

# Introduction to Regular/Double 8mm Filmmaking: Shoot, Process, Project

Sandy McLennan (edited March, 2023)

## Why shoot film:

A big reason to shoot film is to have the experience of the acts and processes. Unlike digital where devices are camera/processor/projector in one, analogue shooting is separate and distinct from processing, which is separate and distinct from viewing and each involves concentrated labour. The deliberate hands-on interaction with old and usually fussy equipment, where nothing is electronic or automatic, is unique and memorable. It is an experience in itself. It involves anticipation and anxiety about how the images will turn out. What you do may not be what you get. Projecting one's film offers a nerve-wracking/thrilling and simultaneously solo/social event. Then there is the emotional response to the way it finally looks on the screen.

## History:

From the invention of motion pictures in the late 1800s

<https://archive.org/details/42754TheBiographyOfTheMotionPictureCamera>

Early film was 35mm wide and nitrate-based, requiring large equipment, expensive processing and it was highly flammable. Commercial research/development sought to reduce the size of film and equipment, and create a "safety" film which would not catch on fire in the home. "Eastman Kodak's 1923 invention of the Cine-Kodak trumped the competition"<sup>1</sup>. This camera employed 16mm acetate film, which was processed such that the camera-original film could be projected directly as a positive image.

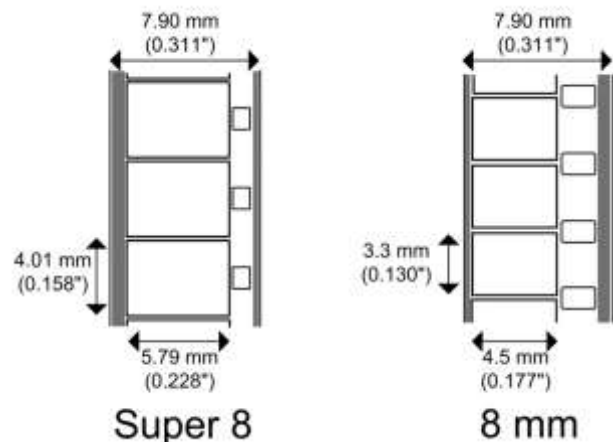
<https://www.kodak.com/en/motion/page/chronology-of-film>

To lower the price, shrink the size of equipment and sell more film and gear, in 1932 Eastman Kodak developed the Cine Kodak Eight camera and 8mm film. With twice the number of perforations on each edge, and having the operator run the film through the camera twice, four times as many frames could be shot on an equivalent length of 16mm film (the processing lab would slit the film down the middle and splice it end to end). This became: "the favorite format for hobby amateur filmmaking, a format that would remain essentially untouched for nearly 30 years".<sup>2</sup> Paillard-Bolex entered the market with the L-8 in 1942. In 1965 Kodak introduced Super 8.

The Super 8 film format included improvements of Regular 8: simplified camera loading by employing a drop-in cartridge, a larger picture frame and enabling some cameras to record sync sound on a magnetic stripe on the film. Battery operation allowed longer takes than spring-wound cameras.

Image: Max Smith,

[https://en.wikipedia.org/wiki/Super\\_8\\_film](https://en.wikipedia.org/wiki/Super_8_film)



