APPLICATION SHEET

REVERSAL PROCESSING

USING ILFORD BLACK & WHITE FILMS TO MAKE MONOCHROME TRANSPARENCIES

REVERSAL PROCESSING OF ILFORD BLACK & WHITE FILMS

Todays monochrome film emulsions are extrememly robust products, capable of producing excellent quality images matched to variable contrast paper emulsions such as ILFORD MULTIGRADE IV. In the overwhelming majority of cases these films are more than up to the job demanded of them by todays photographers. Occasionally, however, a black and white positive image is required for projection to sceeen rather than the usual negative images for printing purposes. In this case, reversal processing enables black and white transparencies to be produced directly from high quality film materials such as PAN F Plus, FP4 Plus and 100 DELTA PROFESSIONAL. This information leaflet outlines the method and materials needed for the reversal processing of ILFORD films.

The reversal process starts with the development of the negative image. this leaves the unused silver halide untouched, but it is not fixed out, as it will later be used to form the positive image.

After the negative image has been developed, it is totally bleached away using an acid bleach. This leaves the remaining silver which is light-fogged and then re-developed to produce the positive image.

Between the various stages of processing, washes are used to prevent contamination of each new processing solution by the previous one.

HEALTH AND SAFETY INFORMATION

The processes mentioned in this leaflet suggest the use of chemical substances and/or proprietary chemical preparations. The bleach is strongly acidic, containing sulphuric acid. Concentrated sulphuric acid is highly corrosive. Do not get it into eyes, or onto skin and clothing as it causes severe burns. It may be fatal if swallowed. In case of external contact immediately flush the affected area with water containing sodium bicarbonate. For internal contact get medical attention at once. Always pour the acid into the water, never add water into the acid. Before using these substances, please obtain and study the Materials Safety Data Sheets relevant to them. These data sheets are available from the supplier of the chemicals.

Please read the Material Safety Data Sheets carefully and observe the safety precautions written in them. In the absence of any specific safety precautions, you should always remember to:

– work in a well ventilated area

– wear safety spectacles, gloves and an apron or overall when handling chemicals

– wash your hands thoroughly after handling chemicals

– seek medical advice if you feel unwell or if you have come into contact with the chemicals: if seeking medical advice take the chemical container and/or Material Safety Data Sheet with you

– never eat, drink or smoke whilst handling the chemicals

– store chemicals in cool, dry conditions in appropriate containers away from children, pets and foodstuffs.

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RECOMMENDED FILMS

The suitability of a negative film for reversal processing depends largely on its inherent contrast. Little can be done to change the contrast appreciably by changes in processing, so choose a film for reversal processing acccording to the ultimate contrast required in the final positive image.

FP4 Plus is recommended for a moderately soft graduated image. However, PAN F Plus gives bright, higher contrast positives particularly useful for copy work. 100 DELTA Professional is also recommended.

We do not recommend reversal processing HP5 Plus or DELTA 400 PROFESSIONAL film stock. Results are likely to exhibit unacceptably low contrast.

EXPOSURE

When exposing films for print generation, exposure is not that critical because any variation in negative density can usually be compensated for in printing. When a film is to be reversal processed, exposure must be accurate if good quality transparencies are to be produced. For general indoor/outdoor use, first adopt the published ISO setting and vary this, by trial and error, to determine the best exposure for your particular taste.

When copying prints or drawings on PANF Plus, use two Photofloods approximately 60cm/2ft from the centre of the copy aimed at opposite sides. A starting exposure of 1/2 second at f22 is recommended. Again, best results are obtained by testing. It is a good idea to make a series of exposures up and down in third stop increments. Examine the resulting slides – overexposure produces light slides while underexposed slides are dark.

CHEMICALS REQUIRED

The following chemicals are required for reversal processing:

ILFORD BROMOPHEN or
ILFORD PQ UNIVERSAL DEVELOPER
sodium thiosulphate

potassium permanganate
sulphuric acid

sodium or potassium metabisulphite

ILFORD RAPID FIXER or
ILFORD HYPAM
ILFORD HYPAM HARDENER (if needed)

ILFOTOL

water

SOLUTION PREPARATION

First Developer

Use either ILFORD BROMOPHEN developer diluted 1+1 or ILFORD PQ UNIVERSAL developer diluted 1+5.

