EyeView®
Functional Vision Analysis Software

Software customized for Stereo Optical Corporation for use with the Optec 6500®

Instruction Manual

VSRC

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Table of Contents

Functional Vision Analysis Software

Introduction

Purpose

To allow doctors and clinicians to digitally record patient data and responses from the FACT (contrast sensitivity) and ETDRS (visual acuity) tests.

Definitions

Acuity	The ability to identify the smallest black and white details of an image. Does not test sensitivity to contrast for a range of sizes. It tests only the ability to resolve high contrast black-on-white letters.
Contrast	The difference in brightness levels from one part of an image to another. A white cat on a white snow bank is low contrast; a black cat on a white snow bank is high contrast.
Contrast Sensitivity Function	Curve that describes a person's sensitivity to contrast as a function of size. Used to help detect optical problems, as well as diagnose and track certain visual disorders. Determines visual capability to detect and identify everyday objects.
ETDRS Visual Acuity	Special visual acuity charts used in clinical studies.

Minimum System Requirements for EyeView® software

- PC Platform (Macintosh not currently supported)
- 486DX/66 MHz or higher processor
- Windows 98 or higher
- VGA color monitor
- CD-ROM or DVD-ROM drive
- USB Port

To install the EyeView® Functional Vision Analysis Software:

1. Insert the EyeView® CD into the CD-ROM drive.
2. Open the CD by double clicking the CD drive icon in "My Computer".
3. The CD should contain the following three files:

   > Optec6500.CAB
   >
   > Qtsusk.inf
   >
   > Qtsusk.sys
   >
   > Setup.exe
   >
   > Setup.1ST

4. Double click the file "setup.exe"
5. A message box labeled "Install" should appear with the following message: "Copying files, please stand by". This process may take several seconds.
6. Once files are copied, the screen should turn blue and a message box should appear with the following message: "Welcome to the Optec 6500 installation program".
7. Click "OK" to continue installation.
8. The next message box contains a button with an image of a computer; click this button to continue installation.
9. You will then be asked to "Choose Program Group". Ensure that "Optec 6500" is selected in both fields. Click "Continue".
10. Setup will begin. The program files will be installed in the following directory, C/Program Files/Optec 6500.
11. Once setup is complete, a message box will appear indicating, "Optec 6500 setup was completed successfully". Click "OK"
12. Setup is now complete.

Please note that the screen area must be set to 1024 x 768 pixels or higher in order to view the screen properly.

For quick "Optec 6500" program access, place a "Shortcut to Optec 6500" icon on the desktop. Double-click this icon to begin the program.

Dongle Installation:

- The Optec 6500 software requires a dongle to function. The dongle must be inserted into the USB port before program start-up.
- If no dongle is inserted, a message will appear which states, "This program has failed to detect a dongle". This message also provides instructions on dongle installation and troubleshooting.
- The dongle requires a driver in order to communicate with the software. Therefore, upon initial startup of the Optec 6500 program, the dongle driver must be loaded.

Please note that the following steps are only required during software installation.
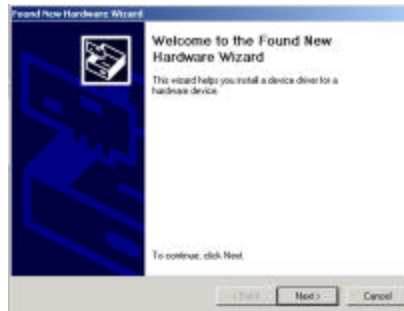
To install the driver:
1. Insert the dongle into the USB port.
2. Insert the EyeView® CD into the CD-ROM drive
3. Double-click the Optec 6500 icon from the desktop to begin the program.
4. A message should appear which states, "This program has failed to detect a dongle." If the driver is inserted properly, driver installation should automatically begin.
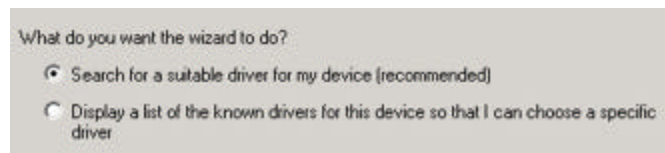

