MULTIPOSITION SPECTACLE TELESCOPIC SYSTEM

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INTRODUCTION:

Spectacle mounted telescopic aids have been proven very useful in expanding residual sight for many low vision patients. While primarily designed for improving distance vision, their application for near use is possible with the use of a reading cap or a telescope with an adjustable focus design.

Since these telescopes have a dual purpose, their position in the spectacle mount is very important. If mounted in the bioptic position for distance use, their use for reading tasks require that the patient tilt their head in such a position that is uncomfortable for prolonged reading. If the telescope is mounted in the reading position, distance use becomes impractical. When mounted in the central position, there is a compromise for both distance and near use, as well as an obstructed field of view with subsequent impaired mobility.

The goal of this project was to design a system in which a spectacle mounted telescope could have the capability to be adjusted to different positions for both distance and near use. This design would consider such factors as materials to be used, feasibility of manufacture, durability, cost, and simplicity of use.

DESIGN:

An aluminum alloy ring (see figure 1), was designed to be fitted inside the eyewire of a pair of spectacles. This material was chosen for its strength, low cost, and lightweight. The frame to be used was manufactured by Avant Garde. It was chosen because of its sturdy construction as well as its features of adjustable nose pads and spring temples for comfort. Slight modifications of the frame were done to allow for a good fit of the ring device. This involved filing the eyewire to a uniform thickness of slightly less than .187 inches. In addition, the frame was heated and stretched to accommodate the ring device. The frame and ring were both heated and cooled rapidly to allow the frame to contract and take the shape of the ring.

Since the ring rotates about the frame, with time, the fit would become loose. To compensate for this, adjustable tension of the ring against the frame was achieved through the use of a double nut assembly located where the ring is split (see photograph 1).

The frame was then adjusted to the patient and the appropriate bioptic location for the telescope determined. A plastic ophthalmic lens was then cut and edged to fit inside the bevel located within the ring. This lens was also drilled to accommodate the telescope.

After insertion of the lens, the ring tension was adjusted and the lens glued in place. The position of the glue was important since it must not interfere with the tension adjustment. As a result, it was glued on the opposite side of the split at a length of 1.5 inches, about the inside circumference. This would allow for the adjustment of tension as well as hold the lens in its position.

After final adjustment of the frame on the patient, the telescope was glued in place at its proper angle. It was then ready for clinical trial (see photograph 2 and 3).

CLINICAL EVALUATION OF PROTOTYPE:

The first prototype was fitted on a 39 year old white male. Pertinent examination data follows:

Ocular history:

O.D. Retrolental fibroplasia, cataract surgery, keratoconus with subsequent corneal transplant, glaucoma, and trabeculoplasty.

O.S. Retrolental fibroplasia, nuclear cataract.

Ocular medications:

O.D. Timoptic

Uncorrected distance visual acuity:

O.D. Light projection

O.S. 10/300 at 3 meters

Uncorrected near visual acuity:

O.D. Light projection

O.S. 8M at 40 cm.

Corrected distance visual acuity:

O.D. Light projection

O.S. 10/200 at 3 meters

Corrected near visual acuity:

O.D. Light projection

O.S. 4M at 40 cm.

This patient's vision was corrected with a Boston II rigid gas permeable contact lens on his left eye only.

The telescope used was the Designs For Vision 6X spiral expanded field telescope. With this, his acuity was 10/30 at 3 meters and 1M at 40 cm., O.S.

After 10 weeks of daily use, only two small problems were encountered. First of all, cold weather caused the frame to contract, thus restricting the movement of the ring. This was easily corrected with the application of powdered graphite. This allowed for easier movement, while allowing the telescope to maintain its set position. The second problem was the development of a small crack in the carrier lens. This occurred after it was accidently dropped on the floor. Even though it was cracked, the patient reported that the lens was still holding together and that it was still functional and used daily.