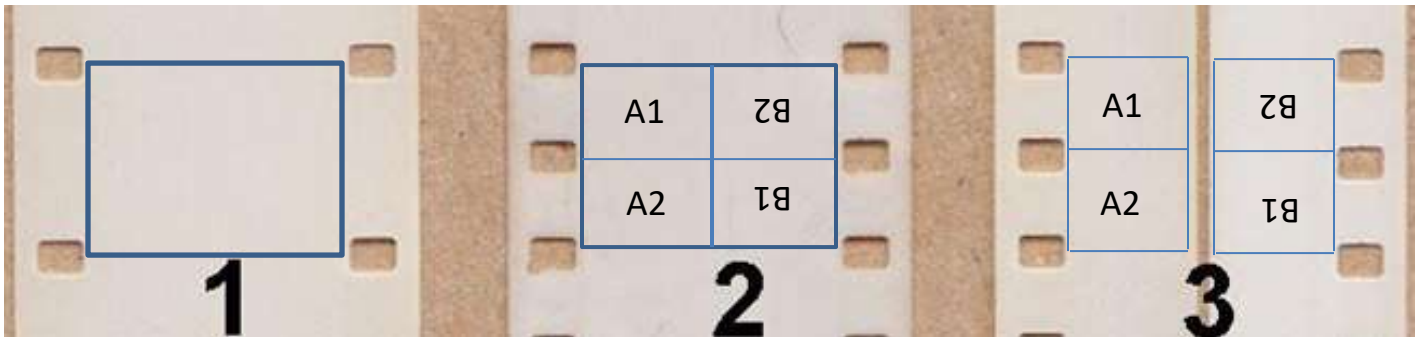
<sup>1</sup> Adrianna Link, <https://www.theatlantic.com/technology/archive/2011/06/the-summer-of-super-8-a-look-at-the-films-technological-origins/240219/>

<sup>2</sup> ibid

### Double 8mm (aka Regular 8mm, Standard 8, Normal 8, 8mm) film format:

The 16mm-wide film must pass through a Regular 8 camera twice. On first pass (side A) the length of film is exposed between the sprocket holes to the centre, half of its width. When the length of film has run through the camera, the take-up spool is flipped over, placed on the supply spindle and the camera re-loaded. Side B is exposed. After processing and drying, the film is traditionally slit down the middle lengthwise, resulting in two lengths of 8mm film which are spliced together end to end. As an option, the film can be left 16mm wide and projected as such, with considerations – side B will show time in reverse relative to side A, and it may show images that are upside-down and backwards. Something to think about.

1. 16mm double perforation (aka. double-perf, 2R)
2. Double 8 from camera: 4 frames show at once on 16mm projector. Side B in reverse time relative to Side A, Side B orientation upside-down relative to side A (if side B shot with camera right side up). If side B shot with camera upside-down, top of image orientation will be the same as side A.
3. Slit Regular 8mm, traditionally spliced A2 to B1. Time and orientation are “correct”



### The film stock:

Kodak ceased sales of standard 8mm film under its own brand in the early 1990s. As of March 2023, the only factory manufacturer of Regular 8mm film (that I’m aware of) is Foma in the Czech Republic, which only makes black & white reversal and sells to distributors only, such as LIFT. Re-perforated 16mm stock (doubling the perforations to enable use in Regular 8 cameras) is available from a few businesses, including Niagara Custom Lab. Rolls usually come in 25-foot lengths. Fomapan is 33’ on a roll. Film Photography Project (FPP) sells some in 100-foot lengths (for use in a Bolex H-8 camera). If the processed film is slit, you get double the length you bought, which is unique to this film format.

[Fomapan R100 tech sheet here](#) . Movie about Wittner company’s [perforating machine](#) to make Double 8mm film stock.

### Shooting film:

For the workshop we’ll use Fomapan R100 reversal film (meant for projecting the camera-original film as a positive “normal to our eye” image, as opposed to a negative which looks unusual to our eye and is meant to be printed to create a positive image). Note that any film can be processed any way you choose if you are experimenting and you might also try projecting negative film, see if you like it.

The in-person workshop cameras are Bolex B8 or K2, all from the 1950s and early 1960s. Perhaps the trickiest part of this whole adventure is getting the Double 8mm film in the take-up spool slot then loading the film correctly in the camera. This procedure is to be practiced in the room light, then with eyes closed, then in the dark. The emulsion (light-sensitive) side of the film must face the gate (the frame-size opening where the light gets in to a camera) and lens to be exposed. It is the dull side compared to the shinier plastic base side, it usually curves in and will stick to your wet lip if you pucker it. The R100 tech sheet states to handle the film in complete darkness, but using a very dim, indirect dark red (640nm) safelight will not fog the film (unintentionally expose film to light energy which darkens its base colour) to a detrimental degree in this workshop.

