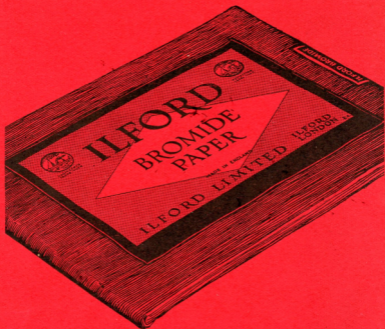


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PLATES
AND
FILMS



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ILFORD

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ILFORD PLATES & FILMS

ILFORD Plates and Films have for many years been noted for their consistency in quality and good keeping properties. Their extended use in all parts of the world bears witness to this, but the finest material in the world can be rendered useless by improper handling, and a few hints as to the handling and conservation of photographic materials in general and Ilford Plates and Films in particular may not be out of place.

1. Never remove the outer wrapper from a package of Plates or Films until you want to use the contents.
2. All Photographic materials, whether opened or unopened, should be kept in a clean, cool, dry place where neither products of burning gas, coal or coke can penetrate, nor where chemicals are stored.
3. Boxes or envelopes of material from which part has been used may with advantage be kept in tin boxes which have a close fitting lid.
4. Strong light should not be allowed to fall directly on packets of sensitised material.
5. All exposed material should be developed as soon as possible. Where this is not possible, plates or films should never be left in dark slides or in the camera, but should be repacked in the same manner as originally received, that is in the same wrapping paper and boxes. Care should be taken to ensure that they are packed tightly and that no undue movement is possible.
6. Sensitive surfaces should never be touched with the fingers. Plates and Films should be handled by the edges only.
7. Unused materials should be repacked in their original packing and special care should be taken when loading cameras or dark slides to ensure that all boxes and packets are closed before white light is turned on in the dark room.
8. Plates may be dusted by being lightly tapped on one edge against the table or bench, or by dusting very lightly with a clean, dry velvet pad. Films should not be dusted at all.

Properties of Ilford Plates and Films.

THE properties of photographic material vary very widely, according to the particular purpose for which they may have been produced. There is an Ilford plate or film for practically every purpose in photography, and in this wide range of materials speed, latitude and gradation vary within wide limits.

Speed in photographic materials is usually indicated by what is

called a "Speed Number." These speed numbers are usually determined in England by the Hurter and Driffield system, while on the Continent the Scheiner system is favoured. As the basis of these two systems is essentially different, it can easily be understood that such speed numbers may be misleading to any one but an expert. On the other hand the user of Plates and Films must have some indication of the sensitivity of the material he is using in order to give an approximately correct exposure. Ilford Limited give speed numbers which in conjunction with a satisfactory Exposure Meter will enable the user to expose correctly, and it is for this reason and only with this end in view that such speed numbers are supplied. The necessity for accurate exposure cannot be over emphasised, because while a certain amount of control can be obtained by variations in developer and development, no such variation or control can correct a badly under-or over-exposed negative.

By latitude is understood the extent to which deviation from the best or correct exposure can still yield a printable negative. It is sometimes claimed that the latitude of modern photographic materials is so great as to overcome all but the grossest mistakes in exposure. While the latitude of materials to-day is remarkable, it would be folly to expect it to ensure against careless exposure, and it must be emphasised that to obtain the fullest advantage from the materials used it is not the latitude but the correct exposure which should be borne in mind. Hence, the golden rule is—remember always to give the correct exposure every time. It may perhaps be mentioned that the optimum exposure varies to some extent with the developer to be used but exposure tables (see later) generally pre-suppose the use of one of the standard developers—Pyro-Soda or M.Q.

As plates and films vary in speed and latitude, so they also vary in gradation, *i.e.*, in the rate at which density in the negative grows with increasing exposure. It will be appreciated that a plate intended to be used for copying line drawings must have a very different scale of gradation from a plate used in portraiture. In the first instance, as with Process material, it is necessary that the emulsion shall have the power of building up density rapidly as the brightness of the subject increases, the density of the negative advancing quickly from almost clear glass to a dense black; such negatives are said to be of hard gradation or to show great contrast. In portrait work, on the other hand, the density of the negative must advance gradually as the brightness of the subject increases, a high density being approached slowly and every variation in the subject being clearly reproduced.

Two plates may also have the same range of densities or difference between their extremes and yet differ in their representation of the intermediate half-tones of a subject, one rendering the true brightness-values better than the other.

All Ilford materials readily give ample density for the purposes for which they are recommended, and it is unnecessary to prolong develop-

ment unduly to get it. It is merely a question for the individual worker to decide how much of the available density he needs for his particular purpose. There is an Ilford Plate and Film for every purpose, and a glance at the lists and descriptions given in subsequent pages should enable the user to decide exactly what material is suitable for the particular purpose in question.

It should be specially noted that **all Ilford materials** combine the qualities of *uniformity in speed and excellence of gradation with ample density, fineness of grain, absence of fog, great latitude and freedom from mechanical defects, together with exceptional keeping properties.*

Varieties of Ilford Plates.

ILFORD PLATES for negatives are produced in many distinct varieties, differing in speed and in the character of the negative they give. They consequently meet a very wide range of requirements, from instantaneous work with the shortest possible exposures, to the production of line negatives for process work. Each variety is characterized by uniformity in sensitiveness and general quality, so that when once experience has been gained as to exposure and development the user can be certain that this experience will hold good so long as the same plate is adhered to, and that he will not be troubled by any vagaries in the behaviour of successive batches. This is obviously a most important point, especially to the professional photographer whose success and profits depend so much on the uniform reliability of the materials that he uses.

ILFORD ORDINARY (Yellow label), Speed H. & D. 70, retain all the distinctive good qualities which have made them famous for half a century, such as fineness of grain, freedom from veil, great vigour in the negatives they give, and wonderful powers of resistance to the deteriorating action of time and climate. They are adapted for general out-door work, copying, enlarging, and for all photography in which strong and clear images together with simple and easy manipulation are more important than short exposure.

ILFORD SPECIAL RAPID (Red label), Speed H. & D. 270, are specially suitable for all-round work and when very short exposures have to be given, as in hand-camera work, snapshots of moving objects, and for dimly lighted architectural interiors. They are the most suitable plates for use in the Tropics.

ILFORD PRESS (ORTHO), (Green and Red label), Speed H. & D. 700, are ideal plates for Rapid Press work, being very fast and giving very brilliant negatives. They develop rapidly, stand for long without fog and have a fine grain.

ILFORD DOUBLE-X-PRESS (White, Blue and Orange label), Speed H. & D. 1500. These plates are specially prepared for press work under poor lighting conditions, where high speed and colour sensitivity are particularly important.

ILFORD ZENITH (Chocolate and White label), Speed H. & D. 650. A fast universal non-colour-sensitive plate, popular with professional operators for out-door work.

ILFORD ISO-ZENITH (Chocolate, Orange and Green label), H. & D. 700. High speed, colour-sensitive studio plates. Combine all the good qualities of the Zenith with the colour-sensitiveness which increases their use in artificial light, including flashlight. This plate is also supplied with a MATT surface.

ILFORD GOLDEN ISO-ZENITH (Gold, Black and Yellow label), Speed H. & D. 1400. **These are the fastest Orthochromatic plates in the world.** They are similar to the Iso-Zenith but of softer gradation, and are invaluable where very great speed is a consideration.

