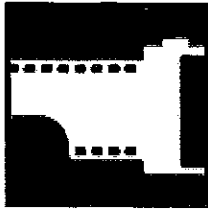


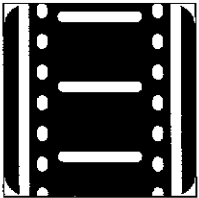
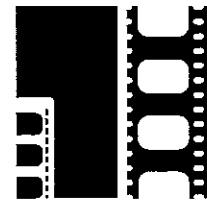
BW FILM PROCESSING

Mini – workshop: 18 October 2008



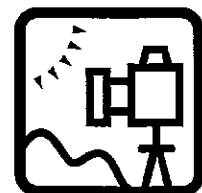
BW film processing is EASY

CRAFT your photograph YOUR way



Process film to explore your CREATIVITY

Be wild, think ANALOGUE



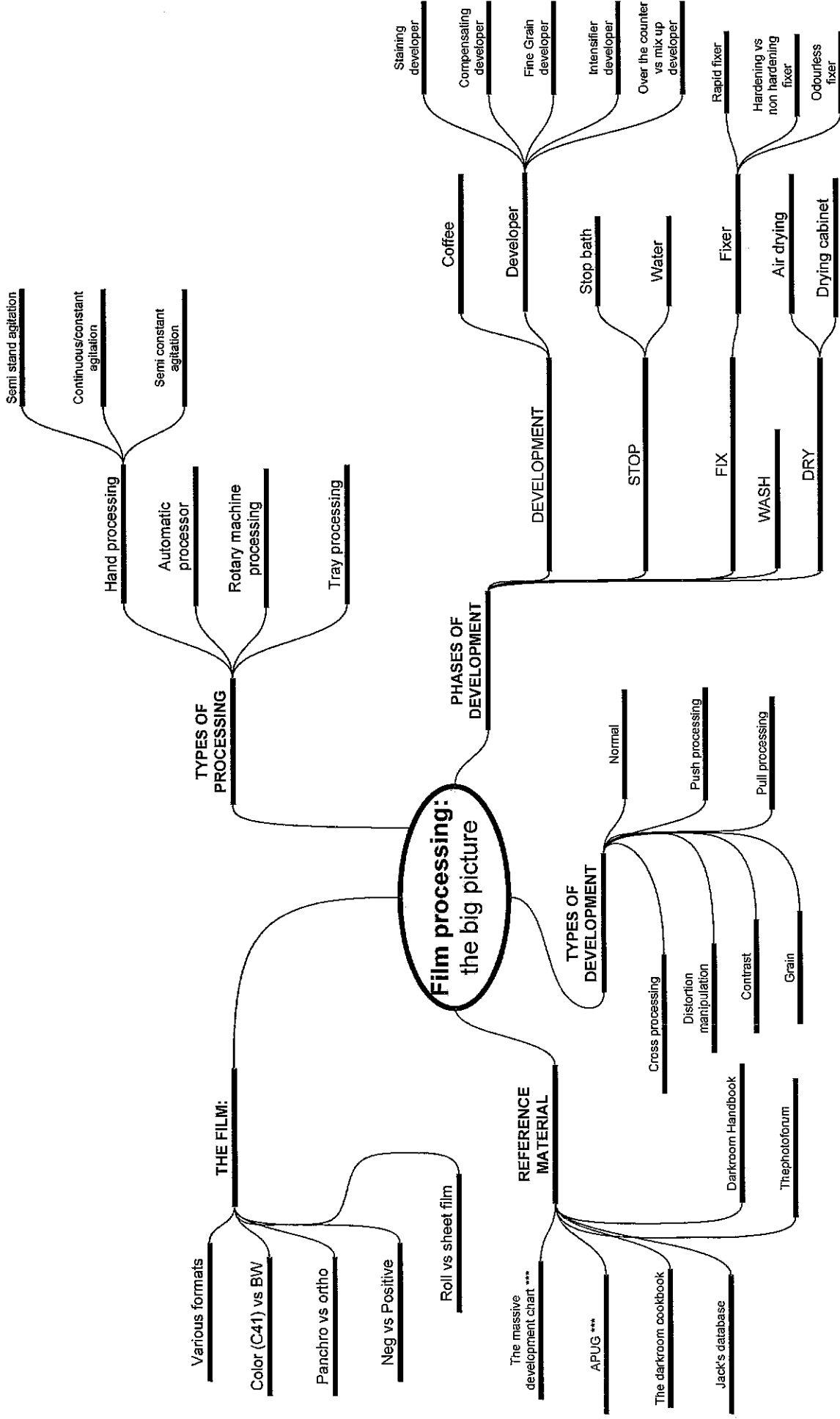
Mini-workshop: BW Film processing

TABLE OF CONTENT:

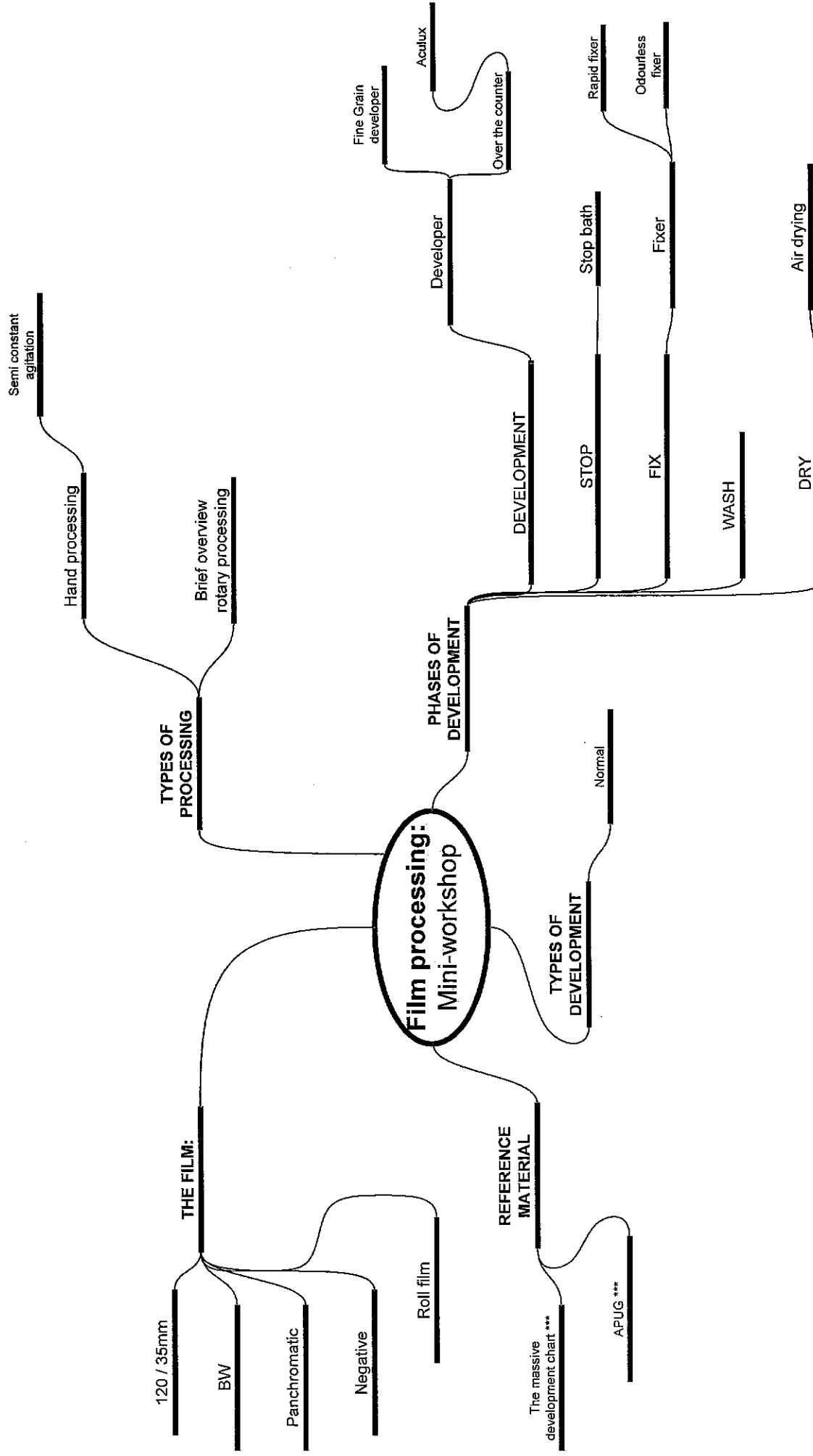
THE BIG PICTURE	4
COVERAGE OF THE MINI-WORKSHOP	6
THE CRAFT OF AN IMAGE	7
MATERIALS	8
THE CHEMICALS	10
Film developer	10
Stop bath	10
Fixer	11
Wetting agent	11
Working with chemicals	11
Reading datasheets	12
Suppliers	12
LOADING THE PROCESSING TANK	13
BW FILM PROCESSING STEPS	14
AGITATION TECHNIQUES	15
Semi-stand agitation	15
Constant agitation	15
PRACTICE SESSION: PROCESSING HP5 FILM	16
FUNDAMENTALS OF THE PROCESS	18
READING THE NEGATIVE	18
TESTING YOUR PROCESS	19
WHAT NEXT?	21
USEFUL ADDRESSES	22
FINAL WORDS	23

