

# **Adaptometer**

**Goldmann / Weekers**

**HS**  
SWITZERLAND

**HAAG-STREIT**

## Adaptometer Goldmann/Weekers

This adaptometer was made to replace multiple instruments required for testing the various functions of the dark-adapted eye with one instrument. The following tests can be carried out monocularly and binocularly:

- I. The absolute threshold of light perception in the course of dark-adaptation of a particular part of the retina.
- II. The absolute threshold of light perception in the course of dark-adaptation of the whole retina = Integral dark-adaptation (Chevalier-Jayle).

It also makes possible:

- III. The objective determination of the threshold of light perception during dark-adaptation (Rieken).
- IV. The examination of visual acuity in the course of dark-adaptation.
  - A) Comberg's Nyctometer principle (visual acuity in reduced illumination).
  - B) Examination for sensitivity to dazzle (diminution of visual acuity with reduced illumination through dazzling).
  - C) Examination of visual acuity during dark-adaptation (Novak).
- V. Examination of the differential threshold (measuring of minimum luminance at which a figure of a particular size and contrast is perceived during dark-adaptation).
- VI. The measuring of pre-adaptation (light-adaptation = l. a. of the whole retina).

By means of the mobile luxmeter measurements of illuminance of 0 to 25 lux are possible. The luminance of the pre-adaptation can be measured up to 5000 asb and, by measuring one bulb at the time, up to 10000 asb. The factor of transmission of the tests is known which allows the conversion into units of luminance (apostilb = asb). For the measurement of the pre-adaptation, the time and the luminance inside the

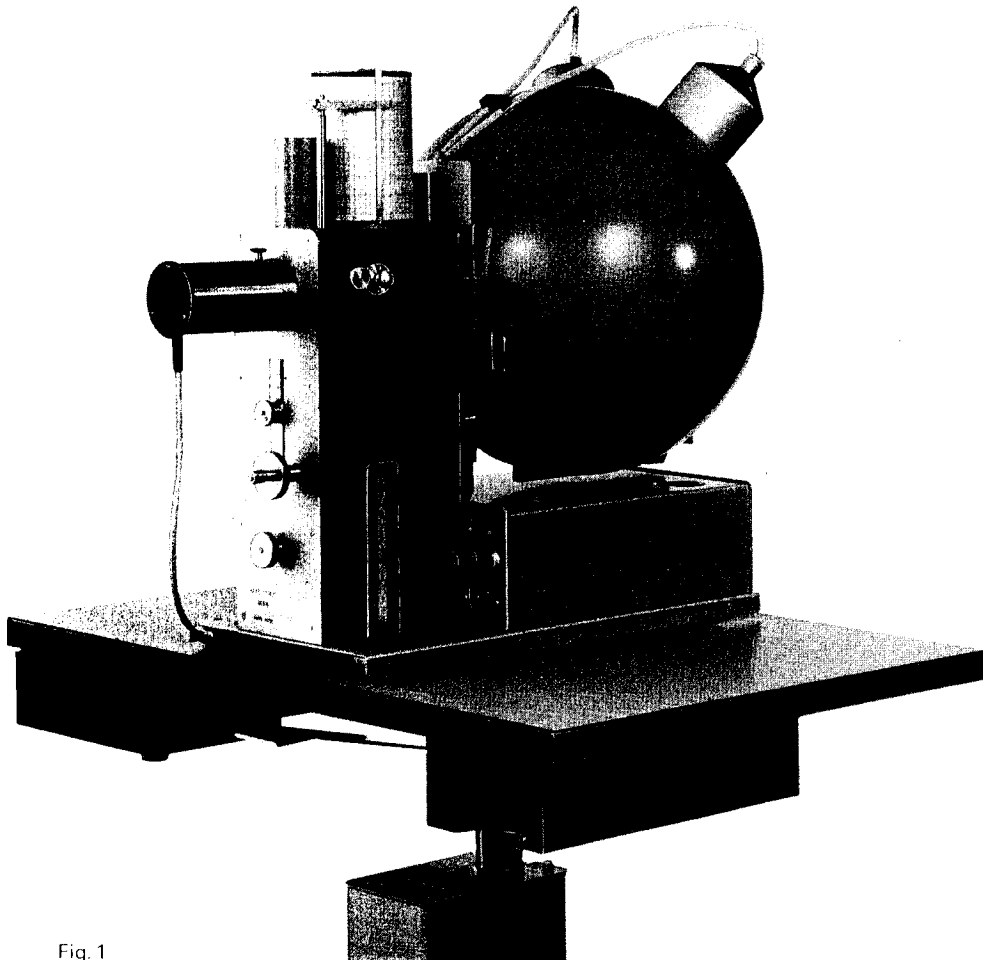


Fig. 1

sphere are taken into consideration, for the measurement of dark adaptation the luminance of the test is of importance.

The pre-adaptation can be modified by varying the time and also by choosing one or two bulbs of 15 to 100 watt.

More powerful bulbs may be used only when connected directly with a 220 V mains. In all other cases, the bulbs receive their current through a built-in transformer of 200-watt capacity.

