series of miniature lamps provides fourteen tests of nine visual functions... not just visual acuity alone.

The tests indicate whether the eyes work together as a team, measure eye positions and imbalance, and even check such skills as depth perception and colour discrimination.

Binocular testing is a significant advantage of the VS-II. Even those tests designed to check the acuity of one eye are given with both eyes open... because this is how the eyes are used in the individual’s everyday environment.

This technique also determines whether there is suppression (blocking of vision) in one eye... a condition which cannot be detected when one eye is occluded during tests (as with the wall chart technique).

General test procedure

VS-II screening is unusually easy to administer. All test operation is under push button remote control.

The subject sits or stands before the instrument, looks into it to view the target slides and lamps. The examiner explains the targets and the intended reaction with brief note. His/her responses are checked on a record form.

Testing is rapid... and enjoyable for all ages. The total screening series can be given in three to four minutes.

Near-point and far-point information

The VS-II measures visual skills at both far point and near point. Far point is the equivalent of an actual distance of six meters (20 feet). Near point is the equivalent of about forty centimeters (16 inches) - and is usually referred to as “reading distance.” In addition to these two standard test distances, the VS-II offers an additional test at intermediate distance, the common viewing distance required of operators of visual display terminals (VDTs). Testing at intermediate distance can provide valuable information relative to visual fatigue of computer and word processor users. The test is activated by inserting a supplemental lens system in back of the far point lenses with an instrument-mounted, spring loaded plunger. While acuity measurements with the special feature are most valuable, any of the available test targets can be viewed through the intermediate lens feature.

Far and near distances are produced optically by a unique bifocal lens system. This not only conserves space, but makes VS-II test particularly valuable in checking the vision of persons who are required to make heavy demands on their eyes in reading at near point.
TEST INSTRUMENT

The Keystone VS-II Vision Screener represents the second generation of electro-mechanical/mechanical vision test instruments. All functions are under push-button control . . . for unparalleled ease and reliability of operation. Completely self-contained, the unit operates from standard 240 volt a.c. power. It’s light in weight and unusually compact, able to go wherever it’s needed.

As modern as tomorrow, the VS-II is the result of more than four decades of Keystone leadership - and reliability - in screening instrument design. Utilizing state-of-the-art technology, it’s virtually maintenance-free.

The Basic Instrument

1) Headrest: The test subject’s forehead should rest lightly against this specially-designed strip.

2) Bifocal lens system: Far and near test distances are created using double-segment, hard resin lenses. Viewed through the upper segments, test targets appear at the precise equivalent of six meters. When seen through the lower segments, the targets appear at the usual forty centimeters (16 inch) reading distance. Lens segments not in use at a given time are mechanically occluded.

3) Perimeter Test. (see point 9)

4) Supplemental lens feature: Mounted inside the instrument, the intermediate distance lens assembly is positioned by depressing the attached plunger. The plunger is designed so that the lens assembly will lock in position. To release, merely press and move the plunger slightly forward.

5) Power switch: The off-on power control is located on the rear of the instrument case.

6) Control unit: Puts test operations under push-button command. (Control panel is described in detail on the next page).

7) Transformer: To eliminate electrical and heat hazards, power for the VS-II is converted to 24 volts a.c.

8) Light and compact: Only 25 cm (10 in) wide, 30 cm (10½ in) long, and 17 cm (7 in) high, the VS-II is a space saver that requires little more than a square foot of desk area. Total unit weight is less than 5 kilos (11 pounds).

9) Peripheral vision test: Light-emitting diode target lenses between the lenses and recessed in the temple areas of the viewing head measure horizontal peripheral visual fields. They are positioned so eyeglass frames will not interfere with testing.

10) Observation windows: Cover slides back to expose viewing windows which allows operator to see target being viewed by subject, and to use a pointer when necessary.
Positive occlusion

The VS-II incorporates a unique system for occluding (blocking out) the stereoscopic test target image seen by either eye. Each side of the targets is illuminated by a separate lamp. To occlude an image on either side, simply press the appropriate button on the control. The lamp will go out and the image will no longer be visible.

