

Contrast Sensitivity Tester

Model 1800 Digital™

Instruction Manual (Demonstration)



VSRC

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Product Information

Weight: 18 pounds

Contrast Sensitivity: F.A.C.T. Near Chart
Contrast Sensitivity

Height: 12 inches

Visual Acuity: ETDRS Near Chart
Visual Acuity
High Contrast
(Low contrast
Available)

Width: 10 inches

Glare: Yes*

Length: 23 inches

The CST 1800D (Digital) is essential in clinical studies and helps provide better patient care. This compact, view-in unit includes the patented (US patent # 4365873, 5414479, 5500699), second generation F.A.C.T.™ sine-wave grating contrast sensitivity chart, which has proven to be more sensitive than any other contrast test available. With the system's new software, users can easily enter patient data, display the F.A.C.T. or ETDRS charts and the unit will record and analyze patient responses. Users also have the capability of creating pictures with the EyeView™ Vision Analysis technology, demonstrating how a street scene appears to the patient based on their individual contrast sensitivity scores.

The lightweight, portable tester uses a patented Uni-Light™ system to create uniform light across the test charts to ensure test accuracy. This exclusive testing device provides variable luminance conditions such as photopic and mesopic lighting conditions as well as a self-contained, calibrated glare source*.

The CST 1800 Near testing can be achieved by removing lenses or by inserting -2.00 D. lenses into the lens holders

The CST 1800 and the F.A.C.T. sine-wave grating technology have been recommended by the FDA for refractive surgery and intraocular lens implant clinical trials.

For further information not provided by this instruction manual, please feel free to contact Vision Sciences Research Corporation at 925-837-2083 x 18. For further information about why sine-wave contrast sensitivity testing is the most sensitive and size-specific contrast test, please go to contrastssensitivity.net.

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CST1800 Digital

Contrast Sensitivity Tester Model 1800 Digital™

Introduction

Purpose

To establish uniformity of test distance and test light levels in visual acuity and contrast sensitivity testing among clinical sites.

Scope

Testing with the CST (Contrast Sensitivity Tester) provides a comprehensive evaluation of visual function across a wide range of sizes and contrasts that appear in the everyday environment. (See contrastssensitivity.net for further information)

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.
CST	Contrast Sensitivity Tester
ETDRS Visual Acuity	Special visual acuity charts used in clinical studies.

CST Software Overview



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 CST 1800” icon from the desktop.

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.

Testing a new patient

- 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. (The “Save” function is not available in the demo version. Please use sample patients to view screens)

Testing an existing patient

- b. Highlight the patient's name on the list. The selected patient should appear as the "Test Subject" located under the patient list.
 - ◆ Test results and patient information for existing patients can be edited or removed by selecting "Review Patient Data". (The "Edit" and "delete" functions are not available in the demo version. Please use sample patients to view screens).
- 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. The user will be taken to the score form for the chosen test.
- d. The chart and glare lights (when a tester is attached) will turn on once the score form appears. The luminance conditions are those specified on the Patient Data screen. Navigating away from the page will cause the lights to turn off as they are only needed during testing.

Preset luminance conditions are available (Photopic, Mesopic 6 cd/M², and Mesopic 3 cd/M²), however other luminance levels ranging from 2-85 cd/M² can be entered by selecting "Other" and typing the desired value into the field. The following glare range is available, 25-60 LUX, as well as the standard preset value of 35 LUX.

Test Order

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/M²) and proceeding to the lower light level (Mesopic 3 cd/M²). 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. During CST testing, the FACT chart is used to test the right eye, left eye, and both eyes. On the FACT Score Form, it is important to ensure that the appropriate testing condition (Photopic or Mesopic; with or without glare) has been selected. 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 would read across each line, starting with row A and indicate the direction of the top of each grating.
- c. The answer guide is as follows:

R = Right
U = Up
L = Left

- d. 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. 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 scoring option is not available in the demo version, please use the “Edit/Review” screen to view previously tested patients for scoring examples). The measure is labeled underneath the columns. 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.

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. (The “Print” function is not available in the demo version).

Visual Acuity Testing

- a. During ETDRS testing, use the ETDRS Chart 1 for the right eye, Chart 2 for the left eye, and Chart 1 for testing both eyes together.
- b. The patient would read the smallest line of letters possible. If they miss any letters on this row, they would read the line above it. This step would be repeated until they are able to read an entire line correctly.
- c. If they read the line correctly on the first try, the patient would be encouraged to read the line below that and, if appropriate, the line below that, etc.
- d. 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.
- e. 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. (The scoring option is not available in the demo version; please use the "Edit/Review" screen to view previously tested patients' scoring examples). 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."
- 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”. (The “Print” function is not available in the demo version).

Contrast Sensitivity Chart

- a. The “Draw Chart” button 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. (The “Print” function is not available in the demo version).

EyeView

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

- a. Highlight the test session to be viewed.
- b. Select “Ok”.
- c. The EyeView 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.

d. To change the current picture, select the desired image:

- ◆ ETDRS vision chart
- ◆ Street Scene
- ◆ Newsletter
- ◆ Distance Photo
- ◆ Night Driving

Please note that only 2 images are available in the demo version, “Street Scene” and “Newsletter”.

- e. Select “Process Image” and a status bar will appear indicating that the patients scores are being applied the image.
- f. Once processing is complete, the image may be printed by selecting “Print” 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. (The “Print” function is not available in the demo version).
- g. The user may then select a different test session (by selecting the “EyeView” button) and repeat the above steps to process EyeView for that session.

Currently EyeView will only process Photopic images. Therefore choosing any session with an illumination below 10 cd/M² will result in an error message.

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”. 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. (Not available in the demo version)

- c. Individual exams can be deleted by highlighting the exam and selecting “Delete.” (Not available in the demo version)
- d. The list of patient tests can be printed by selecting “Print List.” (The “Print” function is not available in the demo version).

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.