

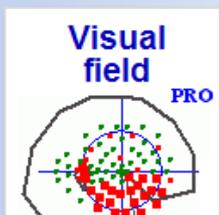


Manufactured by Metrovision
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USER'S MANUAL

VISUAL FIELD

Goldmann perimetry



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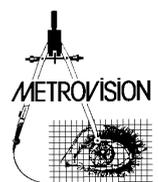
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■ CW_US version 28/02/2019

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INTRODUCTION



WARNING

Before reading this document, you should be familiarized with the general information related to the hardware and software of the Vision Monitor.

This information is available in the following documents:

DOCUMENT	CONTENT
AA1_US	Vision Monitor – Installation and instructions for use of the equipment
AA2_US	Vision Monitor – Introduction and general operation of the software

Despite the great progress introduced by standard automated perimetry, there are still a number of clinical situations where a “manual” mode such as available on the Goldmann perimeter is needed: an estimated 20 to 30 percent of patients for which perimetry is useful cannot be tested reliably on automated systems: young infants before the age of 6 to 7 years old, elderly patients, handicapped subjects...

For this reason, two visual field perimetry applications are available on the Vision Monitor for standard clinical use:

- **Standard automated perimetry** which is described in another document: “VISUAL FIELD – Standard automated perimetry” (CV_US)
- **Goldmann perimetry** (or “manual” perimetry) which is described the present document “VISUAL FIELD – Goldmann perimetry” (CW_US).

On the Vision Monitor, “manual” perimetry can be performed with 21st century tools. Innovations such as a highly interactive computer interface and a high resolution, large field video recording greatly facilitate the exam of these patients who cannot perform reliably with automated system.

In addition, this manual describes new perimetry applications of the Vision monitor such as **attraction perimetry**, using eye movements as a response to peripheral stimuli, perimetry for the evaluation of **ptosis**, perimetry for the evaluation of **diplopia** (binocular single vision field)...

Clinical research applications, available on MonCvONE-CR, are described in several additional documents

- “VISUAL FIELD – Advanced functions” (CV2_US) for applications such as dark adapted chromatic perimetry
- “Dark adaptometry” (AO_US)
- “Pupillometry” (PU_US)



Goldmann perimetry on the Vision monitor

■ A truly interactive interface

One of the important features of “manual” Goldmann perimetry is the **ability of the operator to interact with the patient**. For this purpose, the interface of the Vision monitor provides a **direct** control of the stimulus: pressing the mouse button presents the stimulus at the pointer location. Moving the mouse immediately moves the stimulus.

Note: **Direct** control is totally different from **vector control** of the stimulus. With vector control, several mouse actions are needed to trigger a stimulus. Direct control facilitates greatly the interaction with the patient.

In addition, the operator has a complete control of stimulation parameters with commands quite similar to the Goldmann:

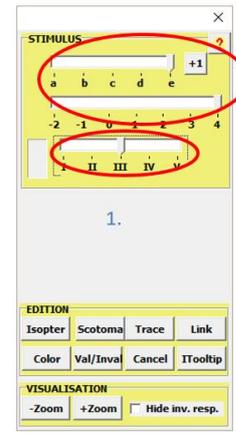
- size
- luminance

■ A large field, high resolution video

The Vision Monitor is equipped with a high-resolution camera which allows a precise monitoring of eye fixation and movements. The viewing field is much larger (>10 cm) than the Goldmann’s viewing ocular or the video control of current automated perimeter. This allows binocular visual field control and is quite suitable for testing very young patients who tend to have quite large head movements. It also opens the way to several

■ Video synchronous recording

This additional feature is proposed as an option (reference PVM-CF). It allows the recording of the video in compressed format which can be replayed in synchrony with the examination. This offers several useful applications such as the inclusion in the visual field report of snap shots of the video to document artefacts such as ptosis, abnormal head posture... It can also be used to record the patients’ behavioral responses and abnormal eye movements.



The operator can also:

- select response locations,
- define isopters,
- define the contours of scotoma.

tests related to binocular vision such as diplopia field tests and recording the cardinal positions of gaze.



Advantages in comparison with the Goldmann perimeter

■ Fully digital data

The Vision Monitor offers all the capabilities of computers: storage, scalable display, easy export to computerized medical records...

■ Quantification of results

The Vision Monitor provides an automated quantification of **isopters and scotoma**. This quantification is based on the measurement of their surface area (in square degrees) or of their solid angle (in steradian). The preferred measurement can be selected from the preference menu.

This information is also used for the **follow-up of patients**. Select the follow-up option in the ANALYSIS menu to make the program search all the exams performed on the same patient (same name, same birth date and same tested eye) and display the evolution of the different isopters or scotoma.

Note: it is also possible to import data from old Goldmann results: see chapter “Digitizing of Goldmann perimetry results”.

■ Micro-perimetry

The Vision Monitor includes the ability to place the **image of the eye fundus or OCT** on the background of the visual field display, with the same scale.

This is facilitated by the ability to **zoom the central part** of the visual field and perform a study of the macular area with much more accuracy than on the Goldmann perimeter.

See chapter “Micro-perimetry” for details.

■ A large viewing field, high resolution video

The viewing field is much larger (>10 cm) than the Goldmann’s viewing ocular. This allows binocular visual field control and is quite suitable for testing very young patients who tend to have quite large head movements. It also opens the way to several tests related to binocular vision such as diplopia field tests and recoding the cardinal positions of gaze.



Vision Monitor models

The GOLDMANN PERIMETRY program is available on the following Metrovision's systems.

■ MonCvONE

MonCvONE is a full field projection perimeter

It can perform standard automated perimetry as well as Goldmann (manual) perimetry.



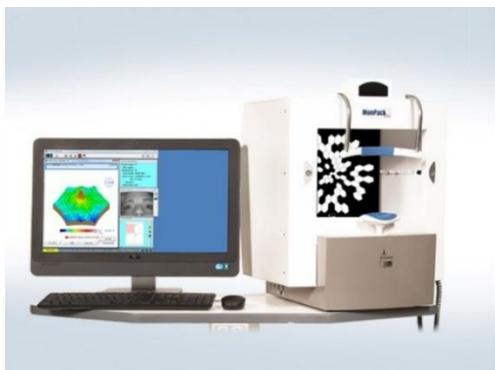
■ MonCv3

MonCv3 is a central visual field perimeter with additional light sources along the horizontal meridian for the test of drivers. It is also a multifunction system allowing the evaluation of contrast sensitivity, visual aptitudes and much more...



■ MonPackONE

MonPackONE is similar to MonCv3 with the additional capability of visual electrophysiology tests such as ERG, VEP and EOG.