A major function of occlusion is to determine the existence of visual suppression... the mental blocking out of the image seen by one eye so that the only image registering in the brain is the one seen by the other eye. (Normally, the images seen by the two eyes are fused into a single, integrated image).

Because the VS-II requires the eyes to work together, any suppression will become evident during the first two tests if the subject reports that the image which should be visible to one eye does not appear.

In such cases, occlude the vision of the opposite eye: This usually causes the "non-seeing" eye to work hard enough so the "missing" image becomes visible. If it does not, it may be concluded the test subject is blind in that eye.

The occlusion system is also used with certain tests to provide official medicolegal data.

A convenient storage area, accessible from the rear, is built into the base of the instrument. The instruction manual and record forms may be stored here when the VS-II is not in use.

Accessible on the rear panel of the VS-II are:
- The main power switch "on/off".
- Fuse holder for 1 amp fuse.
- Main power input socket.

Control Unit

By pressing appropriate buttons on the compact panel, the stereo tests may be advanced, near or far test distance selected, either of the subject's eyes occluded, and the peripheral vision test lights selectively lit. Suitable for either hand-held or desk-top operation, the unit measures 11 x 26 x 2.5 cm (4 3/8 x 10 3/4 x 1 in) and weighs only 5200 grams (8 oz).

![Control Unit Diagram]

A) Stereo tests are listed on the control key card. A lamp next to each test description signals when that target is being presented.
B) Peripheral vision target lamps are lit by pressing these buttons. A signal lamp shows which eye is being tested.
C) A slide switch determines if the stereo targets are presented at near or far point. A lamp shows when the control is set for near point.
D) Occlusion is controlled by pushing separate buttons for each eye. The button must be held down continuously to extinguish the target lamp.
E) Touch this button and the stereo target drum advances to the next test. Keep the button depressed and the drum will continue to rotate.
F) The night switch simulates night vision conditions of reduced illumination. (Hold down the button continuously to maintain the reduced illumination).
VS-II MAINTENANCE

Under normal use conditions, the VS-II instrument requires minimum attention if it is protected by the dust cover when it is not in use. Ventrally no repair or adjustment is needed, since all operating components are protected and solid-state circuitry assures exceptionally high reliability.

Cleaning

Periodically, some cleaning will be necessary. The main instrument housing and control unit should be dusted from time to time with a soft cloth or brush, and the lenses washed with soap and water dampered cloth and dried with a soft cloth or tissue.

If the instrument has become very soiled, it may be cleaned with a mild soap-and-water dampered or general purpose cleaner dampered cloth. (Other solvents are not recommended.)

Be sure to disconnect the unit from its power supply before cleaning.

When the VS-II is used in a heavy industrial environment, such as that of a foundry, it is possible that some dust may accumulate on the stereo targets.

In this case, remove the top cover of the instrument and carefully dust the target with a soft camel's hair brush. The drum should not be removed. Instead, rotate it using the test advance button on the control panel.

Lamp Replacement

Two G-E No. 400 (28 volt) miniature lamps provide illumination of the stereo targets. Although they are rated for 1000 hours of continuous use, replacement will eventually be required. (One spare lamp is supplied with the instrument. Additional lamps may be obtained from your distributor or directly from Keystone View.)

Remove the instrument's top cover. Turn power switch on to check condition of the lamps. Make sure the bulb contacts are touching the metal lamp clips. (Please bear in mind that when one lamp fails, the second will probably fail within a short period. Another spare bulb should be available.)

The peripheral vision test targets in the viewing head and the red signal lights on the control panel are light-emitting diodes (LEDs). They are designed for extremely long life and should not require replacement during the lifetime of the VS-II.

If, however, any LED should fail, contact your equipment distributor or Keystone View.

Fuse Replacement

A standard 0.1 ampere automotive-type fuse is incorporated in the circuitry of the VS-II to protect the unit against possible electrical malfunction. It is located below the On/Off switch.

