Development Procedure for Ultimate U08 Plates exposed with continuous laser

version of 16 Mai 2010, controlled by Yves GENTET

The proposed development method is easy to implement and uses development products optimized by the manufacturer.

Materials required:
- one light tight box to hold the plate to be exposed
- 3 cans of products: developer (concentrated), bleach (ready to be used) and drying water (distilled or de-mineralized water with a few drops of Photoflo added)
– a processing tray: 8x8cm for 6.1x6.1cm plates; 12x15cm for 10.2x12.7cm plates and 32x42cm for 30x40cm plates. Flat bottom tray to limit the quantity of developer, and white color to visualize the process are preferred.
- a 5ml syringe or similar and a 100ml graduated cylinder (for 4x5" plates). Proportional equipment for larger plates
- clean running water

Optional: lint-free paper towels + electric hair dryer for those who cannot wait for natural drying.

❶ Exposure:

After removing the holographic plate from the refrigerator and its protective packaging (in a dark room) – transfer it into a light tight box for transport and let it adjust to room temperature (at least 30 minutes prior to exposure). The plate is then ready for exposure.

For the power output of your laser, you must adjust the exposure time for an exposure of $200\mu J/cm^2$. If you do not have a power meter, estimate or call our technical support for help. Please be ready with the laser characteristics and description of your bench when calling.

Typical exposure times for **Ultimate 08** in Denisyuk holography (the range depends on the optics used) :

- Laser He-Ne (25mW) –   30 x 40cm plate: 30-40 sec.
- Laser He-Ne (10 mW) – 10.2x12.7cm plate: 7-10 sec.
 -Laser He-Ne (5 mW) –   6.1x6.1cm plate: 4-5 sec.

❷ Development :

The developer provided in the kit is non-toxic and optimized for Ultimate plates.

It comes in cans of 120ml (or 550ml) concentrate – you will need to dilute with water (1:10), only the quantity that you need, when ready to use. Keep unused developer in the original white bottle which prevents oxidation. The kit provides enough developer for 40 of the 6.6x6.1cm plates or 24 of the 10.2x12.7cm plates:

6.6x6.1cm plate: mix 3ml of developer with 30ml of water in a small tray (approx. 8X8cm);

10.2x12.7cm plate: 5ml of developer mixed with 50ml of water (approx. 12X15cm tray).

For repetitive work, it is best to use new developer for each plate. Measure the water temperature before mixing – it must be equal or greater than 20° C (68° F) for the developer to function properly.

Development time : 6 minutes @ 20°-25°C under safelight (green LED for red sensitive plates, or red LED for blue-green sensitive plates).

The developer effect will start to be visible a few seconds after the plate is covered with the mixed developer and will be complete after 6 minutes.

After development, the Ultimate 08nm plates will have a pale yellow/orange color.
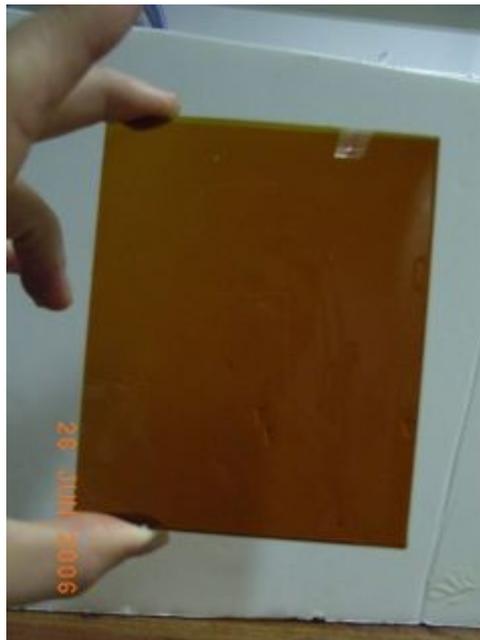
Example of Ultimate 08 plate after development (color is typically pale yellow/orange).
Exposure: 200 µJ/cm² with a He-Ne Laser

This color is explained by the very small grain size (MIE diffusion), much smaller than competitive holographic materials .