As of this writing, the patient reported that he was doing well with the device. He uses the telescope in the bioptic position primarily for mobility (see photograph 4). Since he is a sculptor, it is used in an intermediate position when doing tasks at arms length. In addition, when used in conjunction with a reading cap, the patient reports an ability to read books as well as a scale with increments of 1/32 and 1/64. He also adds that the telescope stays in position well

and is light enough for comfortable wear all day long (see photograph 5 and 6).

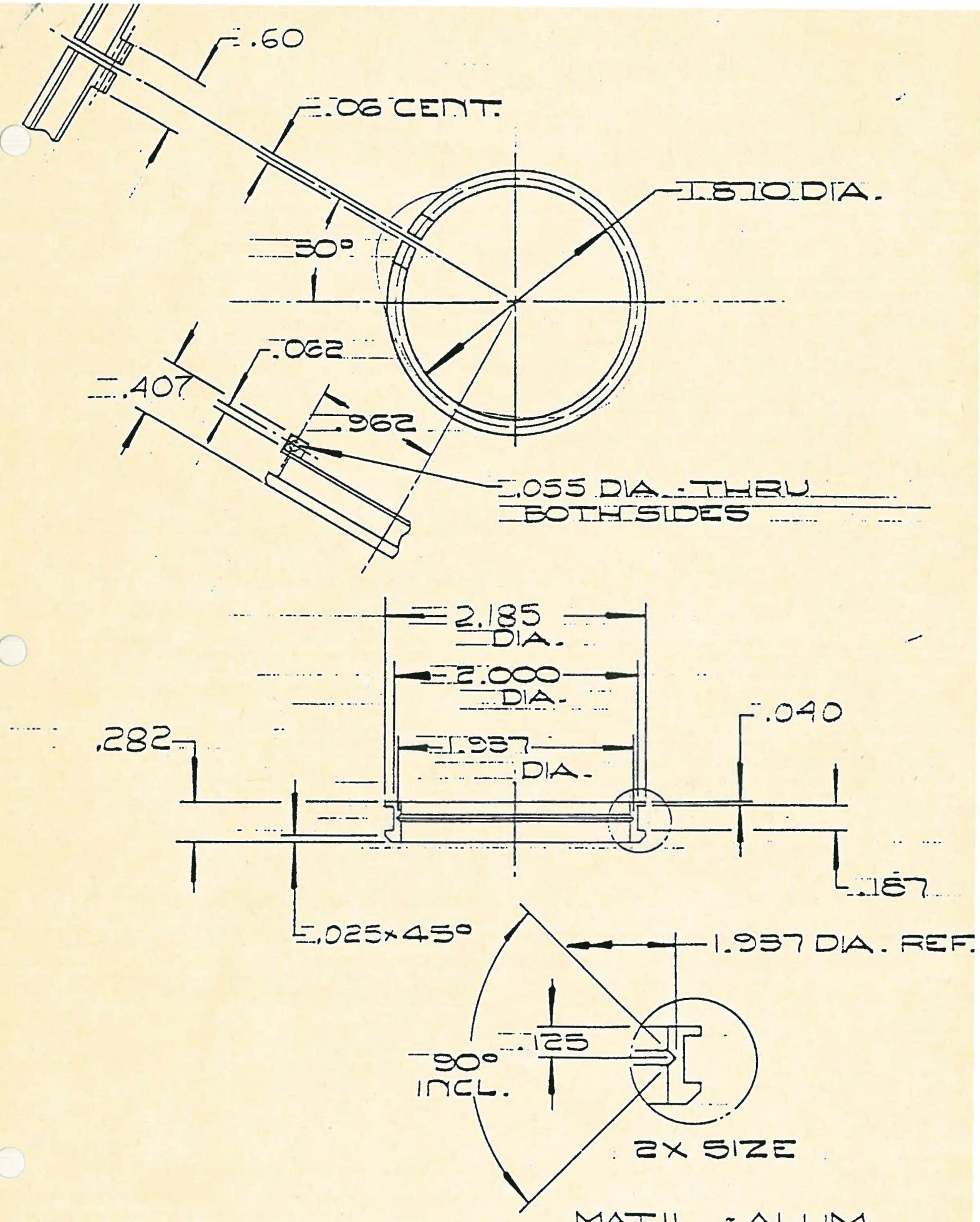
DISCUSSION:

Before this or any other telescopic device becomes useful, the patient must first have an ocular condition that could benefit from the use of telescopic magnification. They must also be motivated to use such a telescopic device.