5. The driver installation message should automatically appear.

6. Next, the hardware wizard will guide the user through the driver installation.
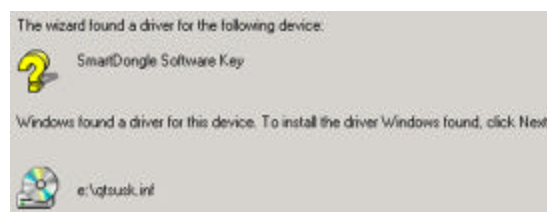
7. Click "Next" to proceed with installation.
8. The hardware wizard will search for drivers for the dongle. Ensure "Search for a suitable driver for my device" is selected.

9. Click "Next" to search for a suitable driver.
10. The hardware wizard requires a search location to be specified. Ensure the EyeView® CD is loaded into the CD-ROM drive.
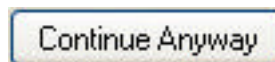11. Select "CD-ROM drives" as the search location.
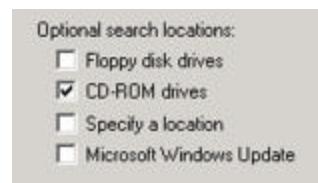
12. Click "Next" to search the CD-ROM drive.
13. The hardware wizard should find the appropriate driver for the dongle.

14. Click "Next" to install the driver.

15. For clients using Windows XP, the following message may appear during installation:

16. Please continue with installation by selecting, "Continue Anyway"

17. Once installation is complete, a confirmation message will appear.

18. Click "Finish" to complete installation.

Note: The screen captures above pertain to Windows 2000 and therefore the hardware wizards from other Windows versions may vary slightly.

For demonstration purposes, sample data has been entered for two FACT tests and one ETDRS test.

Procedures

Software Preparation

1. Power on the computer.
2. Insert the dongle into the USB port before starting the program. **Please note that the dongle must be inserted for the program to function properly.**
3. Choose the "Shortcut to Optec 6500" icon from the desktop to start the program.
4. The Optec 6500 screen should appear with a message that states "Program Loading..."
5. Next, the "Patient Data" screen will appear and information pertaining to the patient and testing conditions can be entered.

Software Overview

Patient Data	Draw Chart	Summary	EyeView	Quit

Each screen contains a taskbar at the top with the following buttons:

◆ **"Patient Data"** takes the user to the Patient Data screen.

◆ **"Draw Chart"** allows the user to plot the contrast sensitivity scores for one or multiple testing sessions of the selected patient.

◆ **"Summary"** refers to the Session Summary screen, which allows the user to view the summary results of the selected patient.

◆ **"EyeView"** takes the user to the EyeView® selection screen for the selected patient. The user can then highlight the test session to be viewed and click "ok". EyeView® will process only one test session at once therefore if two sessions are highlighted, the session that appears first in the list will be used.

◆ **"Quit"** will quit the program entirely and return the user to the windows screen. To restart the program, simply choose the "Shortcut to Optec 6500" icon from the desktop.

Testing a new patient

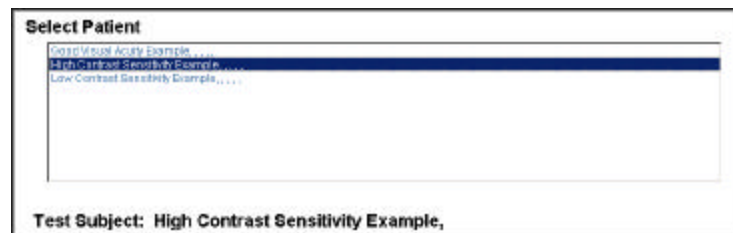The Patient Data screen allows both existing and new patients to be tested.

