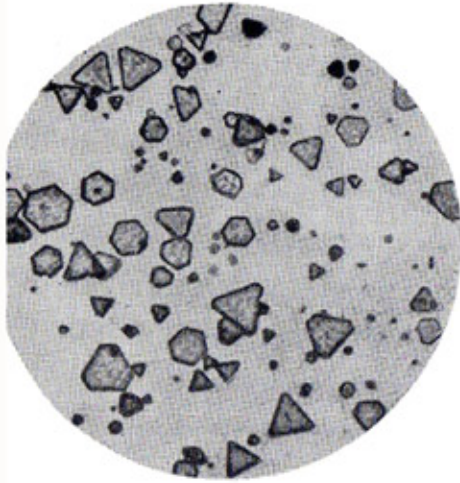


WADDINGTON'S
FUTURE SCIENTIST
EDUCATIONAL SERIES



Photography

Photography



Photomicrograph of photographic film.



Buckingham Palace, London.

Every serious amateur will want to develop his own film and print his own pictures. This is not very difficult, it simply requires a little practice and a good deal of patience. In developing and printing your own pictures you will be able to produce very much better results than can be expected from commercial, mass processing.

When you develop your film, you are completing a very remarkable process that begins inside your camera, when you press the shutter release. What happens is this. The light-sensitive coating of your film is made up of enormous numbers of minute crystalline grains of a chemical called silver bromide. They are so tiny and so close together they look like one continuous sheet, but if you put a piece of film in a powerful microscope, you would see it was made up of quite separate grains, mostly triangular or hexagonal.

When light reaches this light-sensitive coating, through the lens of your camera, a chemical action takes place – some of the silver bromide grains undergo a complicated change. But, if you could take the film out of your camera and examine it, you would see nothing different about it – it would contain a picture but it would be invisible, and this invisible picture is called a “latent image” – which means a “hidden image”. To process your film you must make a solution of chemicals that will “develop” the latent image by making the changed silver bromide grains into real metallic silver, dark and visible. The grains that did *not* receive any light have not changed their character and these the developer does not change. If, in the darkroom, the film was only put into developing solution, when you put the light on, the “unchanged” grains would very rapidly change and the whole film would turn black – this is called “fogging”. To fix the film, and prevent fogging, when the film is developed it must be rinsed and then put into a “hypo” solution or “fixer” – a solution of sodium hyposulphite – which dissolves away all the unchanged silver bromide, leaving “thinner”, sometimes quite transparent areas.

Now you will understand why a developed film gives you a “negative” – where the picture was very bright, such as clouds, nearly *all* the silver bromide grains will be changed and therefore develop into areas of dense, dark silver – where the picture was dark, such as a deep shadow, very few grains will be changed and so, when fixed, the film will be almost transparent.

Developing your film

For your darkroom, use a room, if you can, that has a sink and running water. If running water is not available, a bowl or bucket filled with clean, fresh water would be useful.

Your room must be really dark. If any light comes from a window, or under the door or in any other way, you must find ways of preventing it. To test the darkness properly you must stay in the room for at least five or ten minutes to give your eyes time to adjust. It is surprising how light a “dark” room can become after a few minutes!

Dust is another enemy, make sure your darkroom is as free of dust as possible. If any particles get on to your film – at any stage, developing, drying or printing – you may find unsightly “pin-holes” in your pictures. Give yourself enough working space and if necessary protect the table or bench top with paper or other material to prevent the risk of staining.

Now lay out the dishes in positions you will easily find when you are in darkness. One other useful provision is to have a nail or screw on a wall from which you can hang your film.

Now you must prepare the chemicals. Have a quantity of clean water ready at a temperature of 68°F (20°C). All your developing, rinsing and fixing should be done at this temperature. Take the packet of "M.Q. developer" (packet 'A') pull the small packet from it, cut a small corner off this small packet and put it carefully on the table.

Cut the larger packet open along the line, and pour some of the water into the bag, keeping the level a little *below* the red line. Shake the bag, until the chemicals are dissolved. Add the contents of the small packet and shake or stir the solution until all the chemicals are dissolved. Now check the temperature and if necessary correct it with either warm or cold water, and fill the bag to the level of the red line. You can now pour the solution into dish No. 2.

Take the packet 'B' (fixer) and dissolve the contents in the same way. The fixer crystals very quickly cool the water so you can use water up to about 100°F (38°C). Pour the fixer into dish No. 3.

As you will first need the dish with plain water in it, place it first in the row – *well away from the fixer!*

Into dish No. 1 pour some clean, 68°F water. Finally check that the contents of all three dishes are at approximately 68°F.

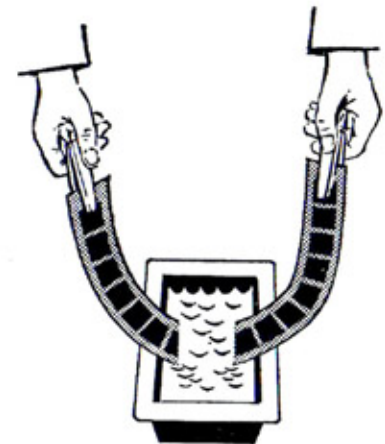
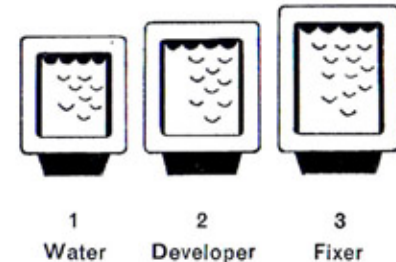
Take the roll of film in one hand and turn out the light. Unroll the paper until you reach the film and then fasten one of the plastic clips to it. Hang the clip on the nail or hook you have prepared and carefully unroll the film. Tear off the paper backing strip and fasten the second plastic clip to the other end of the film.

Now, holding both clips, form a 'U' with the film, move it over to tray No. 1 and pass it through the water by alternately lowering one end and raising the other, about every five seconds for a minute or two. This will soak the emulsion, help to prevent "air-bell" blemishes and reduce the tendency to curl when in the developer. This action calls for a little skill. It is a good idea to practice first in daylight, with a roll of paper, or film if it is available.

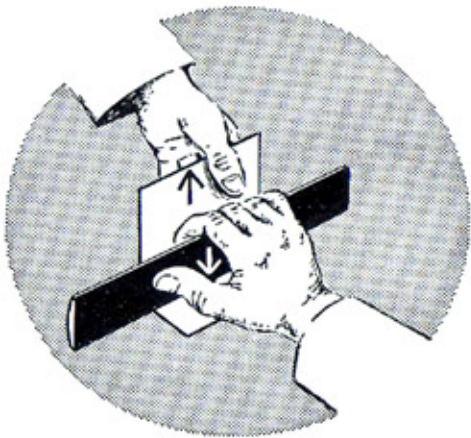
Check the recommended developing time given by the makers of the particular film you are using (in the absence of instructions try 12 mins.). Now start your timing device, if you have one, or if you have arranged for someone outside to give you the time, tell them you are beginning. Move to tray No. 2, *holding your film steadily in its 'U' form*, and begin passing it through the solution as you did through the water. Keep this action going until the correct time has elapsed, move back to tray No. 1 to rinse the film for a few seconds and then begin passing it through the fixer in tray No. 3.

If your temperature and solution mixing is correct you can safely turn on the light after three minutes in the fixing tray. You may find the film shows some milky white areas, if so, continue the fixing process until this disappears and *keep it going for the same length of time again*.

After the film is thoroughly fixed it should be washed for at least half-an-hour. This may most easily be done in a bowl or basin and care must be taken to see that the film does not curl back into a tight roll. It is not necessary to have a tap running fast – and if running water is not available, several changes, say six or seven, of static fresh water will do, provided the film is agitated frequently.



Photography



When washing is complete, hang the film up by one of the clips, with a clip on the bottom end to prevent curling. Wipe off excess water with a clean soft sponge or cotton wool swab and leave the film in a dust-free room to dry. After drying, the negatives can be cut apart and stored in transparent envelopes.

Making your Prints

Prepare the developer and fixing solution as before. It is possible to use solutions made and used earlier, especially the fixer, but they should be kept in covered jars or bottles. The developer does, however, deteriorate fairly rapidly and it is wiser to use a fresh solution at each session or whenever it becomes at all discoloured. A quantity of 8 ozs. of fixer should be discarded after approximately 75 prints have been fixed in it.

For printing, since you can see what you are doing, the trays can be arranged with the water rinse in the centre.

The light-sensitive coating on printing papers is not so "fast" (so sensitive) as that used for films – so you can work in a special amber light. Therefore, take out the ordinary light bulb and substitute the amber bulb from your kit.

There are various sizes of printing masks in your kit, for making prints of the whole, or only parts of the negatives, and giving them white borders. To use them, take off the back of the printing frame, insert the chosen mask, and then position the negative over the mask leaving the *dull* side of the negative upwards. Now turn off any white light, leaving only the amber. Open a packet of printing paper and lay a piece on the negative. Replace the printing frame back and close the spring clips.

Before you begin processing films or prints, be sure your hands are spotlessly clean. You should *never* touch a photographic emulsion if you can help it. *Always handle films and paper by the edges.* If you do touch a surface with a dirty or greasy finger, you are sure to ruin the picture.

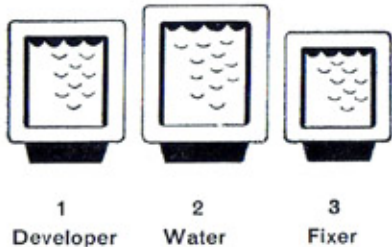
Before you do anything more wrap up the remainder of the printing paper.

Now, if you have a white light in your darkroom, you can use it to make your first print. If you have not, you may find it possible to leave your darkroom and print in another room, but keep your printing frame covered up whilst you are moving about.

Since negatives vary so much in density it is impossible to give a standard exposure time but if you think your negative is of "average" density, you could begin by placing your printing frame three feet from an electric lamp of 60 watts and counting five seconds.

Never try printing the paper in this kit, in daylight. Daylight is very, very much stronger than electric light and your prints will be fogged. If you want to use daylight for printing you should ask your dealer for suitable paper.

After exposing your print, take the paper out of the printing frame and slide it edgewise into the developer in tray No. 1. Make sure the developer flows all over the paper, and keep the solution moving by rocking the



St. James' Park, London.

tray gently. If the print was correctly exposed it will develop fully in approximately one-and-a-half to two minutes. Prints should always be developed for at least one minute. In the light of your darkroom lamp a good print will look a little darker than you would want it to appear in the normal light.

When development is complete, rinse the print for a few seconds in tray No. 2 and then immerse it in the fixer tray No. 3 – you can switch on the white light after half a minute. Leave the print in the fixer for approximately ten minutes, agitating the solution from time to time.

If a print looks too dark, reduce the exposure time; if it is too light, increase the exposure time. If you keep written records of your first correct exposures you will save yourself trouble and expense later.

If you get fixer on your fingers, always wash them thoroughly – even the smallest amount of hypo in the developer or on undeveloped prints will cause trouble.

After fixing, wash your prints for an hour in cool, running water. If running water is not available, rinse the prints thoroughly in 12 changes of water for five minutes in each change. Keep the prints separated and move them about occasionally during this washing process.

Prints may be dried, face downwards, on pieces of lint-free cloth, such as linen, or on clean blotting paper. After drying they can be flattened by placing them under heavy weights for a few hours or, *with great care*, they can be straightened immediately with a rounded ruler as shown in the diagram on page 4.

How to use your Future Scientist camera

This camera is a very simple one to use and will provide you with excellent pictures if you use it carefully. First examine the front of the camera and learn how to use the focusing ring, the aperture, the shutter and the "bulb" and "instantaneous" controls.

When you understand how the controls work, load the film into the camera as follows:

1. Set the locking screw to "open" and slide the camera back off.
2. Open the film spool gate, insert the film spool and close the gate.
3. Thread the end of the paper into the take-off spool and wind the spool knob until the paper is drawn tightly across the back.
4. Replace and lock the camera back.
5. Watch the red window in the camera back and wind the film along slowly until you see the figure 1 appear: stop there – your camera is ready for use.

Before you take a photograph check –

1. Is the lens cap off?
2. Is the focus set?
3. Is the aperture set?

After every exposure wind on the film.

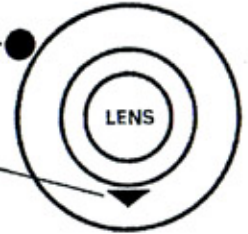
You can buy films of different "speeds". There are "slow" films, usually used for photographing "still life" or copying other pictures, and very "fast" films used in places where the light is very weak. All films are given "speed ratings". The film in your kit is rated at ASA 160 and it gives you 16 exposures, $1\frac{5}{8}$ " square.

Shutter Release

Shutter speed is $\frac{1}{25}$ th second.

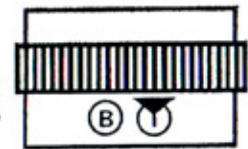
Focusing Ring

Judge the distance between you and your subject and set the pointer to the correct figure.



Shutter Setting

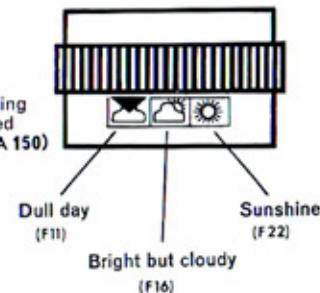
If the control is set at 1, when you press the Shutter Release you will make an "instantaneous" exposure – a snapshot.



If the control is set at B when you press the Shutter Release the shutter will remain open as long as you keep your finger on it. You will only need this "bulb" setting for photographing still objects in electric light or very weak daylight.

Aperture

Aperture settings, using a film (speed prox. ASA 150)



Photography



Thin (under-exposed) negative.



Flat print from under-exposed negative.

How to take good pictures

Photograph in full sunshine, if you can, and *be sure the sun is behind or to one side of you – never in front.* Hold the camera straight or you will have people and buildings falling over!

Hold the camera firmly and steady. If you can rest it on or against something solid such as a wall or tree, always do so and avoid the risk of shaking the camera.

Choose subjects with plenty of contrast if you can. Make sure what it is you want and fill your viewfinder with it if you can.

Trouble Shooting

Here's a brief analysis of some common print and negative troubles with their possible causes and remedies.

Contrasty Prints

Negative was too contrasty (too many very black and very clear areas without enough greys in between) for grade of paper used; not enough exposure with too long development.

Flat Prints

Negative is too grey (not enough really clear or deep black areas) too short development time; developer too cool; try shorter exposure; check developer temperature.

Stains

Development time too long; old developer; dirty trays; hands wet with developer or fixer; not enough fixer; too short a wash. Next time expose longer; use fresh developer; keep equipment and hands clean; use fresh fixer; move prints occasionally in bath; wash prints one hour in running water.

White Spots

Dirt or lint on negative or printer glass; hypo fixer on paper before development; bubbles of air on surface of prints while in developer. Next time keep printer glass and negatives clean; wash hands thoroughly after being in fixer; avoid splashing fixer; slide prints edgewise into developer and agitate during development.

Grey Prints

Paper fogged by too much white light or by safelight which was too close to paper; developed too long or developed at too high a temperature; deteriorated paper, outdated or stored at high temperatures. Next time be sure your work area is dark except for properly located safelight; develop prints for recommended time at 68°F (20°C); be sure paper life has not expired; store paper in a cool place.

Thin Negative

Negatives that are generally thin and lack detail, especially in lighter parts, are usually caused by under exposure in the camera; cold or exhausted developer. Next time use larger lens openings or longer exposure times under similar lighting conditions; use fresh developer at recommended temperatures.

Negative Spots

"Air-bells". Bubbles of air have adhered to film, preventing development and causing small areas of little or no density. Next time dislodge any air bubbles which may have adhered to the film; agitate regularly during development.

Dark, Dense Negatives

Negatives that are generally dense and require extremely long printing times are caused most often by over exposure in the camera. Next time use smaller lens opening or shorter exposure times under similar lighting conditions. If you cannot give a shorter exposure with your camera, use a filter. As well as reducing the strength of the light it will improve the tone values in your pictures – provided you are using a panchromatic film.

Grey Negative Margins

Incorrect darkroom illumination; film outdated or stored at high temperature; developer temperatures too high; developed too long. Next time develop panchromatic film in total darkness; use recommended developing time and temperature; use fresh film, store film in cool place.

Black Streaks on Negative

Film fogged in camera; film not tightly rolled. Next time check camera for light leaks; load and unload film in subdued light; be sure backing paper is not allowed to unroll while loading and unloading the camera.

Taking Flashlight Pictures

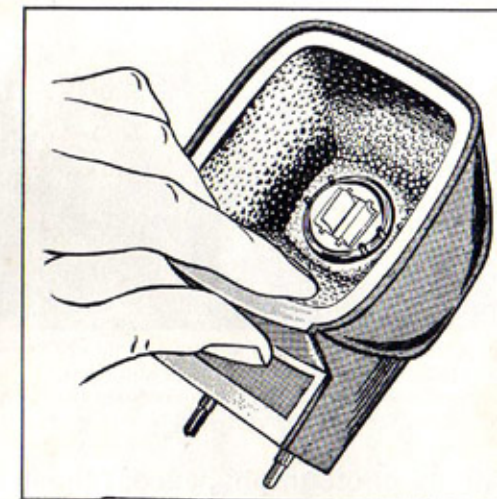
Your Future Scientist Camera is synchronised for flash. To complete the equipment you will need two small torch batteries and, of course, flash bulbs.

To fit the batteries, first remove the reflector plate. This is held in position by a plastic locking ring which must be turned 45° anti-clockwise until the "finger pegs" are in a horizontal line – as shown in the illustration. Lift off the reflector, giving a straight, upward pull. Insert the batteries – *facing them in opposite directions* – as indicated by the small, moulded panels.

When fitting the batteries, check that they are in proper contact with the studs in the base of the flash gun. Sometimes the paper covering of a battery extends so far beyond the metal base as to lift it clear of the stud. You can easily test the flash gun circuit. Hold an ordinary torch bulb across the metal contacts in the centre of the reflector and connect the two contact pins with any piece of metal – the bulb should light up. Snap the reflector back, turn the locking ring 45° clockwise and your flash gun is ready to plug into the camera. You will require the smallest, standard, *capless* flash bulbs, usually known as type AG-1. Set the aperture to "Sunshine" for flash photography. The best results should be obtained at distances of 10-15 feet from camera to subject.



Cars in Piccadilly, London.



Photography



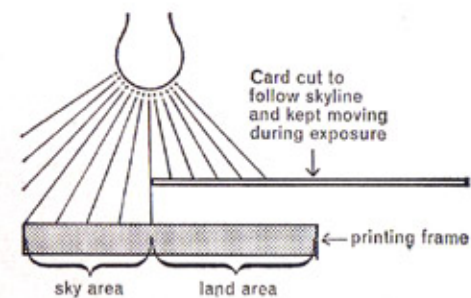
The Quadriga, Hyde Park, London.

The most experienced photographers find that sometimes they produce very good negatives that still do not give perfect prints. Sometimes there are shadows that are too black or sky that is too white. These extremes can very often be corrected by "shading" during printing.

The diagram shows how shading is done. Suppose a negative with a rather dense sky area (but with good cloud formation) is being printed. The correct exposure for the "thinner" land area has been given and now a card, cut to follow the skyline, is held over the land to allow extra exposure of the sky.

This "shading" technique requires practice but if you cut your cards accurately and *keep them moving* slightly during the extra exposure, you can often greatly improve your prints and enlargements.

Reproduced below are several pictures illustrating faults to be avoided.



Subject is too far off. The monument did not seem to be far away, and the grass and trees, in colour were attractive. In monochrome the monument is now insignificant.



Camera not held correctly – buildings falling over!



Camera not held steady – giving a double image.



Viewfinder used carelessly. If you are close to an animal subject at least get the head in!

All the photographs, except those on the cover, and the photomicrograph, were taken with a Future Scientist camera, and slightly enlarged.



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