Before a multiposition system is fitted, the patient must have visual demands for different distances and positions. In addition, they must be physically able to rotate the ring and look through the telescope. In some cases, this may require practice and patience on the part of the patient.

This, like all low vision aids, have some disadvantages. First of all, the frame is distorted. Some people may consider this cosmetically unappealing. Also, even though the material is light in weight, when this is added to the weight of the telescope, one would feel the increase in weight on one side. This will always be a problem with spectacle mounted telescopes. Finally, the fitting would have to be on an individual basis, requiring careful measurements and analysis of the patients intended uses.

This device adds versatility to the spectacle mounted telescope. Its utilization would be most beneficial for those patients whose daily tasks require viewing at different distances and positions.


.60
.06 CENT.
1.810 DIA.
30°
.062
.407
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.055 DIA. THRU
BOTH SIDES
2.185
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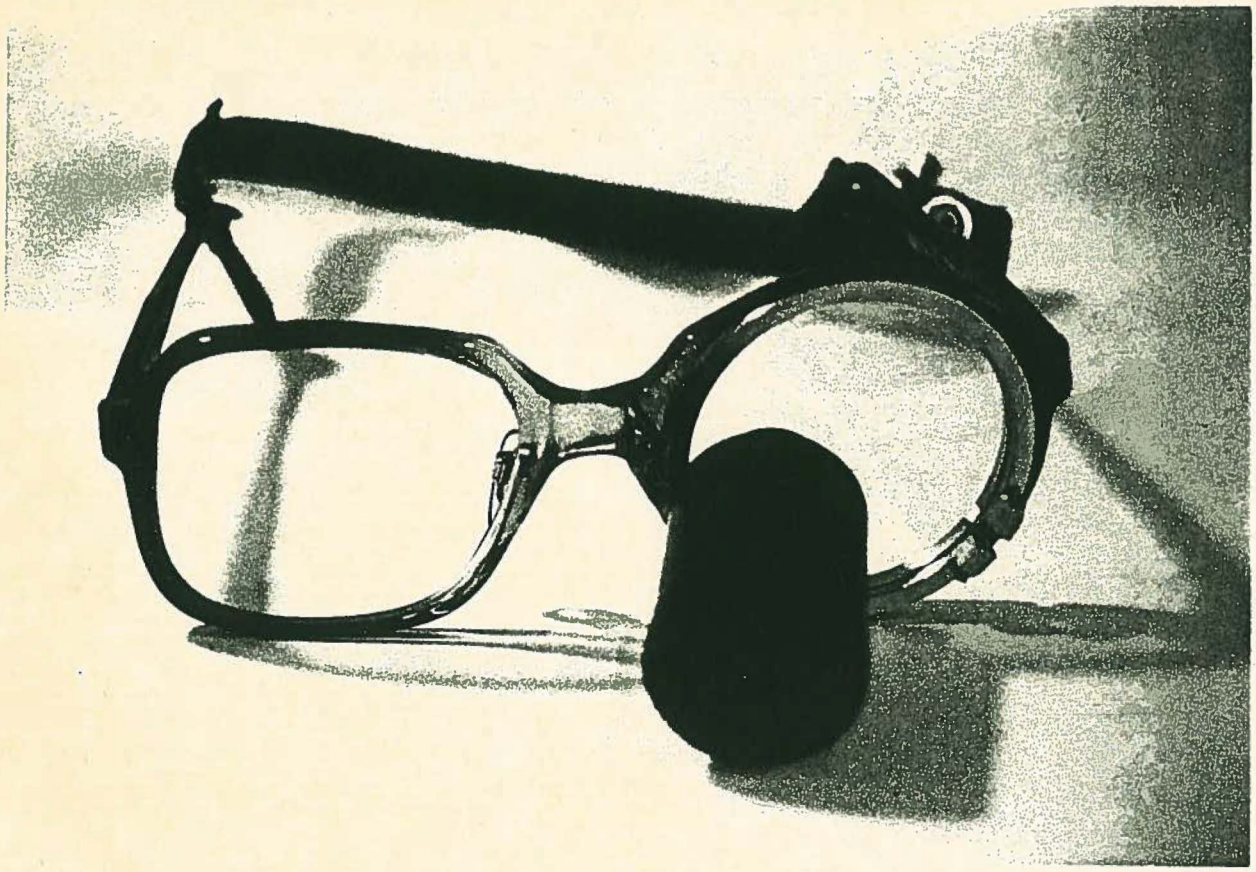
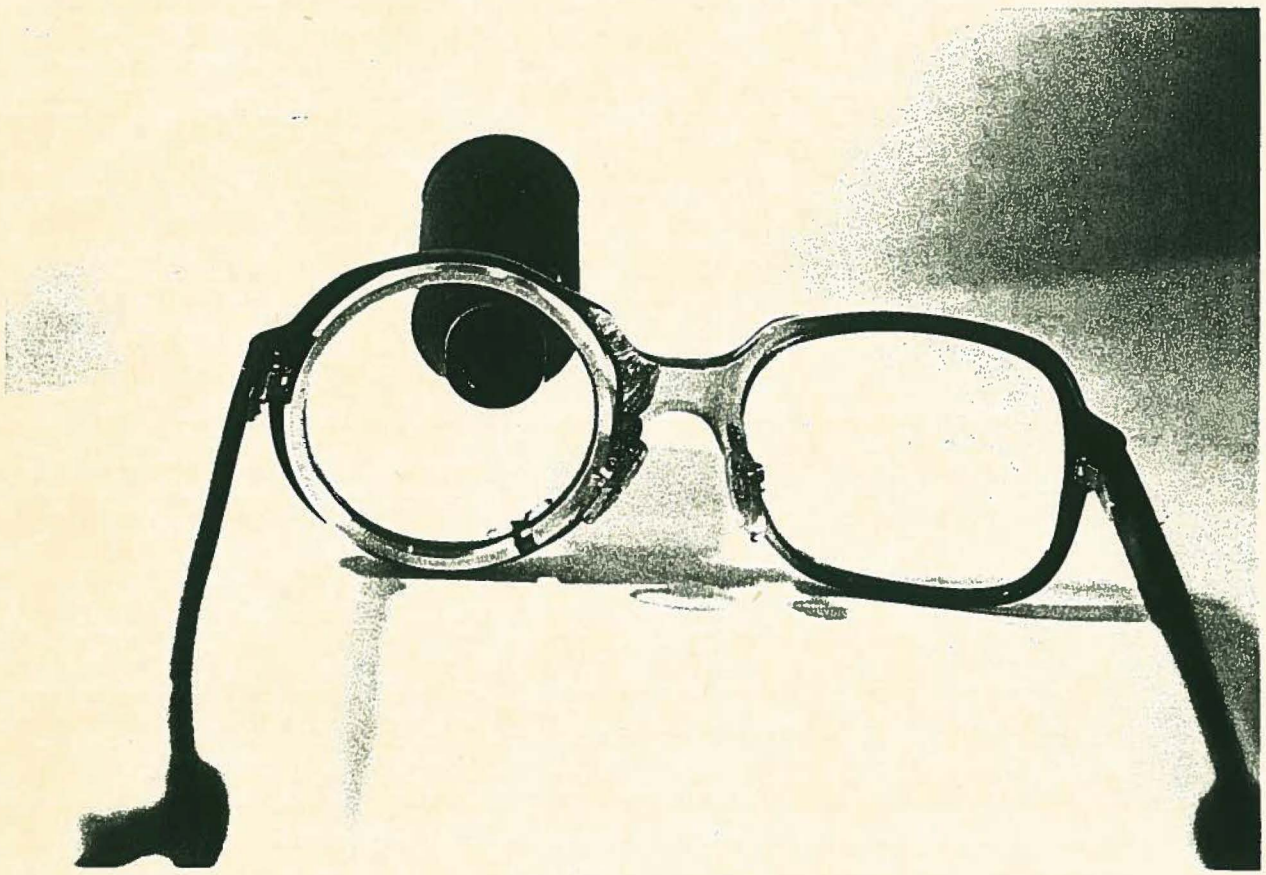
.040
.282
1.937
DIA.
.187
.025x45°
1.937 DIA. REF.
.125
90°
INCL.
2X SIZE
MAT'L. - ALUM.
FULL SCALE

