HENSON CFA 3000

CENTRAL VISUAL FIELD ANALYSER

OPERATORS MANUAL

August 1989

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Section 1

INTRODUCTION

Section 2

INSTRUMENT AND PATIENT PREPARATION

using the large cross, the limbs should be orientated in such a way that they do not obscure any of the stimuli.

SWITCHING ON THE HENSON CFA 3000

Selecting the Eye

When first turned on, the Henson CFA 3000 will print its name on the monitor and the question "Right or Left eye?". This question should be answered by pressing either the key marked 'Right' or the key marked 'Left' (see fig 2).

Setting the Background Luminance

After you have selected the eye, the CFA 3000 will automatically check the background luminance. If it is correct, then it will immediately go on to the next stage of the examination. If it is incorrect, then a scale and an arrow will be drawn on the monitor (see fig 4) along with the message:

"Background intensity out of tolerance
Adjust until arrow falls within correct region of scale
then PRESS A"

Adjust the background intensity with the, 'Background Intensity' control and/or the 'Room' controls until the arrow falls within the correct region of the scale and then press the key labelled 'A' to continue with the examination .

The CFA 3000 measures the luminance of the screen.

Any ambient illumination will be taken into account by the light meter. There is therefore no need to work in a totally blacked out room. The CFA 3000 can be supplied with a hood which shields the screen from ambient illumination and allows the analyser to be operated in areas where the illumination cannot be readily controlled.

You are now ready to proceed with the field examination. Depending on how the CFA 3000 has been configured (see Start-up Options) you will be at the beginning of either the 'Full Threshold' or the 'Supra Threshold' program. The top left hand corner of the monitor displays a message stating which program you are in.

Section 3

FULL THRESHOLD TEST PROCEDURE

CONDUCTING A FULL THRESHOLD TEST

Inputting Patient's Age (see fig 5)

At the beginning of a 'Full Threshold' test the operator will be presented with the following message:

"Adjust 'AGE' until displayed value correct
then PRESS A to continue with FULL THRESHOLD Test
B to perform SUPRA THRESHOLD Test"

Lower down on the monitor the label:

"Patient age = 00"

The operator should adjust the control labelled 'AGE' (see fig 2) until the displayed value is correct and then press 'A' to continue with the 'Full Threshold' test. An option of transferring to the 'Supra Threshold' test is also given. There is no need to enter the patient's age if you are going on to the 'Supra Threshold' test.

Starting Full Threshold Test (See fig 6)

After the patient's age has been entered the CFA 3000 will draw a field chart on the monitor and display the message:

"PRESS A to start test
B to change options
C to exit"

It will then wait for one of the three keys to be pressed. This is a good time to instruct the patient as to the nature of the test (see section on 'Sample Instructions to Patient').

Sample Instructions to Patient

"In front of you there are a whole series of small lights that are controlled by a computer. During the test the computer will flash one of these lights every few seconds. If you see the flash, then press the response button. You will not see all the flashes, some of them will be too dim, so only press the response button when you are sure you have seen the flash. Throughout the test, you must keep looking at the central fixation point. The test takes approximately 8 minutes to complete. If you feel that you need a break during the test then

press and hold down the response button. The test will be halted for as long as you hold down the button.

I will now demonstrate the test to you. When I am happy that you understand what is required, I will proceed with the test, so do not worry if at the beginning you make a few mistakes. Remember you must keep looking at the central spot throughout the whole test."

On pressing 'A' the program will go on to the next stage of the 'Full Threshold' test, which is a demonstration routine.

On pressing 'B' (see fig 7) the program will display the start-up options that have been selected and give the operator the opportunity to change these (see sections on 'Start-up Options' and 'Changing Start-up Options' - Appendix 5)

On pressing 'C' the program will go back to the beginning of the test. This option is useful if the operator has made a fundamental mistake such as selecting the wrong eye or starting a 'Full Threshold' test when they meant to perform a 'Supra Threshold' test.

Demonstration Routine

This routine is used to familiarise the patient with the nature of the test.

The routine repeatedly measures the threshold at 4 retinal locations but does NOT store the results.

During this routine the following message will appear on the monitor (see fig 8).

"Demonstration routine
Press A to start testing
C to exit"

Different patients need different amounts of training before they become competent/comfortable with this type of examination. This routine does not, therefore, have a fixed duration. It will continue until the operator is happy that the patient understands what is required of them and presses 'A' in order to go on to the next stage of the test which is the 'Blind Spot Routine'.

Again, the operator is also given the option of starting again by simply pressing the key labelled 'C'.

Response Time

The CFA 3000 presents the stimuli at a rate which is set by the control labelled 'Response Time' (see fig 2). The operator should adjust the response time during the demonstration routine to a level which the patient feels comfortable. It is wise to start off at a relatively slow rate and then increase it as the patient becomes more familiar with the test. The 'Response Time' control can be adjusted at any stage of the examination.

Blind Spot Routine

In this routine the CFA 3000 presents a stimulus, depicted by a cross on the monitors display (see fig 9), in what it considers to be the most likely blind spot location. If the patient fails to respond, by not pressing the response button, then the program records this as the blind spot location. If the patient responds to this stimulus by pressing the response button, then the program moves on to the next most likely blind spot location, as depicted by the movement of the cross on the monitor's display. It will continue to search for the blind spot until either;

a) the patient fails to respond, in which case the last location is taken to be in the blind spot and the test proceeds to the next stage,

or

b) it runs out of possible locations.

If it runs out of possible locations, the following message will appear on the monitor (see fig 10):

"Blind spot not found
Press A to try again
B to continue"

Pressing the key labelled 'A' will repeat the blind spot routine while pressing the key labelled 'B' will proceed to the next stage of the test, establishing the thresholds, without a blind spot location being recorded.

Establishing the Thresholds

During this stage the program establishes the threshold, with a bracketing strategy, at 52 retinal locations. It starts at 4 locations, one in each quadrant, and works from these towards both the centre and the periphery of the field. During this stage the following message is displayed: 'Press A to halt test'

On pressing the key labelled 'A' the test will be halted and the following message displayed:

"Press A to continue
C to exit

Pressing 'A' will continue with the test from where it left off, while pressing 'C' will take you back to the beginning. The test can also be halted by the patient holding down the 'Response' key.

Test Completion

Once the program has established all the thresholds, the CFA 3000 issues a series of tones and the following message appears on the monitor.

"Press A to print results
B to transfer data
C to test next eye"

On pressing 'A' the CFA 3000 will produce a print out of the results (see page 19) '.

On pressing 'B' the CFA 3000 will transfer the results of the test to a host computer through its serial port (see Appendix 4).

On pressing 'C' the CFA 3000 will go back to the beginning ready to test another eye. After printing or transferring the data, the program will return to the above message giving the operator the option of having several printouts, etc.

N.B. If 'A' is not selected, the instrument will not retain field data in its memory. It is recommended that after each eye is tested results are printed.

Changing Start-up Options

The CFA 3000 can be configured, with the aid of 8 small switches located in the storage compartment, to start-up in a variety of different ways (see Appendix 5). While these switches are very useful, in that they save the operator from having to make the same series of key presses every time, they turn the instrument on, there will, on occasions, be the need to conduct a visual field test which differs from that for which the instrument has been configured.

To change the start-up options, select 'B' when presented with the following message at the beginning of the examination.

"Press A to start test
B to change options
C to exit"

The screen will be cleared and the following message displayed (see fig 7):

"Use 'Stimuli Intensity' keys to select option and then press 'A'

To continue with threshold test
Estimate fluctuation ON
Repeat points >4 db from expected norm ON
Perform SUPRA THRESHOLD test"

An arrow will be pointing at the first option 'To continue with threshold test'. Pressing the 'Stimuli Intensity' keys will move the arrow up and down between the 4 different options. To select an option first position the arrow so that it points at the required option and then press the key labelled 'A'

If 'A' is pressed while the arrow is pointing at:

the first option then the program will return you to the start of the 'Full Threshold' test,

the second option then the fluctuation estimate will be toggled from either ON to OFF or OFF to ON,

the third option then the repeat points greater than 4 db from expected norm will be toggled from either ON to OFF or OFF to ON,

the fourth option then the computer will exit from the 'Full Threshold' program and enter the 'Supra Threshold' program.

Fixation Losses, False Negatives and False Positives

During the examination, the CFA 3000 conducts a series of three different kinds of catch trials:

i) **Fixation losses.** At the beginning of the 'Full Threshold' program the computer establishes the location of the patient's blind spot. Throughout the rest of the examination, the program occasionally presents a stimulus at this location to see if fixation is being maintained. If the stimulus is seen, then an assumption is made that the patient is not looking at the fixation target and a fixation loss is recorded. On occasions, the program might not be able to find a blind spot location, in this case, the program will not test for fixation losses.

ii) **False negatives.** After the program has established the threshold at a new retinal location it occasionally represents a stimulus at an intensity above the measured threshold. If the patient fails to respond positively to this presentation, then this is counted as a false negative.

iii) **False positives.** The computer occasionally goes through the motions of presenting a stimulus but does not actually present one. If the patient reponds to this, then it is counted as a false positive.

These catch trials are designed to give the clinician an estimate as to how reliable the patient was. Clearly, if the patient makes a lot of errors then their results must be viewed with a certain amount of suspicion. There are, however, no published results which give the relationship between the number of errors and reliability. Until such measures are available the clinician will have to rely upon his own clinical judgement as to what is and what is not a reliable visual field result.

The measurement of fixation losses is subject to the analyser finding a stimulus location within the blind spot region at the beginning of the test. If this location is close to the edge of the blind spot, the analyser might report an erroneously high number of fixation losses.

Result Interpretation - Printout

The printout, (see fig 19), presents the visual field data in three ways.

i) as raw threshold values in decibels (db). 0 corresponds to 300 cd/m^2, 10 to 30 cd/m^2, 20 to 3 cd/m^2 and 30 to .3 cd/m^2,

ii) as the difference between this set of data and that from an age matched norm. Positive numbers mean that the measured sensitivity is greater than of an aged matched norm while negative numbers mean that it is below that of an aged matched norm,

iii) as a grey tone represention of the threshold data. Dark areas represent lowered sensitivity.

In i) and ii) the blind spot is represented by a cross of star shaped symbols.

The printout also gives the global indices, mean defect, loss variance, fluctuation and corrected loss variance. The last 2 indices will only be given if the option to estimate fluctuation was selected (see section on 'Start-up Options' and 'Changing Start-up Options', Appendix 5). Details of how these global indices are calculated are given in Appendix 6 (see page 46).

Finally, the printout also gives the number of fixation losses, false negatives and false positives. All these values are given in the form of a fraction where the numerator represents the number of fixation losses, false positives and false negatives, while the denominator gives the number of times they were tested.

Section 4

SUPRA THRESHOLD TEST PROCEDURE

SUPRA THRESHOLD PROGRAM

The 'Supra Threshold' program of the CFA 3000 is designed to be run in what is known as a threshold related manner. At the beginning of the examination the operator obtains a quick estimate of how sensitive the patient's eye is and then, by pressing the 'Mode' key (see fig 2), increases the intensity of the stimuli to a 'Supra Threshold' value before testing each retinal location. Before describing how to conduct a 'Supra Threshold' examination, it is important that you understand the functions of the 'Stimulus Intensity'and 'Pattern' keys.

The Stimuli Intensity Keys (see fig 2)

At the beginning of an examination, when the following message is presented in the upper right hand corner of the monitor;

"Establish Threshold
Then press MODE key"

the 'Stimuli Intensity' keys adjust the intensity in 0.1 log unit steps (1db). The arrow pointing up increases the intensity and the arrow pointing down decreases the intensity. The intensity is given in the bottom left hand corner of the monitor's display as an equivalent filter value, the higher the number, the dimmer the stimuli.

These keys have an auto repeat action. If held down they will repeat their action over and over again.

Pattern Keys (see fig 2)

Pressing the 'Pattern' key with the arrow pointing to the right selects the next stimulus pattern, while pressing the one with the arrow pointing to the left takes you back to the previous pattern.

Each pattern is represented by a number at the bottom of the monitor's display (see Fig 16). This number tells you how many stimuli there are in each pattern. The currently selected pattern has a bar shaped cursor underlining it. The position of the stimuli within the currently selected pattern are given by the letters that lie over the chart in the centre of the monitor's display.

These keys have an auto repeat action. If held down they will repeat their action over and over again. They also have a roll over action. If you are on the last pattern

and you press the key to advance you to the next pattern, then it will roll over and take you to the first pattern. Similarly, if you are on the first pattern and you press the key to take you back to the previous pattern, then it will roll over and take you to the last pattern.

Patient Instruction

A typical set of instructions are:

> "You are going to be presented with some patterns of lights. Each pattern will be made up of either 2, 3 or 4 lights and will only be on for a brief period of time. What I would like you to do is to tell me how many lights there are in each pattern. On occasions the lights will be so dim that you may not see any of them. Before each presentation there will be a short bleep. During the test you must keep looking at the central white spot. Before starting the test I will demonstrate what is required."

Demonstration Routine

The CFA 3000 starts off with the intensity at 3.3 log units (33 db). This value should be above the threshold of most patients and therefore easily detected. If it is not then choose a higher intensity (lower equivalent filter value) by pressing the 'Stimulus Intensity' key with the arrow pointing up. Repeat to the patient that he should keep looking at the central white spot. Press the key and ask the patient how many lights he saw. Select another pattern and repeat until you believe that the patient understands the test. It is important that once a patient has seen some or all of the stimuli in a pattern, that the next presentation be a different pattern. If this is not done then you may get unreliable results due to the patient remembering the location of the stimuli.

Establishing the Threshold

There are many different ways in which the threshold can be established. The following technique has been proven to be quick and reliable in patients with both normal and defective visual fields.

Once the patient understands the test, inform them that you are going to make the stimuli dimmer (by increasing displayed log unit value) and that they should not be

concerned if they cannot see them. Continue to reduce the stimuli intensity in 0.1 log unit (1 db) steps (increase displayed threshold value by 0.1 log units), changing the pattern between each presentation until the patient does not see any of the stimuli. Increase the intensity by 0.1 log units (1db), (decrease displayed threshold value by 0.1 log units) and then press the 'Mode' key in order to go on to the 'Supra Threshold' stage of the examination.

The CFA 3000's 'Supra Threshold' program is gradient adapted. Stimuli at the periphery will have the same threshold as those near the centre.

Supra-Threshold Mode - Test Procedure

The following message will apear in the top right hand corner of the monitor's display when you are in the 'Supra Threshold' mode (See fig 16):

"Supra Threshold MODE
at ** above T'HOLD"

To present stimuli, at the new 'Supra Threshold' intensity, press the 'Present Stimuli' key. To go on to the next pattern and present it, first press the key with the arrow pointing to the right and then press the 'Present Stimuli' key (see fig 2).

There are no restrictions to the order or the number of times that you can present a pattern. The keys will allow you to go to any pattern at any stage of the examination.

To indicate that a pattern has been presented while in the 'Supra Threshold' mode, a small tick mark will appear above the number currently underlined by the cursor. In addition, you will find that when you go on to another pattern, small dots will be left on the monitor's display at the locations of the tested points. These inform the perimetist of the points that have been tested.

The computer keeps a record of the number of stimuli that have been tested while in the 'Supra Threshold' mode. This information is presented on the monitor's display as the denominator of the fraction printed half way down the right hand side of the monitor's display. The numerator represents the number of stimuli that have been missed.

You can return to the threshold mode by pressing the 'Mode' key a second time. There is no limit to the number of times that you can transfer from one mode to the other.

If you change the threshold value during a test, other than to re-test missed stimulus points, then you should re-test all the points.

Recording a Missed Stimulus

If a stimulus point is missed, the operator should remind the patient to keep looking at the central fixation point and then present the pattern a second time (either immediately or at some later stage), to ascertain whether the miss was due to random fluctuations in the patient's threshold, fixation loss or to a scotoma. If it is seen on the second presentation, then no further testing of this point is required. If it is missed a second time then the operator has to ask the patient where he saw the lights in order to ascertain which stimulus was missed.

The position of each stimulus in the currently selected pattern is represented on the monitor by a letter which flashes on and off. Once you have deduced which stimulus has been missed, press the appropriate missed stimuli key (see fig 2).

Three things will now happen:

i) The flashing missed stimulus number will be replaced by a grey scale symbol corresponding to the current test intensity.

ii) The number underlined by the cursor will be highlighted.

iii) The numerator of the vulgar fraction, printed half way down on the right hand side of the monitor, is incremented.This number represents the total number of missed stimuli .The denominator is the total number of presented stimuli.

When a pattern is selected in which there is a missed stimulus, two flashing stars will appear on either side of the missed stimulus symbol. These allow you to differentiate between several missed stimuli within a given quadrant. Patients often find it helpful if you suggest to them that they consider the screen as a clock face and give the locations of the lights as hour positons.

Stimuli in the upper left hand quadrant are always labelled 'A', those in the upper right hand quadrant 'B', those in the lower right quadrant 'C', and those in the lower left quadrant 'D'. The missed stimuli keys will only work after the pattern has been presented in the 'Supra Threshold 'mode.

Re-testing Missed Stimuli at Higher Intensities

In the 'Supra Threshold' mode, the 'Stimuli Intensity' keys set the intensity at 0.5, 0.8 or 1.2 log units (5, 8 or 12 db) above the estimated threshold. Stimuli missed at 0.5 log units above threshold can therefore be re-tested at 0.8 and 1.2 log units above threshold. The current 'Supra Threshold' test intensity is displayed in the form of a grey scale symbol, in the upper right hand corner of the monitor's display. A key to the grey scale symbols is given on the left side of the display. If a stimulus, missed at 0.5 log units above the threshold estimate, is also missed at a higher setting, then the operator should again press the appropriate missed stimuli key in order to update the displayed results.