THE BIG PICTURE

www.delphinelopez.com

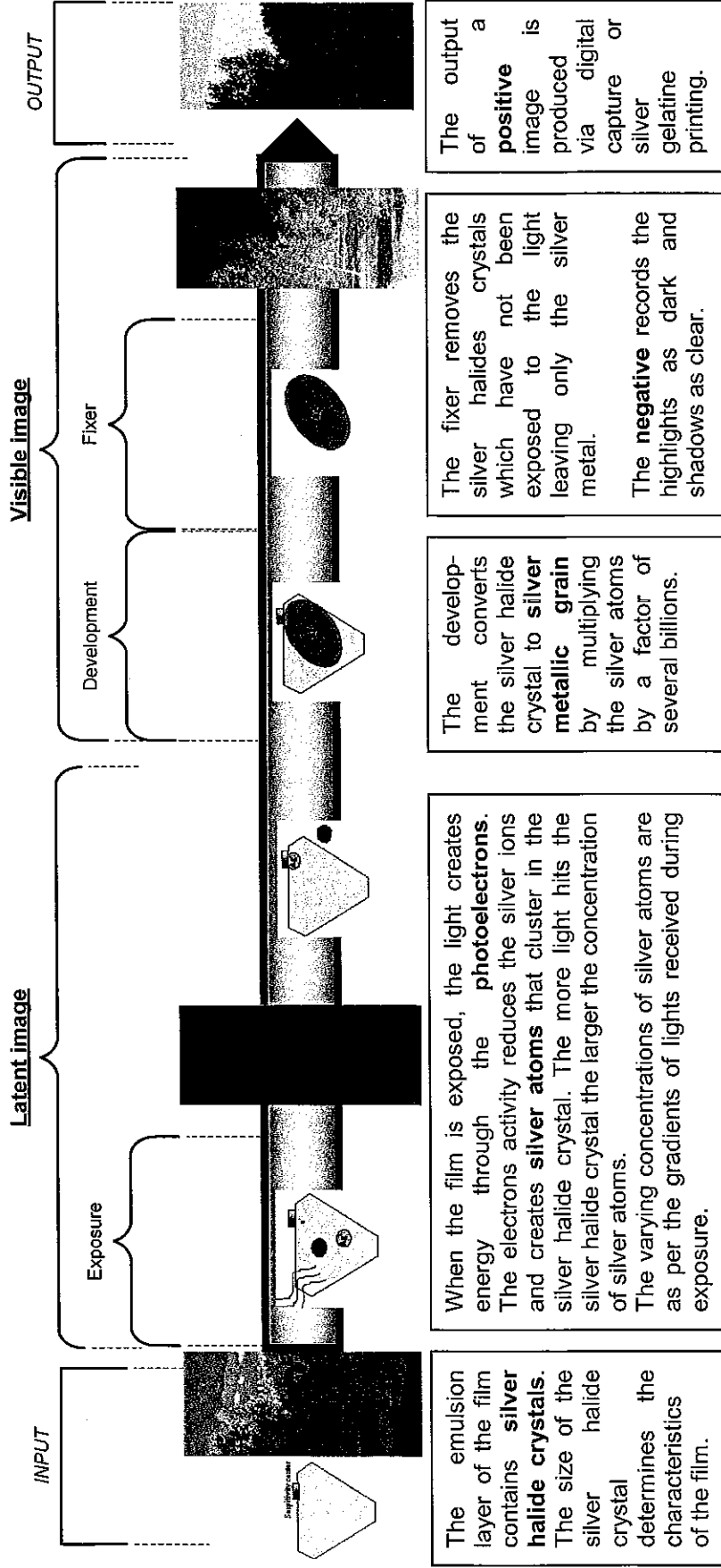


COVERAGE OF THE MINI-WORKSHOP



THE CRAFT OF AN IMAGE

Processing the film allows to convert the *latent image* captured by exposure of the film to light into a *visible negative image*. Photochemistry explains the transformation of the latent image to the visible one.



The main components of the developer are either hydroquinone or glycin. The main component of fixer is sodium thiosulphate. For those interested in the science of photography and photochemistry, there are a lot of resources available online.¹ I warmly recommend <http://www.ted.photographer.org.uk/> for wonderfully explained and easy read photo science.

¹ The graphics of silver halides molecules used to illustrate the craft of an image were sourced from: <http://www.cheresources.com/photochem.shtml>

MATERIALS



1. Processing Tank

Processing tank should be complete:

- The tank itself
- Tube, it fits in the middle of the tank. It channels the liquids to the bottom of the tank. The tube acts as a light baffle.
- Lid
- Reel – Please note that very often the reel is sold separately. Avoid metallic reels, use plastic ones.



2. Changing bag

The film can only be spooled onto the reel in absolute darkness. A darkroom is not necessarily and the changing bag is the most portable and convenient way to un-can and load the film.

Film has a better sensitivity than our own eyes. It is sensitive to all wave lengths of light therefore it can be fogged even by remniscent fluorescent lights not apparently visible. For this reason, darkroom safelights are not safe for the purpose of manipulating unprocessed film. And even if safelights were switched off, the darkroom would have to be tested for light tightness to guarantee that it is safe to unexposed film; usually it is not.

Conclusion: the changing bag rocks!

3. Pair of scissors

Avoid pointy ones so as not to damage your changing bag. The scissors are required to cut the tab of the film.

Some people find nail clippers handy to cut the corners of 35 mm film to help spooling it onto the reel.



4. Film cassette opener

It is used to un-can 35 mm film. You do not need one if you intend to process only medium format film (120 / 220).

5. Thermometer

Either spirit or digital thermometer, you will need to measure and maintain your processing chemical at roughly the same temperature. Processing temperatures vary from 18 to 24 deg C usually.

6. Storage bottles (x2)

Storage bottles are used for the stop bath and the fixer. The stock solution is diluted to make a working solution which is re-used several time.

To ensure good keeping of your chemical, always use clean storage bottles, they should be opaque and air tight.

Usually a storage bottle is not required for the developer as the working solution is a "one shot and frisky". The bottle the stock is sold in is used as the storage bottle.

Note: Always squeeze your storage bottle to bring the level of the chemical at the top of the storage bottle to eliminate air inside the bottle and preserve the chemicals.

Always label clearly your bottles with chemical name, mixing date, and usage. (Never trust your

memory!).

7. Jugs / water bottle (s)

Why not recycle those empty milk bottles? Whichever container you elect to be your water jug, make sure that you never put chemicals in it. Make sure that you label your water jug. It is used for storing the water for washing the film.

8. Working solution bottles (x3)

These containers are used for storing and keeping at constant temperature the working solutions used for processing the film (Developer/Stop bath/Fix)

9. Measuring funnels or measuring bottles

They are used to measure the stock chemicals to make working solutions. The developer needs to be measured very accurately. To make 500ml of working solution, you will generally need 50ml of developer stock.

10. Stirring rod

Used to stir the working solutions as they are being prepared.

Note: stirring should be gentle so as not to introduce air in the chemical being mixed up. This is because air usually exhausts the chemical.

11. Timer

Analogue or digital, you will need easy visibility of both the minutes and the seconds. The timer or clock, should be easy to operate on the "fly" as you are processing

12. Film clips

To hang the film as it is left drying.

Note:

The equipment can be collated on the cheap, very often it is a matter of hunting one pound shops, recycling bottles or finding new uses to surplus items.
For e.g. adapt cheap cloth pegs to use as film clips.

The only dedicated items that you really need are the processing tank and changing bag.

THE CHEMICALS

Film developer

There are many types of developers on the market. Your choice of developer should be driven by its price, the purpose of the negative (scanning vs printing), the concentrate form (powder vs liquid concentrate) and the size of the container.

If you intend to process little, it is probably best to buy little quantities (125ml or 500ml).

It is recommended to stick to one film developer, until you are experimented enough, and have full control over your process before you move on to using different film developers.

Common brands and "general" developers are:

ID11 (Ilford – powder stock)

DDX (Ilford)

Ilfosol (Ilford)

Aculux (Paterson)

Rodinal (Agfa)

Dilutions and processing time vary from one developer to another, and for each type of film. Always refer to the datasheet of the manufacturer for technical information.