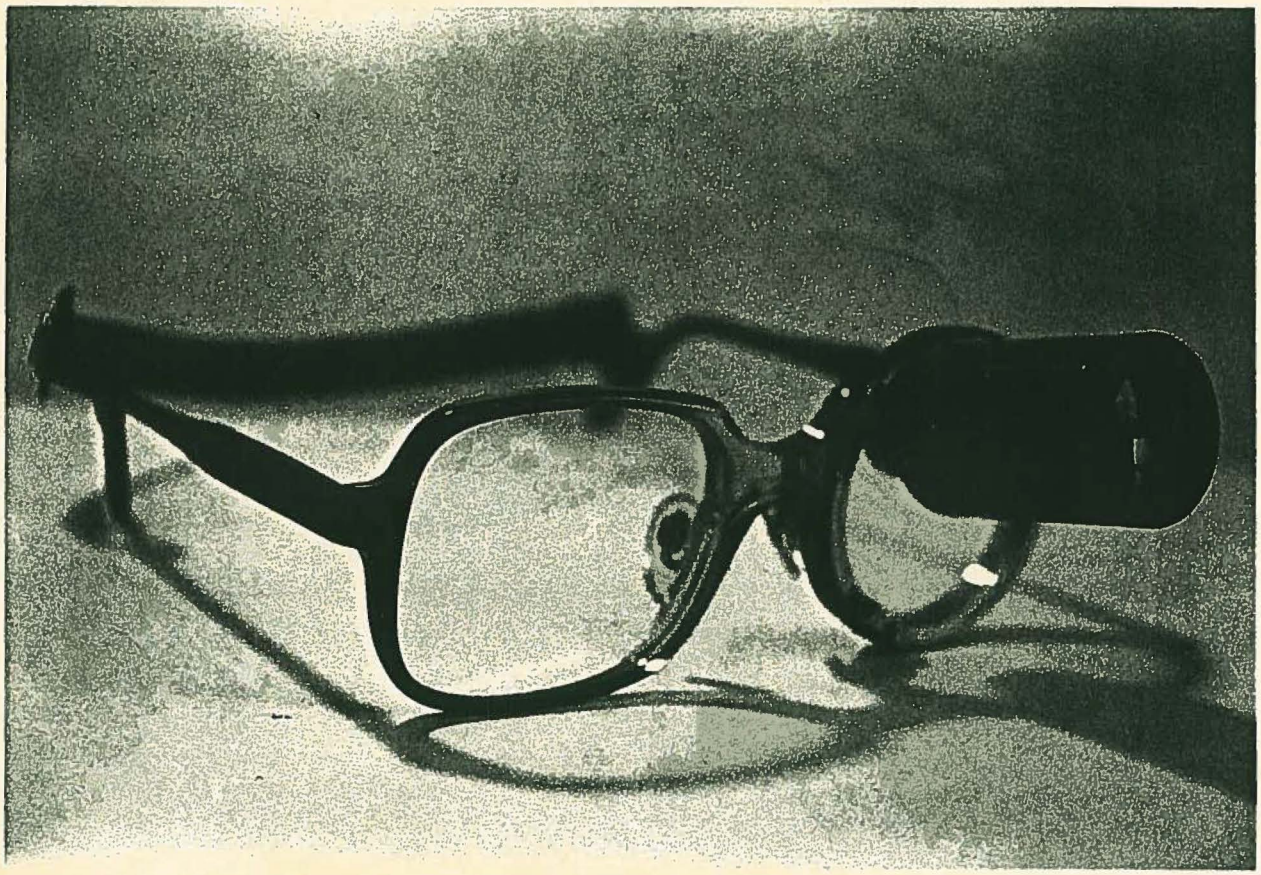
Figure 1.



