

Vision Aids for People Having Homonymous Hemianopsia

The National Institute for Rehabilitation Engineering (NIRE) is a non-profit organization which operated clinics for the development and dispensing of low-vision aids from 1967 through 1987. These clinics assisted *hundreds* of people having permanent impairments of visual acuity and/or visual fields. This paper summarizes the successful clinical methods developed and used during this period for assisting individuals having HOMONYMOUS HEMIANOPSIA. Because the NIRE no longer operates these vision clinics, the information is being made available in hopes that NIRE's methods and data may be used by vision-care professionals all over, to help rehabilitate individuals having Homonymous Hemianopsia. *PERMISSION is granted for the free copying and distribution of this © paper provided copies are complete and unaltered.*

Two types of “field-expanding” eyeglasses were developed for homonymous hemianopes. Neither type restores “normal” vision. However, each of these eyeglass types has proven very helpful to their users while being attractive looking and low-cost.

HH Glasses, TYPE-1 have the appearance of ordinary eyeglasses, fit in any standard eyeglass frame, are light-weight and low-cost, and do NOT require any special user intelligence, awareness or training. They can be made as single vision, bifocal or trifocal glasses and may accommodate just about any corrective lens prescription. **HH Glasses, TYPE-1 are recommended for all people with Homonymous Hemianopsia.** They expand central vision to the blind side and are beneficial for all activities (*see below for more on driving and HH Glasses, TYPE-2 which expand both central and peripheral vision to blind side*).

The TYPE-1 glasses are made for a person blind with both eyes to the left side (left hemianopsia) or to the right side (right hemianopsia). Essentially, the lenses have been ground and installed with prism bases toward the user's blind side. For a person having a plano lens prescription (no correction required), the two lenses are identical and very simply made:

TYPE-1 EXAMPLES: (for person age 30 years)

Rx example for Left Hemianope: OD: plano lens with 5 prism diopters base-left
OS: plano lens with 5 prism diopters base-left

Rx example for Right Hemianope: OD: plano lens with 5 prism diopters base-right
OS: plano lens with 5 prism diopters base-right

Lenses should be made of plastic or polycarbonate and should be coated for uv blocking, for scratch resistance, and for light reflection reduction. The amount of prism varies with age. (see Age Table.)

All criteria are the same for hemianopes with macula sparing and for those without sparing of the macula. Assuming the patient's two eyes track properly and have normal convergence, the example prescriptions given above will:

- (1) Expand the patient's central (sharp) vision toward his blind side – and
- (2) Center the patient's face toward what he is viewing.

EXCEPTIONS:

ABNORMAL CONVERGENCE - If the patient's two eyes do not have normal convergence or tracking, then corrective prism differentials may be needed between the two eyes – which can be determined using trial lenses for testing. Some such patients can be compensated and some cannot be compensated with prism differentials.

THE MONOCULAR HEMIANOPE – is a patient blind in one eye and hemianopic with the other. This assumes the blind eye is totally blind or absent. If so, the one good eye is dealt with in either of two ways: (1) if the good eye is hemianopic toward the person's outside (not toward the nose), then the information in this paper is applicable and can be used. Or (2) if the good eye is hemianopic toward the inside – toward the nose) then this Institute should be contacted for a copy of its paper on "*Vision Aids for People Sighted in One Eye.*"

HEMIANOPIE VISION IN ONE EYE & NORMAL VISION IN OTHER EYE – presents an interesting challenge. The rules for these patients are: (1) if the hemianopic eye is blind toward the nose – no special glasses are needed because both eyes have normal side and peripheral vision. But, (2) if the hemianopic eye is blind toward the outside, on either side, then glasses should be made with equal prism in both lenses, prism bases toward the blind side.

TYPE-1 EYEGLOSS PRESCRIPTIONS & SPECIFICATIONS - These glasses can be prescribed and/or dispensed by an eye-care professional, ophthalmologist, optometrist or optician. Retesting is needed at dispensing so, if gotten from an optician, return visits for testing and evaluation by the prescribing doctor may be useful.