Data Correction - The Erase Key (see fig 2)

If the perimetrist enters a missed stimulus in error or on re-testing finds that a formerly missed stimulus is now seen, then this missed stimulus can be deleted from the monitor's display by pressing the 'Erase' key. All the missed stimuli in the currently selected pattern will be deleted. If you only wish to delete one of the stimuli in this pattern then after pressing the 'Erase' key you will have to re-enter the stimuli you did not wish deleted.

Volume Key (see fig 2)

The knob marked 'Volume' allows the perimetrist to adjust the volume of the audible tone that occurs 0.5 seconds before the stimuli are flashed. Turning this knob clockwise increases the volume of the tone. If the knob is turned fully anticlockwise then the tone will be turned off. Pressing the key marked 'Present Stimuli' will demonstrate how loud the tone will be. The volume can be adjusted at any stage of the examination. When the tone is turned off, the computer presents the stimuli immediately after the 'Present Stimuli' key has been pressed.

Increasing the Number of Stimuli with Extend Key (see fig 2)

Pressing the 'Extend' key allows the perimetist to increase the number of points tested. A total of 40 stimulus patterns are available (132 stimuli). The CFA 3000 will advise you when to extend the visual field test with one of the following messages:

"Screening failure
Recommend extend to 66 stimuli (See fig 16)"

"Recommend extend to 132 stimuli (See fig 17)"

These recommendations are based upon the current eye's visual field results. If there is any suspicion that the patient may have a visual field defect, eg. family history of glaucoma, raised IOP, suspicious disc; then the perimetrist should extend the test to at least 66 stimuli.

Interpretation of Results

The Henson CFA 3000 uses grey scale symbols to assist in the visual interpretation of the results. It also has a unique system, which estimates the likelihood that the current visual field result comes from a patient with a normal visual field. This additional information is provided, once the test has been extended to either 66 or 132 stimuli, in the form of a scale and an arrow in the lower right hand corner of the monitor's display. The scale is divided into three sections; 'Normal', 'Suspicious' and 'Defect'. If the arrow points to the defect region of the scale then there is a less than 1 in 1000 chance that the current visual field result comes from a normal patient. If the arrow points to the normal region of the scale, then there is a greater than 90% chance that the result comes from a normal patient.

Printing Results

The Henson CFA 3000 is designed to be used in conjunction with a dot matrix printer.

On pressing the 'Print' key the results from both the right and left eyes are printed out on a single sheet of paper. The right eye is always printed out first. If only one eye has been tested, then a blank space is left on the appropriate half of the printout.

Additional copies can be obtained by re-pressing the 'Print' key after the first copy has been printed.

Results can only be printed out while in the 'Supra Threshold' mode.

Section 5

MENU FUNCTIONS

Data Recall

A series of auxiliary functions can be accessed by pressing the 'Menu' key (see fig 2). The current monitor display will be replaced by a menu listing these functions (see fig 15). The previously displayed field data will be automatically stored in memory for future recall. The auxiliary functions are:

A) Recalling data from other eye. Pressing 'Q' will recall the results from the patient's other eye storing the currently displayed data in the memory for future recall.

B) IOP/CD Analysis (see section on IOP/CD analsysis - Page 32)

C) Transfer data to host computer (see Appendix 4 - Page 39)

D) Produce isometric representation of field data.

A pseudo three-dimensional isometric plot of the visual field data can be obtained by pressing the key marked 'D'.

Once the display has been completed, the perimetrist has the option of copying the display on to the printer or returning to the conventional display of the data.

IOP/CD Analysis

(See section of IOP/CD Analysis - page 32)

Transfering Data to Host Computer

(See Appendix 4 - Page 39)

Generating Isometric Plot (see Example 4)

A pseudo three-dimensional plot of the visual field data can be obtained by pressing the key marked D. Once the display has been completed, the perimetrist has the option of copying the display on the printer or returning to the conventional display of the data.

Selecting Full Threshold Test

On pressing the 'Mode' key, the computer will enter the 'Full Threshold' program. It is important to make sure that a printout of any 'Supra Threshold' data is obtained prior to selecting this option, as all 'Supra Threshold' data will be lost.

Section 6

IOP/CD ANALYSIS

On selection of this menu option, the monitor's display will change to that shown in figure 13. The control labelled IOP/CD (see fig 2) will now alter the displayed IOP for the right eye. When the correct value has been set the operator should press the key labelled 'A'. This process should then be repeated for the left eyes IOP, the right eyes C/D ratio and the left eyes C/D ratio. When this has been completed, an analysis of the data will be performed and the results displayed in the form of three scales (see figure 13). The first scale represents the results from a visual field analysis conducted on the visual field data currently stored within memory, the second an IOP analysis and the third a cup/disc ratio analysis. Each scale is divided into three regions labelled 'Normal', 'Suspicious' and 'Defective'. If the arrow points to the region marked 'Defective', then there is a less than 1 in 1000 chance that the data (field, IOP or C/D ratio) comes from a 'normal' patient. If the arrow points to the normal region of the scale, then there is a greater than 90% chance that the data comes from a 'normal' patient. Each analysis takes into account both the level and asymmetry (right versus left eye) in field scores, IOPs and C/D ratios. The analysis of IOPs and C/D ratios is based upon the data obtained in the Framingham Eye Study (see Leibowitz et al 1980).

References

Leibowitz HM, Kreuger DE, Maunder LR, Milton RC, Kini MM, Kahn HA, Nickerson RJ, Pool J, Colton L, Ganley JP, Lowenstein JI & Dawber TR. The Framingham eye study monograph, Survey Ophthalmology 1980; 24 (suppl): 335-610

