

Jean Benton, Donor
Betsy Connors, Collection Manager

Collection of Steve Benton

May 12, 2023

Dear Ms. Connors,

Per your request, please find herein my appraisal of three Yuri Denisyuk reflection holograms and related items, belonging to the hologram collection of Steve Benton, as discussed on April 26, 2023, by phone with Ms. Connors based on two supplied digital photographs of the holograms (supplied by Ms. Connors).

The total valuation of the three holograms in *Figure 1* is \$1500.00. This valuation is based exclusively on the assumption that these holograms were recorded by Yuri Denisyuk. The speculations outlined below, which cannot be currently verified, would enhance their value, perhaps significantly.

All three holograms are circular, approximately 1.75 inches in diameter. They can be viewed with a visible wavelength broadband halogen point source and, separately, in laser light, to ascertain possible content which has not been done by me. All the holograms have various stickers and labelling indicative of recording angle, recording wavelength, and various inventory schemes.

These pieces are historical scientific artifacts, related to technological developments of the mid twentieth century in general, and more specifically, to the fields of optics, lasers, and in particular, holography. They are believed by me to possibly represent the initial investigation exposure series by the original international discoverer of what, was then, an entirely new discovery in holography, that is, reflection holography.

The pieces came to be in the collection of Steve Benton by direct personal gift from the discoverer and maker of these pieces, Yuri Denisyuk. See links for biographical information about Yuri Denisyuk.

https://en.wikipedia.org/wiki/Yuri_Denisyuk

<http://www.hih.org.gr/en/institute/denisyuk.html>

I know of two other similar disk holograms by Yuri Denisyuk.

One was donated to the Museum of Holography (MoH) and was/is allegedly accompanied by a letter from Denisyuk, addressed to Posy Jackson, who at the time, was director of the Museum of Holography when it was in New York City. That hologram is now in the Museum of Holography collection at the MIT Museum. I have seen neither the hologram nor the letter.

I have another similar hologram that was sent to me by Yuri Denisyuk a couple of decades ago. It is also a disk of the same size. I don't recollect there being any explanatory information included and was never able to see an image or diffraction in the hologram disk. It would be potentially useful to see the hologram donated to MoH and, particularly, the letter to Posy Jackson which accompanied the hologram donated by Denisyuk.

The three holograms are pictured in *Figure 1*.

Unlike the one I have, which is also a disk, and unmounted in any way, the three holograms appear to be laminated to clear glass plates, approximately 3 by 3.5 inches. Those clear glass plates are, in turn, mounted and held in what appear to be black metal holders. Two of the three holders are labeled with paper labels and inscribed with additional information. From the photograph, it's impossible to discern if there's any labeling or inscribed information on the third holder (*Figure 6*) since it's obscured by what appears to be deteriorating foam padding.

The left most and center holograms in *Figure 1* have paper labels with "Denisyuk #6" (D6) and "Denisyuk #7" (D7) written by hand on what may be small Avery Dennison white paper pressure sensitive labels. Those may be labels put there by Steve Benton or at his direction for his collection inventory. If that's true, that would imply that there should be at least 7 Denisyuk holograms in the Benton Collection. The numbers do not correspond to the inscribed numbering on the metal holders.

There is a fourth photo also labeled "Denisyuk #7" with a similar paper label in a different location (*Figure 2*). Looking at this image side by side with a cropped version (*Figure 3*) of the center hologram pictured in *Figure 1* and based on an examination of the enlarged residue patterns on each image, they appear to be the same hologram although, in the photos, the hologram coloration is different and paper labeling is in a different location.

The estimate of the disk size is based on the image of the graph paper notebook at the top of *Figure 1*. Assuming that each square on the graph paper equals $\frac{1}{4}$ inch, by overlaying the graph paper on the image of one of the disks in the same photo, it can be seen that each disk is approximately 1.75 inches in diameter.

It seems probable that the metal holders for the three holograms in *Figure 1* were supplied "as is" by Yuri Denisyuk. Therefore, it seems reasonable to assume that the information inscribed on the metal holders pertains directly to the original recording data for each hologram.