For demonstration purposes, sample data has been entered for two FACT tests and one ETDRS test.

a. Enter the patient's full name into the system (the last name is the only required field). Optional information includes the patient's date of birth, ID number, examiner name and comments such as "wears contacts." Once the patient data has been entered, choose "Save New Patient Data." This will save the information to the database. The patient's information must be saved in order to save test results. Once saved, the patient's name will appear in the patient list in alphabetical order.

b. Once the new patient information is saved, highlight the patient's name on the list. The selected patient should appear as the "Test Subject" located under the patient list.
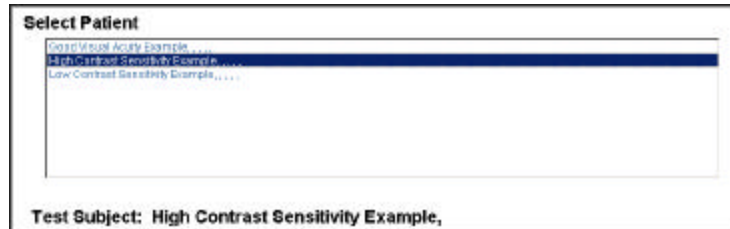

c. Several testing options appear under the patient list including luminance and glare conditions, test type (FACT or ETDRS), and vision correction. Choose the appropriate testing conditions and select "Test Patient" to continue.

d. The user will be taken to the score form for the chosen test.

Testing an existing patient

a. Highlight the patient's name on the list. The selected patient should appear as the "Test Subject" located under the patient list.
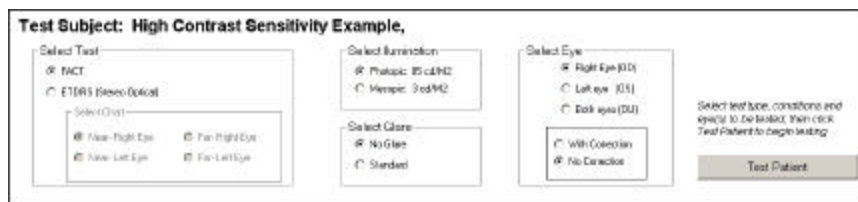

b. Several testing options appear under the patient list including luminance and glare conditions, test type (FACT or ETDRS), and vision correction. Choose the appropriate testing conditions and select "Test Patient" to continue. The user will be taken to the score form for the chosen test.

 ◆ Test results and patient information for existing patients can be edited or removed by selecting the appropriate patient and then selecting "Review Patient Data."

Test Order for FACT

The order of testing will vary depending upon the patient or the clinical trial. A suggested test order would involve first testing the right eye, left eye, then both eyes beginning with the higher light level (Photopic 85 cd/M^2) and proceeding to the lower light level (Mesopic 3 cd/M^2). Consider testing with glare last as it will temporarily bleach the patient's eyes.

Score results accordingly for visual acuity (ETDRS) and Contrast Sensitivity Testing (FACT):

Contrast Sensitivity Testing

a. Use the FACT chart to test the right eye, left eye, and both eyes. On the FACT Score Form, ensure that the appropriate testing condition (Photopic or Mesopic; with or without glare) has been selected.

```
Eye:  OU

Correction:  No

Luminance: 6 cd/square

Glare:  No
```

If not, choose "Patient Data" and select the appropriate conditions on the Patient Data screen. Then choose "Test Patient" to return to the score form.

b. The patient should read across each line, starting with row A and indicate the direction of the top of each grating.

The answer guide is as follows:

    R = Right
    U = Up
    L = Left

c. To score the patient, click on the answers that are correct. A blue patch indicates a correct answer. Clicking on a blue patch will turn it gray indicating an incorrect answer. To correct a mistake in scoring, simply click on the patch again to change the color.

|	1	2	3	4	5	6	7	8	9
A (1.5)	L	U	R	U	L	R	L	U	R
B (3)	R	L	R	L	R	U	L	R	U
C (6)	U	R	L	U	R	U	R	L	R
D (12)	L	R	U	R	U	L	U	R	L
E (18)	U	L	R	U	L	R	U	R	U

d. As a shortcut, the "All Blue" button under the FACT chart can be selected to automatically select all answers as correct. The "All Gray" button can be selected to automatically select all answers as incorrect.

e. Once a measure is completed, select "Score Test". The patch and the contrast sensitivity scores will appear in the columns to the right. The measure is labeled underneath the columns.

f. After scoring, select the "Save" button to retain test results. Once the scores have been saved, the user will be asked if they wish to repeat the measure.   This allows the user to repeat the FACT test under the same luminance conditions. At least two measures should be taken for each patient for each luminance condition although the program will allow up to 3 measures to be completed.