FIGURES AND EXAMPLES

FIG 1

The Henson CFA 3000

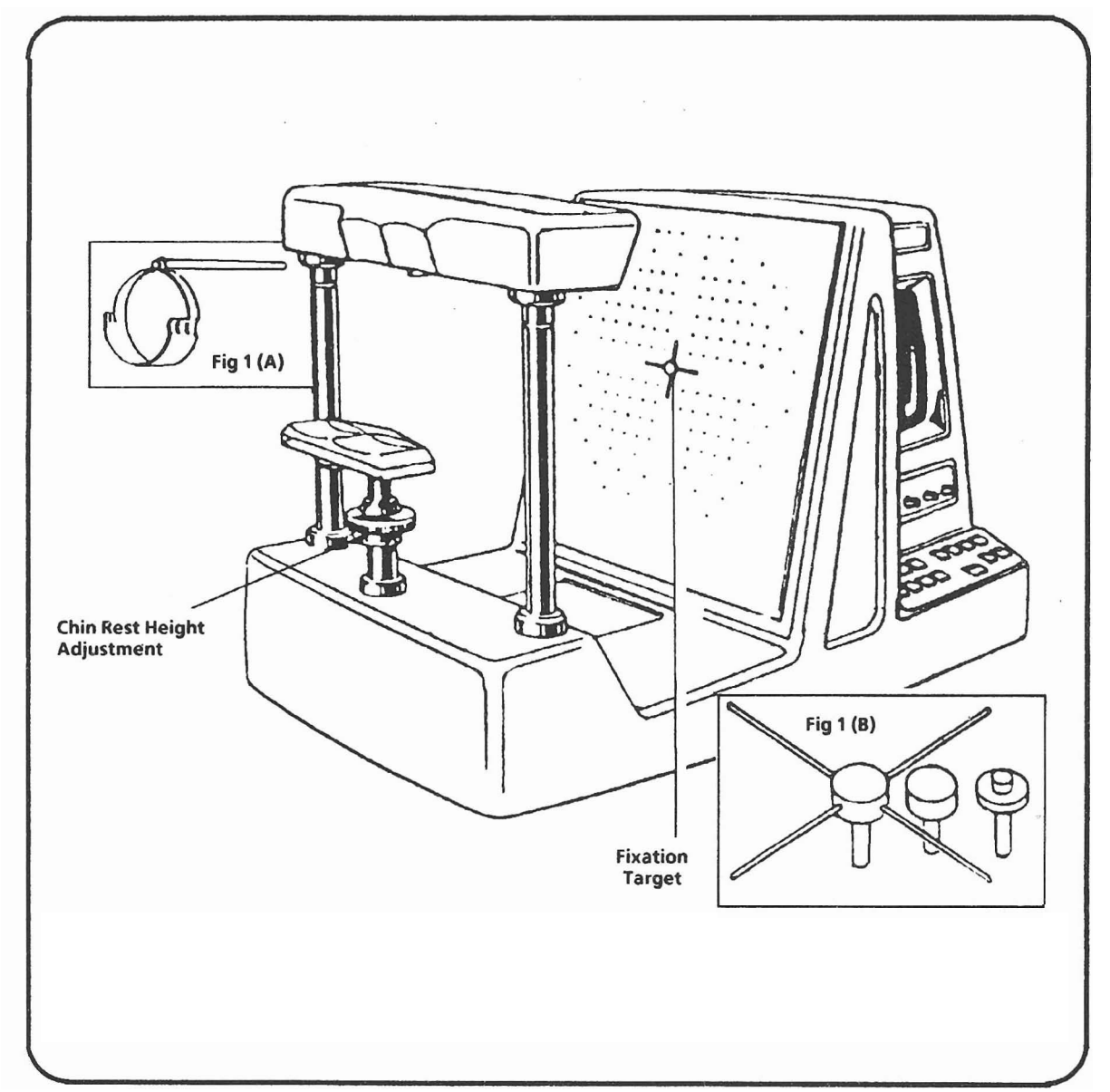


FIG 3

Printer Connection Instructions

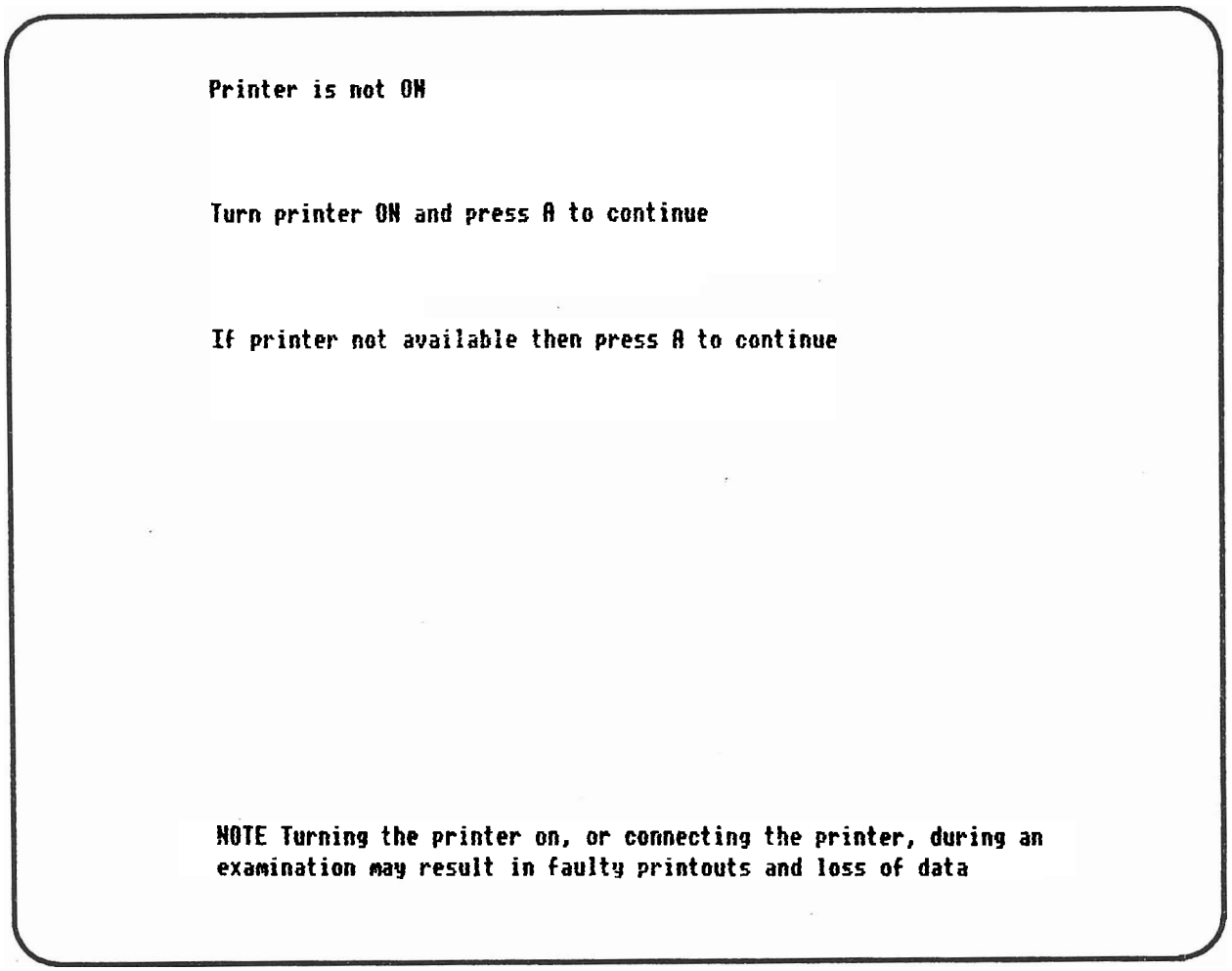


FIG 4

Background Intensity Scale

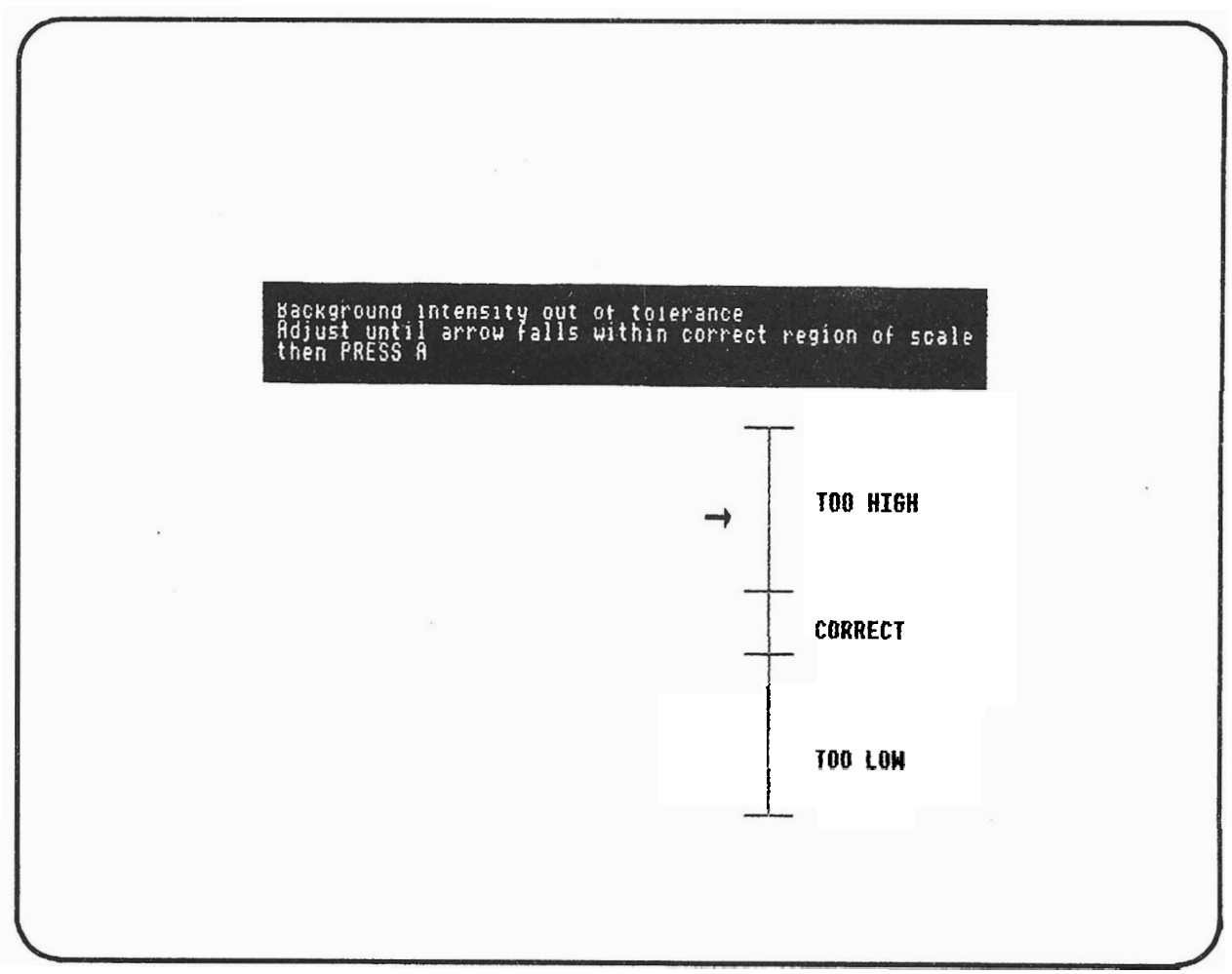


FIG 5

Patient Age Data Instruction

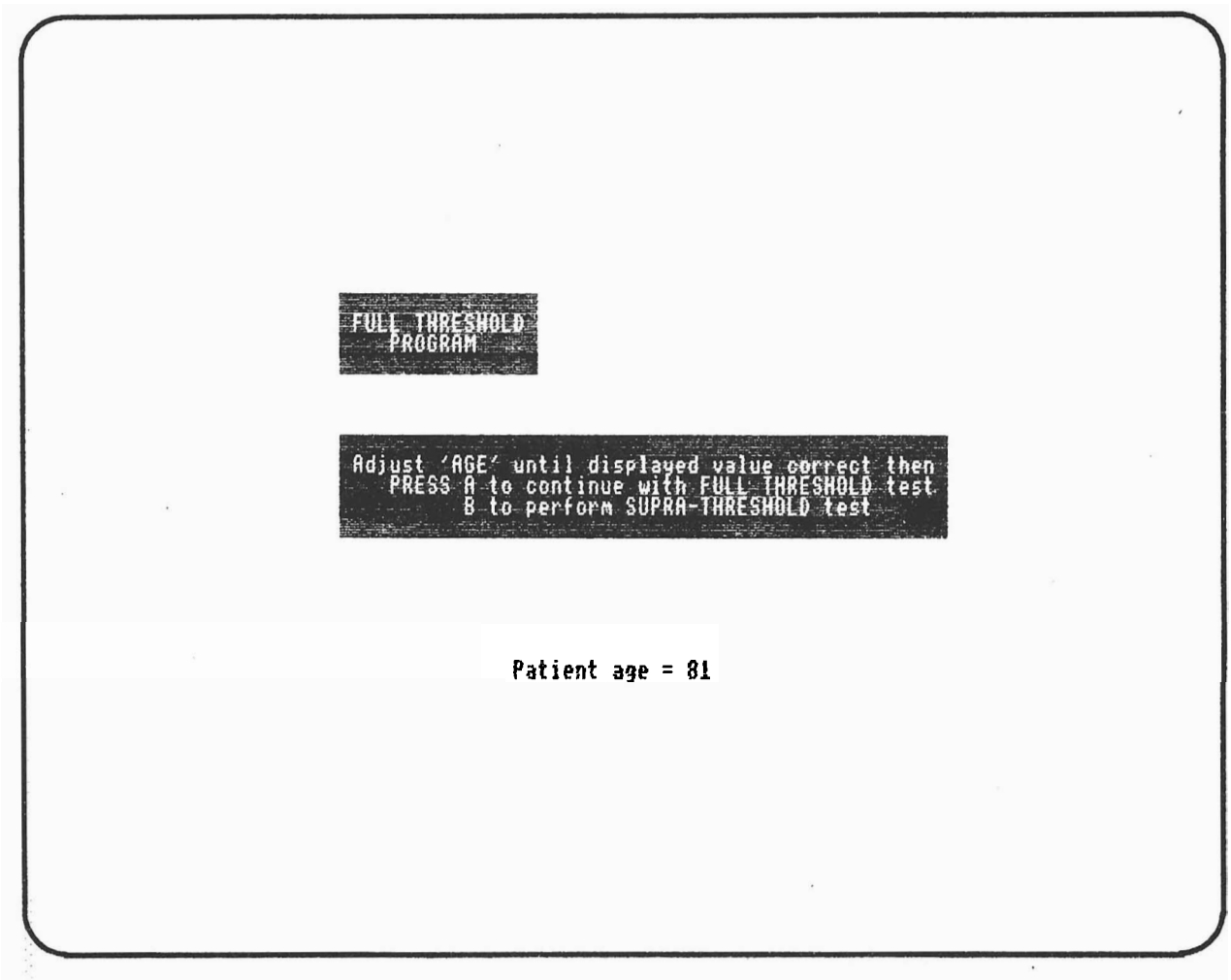


FIG 6

Sample Monitor Display Start Mode

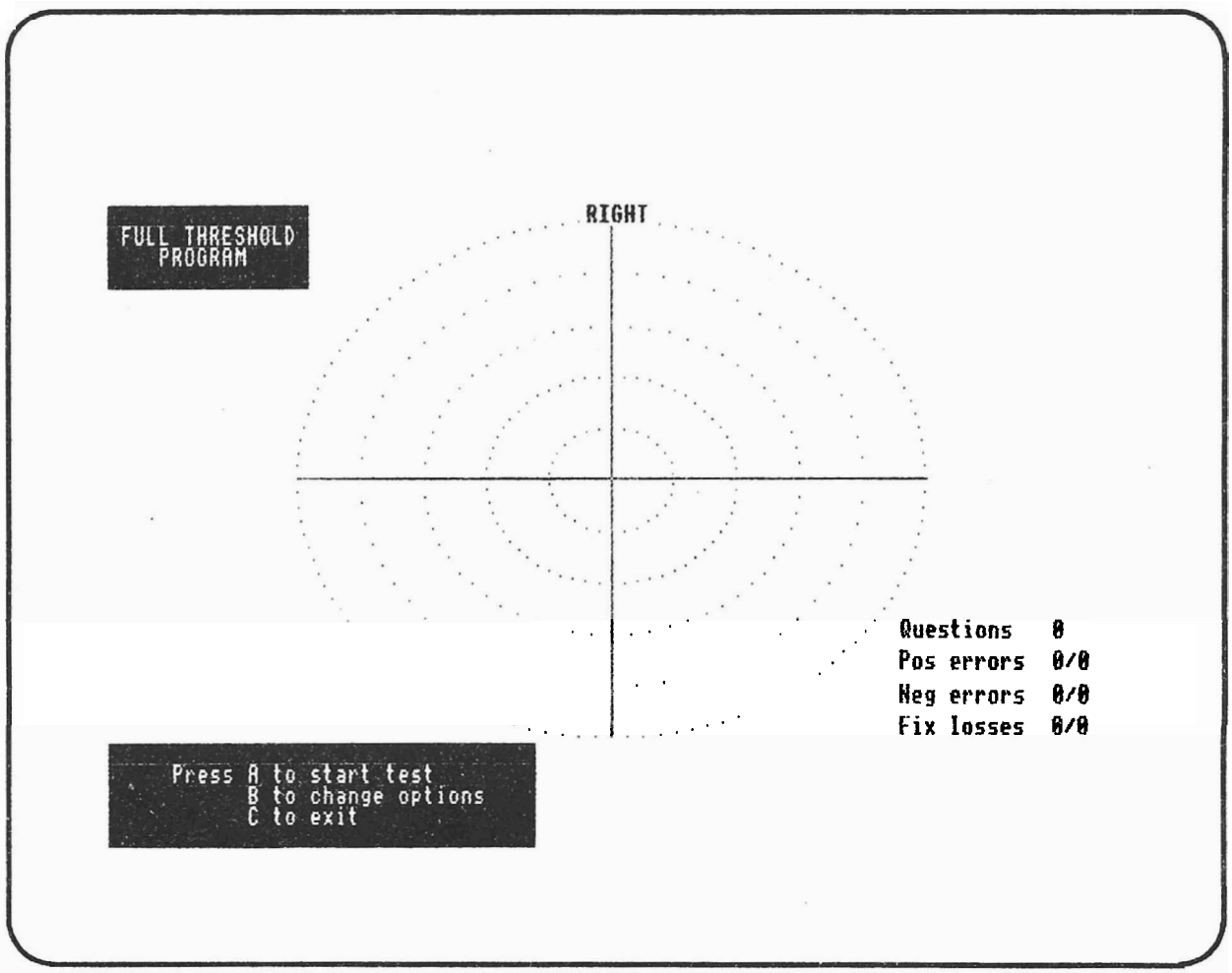


FIG 7

Menu Options

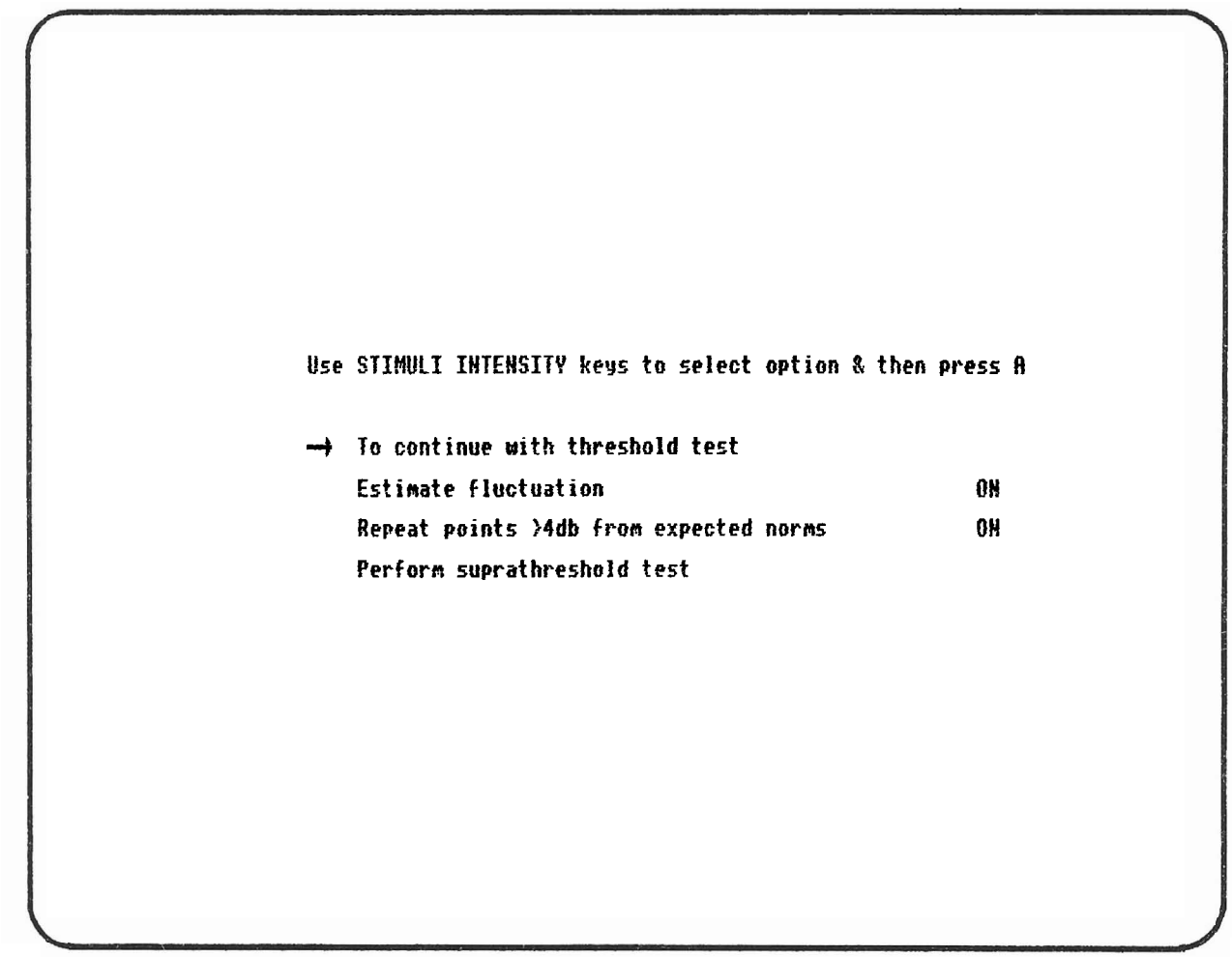


FIG 8

Sample Monitor Display in Demonstration Routine