To the working strength developer add sodium thiosulphate crystals (Hypo).

For PAN F Plus add 8g/l, and for FP4 Plus and 100 DELTA Professional add 12g/l.

Bleach

Two solutions, A and B are mixed as follows:

for solution A add 2g of potassium permanganate to 500ml water

for solution B add 10ml of concentrated sulphuric acid to 490ml water

If concentrated sulphuric acid cannot be obtained use dilute acid. This can be a 10% solution. If 10% sulphuric acid is used add 100ml to 400ml of water to make the part B bleach solution.

These stock solutions will keep for a long period of time before they are mixed together. For use, mix equal parts of A and B, making a fresh working solution for each film, and discard after use.

Clearing solution

Add 25g sodium or potassium metabisulphite to 800ml water. When the sodium or potassium metabisulphite is dissolved make up to 1 litre.

Second developer

ILFORD PQ UNIVERSAL diluted 1+9.

Fixer

ILFORD RAPID FIXER 1+4 or ILFORD HYPAM 1+4.

A hardening fix bath may be beneficial in some circumstances as the bleach bath may soften the film emulsion more than ususal. For a hardending fixer use HYPAM 1+4 with HYPAM HARDENER added 1+40 (25ml/l) to the working strength fixer solution.

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PROCESSING NOTES

First Development

The first development time, nominally given as twelve minutes, may be adjusted to determine the optimum developing time for a particular ISO rating. A longer development time will give a lighter image and vice versa.

Here the exposed image is developed to a negative. An ordinary spiral reel and tank is recommended for the first development. Adjust the temperature of the developer to 20°C/68°F. Load the exposed film into the spiral reel and place it into the tank. Fill the tank with the recommended quantity of developer. Invert the tank four times in 5 seconds and tap it on a counter to dislodge any air bubbles from the film. Place the tank in a water-bath to maintain a constant temperature. Agitate during development by giving a 5 second inversion to the tank every 15 seconds followed by a couple of taps on a counter.

A development time of 12 minutes at 20°C/68°F is recommended as a starting point for all the ILFORD films listed. It is important that the time and temperature be closely monitored if consistent results are to be obtained. After the required development time, remove the cover from the tank and pour the developer away. Go immediately to the FIRST WASH step described below.

First wash

Special attention should be give to the wash and rinse temperatures throughout the reversal process. Fill the tank with fresh water at 20°C/68°F. Invert the tank five times. Discard the water and fill the tank again with fresh water and invert it ten times. Discard the water, refill the tank with fresh water and invert it twenty times. Discard the water, refill the tank with fresh water and invert it another twenty times. Or wash film in running water for five minutes. Discard the water and go to BLEACH.

Bleach

Pour in the bleaching solution at 20°C/68°F, the bleach, being strongly acid, stops development almost instantly, and after about 30 seconds, the lid may be removed from the tank and the remainder of the process carried out in room lighting.

Bleaching should be continued for 5 minutes with continuous agitation, or as long as it takes to remove the silver image. This vigorous agitation is necessary to ensure complete bleaching. When all the silver has been removed, the film will be a creamy-yellow colour.

After bleaching has stopped it is possible to carry out the remaining steps in room lighting.

Second wash

Fill the tank with fresh water at 20°C/68°F. Invert the tank five times. Discard the water and fill the tank again with fresh water and invert it ten times. Discard the water, refill the tank with fresh water and invert it twenty times. Discard the water, refill the tank with fresh water and invert it another twenty times. Discard the water and continue with CLEARING BATH. (A sixty second running wash may be substituted.)

Clearing Bath

The clearing solution removes any yellow staining caused by bleaching.