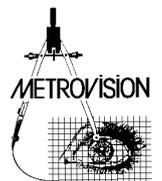


Test procedures

The following test procedures are available

Procedures	Clinical applications	Specific features
Aptitudes	<ul style="list-style-type: none"> • "manual" evaluation of visual aptitudes based on the Esterman grid. 	<ul style="list-style-type: none"> • Binocular • Goldmann III4e (default) • Available on MonCvONE only
Attraction visual field	<ul style="list-style-type: none"> • Test of the visual field based on the eye movement response 	<ul style="list-style-type: none"> • Binocular • With automated video recording • Goldmann tests on all equipment • Baby test available on MonPackONE and MonCv3
Goldmann visual field	<ul style="list-style-type: none"> • Patients who cannot perform reliably automated perimetry • Neuro-ophthalmology disorders 	<ul style="list-style-type: none"> • Monocular • Video recording on demand
Automated kinetic perimetry	<ul style="list-style-type: none"> • Neuro-ophthalmology disorders 	<ul style="list-style-type: none"> • Peripheral isopter • Intermediate isopter • Central isopter • Blind spot
Diplopia field	<ul style="list-style-type: none"> • Evaluation of single vision and double vision fields 	<ul style="list-style-type: none"> • Binocular • Automated video recording
Cardinal positions of gaze	<ul style="list-style-type: none"> • Oculoplastic surgery 	<ul style="list-style-type: none"> • Monocular or Binocular • Automated video recording
Ptosis visual field	<ul style="list-style-type: none"> • Oculoplastic surgery 	<ul style="list-style-type: none"> • Monocular • Automated video recording
Scotopic visual field	<ul style="list-style-type: none"> • Clinical studies (RP, ...) 	<ul style="list-style-type: none"> • Visual field test under scotopic conditions • Red, blue and white stimuli • 62 dB dynamic range
Mesopic visual field	<ul style="list-style-type: none"> • Clinical studies 	<ul style="list-style-type: none"> • Visual field test under mesopic conditions • Red, blue and white stimuli • 62 dB dynamic range





GOLDMANN PERIMETRY INTERFACE



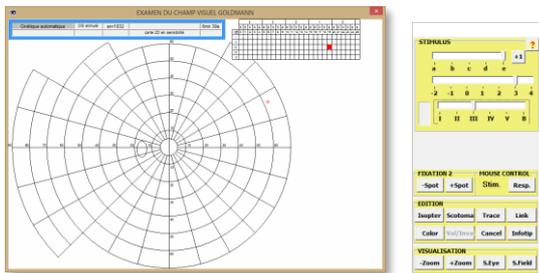
Getting started

Introduction to the Goldmann interface

1. Select the program « Visual field PRO ».
2. Identify the patient and select the eye to be tested.
3. Start the test « Goldmann perimetry ».

Three windows appear:

On the left, a window allowing the control of the stimulus position and the selection of responses.

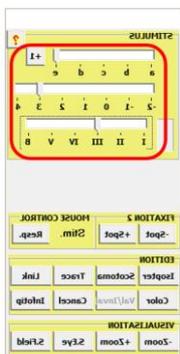


In the center, a window comprising several panels:

1. STIMULUS for the control of stimulus parameters (size and luminance)
2. FIXATION for the control of the intensity of the fixation target.
3. EDITION for the definition of isopters, their color to cancel the last test, ...
4. MOUSE CONTROL to switch between the control of the stimulus position and the selection of responses (see the paragraph “Advanced mode”)
5. VISUALISATION to change the zoom factor, to import an eye fundus image or a previous visual field result

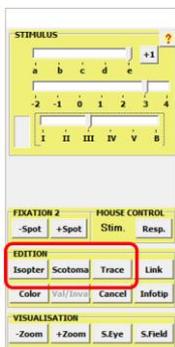
On the right, the video window displaying the video of the patient’s eye(s).

Selecting and presenting the stimulus



1. Select the size and luminance of the stimulus with the corresponding cursors in the STIMULUS panel
2. Select the stimulus position by positioning the mouse cursor in the left window
3. Press on the mouse left button to make the stimulus appear in the desired location.
4. Un-press the mouse button and the stimulus disappears.
5. Move the mouse while pressing the left button and the stimulus follows the movements of the mouse.
6. The patient’s responses are automatically recorded when the patient presses the response button.

Tracing the isopter

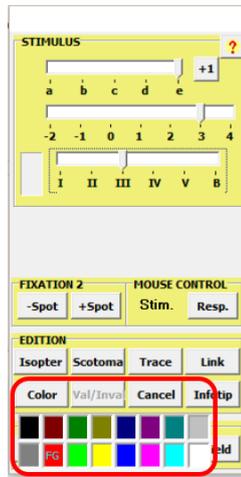


Several solutions are proposed for tracing the isopter:

- If the patient’s response points are regularly arranged around the fixation spot, just do a left click on the **Isopter** button in the EDITION panel.
- If the response points describe a scotoma, make a left click on the **Scotoma** button.
- If the isopter is irregular, make a left click on the **Trace** button. The set of points belonging to that isopter will start flickering. The initial point is identified with a black filling. Thereafter, move the mouse over the response points, starting from the second point and following their connection order. The selection will stop when you come back to the initial point or when you click again on the **Trace** (in the case of an unclosed isopter).



■ Changing the color of the isopter



Click on the **Color** button in the EDITION panel and select the requested color

Note: the colors of the different isopters can also be pre-defined in the preference  menu, in the page « visual field ».

■ Completing the exam

The exam can be continued by defining additional isopters with different sizes and luminances and tracing the corresponding isopters.

When all tests have been performed, move on to the result exploitation by pressing the RESULT button on the Navigation bar. You can then save and print the examination result.

Advanced mode

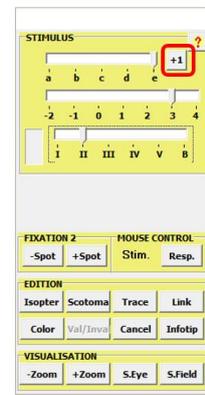
■ Defining several isopters / scotomas with the same luminance and size

In some cases, it may be necessary to test several isopters or scotoma having the same stimulus size and luminance.

In those cases, it is necessary to indicate to the program that the new isopter is different from the previous one.

This is obtained by clicking on the  button.

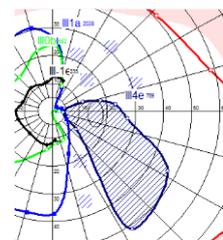
This button will now be displayed as , indicating that a new isopter will be tested with the same parameters.