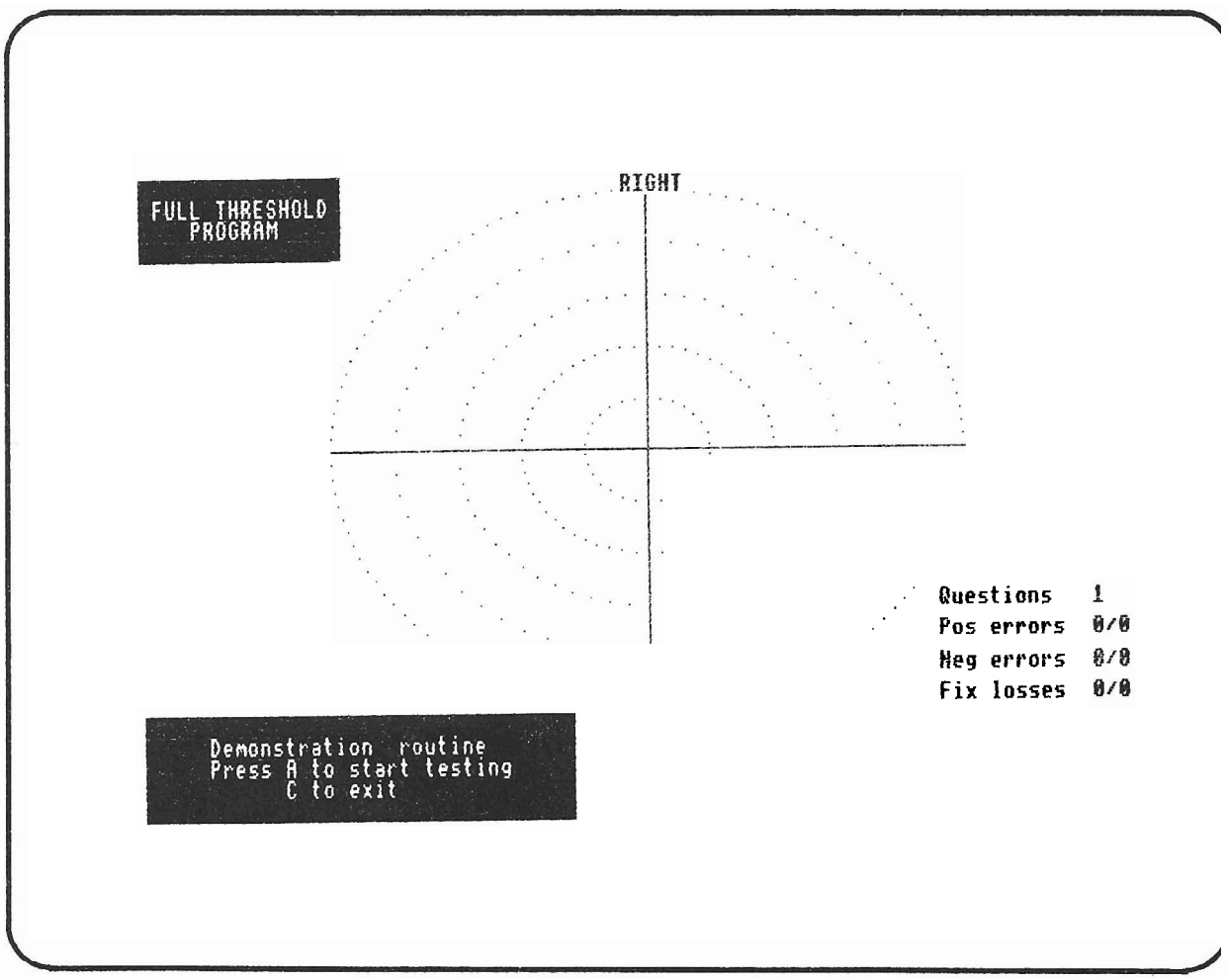


FIG 9

Sample Monitor Display in Blind Spot Routine

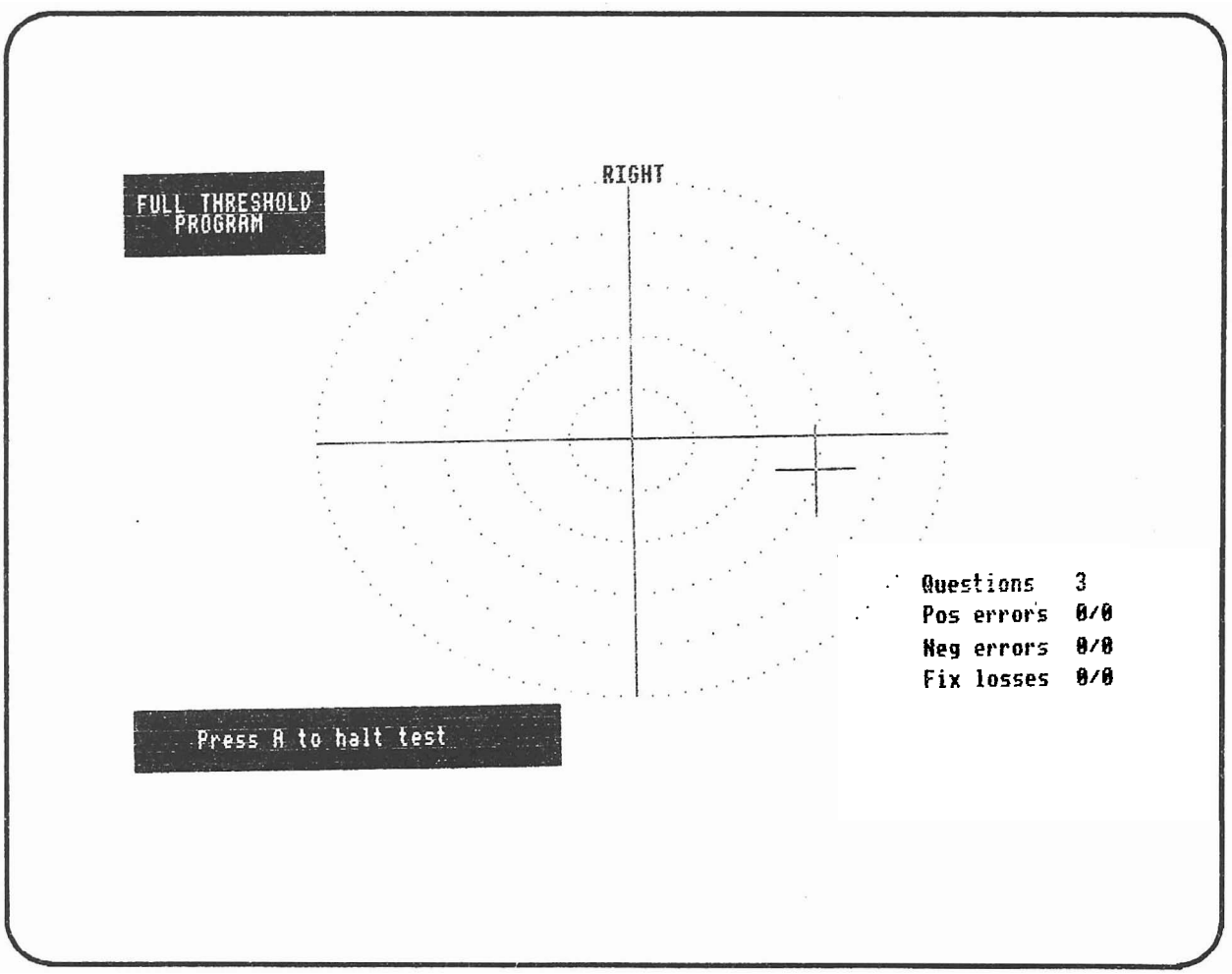


FIG 10

Sample Monitor Display after Blind Spot Routine Failure

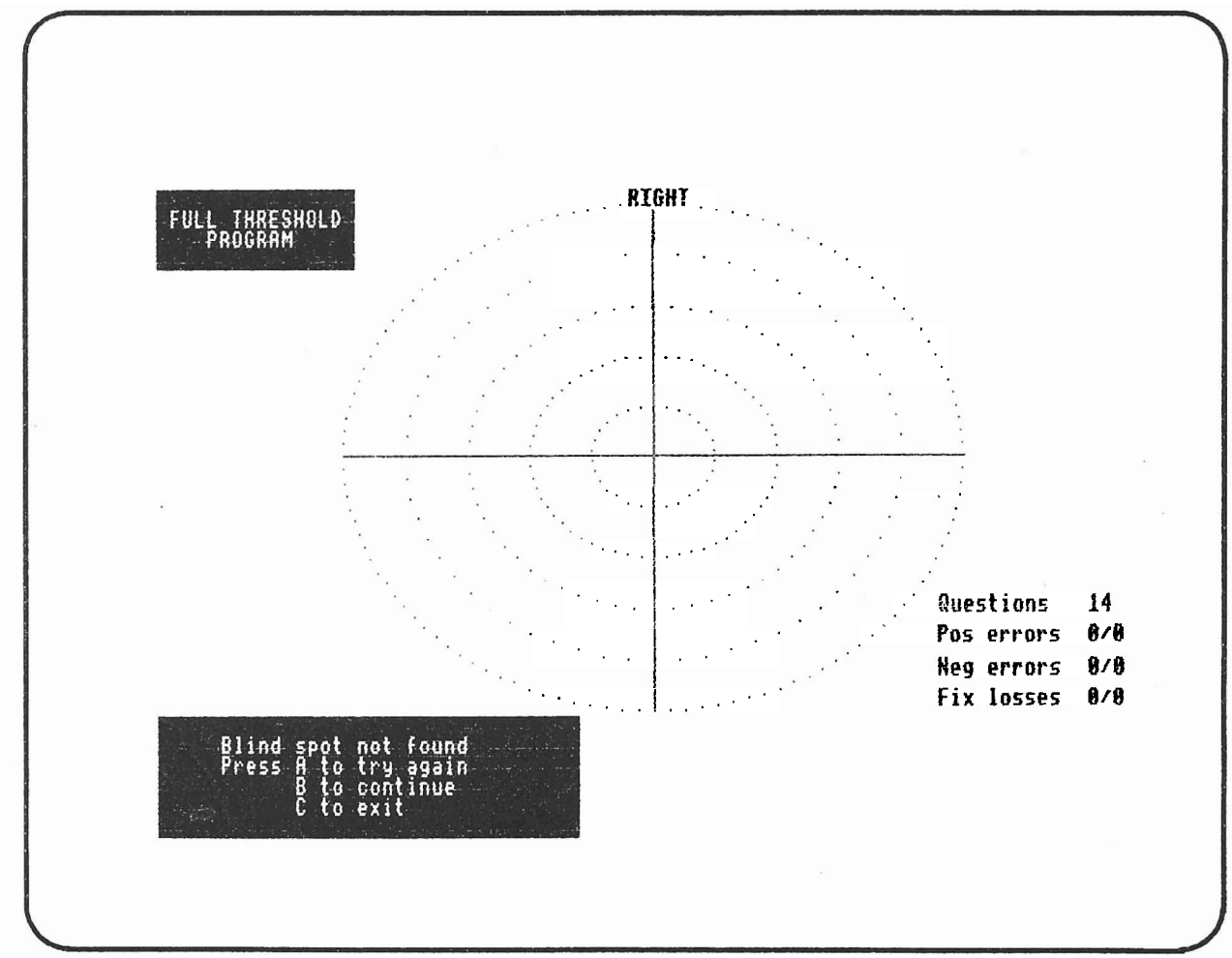


FIG 11

Sample Monitor Display in Full Threshold Mode

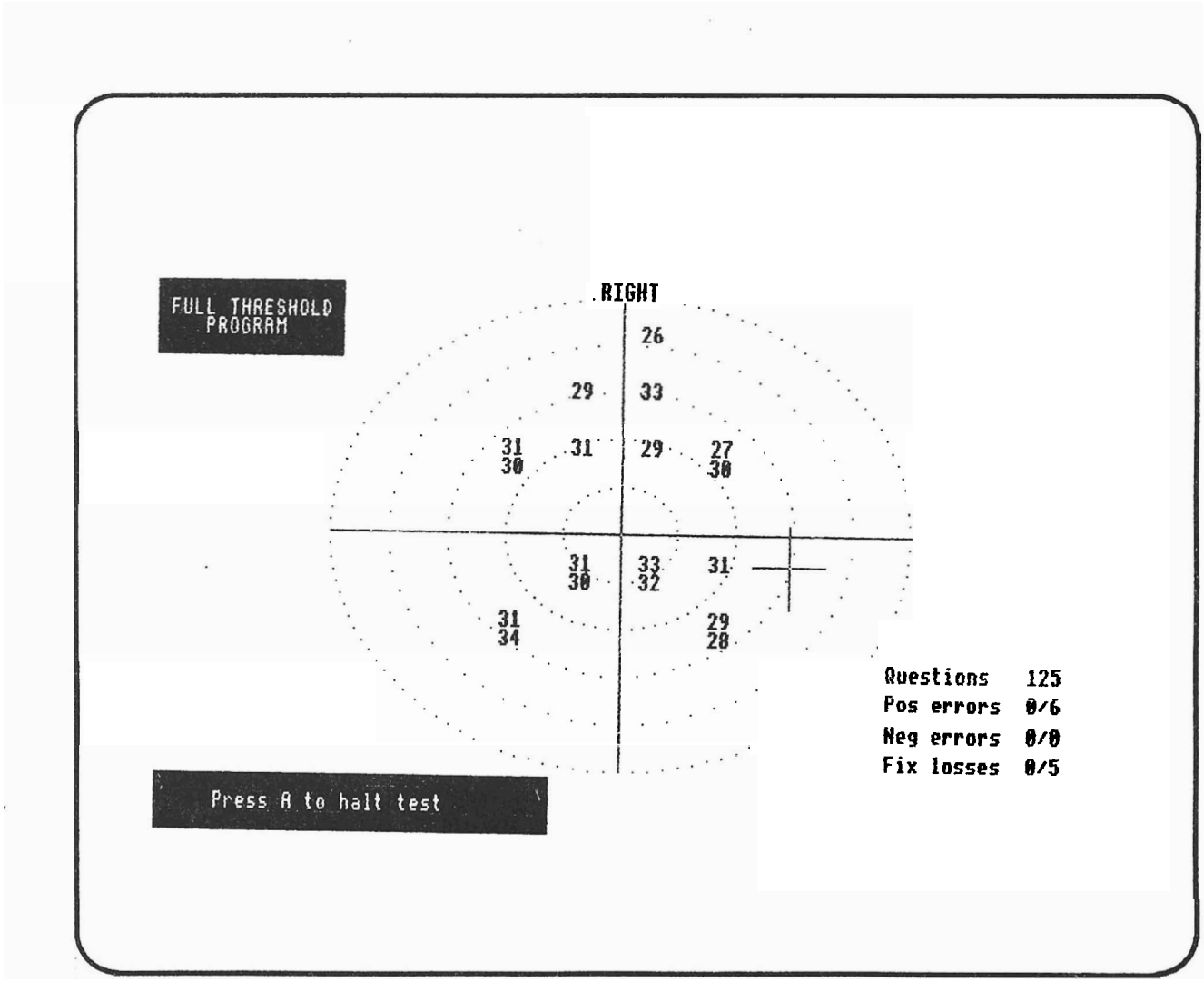


FIG 12

Monitor Display at Beginning of Supra Threshold Program

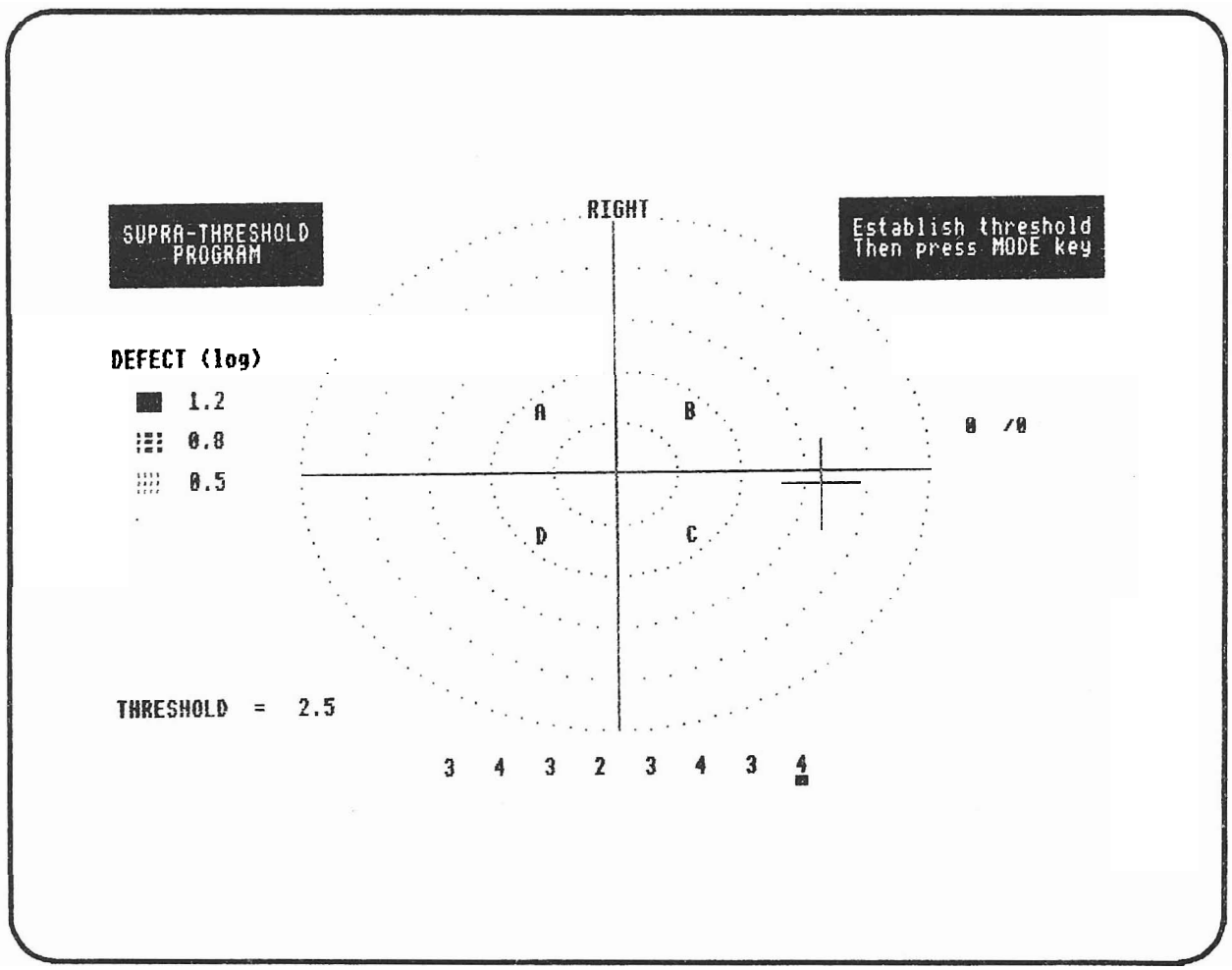


FIG 13

Monitor Display of IOP/CD Analysis System

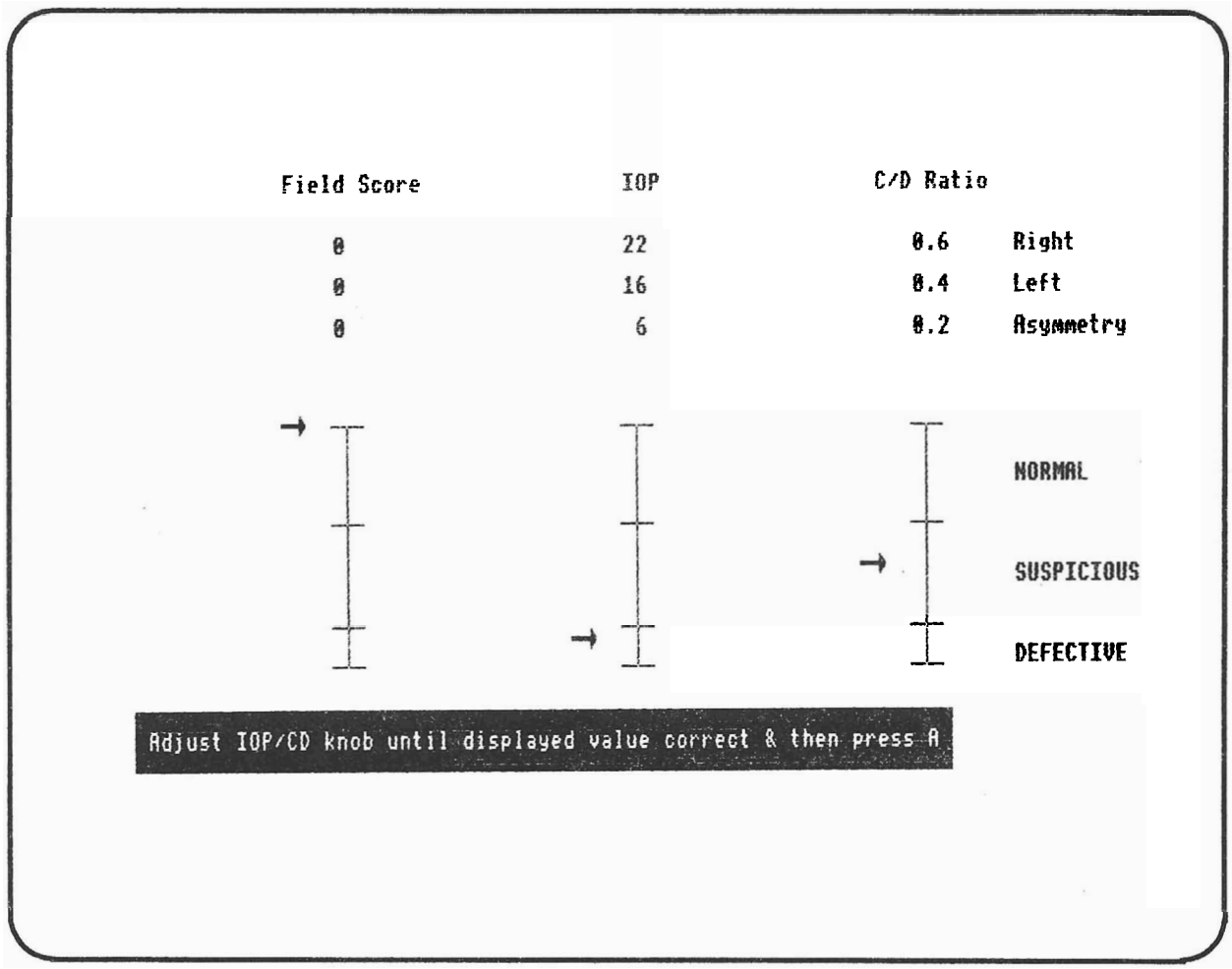


FIG 14

Menu Options