The massive development chart online provides comprehensive guidelines, processing data and technical sheets. The database is widely used and recognised as a reference by the analogue users:

<http://www.digitaltruth.com/devchart.html>

Film developers are used as one shot solution. They keep for about 6 months, until the stock solution looks brownish. Never take risks with the developer. In doubt, discard it.

Unless you are experimenting, and you are looking for wacky results with high contrast and large grain; you cannot substitute print developers for film developers. They are separate products. This contrasts with stop bath and fixer which are the same stock solutions for both film and print processing.

For the purpose of the workshop, we will be using Aculux (Paterson) which is a non staining fine grain developer. It comes in a liquid form, and requires mostly dilutions at 1+9.

Stop bath

There are two different schools amongst analogue users. Those who use stop bath and those who use plain water bath. It is a personal choice to use one or the other. Therefore a stop bath is not compulsory.

A stop bath is based on acetic acid. Some brands include a visual indicator (the solution changes colour) to tell when the pH of the bath is too high and that it is time to replace it. I recommend purchasing stop baths with indicators for ease of use.

The stop bath stock requires little dilutions (commonly 1+19) and keeps for long periods of time. Therefore, purchase only small quantities of stock (250ml to 500ml). The working solution is kept into a storage bottle and re-used to process film (or paper) until the dye indicator turns blue-ish.

There are no particular advantages choosing one brand over another when it gets to stop bath.

For the purpose of the workshop, we will be using Fotospeed SB50 odourless stop bath with indicator. It is diluted at 1+19 to make working solution.

I use stop bath rather than water in my process because I believe that the immediate interruption of the development and prevention of the post development gives me more repeatability in my process and consistency.

Fixer

There are many fixers to choose from on the market. Your choice is about whether you want the fixer to be odourless or not, rapid or not. Usually rapid fixers do their job in 2 mins at 1+4. A non rapid fixer takes at least twice more time.

If the fixer says "hardening fixer" avoid it, as no hardening is required for processing film, and it would prevent an effective wash.

Fix concentrate has very good keeping capability (several months when opened), and for a faster processing, it usually gets diluted at 1+4. Pending on your expected usage, 1l is probably the minimum quantity to buy to start up with.

Always refer to the manufacturer's instructions as the dilutions and processing time vary from one product to another. It is important not to over-fix as the solution dissolves metallic silver and would end up bleaching the image over time.

The common practise is to re-use the fixer however, it is very important not to over-work the solution and to keep on monitoring the fixer. To play it on the safe side, you may want to use the solution as a one shot. To monitor the fixer, follow the manufacturer's instructions. As a broad rule, expect to be able to use your 1l fix solution (not the stock!) for about 15 rolls.

I personally would rather be safe than sorry. I use fixer as a one shot stock. I don't discard it though, as I re-use this fix as my 1st fix bath when printing.

For the purpose of the workshop, we will be using Fotospeed FX30 odourless fixer with dilutions at 1+4.

Wetting agent

The wetting agent is used at the very end of the film process. The washed negative is given a quick dip (no more than 30 seconds) in a wetting agent bath. The purpose of the wetting agent is to disperse water as the film dries and avoid water marks.

Such a cheap and economical chemical could never have attracted so much debate amongst analogue users. Whether you decide to use it or not, is your decision to make. However, my recommendation is to use it because it does indeed avoid water marks. But if you do use it, then avoid problems and headaches by ensuring that -1- you dilute no more than the manufacturer's recommendation and -2- the film is only briefly soaked in the wetting agent.

The stock is super concentrated, and therefore the dilutions are very high. You will ever need the minimum stock quantity you can find. It keeps forever, either as stock or as working solution.

For the purpose of the workshop, we will be using Fotospeed Super Rinse Aid. Dilution at 1+200.

Working with chemicals

None of the chemicals referenced for processing film have high toxicity. They are safe and easy to use. However, you need to remain vigilant and take precautions when working with chemicals for your personal protection and that of others.

Common sense applies, wash splashes off your skin, never eat or drink whilst working with chemicals. If you have sensitive skin, wear nitrile gloves. Label carefully any recipient/containers that are being used for chemicals.

Always refer to the manufacturer's instructions prior to using any chemicals, and follow recommendations.

When storing your chemicals, to preserve their capability and shelf life, ensure that the storage bottles are stopped down, by squeezing out air out of the bottles.

Cleanliness is next to godliness. Always ensure that all your mixing materials (funnel, stirring rod), storage bottles, processing tank and reels are never let to dry without a good water rinse, and soap water wash. Keep it clean!

Avoid any form of cross-contamination when handling chemicals. In doubt, don't, just discard your stock or working solution. Use separate funnels and separate stirring rods if possible.

It is good working habit to add the stock to the water when making working solutions.

Reading datasheets

It is essential to peruse the datasheets as they contain all the information about the working dilutions, process time, and words of caution.

Working solutions are always indicated as 1+ x. E.g. 1+9 ; this means that for one part of stock solution, 9 part of water need to be added to make the working solution.

Do your math, this means that $1/10^{\text{th}}$ of the total quantity of working solution required is the stock solution, the rest of the quantity being water.

Having warmed up with the math... let's do another example.

Your processing tank requires 450 ml of working solution.

The stock solution requires dilution at 1+4.

How much stock solution and how much water are required to make the working solution?

Math crunching:

Stock solution	Part	1	Stock ($1/5 \times 450\text{ml}$)	90 ml
Water	Part	4	Water ($4/5 \times 450\text{ml}$)	360ml
Total	Part	5	Total working solution	450 ml

When it gets to measuring stock solution for the developer, be as accurate as possible. To have repeatability and consistency in your film processing, your dilutions need to be spot on.

THE MASSIVE DEV CHART

To complement the developer's datasheet, the massive development chart is a very useful and comprehensive tool.