   ◆ If a patch difference greater than 2 patches exists between the measures, the user will be asked if they wish to retest.
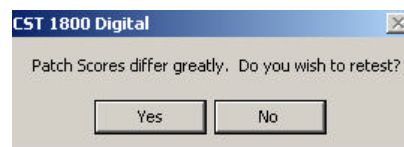
If the user selects "Yes", another measure will be taken and the inconsistent measure will be deleted. If the user selects "No", the scores will need to be saved by selecting "Save". Multiple measures should be within 2 patch scores and this function ensures that any wide difference between measures is intentional.

g. When the FACT testing is completed, the measures will be averaged and the results displayed on the Session Summary screen.

A Session Summary report can be printed from this page either at the time of testing or the user may come back to this screen at any time by selecting "Summary." Choose the desired test results by selecting the test date from the pull-down menu.

- Please note that if a patient is tested with less than 3 measures and then tested again under the same conditions within a 24-hour period, one testing parameter must be changed. It is recommended that this modified parameter be simple such as the removal or addition of the middle initial.

Visual Acuity Testing

a. Ensure that the appropriate luminance condition (Photopic or Mesopic; with or without glare) has been selected and that the eye being tested is correct.

b. If not, choose "Patient Data" and select the appropriate conditions on the Patient Data screen. Then choose "Test Patient" to return to the score form.

c. Have the patient read the smallest line of letters possible. If they miss any letters on this row, have them read the line above it. Repeat this step until they are able to read an entire line correctly.

d. If they read the line correctly on the first try, encourage them to read the line below that and, if appropriate, the line below that, etc.

e. To score the patient's test performance, click on the answers that are correct. A blue patch indicates a correct answer. For incorrect answers, click on a blue patch to turn it gray as a gray patch indicates an incorrect answer. To correct a mistake in scoring, simply click on the patch again to change the color.
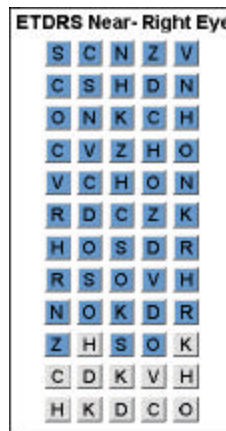
f. Once a measure is completed, select "Score Test.". The line score, correct letter ID score, and Snellen visual acuity scores will be calculated and displayed.

Line Score (12.5)	48
Correct Letter ID Score	48
Snellen Visual Acuity	20/20-2

After scoring, select "Save" to retain test results.

Reviewing Patient Results

There are several ways to view patient results:

Session Summary

a. Session Summary screen allows the user to view a summary score report of previous sessions. To view previously tested patients, select the patient from the patient list on the Patient Data screen and then select "Summary." Remember, only saved scores are available for review so remember to save the scores after each test.

b. Scores are viewed by date. To select a test date, simply select the date from the pull-down menu and the scores will appear on the left of the screen.

c. Selecting "Print Records" will print the summary score report for the date selected. To print another date, select the date from the list and click "Print Records"

Contrast Sensitivity Chart

a. The "Draw Chart" button from the taskbar takes the user to the contrast sensitivity chart where FACT results for one or multiple FACT tests can be graphed.

b. To select the tests to be graphed, highlight the appropriate tests from the list. Click on the highlighted tests to deselect them. Only highlighted tests are graphed.
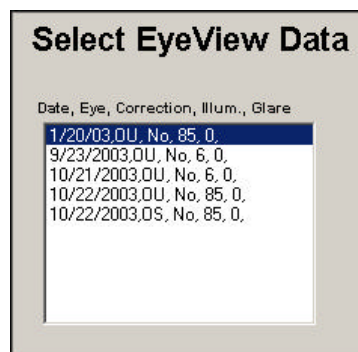
c. Once the desired plot is achieved, select "Print Chart" to print the contrast sensitivity chart.