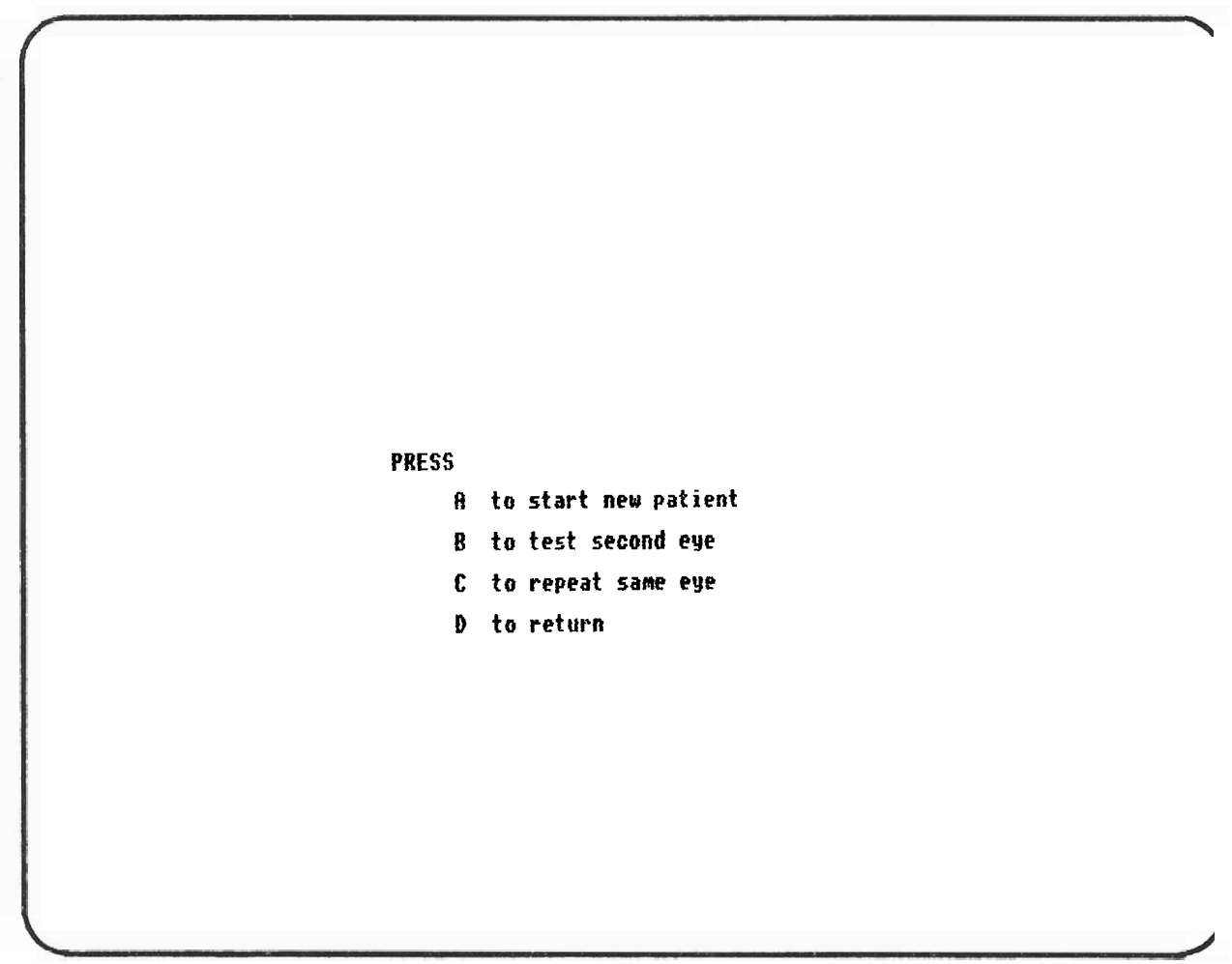


FIG 15

Auxillary Menu Functions

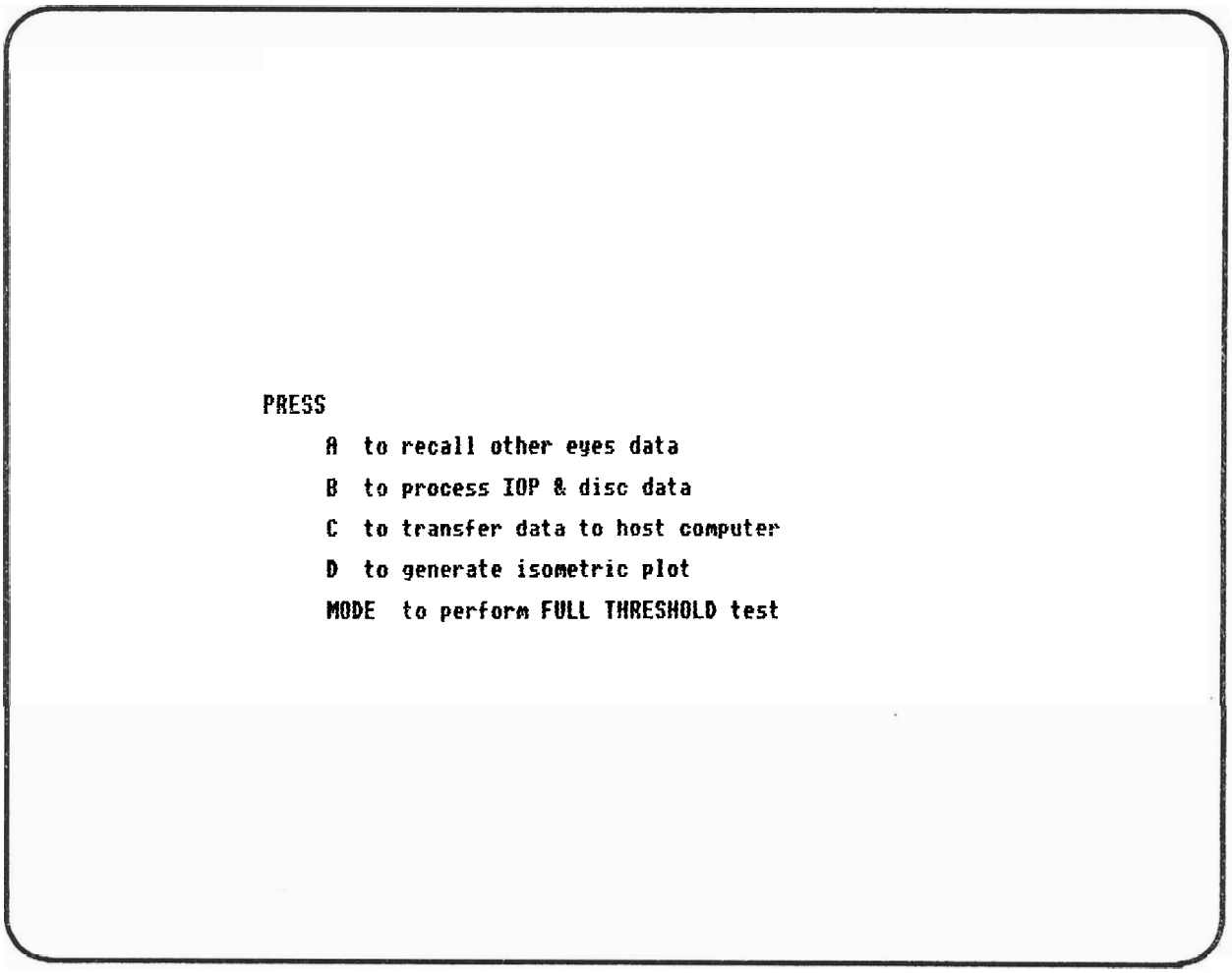


FIG 16

Sample of Monitor Display after Screening Failure

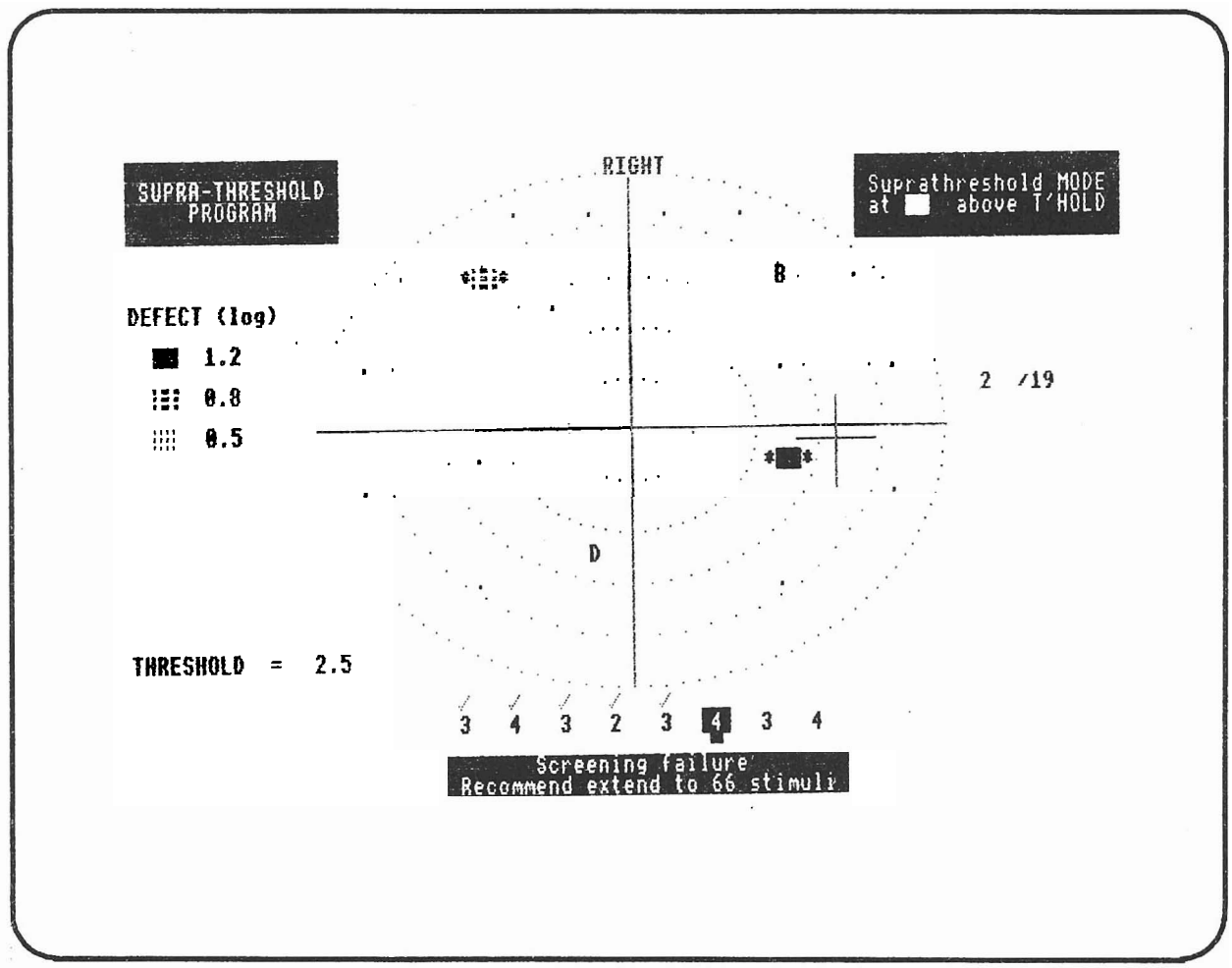


FIG 17

Sample of Monitor Display after 66 Point Supra Threshold Test

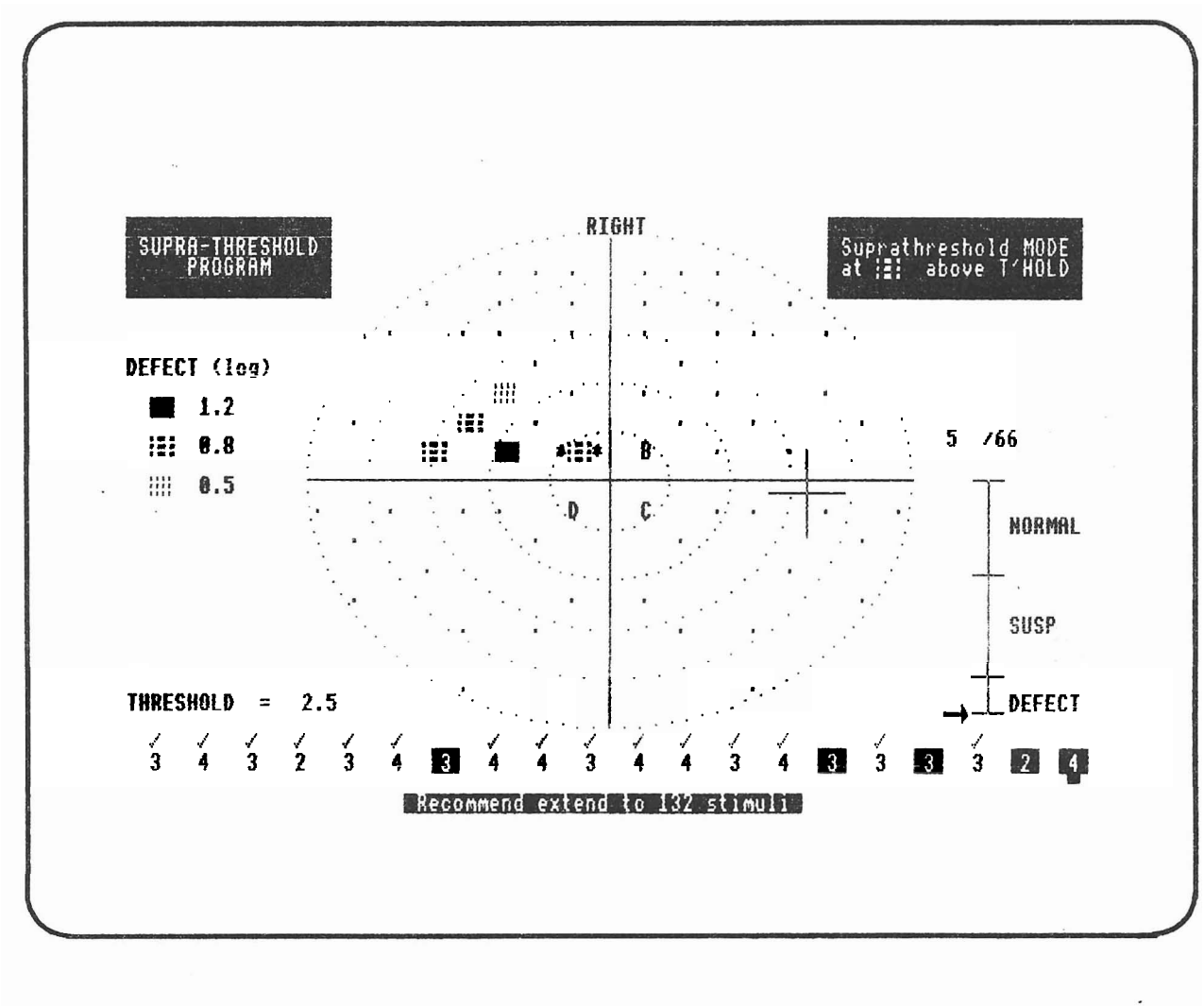


FIG 18

Sample of Monitor Display after Completion of 132 Point Supra Threshold Test

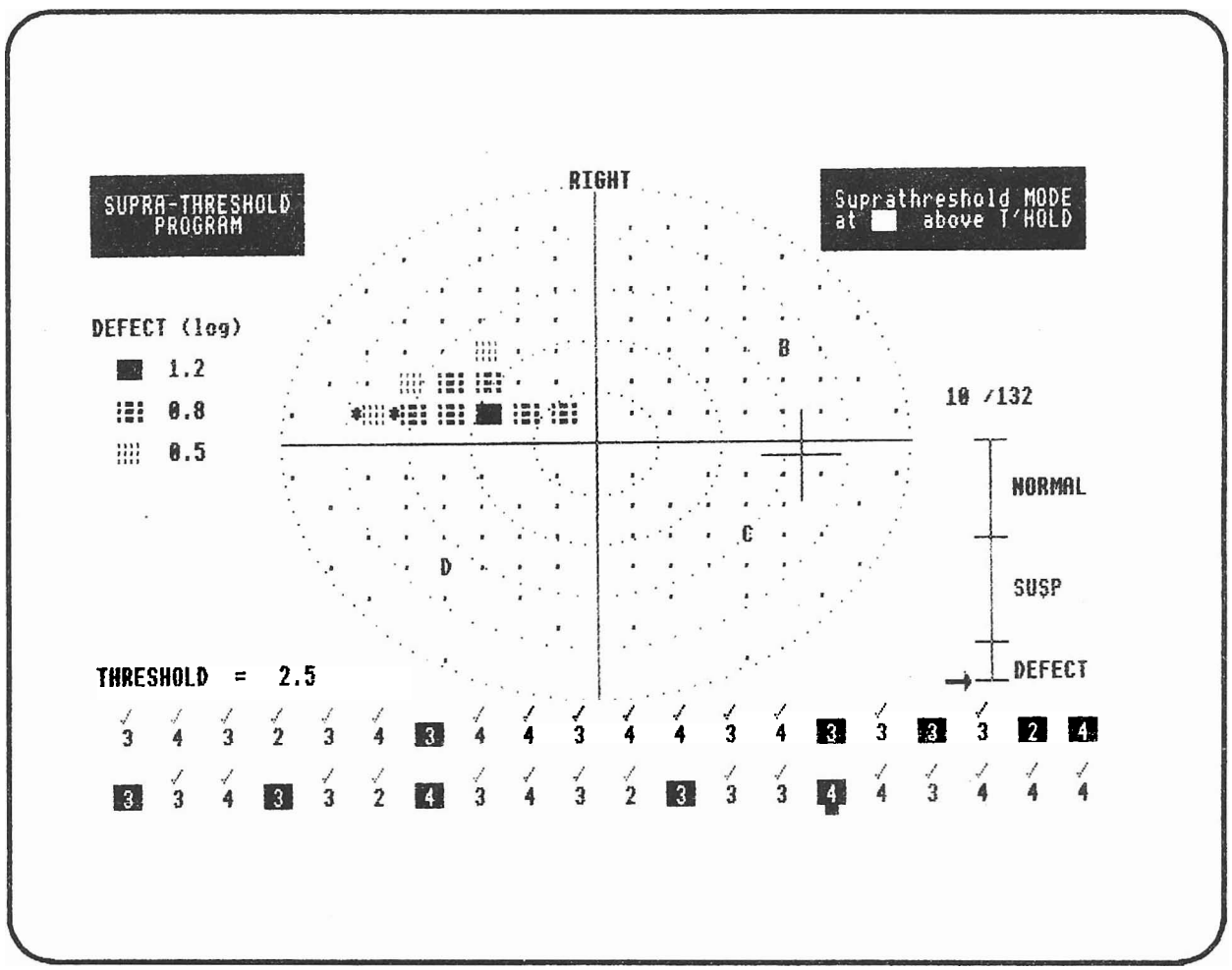


FIG 19

Sample Printout out from Full Threshold Program

Patient . . . . . Date . . / . . / . .