We can restate another way: it is normal for this material not to reach any black density like other holographic or photographic material. **There is no need, or reason, to develop further than the required 6 minutes.**

The U08 material provides a wide latitude in exposure. Only very over-exposed plates will not give transparent holograms.

❷ **Rinse: Rinse under running water for 30 seconds in the tray, allowing water to overflow into a sink.**

❸ **Bleach:**

   The bleach in the kit is non-toxic. It comes as a powder to be diluted one time in a liter of water. It can handle at least one hundred 10.2x12.7cm holographic plates. It is considered "dead" when it does not bleach a plate in less than 10 minutes. Even weakened, it gives the same quality of holograms. It conserves well when stored at room temperature – for up to a year.

   Pour the plate into the developing tray containing the bleach and agitate continuously until you get good transparency (3 or 4 minutes).
   Wash the plate under running water for 1 minute.

Denisyuk Hologram observed by transmission via halogen spot, after bleach but before drying.

   When the hologram is successful, this image will be very strong.

❸ **Second Rinse: Rinse under running water for 2 minutes**
   For maximum transparency, if you need it, bleach again for 30 seconds more - then rinse again.

❹ **Drying: use a demineralized or distilled water solution with some drops of Photoflo added.**

Alternative 1 (no contact): vertical natural drying, no contact with the emulsion.

1: Soak 1 minute in this solution.
2: Remove the plate gently and allow to dry vertically for 15-20 minutes.

Alternative 2 (faster but with a small risk of scratching the plate)
Care is required to avoid scratching the plate.
1: Soak 1 minute in this solution.
2: Wipe the gelatin side of the plate very gently, with paper towel folded in 4, until the surface is dry. Rotate the plate 90 degrees each time the entire plate is wiped (to eliminate streaking).
3: Now finish with a hair dryer (at moderate heat and not too close). The holographic image will quickly appear.

Final result:

Hologram on Ultimate 08 plate
Exposed with He-Ne Laser - Reconstructed in white light (halogen)

Criteria for judging the quality of the hologram:
- if the hologram is bright but the plate is milky white / opaque: over-exposed
- if the hologram is dim and the plate is transparent: under-exposed (or movement)
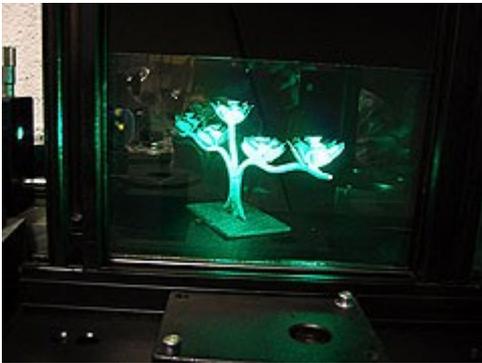- if the hologram is bright and the plate is transparent: perfect exposure

❺ Examples of holograms created by our clients with Ultimate 08 :
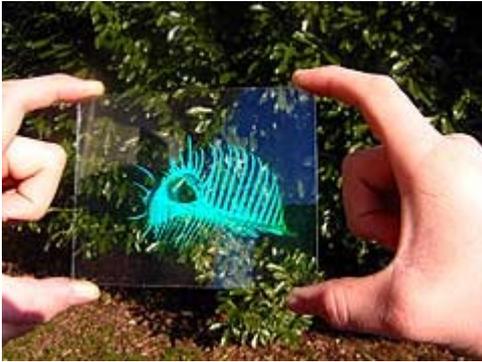
Ultimate 08, laser 532nm, hologram H2

Ultimate 08, laser 532nm, hologram Denisyuk

Ultimate 08, laser 532nm, transmission hologram H1

Don't hesitate to share your results and observations with us!