Chart Interpretation

Spatial Frequency axis

This axis corresponds to the rows of the FACT chart where 1.5 cycles/degree represents row A and 18 cycles/degree represents row E. These numbers refer to the size of the gratings in that the lower the number, the wider the grating. Therefore 1.5 cycles/degree contains the widest gratings and 18 cycles/degree contains the narrowest gratings. The higher spatial frequencies are similar to the smaller letters on the eye chart. For example, a patient seeing the 18 cpd target corresponds to seeing a 20/24 size letter.

Cycles/Degree

Each combination of a dark and a light bar represents one cycle and a degree refers to the visual angle. Therefore row B which is 3 cycles/degree has 3 alternating light and dark sets of bars in one degree of visual angle. One degree of visual angle is the similar in size to the width of your fingertip held at arms length. Row E, which is 18 cycles/degree, has 18 sets of light and dark bars in one degree of visual angle. In other words, the thinner the bars, the more sets of bars that appear in one degree of visual angle.

Contrast Sensitivity axis

This axis corresponds to the average Contrast Sensitivity score and is plotted on a log scale. Contrast sensitivity is the reciprocal or inverse (one divided by) the physical contrast of the grating. The grating contrast is determined by contrast C = (maximum luminance - minimum luminance) divided by (maximum luminance + minimum luminance) where the maximum luminance is the lightest part of the grating and the minimum luminance is the darkest part of the grating. Therefore, contrast sensitivity = 1/contrast. The average contrast sensitivity score can be seen numerically on the "Session Summary" score report. The Contrast Sensitivity score is more useful for interpreting results then the Percent Contrast which is located on the axis to the right.

Percent Contrast axis

The Percent Contrast levels simply show the contrast level, which is being detected at each grating patch. For instance, the grating patch 1 of row E is approximately 30% contrast while the grating patch 9 of row E is about 1.5% contrast. Therefore patch 9 has lower contrast than patch 1 and subsequently a higher contrast sensitivity score.

Population Norm

The shaded area of the graph represents the population norm. 90% of the normal population will have contrast sensitivity within that shaded area. Any contrast sensitivity scores below that shaded area are less than 95% of the population.

Information contained inside the graph

The brackets inside the graph show an approximate functional visual acuity score. For instance, a patient with a patch score of 5, 6 or 7 in row E (18 cycles/degree) has a functional visual acuity score of approximately 20/20.
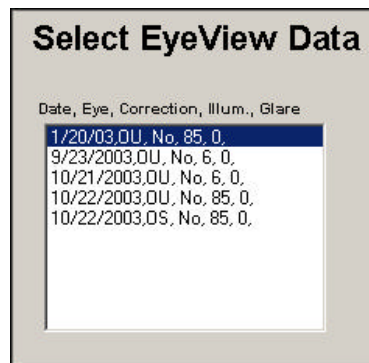
The columns of numbers inside the graph (1-9) refer to the 9 patches in each row of the FACT chart. The contrast decreases from patch 1 to patch 9 in each row with patch 9 having the lowest contrast. However the ability to detect lower amounts of contrast corresponds to a higher contrast sensitivity; therefore a patient with a patch score of 9 has a higher contrast sensitivity than someone who can only correctly identify up to patch 5.

Generally the human Contrast Sensitivity Function (CSF) has maximum sensitivity in the middle spatial frequencies of about 3-6 cycles/degree (rows B and C in FACT chart).

EyeView® Pictorial Analysis

The EyeView® Pictorial Analysis program uses the contrast sensitivity data for each patient and creates filtered pictures based on patient exam data. Any patient tested with the FACT can have their results displayed using EyeView® Pictorial Analysis. Once "EyeView" is selected, each test session for the selected patient will appear in the list. To produce the EyeView® Pictorial Analysis picture, complete the following steps:

a. Highlight the test session to be viewed.

