Direct Positives by Reversal Processing

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Direct positive print making is the art of producing positive prints directly from photographic paper without involving a negative. Unlike normal print making where a scene is first exposed on a piece of film/plate/paper which is processed as a negative and subsequently enlarged (or contact printed) on a sheet of photographic paper, in direct positive print making, the scene is exposed on photographic paper which is then processed to give a positive directly. Direct positive paper is a special photographic paper designed to make direct positive print making simple and easy. However, direct positive paper is comparatively more expensive than regular photographic paper. Interestingly, it is possible to use the regular photographic paper in direct positive print making with a process known as reversal processing. This process makes it possible for us to use almost any photographic paper in direct positive print making and provides greater control over contrast than direct positive paper.

Reversal Processing

The steps for making a direct positive from a regular photographic paper are as follows:

1. Establishing EI for the paper + lighting combination
2. Exposure (with optional colour filtering or pre-flashing)
3. First development using a print developer
4. Stop bath or 2 rounds of water rinse
5. Bleach followed by 2-3 rounds of water rinse
6. Clearing bath followed by water rinse
7. Second development using a fogging developer followed by 2-3 rounds of water rinse
8. Fixing
9. Wash
10. Any post-processing steps for fine tuning the result or embellishments such as toning.
11. Dry

A very nice thing about reversal processing is that the two developing steps (#3 and #7) are to be done till completion and hence there's no worry of overdeveloping. And when a fogging redeveloper is used for second development, all chemical processing steps can be done in a daylight tank or in the darkroom under red safelight. On the other hand, contrast is controlled mainly by the combination of paper type and exposure (colour filtering in case of VC paper and pre-flashing in case of both graded and VC papers). Development plays very little role in contrast control as it is done till completion unlike film negative processing. Exposure Index (EI) varies substantially with paper and lighting condition as paper is sensitive to blue or blue-green light and insensitive to red light. Proper exposure and contrast control are key to achieving success as subsequent steps can't, in general, overcome the deficiencies in exposure and contrast.

Paper Choice:

Fomaspeed Variant RC variable contrast paper is a relatively inexpensive and excellent photographic paper. However, any paper other than the very slow contact printing papers should be fine. VC papers allow finer control of contrast than graded papers.

Exposure Index:

For a given combination of paper and lighting condition, EI for direct positive process is best established by first doing some paper negatives and establishing EI for the paper negative process. The reason being paper negatives are relatively easier to make reliably than direct positives and reversal processing generally requires about two stops more exposure than paper negatives (this can

be explained using paper sensitometry). So downrate the paper negative EI by about two stops to get your reversal EI. If you plan to use colour filters while making exposures, establish EI with the filter on.

Contrast Control of VC Paper

Blue filter produces the highest contrast whereas green filter produces the lowest contrast. Intermediate contrast levels can be achieved by controlling the composition of light using a suitable yellow or orange filter. The choice of the specific filter to use while making the exposures is determined by the scene contrast and lighting conditions. However, a medium-yellow filter is good enough for many scenarios and can be used till consistent results are obtained. If no filter is used for VC paper, contrast is determined by the composition of the light of the scene and will vary significantly with the lighting condition.

Contrast Control of Graded Paper

Pre-flashing can be employed to control the shadow contrast. Pre-flashing can be done either in the darkroom with the help of an enlarger or in the camera with the help of a diffuser. If pre-flashing in the camera at the scene, meter with the diffuser, stop down 2 or 3 stops, focus the lens to infinity, mount the diffuser on the lens and make a pre-flash exposure.

Reciprocity

Most papers are designed not to suffer from reciprocity failure when the exposure is of a few seconds duration. As EI of paper is usually low, exposures can be several minutes long at times and consequently there can be reciprocity failure. Reciprocity can affect both exposure and contrast in varying degrees for different papers. Unfortunately, there is no official reciprocity correction data available for paper. At least in the beginning, avoid exposures that go into several minutes.

First Developer

Any print developer can be used as the first developer at the dilutions recommended for darkroom printing (e.g., Ilford ID-62 1+3). As the development is till completion, use the recommended development time for the paper plus a minute.

If the final positive (i.e., after step #9) comes out darker than desired, add a little bit of a halide solvent like Sodium Thiosulphate to the first developer. This will produce a cleaner looking print. Start with 1g/l and adjust the amount based on your judgment of the final result.

Second Developer

Second development with a fogging redeveloper ensures even tones, deep blacks and complete development. Use 10g Sodium Dithionite + 10g Sodium Carbonate in 1l RO or distilled water as the fogging redeveloper. Develop for 5 minutes.
If you have only tap water available to you, add a pinch of Sodium Hexametaphosphate (Calgon), a water sequestrant, to the water before mixing Dithionite and Carbonate.
The second developer needs to be used within 30 minutes of mixing as it won't remain stable for longer time.
Dithionite has a strong odour and can cause skin irritation. Take appropriate safety measures while handling.

Bleach

Use 10g Potassium Dichromate + 12ml Sulphuric Acid + 1l water. Bleach for two minutes.
Sulphuric Acid can be replaced by 55g of Potassium Hydrogen Sulphate. As the latter is a powder, the risk posed by spills is lower.
Dichromate is toxic and hence take due safety measures while mixing and using the bleach.

Bleach can be reused till it takes a dark blood red hue. Filter after every few uses.
Take appropriate safety measures for storing the bleach.
Take appropriate disposal measures when the bleach is to be discarded.

Clearing Bath

Use 20g Sodium Sulphite + 1l water. Clear for 1 - 1 1/2 minutes.

Fixer

Any print fixer can be used (e.g., Ilford Rapid Fixer 1+9). Use the recommended fixing time for the paper.

Post Processing

All toning techniques that are known to work well for silver gelatin prints can be employed for direct positives.

Troubleshooting

1. If the final result appears overall very dark, you might need to downrate your EI further, i.e., give more exposure. On the other hand, if the final result appears overall very light without any deep blacks, you might need to uprate your EI further, i.e., give less exposure. When adjusting exposure, it is instructive to check the intermediate result at the end of step #4. The image should appear somewhat dark throughout as if it were fogged. If it appears light then the final result will be very dark and if it appears very dark then the final result will be very light.
2. If the contrast is too high when using VC paper, consider using a filter that cuts blue light (e.g., yellow).
3. If the highlights in the final result are paper white, you might need to either reduce the contrast and/or give less exposure.
4. If the shadows in the final result are too dark, add a little bit of halide solvent (e.g., Sodium Thiosulphate) to the first developer or increase the amount of pre-flashing exposure.
5. If the final result looks partially reversed in mid tones, check the strength of the bleach and increase the bleaching time. When adjusting bleaching time, it is instructive to check the intermediate result at the end of step #6 - the paper should look uniformly blank.

Safety

Please check-up the hazard status and toxicity estimate of the chemicals used in reversal processing. Chemicals need to be handled with appropriate care and precaution. It is advisable to wear gloves, mask, goggles, and lab apron to reduce the degree of exposure to chemicals. Avoid spills and clean up the spills thoroughly when they happen.