The initial illuminance of the test field can be adjusted by means of a diaphragm. The carefully chosen neutral grey glass wedge allows a continuous alteration of the illuminance of the test field within 7 logarithmic units. The bulb burns at slightly less than its maximum voltage which improves its longlivedness. A built-in stabilizer provides for a steady brightness of the bulb during the examination.

The recording of the threshold values at any given state of adaptation of the eye is effected by means of the recording arm coupled to the grey wedge indicating on a logarithmic chart (7 logarithmic units) changes of illuminance (lux), luminance (asb) respectively, of the test field. The chart is stretched on a drum which turns once in 1 hour at 50 hertz and in 50 minutes with a frequency of 60 hertz. On the abscissa of the chart, 1 minute = 4.5 mm at a frequency of 50 hertz and 5.4 mm at a frequency of 60 hertz.

## Legend with Explanations

(Illustrations, see after page 21)

- |  |   |
|--|---|
| 1. Recording drum                      | 1 revolution per hour, 4.5 mm per minute at a frequency of 50 hertz;<br>1 revolution in 50 minutes, 5.4 mm per minute at a frequency of 60 hertz.   |
| 2. Clamp                               | for recording chart. The drum can be lifted from the axis to fasten the chart. It can be turned freely for adjustment of the initial position.  |
| 3. Recording arm                       | with pricker for recording measuring results on the chart in the course of the examination.   |
| 4. Bulb for illumination of test field | Bulb for dark-adaptation. The filament of the bulb must be vertical.  |
| 5. Housing                             | for the dark-adaptation bulb.   |
| 6. Small lamp                          | for fixation point (F.P. bulb), with red ring and centring base, for chart and control plate illumination.  |
| 7. Housing of F.P. bulb 6.             | The housing has a round and a slit aperture. The round one faces the sphere and projects the fixation point inside at 11° above the centre of the test plate. The light falls through the slit on to mirror 10. |
| 8. Dazzling lamp                       |   |
| 9. Housing of dazzling lamp            | The round light aperture faces the slit in the sphere.  |
| 10. Mirror for chart illumination      | It illuminates the lower part of the chart and projects an index, so that the duration of examination can be read in the dark. The mirror can be replaced by control plate 37 for the visual acuity test.       |
| 11. Button for the diffusion filter    | By pushing knob 11, an opal filter is introduced in the path of light of bulb 4 which produces diffusion and uniform illumination of the test field.  |

12. Knob for operating the revolving diaphragm	When pressed in and turned to the right, the diaphragm revolves and produces intermittent illumination of the test field. 1 second light, 1 second dark at a frequency of 50 hertz or about 0.8 seconds with 60 hertz. When pressed in and turned to the left, the diaphragm remains open. When the knob is pulled out, the diaphragm remains shut. A brief pressure on the knob opens and shuts the diaphragm once.	motor driving the recording drum 1 and the revolving diaphragm 12 are started.
13. Receiving screen for signal light	A point of light appearing on this screen shows the investigator that the test field is illuminated. This control is important in the case of intermittent illumination.	
14. Knob for adjusting the initial illuminance of the test field	For adjusting the illuminance knob 14 is loosened and moved up and down until the desired initial illuminance is shown on the connected Luxmeter. The recording arm 3 must be in its highest position. The graduation on the slide does not directly correspond to the intensity of light, but only serves as a guide.	
15. Button for changing the illuminance	The illumination of the test field and the position of the recording arm are changed by turning this knob. A point is pricked on the recording chart when it is laterally pulled.	
16. Knob for turning the test plate by the examiner	When button 16 is turned, button 17 remains stationary. On the other hand, if button 17 is turned, button 16 turns simultaneously. The examiner can thus move the test plate 35 without the patient's knowledge.	
17. Button for turning the test plate by the examinee		
18. Shadow scale	The scale is illuminated from within. The brightness can be changed by means of button 22. During the examination, the scale shows the position of the recording arm 3 on the chart and the manner the striped test plate 35 is turned. The figures correspond to the logarithmic divisions on the recording chart.	
19. Switch for the main current	When the current is connected, the dark-adaptation bulb 4, the F.P. lamp 6, the illumination of the shadow scale 18 and the	
		20. Switch for the bulbs for light-adaptation (l.a. lamps)
		21. Press-button for dazzling light
		22. Rotary resistance
		for adjusting the brightness of fixation point and illumination of the shadow scale 18 to the corresponding state of adaptation.
		23. Appliance inlet
		for main circuit connection.
		24. Support for tilting the instrument
		It is recommended to tilt the instrument during examination with support 24.
		25. Voltage selector
		The adaptometer is designed to be connected on alternating current. To adjust the instrument to a particular mains voltage, press the button and turn it to the left. Now the fuse can be pulled out. Turn the inner disc until the red index is opposite the figure corresponding to the desired mains voltage. Now the fuse is once more inserted and the screw tightened.
		26. and 27. Mobile luxmeter
		consisting of selenium cell with perforated screen and micro-ampere-meter.
		28. Bulb for illumination of scale 18
		When the 2 small knurled nuts have been loosened, the cover can be removed and the bulb with the red ring is uncovered. The same small bulbs are used for the illumination of the scale 18 and the fixation point 6.
		29. Two sockets for connecting the light-adaptation lamp
		The working voltage for the light-adaptation lamps is 22 volt. In case of other voltages, these 220 volt are automatically obtained through the transformer, if the voltage selector 25 is properly adjusted. Maximum output 200 watt.
		30. Socket for connecting the striped drum for objective adaptometry (220 volt)
		Never connect any other apparatus.