■ Defining non-seen areas

Create a « non-seen » point by pressing the « CAPS » key and simultaneously doing a right mouse click on the “non-seen” area.

If the “non-seen” point is located within a scotoma, the entire scotoma will be hatched.



■ Using the operator’s responses

In some cases, the patient’s responses are not reliable and there will be several different responses when the same location is tested several times. In some other cases, the patient is not able to press the response button.

In those situations, the operator can define directly the position of the response by pointing the location with the mouse cursor and then doing a right mouse click.

Tracing the isopter (or the scotoma) can then be done as described in the previous paragraph except that the operator has to use the right mouse click instead of the

■ Zooming – de-zooming

The **+Zoom** button allows to zoom the visual field and obtain a much better definition of the central field. The

■ Cancelling patient’s responses or operator’s actions

The **Cancel** button cancels the latest response from the patient or action from the operator

■ Using the vector mode

The movement of the stimulus can also be controlled by tracing vectors:

- position the mouse pointer at the starting point
- press the SHIFT key and move the mouse pointer: a vector line appears. While pressing the shift key, move the pointer to the desired final position of the stimulus.
- release the shift key: the stimulus moves along the

■ Mouse control modes

The mouse can be used to control the stimulation or to control the acquired responses (for validation / invalidation, ...). During the exam, you can switch from one mode to the other by pressing the “Stim.” And “Resp.” buttons in the Mouse control panel.

Once in the Resp. control mode, it is no longer possible to change the stimulation and the corresponding controls are shaded in gray. Press the “Stim.” Button to recover the control of the stimulation.

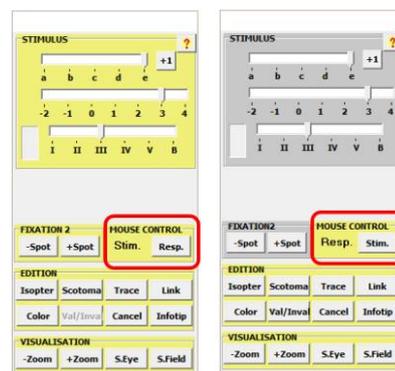
left mouse click for the **Isopter**, **Scotoma** and **Trace** buttons.

Both the patient and operator responses can also be combined by pressing the shift key when you click on the same buttons.

Responses from the patient and from the operator can easily be differentiated: the patient’s responses have a squared shape whereas the operator’s responses have a circular shape (‘O’ like operator).

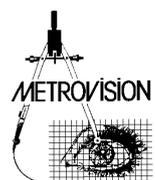
The **-Zoom** button allows to de-zoom the result and return to the full-field display.

programmed vector line. The velocity of the movement is constant and is defined by the Velocity button. Velocity can be changed at any time just by pressing the corresponding Velocity button. The movement of stimulus stops when the final position is reached or when a response is recorded or when the space bar is pressed.



Stimulus Control mode

Response control mode



■ Switching from automated to manual mode

If you are doubtful about the results of an automated exam and you are willing to control rapidly some abnormal areas, you can switch to the manual mode.

- 1- At the end of the exam, save the result but **DO NOT RETURN TO THE MENU.**

- 2- Click on **ANALYSIS** and select the option « control measurements »
- 3- The program switches to the Goldmann mode which allows you to perform additional measurements that will be added to the previous result.

■ Modifying the results of an exam

It may be useful to modify the result of a manual “Goldmann” exam once the exam is completed.

This allows to invalidate some response points, to indicate some “non-seen” areas or to trace the isopters.

- 1- Display the result of the exam.
- 2- Click on **ANALYSIS** and select the option « edition ».
- 3- The Control window is then displayed and you can perform all the commands that have been described in the previous paragraph.

■ Fixation control / Measurement of the pupil diameter / Recording of the video (option)

Fixation control

Initialize the fixation control by pressing the **F** button on the right side of the video window. The program takes several measurements of the eye gaze orientation which are used during the exam to detect fixation errors.

If initialization is successful, a warning message is displayed when the patient fixation changes or when the patient blinks.

If initialization fails, repeat the same command or use the **M** button that will start the detection of eye movements during the exam.



The control of fixation can be stopped by pressing again on the initialization button.

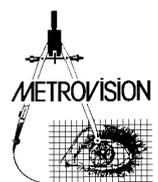
Measurement of the pupil diameter

The pupil diameter can be measured by pressing button



on the right side of the video window.

It is then automatically included in the examination report.



Recording of the video

Video recording is initialized by pressing on button  on the right of the Fixation Monitor window.

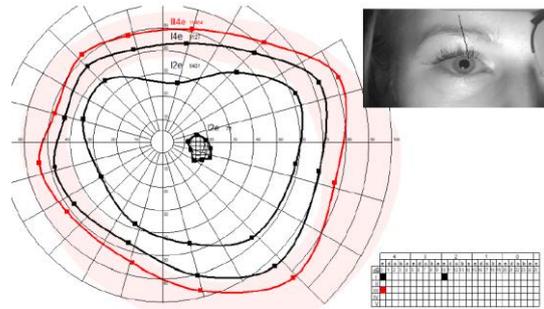
This button will then start blinking.

The video recording is stopped and saved automatically either:

- by pressing again on button 
- or when the examination result is saved.

It is then automatically included in the examination report.

Note: the inclusion of the video in the printed report can be cancelled by closing the video window.



■ Recording of eye movements (option)

This feature is available with version MonCvONE-CR.

Eye movements can be recorded during all exams performed on the Vision Monitor using the Hirschberg technique (position of the corneal reflex relative to the pupil).

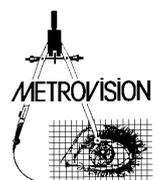
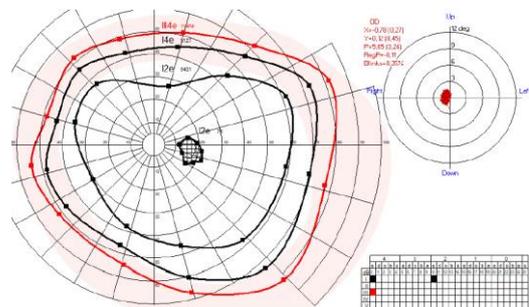
Eye movements recording is initialized by pressing on button  on the right of the Fixation Monitor window.

This button will then start blinking.

The eye movements recording is stopped and saved automatically either:

- by pressing again on button 
- or when the examination result is saved.

It is then automatically included in the examination report.