Place the camera between yourself and the world, and shoot film! Wind the spring motor, go outside, see what made you look. That is your personal experience, with nothing to show for it. You may tell about it, you may remember what

happened, but that may be all you get. Once you're done shooting, there is only a potential image on film — a latent image. To be developed.

Many Regular 8 cameras will have only one frame rate or shooting speed (not the same as shutter speed – see below), usually 16 or in later models, 18, frames per second. To determine shutter speed, we need to know the frame rate, eg. 16 frames per second and the shutter angle — the size of “pizza slice” taken out of a 360 degree disc, eg. half the pie or 180 degrees. A detailed explanation of film camera mechanism is here: <http://www.shutterangle.com/2012/cinematic-look-frame-rate-shutter-speed/>

The formula is (fps X 360)/shutter angle, so (16 x 360)/180 = 32 which means a shutter speed of 1/32sec or to simplify, 1/30sec. When assuming a shutter angle of 180 (it may actually be 165 or 190) multiply the frames per second number times two and make that a fraction: 18 frames per second gives a shutter speed of 1/36sec and 24 frames per second gives a shutter speed of 1/48sec.

To determine aperture without a light meter, adapt the “sunny 16 rule”: with an outdoor scene under a cloudless midday sun, use aperture f/16 and a shutter speed determined by 1/ISO (Fomapan is ISO100) so 1/100sec. But we have a shutter speed of 1/30sec, so we need to close the aperture from f/16 to f/22. Simplifying will work, so use the chart below. If the scene has both bright/reflective areas together with deep shadow areas, set the aperture to f/8 as “average”.

ISO100	sharply-defined shadows from clear sun	1/30sec	f/22
ISO100	soft shadows from thin overcast sunlight	1/30sec	f/16
ISO100	no defined shadows from overcast sunlight	1/30sec	f/11
ISO100	no defined shadows from heavy overcast sunlight	1/30sec	f/8
ISO100	no defined shadows, subject in deep shade	1/30sec	f/5.6

After shooting half the film (side A), return to the darkroom or use a film changing bag. Open the camera, flip over the spool now full of film and place it on the supply spindle. Load the camera. Shoot side B, considering how you would like to project it: if projecting Double 8mm in a 16mm projector and the side B camera is held upside-down, the side B images will be oriented same-side-up as side A. If shooting side B with the camera right-side up, the images will be upside down relative to side A, but will be right side up if slitting and projecting as Regular 8. It's a tricky medium!

#### Processing film:

As my friend, artist Elspeth Wood, says about experimental image-making: “it doesn't much matter what I get, as long as I get something.” The exposing event is significant in and of itself, with its own expectations, surprises, disappointments and rewards. Processing is a distinct event with its own expectations, surprises, disappointments and rewards. One hand-made filmmaker says: “you have to believe something is going to happen”.

In order to reveal latent images on the film (or discover you have no images!), we use liquid chemistry and time. We start with short strips and not the whole film, to learn the process and assess results before committing to processing a whole roll. You could shoot exposure tests and take notes, then process those clips individually while taking notes, then save backlit digital still images of the resulting film clips, as reminders to go with the notes. It is an advantage of Double 8mm (and 16mm) film over Super 8 in that you can shoot very short strips and process them whereas you must shoot a whole cartridge of Super 8 before starting to process any of it.

Black & white reversal processing in buckets involves four chemical mixtures, water and a white light in this order: first developer, stop bath, bleach, clearing bath, re-exposure, second developer and fixer. Pour the developer, bleach, clearing bath and fixer in to their own buckets. Pour water into three buckets.

Each film stock has a recommended developer and corresponding time/temperature. The activity of the developer (turning light-exposed crystals black so we can see them) is increased with higher temperature or longer time. For Fomapan R100 stock, try Caffenol at room temperature (~20C) for 8 minutes. If the developer is much cooler or warmer than that, here's an online calculator to determine the relative time to use:

<https://www.digitaltruth.com/devchart.php?doc=timetemp>

### Recipes and processes:

Developer (for black & white negative and reversal processing):

Caffenol C-M from <https://caffenol.blogspot.com/2010/08/recipes.html>

In 750ml warm water, mix in order:

54g weight, 3 Tablespoons washing soda (eg. Arm & Hammer SoClean from grocery store)

16g weight, 1 Tablespoon ascorbic acid (aka. vitamin C powder) from Bulk Barn or health food store

40g weight, 7 Tablespoons instant coffee (eg. discount store brand)

Add water up to one litre

Stop Bath (for black & white negative and reversal processing): room temperature water

Fixer (for black & white negative and reversal processing):

Commercial, non-hardening fixer, eg. EcoPro Fixer

from <https://www.argentix.ca/> or <https://www.bhphotovideo.com/>

Essentially it is ammonium thiosulfate, sodium sulfite and water,

bulk chemicals from <https://flicfilm.ca/bulk-chemicals-and-accessories/> or <https://www.argentix.ca/>

Or 300g (1 Cup), coarse/sea salt in one litre hot water (fix for at least 12 hours or until edges are clear on negative strip)

Bleach (for black & white reversal processing, the step after first developer and stop bath):

Sandy's current preferred bleach is referred to as Kodak R9/Foma B2/Orwo 833, which is 5g potassium dichromate from <https://www.argentix.ca/> and 44g sodium bisulfate (swimming pool product Aquarius PH- minus) from [Canadian Tire](#) in 1L water. Recipes call for sulphuric acid but sodium bisulfate is the substitute: for 1 ml of concentrated acid substitute 4.42 grams of sodium bisulfate

Other black and white reversal bleaches include Kodak R10/Ilford Reversal (solution A = 2g potassium permanganate in 500ml water, solution B = 60g sodium bisulfate in 490ml water; mix solution A and B just in time). Noah Henderson informs about ferric chloride/ammonia bleach process at 14:17 here <https://youtu.be/4XCOW1SKI> Noah is a wealth of dedication/information; he also describes a reversal/fogging + second developer bath of Iron Out ([from Canadian Tire](#)), 1Tbsp to 300ml distilled water, 5 minutes.

Another locally-sourced reversal bleach is Hydrogen Peroxide + vinegar. To make one litre:

257ml of 35% strength hydrogen peroxide, 540ml of grocery store vinegar (5% strength acetic acid) and 200ml water to make one litre. DO NOT STORE this mix — it is actively creating gas and will cause a sealed container to explode (take my word for it).

35% strength hydrogen peroxide is sold by [www.sproutmaster.com/35-food-grade-hydrogen-peroxide-c-1/](http://www.sproutmaster.com/35-food-grade-hydrogen-peroxide-c-1/) and they ship in Canada. It's available at [Upayanaturals.com](http://Upayanaturals.com) in Toronto, at <https://nutritionplus.ca/> in Barrie. The original recipe calls for 90ml of 9% strength hydrogen peroxide (to get 9% strength from 35% strength, the formula is  $90/.35$ ) and 27ml of pure acetic acid (grocery store vinegar is 5% strength so the formula  $27/.05$ ).

Another option to test is 500ml of 3% hydrogen peroxide (Canadian Tire, Shoppers) plus 35ml white vinegar (grocery store, 5% acetic acid). DO NOT STORE

Try this article for another peroxide recipe: <https://imager.ie/a-better-peroxide-black-and-white-reversal-bleach/> with some of the chemicals listed being available from Argentix or <https://www.krinslifescienceslab.ca/product/edta-acid-free-acid-extrapure-ar-99/>

Clearing Bath (optional step after the bleach to remove its stain):

Foma recipe: 50g potassium metabisulphite in 1L water; Ilford recipe: 25g sodium or potassium metabisulphite in 1L water. Bulk chemicals from <https://flicfilm.ca/bulk-chemicals-and-accessories/> or <https://www.argentix.ca/>

To test whether or not a film becomes fogged (shows unintentionally-formed metallic silver) by a safelight, or to learn if a suspect roll of film is fogged (before shooting it): in complete darkness, cut off four inches of known-good stock (properly-stored, factory-fresh, never been opened) and drop it in the fixer. After two minutes, turn on the room light then dry the clip. This will be the reference to know the expected base density/colour of that film stock.

In complete darkness, cut a short piece of suspect film and develop it straight from the can, as negative, using the recommended developer/time/temperature. See if there is any difference in the base between this clip and the reference. If the base is grey/fogged, you can expect that to show in camera-exposed film, which will be very low contrast. Good to know in advance when considering expectations and how to use this specific film in a project.

To test a stock/safelight combination, place the clip emulsion-up on a table with half its length covered by an opaque object. Turn on the safelight for five minutes. Turn off the safelight, develop the film as negative and compare the covered to uncovered halves. If the film is fogged, this is not a safe light in that position for that length of time.

Procedure:

1. With a guillotine splicer (or scissors) handy and chemical buckets filled/in place, in the darkroom with room light off, open the camera and cut off the desired length of film from the spool, collect it in a dry container
2. Put on rubber gloves and safety goggles, start the timer (if a phone timer, keep the screen light covered), dunk the Fomapan in the Caffenol developer for 15 minutes
3. Every 30 seconds, reach in and swish the film around for 5 seconds (agitate). Make sure all of it stays submerged
4. 15 seconds before time is up, lift film out of the liquid and let it drip then move it to the stop bath (in this case, water) and swish for one minute. If processing negative, skip to step 9.
5. [for reversal] Dunk in the bleach, "to completion". After a couple of minutes, turn on the room light. When all of the black is gone (some of these parts may become see-through), lift film out of the liquid and let it drip. Move it to a water bucket and swish for 1 minute
6. [for reversal] (optional, clears the brown stain on Fomapan) Dunk in clearing bath for 30 seconds. Rinse in water
7. [for reversal] Pass film from end to end, closely under a bright bulb (eg. 60W tungsten table lamp) then pass it back again with the other side up
8. [for reversal] Dunk in the developer, "to completion": a few minutes until edges turn fully black. Rinse in water
9. Dunk in the fixer (commercial fixer takes a minute or two, salt fixer takes 12 hours until edges clear)
10. Swish film in water. Drain this bucket at the sink and refill/swish, twice.
11. Dry the film (use a shower curtain rod or paper clips bent over a stretched string)

Article about reversal Processing, <https://imager.ie/black-and-white-reversal-with-hydrogen-peroxide/> by Karl Matthias, edited by Sandy: Starting with a negative image (developer-only, not fixed), the highlights/blackest parts (metallic silver) will be removed in bleach to make that part of the image clear and the remaining under/unexposed silver halide (shadow parts) will be re-exposed and re-developed to become black metallic silver. The result is a positive image, with black shadow areas and clear highlight areas: the reversal of a negative.

Reversal process video by Kelly-Shane Fuller <https://www.youtube.com/watch?v=XVOgi3QcGzk> and one by Noah Henderson <https://www.youtube.com/watch?v=4XCOWOW1SKI>

Filmkorn.org regarding reversal processing, edited by Sandy: Increasing the amount of metallic silver in the negative by overexposing the frame or lengthening first developer time, more metallic silver is removed by bleach and less silver halide remains available for re-exposure/re-development. The result is a lighter positive image. And vice versa.

When you don't trust a suggested developer time/temperature for a specific film/exposure context, try developing clip(s) "by inspection" to get you in the ballpark. I use an infrared light on an old camcorder (eg. [Sony with "Nightshot"](#));

the recording function does not need to be working) or you could try a certain safelight as per <https://unblinkingeye.com/Articles/Inspection/inspection.html> by Ed Buffaloe, edited by Sandy: Inspect under a dark green safelight filter [eg. 5mm green LED 525nm]. The negative should be developed for at least half the "normal" time before inspection. As development progresses, the negative becomes increasingly desensitized to further exposure, but it is always advisable to keep inspection times to a minimum.

As a reference for each stock in question, have a normally exposed, "correct" developer-only (not fixed) negative. With developer at a known or usual "room" temperature, develop the film for half the "normal" time, place it in a water bath to halt development, and examine it carefully under reflected green LED light. The emulsion side will be mostly dark, so closely examine the base side and compare with the reference negative. If the highlights appear as substantial black in the general milkiness of the base side, move to the fixer. Otherwise, turn off the safelight, put back in the developer for a further, measured, amount of time and repeat the inspection. It may help to place a finger behind the negative then the highlight values (dark portions of the negative) should be distinct from and not as dark as the total darkness of your finger. It requires considerable experience to judge a negative. Also use high-contrast, low-contrast and first-developer-for-reversal "correct" negative samples for comparison.

### Projecting film:

Part three of the film experience is projection, the obverse of camera shooting. It uses the same mechanism but light comes from the other side, as it were. A very detailed video here: [How a Film Projector Works - YouTube](#). If we think of emulsion as the front of the film, then the camera enables light to hit the front of the film. The projector light shines through the "back" of the film and casts an image on the screen. Part three completes the circle.

If the filmstrip is not completely dry before spooling or projecting it, sections may stick together and the emulsion may be altered when forced apart. An artistic and practical decision is made when you choose to slit the film from 16mm to 8mm width, or not. This determines whether a Regular 8 or 16mm projector is to be used. Projection format (unslit Double 8 or slit Regular 8) and frame rate (projector speed) relate back to choices and settings from when the film was shot, and from how it was processed. New inspiration/direction is available in each of the three stages of your creation.

16 frames per second was the standard shooting and projection speed (frame rate) for Regular 8mm cameras and projectors in their era. Later, 18 frames per second became the standard (I have not been able to find out the reason why). Shooting and projecting at the same frame rate (eg. both at 16fps) will look like a "normal" speed of motion. Projecting at a rate that is faster than shooting rate will appear to speed up motion, and vice versa. This is something to keep in mind when shooting and projecting, especially if you have a variable speed camera and/or projector.

16mm projectors commonly run at "sound" speed, 24fps. Some have a "silent" speed, 18fps. Many Regular 8 projectors only run at 16fps. Some, especially dual 8 (Regular 8 or Super 8), run 18fps or 24fps or variable speed including very slow rates. It can happen that your instructions to the projectionist stating: "project at 18fps" are not observed and your film may be seen at an undesirable rate of motion. Regarding festival screening, especially if you have a sound track that is synced to a specific picture frame rate, you might contact the festival and ask what speed(s) they know they can project at. If they don't have your first choice of speed, it will be easier to edit your audio (if it can remain artistically valid) than to re-shoot or print the film.

Lots to think about and try.

Run times for different formats and speeds:

Double 8 (4 x 8mm images in one 16mm frame) has 40 (quad) frames per foot, Regular 8mm has 80 frames per foot, Super 8 has 72 frames per foot:

	Regular 8	Regular 8	Double 8	Double 8
Frames per second (fps)	16fps	18fps	18fps	24fps
25 feet (16mm quad frames)			55 seconds	42 seconds

50 feet (side A spliced to side B)	4:10	3:42		
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## Resources:

R8 film stock:

<https://lift.ca/product-category/8mm/>

[https://niagaracustomlab.com/?page\\_id=904](https://niagaracustomlab.com/?page_id=904)

<https://filmphotographystore.com/collections/movie-film/double-8>

<https://www.buy8mmfilm.com/>

<http://toeppenfilm.com/>

[https://www.bhphotovideo.com/c/product/927375-REG/foma\\_411801\\_fomapan\\_r100\\_2x\\_standard.html](https://www.bhphotovideo.com/c/product/927375-REG/foma_411801_fomapan_r100_2x_standard.html)

<https://www.freestylephoto.biz/411801-Foma-Fomapan-R100-Black-and-White-Reversal-Film-2x8mm-Double-8>

[Double 8 film stock - REVOIR \(re-voir.com\)](http://www.double8filmstock.com/)

[Wittner in Germany](http://www.wittner.com/)

Edward Nowill in London, England may re-perforate 16mm film to R8 (must be acetate base, and double-perf 2R)

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Camera information:

<http://www.bolexcollector.com/cameras/b8.html>

[vintagecameras.fr - Notices & Documents](http://www.vintagecameras.fr/)

<https://www.browniecam.com/brownie-movie-cameras/>

When researching a camera buy, ask if the seller/giver has used it themselves to shoot then process that film. If so, what results? If not, pay as if it does not work.

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Projecting:

For a knife to slit Double 8mm to Regular 8mm, try Joe McGloin, [xkaes@aol.com](mailto:xkaes@aol.com) (he also lists small amounts of bulk chemicals) <http://www.subclub.org/sponsors/goathil2.htm>

Or try searching eBay for: movie film cutter knife 16mm 2x8mm splitter slitter

16mm and 8mm projectors (both Regular 8mm only and dual R8/super8) can be found on Kijiji, eBay, estate/lawn/garage sales. Sometimes people give them away. Usually the giver/seller does not know if it works as they haven't tested it with film. Aside from physical functioning, assess the availability of spare bulbs as they will probably be the biggest expense. Extensive resource: <http://www.replacementlightbulbs.com/index.html>

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Equipment Rental:

Around the world there are artist-run centres and co-operatives that have analog film cameras and projectors for rent, and they offer workshops. [Film labs.org](http://www.film labs.org)

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Used photo equipment shows:

Photographic Historical Society of Canada <https://phsc.ca/camera/fair/> and another in Toronto is [Camerama](http://www.camerama.com/)

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Repairs

Pigeon Creek Camera (TJ Ediger, Janetville, Ontario) [Pigeon Creek Camera](http://www.pigeoncreekcamera.com/)

Jean-Louis Seguin repairs and sells 16mm equipment (Montreal) <https://www.bolexpert.com/>

Daniel Tancou repairs Nizo super 8 cameras (Toronto) 416-669-7911

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Exposure (a big topic):

One of many "Sunny16" references: <https://photographylife.com/what-is-the-sunny-16-rule>

[Exposure Value](http://www.exposurevalue.com/) is a universal and, once grasped, useful method of setting exposure given an outdoor lighting situation

Light meters for iOS and Android phones, intro/review page (updated January 2023):

<https://www.photoworkout.com/best-light-meter-apps/>

A digital camera on manual can be used as a light meter if the ISO, shutter speed and aperture can be set and read

Processing:

Plastic pitchers/pails and rubber gloves can be purchased at a dollar/discount store. A digital meat thermometer from the grocery store is useful if you will pursue darkroom work.

Foma processing technical document, includes recipes for Dichromate bleach (like Kodak R9) and clearing bath  
<https://www.foma.cz/en/fomapan-R-100>

Covers reversal processing, includes recipe for Permanganate bleach (like Kodak R10)  
<https://www.ilfordphoto.com/reversal-processing/>

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Bulk chemicals:

Canada: <https://www.argentix.ca/>

<https://flicfilm.ca>

USA: <https://www.artcraftchemicals.com/>

<https://stores.photoformulary.com/bulk-chemicals/>

Possible suppliers in Mississauga:

KRINS Life Sciences 289 201 4175 [www.krinslifescienceslab.ca](http://www.krinslifescienceslab.ca) [info@krinslifescienceslab.ca](mailto:info@krinslifescienceslab.ca)

AlphaChem <https://alphachem.ca/> 905-821-2995 [questions@alphachem.ca](mailto:questions@alphachem.ca)

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Apps:

Night vision (long exposure/low light camera app for iOS; test with non-critical film if processing by inspection):

[Night Eyes - Night Camera on the App Store \(apple.com\)](#)

[Darkroom Clock \(apple.com\)](#) (in the menu, turn on darkroom mode to make the screen dim red, so it could possibly double as a safelight; test with non-critical film)