Suppliers

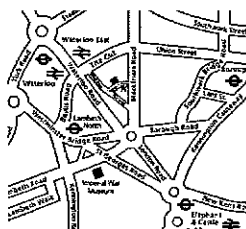
Chemicals can be bought online or over the counter at Silverprint. Chemicals are cheap and allows to process film at a very low cost.

I recommend Silverprint's website as it contains a lot of product information and datasheet.

Silverprint ***** : <http://www.silverprint.co.uk/>

Firstcall photographic: <http://www.firstcall-photographic.co.uk/>

RK: <http://www.thedarkroom.co.uk/>



LOADING THE PROCESSING TANK

Loading the processing tank is always done in **absolute darkness**. There are no lights which are safe to undeveloped film emulsion.

For the purpose of the workshop, we will be using changing bags. This is the most practical, portable and safe way to load film onto a reel.

PRACTICE SESSION:

- Loading 120 MF film is demonstrated by Delphine
- Loading 35mm is explained
- Participants practise loading film onto reels until confident doing it in the changing bag.

Once loaded, and closed, the processing tank is light tight. The rest of the film processing is done in day light.

TIPS:

Before you start un-canning your film, make sure that you have all the elements that you need as you close the changing bag.

Last minute checklist:

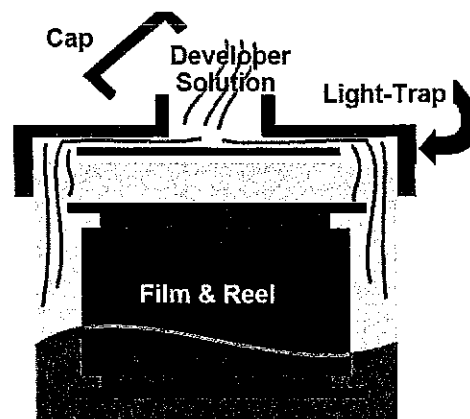
- Complete processing tank: i.e. tube, lid, reel, and the tank itself. That makes 4 items. Count them
- Pair of scissors
- Can opener
- The exposed film(s)

Always make sure that the bag is well sealed, that the arms' elastic bands feel tight around your arm.

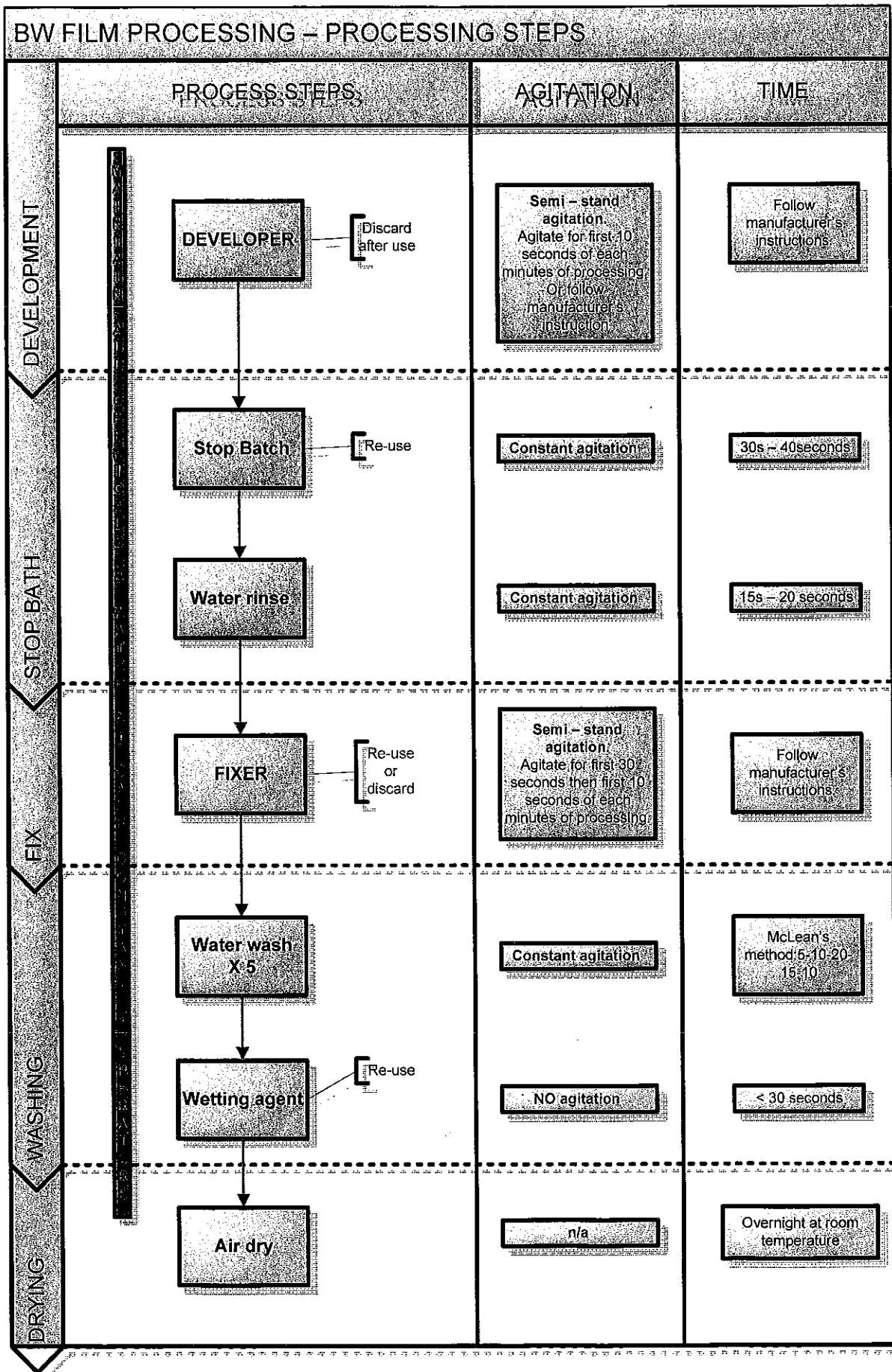
Before pulling your arms out of the changing bag, always check that the lead of the processing tank is solidly attached to the tank by pulling it gently.