ILFORD CHROMATIC (Green and White label), Speed H. & D. 135, are of the highest Orthochromatic quality and render coloured objects, other than strong reds or oranges, in approximately correct monochrome. These plates are especially sensitive to green, yellow and orange-yellow rays and give strong negatives. They are therefore invaluable in Process work, copying yellow manuscripts, cloud negatives, and for any work where contrasty results are required.

ILFORD RAPID CHROMATIC (Green label), Speed H. & D. 400, have the unique colour-sensitive qualities of the Chromatic Plates. They will give fully exposed negatives in quick-shutter work *with a filter* and are suitable for colour work in which very short exposures are required. These plates should be used when photographing flowers, landscapes (especially in spring and autumn), portraits where the face is freckled, or if green, yellow, or orange-yellow are prominent in the costume, for architectural interiors if the light comes through yellow or smoke-grimed windows. They are especially valuable for mountain scenery, distant landscapes, snow scenes, etc., and are invaluable in photomicrography. Both the Chromatic and Rapid Chromatic plates may be used with very satisfactory effect without a filter, but to obtain the fullest benefit from their colour-sensitiveness they should be employed in conjunction with the Ilford Iso Filter. This filter is specially adapted for use with Ilford Chromatic and Rapid Chromatic plates and is the best for the purpose.

ILFORD AUTO-FILTER (Buff, Chocolate and Green label), Speed H. & D. 400. These plates are sensitive to yellow and green and include a light filter in the emulsion. They are specially intended for amateur use for landscape and general subjects where their colour-sensitiveness avoids the inaccurate rendering of yellows and greens to which ordinary plates are prone, while their speed allows their use under poor lighting conditions.

ILFORD TOPOGRAPHICAL (White, Black and Red label), Speed H. & D. 100. A plate specially prepared for photogrammetry, in which fine grain, high resolution and high colour-sensitivity are essential.

ILFORD SCREENED CHROMATIC (Green and Yellow label), Speed H. & D. 270, are sensitive to green and yellow. Similar in general characteristics to the Auto-Filter Plate, but slightly slower. Invaluable in architectural and landscape work.

ILFORD PANCHROMATIC PLATES are made in Four varieties, viz. :—

ILFORD RAPID PROCESS PANCHROMATIC (Blue, Red and Black label), Speed H. & D. 100. As the name implies these are specially prepared for the process worker and for use when decidedly greater contrast is required than that given by the Special Rapid Panchromatic. They develop rapidly and give great density together with beautifully crisp dot formation in half-tone screen work.

ILFORD SPECIAL RAPID PANCHROMATIC (Yellow, Red and Black label), Speed H. & D. 400. This is the well-known Ilford Special Rapid Panchromatic Plate, the pioneer of high speed Panchromatic Plates, possessing the unusual colour-sensitivity which is characteristic of all the Ilford Panchromatic Products. These plates are suitable for all-round work including commercial and landscape photography and for instantaneous work with or without a correcting filter.

ILFORD SOFT GRADATION PANCHROMATIC (Pink, Green and Purple label), Speed H. & D. 700 to daylight, H. & D. 2000 to Half-Watt light. Adopted by many modern portrait artists for its fine performance under half-watt lighting. It combines high speed, soft gradation and great latitude with high colour-sensitiveness.

ILFORD HYPERSENSITIVE PANCHROMATIC (Cream, Red and Brown label), Speed H. & D. 2500 to daylight; 8000 to Half-Watt lighting. For all kinds of work by artificial light these plates are invaluable, *e.g.*, street work at night, theatre photography, artificial light portraiture (both studio and home), meetings, banquets.

All Panchromatic varieties are so highly colour-sensitive that they should be manipulated in absolute darkness, no light being "safe" for them unless used in conjunction with Desensitol.

ILFORD INFRA-RED (White, Red and Black label), Speed (with Infra-Red filter) 20 H. & D. This plate specially sensitised for the infra-red is intended for use with the Ilford infra-red filter. These plates have been used for long distance photography, clinical photography and photomicrography, and also for spectroscopy in the extreme red, and numerous other purposes.

ILFORD PROCESS (Black and White label), are slow plates which give negatives with extremely strong contrasts, with the appearance of clear glass in the shadows if the exposure has not been excessive, and absolute opacity in the densities if the exposure has been correct. They are intended for the production of half-tone negatives and give sharp dots of ample density without reduction or intensification. They are also adapted for copying line drawings, book illustrations, diagrams, plans, etc., and give excellent lantern slides where contrast is required.

ILFORD THIN FILM- HALF TONE (Brown and White label), Speed H. & D. 10. Plates for process work, of very fine grain and extreme contrast, they produce results equal to wet plates but with greater ease and certainty. Rapid development, fixing and drying are marked characteristics of this plate.

BACKED OR ANTI-HALATION PLATES. Where subjects show great contrasts of light and shade in close proximity, as in tree foliage against a bright sky, interiors including windows and so on, backed plates should be used. All Ilford plates are supplied backed to order.

(For Ilford Lantern Plates see special pamphlet.)

Ilford Flat Films.

ILFORD FLAT FILMS. For Professional, Commercial, and Process Photography.

ILFORD HYPERCHROMATIC FILM. This film, because of its high speed and orthochromatic qualities, is equally suitable for daylight and artificial lighting conditions. It is multi-coated to provide exceptional latitude, and anti-halo backed to avoid light spread and to widen its scope for general work. Speed H. & D. 1500.

ILFORD PORTRAIT FILM, ORTHO FAST. A film of soft gradation, great latitude and freedom from fog, giving the photographer very considerable control over his result for all types of subject and lighting conditions. It is orthochromatic and is provided with an anti-halation backing. Speed H. & D. 700.

ILFORD PORTRAIT FILM, MEDIUM SPEED. This film is provided with an emulsion of somewhat greater contrast and lower speed than the Ortho Fast, and is suitable for certain portrait work where harder results are required, and for out-door portraiture. This film also is anti-halo backed. Speed H. & D. 350.

ILFORD PANCHROMATIC FILM. A film of medium contrast having all the excellent panchromatic qualities for which Ilford panchromatic plates are so well-known. Speed H. & D. 400.

ILFORD HYPERSENSITIVE PANCHROMATIC FILM.

This film will prove of inestimable value for all kinds of artificial light photography, street scenes at night, theatre photography, artificial light portraiture, banquets, etc. Speed 2000 H. & D. to daylight, 5000 H. & D. to Half-Watt lighting.

ILFORD COMMERCIAL ORTHO FILM. A film with a high colour-sensitiveness to the green and yellow-green, and this, combined with a moderately steep gradation, makes it suitable for all types of commercial work. This film also is provided with an anti-halo backing. Speed H. & D. 250.

ILFORD FINE GRAIN ORDINARY FILM. This has a contrasty emulsion of specially fine grain, and is excellent for copying and much general photomechanical work. This film also is provided with an anti-halo backing. Speed H. & D. 45.

ILFORD PROCESS FILM. The emulsion on this film is of fine grain and great contrast, giving an exceptionally clean dot when used with a half-tone screen and ensuring excellent reproduction of line work. This film also is provided with an anti-halation backing. Speed H. & D. 15.

ILFORD LINE FILM. The emulsion, which is coated on thin celluloid, is intended for the finest line negative making, with a view to obtaining improved sharpness and ease in cutting up for preparing composite negatives.

The following films can be supplied matt backed to order:—Portrait Ortho-Fast, Fine Grain Ordinary, Panchromatic, Hyperchromatic and Hypersensitive Panchromatic. (Matt backed films are not supplied with anti-halo backing.)