Should replacement ever be required, order an 8 AG ONE amp anti surge fuse (125 inches long) from your distributor (Part No. 297-268).

Installation and Synchronisation Of
The Stereo Test Target Drum

The VS-II Screen is shipped ready for operation, with the target drum installed and synchronised with the control panel. It is recommended that instrument owners do not remove the drum except for replacement or in an emergency situation.

Drum removal: If removal is required, (Wear light cotton gloves or use a facial tissue to protect the stereo target areas from finger prints. Try to handle the drum near the end cap gears) push the spring clips, "A" and "B", outward from the ends of the drum. Slide the drum towards the rear of the instrument - away from gears "C" and "D" - and lift it out.

Drum replacement and synchronisation:

1. Turn power switch on. Slowly rotate target gear "C" until gear "D" stops moving. Observe which red signal light on the control panel is lit. This shows how the drum is to be installed.

2. To synchronise the target drum with the control, the drum must be inserted with the corresponding target facing the lens opening at the front. Insert the drum downward between the spring clips ("A" and "B") slide it forward toward the lens until the clips snap in toward the drum. The drum gear cogs should now be engaged with gears "C" and "D".

3. Press the test advance button on the control to move the drum to the next target. Look through the lenses to determine if the target is centred vertically in the lens openings.

4. If a centring adjustment is required, move only spring clip "A" away from the drum and move left end of the drum backward and away from gear "C". Gear "C" must be disengaged from the drum cogs. Rotate drum backward or forward to accomplish adjustment. Snap drum back into position, re-engaging gear "C". Recheck target alignment by looking through lenses.

5. Repeat step 4 if required.

For other maintenance data, contact your equipment distributor or Keystone View Division.
THE TEST

Eight stereoscopy test targets, eight miniature lamps, and a supplementary tone system provide eighteen tests of binocular vision function. Most of the stereoscopic tests are given at both far point (optically equivalent to 6 meters/20 feet) and near point (equal to 40 cm/16 inches).

Stereoscopic Test Targets

Each of these permanently-mounted test targets presents somewhat differing images to the two eyes. The eyes must work together to fuse - i.e., merge - both images into a single image, as shown in the illustrations on this page.

Acuity: Left Eye - Test at far and near points
Similar to the preceding test, this target measures the visual acuity of the left eye while the right eye is open and seeing. Estimated values in terms of MDOF in RA (20/200 to 20/20) are provided.

Acuity: Right Eye - Test at far and near points
The acuity (fineness of visual discrimination) of the right eye is measured while the left eye is open and seeing. Results are calibrated in values from 6/30 to 6/6 (20/200 to 20/20).

Acuity: Binocular - Test at far, intermediate, near and test points
This acuity test presents the same numbers to both eyes simultaneously, providing seven ratings ranging from 6/30 to 6/6 (20/200 to 20/20). All three acuity targets employ modern Sokol-type numerals with vertical lines (finishing strokes).

Fusion - Test at far and near points
Here's a check of one of the basics of visual accuracy: Whether the images seen by the two eyes can be fused into a single, integrated image. Two balls are presented to each eye. They should fuse into a single column of three balls.

Stereopsis - Test at far and near
This 3-D target measures stereoscopic depth perception, due solely to the coordinated use of the eyes. The subject must name the symbol on each line that stands out from the others. A correct answer on any line shows 100% stereopsis.

Phoria (eye co-ordination) - Test at far and near points
Are the eye muscles balanced to work together with comfort and efficiency? This target measures vertical and lateral phorias (the tendency of one eye to turn in, out, up, or down) in prism diopters.

Colour perception - Test target at far and near points
Each target presents numbers "hidden" in pseudo-auditory/motoric symbols. They indicate if a color (rod/green) or blue (blue/violet) discrimination deficiency exists, but do not further clarify the disorder.