The slightest mistake would severely be punished by fogging the film.

How does the processing tank work?



BW FILM PROCESSING STEPS



AGITATION TECHNIQUES

The agitation technique and the duration of the agitation is very important as it impacts directly on the results that you are going to get. For more contrast and grainier negatives, increase the agitation.

Agitation is essential during the development and fix phases. This is because the chemicals in contact with the surface of the negative exhaust very quickly and need to be renewed to ensure that the development is homogeneous and constant.

For example, no agitation during the development phase would result in ultra-thin negatives (i.e. underdeveloped).

At the end of each agitation cycles, the processing tank must be banged rather vigorously. The bang is required not just to attract attention but because it helps dislodge any air bubbles that would form at the surface of the film emulsion as the tank is being agitated.

Bank the tank... but don't break it either.

Semi-stand agitation

Develop your own agitation technique and stick to it for consistent and repeatable results.

As an example, here is the agitation technique used by Tony M:

During the development phase, over 10 seconds of each minute of processing, give your processing tank the following agitation:



4 full inversions



1 swirl



1 bang

Constant agitation



Continuous full inversions

PRACTICE SESSION: PROCESSING HP5 FILM

PRACTISE SESSION:

- Using, mixing & storing chemicals is explained by Delphine
- Processing of one roll of 120 MF Ilford HP5 is demonstrated by Delphine:
- Participants who chose to process mix their chemicals and process their film

For the purpose of the workshop, one roll of HP5 is developed in Aculux developer (Paterson) at room temperature. Process normal as per the manufacturer's recommendations. Developer dilution at 1+9. Stop bath and Fixer used are branded Fotospeed.

All the processing steps are explained in detail.

NOTES:

Caution: all the chemicals and water baths should be maintained at the same processing temperature, about 20C, to ensure an even film development.

1. Developer:

Start timing the processing time as soon as the developer is poured into the processing tank. The developer should be poured in as quickly as possible without overflowing. The timing as started, start the agitation (4 inversions, 1 swirl, 1 bang) over 10 seconds every minutes until the end of the processing time. About 5 seconds before the end of the processing time, start emptying the processing tank.

2. Stop bath:

Start timing as soon as the chemical is in. You want to use constant gentle agitation for 30 to 40 seconds. Pour out and recoup the stop bath in the storage bottle.

3. Brief water wash:

The brief wash is to wash out any stop bath out of the processing tank and avoid cross-contamination of the fixer. Give it a constant agitation for about 15 seconds and frisbee.

4. Fixer:

Start timing as soon as the chemical is in. Be cautious not to over nor under-fix. Agitation during the fix phase is not as crucial as in the development phase. There is no need for banging in the fix phase.

5. Washing:

Aim for washing over 10 min approximately. McLean recommends five water changes with 5, 10, 20, 15 and 10 inversions of the tank. It is very important that the first wash, is as short as possible to remove as much of the fixer as possible the fastest. Once the film is washed, you can finally open your processing tank, and ... gasp or smile! (to err is human ... we all mess up as some point or another) ☺

6. Wetting agent:

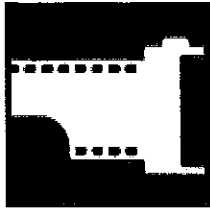
The wetting agent phase is simple, but it is important to do it correctly. Never dip your reel in the wetting agent bath. Give a twist to open your reel, and dip the film ever so gently in the wetting agent bath. You don't want to make foam at the surface of the wetting agent (bubbles could leave marks at the surface of the emulsion). Ever so gently, stretch the film slowly and find the end bit of your film. Pin in the film peg, and with a nice and confident gesture, pull the film off the bath holding the film peg. You are now ready to hang to dry the film.

WARNING:

- Never touch the emulsion of the film when wet. It is extremely fragile and would be irreversibly scratched or altered if you touched it. If, like me, you are a tactile person and like touching wet emulsion, make sure you do it only at the stubby end bit of your film.
- Sediments in the tap water can leave deposits on the emulsion. Pending on the quality of your tap water, you can use purified / de-ionised water for mixing the wetting agent/water for the last wash to reduce the risk of deposits of staining.

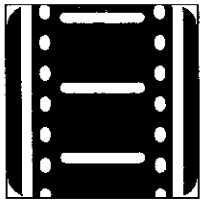
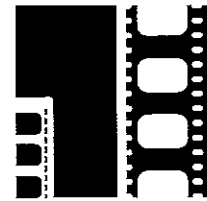
7. Drying:

The best way to dry film flat is to let it air dry slowly. It must dry in a dustless environment. If you hang your film to dry in your bathroom, close the door, and avoid entering the room before the film is dry. This is to avoid any air movement. For this reason, if you haven't got a dedicated film drier, it is best to let it dry overnight.