Selo Roll Films.

The Selo series of Roll Films now comprises, in addition to the original standard film, a new extra fast and highly orthochromatic film—Selochrome, and a panchromatic roll film of exceptionally high quality and colour rendering properties—Selo Panchromatic.

SELO. The original fast film, possessing great latitude and colour-sensitive properties. The film for the amateur.

SELOCHROME. An extra fast, highly orthochromatic film, multi-coated, and having an anti-halation backing. The highly orthochromatic properties of Selochrome make brilliant snapshots possible under lighting conditions which would be disastrous with an ordinary film. For difficult subjects use Selochrome for safety.

SELO PANCHROMATIC. This film, particularly with a pale yellow filter, gives a true rendering in monochrome of all ordinary coloured subjects. It is clean working, of high speed, and consistent in quality. It will be welcomed by all photographers who appreciate the benefits conferred by the use of panchromatic emulsions.

What Exposure to Give.

The following tables used in accordance with the instructions given, will be found useful in determining the exposure required under the varying conditions occurring in practice.

The Plate, Weather, Stop, and Subject Table given on page 11 should first be referred to. Find the variety of plate being used and the weather conditions in a line with it. Then follow the column so arrived at downwards to the stop. In a straight line with the stop the exposure necessary for each subject will be found under its appropriate heading. After one or two trials this can be done at a glance. Multiply the exposure by the number given in the table of Relative Exposures at Different times of the Day and Year which follows below and the exposure required is obtained.

Relative Exposures at Different times of the Day and Year.

†Hour of Day.	June.	May. July.	April. Aug.	Mar. Sept.	Feb. Oct.	Jan. Nov.	Dec.
12 noon	1	1	1½	1½	2	3½	4
a.m. p.m.							
11 or 1	1	1	1½	1½	2½	4	5
10 " 2	1	1	1½	1½	3	5	6
9 " 3	1	1½	1½	2	4	12*	16*
8 " 4	1½	1½	2	3	10*		
7 " 5	2	2½	3*	6*			
6 " 6	2½	3*	6*				
5 " 7	5*	6*					
4 " 8	12*						

†Greenwich Mean Time.

This table is calculated for latitudes about 52° N. and is suitable for exposures in the British Isles (except the North of Scotland), Holland, Belgium, Denmark, Mid-Russia, Southern Canada and British Columbia. Tables for other latitudes can be supplied on request.

*These figures are too low if the sunset is a markedly yellow one, unless a colour-sensitive plate or film is used, when they may be taken as sufficiently correct.

For example—

1. **Plate, Weather, Stop, and Subject.** Special Rapid plate, cloudy weather, stop $f/16$, subject open landscape with a felled tree in foreground. Table gives $\frac{1}{4}$ sec.

Time of Day and Year. 2.30 p.m., 21st April = $1\frac{1}{4} - 1\frac{1}{2}$.

Multiplying these two numbers gives $\frac{5}{16}$ to $\frac{6}{16}$ = $\frac{1}{2}$ second.

2. **Empress plate, sunshine white clouds, stop $f/11$, outdoor portrait** = $\frac{1}{2}$ second.

Date, etc. September 10th, 4.0 p.m. = 3.

Hence exposure required = 1 second.

Plate or Film, Weather, Stop, and Subject Table.

PLATE OR FILM.	WEATHER.					LANDSCAPE.					INTERIORS.					PORTRAITS.					
	Very Dull	Dull	Cloudy	Sunshine blue sky	Sunshine white clouds	Cloudy	Sunshine blue sky	Sunshine white clouds	—	—	Open Landscape, light foreground. Figures on Beach.	Open Landscape with foreground. Cattle, etc.	Foreground, Buildings, Figures, Groups.	Landscape with very heavy foreground.	Under trees may require, up to	Bright Interiors require not less than	Dark Interiors, up to	By bright diffused light in the open air.	By good studio light.	In well-lighted room.	
	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	f	
Ordinary Empress Chromatic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Special Rapid Screened Chromatic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Zenith Rapid Chromatic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Special Rapid	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
S.R. Panchromatic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Solo Roll Film Panchromatic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Solo Roll Film Panchromatic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Selochrome Film Pack Orthochromatic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Impaan Film Pack Panchromatic	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Zenith Iso-Zenith, Monarch, Press Soft Gradation Panchromatic Studio Film	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
*Golden Iso-Zenith	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
STOPS	2.2	3.2	4.5	6.4	9.0	12.6	18.0	25.2	36.0	50.4	70.0	96.0	132.0	180.0	252.0	360.0	504.0	700.0	960.0	1320.0	1800.0

*Requires one half these exposures.

For Time of Day and Year refer to table on page 10.

3. Rapid Chromatic plate, sunshine white clouds outside, stop $f/11$. Interior of Church with stained-glass windows (a rather dark interior). This exposure we must estimate from the probable range given for interiors under these conditions, viz., 8 to 120 seconds; suppose we take this as 1 minute. The time of day and year January 20th, 10 a.m.

This gives us a multiplying factor of 5.

Hence the required exposure will be about 5 minutes.

These exposures will be found ample for the Ilford standard Pyrosoda and the Metol-Hydroquinone developers as given in the instructions on the plate boxes, and for the Seló M.Q. packet and Certinal developers.

It will be useful to remember that the great majority of ordinary pocket-watches tick five times to the second. If the watch be held to the ear and as the cap is removed from the lens you begin counting in time with the watch, beginning with 0 at the beginning of exposure, and replace the cap or close the shutter at the last tick of the time to be given, it is quite easy, with a little practice to give very accurate time-exposures from two-or three-fifths of a second upwards.

The asterisks and their meaning in the table of months and hours must be carefully noted, because with a yellow sunset these numbers are too low for all except colour-sensitive plates and may need to be doubled.

Another important point, especially to users of hand-cameras, is the correctness of the speeds marked on the shutters. It should be borne in mind that not only are the speeds given often seriously incorrect, but the times given represent, in most cases, the period elapsing from the beginning of opening to the end of closing; a slightly longer exposure, therefore, than that indicated in the table on p. 11 must be given to compensate for this. On the other hand, many cheap shutters give a far longer exposure than that indicated, amounting even to double or treble the time shown.

Illumination of the Darkroom.

The aim in lighting a photographic darkroom should be to obtain the maximum illumination consistent with safety. Daylight is impracticable for this purpose since it is too variable even when available. There are a large number of lamps on the market for all sorts of artificial lights, which give light of a suitable colour by the use of safelights. The use of coloured glass or fabric should, in general, be avoided for this purpose since most samples transmit a certain amount of blue

and violet light and are, moreover, not very transparent to the light they are supposed to transmit. It is preferable, whenever possible, to use dyed gelatine film held between two glasses. Since such films are easily spoiled if overheated, it is necessary to ensure that the lamp is well ventilated. Most workers prefer to have the light well diffused, some lamps being constructed so as to reflect the light through the filter from a matt white reflecting surface; the Ilford Darkroom Safelights include a very efficient diffusing medium for the same purpose.

The amount of light permissible is dependent upon several factors including the speed of the plate, the size and arrangement of the darkroom, and the precautions adopted by the worker to prevent the lamp from shining directly on the plate, especially before it is in the developer. Some indication may be given on this point by the fact that the Ilford "F" Safelight is designed to give practically no fog on a Special Rapid plate exposed for 1 minute at a distance of 18 inches from the safelight behind which is a 20 W. metal filament lamp.