Horizontal Peripheral Visual Fields Test

Miniature lamp (LED) 180° is between the lens and recessed in the temple at the farthest point from the subject's visual field. All the infrared light extends when (A) the inks straight ahead.

Persons with "tunnel vision", a drastically restricted peripheral field, are quickly identified. The targets are collectively lit by individual buttons on the control panel to show a 45° nasal field and to check temporal fields at angles of 0°, 70°, and 135°. (A total field of 0° to 135° can be measured for each eye). The Evans may be tested separately or together.
THE RECORD FORM

The VS-II Record Form - illustrated at the right - makes subject charting easy. The examiner needs only to check the test subject's responses to provide a detailed record of her/his visual abilities.

(Complete instructions for filling out the Record Form will be found in the section, "Test Administration").

The area for noting subject's responses to the stereoscopic tests is divided into clear and shaded columns. Any checks in the shaded columns indicate potential unsatisfactory performance. See page 12 for scoring guidelines. (For the phoria tests, horizontal shaded bars indicate a probable vision handicap).

Results of the lateral peripheral vision test are recorded in the section, "Horizontal Field Tests", at the bottom of the form.

The record form has two sides. Far vision tests are recorded on the front half while the near vision tests are grouped on the back side.

Test are identified by a sequence number and by description to match call outs on the control key card.

It is often desirable to provide a second copy of the record form, either for the test subject or for a vision specialist to whom the test may be referred. A carbon copy of the chart can be easily prepared using pencil carbon paper between two forms and writing with a ball point pen or hard lead pencil.

The record form is supplied in packages of 5 pads of 100 sheets each. Order number 55063.

INTERPRETATION OF TEST SCORE

REFER for a full eye-examination any subject who scores one or more test in the "unacceptable" area of the record form, or whose side field of vision is less than 70 degrees on one or both sides.

Scores in the lightly shaded area indicate a somewhat doubtful performance; and subjects whose occupation requires good vision (e.g. Display Screen operators) and who score thus, also should be referred.

NOTE: Those failing only the stereopsis (depth perception) and/or colour vision tests need not be referred, but should be made aware of their deficiency.

(SEE ALSO PAGE 12 IN THIS MANUAL)
PREPARATION FOR TESTING

Place the VS-II on a table, desk, or counter which provides sufficient space for the instrument, control unit, and record forms. A desk/table height of 66-
76 cm (26-30 inches) - is recommended.

Position the instrument near the edge of the desk or counter. If subjects are to be tested while seated, be sure sufficient knee room is provided. Chairs for both the examiner and test subject should be straight-backed.

Equipment readiness

Before testing, check the VS-II to ensure it is in proper working condition.

The unit should be connected to a standard 240 volt a.c. outlet and both target illumination lamps should light when the power switch is turned on.

Next check to determine if the drum holding the test targets is properly synchronized with the control. Compare the test actually presented through the lenses with the indicator lamps on the panel. They should correspond.

(If they do not, or if portions of two test targets are presented simultaneously, follow the procedure outlined on page 4 of this manual to align the drum. Once it is properly positioned, no realignment should be necessary unless the drum is removed).

Also make sure that:

1. The horizontal field target lamps light as the appropriate buttons on the control panel are depressed.
2. The corresponding target illumination lamp goes out when each of the “Occlude” buttons is pressed.

3. The correct segments of the viewing lenses are exposed when test distance (“Near-Far”) selector switch is moved.
4. The night vision button reduces the illumination on both targets.

It may also be advisable to dust the VS-II and clean the lenses with a soap and water-dampened soft cloth.

General test conditions

Whenever possible, VS-II screening tests should be given in a reasonably quiet room. Testing can be performed in virtually any area where traffic, noise, or interruptions do not disconcert either the test subject or examiner . . . and do not interfere with the accuracy of speed of the tests.

If a number of persons are to be tested, they should be admitted to the test area one at a time. This will prevent those waiting to take the tests from obtaining erroneous or advanced information concerning responses . . . which could affect test validity. (Although the test targets can be seen only by the subject, oral remarks may be overheard and incorrectly interpreted by others).