- (A) Eye-glass Frames should be light weight, comfortable, close-to-the face, and rigid. Avoid using "flex" or "flexible" frames so that the two prism lenses do not shift alignment between themselves.
- (B) Decentration of Lenses to increase or decrease prism effects is a technique requiring careful thought and planning. In general, for weak to moderate lens prescriptions, it is better to NOT decenter, and to use the lens's prism characteristics to generate the desired amount of prism base-toward-blind side. Decentration becomes a factor for strong correction, e.g. plus or minus 3 or 4 (or more) diopters of sphere. Where there is strong correction, it is helpful to use Decentration to prevent the strong Rx from lessening the effective prism toward the blind side. It may also be used to enhance or increase the effective prism toward the blind side, in some cases. Remember, both eyes need the same net prism toward the blind side. If the corrective Rx is strong for one eye and weaker for the other, don't allow Rx Decentration to unbalance the overall base-toward-blind-side prism for the two eyes because doing so can impair convergence or cause double vision.
- (C) Cylinder or Astigmatism Corrections & Rx Tolerances are very important when using prism lenses and are especially more sensitive when making field expander eyeglasses for people over 40 years who are less accommodating or more presbyopic. All candidates for these glasses **must** be very carefully refracted with trial lenses, in combination, to arrive at the exact cylinder and sphere corrections required for each eye, without and WITH the added prism

factors. If this is done carefully, the patient will see as clearly with his prism Rx glasses as he sees using similar glasses lacking the prism features. *What must be avoided is a situation where a patient has both regular and prism glasses and chooses to use the regular glasses instead of the prism glasses because he sees more sharply through the regular (non-prism) glasses.*

(D) Age Table for Prism Selection – Older people have reduced focal distance accommodation (or more presbyopia). For this reason, younger people can tolerate, adjust to and enjoy more prism than older people. Yes, it is possible to start a person on, say, 4 prism diopters – wait three months – and then remake the glasses with 5 prism diopters. Using this staging method, it is possible to get some patients up to 7 or 8 prism diopters. Having used this staging method early in our clinical research, we eventually found it to be an unnecessary burden for most patients. Instead, we develop the AGE vs PRISM TABLE below. (Try the higher value first with trial lenses, and then the lower value, if necessary.)

<u>PATIENT AGE (Yrs)</u>	<u>PRISM DIOPTERS</u>
6 - 18	6 or 7
19 - 30	5 or 6
31 - 39	5 or 6
40 - 46	4 or 5
47 - 52	3.5 to 5
53 - 60	3 to 5
61 -70	3 to 4
71+	3 to 3.5
aphakics	2.5 to 3.5

HH Glasses, TYPE-2 have *almost* the appearance of ordinary eyeglasses, fit in most standard eyeglass frames, are light-weight and low-cost - but DOES require special user intelligence, awareness or training. They can be made as single vision, bifocal or trifocal glasses and may accommodate just about any corrective lens prescription. **HH Glasses, TYPE-2 are recommended for some (but NOT all) people with Homonymous Hemianopsia. They expand BOTH central AND peripheral vision to the blind side and are beneficial for all outside activities, including bicycling and driving.**

The TYPE-2 glasses are made for a person blind with both eyes to the left side (left hemianopsia) or to the right side (right hemianopsia). Essentially, the lenses have been ground and installed with the prism bases toward the user’s blind side.

Important Notes:

(1) **PREPARATION** - TYPE-2 Glasses for Homonymous Hemianopsia should NEVER be prescribed or dispensed at the first, or as the ONLY field expanding glasses for any hemianope. Always prescribe or dispense TYPE-1

Glasses first – and then consider TYPE-2 Glasses as a second pair at some future time after the patient has become comfortable using the TYPE-1 glasses.

- (2) **TYPE-2 USER TRAINING IS REQUIRED** because of the special prism segment added on one lens, which the user must learn to use. Learning to use the added segment is comparable to a person learning to use a bifocal add for the first time. TYPE-1 Eyeglass users require no training; the glasses are effective even for stroke or brain damaged patients whose cognitive functions are impaired. On the other hand, TYPE-2 glasses require conscious judgment and reasonable cognition for use.