The most suitable colour for the safelight is dependent on the plate. For colour-sensitized plates of the chromatic type a deep red safelight is generally preferred though some workers use a bluish-green safelight, the only one allowable for panchromatic plates. For plates which are not colour-sensitized the most suitable colour is a greenish-yellow. Since the eye is more sensitive to light of this colour than to red, and since all plates show an appreciable sensitiveness to deep red (some plates show even more sensitiveness to deep red than to yellow-green), such a light gives greater efficiency and is, in addition, much more comfortable to work in than a red light. The Ilford Darkroom Safelights "S" and "F," for ordinary plates, are of this type.

While on this subject, a further word of warning may be given; it should be remembered that all plates are sensitive to all lights and will be fogged if given a sufficiently long exposure; it should also be remembered that the ease of fogging by the darkroom light is not always proportional to the daylight speed of the plate, some slow plates being exceptionally sensitive to red light. Reasonable precautions should, therefore, be taken at all times, particularly with a brand of plate with which the worker is not familiar.

For further particulars of Ilford Darkroom Safelights see page iii at the end of this pamphlet.

Desensitizing. Users of Panchromatic Plates and Films may find it irksome to develop these in complete darkness, while others prefer to work as little as possible under dark-room conditions: in such cases desensitization allows of the greater part of the process being carried out in diffused white light or in a very full green light.

The desensitizer may, in most cases, be added to the developer but the method is not recommended as it is better to desensitize before development.

Desensitizing Bath.

Ilford Desensitol	.. .. .	1 part
Water	.. .. .	50 parts

The plates or films are bathed in the above solution for at least one minute in the normal darkroom conditions (*i.e.*, in complete darkness for panchromatic plates); development is then proceeded with either by diffused white light or, preferably, with the aid of the Ilford Bright Green Safelight. Orange and Ruby Safelights must not be used but, if preferred, ordinary candle light is safe.

The Desensitol solution can be used over and over again; all that is required is to add fresh solution from time to time to keep up the bulk. A deep dish is preferable to a shallow one in order to ensure that the plate is perfectly covered.

Development.

Apart from the difference in handling Roll and Flat Films the instructions published in this pamphlet for Ilford Plates generally apply to Films.

Ilford formulæ are given in both the English system of weights and measures (grains, avoirdupois ounces of 437½ grains, and fluid ounces of 8 drams or 480 minims), and the metric system (grammes and cubic centimetres). The figures of the two systems are *not interchangeable* but the finished solutions have approximately the same composition.

Ilford plates and films may be developed with any of the well-known developing agents in accordance with the formulæ adapted for each, but the best results will usually be obtained with the well-known Ilford Pyro-Soda developer which is made up as follows:

Stock Solution

Pyrogallie Acid	.. .. .	1 oz.	} or {	25 grms.
Potassium Metabisulphite	.. .. .	100 grains		6 grms.
Water up to	.. .. .	10 ozs.		250 c.cm.

This solution will keep good for several months.

The potassium metabisulphite, in clear hard crystals, should be first dissolved in the water previous to adding the pyro. Freshly boiled but cooled water is to be preferred for making up all developers.

Working Solutions

No. 1	{	Stock Solution of Pyro	2 OZS.	}	or	{	50 c.cm.
		Water up to	20 OZS.				500 c.cm.
No. 2	{	Sodium Carbonate (crystals)	2 OZS.	}	or	{	50 grms.
		(not bicarbonate)					
		Sodium Sulphite (crystals)	2 OZS.				50 grms.
		Potassium Bromide (10% Solution)	2 drams				6 c.cm.
		Water up to	20 OZS.				500 c.cm.

For use mix equal parts of Nos. 1 and 2.

The above developer is made up in Tabloid form by Burroughs Wellcome and Co., and is sold as Tabloid Pyro-Soda Developer (ILFORD FORMULA).

Be very particular about chemicals, and always buy the best. For instance, in the formula given above, do not use common washing-soda, but pure carbonate of soda crystals free from white crusts. Be equally careful with the sodium sulphite. There is something wrong with the chemicals if, after making up the solutions carefully and correctly, any of the following appearances occur when using equal quantities of No. 1 and No. 2 for development:—

1. Stock Solution of pyro is dark brown or black.
Either the pyro is bad (which would be apparent from its colour before solution), or the potassium metabisulphite is bad, and probably is not metabisulphite at all.
2. The image refuses to appear, even on a fully exposed plate, or it is very slow in coming up and refuses to gain density although the developer and dishes are at a proper temperature, that is, about 65° F. and the plate has been in the developer for five or more minutes.
The pyro solution is very stale and will in that case be discoloured, or the carbonate of soda is adulterated and useless.
3. The image develops readily but is of a disagreeable green tint, and the whole film is more or less stained a dirty yellow.
This is because the sulphite of soda is bad or the No. 2 solution has become stale with age.

How to Develop a Plate.

If the exposure is believed to be correct, that is to say, neither under nor over-exposed, take equal quantities of No. 1 and No. 2 solutions in a measure and mix thoroughly, taking care to avoid the formation of froth or bubbles.

Now, shielding the plate from the direct light of the lamp, place it, film-side up, dry, in a flat-bottomed developing-dish just large enough to take it comfortably. The dish must not be a size or so too large, or the plate will slide about, and its edges will cause numerous air-bubbles to form in the developer as it flows over the plate.

Take plenty of developer and no difficulty will be experienced in covering the whole plate instantly. For $\frac{1}{4}$ -plate use $1\frac{1}{2}$ ozs. (40 c.cm.) of developer, for $\frac{1}{2}$ -plate 2 to 3 ozs. (75 c.cm.), for $\frac{3}{4}$ -plate 3 to 4 ozs. (100 c.cm.), and so on.

Hold the dish in the left hand in such a way that it is under illumination, but so that no direct light falls on the plate in it, and tilt it very slightly away from you, and downwards to the right, with a long side nearest you. Now place the lip of the measure with the developer in it, at the top corner of the dish and pour out the developer, steadily moving the measure along the near edge of the dish as this is done. After one or two trials it will be found that this can quite easily be done and it is the quickest way to cover the plate completely. Rock the dish gently with a somewhat circular motion throughout the process of development. The plate may now be examined by the darkroom light, as it lies in the developer, making sure that it is perfectly covered and that there are no air-bubbles sticking to the film. Remember that markings caused by careless flowing of the developer or by adherent air-bubbles can never be completely removed, so be careful to avoid them.

With the formula given and equal parts of No. 1 and No. 2 the image should begin to appear on a correctly-exposed Ilford Special Rapid plate in about 30 secs. if the temperature of the developer is about 65° F., and development should hardly ever take more than 4 minutes. It is impossible to give exact figures as the nature of the subject, the temperature and proportions of the developer, etc., all make a difference. For portraiture, where a soft negative is desirable with little density, development will often be complete in about 2 minutes. At lower temperatures, development must be prolonged; at higher, it must be shortened. Thus the equivalent of 3 minutes at 65° would be about 2 minutes at 75° and $4\frac{1}{2}$ minutes at 55°.

Pyro-soda is a developer of average energy, gives ample density without hardness and, above all, it brings up the image gradually. This last is a property which gives the user more time to study the progress of development, and makes it easier for him to recognize incorrect exposures. The property which makes pyro-soda so extremely valuable for general use is its sensitiveness to the restraining or slowing action of potassium bromide. The absence of this quality is the great drawback to the very rapid developers such as those containing Metol, as with them it is almost impossible to save an over-exposed plate.

Compensating for Errors in Exposure.

Although, as has been already said, the best results are obtained by correct exposure and development with a well-balanced developer, like the Ilford Pyro-Soda, the fact that the so-called speed of a plate depends partly on the developer used must not be overlooked. Half-

a-dozen different developers would really require half-a-dozen different "correct" exposures. Looked at in another way this means, of course, that within certain limits, errors of exposure for a particular developer can be obviated by making use of a developer for which the exposure given would be correct. To do this properly requires experience and judgment and it is necessary to know beforehand the degree of under or over-exposure.

By making use of different developing agents, in conjunction with variations in the proportions of the ingredients, enormous variations in exposure can be developed successfully.

With the pyro-soda developer, where the correctness of the exposure given is uncertain, proceed as follows:—

Make up the No. 2 solution *without* potassium bromide and have at hand a solution of potassium bromide (Potassium Bromide 1 oz., Water up to 10 ozs.). Mix the developer with twice the usual proportion of No. 1 solution of full strength (1 oz. of No. 1 and $\frac{1}{2}$ oz. of No. 2, for a $\frac{1}{2}$ -plate), and add 7 or 8 drops of the potassium bromide solution; if over-exposure is suspected add twice this amount. Having poured this on the plate, rock gently and watch carefully for the appearance of the image. If it begins to appear in about 30 seconds at 65° Fahr. and comes up slowly and regularly the exposure is not far wrong, and more of the No. 2 solution without bromide should be added, little by little, in order to hasten development and bring out the fine detail. If the image appears much earlier than this, say in 20 seconds, and the whole comes up quickly, at once remove the plate and rinse it thoroughly under the tap, then put another 20 drops of the potassium bromide solution into the measure, and pour the developer from the dish into it, and proceed to develop with this solution.

If, on the other hand, no image appears in 50 seconds, measure out an ounce of the No. 2 solution without bromide, pour the developer off the plate into this and return the whole to the dish. If the plate still does not develop quickly enough you may add a little more No. 2 solution, but the plate may be looked upon as hopelessly under-exposed for this developer, if this treatment fails to bring the image up satisfactorily. In such a case the best thing to do is to add one or two drachms of the following solution and dilute the mixed developer with an equal quantity of water.

Metol	.. .. .	100 grs.	} or {	6 grms.
Sodium Sulphite (crystals)	.. .. .	1 oz.		25 grms.
Water up to	.. .. .	10 ozs.		250 c.cm.

Having developed one plate and found out what treatment it wants, any others known to be similarly exposed can be dealt with by mixing the appropriate developer for them. Modifications after development has started are never so effective as using the most suitable developer at the commencement.

The beginner generally finds it difficult to judge when to stop development and is apt to stop much too soon. Practice alone can give him the desired skill, but he may find the following hints useful.

Judge density by looking through the plate at the lamp. Hold the plate always at the same distance from the lamp-glass, which should be covered with fine tissue-paper or ground-glass to give a pleasant diffused light. (Ilford Darkroom Safelights are made with a special diffusing screen, and their use would obviate the necessity for covering the lamp glass with tissue.) Obtain a good negative, or select one which is considered of about the right density, and keep it at hand in the darkroom, fastened by two elastic bands to an undeveloped dry plate of the same variety. The plate being developed can then be compared with this at any time.

Density may also be judged from the appearance of the image at the back of the plate, but this is not so reliable, as various plates and subjects show very marked differences.

Other Developers.

All Ilford plates and films will yield excellent results with any well-balanced and reliable developer so that although users of them are strongly recommended to use pyro-soda according to the Ilford standard formula, the following formulæ for a few other developing agents may be adopted by those who prefer them.

A few remarks as to their applicability to special circumstances will be helpful.

In cases where the plates are known to be very fully exposed or strongly over-exposed the hydroquinone formula will be found advantageous.

In cases of under-exposure a developer containing metal should be employed; with very considerable under-exposures the pyro-metal formula will be found to give the best results. Never risk an over-exposed plate in these developers, as they are very rapid, and almost insensitive to the action of potassium bromide, so that they can be only slightly restrained.

Hydroquinone Developer

This developer gives ample density, but it should *not be used for under-exposure*. It is very suitable for full or over-exposure. The printing density of negatives developed with hydroquinone or metal is somewhat less than their apparent density, owing to the blueness of the image; care should, therefore, be taken to develop somewhat further than with Pyro-soda. In the case of considerable over-exposure

an equal weight of Sodium Carbonate (crystals) may be used instead of Potassium Carbonate.

A	{	Hydroquinone	160 grains	}	or	9 grms.
		Sodium Sulphite (crystals)	2 ozs.			50 grms.
		Water up to	20 ozs.			500 c.cm.
B	{	Potassium Carbonate (anhydrous)	1½ ozs.	}	or	40 grms.
		Potassium Bromide	30 grains			1.5 grms.
		Water up to	20 ozs.			500 c.cm.

For use mix equal parts of A and B.

Extra care should be taken with the washing after development, before fixation, when a Hydroquinone developer is used, as otherwise indelible yellow stains are likely to appear.

Metal Developer

This developer gives negatives of soft gradation with maximum detail in the shadows. Development is slow but the speed may be modified by altering the dilution.

A	{	Metal	100 grains	}	or	6 grms.
		Potassium Metabisulphite	100 grains			6 grms.
		Water up to	20 ozs.			500 c.cm.
B	{	Sodium Carbonate (crystals)	4 ozs.	}	or	100 grms.
		Sodium Sulphite (crystals)	2 ozs.			50 grms.
		Potassium Bromide	20 grains			1 gm.
		Water up to	20 ozs.			500 c.cm.

For use mix A, 1 part; B, 1 part; Water, 6 parts.

Metal-Hydroquinone

This developer is rapid and energetic and easily gives ample density. It will be found very useful in cases of under-exposure. It keeps almost indefinitely in a well-stoppered bottle.

Metal	20 grains	}	or	1 gm.
Sodium Sulphite (crystals)	3 ozs.			75 grms.
Hydroquinone	80 grains			4 grms.
Sodium Carbonate (crystals)	2 ozs.			50 grms.
Potassium Bromide	20 grains			1 gm.
Water up to	20 ozs.			500 c.cm.

Dissolve the ingredients in the order given.

For use dilute 1 part with 3 parts of water.

Pyro-Metal Developer

This is an exceedingly energetic developer intended for plates which have received minimum exposures. On account of the yellowish colour of the image even very weak negatives may have good printing contrast.

A	{	Metal	35 grains	}	or	2 grms.
		Potassium Metabisulphite	100 grains			6 grms.
		Pyrogallie Acid	100 grains			6 grms.
		Water up to	20 ozs.			500 c.cm.
B	{	Sodium Carbonate (crystals)	4 ozs.	}	or	100 grms.
		Water up to	20 ozs.			300 c.cm.

Dissolve in the order given.

For use mix equal parts of A and B.

Amidol

This is an energetic developer. It requires no alkali, but the sulphite is essential.

Amidol	175 grains	} or {	10 grms.
Potassium Bromide	50 grains		3 grms.
Sodium Sulphite (crystals)	4 ozs.		100 grms.
Water up to	20 ozs.		500 c.cm.

For use add 3 times its volume of water.

This developer will keep only for a day or two, any left over being useless.

CERTINAL

This is a developer simple in form, portable, easy to use, highly concentrated and of reliable keeping quality. It gives a bright, quick-printing negative free from stain or fog. Contrast or softness may be produced at will, according to the class of negative required, simply by varying the dilution of the developer and the length of time of development. Certinal is harmless to the skin and does not stain the fingers.

Certinal being a rapid developer, development should be continued after all detail has appeared until the required density is obtained.

For Plates and Films.**Normal Exposures**

Certinal	24 minims	2 c.cm.
Water	1 oz.	30 c.cm.

Under-Exposures

Certinal .. .	16 minims	2 c.cm.
Water	1 oz.	40 c.cm.

Over-Exposures

Certinal	48 minims	4 c.cm.
Water	1 oz.	30 c.cm.
add 10% solution of Bromide of Potassium, 48 minims, 1 part		

For Tank Development (see p. 21)

Certinal	1 part		Water	30 parts
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For times of Development see page 22.

For softer results increase the proportion of water.

For stronger results increase the proportion of Certinal and if necessary, especially in the cases of over-exposure, add a further quantity of potassium bromide.

SELO GASLIGHT (M.Q.) PACKET DEVELOPER

in packets, convenient, economical, portable and efficient.

Prepared by Johnson & Sons, Manufacturing Chemists, Limited.

For Ilford Plates and Films and Bromide and Gaslight Papers. Packet Developer—Dissolve in 8 ozs. of warm water.

For Tank development use 16 ozs. of water (see p. 21).

Contents of the smaller packet should be dissolved first.

N.B.—It is preferable to use developers at a temperature of about 65° F.

Tank Development.

This method of development gives negatives of excellent quality and it facilitates the development of a number of negatives at one time.

Metol-Hydroquinone Tank Developer Stock Solution

Metol	20 grains	} or {	1 gm.
Sodium Sulphite (crystals)	3 ozs.		75 grms.
Hydroquinone	80 grains		4 grms.
Sodium Carbonate (crystals)	2-ozs.		50 grms.
Potassium Bromide	20 grains		1 gm.
Water up to	20 ozs.		500 c.cm.

For use dilute one part with 5 parts of water.

This developer keeps in good condition for a long time in the tank especially if a floating lid is used. It should be invigorated as required with the addition of some stock solution made up without the potassium bromide. For the Zenith Series of plates, also Ortho Fast Portrait Films, the dilution may be reduced to 8 parts of water so as to shorten the time of development.

Pyro-Soda Tank Developer

A suitable developer may be made up from the Ilford Pyro-Soda formula (see page 16) as follows:—

Stock Solution of Pyro	1 part
No. 2 Solution	5 parts
Water	20 parts

Times of development for both developers are given in the table on page 22. If less contrast is required, reduce the time of development or increase the quantity of water; greater contrast is obtained by longer development or less water.

It is advisable to reverse the plates in the tank once or twice during development, particularly at an early stage.

A system of Time Development in conjunction with a special thermometer has also been devised by Mr. Alfred Watkins, and may be used for Ilford Plates. Development is carried out in either a dish or tank, without requiring inspection of any kind during its progress. This is particularly valuable in the case of Panchromatic Plates. All particulars can be obtained from the Watkins Meter Co., Imperial Mills, Hereford.

Each box of Ilford Special Rapid Panchromatic plates and films contains a slip on which the times of development for various classes of subjects at different temperatures are given.

DEVELOPMENT TABLE.

The following table gives the approximate times of development, with the developers named, for average negatives and subjects at various temperatures by dish and tank development for different varieties of Ilford Plates and Films. These times may be varied according to the exposure, and the contrast in the subject and that desired in the negative.

	DISH			TANK		
	Ilford Pyro-Soda as given on pages 14 & 15.	Ilford Metol-Hydroquinone as given on page 19.	Selo Gaslight (M.Q.) Packet Developer.	Ilford Metol-Hydroquinone as given on page 21.	Ilford Pyro-Soda as given on page 21.	Selo Gaslight (M.Q.) Packet Developer.
	CERTINAL (Ilford Liquid Developer)			CERTINAL (Ilford Liquid Developer)		
	Certinal .. .. .	.. .. .	1 part	Certinal .. .. .	.. .. .	1 part
	Water .. .. .	.. .. .	15 parts	Water .. .. .	.. .. .	30 parts
	55° F.	65° F.	75° F.	55° F.	65° F.	75° F.
PLATES	min.	min.	min.	min.	min.	min.
Ordinary	3	2 ¹ / ₂	1 ¹ / ₂	6	4	3
Empress	5	2	1 ¹ / ₂	6	4	3
Special Rapid	4 ¹ / ₂	3	2	9	6	4
Zenith 270	4 ¹ / ₂	3	2	9	6	4
Zenith 650	9	6	4	18	12	8
Portrait 400	15	10	6 ¹ / ₂	30	20	15
Auto Filter	4 ¹ / ₂	3 ¹ / ₂	2 ¹ / ₂	9 ¹ / ₂	6 ¹ / ₂	4 ¹ / ₂
Rapid Chromatic	4 ¹ / ₂	3	2	9	6	4
Screened Chromatic	5 ¹ / ₂	3 ¹ / ₂	2 ¹ / ₂	10 ¹ / ₂	7	4 ¹ / ₂
Chromatic	3 ¹ / ₂	2 ¹ / ₂	1 ¹ / ₂	7 ¹ / ₂	5	3 ¹ / ₂
Press (Ortho)	6	4	3	12	8	6
Iso-Zenith	8 ¹ / ₂	5 ¹ / ₂	3 ¹ / ₂	16 ¹ / ₂	11	7
Iso-Record	9 ¹ / ₂	6 ¹ / ₂	4 ¹ / ₂	18 ¹ / ₂	12 ¹ / ₂	8 ¹ / ₂
Record	9 ¹ / ₂	6 ¹ / ₂	4 ¹ / ₂	18 ¹ / ₂	12 ¹ / ₂	8 ¹ / ₂
Double-X-Press	7 ¹ / ₂	5	3 ¹ / ₂	15	10	6 ¹ / ₂
Golden Iso-Zenith	13 ¹ / ₂	9	6	27	18	12
S.R. Panchromatic	4 ¹ / ₂	3	2	9	6	4
S.G. Panchromatic	8 ¹ / ₂	5 ¹ / ₂	3 ¹ / ₂	16 ¹ / ₂	11	7
H.S. Panchromatic	13 ¹ / ₂	9	6	27	18	12
Infra-Red	6	4	3	12	8	6
FILMS						
Hyperchromatic	10 ¹ / ₂	7	4 ¹ / ₂	21	14	9 ¹ / ₂
Portrait Ortho Fast	10 ¹ / ₂	7	4 ¹ / ₂	21	14	9 ¹ / ₂
Portrait Medium	10 ¹ / ₂	7	4 ¹ / ₂	21	14	9 ¹ / ₂
Commercial Ortho	6	4	3	12	8	6
Fine Grain Ordinary	3	2	1 ¹ / ₂	6	4	3
Selo Roll Film	10 ¹ / ₂	7	4 ¹ / ₂	21	14	9 ¹ / ₂
Selochrome	10 ¹ / ₂	7	4 ¹ / ₂	21	14	9 ¹ / ₂
Hypersensitive Pan.	7 ¹ / ₂	5	3 ¹ / ₂	15	10	6 ¹ / ₂
Panchromatic Commercial	7 ¹ / ₂	5	3 ¹ / ₂	15	10	6 ¹ / ₂
Panchromatic Roll Film	7 ¹ / ₂	5	3 ¹ / ₂	15	10	6 ¹ / ₂

The Developers must be fresh and made up exactly as instructed, otherwise the times of development will not hold good.

For soft negatives, or subjects strong in contrast, shorter development is required; for vigorous negatives and flat subjects longer development is necessary.

The times of development in tank may be lessened by the use of less water.

Factorial Development.

Iford Plates (excepting Panchromatic) and Films will give good negatives by the Watkins system of factorial development, which will be found quite reliable, when exposures have been approximately correct. According to this system, the time of development is ascertained by multiplying the time which elapses between the pouring on of the developer and the first appearance of an image, by factors suggested in the Watkins Manual, subject to variation according to the worker's requirements. The product gives the total time of development from the beginning to completion.

Fixing, Hardening, Washing, and Drying.

Fixing. Rinse the developed plate for a few seconds (except where hydroquinone is used when careful washing is necessary, see p. 19) still keeping it shielded from white light, and at once immerse in a fixing bath made up of:—

Sodium Hyposulphite*	1 lb.	} or {	400 grms.	
Potassium Metabisulphite	1 oz.			25 grms.
Water	40 ozs.			1,000 c.cm.

The plates should always be allowed to remain in it for 2 or 3 minutes after fixation is apparently complete. An occasional rocking of the bath is to be recommended.

Acid Fixing Bath. The use of a properly made acid fixing bath, such as that given above by **Iford Acid Hypo Fixing Salts**, offers several advantages. These are, 1st, the neutralization of the alkali of the developer, thus stopping development immediately the plate is in the hypo; 2nd, the white light can be turned up in the dark-room as soon as the plates are in the acid fixing-bath without fear of staining; 3rd, complete freedom from the yellowish stain due to oxidized developer; 4th, a fixing-bath which remains colourless.

Hardening. In very hot weather it is convenient to harden the film of plates or films and this can be carried out either before development, during fixing, or after fixing.

In those cases where it is desired to harden the material before development, the **Iford Tropical Hardener** is specially recommended. It is a liquid and only requires dilution (one part of hardener to seven parts of water) to be ready for use. When Panchromatic materials are used and desensitised before development, the hardening with the **Iford Tropical Hardener** and the desensitisation can be carried out simultaneously. (See Desensitisation, p. 13.)

*Hypo must be most carefully used. Photographic plates and papers are ruined by contact with a mere trace of this chemical before fixation. Hypo in crystals or solution should be kept away from the bench where dark slides are filled or developing done. The hypo dish or tank must not be used for any other purpose.

Combined Fixing and Hardening Bath. The following bath will be found very satisfactory:—

Potassium Metabisulphite	1 oz.	} or {	25	grms.
Chrome Alum	$\frac{1}{2}$ oz.		6	grms.
Sodium Hyposulphite	1 lb.		400	grms.
Water up to	40 ozs.		1,000	c.cm.

Dissolve in the order given,

Hardening after fixing may be carried out by giving the plate or film a light wash and then immersing it in a weak solution of formaline:

Formaline (40 per cent. solution of Formaldehyde)	1 part
Water	100 parts

The hardened film dries more quickly than an unhardened one, which is an advantage.

Washing. The **Washing Process** is most important and must be thoroughly well done if the negatives are to be permanently free from stains. Washing should be for at least $\frac{3}{4}$ to 1 hour in running water, or for 8 changes of 10 minutes each.

When running water is used it should not be allowed to fall with force on to the negative, as this will often set up frilling, and any particles of grit in the water will damage the film. A good plan is to lead the water to the bottom of the washing-trough by means of a rubber tube, or if it contains any grit, tie a flannel bag over the tap.

Drying. When washing is finished, the negative should be set to dry in a warm, well-ventilated place, free from dust. It should not be placed near a hot stove or fire, or the negative will be ruined.

In case it should be necessary, for any reason, to dry a negative very quickly, it should be immersed for from 2 to 3 minutes in a bath of methylated spirit with constant rocking, and finally dried in a current of warm air. Treatment with methylated spirit must not be pushed too far, as this would produce milkiness in the film, due to the fact that the pores of the gelatine would remain open instead of closing, as they do in natural drying. Should this milkiness show itself, the negative must be re-immersed in water, when the defect will instantly disappear.

The negative should be thoroughly dried, and, preferably before it is used, varnished with a good negative varnish. Negatives cared for in this way will last indefinitely, and are not liable to be stained and spoiled in use.

Negatives.

The answer to the question what should a good negative look like, will depend upon the subject and on the printing process for which it is intended. The following points should be remembered, therefore, in examining the quality of the negative:—

What was the subject like? Was the lighting flat, or lacking in variety, or was it richly and variously lighted, including both strong high-lights and deep shadows? A subject may be dull and lacking in contrast, even when fully lighted by strong sunlight, though most, if not all, subjects show more contrast when the sun is shining on them than when it is not. A subject lacking in contrast should be under- rather than over-exposed, and the development should be full, if it is desired to increase the contrasts. Subjects too rich in contrasts or "hard" as they are called, such as may occur in portrait work in the studio, should receive a relatively short development if it is desired to get softer results. The longer the development the greater will the contrasts be, or the harder the results, and vice versa.

Altogether incorrect exposures give negatives with characteristic appearances which should be carefully studied by the beginner, in order that he may readily recognize the nature of a mistake in his exposures. Both under- and over-exposures may be either under- or over-developed, and the problem is to distinguish such negatives from correctly exposed and developed ones.

UNDER-EXPOSURE—with Short Development.—Much of the negative is devoid of any image, only the brighter parts of the subject having produced any results at all, and that is thin. There is no fine detail. The image on printing is flat, and the whole print fogs over very soon.

With Moderate Development.—Similar to the first but a little more detail is apparent and the brighter parts of the subject (the high lights) are denser. It is hard in contrast on printing without being vigorous, and is devoid of detail in the shadows.

With Prolonged Development.—Still deficient in fine detail, and the high lights very dense. Excessively hard and unpicturesque in printing. May usually be improved by reduction with ammonium persulphate (see p. 28).

CORRECT EXPOSURE—with Short Development.—Not quite enough detail in the deep shadows. The negative as a whole is not rich enough in contrast and density, and gives poor, flat prints unless a very brilliant printing paper is used. Much improved by intensification.

With Correct Development.—The result is the most faithful reproduction of the subject that can be obtained, and with a subject rich in variety of tone and lighting, should be full of very fine detail

in the shadows, and should range from practically clear glass through all degrees up to the maximum density that is of use in printing.

With Over Development.—Although the image is present in full detail in all parts, the shadows, the half-tones, and the high-lights are all unnecessarily dense, the negative takes a long time to print, and is too steep in gradation, so that, in the print, either the detail in the high-lights does not appear, or the shadows are blocked up. Reduction with the ferricyanide reducer will improve such a negative (see p. 28).

OVER-EXPOSURE—with Short Development.—The negative is full of detail, but very thin and flat, and may be confused with an under-exposed, under-developed negative if the latter has been veiled all over in any way. Careful examination of the shadows will, however, enable detail to be detected. This type of negative can be much improved by intensification with mercury (see below), whereas an under-exposed one is made very hard as a rule.

With Moderate Development.—The negative is more dense generally than is the case with over-exposure and short development, but it is still very flat and muddy-looking. It may sometimes be improved by reducing with the ferricyanide reducer and intensifying afterwards.