31. Supporting column for the sphere.
32. Slide with diaphragm aperture and opal glass The slide is held in 3 positions by a spring. In the highest position, it closes the aperture of the sphere during light-adaptation. In the central position, the opal glass 33 is in front of the sphere aperture and in the lowest position the test field is uncovered.
33. Opal glass This is brought in front of the sphere aperture for the integral examination of dark-adaptation. The opal glass can also be used as a small test plate (Diameter about 28 mm = 5½ degrees).
34. Opal screen for covering the source of light during examination of the integral dark-adaptation.

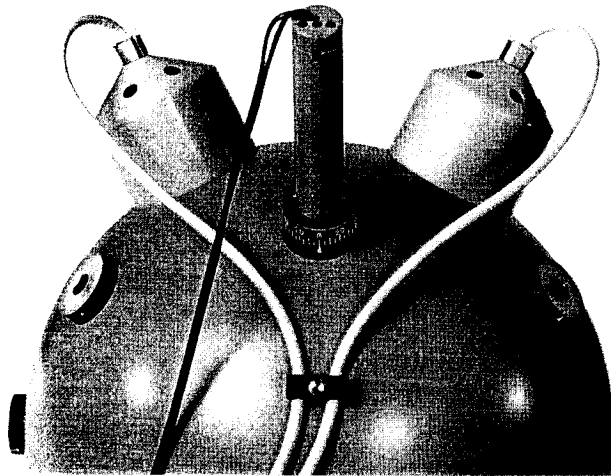


Fig. 2  
Sphere with movable fixation point at 0°, 45°, 90° and 135° meridians.

35. Test plates Size of test field 56 mm = 11 degrees at a distance of examination of 30 cm.  
Striped figure black and white, contrast 100%, illustrated on fig. 6.  
Striped figure black and white, contrast 20%  
Striped figure black and white, contrast 10%  
Opal glass without stripes  
Opal glass with Landolt ring, aperture 40'.
36. Visual acuity test plate This is placed in the guide behind the slide 32.
37. Control plate for the visual acuity test Is affixed like mirror plate 10 and also illuminated by the F.P. lamp 6.
38. Support for sphere during objective examination.
39. Shield Protects the sphere from impurities. Can be removed for cleaning.
40. Striped drum for the objective examination of dark-adaptation.
41. Connecting box for the movable fixation point.  
On instruments with the sphere for the movable fixation point this receptacle is mounted in place of cover 28.
42. Cable clip with knurled screw.

## Use of the Luxmeter

The luxmeter consists of 2 parts, the selenium cell with a perforated screen to be pushed on and the indicator, i.e. a micro-ammeter. The amperemeter scale covers two measuring ranges; the upper part being suitable for measurements from 0 to approximately 25 lux and the lower part from 0 to approximately 5000 asb. The upper part of the scale must be used if measurements are carried out without the perforated screen. If the perforated screen is pushed on, the lower scale is applicable.

Amperemeter, selenium cell and perforated screen have the manufacturer's identical serial numbers. Since all three parts are individually adjusted to each other, parts with different numbers cannot be used unless they are regauged.

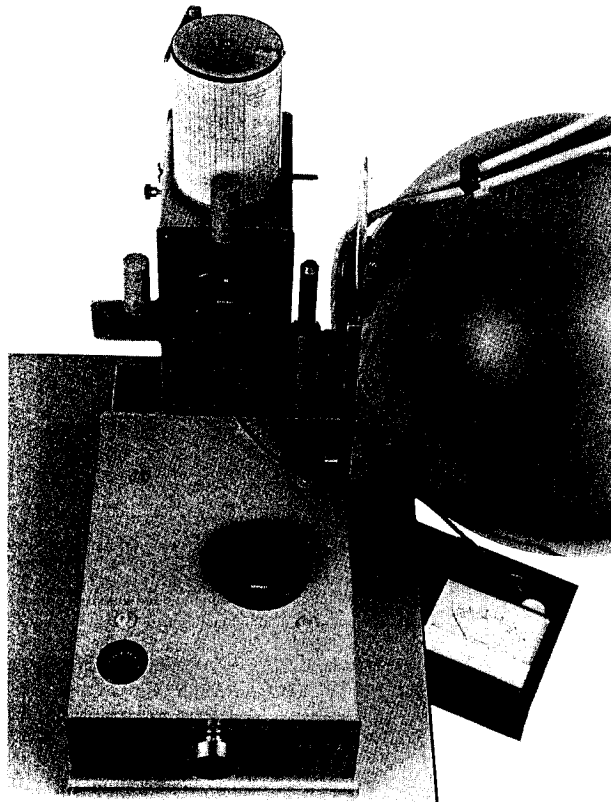


Fig. 3

## Checking the luxmeter

The checking of the mobile luxmeter is best accomplished in a photometric laboratory or in our factory duly equipped for the purpose.