Number . . . . . DOB . . / . . / . .

Rx worn at test . . . . . VA . . .

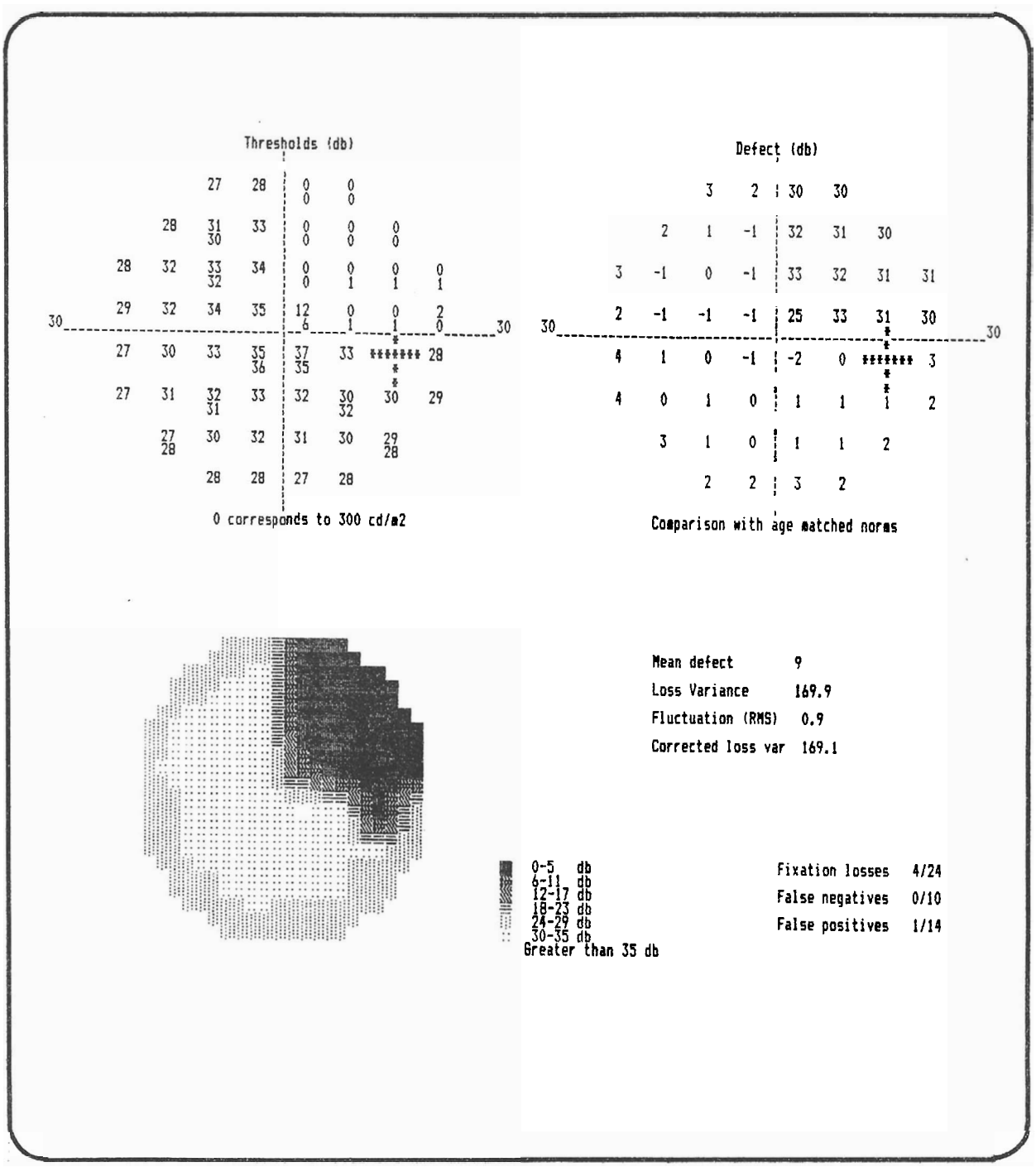


FIG 20

Conversion Table from Log Units to Candela per Square Metre and Apostilbs

The intensity values are for a stimulus at the centre of the visual field (i.e. where none exist). Peripheral threshold values can be calculated from the equation:

Peripheral threshold value - threshoid value - (0.8/25)x

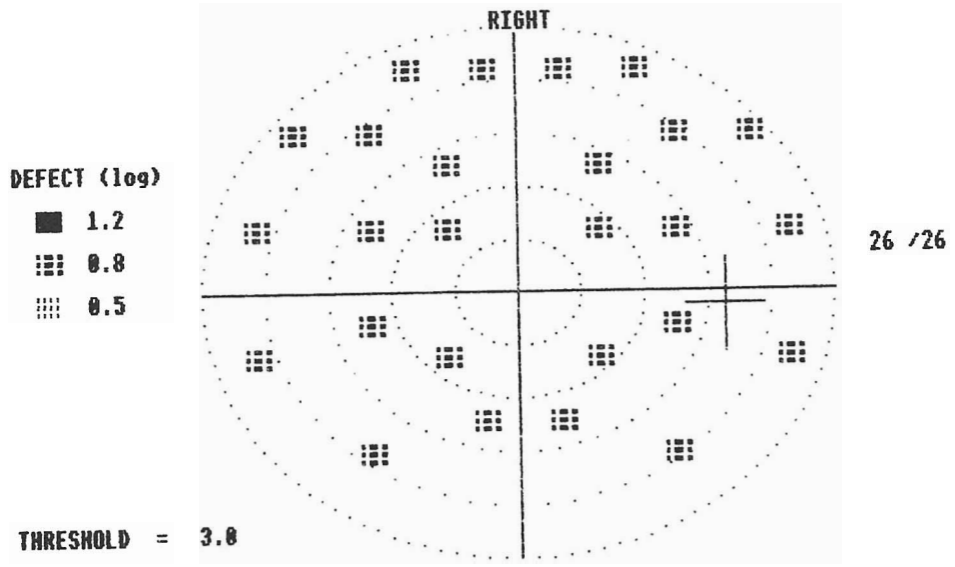
where x = eccentricity of stimulus in degrees.

E.g. if the threshold value is 3.3 and the simulus is 12.5 degrees from the centre of the field, then the peripheral threshold value is 3.3 - (.8/25)*12.5 - 2.9 and the intensity of the stimulus would be .38 cd/m2.

THRESHOLD VALUE	INTENSITY CD/M2	INTENSITY ASB
4.0	.03	.09
3.9	.04	.12
3.8	.05	.15
3.7	.06	.19
3.6	.08	.24
3.5	.10	.30
3.4	.12	.37
3.3	.15	.47
3.2	.21	.59
3.1	.24	.75
3.0	.30	.94
2.9	.38	1.19
2.8	.48	1.49
2.7	.60	1.81
2.6	.75	2.37
2.5	.95	2.98
2.4	1.19	3.75
2.3	1.50	4.72
2.2	1.89	5.93
2.1	2.38	7.47
2.0	3.0	9.42
1.9	3.78	11.87
1.8	4.75	14.92
1.7	5.99	18.81
1.6	7.54	23.68
1.5	9.49	29.80
1.4	11.94	37.49
1.3	15.04	47.23

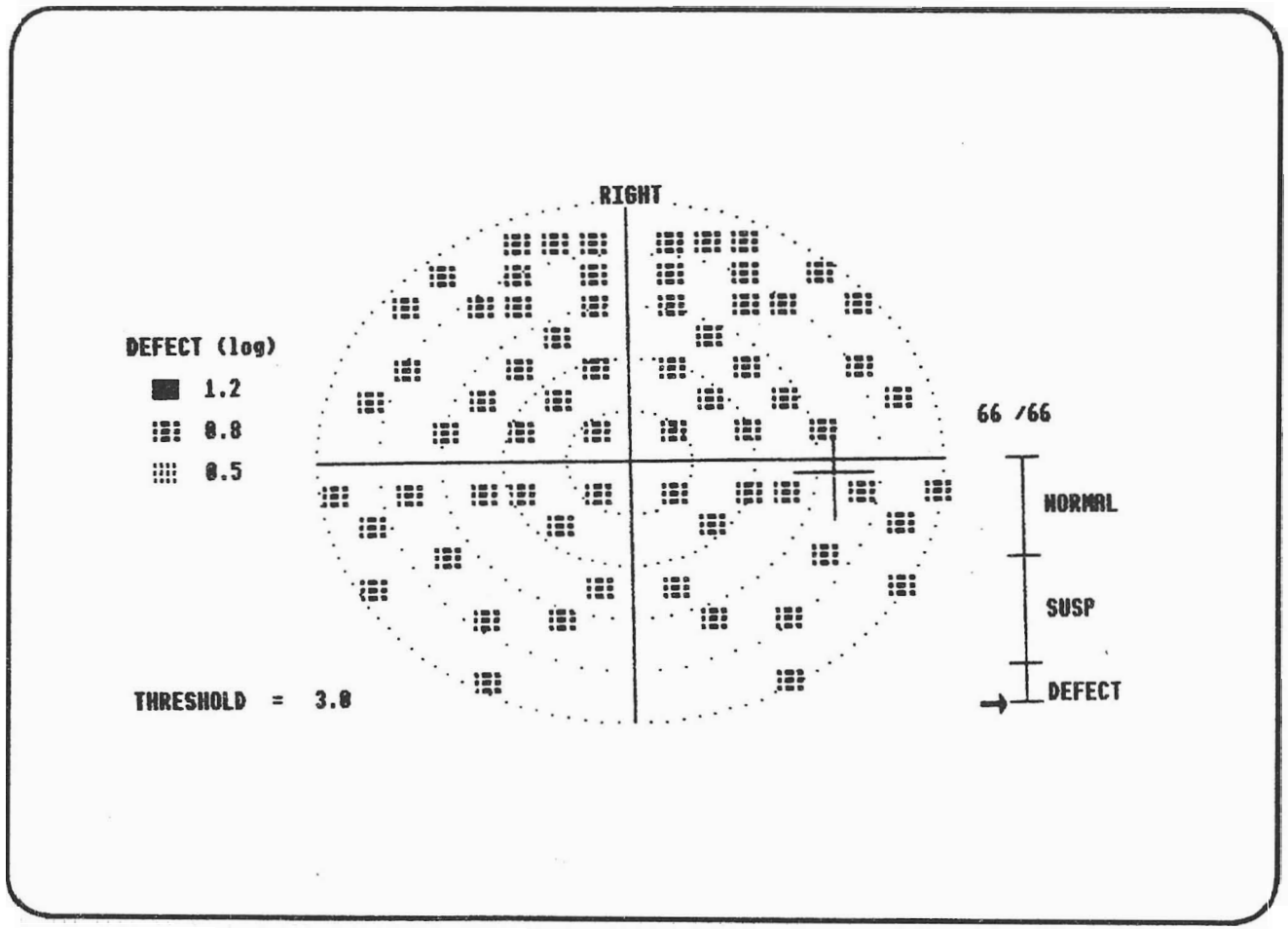
EXAMPLE 1

Position of the 26 Stimuli in the Screening Program



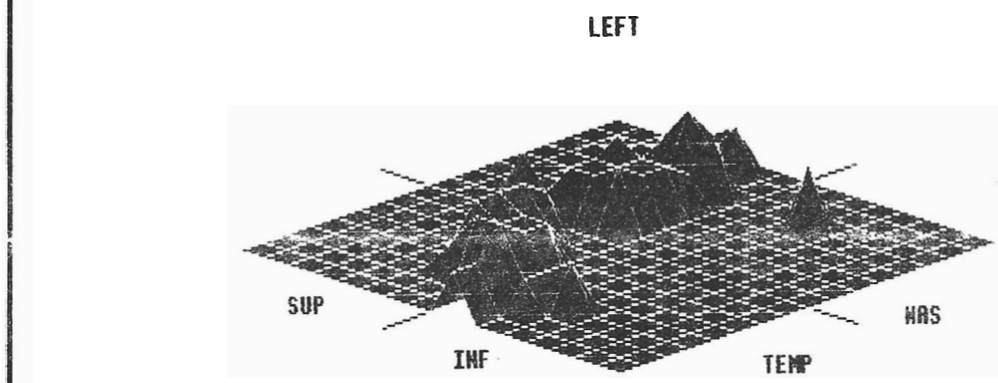
EXAMPLE 2

Position of Stimuli in 66 point Extended Screening Program



EXAMPLE 4

Visual Field Data as an Isometric Plot



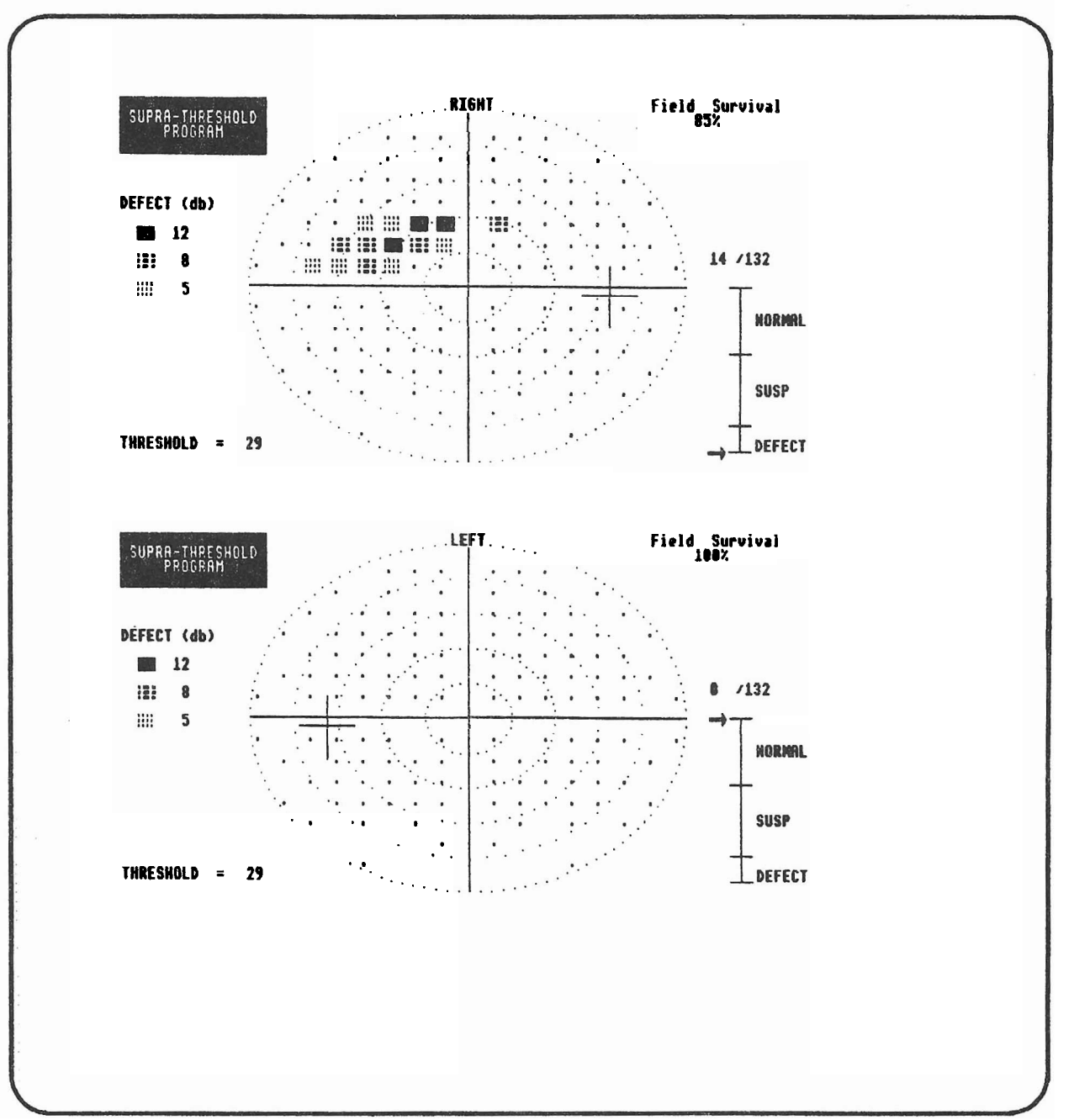
EXAMPLE 5

Results from a Supra Threshold Examination in which all 132 Stimulus Locations Have Been Tested

Patient . . . . . Date . . / . . / . .