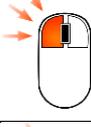


■ Short cuts

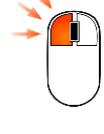
- **Space** bar: cancels the previous action
- **Escape**: return to the exam menu
- **Right** and **left** arrows: increase and reduce the stimulus luminance
- **Mouse wheel or Up** and **down** arrows: zoom and de-zoom the visual field display

- **F1** and **F2**: move the head rest right and left (for MonCvONE stimulator only)
- **F3** and **F4**: move the head rest up and down (for MonCvONE stimulator only)

■ Summary of interactive commands

Action			Stimulus control mode	Response control mode
Position the mouse pointer and press the left mouse button			Present the stimulus at the location pointed by the mouse	Select the isopter and response pointed by the mouse
Position the mouse pointer and press the right button			Record the operator response at the location pointed by the mouse	
Position the mouse pointer and press the right button while pressing the shift key			Record an absence of response at the location pointed by the mouse	
Move the mouse pointer while pressing the left button			Move the stimulus	
Move the mouse pointer while pressing the left button and the shift key			Define the stimulus vector	
Left click on the ISOPTER button			Draw an isopter connecting the last patient's responses (with the same stimulus parameters)	Draw an isopter connecting the patient's selected responses (with the same stimulus parameters)
Right click on the ISOPTER button			Draw an isopter connecting the last operator's responses (with the same stimulus parameters)	Draw an isopter connecting the operator's selected responses (with the same stimulus parameters)
Left click on the ISOPTER button while pressing the shift key			Draw an isopter connecting the last responses both from the patient and the operator (with the same stimulus parameters)	Draw an isopter connecting the both the patient's and operator's selected responses (with the same stimulus parameters)



Left click on the SCOTOMA button			Draw a scotoma connecting the last patient's responses (with the same stimulus parameters)	Draw a scotoma connecting the patient's selected responses (with the same stimulus parameters)
Right click on the SCOTOMA button			Draw a scotoma connecting the last operator's responses (with the same stimulus parameters)	Draw a scotoma connecting the operator's selected responses (with the same stimulus parameters)
Left click on the SCOTOMA button while pressing the shift key			Draw a scotoma connecting the last responses both from the patient and the operator (with the same stimulus parameters)	Draw a scotoma connecting the both the patient's and operator's selected responses (with the same stimulus parameters)
Left click on the TRACE button			Draw the point by point connections of the last patient's responses (with the same stimulus parameters)	Draw the point by point connections of the patient's selected responses (with the same stimulus parameters)
Right click on the TRACE button			Draw the point by point connections of the last operator's responses (with the same stimulus parameters)	Draw the point by point connections of the operator's selected responses (with the same stimulus parameters)
Left click on the TRACE button while pressing the shift key			Draw the point by point connections of the last responses both from the patient and the operator (with the same stimulus parameters)	Draw the point by point connections of both the patient's and operator's selected responses (with the same stimulus parameters)
Right click on the TRACE button while pressing the shift key			Draw the point by point connections of the last operator's responses in their realization order (with the same stimulus parameters)	Draw the point by point connections of the operator's selected responses in their realization order (with the same stimulus parameters)



QUANTITATIVE AND FOLLOW-UP ANALYSIS

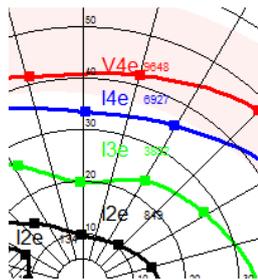


■ Quantification of isopters and scotoma

Two options can be selected from the preference menu for the quantitative measurement of isopters and scotoma:

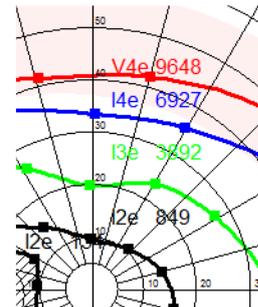
- 1- The surface area given in square degrees
- 2- The solid angle given in steradians

These measurements are calculated and displayed automatically at the right of the isopters' labels (V4e for example). The value of the surface area is usually a large number (for example 9648 degrees²) whereas the value of the solid angle is a much smaller number (for example 0.078 steradians).



Note: the use of solid angle measurements allows a more precise evaluation of isopters and scotoma as it corrects the deformations associated with the planar representation of the Goldmann visual field.

Easy way: if you have difficulties reading the value of the surface area, press the “L” key of the keyboard to make the displayed numbers Larger.



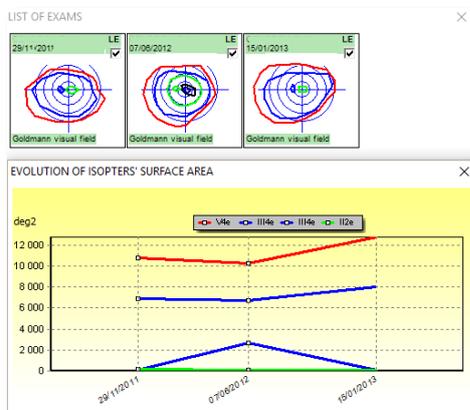
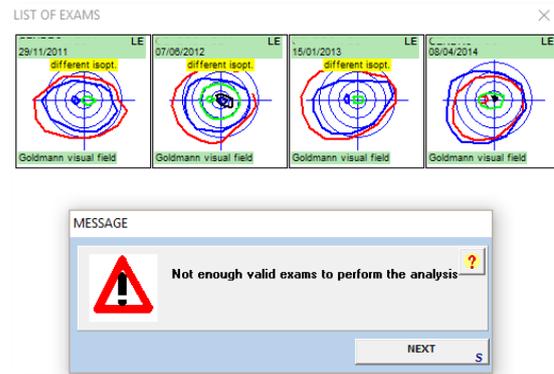
■ Follow-up analysis

This analysis is used to study the evolution of the patient's visual field, on the basis of the surface area of isopters and scotoma or of their solid angle.

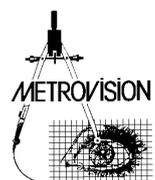
The program searches the database for all exams performed on the same eye, with the same patient's name and the same patient's birth date.

It displays the list of corresponding exams in chronologic order and a plot of the evolution of the surface area or solid angle of the isopters and scotoma

Note: if exams are not made with the same isopter parameters, the program will not accept to display the result



Example where different isopter parameters have been used which does not allow the follow-up analysis



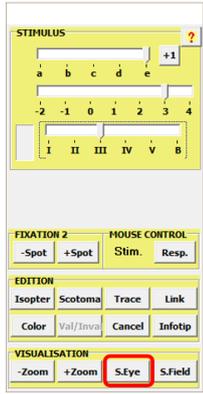
MICRO-PERIMETRY



■ Getting started

Micro-perimetry consists in realizing Goldmann perimetry with the patient's eye fundus image or OCT image as background.