The luxmeter is stored in a moveable box underneath the table top. The amperemeter should be placed there in such a way as to permit observation of the scale if the box is swung open. When connecting selenium cell and amperemeter, make sure that the contact pin of the plug marked with the + sign is pushed into the + socket of the amperemeter. Protect the selenium cell from overexposure of light, especially when it is connected with the amperemeter. We, therefore, recommend you not to take off the perforated screen except for setting the initial illuminance of the dark-adaptation lamp. For this purpose button 11 should be pushed in and besides, press on knob 12 and turn it to the left, the selenium cell is put on to the socket of the adaptometer which usually takes up the test plates 35. (See Fig. 3). The initial illuminance of the test field can be adjusted by displacing the conical diaphragm with button 14. The value in lux will be read from the upper part of the scale. This value serves to calculate the luminance in the following steps a-d.

- a) Inner surface of the sphere, examination of the integral dark-adaptation.

The value read from the upper scale of the luxmeter must be multiplied by 0.05 in order to obtain the approximate luminance of the surface of the sphere in asb.

For this measurement, button 11 remains pushed in. For the examination itself, it is pulled out, the opal glass 33 is brought in front of the aperture of the sphere and the opal screen 34 placed in the sphere.

- b) Visual acuity test

The value in lux read on the luxmeter must be multiplied by 0.5 in order to obtain the luminance of the ground of the test plate in asb.

- c) Striped drum for objective examination

The lux value read, multiplied by 0.025, gives the luminance of the light stripes of the drum in asb.

d) Luminance of test 35

For all examinations, button 11 remains pushed in. The luxmeter indicates the illuminance of the test plates 35 in lux (upper scale).

To obtain the luminance of the test field in Apostilb (asb) the value in lux must be multiplied by the factor of transmission engraved on the frame of the test plate, e.g. 6 lux read on the luxmeter corresponds with a test plate of 0.52 transmission to  $6 \times 0.52 = 3.12$  asb.

The factor of transmission engraved on the frame of the test plate corresponds to the light stripes or to the test field without stripes. The luminance of the grey stripes is reduced by the percentage (10% or 20%) engraved on the frame.

Measuring the luminance inside the sphere

For measuring the luminance inside the sphere (light adaptation) the slide 32 must be brought to its highest position. Then hold the selenium cell with the perforated screen pushed on into the sphere from above the headrest

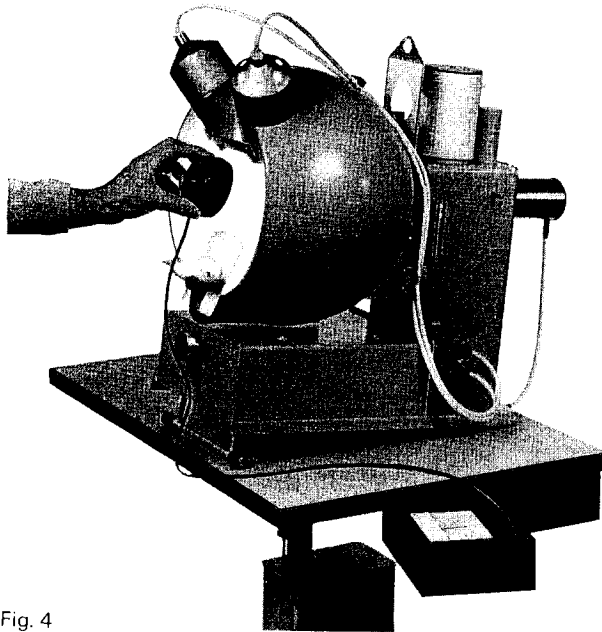


Fig. 4

at a downward angle (Fig. 4). Readings are now made from the lower part of the scale.

Inner surface of the sphere with switched on illumination for light adaptation.

The luminance can be varied considerably depending the use of one or two bulbs of 15 to 100 watt. The normal luminance of 1400–2100 asb is reached with a combination of 25 and 40 watt bulbs. All normal bulbs, frosted or opal can be utilised provided that the length is between 80 and 110 mm with a maximum diameter of 70 mm and with Edison 27 thread. Utilise only bulbs of 220 volt. Put the selenium cell back into the moveable box after measuring.

### Conversion of Units of Illuminance and Luminance to other Units

a) Units of illuminance

Name of unit Symbol	lux lx	footcandle fc
1 lux =	1	0.0929
1 footcandle =	10.76	1

b) Units of luminance:

Name of unit Symbol	nit nt	stilb sb	apostilb asb	lambert L	footlambert fL
1 nit = $1 \frac{\text{cd}}{\text{m}^2}$ =	1	0.0001	3.141	0.000314	0.292
1 stilb = $1 \frac{\text{cd}}{\text{cm}^2}$ =	10 000	1	31 415	3.141	2920
1 apostilb = $\frac{1}{\pi} \frac{\text{cd}}{\text{m}^2}$ =	0.318	0.0000318	1	0.0001	0.0929
1 lambert = $\frac{10^4}{\pi} \frac{\text{cd}}{\text{m}^2}$ =	3180	0.318	10 000	1	929
1 footlambert =	3.426	0.0003426	10.76	0.001076	1

1 cd = 1 candela = unit of luminous intensity

## The Examination with the Adaptometer

This apparatus is designed for use with alternating current. Before connecting, make sure that the voltage selector 25 is properly adjusted to the local mains. For light-adaptation, always 220 V bulbs are utilised. When there is any other mains voltage, these 220 V are obtained by means of the built-in transformer in the instrument.