Photograph 1.



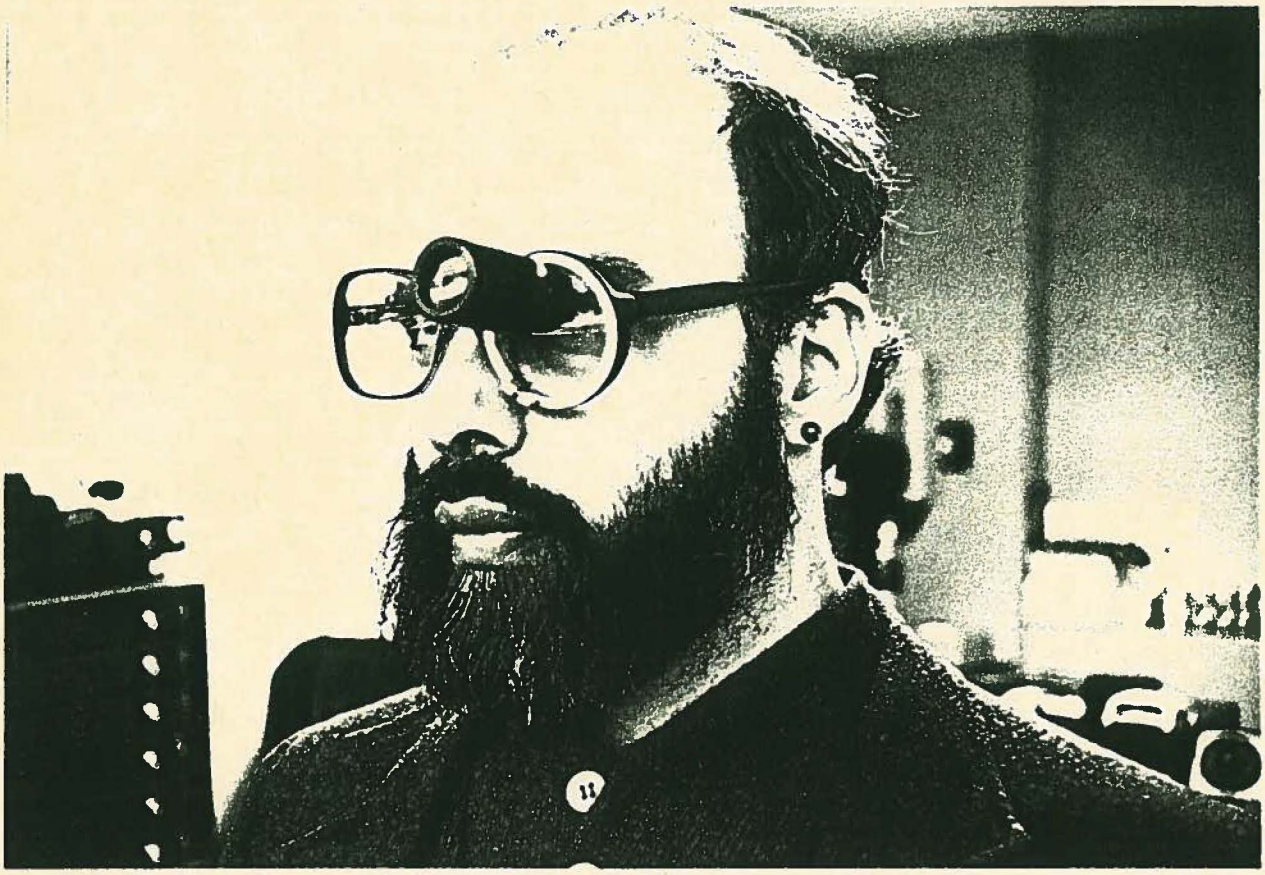
Photograph 2.



Photograph 3.

Photograph 4.

Photograph 5.



Photograph 6.