- (3) **TYPE-2 USER ACTIVITIES CAN BE DANGEROUS** – Most people desiring these glasses want them for potentially hazardous outside activities such as riding a bicycle, walking in high crime areas, or driving a car or boat. And, YES, they can be and usually are helpful for such activities. However, patients need to be cautioned as follows, for their own safety and for the safety of others:
 - (A) YES, these glasses do help in these situations because they expand, toward the blind side, BOTH central and peripheral vision. BUT, while expanding the vision, up to 6 degrees CENTRAL and up to 25 degrees PERIPHERAL, they do not restore the full, normal vision that was lost. Even with these glasses, hemianopic drivers must have and use appropriate inside and outside rearview mirrors and must follow careful defensive driving techniques.

 - (B) COGNITION and JUDGMENT by the user are most important for safety when using these glasses. Unfortunately, some hemianopes became so from a stroke or other brain damage. This same stroke or brain damage may also have caused changes in cognition or judgment and may even have affected arm or leg movements or physical coordination.

 - (C) FOR HEMIANOPES WHO WISH TO DRIVE, we recommend that they: (1) be fitted with TYPE-1 glasses and become comfortable using same; (2) they then be fitted with TYPE-2 glasses and learn to use them when walking outdoors; and that (3) they be referred to a rehabilitation center that does driving evaluation & training for post-stroke patients. The driver assessment and training staff at the stroke rehabilitation center will be able to:
 - a. assess the person's physical coordination, arm, hand and leg functions as to safety and/or assistive device needs.

 - b. assess the person's cognitive and judgment capabilities and help decide if the person can drive safely once licensed.

- c. assist the patient to learn to use glasses and mirrors properly for safe driving.
- d. assist the patient, when ready, to arrange a state road test so as to be properly licensed to drive with the special glasses, mirrors, training, etc. Or, if the patient should not drive, to convince him of the need for and wisdom of such a decision.
- e. assist the patient with any on-site assessments or retraining at his workplace, for using machinery or engaging in possibly hazardous activities, using the Type-2 glasses.

TYPE-2 EYEGLOSS PRESCRIPTIONS & SPECIFICATIONS - These glasses can be prescribed and/or dispensed by any eye-care professional, ophthalmologist, optometrist or optician. Retesting is needed at dispensing - so, if gotten from an optician, return visits for testing and evaluation by the prescribing doctor are advised.

TYPE-2 glasses are identical to TYPE-1 glasses in basic design and construction. The same Age Table data should be applied. An important difference is that, while TYPE-1 glasses can be bifocal or trifocal, **we recommend that TYPE-2 glasses be only single vision, or bifocal**, for easier use. This lessens the weight and fragility, and enhances the peripheral vision expansion characteristics of the TYPE-2 glasses. This is yet another reason why a hemianope should have both TYPE-1 and TYPE-2 glasses.

Please refer to the EXAMPLE information at the beginning of this paper. We assume the patient is a **LEFT HEMIANOPE** who is 30 years old and that he will have TYPE-2 glasses that are single vision, either plano or with a weak prescription. We assume he was tested and that 5 prism diopters were decided upon for his main or carrier lenses, both prisms to be BASE-LEFT for this patient who is blind to his left side.

This is how his glasses will be constructed:

1. EYEGLOSS FRAME: All-metal eyeglass frame that is light weight but rigid, preferably with two metal connections, one across the nose bridge and the other at the top of the frame. The eye sizes should not be too large because the prism lenses could become too thick. The height of each lens should be moderate and the width should be greater than the height. The two lenses are either plastic or polycarbonate – not glass.
2. RIGHT LENS: plano or Rx single vision - with 5 prism diopters BASE-LEFT
3. LEFT LENS: plano or Rx single vision - with 5 prism diopters BASE-LEFT

A prism segment, made as described below, is cemented to the inside surface of the left lens, with its exact location being determined by trial fittings before it is cemented on. (Note: the Age Table does NOT apply to this add-on prism – it applies only to the prism carrier lenses.)

CAUTION - Do NOT use a fresnel lens (grooved plastic) as the add-on prism. Fresnel lenses are of such poor optical quality as to make them entirely unsafe and unsuitable for this application.