If that's true, then D6 (*Figure 4*) was inscribed as exposure number 25 in an apparent test sequence, with the diverging laser point source at a distance of 2056mm (2 meters plus 56 millimeters), recorded with a laser of wavelength 546nm (5460A), with the laser point source center ray at a recording angle 3 degrees 35 minutes measured from the 90 degree perpendicular to the center of the plane of the hologram disk.

D7 (*Figure 5*) was inscribed on the metal holder as exposure number 5, with the same laser point source distance and wavelength but at zero degrees (exactly the 90-degree perpendicular).

Without further evidence to go on at this time, it seems reasonable to speculate that, since these were gifts from one scientific inventor/pioneer to another in the same field, it's likely that these pieces had special significance to Yuri Denisyuk. It seems possible, even probable, that these are original investigative test pieces following directly from Denisyuk's initial discovery of reflection holography. The fact that the holders are professionally inscribed with exposure numbers and angles, etc., rather than stored in some kind of inexpensive envelope, leads me to believe that these were historically significant to Denisyuk and his lab in the Soviet Union. Based on the evidence of these inscribed holders, it seems probable that Denisyuk exposed an unknown number of hologram disks in a sequence with the same laser point source distance only varying the exposure angles for each exposure in some methodical manner. Additionally, based on the receipt of a similar disk by the MoH when it was located in NYC, and me about 20 years ago, it seems reasonable to assume that the 1.75-inch disk format was a format arrived at for convenient and frugal use of photosensitive materials and chemicals.

It would be useful to have access to any documentation and/or correspondence between Yuri Denisyuk and Steve Benton concerning Denisyuk's gift of these holograms as it might enhance the value of the holograms by providing definitive provenance. It would also be interesting to do further research on these pieces to find out more specific information such as dates of recording, exact type, and method of fabrication of the photosensitive materials, chemistry, and processing details, etc.

In conclusion, these are probably unique scientific collectibles since they were original hologram tests exposed by the discoverer of the basic reflection holography process, probably recorded at or very near the time of original discovery.

Best regards,

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Addendum May 19, 2023: Subsequent information from Ms. Connors revealed that there is no hologram under foam in rightmost Denisyuk hologram holder. When Ms. Connors exhibited the Denisyuk MoH hologram mentioned above, at the MIT Museum in 1993, she was able to view the authenticating letter from Denisyuk to then Director of MoH, Posy Jackson.



Figure 1: Three Yuri Denisyuk holograms. Photo by Betsy Connors.



Figure 2: Additional provided photo also labeled "Denisyuk #7". Photo by Betsy Connors.