This is to clear away all traces of the powerful bleaching bath, and the slight stain it leaves behind. Pour the clearing solution into the tank. Treat the film for 2 minutes in the solution, agitating 4 inversions in 5 seconds every 15 seconds.

Third wash

Fill the tank with fresh water at 20°C/68°F. Invert the tank five times. Discard the water and fill the tank again with fresh water and invert it ten times. Discard the water, refill the tank with fresh water and invert it twenty times. Discard the water, refill the tank with fresh water and invert it another twenty times. Discard water and go to SECOND EXPOSURE. (A sixty second running wash may be substituted.)

Second Exposure

This is a total fogging exposure to make the remaining silver halide develop readily. Open the tank and remove the film from the spiral reel. Expose both sides of the film for the equivalent of 30-60 seconds at 46cm/18in from a 100-watt tungsten lamp or 30cm/12in from a fluorescent light tube. Insufficient second exposure will result in a reduction in density when the film is finally fixed. Two to four times the specified exposure may safely be given, but over exposure beyond this extent may lead to slightly foggy highlights.

Do not expose to sunlight as the film may start to print-out, thus affecting maximum density.

Re-development and fixing

Finally the film should be developed and fixed as in normal black and white processing using the times and solutions specified.

Second development

In this step, all the residual silver halide is developed fully, to form the positive image. If the spiral reel employed permits, re-insert the film onto the reel (it may help if this operation is carried out under water). However, if re-insertion of the film onto the reel is not possible, the second development and subsequent operations may be carried out in a dish/tray by using a 'see-saw method'.

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Appropriate protective gloves must be worn while performing the 'see-saw' method.

Using a freshly mixed developer solution, develop the film for 6 minutes at 20°C/68°F. Development time is not critical – it should simply be continued until maximum density is achieved. After development, discard the used developer.

Fourth wash
Fill the tank with fresh water at 20°C/68°F. Invert the tank five times. Discard the water and fill the tank again with fresh water and invert it ten times. Discard the water, refill the tank with fresh water and invert it twenty times. Discard the water, refill the tank with fresh water and invert it another twenty times. Discard water and go to FIXING. (A sixty second running wash may be substituted.)

Fixing
This is an optional stage which removes any last traces of silver halide that did not develop and leaves the image clean and fully transparent in the clear parts. Pour in the fixing bath and fix for 5 minutes with intermittent agitation. This removes any insensitive silver halide in the highlights. If necessary a hardening fixer can be used. Pour out the fixer, it may be saved for subsequent reuse.

Fifth wash
Fill the tank with fresh water at 20°C/68°F. Invert the tank five times. Discard the water and fill the tank again with fresh water and invert it ten times. Discard the water, refill the tank with fresh water and invert it twenty times. Discard the water, refill the tank with fresh water and invert it another twenty times. Discard water and go to DRYING TRANSPARENCIES. (A ten minute running wash may be substituted.)

Drying transparencies
After washing, give the film a final rinse in water containing an ILFORD ILFOTOL Wetting Agent (1+200). The film should then be hung to dry.

MOUNTING AND PROJECTION OF TRANSPARENCIES

The film is ready for projection when dry and may be mounted in cardboard mounts or between glass.

A wide range of fact sheets is available which describe and give guidance on using ILFORD products. Some products in this fact sheet might not be available in your country.

THE REVERSAL PROCESS AT A GLANCE

Processing Steps	Time	Comments
First Development	12 min	May be adjusted to give optimum time for particular ISO rating. A longer development time will give a lighter image and a shorter development time will give darker image.
Wash	5 min	Preferably running water
Bleach	5 min	Strong acid and therefore stops development immediately: extend time if necessary for full bleaching: continuous agitation
Rinse	1 min	
Clearing Bath	2 min	Clearing solution removes any yellow staining caused by bleaching
Rinse	30 sec	
Second Exposure	1 min per side	See Processing Notes
Second Development	6 min	Development as for normal black and white processing
Rinse	30 sec	
Fix	5 min	Fixing as for normal black and white processing
Final Wash	10 min	running water
Dry		

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