The examples given below are to be regarded not as hard-and-fast conditions of examination, but only as general indications, especially when the initial illuminance of the test and the duration of the examination are concerned.

### I. The Absolute Threshold

1. Stretch the recording chart on the drum 1 after lifting the latter off the apparatus. Then remove clamp 2, place the chart round the drum so that its right extremity is on the black line on the felt, cover it with the left side of the chart and then fasten it with the clamp. Readjust the drum and bring the recording arm 3 to its highest position. Start the adaptometer by means of switches 19 and 20.
2. To measure the luminance in the sphere for the light-adaptation, bring slide 32 to its highest position, hold the selenium cell with the perforated screen pushed on into the sphere and read the value in asb on the luxmeter on the lower scale.
3. The desired intensity of initial illuminance of the test field is also determined by means of the luxmeter. For this measurement, bring the recording arm 3 to its highest position by turning button 15. Insert the diffusion filter by pushing in button 11, press button 12 and turn it to the left. Place the selenium cell without the perforated screen on the socket for the test plate 35, the beam of light of the bulb 4 falls on the cell and the upper scale of the luxmeter indicates the intensity of the test illumination.  
By moving knob 14, the luminous flux of bulb 4 reaching the grey wedge is changed and the desired initial illuminance is adjusted by means of the cell. For instance, 6 lux read on the luxmeter correspond, with the opal glass plate as test, to a luminance of the

test field of  $6 \times 0.52 = 3.12$  asb, 0.52 being the factor engraved on the frame of the test plate 35.

4. Affix the desired test plate 35, bring slide 32 and recording arm 3 to their highest position. Briefly explain to the patient what is going to happen and show him in particular how to turn button 17, if a striped test is being used. Set the drum 1 with the recording chart to the initial position.
5. The standard measurements have been made and the patient is sitting in front of the sphere. After brief pre-adaptation in complete darkness, have the patient adapted in the brightly lit sphere. During the light-adaptation, the examiner has some more time for explaining the course of the examination.
6. After light-adaptation, uncover the test plate by pressing down slide 32, switch off the bright light by means of switch 20 and at the same time prick the end of the light-adaptation on the chart.
7. As soon as the patient indicates, by uninterrupted knocking on the table, that he is aware of the test plate 35 (initial threshold) mark this on the chart. Reduce the luminance of the test field by means of button 15 until the patient stops knocking. Wait until the patient recommences knocking, thus telling that he can see the test plate again. Mark this on the chart and so forth. Approximately after the second minute the examiner does not wait any more until the test is perceived by the examinee. By slowly turning back button 15, the examiner increases the luminance of the test plate from infraliminary to the threshold of perception and so on.
8. The patient should in every case continue to knock on the table as long as he is aware of the test plate.
9. For checking the patient's statements, he should on subsequent occasions when the threshold is being determined, himself place the stripes of the test plate alternatively horizontally or vertically. This is particularly important when the pure adaptation of the rods with reduced distinctiveness of shape begins, that is from about the 6th to the 8th minute. The adjustment of stripes prevents mistakes being made by the patient. The adjustment is to be announced by knocking. The examiner verifies the correctness of the adjustment by means of the shadow figure in



scale 18, marks the time, reduces the luminance and again shifts the test plate. If the patient evinces some uncertainty in connection with the adjustment, which is clearly noticeable on scale 18, the examiner can shift the test plate by means of button 16 without the knowledge of the patient.

10. During the examination of an eccentric spot on the retina, the patient may fix the red point projected into the sphere. Its brightness must be reduced by turning resistance 22 that the examinee can still see the point as supraliminar. At the same time, the illumination of scale 18 is diminished. The sphere with movable fixation point is particularly suitable for examining the dark adaptation of eccentric or peripheral parts of the retina (Fig. 2).

11. Conditions of examination

Example:

Patient stays in an artificially moderately illuminated room	5–10 minutes
Patient stays in completely dark room	2 minutes
Light-adaptation at about 1400–2100 asb	5 minutes
Initial illuminance of test field.	6 lux

Test plate 35 striped figure with 100% contrast. The test plate without stripes can also be used with intermittent light. It can even be exposed for one second only, by pressing once the released knob 12.

Continue the examination for about 30 minutes with or without the red fixation point. During this time, the threshold of perception of the normal eye, measured with the striped test plate 100% contrast, increases by about 5 logarithmic units. The rod adaptation begins with point  $\alpha$  and covers 2 to 3 logarithmic units.