After starting the Goldmann perimetry test, select the eye fundus or OCT image by clicking on the **S.Eye** button.



■ Scaling the eye fundus image

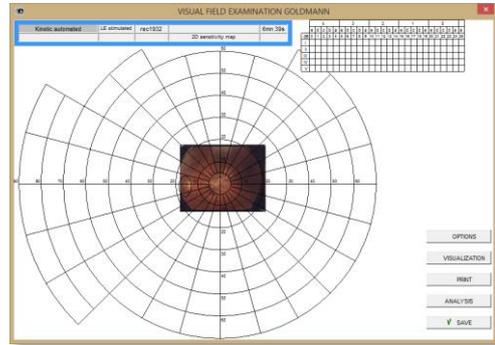
Click on the **FOVEA** button and then click on the fovea location.



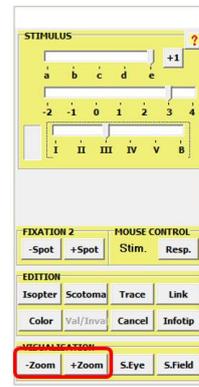
Click on the **PAPILLA** button and then click on the papilla location.



The image is automatically scaled to the visual field and is flipped upside down so that the result is displayed in the visual field representation.

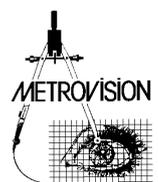
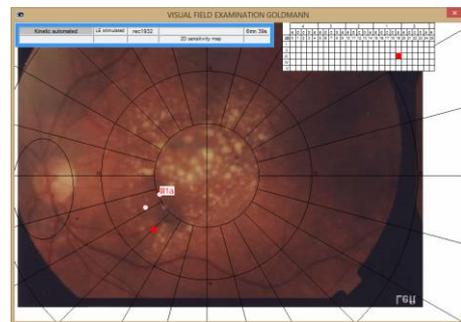


Then click on the **+Zoom** button to dilate the image to a suitable size.

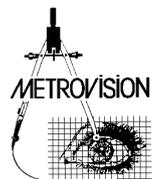


Then you can start the exam using the same procedure that was described in the chapter "Goldmann perimetry Interface".

Note: you can reduce the contrast of the background image by doing a right click on the **S.Eye** button.



ATTRACTION PERIMETRY



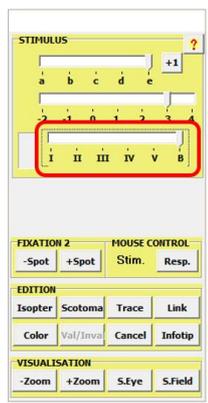
■ Getting started

Attraction perimetry relies on the use of the eye movement response: subjects tend to look at a visual stimulus presented in their peripheral visual field.

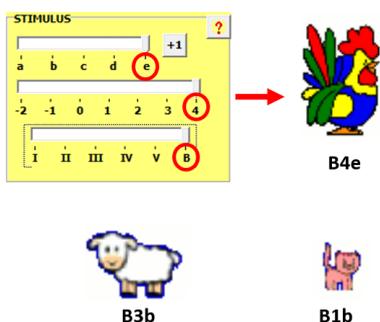
Attraction perimetry can be a useful alternative when automated perimetry is not reliable in cases such as young children (less than 5 years of age) or mentally handicapped subjects.

■ Selecting a stimulus

On **MonCv3** and **MonPackONE**, a set of tests dedicated to the evaluation of children is available. It is selected by moving the size cursor to the 'B' position (B stands for "baby").



Images with different sizes can also be selected with the cursors used to select luminance. This will affect the visibility of objects but not their luminance.

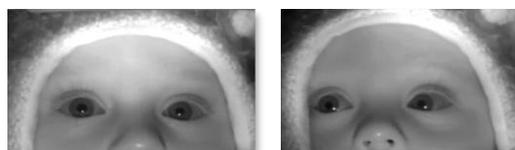


On **MonCvONE** "only" the standard Goldmann tests can be used.

■ Getting the subject's response

Position the stimulus at the center of the display. Do left mouse clicks to make the stimulus flicker and attract the attention of the subject.

Check if the subject is looking at the stimulus by looking at the position of the pupils relative to the corneal reflex. When the subject is looking at the center of the display, the corneal reflex appears just below the pupil (this is because the illumination source is located below the stimulus display monitor).



Left : child looking at the center of the display
Right: child looking at stimulus presented in periphery

As soon as the child is looking at the center of the display, present the stimulus in a peripheral position and move it toward the center.

If the subject moves the eyes toward the stimulus, do a right click on this position to record the response.

■ Running an exam

For very young children, the exam will usually be performed under binocular conditions. First tests include an evaluation of the peripheral isopter with Goldmann V4e. If the child is still compliant, additional tests will be performed with static presentations in the center and eventually an additional central isopter.

■ Reviewing the results

If the equipment includes the **video recording option**, the video of the child behavior is recording during the entire exam and can be reviewed later on in synchrony with the visual field examination.



■ **Example of attraction perimetry on a 2 years old child**

Credit: Dr ZANLONGHI from Nantes

Child looking at the central fixation target

The corneal reflex is just below the pupil (the reason is that the camera and the light source are both located below the display monitor).



Child looking at the visual stimulus presented in his left hemi field

The pupil moves to the right relative to the corneal reflex.



Child looking at the visual stimulus presented in his lower right quadrant

The pupil moves down and to the left relative to the corneal reflex.



