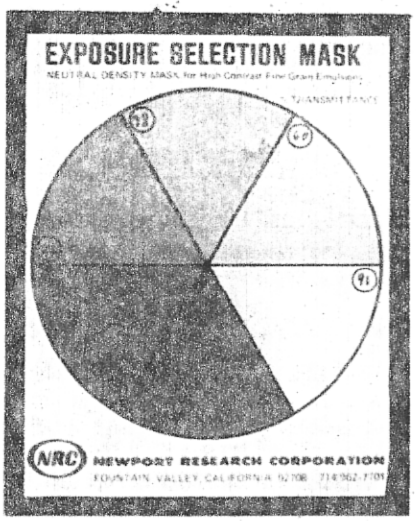
W-2

EXPOSURE AND DEVELOPMENT TESTS

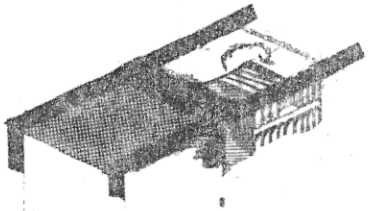
The density of a hologram is controlled by the development and exposure of the film. More exposure and less development can produce the same density as less exposure and prolonged development. But the quality of the hologram will not necessarily be the same in both cases. This test is designed to find the right combination to produce the brightest and least noisy hologram. It can be used with any silver halide material or applied to many other recording materials.

Make the set up and adjust the reference beam to a smooth, even spot. Put the film in the center of the holder and expose four different quadrants. Use the attenuator card and expose each quadrant twice as long as the previous. If you have an exposure mask like the one illustrated on the right, you may do this in one shot. Sandwich the mask in with the film between the pieces of glass in the holder.

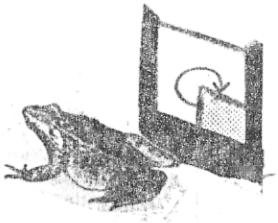


For single beam reflection and transmission holograms or a multiple-beam transmission hologram, all that is necessary is a single attenuator or mask on the reference side of the film. For multiple-beam reflection holograms, two paired attenuators or masks are required, one on the reference side, the other on the object side, as shown in the illustrations below.

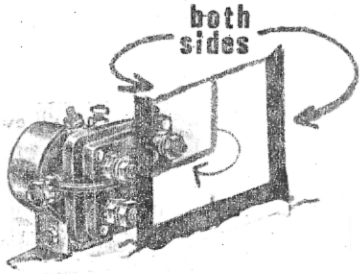
Single Beam Reflection



Multiple Beam Transmission



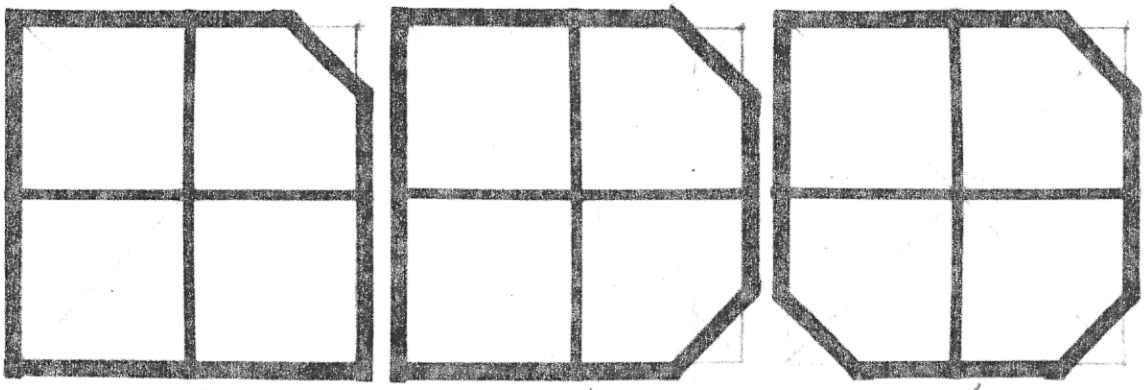
Multiple Beam Reflection



Shoot as many holograms as there will be different development times. Make sure you mark the hologram to distinguish the different processing times.. See the top of the next page for an example.

