

# The BB-Plates: Notes for use

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## Introduction

These are preliminary instructions for the use of BB-plates together with some of their characteristics. These plates are designed for ease of use in common with conventional Western type silver- halide material. The plates have been tested with the common types of developer and bleach such as the "pyrochrome system" or alternatively a developer based on ascorbic acid and either a ferric EDTA bleach or a bleach based on copper sulfate (Blyth's recipe; see below). However, you can try your favorite system possibly allowing longer development times than you are used to.

## Plate characteristics

These plates are mainly intended for the use in display holography. Therefore we try to produce the finest grain size of silver halide and at the same time a good light sensitivity. (Light sensitivity is unfortunately inversely related to grain size). The smaller the grain size the less the scatter or milkiness in a correctly exposed and processed hologram. We have found that our product has noticeably less scatter than that of a well known competitive product but the exposure time does need to be at least twice that of the well known product. This emulsion is hardened quite strongly. If you would like to make reflection holograms with a more broadband replay please ask for plates which are less hardened. Storage conditions for plates should be cool, around 4°C but not below 0°C!

Please allow the plates to equilibrate with the relative humidity and temperature of your lab once you have opened the polyethylene bag before shooting holograms. For making masters (H 1) this is of paramount importance. For these, intensity distribution of the reference beam should be as uniform as possible.

Please note that the plates have cut edges only. Please be careful especially with larger formats and wear appropriate gloves!

## Suggested Processing Formulae\*

### Rehalogenating process

#### a. Developer

700 cc water (deionized, if available)  
70 g sodium carbonate, anhydrous  
15 g sodium hydroxide\*  
4 g metol  
25 g ascorbic acid  
add water to 1000 cc

Please allow any constituent to dissolve before adding the next on the list. It is important to limit the time the surface of this developer is exposed to air (oxygen). Therefore the use of two closely fitting plastic dishes is strongly recommended so that one dish floats ("floating lid") on top of the developer and the only time the whole surface is exposed to air is when the development progress is being monitored. Develop to a density of at least 2.5.

#### b. Stop bath

1000 cc water (deionized, if available)  
5 g sodium hydrogen sulfate\* crystals

Rinse briefly in cold water and then bleach.

\* HRT Holographic Recording Technologies is not liable for any damage caused by the use of these recipes.

Please note that some of substances given in the formulae are toxic and/or corrosive. Please handle these substances according the safety regulations which apply to your country.

### c. Bleach

700 cc water (deionized, if available)  
35 g copper sulfate (pentahydrate)\*  
100 g potassium bromide  
5 g sodium hydrogen sulfate crystals\*  
add water to 1000 cc

Bleach until the hologram is clear. Rinse in cold water. Normally, unless you are making reflection master holograms, this bleach should always be followed by an "anti-print out" bath such as:-

### d. Anti printout

700 cc water (deionized, if available)  
3 g potassium dichromate\*  
6 g sodium hydrogen sulfate\*  
add water to 1000 cc

Treat for about 1 minute with agitation.

To rinse off, just give a brief dip in a bath of deionized water free of any trace of developer. The brevity of the rinse is necessary to actually leave some of the anti-printout solution within the body of the hologram.

Please note that dichromate is a toxic material and treated unprotected holograms should not be handled by young children.

This "anti-print out" has the additional advantage that it will break down any residual dye present in the emulsion from sensitization. However, with the "pyrochrome" system (see below) that bleach will serve as a dye remover.

## "Pyrochrome Process" (van Renesse)\*\*

### a. Developer

#### Solution A

700 cc water (deionized)  
15 g pyrogallol  
5 g metol

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\*\* Graham Saxby, Manual of Practical Holography, Focal Press, 1991

add water to 1000 cc

#### Solution B

700 cc water (deionized)  
30 g sodium carbonate, anhydrous  
7 g sodium hydroxide (may be replaced by 10 g potassium hydroxide)  
add water to 1000 cc

Mix 1 part of solution A and 1 part of solution B immediately before use. The developer lasts for many hours if the "floating lid" (see above) trick is used. Develop to a density of about 2.0 (although a higher density might give a better result). This may take longer than you are used to.

After developing the hologram should be well rinsed in tap water and then rinsed in deionized water before being placed in bleach bath.

### b. Bleach

700 cc water (deionized!)  
5 g potassium dichromate  
15 g sodium hydrogen sulfate crystals  
add water to 1000 cc

Bleach until hologram is clear. Before washing with tap water the hologram should be rinsed thoroughly with deionized water. This is in order to prevent silver ions in solution precipitating in the emulsion with residual chloride ions in the tap water; this would lead to increased scatter in the final hologram.

This process is, in comparison to the rehalogenating bleach system, quite sensitive to overexposure. If your results with respect to diffraction efficiency are poor although developed density is high, please check this out.

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