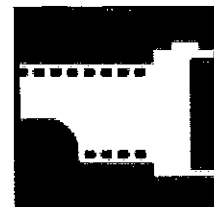
CLEANLINESS is next to godliness

CONSISTENCY & REPEATABILITY



Small progressive INCREMENTAL changes

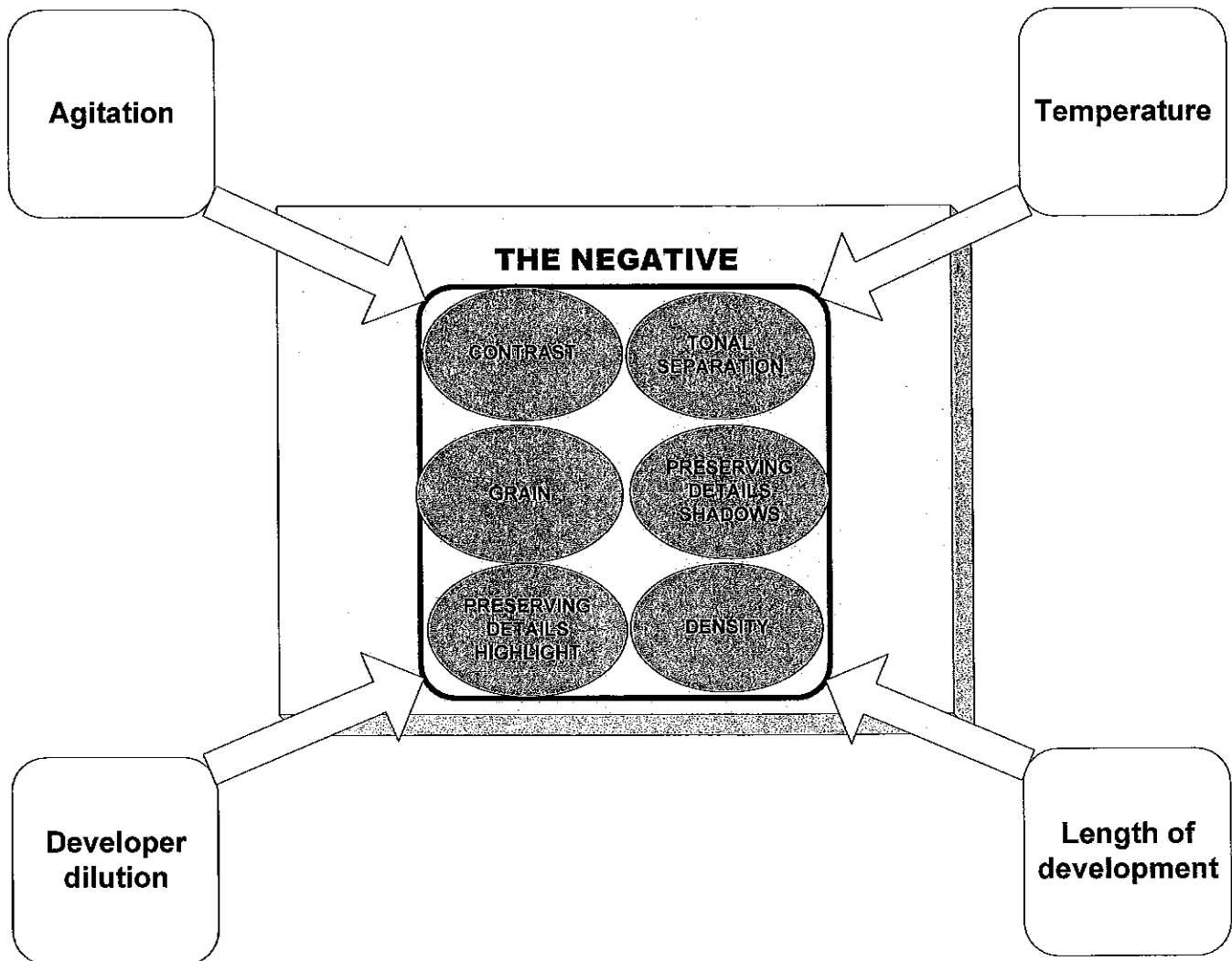
Develop for the HIGHLIGHTS



FUNDAMENTALS OF THE PROCESS

The core elements that allow to craft the negative and to have some control over the development are the agitation, temperature, developer, and timing of the development.

When making changes to your process, it is essential to change only one element of your process at a time. Always keep processing notes.



READING THE NEGATIVE

Please refer to the extract of the Kodak Workshop series, P20/21 dedicated to troubleshooting. Article provided as addendum.

TESTING YOUR PROCESS

Over testing can kill your photography. However, a good photographer always knows the limits/capability of his camera gear and his process.

It is good practise to test your metering (off or in-camera) and your film processing to ensure that you produce the best negative, and that, to gain controllability over your processing.

EXPOSE YOUR TEST PHOTOGRAPHS:

For the test, you need to place your camera onto a tripod and take 3 sets of the same frame at bracketed exposures as follows:

FRAME 1	FRAME 2	FRAME 3	FRAME 4	FRAME 5	} X3 SETS
N - 2 stops	N - 1 stop	NORMAL EXPOSURE	N + 1 stop	N + 2 stops	

DEVELOP THE TEST PHOTOGRAPHS:

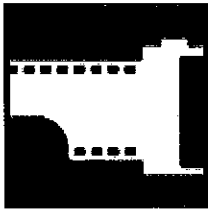
Develop each test sets as per below.

			E.g
Set 1	Develop Normal	Normal dev time	10 min
Set 2	Pull process 1 stop	Normal dev time - 20%	8 min
Set 3	Push process 1 stop	Normal dev time + 20%	12 min

Choose the exposure and processing time which give you the best level of details in the shadows and highlights.

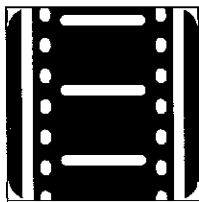
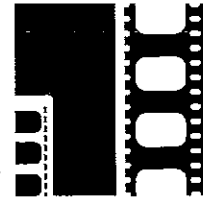
Further read: Creative Black & White Photography – Les McLean.

Further read: A simple way to test for Film speed and developing time. Article provided as addendum.