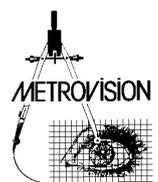
Child looking at the visual stimulus presented in his upper right quadrant

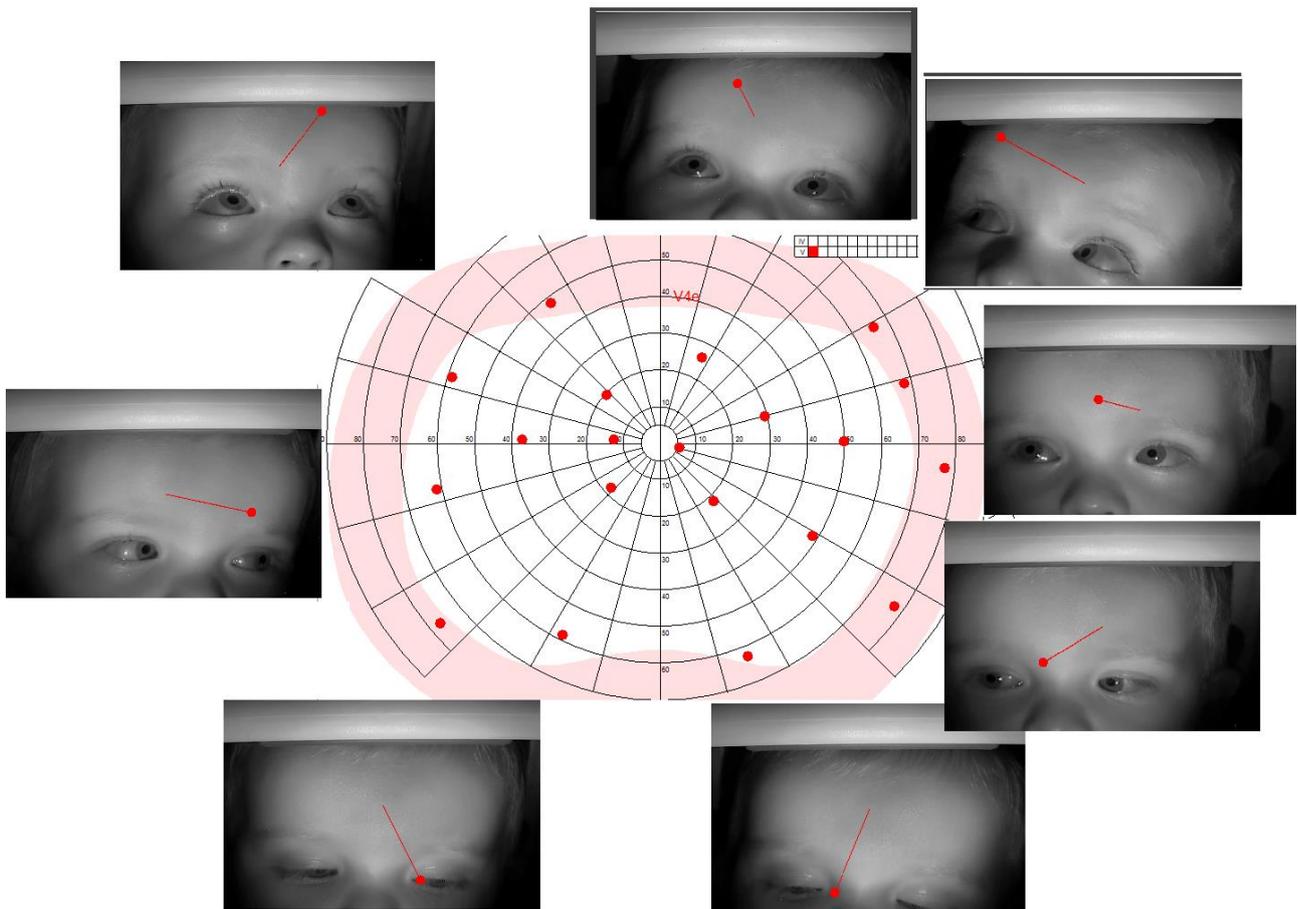
The pupil moves up and to the right relative to the corneal reflex.



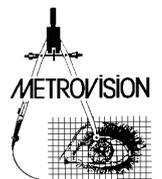
Child looking at the visual stimulus presented in his upper right quadrant

The pupil moves up and to the left relative to the corneal reflex.





TEST OF VISUAL APTITUDE



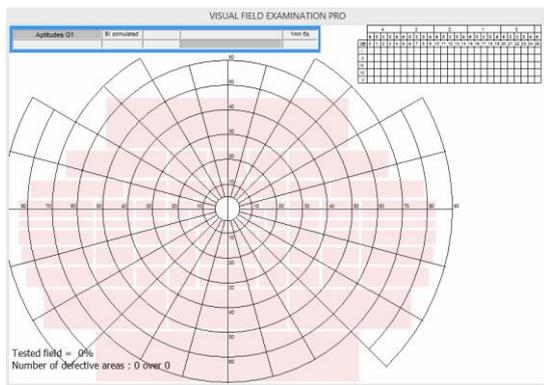
■ Getting started

This program provides an evaluation of the incapacity index based on the Esterman grid method. The binocular visual field is estimated with test III/4e without dissociation of both eyes. Tests points are distributed according to the functional significance of the different visual field areas.

Note: on the Vision Monitor, two solutions are proposed for the measurement of the incapacity index:

- by using automated static perimetry: refer to the Standard Visual field user manual for more information
- by using manual "Goldmann" mode perimetry. This last method is more appropriate for patients who are not reliable with automated perimetry.

■ Running an exam



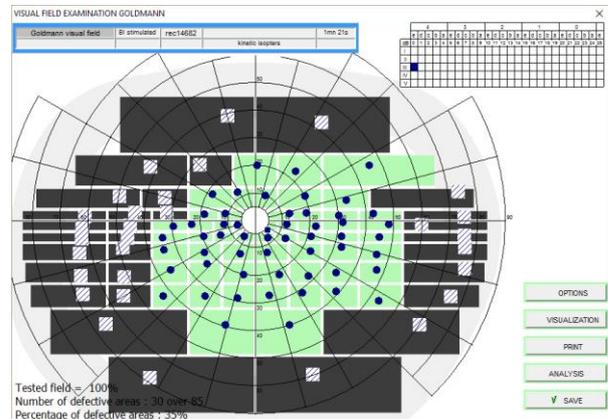
The background luminance (10 cd/m²) and the III4e stimulus are automatically selected at the beginning of the exam. The Esterman grid is displayed on the control window. The color of each zone of the Esterman grid indicates whether it has not yet been tested (pink), it has been tested with a positive response (green) or it has been tested with no response (black).

■ Recording the subject's responses

The presentation of the stimulus is made either using static presentations (positioning the mouse pointer inside one of the grid element and doing a mouse left click) or using kinetic presentation (moving the mouse while pressing the left mouse button).

The response is recorded either when the patient presses the response button or when the operator presses on the right mouse button while the mouse pointer is in the stimulus location. The absence of responses is recorded by simultaneously pressing the shift key and the right mouse button while the mouse pointer is in the stimulus location.

■ Scoring the results



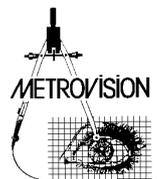
The final score is displayed on the bottom left of the result including the percentage of the field that was tested (100%) as well as the number and percentage of defective areas.

■ Reference

- 1- ESTERMAN B. Functional scoring of the binocular field. Ophthalmology. 1982, 89, 11, 1226-1234.