The examiner may be positioned anywhere in the immediate vicinity of the test subject where space is available for the control unit and record forms.

Test subject's posture

Good body posture is important to good vision. So it is vital that proper posture be maintained during testing. An uncomfortable position will cause strain and distract the test subject. Whether he is seated or standing, the subject's back and head should be erect and the shoulders level. His/her forehead should rest comfortably against the instrument's headrest. This position should be maintained throughout the test period.

Adjustment of the height and angle of the VS-II is under the direct control of the test subject. (The examiner may wish to grasp the side of the unit with one or both hands, with the elbows resting on the desk or counter.

Do not allow the subject to pull back or away from the instrument between individual tests. Caution him or her against tilting the head to the side at any time.

Corrective lenses

If the subject wears corrective lenses, either regular eye-glasses or contact lenses, the test should be conducted with the lenses worn as usual.

If lenses are worn only for reading or only for distance vision, they should be removed when testing that type of vision for which they were not prescribed. If the subject wears bifocals, be sure (s)he is looking through the appropriate lens segment for each of the two test distances.

Also exercise caution when testing a person who has recently been fitted with new glasses. Many vision specialists do not fit a patient with full-correction lenses, but rely on the patient to help him/herself as time progresses. Therefore, poor scores on the screening tests shortly after such a fitting may not be truly significant. A retest after two months is recommended.

LOW-LIGHT NIGHT VISION TEST

Your Keystone VS-II is equipped with the facility to test vision under conditions of low lighting, such as would be experienced when driving at night.

To test “low light or night vision”, press and hold down the blue button at the top right of the control box (marked “Day & Night”) and carry out testing on any desired visual function in the usual way. Test results should not be significantly different from those obtained under normal light conditions.
TEST ADMINISTRATION

When vision screening is conducted with the VS-II, it is important that an organised procedure be followed... and that standardised questions be used. Only in this way can consistent results be assured. The sequence of the tests and the instructions given to the subject can both affect his/her performance.

The test questions listed on the following pages have been found to evoke quick responses from the average subject. However, as the individual examiner becomes experienced in administering the tests, (s)he may wish to adapt the specific wording of each question to his or her own style.

Responses should be prompt. After each test is presented and the question asked, allow five to ten seconds for the subject to become oriented to the target scene and report what is seen. An obvious hesitation indicates an effort to guess. Since there is no "penalty" for an "incorrect" answer, encourage the subject to be as frank as possible in telling what (s)he sees.

Acknowledging each response, but be careful not to indicate approval or disapproval, praise or disappointment. Do not "lead" the subject into giving any kind of response. Keeping the amount of conversation to a minimum during testing will help preserve the subjectivity of the tests and save examining time.

Recording the findings

The speed of recording will depend entirely on the examiner's familiarity with the test targets and the Record Form. The form has been designed to show both expected and abnormal responses so that scoring can be done by simply checking the appropriate space.

If undesirable visual characteristics are noted, responses are likely to be slower than usual, and the examiner should allow additional time. Even in such cases, the complete screening examination should take no more than three to five minutes.

Help the test subject to do well

Anyone's visual skills rating can be significantly altered by the attitude of the examiner. It should be the examiner's purpose to evoke the best performance the subject can give.

It is assumed that in normal living, people make the best possible use of their visual skills and do not function under the handicap of their worst moments. Thus, if four balls are seen in the fusion tests rather than the expected three, give the test subject an opportunity for the two white balls to soon merge into one.

If a younger child is being tested, be sure (s)he can recognise and identify the numerals from 1 through 9. Most of the screening tests employ numerals as stimuli.

Record Form identification section

Space is provided at the top of the Record Form for noting subject identification data. Be sure that the basic data is entered before actual testing begins. If a number of individuals are to be tested in one session, it may be preferable to have as much information as possible pre-recorded.