## II. The Integral Examination of the Whole Retina

1. and 2. see under I.
3. Adjust the desired initial illuminance for the test field with the help of the luxmeter. Bring the recording arm 3 to its highest position by turning button 15, insert the diffusion filter with button 11, push in knob 12 and turn it to the left. Now place the selenium cell 27 on the socket for test plate 35 and read the intensity of illuminance on the upper luxmeter scale (Fig. 3). Adjust to the desired initial illuminance by moving knob 14, with the help of the photo-cell. The approximate luminance of the inner surface of the sphere in asb is obtained by multiplying the lux value read by the factor 0.05, for instance 6 lux read on the luxmeter correspond to 0.3 asb in the sphere.
4. Insert the opal screen 34 in the sphere, pull out button 11, press in knob 12 and turn it to the right. Bring slide 32 to its highest position. Remove test plate 35. Turn the recording drum until the needle of the recording arm is at the origin of the abscissa.
5. The patient sits in front of the sphere. After a short period of pre-adaptation in complete darkness, the patient is light-adapted. The end of the light-adaptation is marked on the chart.
6. For dark-adaptation, the bright light is turned off by means of switch 20, slide 32 is placed one stage lower and the small opal glass 33 is thus brought in front of the aperture of the sphere. Now the sphere is illuminated intermittently.
7. The examiner now follows the pulsation of the light on the small screen 13 and, as soon as the patient announces by rhythmical knocking that he has perceived the stimulus, the examiner marks the threshold on the chart. The light is now reduced by means of button 15 until the patient ceases to knock. Fresh perception of the light is again announced and marked, etc. After about two minutes the examiner does not wait any longer until the test is perceived. By turning button 15 very slowly, the examiner increases the luminance of the test plate from infra-liminary to the threshold of perception.

8. If the patient's indications are getting uncertain, it is desirable to verify them before the marking. If the patient indicates a rhythm of the revolving diaphragm, turn button 12 slightly to the left and pull it out. The diaphragm is then closed and the patient should stop knocking. If he stops, again press button 12 and turn it to the right. If he begins again, this will show that he has certainly observed the light.
9. Conditions of examination  
Example:  

Patient remains in artificially moderately illuminated room	5–10 minutes
Patient remains in a completely dark room	2 minutes
Light-adaptation with about 1400–2100 asb	5 minutes
Initial luminance of the test field of measured on the luxmeter, gives in the sphere a luminance of $6 \times 0.05 =$	6 lux 0.3 asb

### III. Objective Examination of Dark-Adaptation

- 1., 2. and 3. up to and including paragraph 2, see under I.
4. Loosen the cables by unscrewing the knurled head screw 42. Lift the sphere from its usual supporting column and place it on support 38. Bring slide 32 to its highest position. Pull out button 11. Now place the black-and-white striped drum 40 on the instrument base in place of the sphere, connect it at the lowest socket 30 and put on test plate 35 (opal plate without stripes). After applying a light anesthetic, e.g. 2 drops of Novesin Wander (Dorsocaine) 0.4% to the eye to be examined, put on the contact glass with phosphorescent points. The other eye may be covered by an occluder. – Bring the drum 1 with the recording chart to the initial position.
5. The patient sits in front of the sphere. After a brief period of pre-adaptation in complete darkness, the patient's eye is adapted by looking into the illumi-

- ated sphere. With a slight movement by hand, the drum 40 starts revolving.
6. After light-adaptation, turn off the light in the sphere by means of switch 20. Mark the end of light-adaptation on the chart and ask the patient to look towards the rotating drum. The distance between the patient's eye and the drum is about 50 cm.
7. The examiner sees in the dark only the phosphorescent points of the contact glass. As soon as nystagmus appears, this becomes apparent from the typical movements of the phosphorescent points and this moment is marked on the chart. Then the illumination is reduced by turning button 15 until nystagmus ceases, and after that the illumination is again slowly increased until nystagmus once more sets in, and this is marked as threshold, etc.
8. After the examination the sphere is again placed on the supporting column 31. Take care to fasten the cables with clip and screw 42. Loose cables may touch drum 1 and get abraded.
9. Conditions of examination  
Example:  

Patient remains in artificially moderately illuminated room	5–10 minutes
Patient remains in completely dark room	2 minutes
Light-adaptation at about 1400–2100 asb	5 minutes
Initial illumination for the examination, read on the luxmeter, gives for the light stripes of the drum, a luminance of $0.025 \times 12 =$	12 lux 0.30 asb

#### IV. Examination of Visual Acuity in Reduced Illumination

##### A) Comberg's Nyctometer

- 1., 2. and 3. up to and including paragraph 2, see under I.
4. Bring slide 32 and visual acuity test plate 36 to the top rest and attach the control plate 37 in lieu of mirror 10. Test plate 35 is not needed. Reduce the illumination of the acuity test plate by adjusting the grey wedge, pricker 3 respectively, to the value at which visual acuity is to be examined. (Example: see point 10; conditions of examination for A and B).
5. Ask the patient to sit in front of the sphere. After brief pre-adaptation in complete darkness, have the patient light-adapted and during this time explain to him once more the course of the test.
6. After light-adaptation, turn off the bright light in the sphere by means of switch 20, mark the end of light-adaptation on the chart and uncover the visual acuity test by pressing down slide 32.
7. Mark the time after which the patient sees 0.1, 0.2, etc. The examiner follows the indications on the control plate 37. If the visual acuity test is in its highest position, the visual value 0.1 is in the centre of the illuminated field. In the next position, it is 0.2 and in the 3rd position 0.3, etc.