Number . . . . . DOB . . / . . / . .

Rx worn at test R . . . . . VA . . . L . . . . . VA . . .



EXAMPLE 5

Results from a 'Supra Threshold' examination in which all 132 stimulus locations were tested.

The patient has a superior arcuate defect in the right eye.

Statistical analysis of this result indicates that the probability of this result coming from a patient with a normal visual field is less than 1 in 1000 as indicated by the arrow pointing to the defect region of the scale.

Further statistical analysis estimates the percentage of residual field as represented by the global index 'Field Survival'. In this example, the filed survival is 85%.

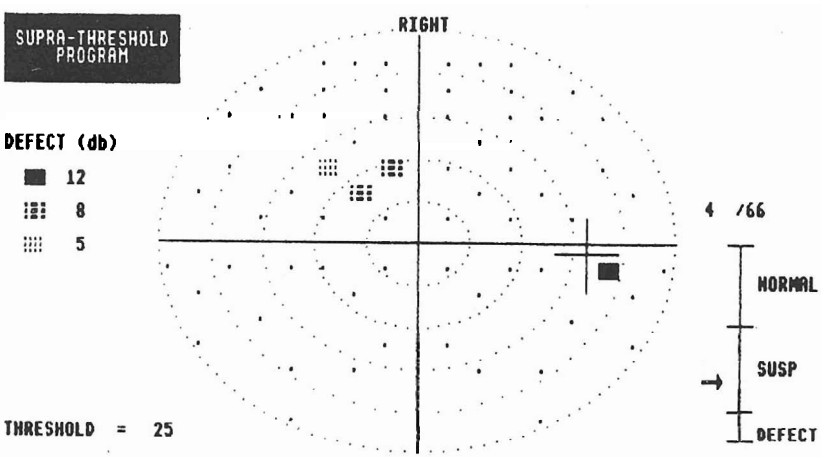
EXAMPLE 6

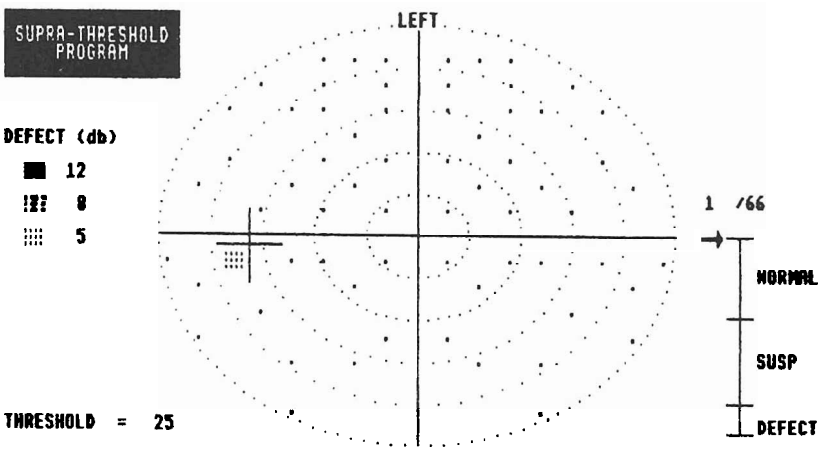
Results from a Supra Threshold Examination in which 66 Stimulus LocationsWere Tested

Patient . . . . . Date . . / . . / . .

Number . . . . . DOB . . / . . / . .

Rx worn at test R . . . . . VA . . . L . . . . . VA . . .





EXAMPLE 6

Results from a 'Supra Threshold' examination in which 66 stimulus locations have been tested.

The patient has a small field loss in the superior arcuate region of the right eye.

Statistical analysis indicates that the probability of this result coming from a patient with a normal visual field lies between 1 in 10 and 1 in 1000, the suspicious region of the scale.

EXAMPLE 7

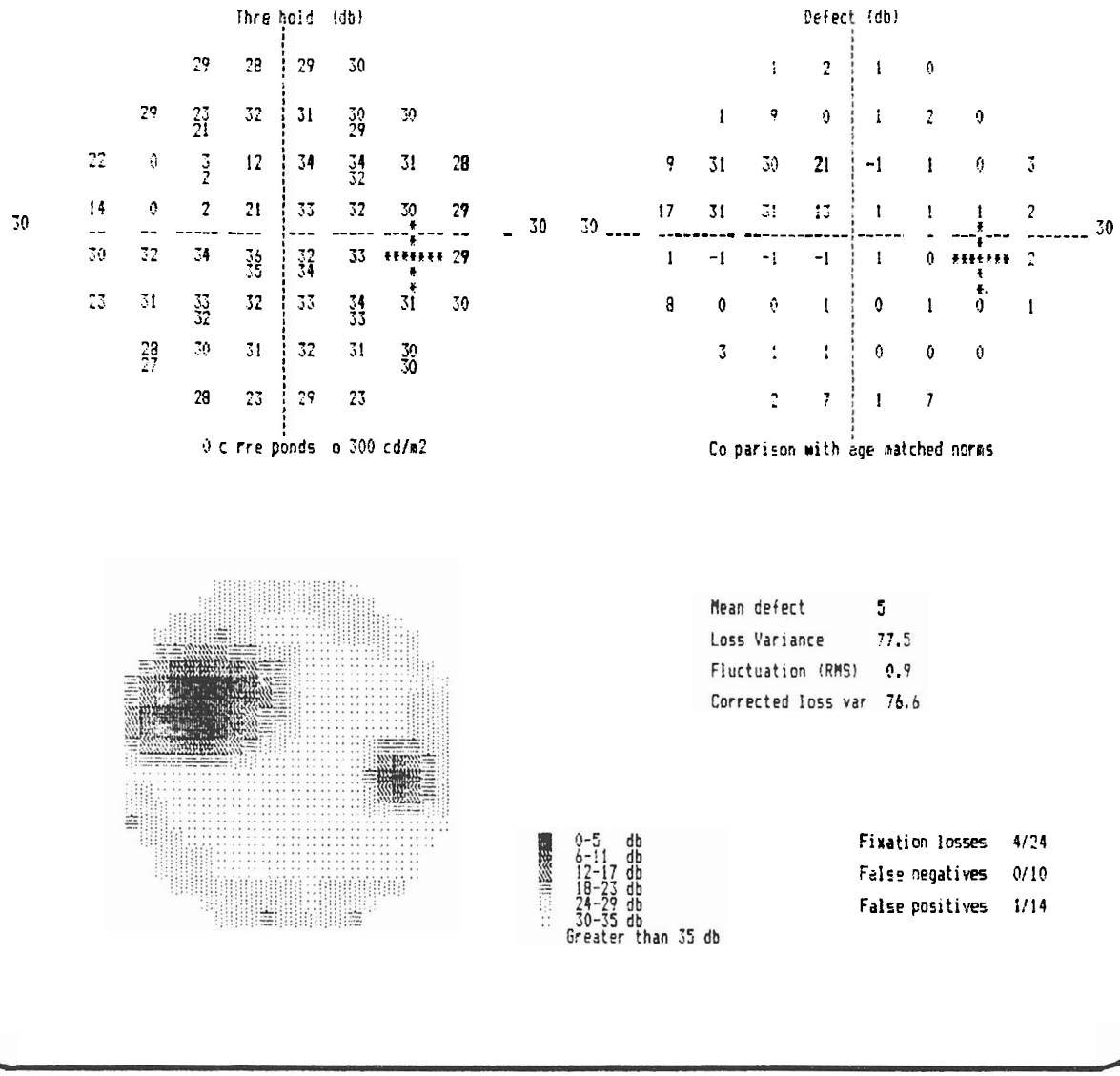
Field Data from Completed Full Threshold Program

Patient . . . . . Date /. . /

Number . . . . . DOB /. . /

Rx worn at test . . . . . VA

RIGHT EYE



EXAMPLE 7

Results from the 'Full Threshold' program.

Normal result from right eye.

The fluctuation estimate option has been selected. The program automatically re-tested 10 retinal locations and estimated the fluctuation and the corrected loss variance. The repeat estimates are given below the first estimates, in the top left hand figure of the printout.

The option to re-test results more than 4 db below the expected norm was turned off.

The top left hand figure gives the threshold estimates.

The top right hand figure gives the differences between these measures and those from an age matched patient with a normal visual field.

The bottom left hand figure gives a grey tone representation of the threshold data.

The numbers in the bottom right hand corner of the printout give the global indices, mean defect, loss variance, fluctuation and corrected loss variance as well as the number of fixation losses, false negatives and false positives.

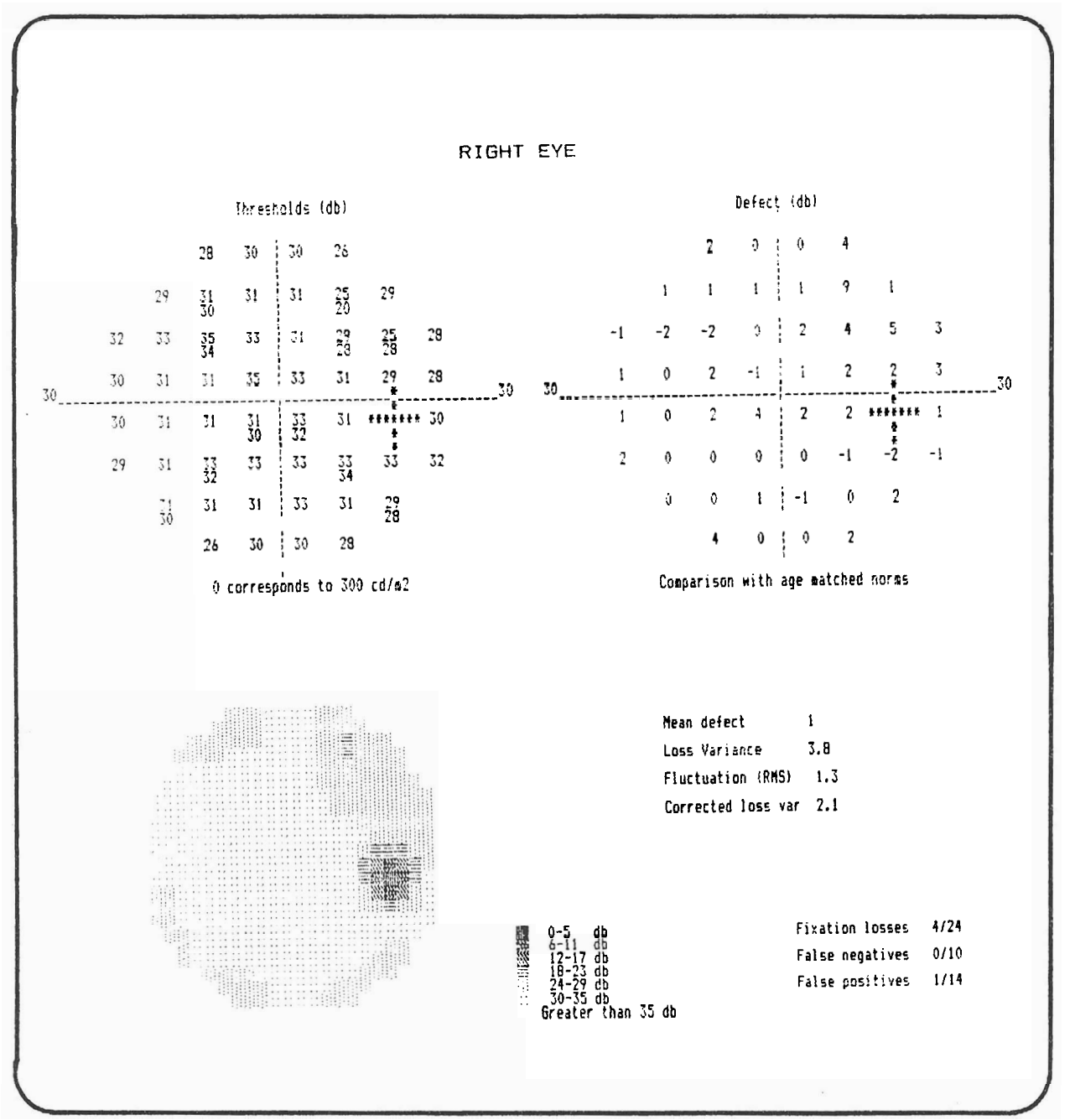
EXAMPLE 8

Field Data from Completed Full Threshold Program with Fluctuation Estimate On

Patient . . . . . Date . . / . . / . .

Number . . . . . DOB . . / . . / . .

Rx worn at test . . . . . VA



EXAMPLE 8

Results from the 'Full Theshold ' program.

Upper temporal field defect in left eye.

The fluctuation estimate was turned on.

The re-test of threshold estimates more than 4 db below expected values was turned off.

Note how the global indices have changed. The mean defect has increased, indicating that the mean threshold is below that of an age matched norm. The loss variance and corrected loss variance have increased dramatically, indicating that there is a large amount of variance in the threshold estimates as would be expected in a patient with a visual field defect.

EXAMPLE 9

Field Data from Completed Full Threshold Program with Fluctuation Estimate On, Including Re-Tested Results, More Than 4 db Below Expected Values

Patient . . . . . Date . . / . . / . .

Number . . . . . DOB . . / . . / . .

Rx worn at test . . . . . VA . . .

RIGHT EYE

Thresholds (db)

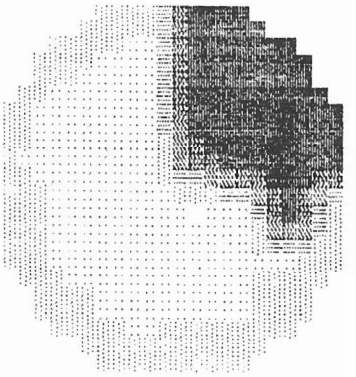
		27	28	0 0	0 0				
	28	31 30	33	0 0	0 0	0 0			
28	32	33 32	34	0 0	0 1	0 0	0 1		
29	32	34	35	12 6	0 1	1 0	2 0		
30									30
27	30	33	35 36	37 35	33	*******	28		
27	31	32 31	33	31	30 32	30	29		
	27 28	30	32	31	30	29 28			
		28	28	27	28				

0 corresponds to 300 cd/m2

Defect (db)

			3	2	30	30			
		2	1	-1	32	31	30		
	3	-1	0	-1	33	32	31	31	
	2	-1	-1	-1	25	33	31	30	
30									30
	4	1	0	-1	-2	0	*******	3	
	4	0	1	0	2	1	1	2	
		3	1	0	1	1	2		
			2	2	3	2			

Comparison with age matched norms



Mean defect	9
Loss Variance	169.6
Fluctuation (RMS)	0.9
Corrected loss var	168.8

0-5 db
6-11 db
12-17 db
18-23 db
24-29 db
30-35 db
Greater than 35 db

Fixation losses	4/24
False negatives	0/10
False positives	1/14

EXAMPLE 9

Results from the 'Full Threshold' program.

Upper nasal quadrant defect left eye.

The fluctuation estimate was turned on.

The re-test of results more than 4 db below expected values was also turned on. Note that there are now two threshold estimates for each location in the upper nasal field. All these test locations were found, on first measurement to be more than 4 db below expected values.

EXAMPLE 10

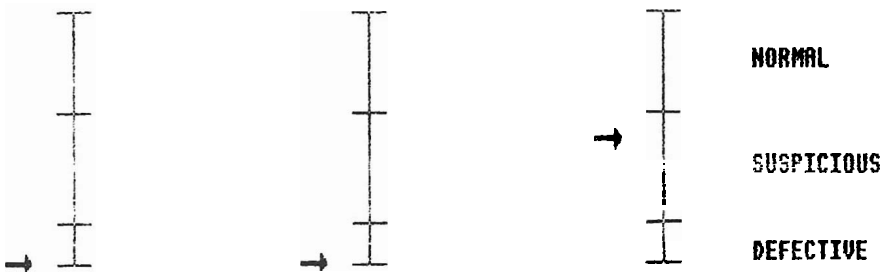
Indicated Results from IOP/CD Analysis System

Patient . . . . . Date . . / . . / . .

Number . . . . . DOB . . / . . / . .

Rx worn at test R . . . . . VA . . . L . . . . . VA . . .

Field Score	IOP	C/D Ratio	
0	12	0.3	Right
42	21	0.5	Left
	9	0.2	Asymmetry



EXAMPLE 10

IOP/CD analysis, (see following figure), indicates that the IOP's are defective and CD ratios suspicious. Note also that the field score now indicates that the result is defective rather than suspicious. This is because the computer, during this phase of the program, is analysing both the level of the defect and also the asymmetry between the two eyes. It is the asymettry in the field scores that warrants the defective classification.

APPENDICES

Appendix 1

Electrical Connections

Lay the CFA 3000 on its back so that you are viewing the bottom of the chassis, check the voltage selection switch setting.

There are two settings:

(a) 230V which will cover a mains input voltage of 209 volts to 253 volts AC at 50 or 60Hz.

(b) 115V which will cover a mains input voltage of 105 to 126 volts AC at 50 or 60 Hz.

If the local mains voltage is different to the setting on the voltage selector switch, unscrew the cover plate over the switch, slide the switch to the other position and replace cover plug in the mains lead to the IEC mains plug marked 'Power Input'.

If the voltage was changed, unscrew the two fuses marked 'Power Input Fuses' using a screwdriver or small coin. If mains selector is set at 230V, fuses should be 1A antisurge (20 x 5 mm).

If the mains selector is set at 115V the fuses should be 2A antisurge (20 x 5 mm).