The information on whether the individual wears corrective lenses is obtained at the time of testing. As mentioned previously, lenses should be worn during the test as they are normally worn. If worn at all times, both near and far point tests are given with the prescription. If lenses are worn only for reading or only for distance, they should be used only for the appropriate section of the test series.

Medico-legal records

Many medico-legal records require distance acuity to be measured without corrective lenses and with occlusion of the eye not being tested. If the VS-II is used to provide such information, these special tests should be conducted after the standard test sequence has been completed.

This test is usually required only at distance but varying state compensation laws may indicate that the same type of test should be repeated at near point.

The procedure is the same for Tests 1 and 2 except that the left occluder button is depressed during Test 1, and the right occluder button is depressed during Test 2. Also be sure that corrective lenses are removed.

Test Procedure: Stereoscopic Tests

The test subject should sit or stand in front of the VS-II instrument, observing the rules of posture listed on page 7. Administer the tests with glasses worn by the subject unless specified.

FAR POINT TESTS

Set the distance-selector slide switch at a distance by the subject as usual.

Far (The red illuminating lamp will not be lit at this setting). Be sure bifocals wearers are looking through the upper segments of their lenses.

Test F-1: Far Point Acuity (right eye)

Question: “Here are nine blocks with numbers in them. Please read me the numbers in the first block in the top row. (Box 2-A.)”

Response: If five of the six numerals are correctly identified, the subject is considered as having 6/6 (20/20) acuity in the right eye and need not read further. If the first block is not correctly read, have the subject continue across each row consecutively from left to right until the numbers in a block are called correctly.
Testing: Place a check mark beside the line on the record form showing the first box correctly read. (Please note that Box 3 C D E B (20/20) is listed first on the form and Box 1 A D 0 (20/20) is listed last.)

Remarks: The subject may report that no boxes or numerals are seen. This indicates the existence of a visual suppression in the right eye. Should the subject report this, exclude the left eye and proceed with the right.

When the recording is used, responses on the record form should be circled rather than checked.

The existence of suppression is important because it reliably indicates some other binocular vision problem.

When a certain stress level is reached in the task of binocular co-ordination, one eye simply fails the other work alone and with comfort. Cases of suppression deserve immediate referral to a vision specialist.

Depending on the severity of the suppression problem, further screening for binocularity, as with Tests 4, 5, and 6, may be prudent.

Test F-1: Far Point Acuity (left eye)

Question: "How left's report the kind of test? The only thing that has changed are the numbers in the different blocks. Can you tell me the numbers in block A-1?"

Recording: Follow the same procedure as for Test 1.

Remarks: The subject may not realize that the first two tests each measure the acuity of one eye. To maintain accuracy, ensure the subject that one does not know this.

Test F-2: Far Point Acuity (binocular)

Procedure: Follow the same procedure as for Test 2.

Insert plungers for intermediate test and repeat Test F-2.

Release the plunger and repeat F-2 holding down the right switch.

Test F-3: Far Point Phoria

(The red vertical line measures lateral phoria. The green line measures vertical phoria.)

Question: "Do you see a scale of numbers and dots with two crossed lines running through it?" At what number is he between what numbers, does the green line pass through the numbers? (Record response) "At what numbers, or between what numbers, does the red line pass?"

Remarks: The expected answer for both lines is, "between 4 and 5." Response may be delayed by the apparent movement of the red line. To assist the subject in repeating response, ask for a number within the range of movement. When this has been obtained, determine how far the range may have moved.

Recording: Check the appropriate spaces on the Record Form to show clearly what the test subject reports. If the red line continues to fluctuate, draw a line between the numbers between which it moves. If it remains moving in one direction, wait until it stops before checking the Record Form.

Remarks: If a subject with binocular vision sees only the scale of numbers and dots of only the red lines, and looks correctly between 4 and 5, this may be uncorrected vision. However, if he sees some other numbers, or the green line, or both lines, this indicates a visual 650e condition. Record immediately.

Some test subjects may report one or both of the lines being the last to break before and after passing through the chart. This is not important. However, a decided head tilt is important and can significantly affect the subject. Make sure proper posture is maintained.