Select EyeView Data

Date, Eye, Correction, Illum., Glare

1/20/03,OU, No, 85, 0,
9/23/2003,OU, No, 6, 0,
10/21/2003,OU, No, 6, 0,
10/22/2003,OU, No, 85, 0,
10/22/2003,OS, No, 85, 0,

b. Select "Ok".

c. The EyeView® Pictorial Analysis screen will appear and the selected picture will begin processing. A drop down list above each image allows the user to compare modified versions of the same image. The following versions are available:

- ◆ "Original" image is the source image for the modified pictures.

- ◆ "Patients Contrast Sensitivity Results" represent the patients contrast sensitivity based on their individual FACT test results.

- ◆ "5th Percentile Contrast Sensitivity" represents Contrast Sensitivity scores in the top 5th percentile.

- ◆ "Lowest Chart Values for Contrast" is the result of the following FACT patch scores: A1, B1, C1, D1, E1 which are the lowest possible scores other than O.

To change the current picture, select the desired image:

- ◆ Visual Acuity Chart
- ◆ Street Scene
- ◆ Newsletter
- ◆ Distance Photo
- ◆ Night Driving Image

d. Select "Process Image" and a status bar will appear indicating that the patients scores are being applied to the image.

e. Once processing is complete, select "Print" to print the image. All 4 images will be printed and labeled along with the contrast sensitivity scores and patient information. It is recommended that a color photo printer be used to print images.

f. The user may then select a different test session (by selecting the "EyeView" button from the taskbar) and repeat the above steps to process EyeView® Pictorial Analysis for that session.

Edit/Review Data

a. Patient data and results can be edited or deleted by selecting the "Review Patient Data" option on the patient data screen. Ensure that the appropriate patient has been selected and appears as the "Test Subject" located under the patient list.

b. The patients name, date of birth (DOB), ID number, and comment can be edited by changing the information contained in those fields. Individual exams can be edited by highlighting the exam and selecting "Edit/Review." The score form for that exam will appear and changes to the testing conditions or scores can be made. Once the user attempts to navigate away from the "Edit/Review" screen, a message will appear asking the user if they want to save the changes. If changes are correct, select "Yes". If they are incorrect, select "No".

Do you wish to SAVE any changes you may have made?

| Yes | No | Cancel |
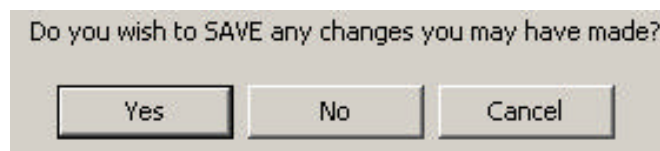
Both options will return the user to the "Patient Data" screen. Selecting "Cancel" will cancel all changes and return the user to the "Edit/Review" screen.

c. Individual exams can be deleted by highlighting the exam and selecting "Delete."

d. The list of patient tests can be printed by selecting "Print List."

There are two main data files that contain all the patient data and test results entitled "PatientDb.tab" and "ResultsDb.tab". These files are readable by Excel or most database programs.

"PatientDb.tab" contains all the patient information including name, DOB, etc. "ResultsDb.tab" contains the FACT and ETDRS test results for each patient. The two files are linked by the "Patient Key" number. For instance, if John Smith has the "Patient Key" of "4" on the "PatientDb.tab" file, his corresponding results will also have the "Patient Key" of "4" on the "ResultsDb.tab" file. The "Patient Key" is assigned by the program and is used as a link for the 2 databases.

These 2 files can be found in the following path, My Computer/C/Program Files/Optec 6500/Db. These files can be used to import data into another program or used as a database. However, any changes made to these files will be reflected in the patient data used in the program. Therefore, ensure that these files are **copied** to a disk, **not** moved, as they must stay in the program directory for proper functioning and it is not advisable to modify the data files while in the program directory.

Periodically these files should be saved to a disk to serve as an alternate patient data backup. Ensure that these files are **copied** to a disk, **not** moved, as they must stay in the program directory for proper functioning.

References

Ginsburg AP, Cheetham JK, DeGryse RE, Abelson M. Effects of flurbiprofen and indomethacin on acute cystoid macular edema after cataract surgery: Functional vision and contrast sensitivity. J Cataract Refract Surg 1995; 21(1): 82-92

For a complete list of references, please visit our web site at
www.contrastsensitivity.net