9/25/80

EACH QUADRANT IS A DIFFERENT EXPOSURE TIME



CUT CORNERS DENOTE THE DIFFERENT DEVELOPMENT TIMES

When the processing is done, compare the holograms side by side. Choose the best test results and expose a complete hologram based on them.

The choice of initial trial exposure and development times may sometimes be a matter of best guess. The manufacturers will recommend certain developing times. You may start there and hold the development constant, and try to zero in on the exposure time. Expose a hologram, using the test method previously described. If the first test strip doesn't darken much at this particular development time, make another test strip at longer times. Or if the film gets too dense, then try another series at shorter times. If there is no manufacturer's recommended developing time, or if the developer is home made, you'll have to rely on intuition. But systematically fine tune to the best development time. No piece of film is wasted if you learn something! Making clear records and notes is a necessity!

9/25/00
EJ

2-M

Which exposure produced the brightest image on each test strip?___

_____

Is it the same exposure on each strip?_____

Which exposure produced the noisiest image on each test strip?

_____How does the noise level relate to the brightness?_____

Which developing time produced the brightest hologram for a given exposure time? _____

Which developing time produced the noisiest hologram for a given exposure time?_____

Which combination of exposure and development times gave the brightest hologram of all?_____the Noisiest hologram of them all?_____

Out of all those combinations, which one gave the best compromise between brightness and noise?_____

Describe the effect that development has on both brightness and noise._____

Describe the effect of exposure on both brightness and noise._____

_____

On the back of this page, explain why you think this happens.

(If different bleaches are used) Compare the brightness and noise levels of the bleaches._____

_____Is there a significant difference?_____

(If unbleached holograms are made) Compare the exposure time of the best bleached hologram to that of the best unbleached hologram._____

Is the noise level the same for bleached and unbleached holograms?

_____How do you account for this?_____

_____

10/2/80 (ES)

SBR exposure and development tests

Label some glassine envelopes with the following information: (One hologram per envelope.)

FOR THIS CLASS:

THE DEVELOPER(S) WILL BE: _____

THE DEVELOPMENT TIMES WILL BE: _____

_____

THE BLEACH(ES) WILL BE: _____

_____

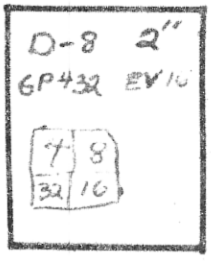
DEVELOPER D. TIME

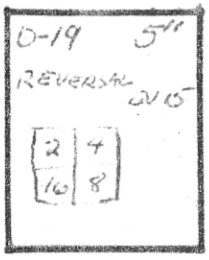
BLEACH EV #

PLACE EXPOSURE TIME IN EACH QUADRANT

DENOTE HOW MANY CORNERS ARE CUT OFF

EXAMPLES





Make a typical Single Beam Reflection hologram set up, either overhead or head on. Use an object that is fairly homogenous over the area of the film plane. Record the light intensity at the film plane.

Expose as many test strips as there will be different development times. Process and compare. Then answer the questions on the following page.

9/26/80
EU

Which exposure produced the brightest image on each test strip?

_____

Is it the same exposure on each strip?_____

Which developing time produced the brightest hologram for a given exposure time?_____

Which combination of exposure and development times gave the brightest hologram of all?_____

What do you think is the trend?_____

(If different bleaches are used) Which bleach gave the brightest image?_____

Does the same exposure and development give the same result with the different bleaches?_____

(If unbleached holograms are also made) Compare the exposure time of the best bleached hologram to that of the best unbleached hologram._____

What color is the unbleached hologram?_____

How do you account for this?_____

_____

9/20/20
CW