If a printer is being used, connect the power lead from the printer to the 'Power Output' socket on the chassis.

Check the printer rating is 70VA or less. Inter-connect the 'Centronics Input'(r) of the printer to the printer part on the underside of the CFA 3000 using the ribbon cable assembly supplied with the printer. Stand the CFA 3000 back on its feet.

(r) Registered trade name

Appendix 3

Summary of Controls in Supra Threshold Test

PRESENT STIMULI	This key presents the currently selected pattern to the patient.
PATTERN	These two keys are used to advance to the next pattern or to go back to the previous pattern.
STIMULI	These two keys are used to adjust the intensity of the stimuli.
INTENSITY	In the 'Threshold' mode they adjust it in 0.l log unit (1db) steps. In the 'Testing' mode they adjust it to either 0.5, 0.8 or 1.2 log units (5, 8 or 12db) above the threshold.
LEFT	This key is used at the beginning of the examination to signify that you are going to test the left eye. (This key has a second function, 'Menu' which takes effect when you are in the 'Supra Threshold' mode).
RIGHT	This key is used at the beginning of an examination to signify that you are going to test the right eye. (This key has a second function, 'Extend', that comes into use when you are in the 'Threshold' or 'Supra-Threshold' modes).

Appendix 2

Specifications

There are up to 132 different stimuli presented in the 'Supra Threshold' program and 52 different stimuli presented in the 'Full Threshold' program.

The stimuli are light emitting diodes (LEDs) with a broad spectral output ranging from 530-600 nm peaking at 560 nm.

The stimuli have a flat diffusing front surface of diameter 3.0 mm. The stimuli are matched to within 0.05 log units.

The stimuli are arranged on a 3 degree matrix. The stimulus presentation time is 200 msecs.

To account for the normal gradient of sensitivity across the retina, the intensity of the stimuli in the 'Supra Threshold' program increases linearly towards the periphery of the field by 0.5 log units (from the centre of the field to 25 degrees eccentricity).

At an equivalent filter setting of 2.0 the central stimuli will have an intensity of 3 cd/m^2. Screen luminance is 0.25 cd/m^2 when correctly set with the internal light meter. The screen is flat and positioned 33 cms from the eye.

Summary of Controls in Supra Threshold Test ... cont

MENU	On pressing this key a menu appears on the screen listing the auxiliary functions that are available.
EXTEND	This key extends the number of stimulus patterns, the maximum being 40 patterns (132 stimuli).
MISSED STIMULI	These four keys are used to enter a missed stimulus. They are also used to select various options from displayed messages/menus.
MODE	This key toggles between the 'Full Threshold' mode and the 'Supra Threshold' mode
PRINT	On pressing this key, a printout of the field data is obtained.
ERASE	Any previously recorded missed stimulus can be erased from the display by pressing this key. Only those missed stimuli within the currently selected stimulus pattern will be erased.
RE-START	Pressing this key will take you back to the beginning of the examination, ready to test another eye or re-test the same eye.
BACKGROUND INTENSITY	This knob adjusts the intensity of the built in illumination system.

Summary of Controls in Supra Threshold Test ... cont

VOLUME	This knob adjusts the volume of the bleep that occurs prior to the presentation of the stimuli.
IOP/CD	This knob is used to enter the patient's intraocular pressure and cup disc ratios.

Summary of Controls in Full Threshold Test

LEFT	This key is used at the beginning of the examination to signify that you are going to test the left eye.
RIGHT	This key is used at the beginning of an examination to signify that you are going to test the right eye.
RESPONSE TIME	This knob adjusts the interval time between stimulus presentations in the 'Full Threshold' test
AGE	This knob is used to enter the patient's age into the computer.
MISSED STIMULI	These 4 keys are used to select various options from displayed messages/menus
STIMULI INTENSITY	These two keys are used to change/select various options when the 'Changing Start-up Options' screen is displayed.

Appendix 4

Serial transfer

General

Both the 'Threshold' and the 'Supra Threshold' programs contain a facility to transfer the data collected during the examination, to a host computer, running an appropriate software package.

The data is transmitted through a serial port (often referred to as an RS232 or V24 port). The analyser transmits data at 1200 baud.

Full Threshold Program

At the end of a threshold examination the CFA 3000 presents the following message:

"PRESS A to print results
B to transfer data
C to test next eye"

To transfer data press 'B'. The message will now be replaced by either:

'Waiting for signal from host computer, if not received in 30 seconds the computer will cancel the transfer request',

or:

'Transferring data'

Depending upon whether 'Start-up Options' switch 3 is set to 'Request Send' or 'Auto Send'.

If the transfer is 'Request Send' then the CFA 3000 is waiting for the host computer to send the command 'H'. On receipt of this command the CFA 3000 will transmit the data in the same manner as 'Auto Send'.

The order of transmission is all follows:

40, (this value signifies that the data is from 'Full Threshold' test)
1 or 0, to indicate right or left eye
Age in years, (upto 3 digits)
Mean defect, (2 digits)
Loss variance*10, (upto 3 digits)
Fluctuation*10, (upto 3 digits)
Corrected loss variance *10, (upto 3 digits)
Fixation losses, (upto 2 digits)
Fixation tests, (upto 2 digits)
Negative errors, (upto 2 digits)
Negative error tests, (upto 2 digits)
Positive errors, (upto 2 digits)
Positive error tests, (upto 2 digits)
Threshold location 1, (upto 2 digits)
Threshold location 2, (upto 2 digits).
Threshold location 52, (upto 2 digits)
Check sum of data AND 255, (upto 3 digits)

Data elements are separated by ","'s. At the end of the transfer the program return to the message:

"PRESS A to print results
B to transfer data
C to test next eye"

The 'Full Threshold' program of the CFA 3000 transmits the threshold data in the order shown in the following figure. If the threshold has been tested twice then the transmitted value is the mean of the two values given in decibels.

		49	45	46	50		
	41	37	33	34	38	42	
29	25	21	17	18	22	26	30
13	9	5	1	2	6	10	14
16	28	24	20	3	7	11	15
32	12	8	4	19	23	27	31
	44	40	36	35	39	43	
		52	48	47	51		

Supra Threshold Program

On pressing the 'Menu' key, the operator is presented with the following display:

"Press A to recall other eyes data
B to process IOP and disc data
C to transfer data to host computer
D to generate isometric plot
Mode to perform threshold test"

On selecting 'C' to transfer data to host computer, the display will be replaced by:

`Waiting for signal from host computer'.
If not received within 30 secs the computer will return to main program.'

if 'Start-up Options' switch 3 is set to 'Request Send'

or: 'Transferring Data'

if 'Start-up Options' switch 3 is set to 'Auto Send'.

If the transfer is 'Request send', then the CFA 3000 is waiting for the host computer to send the command 'H'. On receipt of this command the CFA 3000 will transmit the data in the same manner as 'Auto Send'.

The order of transmission is as follows:

30, (this value signifies that data is from 'Supra Threshold' test)
Right eye threshold (db), (up to 2 digits)
Right eye field survival, (up to 3 digits)
Right eye error score, (up to 4 digits)

Right eye cluster score, (up to 4 digits)

Left eye threshold (db), (up to 2 digits)

Left eye threshold (db), (up to 2 digits)

Left eye field survival, (up to 3 digits)

Left eye error score, (up to 4 digits)

Left eye cluster score, (up to 4 digits)

Right eye field data, see later section for details p. 46

Left eye field data, see later section for details p. 46

Check sum, sum of data AND 255, (upto 3 digits)

Data elements are separated by ","'s

At the end of the transfer the CFA 3000 will return to a display of the right eyes visual field data. At this stage the operator is free to perform any of the CFA 3000's normal operations.

The CFA 3000 stores 'Supra Threshold' data in two 2 dimensional integer arrays, one for the right eye and one for the left eye. Each array is 17*17. Each cell of the array gives information about a given retinal location. The cells of the array correspond to the 3 degree matrix of stimuli tested by the CFA 3000. Note that not all the cells within the arrays have corresponding stimuli. The centre of the visual field is cell 9,9, the bottom left hand corner, 1,1 and the the top right hand corner, 17,17. The number within the cell represents the status of that retinal location:

0.... means it has not been tested.

1.... tested and seen at 0.5 log units above the threshold estimate

3.... means missed at 0.5 log units above the threshold estimate

4.... means missed at 0.8 log units above the threshold estimate

5.... means missed at 1.2 log units above the threshold estimate

Appendix 5

Start-up options

Inside the storage compartment of the CFA 3000 is a series of eight small switches. These allow the instrument to be configured to start-up in a variety of different ways.

On start-up the position of these switches is read by the computer.

Switch 8 controls whether, in the 'Supra Threshold' program, the CFA 3000 starts off in the first level (screening) or the second level.

"OPEN-2nd level CLOSED-1st level"

Switch 7controls whether the CFA 3000, in its 'Supra Threshold' program, displays information in log units or decibels.

"OPEN-db CLOSED-log units"

Switch 6 controls whether the CFA 3000 starts up in the 'Full Threshold' program or the 'Supra Threshold' program.

"OPEN-Full Threshold CLOSED Supra Threshold"

Switch 5 controls whether, as part of the 'Full Threshold' test, the CFA 3000 estimates the patients fluctuation (see later section on global indices). On selection of this option the CFA 3000 will automatically measure the threshold twice at 10 retinal locations and, on the printout, give an estimate of the fluctuation and the corrected loss variance.

"OPEN-est. fluct. CLOSED-do not est. fluct."

Switch 4 controls whether, as part of the 'Full Threshold' test, the CFA 3000 automatically re-tests any retinal location at which it finds the threshold to be more than 4 db below the expected value for an age matched norm.

OPEN-repeat>4 db CLOSED-do not repeat>4 db

Switch 3 controls whether the serial transfer is 'Auto Send' or 'Request Send'.

OPEN - Auto Send CLOSED - Request Send

Switch 2 - not used.

Switch 1 - not used.

Appendix 6

Quantification of Results from Full Threshold Program

The 'Full Threshold' program automatically quantifies the results giving the following global indices:

Mean Defect,

Loss Variance,

Fluctuation

Corrected Loss Variance

The later two indices will only be given if the option to estimate fluctuation was selected.

The Mean Defect

The 'Mean Defect', or as it is sometimes called, the mean depression, tells you how the patient's overall field compares to the normal reference field. For example, if the 'Mean Defect' were 3.4 then the patient's results are on average, 3.4 db below those of an aged matched norm.

This statistic is useful for looking at overall depression in sensitivity which may occur as a result of glaucoma and/or lens clouding. The 'Mean Defect' will also change if there is some localised loss, although it is not very sensitive to this type of change.

Loss Variance

'Loss Variance', which is similar to pattern standard deviation, is designed to be sensitive to localised losses in sensitivity. It measures the dispersion of defect values (differences between measured thresholds and those from age matched normal eyes). Patients with a localised loss will show a large dispersion of defect values; high defect values in areas of loss and low values in areas of normal sensitivity.

In mathematical terms:

'Loss Variance' = sum of all squared defect values ÷ number of measures.

The defect values are squared in order to overcome the difficiculty of positive and negative values. The number of measures is 52, the number of test locations.

Fluctuation

'Fluctuation', or more precisely the short term fluctuation, is a measure of how variable a patient is. It is obtained by testing twice, 10 pre-selected test locations. In mathematical terms, it is known as the root mean square (RMS) and it indicates, on average, how much the retested thresholds differ from each other.

Corrected Loss Variance

Corrected loss variance, which is similar to corrected pattern standard deviation, is a measure of dispersion that has been corrected for patient variability.

The loss variance statistic (defined above) gives a measure of dispersion that is the product of both variability in the patients thresholds across the visual field and patient variability. The short term fluctuation is an estimate of patient variability. By subtracting patient variability (variance, which equals the square of the fluctuation) from the loss variance, a superior estimate of the variability due to physiological processes is obtained.

In mathematical terms:

CLV = Loss Variance ÷ square of the fluctuation.

$$RMS = \frac{\sum_{i=1}^{M} (Xir - X'i)^2}{M}$$

Xir = measured threshold at location i and repitition r
X'i = mean threshold at location i
M = number of locations with double determinations (M = 10)

Appendix 7

Storage Compartment Controls

The following controls are located within the storage compartment.

'Brillance', adjusts the intensity of the monitor.

'Vertical', adjusts the monitors vertical hold.

'Start-up-Options' switches which control how the CFA 3000 starts up.

Section 3

FULL THRESHOLD TEST PROCEDURE

Section 4

SUPRA THRESHOLD TEST PROCEDURE

Section 5

MENU FUNCTIONS

Section 6

IOP/CD ANALYSIS

LIST OF FIGURES/EXAMPLES

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FIGURES

Section 1

INTRODUCTION

The Henson CFA 3000 is a central , 25 degree, visual field analyser. It has two visual field programs:

1) a multiple stimulus 'Supra Threshold' program and

2) a single stimulus 'Full Threshold' program.

Both programs present messages and visual field information to the operator on a monitor attached to the side of the analyser. These messages make operation simple and straightforward.

THE MULTIPLE STIMULUS SUPRA THRESHOLD PROGRAM

The CFA 3000's 'Supra Threshold' program has been designed to give a quick, patient friendly measurement of the visual field. It is particularly valuable for detecting visual field loss, although it also offers some advanced quantification techniques which can be used to monitor the progression of visual field defects.

Three Levels of Investigation

The 'Supra Threshold' program offers three different levels of investigation. The first level (see Example 1) tests just 26 retinal locations and is designed to be used on patients in whom there is no suspicion of a visual field defect, ie. for screening purposes. This test can be completed in under four minutes for both eyes. The second level (see Example 2) increases the number of test locations to 66. It is designed to be used on patients in whom there is some suspicion, either as a result of them missing one or more of the screening stimuli or because of some other parameter such as a raised IOP. The third level (see Example 3) increases the number of test stimuli to 132. It is designed to be used when the clinician wishes to evaluate the extent of a visual field defect.

These three levels are designed to be run one after the other, although it is possible to configure the analyser to start off at the second level. If at the end of the first or second level the practitioner wishes to extend the test, then he simply presses the 'Extend' key in order to go on to the next level.

Multiple Stimulus Patterns

The 'Supra Threshold' program of the CFA 3000 presents multiple stimulus patterns of either 2, 3 or 4 stimuli. Patients verbally report the number of stimuli seen in each presentation. This technique is faster than single stimulus procedures, taking only 50% of the time for an equivalent number of stimuli.

Position of Stimuli

The position of the stimuli in the 'Supra Threshold' program has been selected following careful research into the relationships between location of stimuli and the sensitivity and specificity of the field test.

Quantification of Result

The 'Supra Threshold' program statistically analyses the results from second and third level tests. Two different calculations are performed. The first calculates the probability that a visual field defect exists, while the second gives a global index of the percentage of residual field (field survival).

FULL THRESHOLD PROGRAM

The CFA 3000's 'Full Threshold' program is designed to give more detailed information concerning the depth of any central defects and is particularly valuable for monitoring the progression of visual field loss.

Single Stimulus

The threshold program presents stimuli one at a time. Results are entered into the computer by the patient, who simply presses a button every time he or she sees the stimulus. The intensity and position of the next stimulus is controlled by the computer. The threshold at each of the 52 stimulus locations is established with a bracketing strategy. Each location is tested several times at different intensities until one is found at which the stimulus can just be seen. This is then recorded as the threshold for that location. Although each stimulus location is tested several times, these presentations do not occur one after the other, they are mixed up with all the other stimulus locations, thereby making it impossible for the patient to predict the location of the next stimulus.

Position of Stimuli

Stimuli are presented on a 6 degree matrix displaced 3 degrees from the vertical and horizontal midlines.

Quantification of Results

At the end of the 'Full Threshold' program the results are statistically analysed to give the global indices, mean defect, loss variance, fluctuation and corrected loss variance. These indices are used to monitor a patient's visual field loss.

Section 2

INSTRUMENT AND PATIENT PREPARATION

PREPARATION FOR A FIELD EXAMINATION

When performing a visual field examination, it is important to make sure that the patient is wearing the correct type of glasses, that they are correctly aligned and that they fully understand what is required.

Refractive Correction

Patients should be able to see the central fixation target clearly (see fig 1B). If they cannot, then a correction, appropriate for 33 cms, should be worn. If the patient has a suitable single vision spectacle correction then this can be used. Patients should not, however, wear a bifocal or a multifocal correction, as these can create artificial scotomas. If a patient does not have an appropriate correction, then a trial case lens or lenses should be placed in the lens holder (see fig 1A). Patients may report difficulty in seeing the peripheral stimuli through trial case lenses. This is due to their small aperture. When this happens, the perimetrist should test the peripheral field, 15-25 degrees eccentricity, without the trial lenses and the central field, with the trial lenses.

Preparing the Patient

i) Patch the eye not being used.

ii) Ask the patient to place his chin on the left hand side of the chin rest if you are going to test the right eye, and on the right hand side of the chin rest if you are going to test the left eye.

iii) Adjust the height of the chin rest (see fig 1). This is best accomplished with the patient in situ looking at the central fixation point. Adjust the height of the chin rest until the patient's line of sight passes through the centre of any trial lens placed within the lens holder. If no trial lenses are used then the eye should be aligned with the indentation marks on the side of head rest.

Fixation Targets

The CFA 3000 has three fixation targets (see fig 1B), any one of which can be placed within the hole in the centre of the screen. The small white spot should be used for patients with good acuity. The larger white spot for patients who have difficulty in seeing the small spot and the large cross for patients with a central scotoma. When