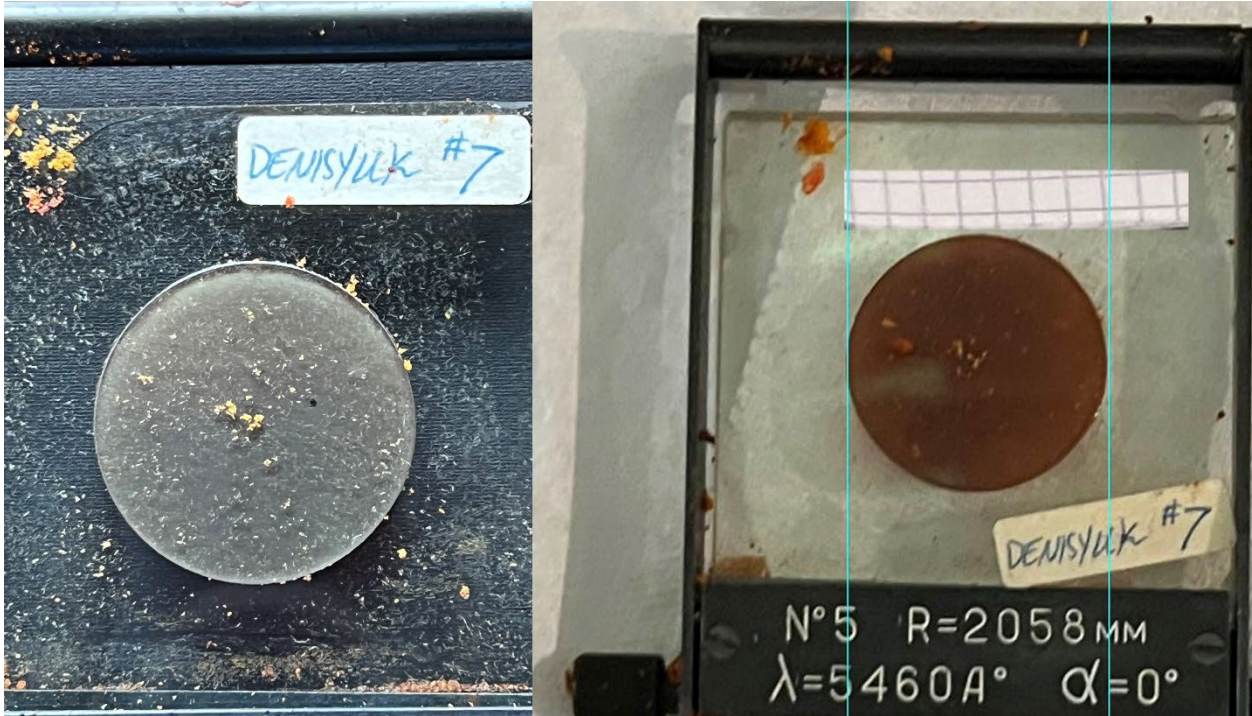


Figure 3: Two "Denisyuk #7" photos side by side. Photo by Betsy Connors with Photoshop additions by Joseph Burns.

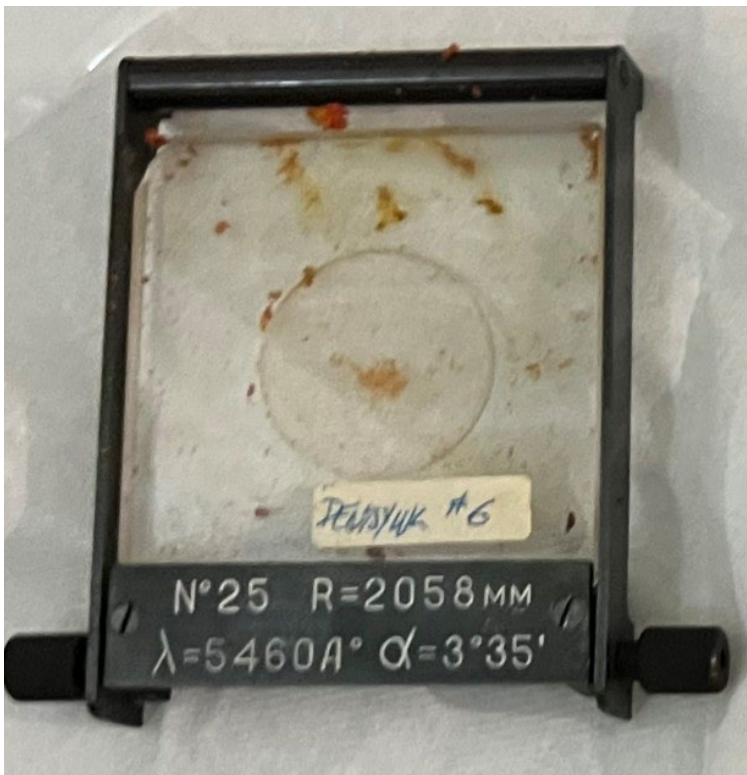


Figure 4: "Denisyuk #6". Photo by Betsy Connors.



Figure 5: "Denisyuk #7". Photo by Betsy Connors with Photoshop additions by Joseph Burns.



Figure 6: Denisyuk hologram unknown. Photo by Betsy Connors.