FUSION OR DIPLOPIA FIELD

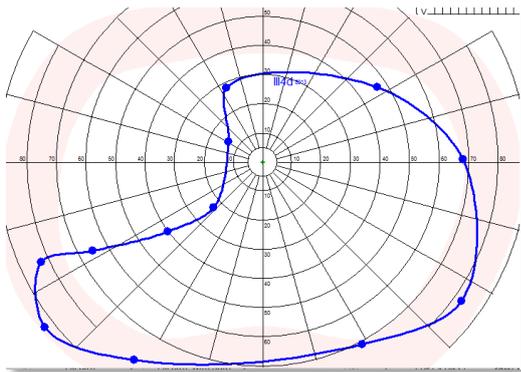


■ Getting started

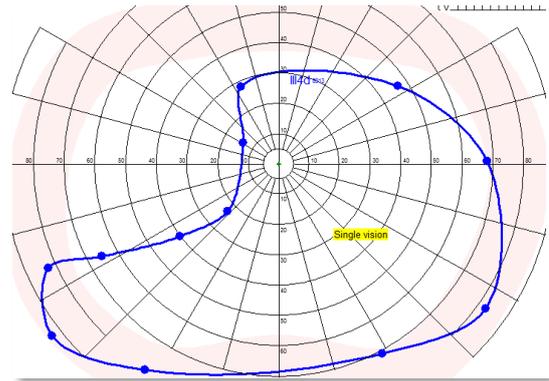
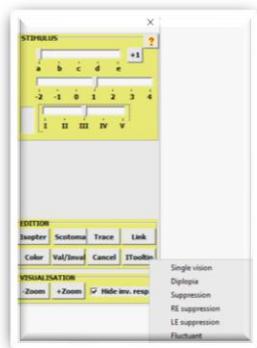
The quantification of the field of binocular single vision (or fusion field or field of binocular single vision) is important for the evaluation of oculoplastic disorders associated with extraocular muscle dysfunction resulting in diplopia.

■ Running an exam

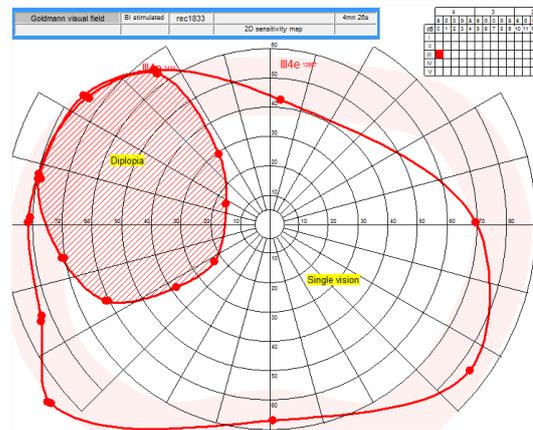
Testing is performed under binocular viewing conditions with the patient's head straight up in the chinrest. The operator presents the stimulus at the center of the screen and moves it at a constant velocity toward the periphery. The patient is asked to track the stimulus with his/her eyes and indicate by pressing the response button or verbally when the stimulus is no longer seen single. This is done along several meridians.



Then the operator draws the contour of the single vision area by pressing one of the buttons “Isopter”, “Scotoma” or “Trace” as described in the chapter “Goldmann perimetry interface”. Then this area is identified by clicking the IToolTip button and selecting the item “Single Vision” and clicking in the middle of the area of single vision.



Thereafter, the operator presents the stimulus so as to determine the contour of the area with double vision. Finally he/she identifies the area of double vision by clicking the button IToolTip and selecting the item “Double Vision”



Note: The video display can be used to check if the patient is tracking the stimulus accurately. Video recording can also be performed to document abnormal eye movements.

■ References

1. WOODRUFF G., OREILLY C., KRAFT S.P. Functional scoring of the field of binocular single vision in patients with diplopia. J. Ophthalmology. 1987, 94, 1554-1561.
2. SULLIVAN T.J., KRAFT S.P., BURACK C., OREILLY C. A functional scoring method for the field of binocular single vision. Ophthalmology. 1992, 99, 575-581.
3. HATT S.R., LESKE D.A., HOLMES J.M. Comparing methods to quantify diplopia. Ophthalmology. 2007, 114, 12, 2316_2322.



CARDINAL POSITIONS OF GAZE



■ Getting started

This test can be used to evaluate the cardinal positions of gaze and to measure the unocular and binocular fields of eye rotation

■ Running an exam

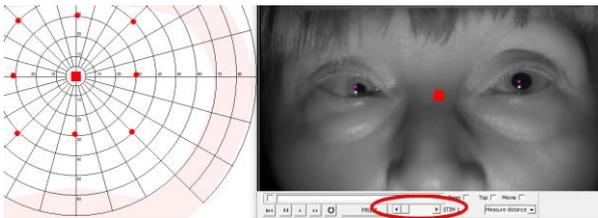
The video recording starts automatically at the beginning of the exam. The operator can then select different stimulus positions, size and eccentricities thanks to the “Goldmann” like interface.

Present the stimulus in a specific position, wait a few seconds until the patient has reached that event by clicking the right mouse button.

Press the RESULT button in the navigation bar when the exam is completed.

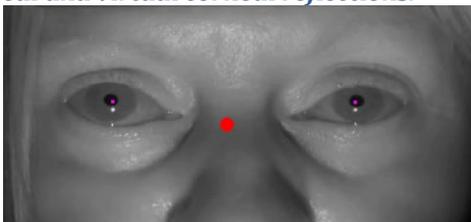
■ Reviewing the results

At the end of the exam, the final result is displayed together with the video recording.



The scroll bar at the bottom of the video can then be used to scroll among the different gaze positions.

The real and virtual corneal reflections.

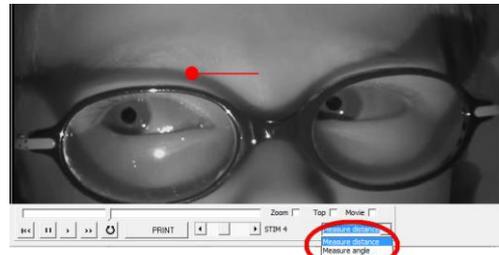


The near infra-red source used to illuminate the eye is located 25 degrees below the horizontal plane. As a consequence the “real” corneal reflection is located below the center of the pupil when a normal subject is looking in primary position. For this reason, the software generates “virtual” corneal reflection colored in magenta which is located in the “usual” position.