##### B) Examination of glare sensitivity

8. After the testing for visual acuity, glare sensitivity can also be measured. By pressing button 21, dazzling light 8 is switched on. The examinee reads the figures he sees during the dazzling. The time that elapses after glaring before the former visual acuity is reached can also be measured. The time after which the patient sees 0.1, 0.2, 0.3, etc. is marked on the chart.

After 5 minutes' examination:

9. Have the dazzling light on for 5 seconds and determine which figures can be read during the dazzling and, if necessary, how much time elapses after the dazzling before the former visual acuity is attained.

##### 10. Conditions of examination for A and B

Example:

Patient remains in an artificially moderately illuminated room	5–10 minutes
Patient remains in completely dark room	2 minutes
Light adaptation at 1400–2100 asb	5 minutes
Visual acuity test at a luminance of the test plate 36 of approx.	0.5 asb
Recording arm with pricker 3 in highest position, initial illumination, measured on the luxmeter gives the test plate 36 (transmission approx. 0.5) a luminance of approx. $0.5 \times 10 =$	10 lux 5 asb
Reduction of illumination by adjustment of the pricker to $1 \times 10^{-1}$ ( $\cong 10^6$ ) on the chart gives on the test plate 36 a luminance of approx. $5 \times 10^{-1} =$	0.5 asb

- C) Examination of visual acuity during dark-adaptation is also possible (Novak) with a Landoltring test plate, ring opening 40'.

## V. The Differential Sensitivity

1. to 8. see under I.

ad 4. In this examination, test plates 35 with 10% or 20% contrast are used.

9. Conditions of examination:

Example:

Patient remains in an artificially  
moderately illuminated room      5–10 minutes

Patient remains in a completely  
dark room      2 minutes

Light-adaptation at about  
1400–2100 asb      5 minutes

Initial illuminance for the test field      6 lux

Test plate 35: Stripes with 20% or  
Stripes with 10% contrast.

Normally 10% contrast is seen after 5 minutes with a luminance of 0.03 asb: that is to say, with an initial illuminance of 6 lux, a test plate factor of 0.50, position of the recording arm with pricker at  $10^5$  ( $\cong 10^{-2}$ ) on the chart (5 on the shadow scale 18)  
 $6 \times 0.5 \times 10^{-2} = 0.03$  asb.

## Cleaning of the Adaptometer Sphere

The dull white interior of the adaptometer sphere requires the most careful treatment. It must be cleaned only with a dust-brush which is supplied with the adaptometer. For the thorough cleaning of the sphere remove breath shield 39 as well as opal screen 34 and its stand by loosening the screw on the lower part of the outside of the sphere.

Wipe all dust from the sphere with a soft brush. Prepare the cleaning agent as printed on its label and rub the sphere carefully with the solution obtained, using a soft, thoroughly moistened natural or artificial sponge. To avoid shiny places in the sphere, go over the dirty parts in circular movements, pressing slightly. The sponge must be frequently rinsed in clear water. Close the hole from where the opal screen stand has been removed with a plug to prevent the washing-water from escaping. It takes from a quarter of an hour to half an hour to remove all dirt from the sphere. Now remove every vestige of the cleaning agent, constantly rinsing the sponge in clean water.

Even very soiled spheres can be cleaned in this way.