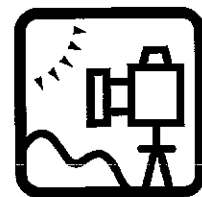
BW Negative film is FORGIVING

EASY has to be the way

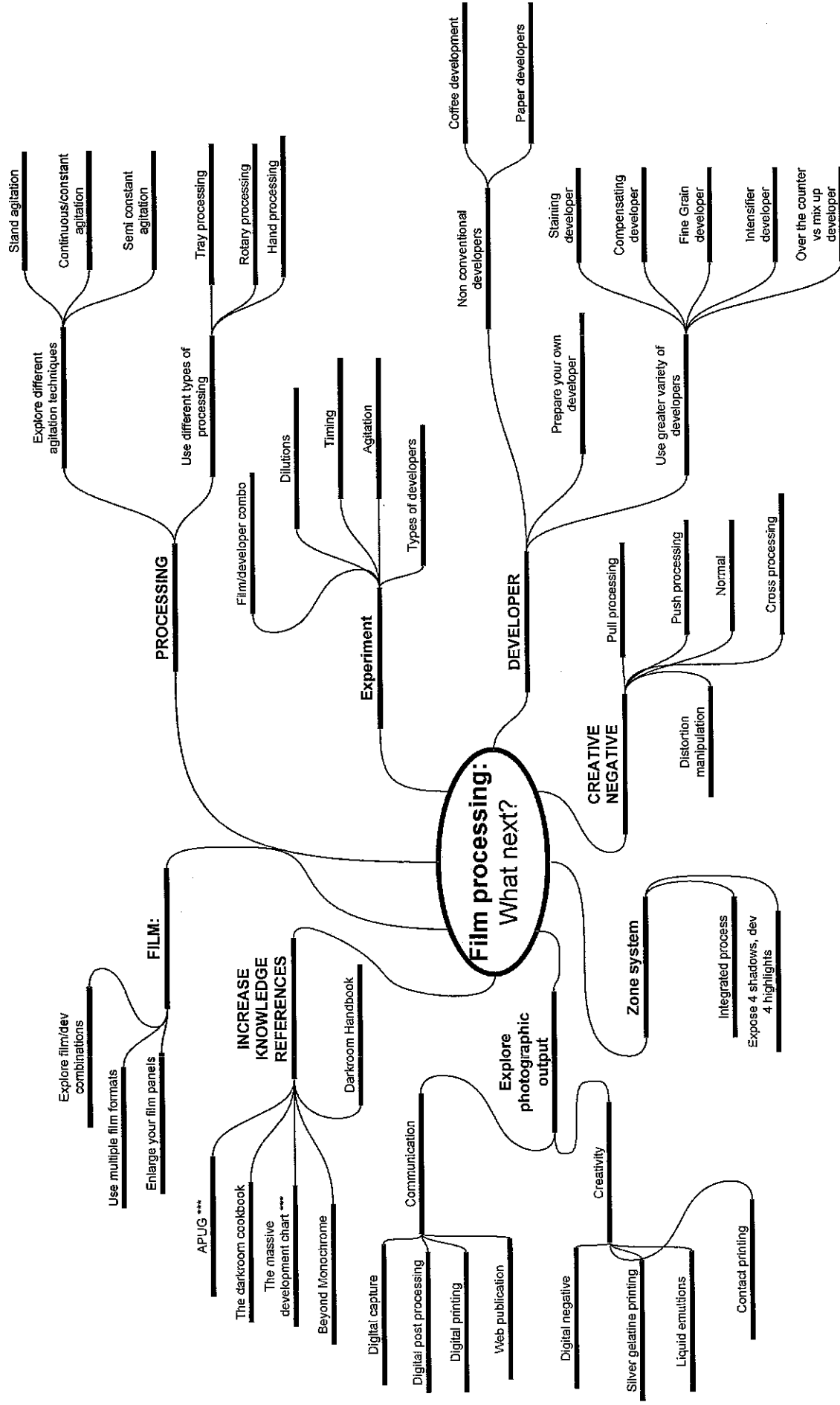


Be creative, EXPERIMENT

And ... welcome to the DARK SIDE!



WHAT NEXT?

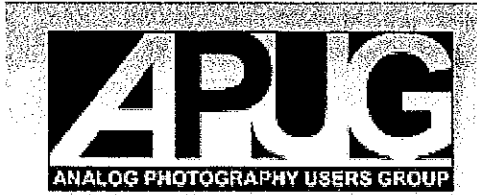


USEFUL ADDRESSES

Hardware supplier :

the Second hand darkroom
<http://www.secondhanddarkroom.co.uk/>

Online forums and analogue community :



<http://www.apug.org/>

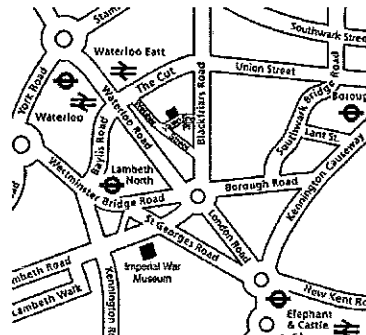
Technical data and processing information :

THE MASSIVE DEV CHART

<http://www.digitaltruth.com/devchart.html>

Chemical supplies :

Silverprint ***** : <http://www.silverprint.co.uk/>
Firstcall photographic: <http://www.firstcall-photographic.co.uk/>
RK: <http://www.thedarkroom.co.uk/>



FINAL WORDS

As you understand, photography is a Whole; it is an Art, a Science, a Technique and a Hobby. Don't let technical data or cryptic chemistry terminology put you off.

Processing film is easy, and needs not be fiddly. Make the process YOUR process, and what works for you, is the way to go.

Processing film is not only a very cost effective way to develop your photography, it also a very rewarding and personal experience; it is that of making YOUR own photograph...from end to finish.

I hope that you will find this booklet useful and informative. I certainly enjoyed putting it together, and sharing my passion for film photography and the craft of making a photograph with you.



This workshop is organised through the LPMG portal. This is a free event and my time is free.

However, if you value the material which I prepared, and find that you gained useful skills/knowledge out of this workshop, you are welcome to sponsor me for the 5k Santa Dash event (Greenwich – December 08) and help me fundraise for the benefit of **St Barts hospital and the London charity**. (Registered charity number 212563).

Contributions made will go direct to St Barts and the Cancer Care Appeal which will provide additional life-saving equipment, fund vital research and ensure patients receive the best treatment possible in a calming environment.

Fill in the fundraising form!!