Do order from an optical lab, a round plano plastic or polycarbonate lens having 15 or 18 or 20 prism diopters. Its diameter should be the same or only slightly greater than the height, in millimeters, of the eyeglass lens. The base curves should be as close as possible for the eyeglass lens (e.g. 5 prism diopters) and the add-on lens (e.g. 15 to 20 prism diopters). The add-on prism lens does not need to be edge ground. (Note: most people prefer the 15 prism diopters add-on lens for its smaller thickness and lower weight)

For the example of our left hemianope, the add-on lens which will be cut on a precision power saw, so that a vertical segment is made of it.

The prism base is to the left. The thick protruding part of the prism is inward toward the person holding it, and the flatter side of the segment is toward or in contact with the inside surface of the left lens.

The vertical add-on segment is the height of the lens, or slightly less, and about ¼” to ½” wide. A belt sander may be used to smooth the edges which were rough from having been cut or sawed.

The eye doctor or refractionist can temporarily use putty, clay, rubber cement, or adhesive tape to temporarily secure the add-on segment to the left eyeglass lens, on the inside, near the left (outer) edge.

The add-on prism is moved very gradually toward the patient’s nose with the patient looking straight ahead. If or when the patient sees the add-on while looking straight ahead, then the add-on is too close to the nose and must be moved away from the nose. Ideally, the patient will NOT see the add-on at all when looking ahead or just slightly toward his left. However, when he turns his eyes far left, as if to look behind himself, he will see through the add-on prism, to his left. He will gain 5 degrees from his carrier lens no matter where he looks, plus 15 degrees from the add-on, giving him a total of 20 degrees expanded peripheral vision to the left (blind side). He will be able to turn his head and look behind.

When the optimum location for the add-on segment is found by trial and error testing, the add-on is cemented to the carrier lens using an epoxy or cement that is commonly used by opticians for mounting lens elements.

Add-on locations vary from patient to patient, from eyeglass frame to eyeglass frame, and differ if there is or is not sparing of the macula.

The need for this trial and error testing and for manual cementing of the add-on is a major reason why this technique has not come into more widespread use. It is suggested that a local lab or optician in a given geographic area might be more

interested in handling these needs if patients are referred regularly for this type of work.

The benefits to patients with Homonymous Hemianopsia are so great that it really is worth the effort to make available to all hemianopes, TYPE-1 glasses, and to those who might benefit even more, the additional TYPE-2 glasses.

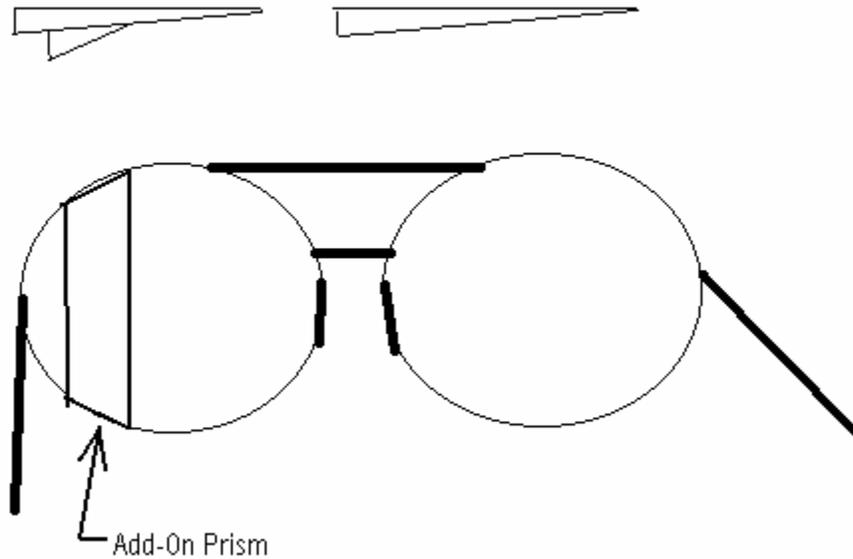


Figure 1 – Rear & Top Views of TYPE-2 Glasses

For additional information or free technical support, please email: nire@warwick.net or contact us by regular mail or telephone.

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