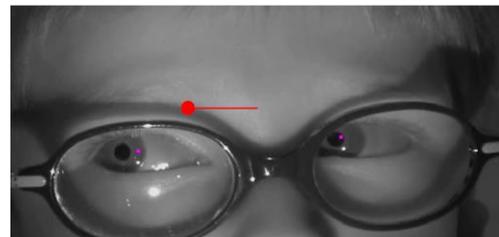
Visual field - Goldmann perimetry

Note: In some cases the “real” corneal reflection is not detected by the software. If this happens, the operator can mark the “real” corneal reflection as follows:

1. Select the option “Mark corneal reflex”



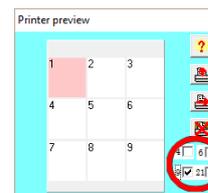
2. Do a click on each of the “real” corneal reflex which is missing. The “virtual” corneal reflection will appear.



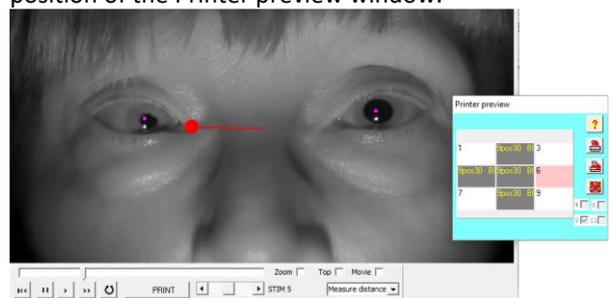
3. Do a click on each of the “real” corneal reflex which is missing. The “virtual” corneal reflection will appear automatically.

■ Printing the results

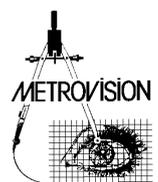
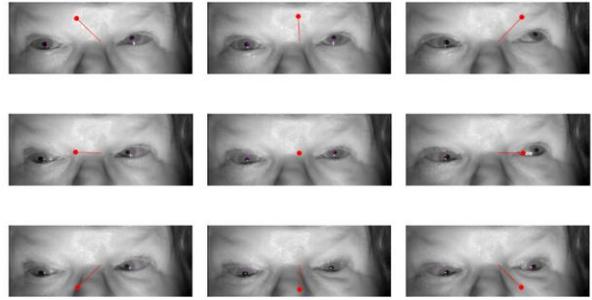
1. Select the “9 positions” check box in the Printer Preview window.



2. Move the scroll bar to select the number 1 stimulation. Then click in the corresponding position of the Printer preview window.



- When all 9 positions will have been selected, the report will be printed.





DIGITIZING OLD GOLDMANN PERIMETRY RESULTS



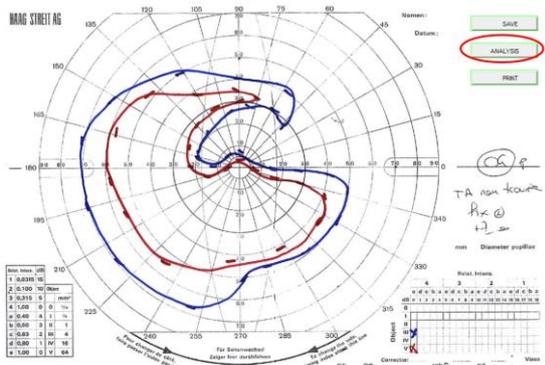
Another possible use of the program is to digitize old Goldmann perimetry result. This can be useful for the follow-up of patients or for the quantification of surface area of isopters and scotoma.

■ **Importing the scanned image of the visual field**

This is achieved by clicking on the “import photo” icon at the top of the main window.



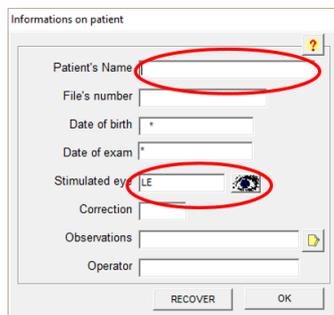
Then double click on the icon of the image you want to import. A new window appears with the imported scan.



Click on the “ANALYSIS” button and select the “Visual field digitization” option.

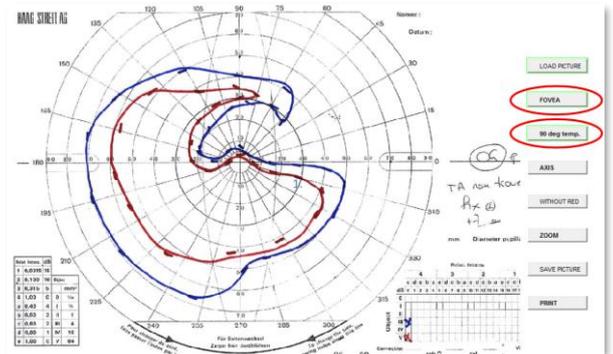
■ **Identifying the patient’s name and tested eye**

A new window “Information on patient” opens. Enter the patient’s name and the stimulated eye. Then press the “OK” button.



■ **Adjusting the scale of the scanned image.**

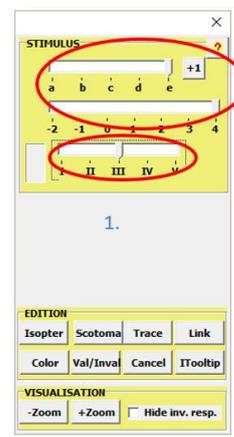
In the next window, click on the **FOVEA** button and then click on the location of the fovea on the scanned image. Click on the **90 deg temp.** button and then click on the temporal location at 90 degrees of eccentricity on the scanned image.



The image is then automatically scaled to the visual field.

■ **Identifying the stimulus parameters.**

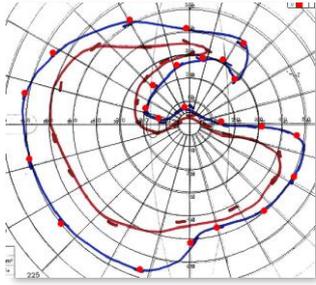
Select the stimulus size and attenuation of one isopter.



■ **Drawing the isopters**

Do a right click on the different positions of responses on the same isopter.





Then draw the contour of the isopter with a right click:

- on the "Isopter" button for a "normal" isopter
- on the "Scotoma" button for a scotoma
- on the "Trace" button combined with pressing the "shift" key when the contour is tortuous (like the example above)

You can also change the color of the isopter by pressing the "Color" button.

Repeat this step until all isopters have been drawn

■ Saving the result

To finalize the process, close the "Goldmann" window (on the right) and click on the SAVE button to enter the result in the Vision Monitor data base.

The final result is shown hereby:

