

Colour Printing - The C41/RA4 Process

This guide is intended to be used in conjunction with the Photocolour FP (film & paper) chemicals for developing C41 film and RA4 paper. Both paper and film can be developed using the same chemicals. What follows are instructions for producing colour prints from this kit. The process works best at 38°C, so you will need to use the Jobo water bath and processing drum (one each in Christ Church and Pembroke).

Mixing the Chemicals and Setting up the Waterbath

First of all fill the waterbath with warm water from the tap at about 40°C. Now plug in and switch on, setting the temperature to about 39-40°C; you will find that the waterbath needs to be at a couple of degrees above the temperature that you want the chemicals at. It is also advisable to use a thermometer to double-check the temperature since the thermostat isn't always very accurate.

The next step is to mix the chemicals. These chemicals are **nasty**: wear rubber gloves whenever you handle them (whether concentrated or diluted). It is best to dilute with warm (approx. 40°C) water so that you don't have to wait for the diluted chemicals to warm up in the water bath before you use them; this can take some time!

Colour Developer: Mix one part of concentrate A with two parts of water, then add concentrate B at 4ml per 100ml of dilute solution.

Bleach Fixer: Dilute one part fix to two parts water.

Now pour the diluted solutions into the special measuring cylinders which fit into the JOBO tank (these are colour coded with little dots) and place them in the appropriate position in the water bath. It is best to mix up 100ml of each since this is enough for 4 10x8" prints and is the stated amount for a 10x8" drum.

You will also need to fill up one or two of the special bottles with water at 40°C. These also have their own home in the water bath.

Now you can leave the whole thing alone for a while to reach an equilibrium state; it is best to leave a thermometer in the waterbath and check that the temperature is stabilising. If not make a suitable adjustment to the temperature control.

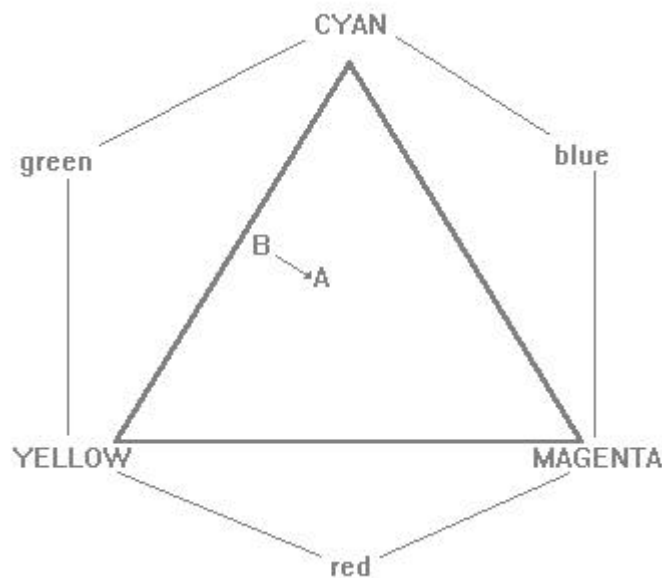
The Dry Part of the Printing Process

(1) Place clean negative into the carrier and insert into enlarger. Adjust height of enlarger to obtain the desired print size and focus.

(2) **Set Basic Filtration.** Set the colour head filters to the filtration values given on your box of paper. A good starting value is Yellow50 and Magenta50.

(3) **Make an Exposure Test.** Vary the aperture giving the paper a constant exposure time e.g. 10 seconds. You can do this by masking off the paper into 4 sections by using a piece of card as a mask.

(4) **Assess Colour Balance.** The correctly exposed print may not have the correct colour balance and it is said to have a 'colour cast'. All colours are made up of three basic colours...in this case they are magenta, yellow and cyan. These all have their colour opposites (green, blue and red respectively) which if mixed in equal amounts will give you white:



If point A is assumed to be the correct colour cast with equal amounts of yellow, cyan and magenta, then if a print has a green cast, it will fall at point B. To correct this the print has to be made **more** magenta. Since we are working with negative materials, to do this we **decrease** the amount of magenta filtration.

It should be noted that the cast could also be removed by equally **decreasing** the amount of cyan and yellow (i.e. increasing the cyan and yellow filtration since negative materials) which is directly equivalent.

Thus it can be seen that for general purposes only **two** filters need to be varied to correct a colour cast. With this particular process cyan is usually set at zero and is not altered (except in an emergency if you can't decrease yellow and magenta any lower!). Most casts that you tend to get are made up of a combination of magenta and yellow (or their opposites green and blue).

(5) **Make a Filtration Test.** Having determined the colour cast and how the filtration should be varied, the extent of change can now be determined by a

filtration test. It is best to vary the filtration in 10-15 intervals for colour negative materials. Increasing the filtration creates a complication - the filters absorb some of the light from the enlarger and therefore, to keep the exposure value constant, the exposure time must be increased by a certain factor.

Adjustment Factor			
FilterValue	Yellow	Magenta	Cyan
5	1.1	1.2	1.1
10	1.1	1.3	1.2
20	1.1	1.5	1.3
30	1.1	1.7	1.4
40	1.1	1.9	1.5
50	1.1	2.1	1.6

Again it is a good idea to use the mask and make four exposures on one sheet of paper with different filtration values. This not only saves paper but quite a lot of time.

(6) Repeat stage (5) if the colour balance is till not acceptable.

(7) **Make a Final Print** using the filtration values obtained from the tests which give the correct colour balance.

The Wet Part of the Printing Process

N.B. Switch off all lights when handling paper!

The paper is sensitive to all colours of light.

(1) Wash the print drum and dry it thoroughly. Any remaining water in the drum may damage the quality of your prints.

(2) Make sure all the chemicals are in the water bath and are at 38°C. If not then either adjust the water bath or decide to use an alternative development temperature (see below). You should have about 100ml of developer and bleach fix and 300ml of water.

(3) Perform the dry part of the process in **total darkness**, load the print into the print drum and place the top securely onto it. Now you can turn the lights on.

(4) Now commence the development procedure starting with the 300ml of water as a pre-soak which heats the print and drum to the required temperature (see below for the sequence and times). Pour the water/chemicals into the top of the drum and as you tip it over horizontal, the

water (or chemicals) will move from the chamber in the top of the drum into the body of the drum where the print is. As you are doing this, put the drum in place in the water bath (it has a magnetic attachment which will hold it) and start the motor which rotates the drum. 15 to 20 seconds before the time is up, remove the drum, pour out the water/chemicals and pour into the top of the drum the next chemical in the sequence. Make sure that you do all of this in the 15-20 seconds since you should tip the drum to coincide with the start of the next sequence step. Pre-soak water can be tipped down the sink after one use, the dev and fixer should be poured back into their measuring cylinders for re-use. 100ml of either can be used for 4 10x8" prints.

(5) After fixing, rinse the print in running water for the appropriate amount of time (see below).

(6) Dry print and assess colour cast. The print may have a blue cast when wet. Don't worry, this will disappear when the print dries. It is best to assess the print under daylight since indoor (tungsten) light has a yellow cast to it.

Processing Sequence					
°F	°C	Pre-Soak	Development time	Bleach Fix	Wash
100	38	1min	2min	1min	2min
99	37	1min	2min 15sec	1min	2min
97	36	1min	2min 30sec	1min	2min
95	35	1min	2min 50sec	1min 30sec	3min
93	34	1min	3min 15sec	1min 30sec	3min
91	33	1min	3min 45sec	1min 30sec	3min
90	32	1min	4min 10sec	1min 30sec	3min
88	31	1min	4min 40sec	1min 30sec	3min
86	30	1min	5min 10sec	2min	4min
84	29	1min	5min 50sec	2min	4min
82	28	1min	6min 30sec	2min	4min