Test F-4: Far Point Fusion

Question: "How many balls do you see?"

Recording: Watch space in Record Form.

Response: The expected answer is three balls. A satisfactory answer is four balls becoming three.

Remarks: If the subject is unable or unwilling to respond, they should be reminded of the correct response and allowed to try again. If they continue to have difficulty, they should be referred to a vision specialist for further evaluation.
Remarks: If only two balls are seen (which is highly unlike), determine by their colour whether they are seen by the right or left eye. (The blue ball presented to the left eye only). If four balls are seen - either initially or after a few seconds - determine if the blue ball is to the left or right of the red one.

Test F-6: Far Point Stereopsis

Question: "Here you see five rows of symbols (shapes) with numbers on each side. Each line across has five different symbols. In the first line, all the top, are a star, a bell, a heart, a box, and a cross. Does one of the symbols in line 1 seem to float out in the air closer to you than the others?" "Which one?" "In the second line, which one floats out closer than the others?" Etc.

Response: The normal response is to correctly report all five lines. If the subject does not report the box as "floating out" toward him/her in the first row, it may be necessary to rephrase the question for better understanding.

Recording: Place a check mark on the test symbol correctly read.

Test F-7: Colour Vision (red/green)

Question: "What number do you see in the circle on the left? In the circle of the right?"

Response: Correctly naming both numerals in one circle is the minimum acceptable answer. Even this indicates some possible colour blindness.

Recording: Check the number of circles on which both numerals are correctly identified.

Remarks: Failure of this test shows severe colour blindness.

Test F-8: Colour Vision (blue/violet)

Procedure: Follow the same procedure as for Test 7. Failure of this test indicates mild colour blindness.

NEAR POINT TESTS

While the test subject is still looking at the target, move the distance selector switch to Near. (The red "Near" indicator lamp will now light).

Explain to the subject that you will now check his/her visual skills at the optical equivalent of normal reading distance, and that [s]he must look through a slightly different set of lenses.

Have the subject put on or remove corrective lenses as indicated. Bilateral wearers should now be viewing the target through the lower segment of their lenses. Let the subject adjust his/her head position in the instrument, if required, and become accustomed to the distance. Then advance to Test 1.

Test N-1: Near Point Acuity (right eye)

Procedure: Follow the same procedure as for (Far Point) Test F-1. Employ the occluders as required.

Test N-2: Near Point Acuity (left eye)

Procedure: Testing and recording follows the same procedure as the previous acuity tests.
Test N-3: Near Point Acuity (binocular)

Procedure: Follow the same procedure as for previous acuity tests.

Test N-4: Near Point Phoria

Procedure: Follow the same procedure as for Far Point phoria tests (F-4). Remember that responses may be delayed by the apparent movement of the red (vertical) line. Ask for a number within the range of movement. When this has been obtained, determine how far each way the movement continues.

Remarks: A test subject wearing bifocals may show a vertical phoria (measured by the green line) at the near distance even though none was noted at Far Point.

Persons who do not wear corrective lenses normally give the same response at both distances.

Test N-5: Near Point Fusion

Procedure: Follow the same procedure as for Far Point Test F-5.

Remarks: This test is particularly important for persons who must use their eyes for extended periods doing close work. Maintaining single vision vision.

at Near Point requires greater visual coordination than at Far Point.

Test N-6: Near Point Stereopsis

This test is optional, since the demonstration of good stereopsis at distance almost automatically assures good performance at Near Point. Further, this skill is not vital to the great majority of Near Point visual tasks.

Test Procedure: Peripheral Visual Fields

This test shows a subject's range of vision to each side when (s)he looks straight ahead. It should be performed by having the subject direct his/her attention to a Far Point stereo target and then lighting the peripheral target lamps at random. The stereo target used should be of a binocular target.

Thus, an excellent time to introduce the peripheral vision test into the total VS-II series is after the Far Point colour vision tests have been completed... and before the Near Point stereoscopic tests.