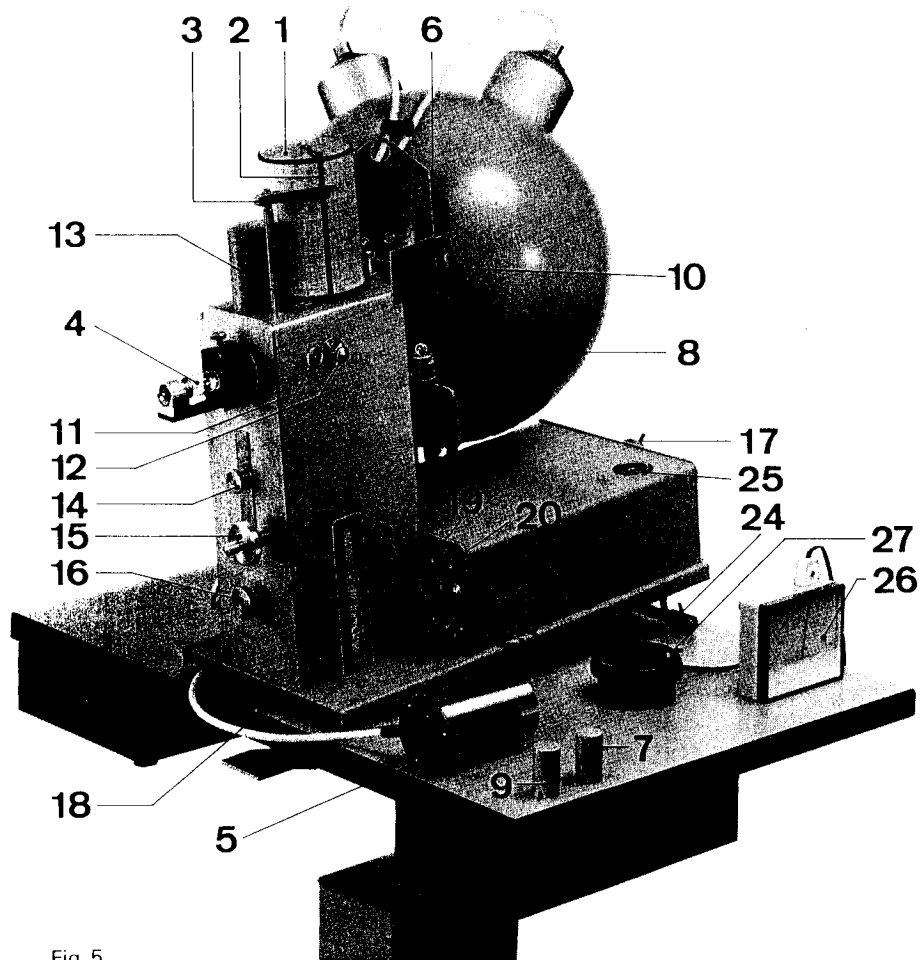


Fig. 5

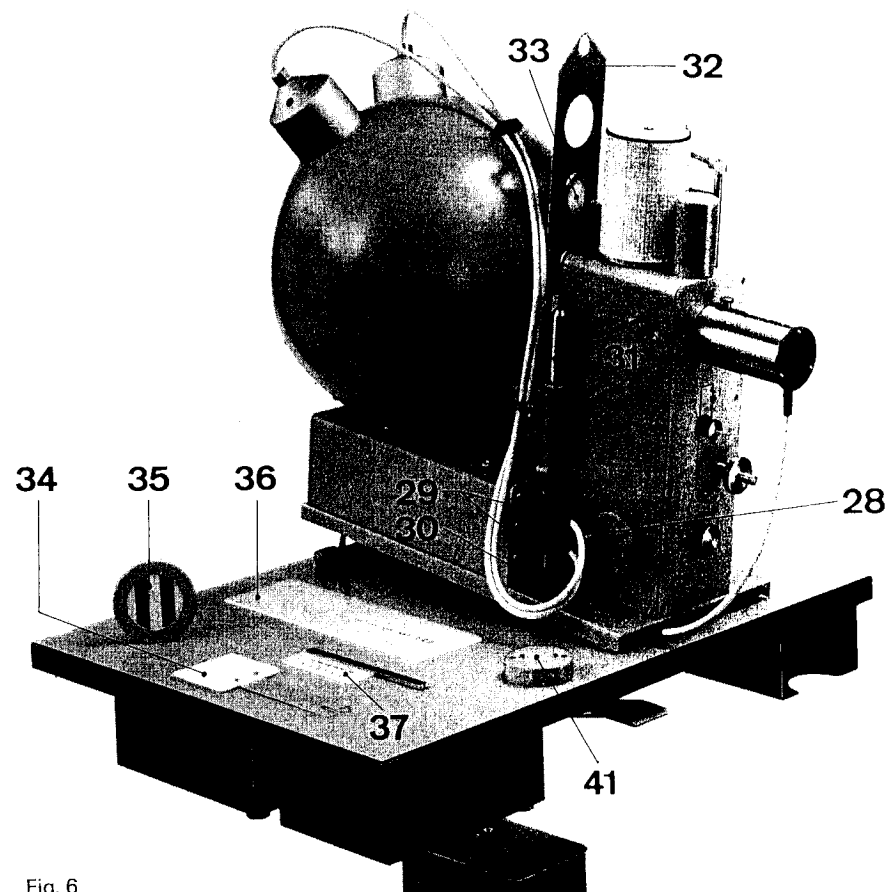


Fig. 6

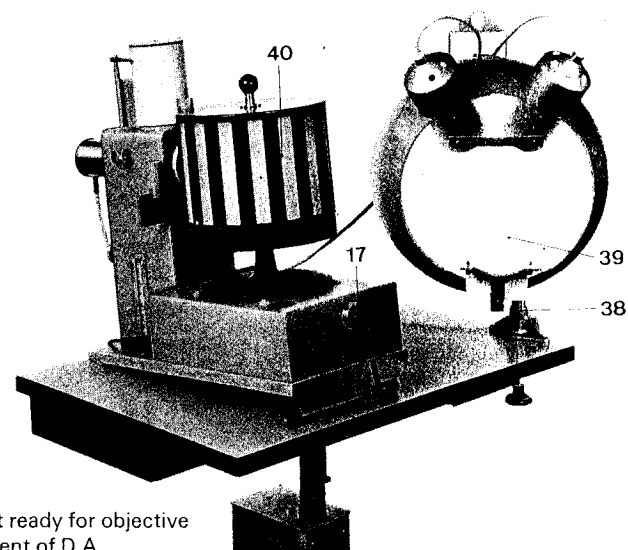


Fig. 7  
Instrument ready for objective  
measurement of D.A.