All peripheral target lamps should be lit, but the order of their appearance is left to the examiner. Recording is done by checking the appropriate box on the form for each target identified.

If an individual is blind in one eye, a total range for the other eye should be obtained. This is done by depressing both the “N” and “T0” buttons simultaneously. A response of “both sides” is expected.

Intermediate Distance Test (V. D. Screen)

This test is useful when evaluating computer or word processor operators. The Far Point Binocular Acuity target is used (Test F-3). Insert the special supplemental lens system by pushing its plunger until it locks down. Administer the test as you did Test F-3. Be sure to release the spring-loaded plunger before proceeding with the remaining Far Point Tests. Note: All the Far Point Tests may be given at this distance equivalent if your evaluation requires it. But the subject passing phoria, stereopsis and colour at Far Point will also generally pass these at this distance.
INTERPRETING TEST RESULTS

Stereoscopic Tests (See also page 6)

In general, the results of the VS II stereoscopic tests cannot be interpreted separately. But as a whole, when taken in their entirety, they will almost always provide a reliable indication of the test subject's visual efficiency.

It must be remembered that the test scores are designed to identify persons who may benefit from professional vision care. It is not intended to provide diagnostic or clinical data.

Suggested Visual Standards

If an eye is marked in the column of the "Acceptable" values, the subject can be considered to have "satisfactory performance".

Some authorities will accept scores of 20/40 or better as a passing minimum, and many driver licensing agencies accept 20/40 as a minimum standard. Also, if a subject's occupation demands good vision at the reading distance but not at the far point, consider 20/40 as a minimum score at the near point, but 20/30 as the minimum score at the far point. In other words, the opposite would apply if visual skills are critical at the near point but not at the far point, as in the case of a crane operator.

Consider scores in the clear areas as good general standards for visual abilities, but allow scores in the lightly shaded areas if visual tasks are not in demand.

Scores falling in the heavily shaded "Unacceptable" areas of the Recording Form indicate that the subject will benefit from professional vision examination. Be sure to test subjects with eye glasses on if they have been prescribed.

Do not refer for professional consultation for "inconclusive" performance on the stereoscopic test. No remedy has yet been perfected for defective colour vision. However, for reasons of safety, persons who are colour blind should be made aware of their deficiency.

Also, stereoscopic vision is a highly developed visual skill subject to maturation factors. Youngsters may do less well than older adults. However, adults whose occupations involve moving machinery or materials should be tested for safety reasons. Scores in at least the lightly shaded "Acceptable" areas on the stereoscopic test indicate that the test subject is not colorblind.

Normal General Perception (Stereoscopic)

Test (G-I and I-I) certification of the standing subject is low.

**TEST KEY**

<table>
<thead>
<tr>
<th>Line</th>
<th>Subject</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
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<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
</tr>
</tbody>
</table>

**Normal Color Vision**

Test (F-I)

1. Identify, red-green.
2. Identify, blue-violet.
3. Identify, yellow.
4. Identify, brown.
5. Identify, white.
6. Test (F-I) Mild Blue-Violet. Identify normal 20 or 50.

The U.S. Interstate Commerce Commission requires a lateral field of at least 70 degrees for truck drivers.

It is suggested that when anyone who holds a motor vehicle operator's license demonstrates a severely restricted field, even though no other visual skills are normal, he be referred to a vision specialist for examination and professional opinion.

Horizontal Peripheral Vision Test

This test is particularly significant in the case of vehicle operators. A person with normal peripheral vision will be able to see a moving object when it is 60 ft (at right angles) to his eye on the temporal (outside) side.

No exact standards have been developed which show the point where diminution of lateral fields first affect an accident. Yet authorities state that a field more restricted than 20 degrees would be a serious danger to a vehicle or an object.

A temporary reading of 20 degrees should be considered the minimum standard for safety. For U.S. Interstate Commerce Commission, 70 degrees is required.

Peripheral fields for driving must be at least 70 degrees for long-range vision.