With Prolonged Development.—The negative is very dense all over, even in the shadows. It may give a passable print but is a very slow printer. Reduction with the ferricyanide reducer is the best treatment for such a negative.

No after treatment of a bad negative can give anything approaching the result obtained by correct exposure and development.

Intensification.

There are many different ways of intensifying negatives, some of which are open to the serious objection that the results are of doubtful permanence. Though rather more troublesome than some other methods, the intensifying formula which uses mercuric chloride as bleacher and ferrous oxalate as blackening agent is undoubtedly the most satisfactory. It should be adopted in preference to any other when permanence and correctly proportionate intensification of all the densities of the negative are important. The following methods will also be found quite satisfactory if the process is properly carried out.

Bleaching with Mercury and subsequent Blackening

BLEACHING SOLUTION	{	Mercuric Chloride (corrosive sublimate)	100 grains	}	or {	6 grms.
		Potassium Bromide	.. .. . 100 grains			6 grms.
		Water up to	.. .. . 10 ozs.			250 c.cm.

The negative, after thorough washing, should be immersed in this solution until the image is white throughout. If not perfectly free from hypo, indelible stains appear and the negative is spoilt. Next wash in running water for 20 minutes, and then blacken in one of the following solutions, according to the degree of intensification desired.

- (a) Any dry-plate developer.
 (b) A solution of sodium sulphite, 1 part in 5 of water.
 (c) Very dilute ammonia, 1 part ammonia, (sp. gr. .880) to 100 parts of water.

Ammonia gives greater intensification than either (a) or (b). With (b) and (c) the intensification of the fine detail is less satisfactory than with (a), owing to the solvent action of the sulphite or ammonia on the bleached image. In the event of over-intensification, density can be reduced by immersion, for a short time, in a very dilute solution of hypo.

A very convenient intensifier is the **Mercuric Iodide Intensifier**. It has the advantages of effecting the operation with one solution only, and of not requiring such thorough washing of the negative before its use.

Mercuric Iodide	.. .. .	45 grains	} or {	2.5 grms.
Sodium Sulphite	.. .. .	2 OZS.		50 grms.
Water up to	.. .. .	10 OZS.		250 c.cm.

Dissolve the sulphite of soda in the water and then add the mercuric iodide. To ensure permanence the negative after intensification should be washed, and then treated with any dry plate developer for a few minutes.

Chromium Intensifier

This is simple to work, not liable to produce stains and gives satisfactory results.

BICHROMATE STOCK SOLUTION	{	Potassium Bichromate	..	1 ounce	} or {	25 grms.
		Water up to	10 ounces			250 c.cm.

This solution keeps indefinitely.

BLEACHING SOLUTION A	{	Bichromate Stock Solution	..	½ ounce	} or {	12.5 c.cm.	
		Hydrochloric Acid (Strong)	..	5 minims			0.5 c.cm.
		Water up to	.. .. .	5 ounces			125 c.cm.

BLEACHING SOLUTION B	{	Bichromate Stock Solution	..	½ ounce	} or {	12.5 c.cm.	
		Hydrochloric Acid (Strong)	..	25 minims			1.5 c.cm.
		Water up to	.. .. .	5 ounces			125 c.cm.

The bleaching solution should be freshly made. Solution A gives more intensification than Solution B. Immerse the washed negative in one of these solutions until it is entirely bleached, then wash until the yellow stain is removed from the film, and develop (by daylight, or after exposure to daylight) with a negative developer. The process may be repeated several times if the first application does not give enough intensification.

After intensification by any process thorough washing is necessary

Reduction.

If a negative has been over-developed and is too dense for convenient printing, or if, being over-exposed, it has been fully developed to get contrast, it may usually be much improved by reduction in the ferricyanide reducer. The negative which has already been fixed and rinsed is placed in a porcelain dish and covered with fresh, plain Hypo Solution (p. 23) diluted with an equal quantity of water. The Hypo is then poured off and after addition of a few drops of the following solution, returned to the dish.

Potassium Ferricyanide	..	..	50 grains	} or {	2.5 grms.
Water	..	..	1 oz.		25 c.cm.

The more potassium ferricyanide solution employed the more energetic is the reduction.

A negative that has been dried requires at least an hour's soaking in water before the reducer is applied, to ensure uniform action. This reducer attacks the delicate half-tones as well as the high lights of the negative so that its action must be closely watched or the result will be hopelessly hard. Thorough washing is all that is required afterwards.

In cases where the negative is too hard and loss of detail in the shadows would ruin its quality, the following ammonium persulphate reducer should be used.

Ammonium Persulphate	..	..	¼ oz.	} or {	6 grms.
Water	..	..	10 ozs.		250 c.cm.

This solution should be slightly acid; if not, it should either be allowed to stand until it becomes so, or 1 or 2 drops of sulphuric acid may be added to it.

The solution vigorously attacks the dense portions of the negative, leaving the fine details unreduced. The negative should be removed before the desired degree of reduction is reached, as the action is continued by the solution in the film. Rinse the plate quickly under the tap, and at once place it in a solution of sodium sulphite (1 in 10) for 2 or 3 minutes. This stops any further action and the negative only requires half-an-hour's washing before drying.

It is important to note that this reducer can only be used on a well-washed negative and not, like the previous one, soon after fixation.

Some Defects in Negatives.

The question of defects in negatives is more fully discussed in the "Ilford Manual." The following are those most commonly met with.

The negative is fogged. Possible causes are (1) accidental exposure to light, (2) use of unsafe light during development, etc., (3) use of too strong a developer, especially one containing too much alkali,

(4) over-exposure, in which case the edges of the negative may remain clear. The negative should be reduced with ferricyanide (page 28). The dark-room light should be tested as a possible cause of the trouble.

Green fog, more commonly called Dichroic Fog, is green when looked at, and reddish when looked *through*. It may be caused by keeping plates in an impure atmosphere; by contaminating the developer with a trace of hypo, ammonia or other silver solvent, especially in dilute tank development. As a rule it can be removed by treating the plate with a *very weak* ferricyanide reducer (page 28).

Halation. The bright parts of the image seem to have spread, and have more or less blotted out the detail of the surrounding dark parts, as in the case of windows in architectural interiors, or tree branches against a bright sky. It is prevented by using backed plates for all such subjects; and all Ilford Plates can be purchased ready backed at a small extra cost. Halation once produced, is very difficult to remove. The best method is to bleach the negative thoroughly in the chromium intensifier (p. 27) and, after washing well, to develop it, for a short time only, in a strong developer. The remaining undeveloped silver chloride should be fixed out in a hypo bath. In this way the worst of the mischief may be got rid of though with some loss of quality in the negative. Prevention is emphatically better than cure.

Frilling very rarely occurs with Ilford Plates and then only when they are roughly used, as by allowing water to fall on the edge of a negative whilst washing or because of the solutions and washing water being of widely different temperatures.

The film is yellow, due to development with a pyro developer containing too little or no sulphite, or to the solution containing the sulphite having become stale. The plate should be immersed for 10 minutes, with frequent rocking, in

Alum	1 oz.	} or {	25 grms. 3 c.cm. 500 c.cm.
Sulphuric Acid	60 minims		
Water up to	20 ozs.		

and should then be thoroughly washed, soft water being used for the first washings.

White, yellow or orange patches, especially visible when the negative is looked at from the back against something dark. The plate has been imperfectly fixed. In the case of white patches some good may be done by putting the plate into a fresh fixing-bath, but if the patches have turned yellow or orange, which they do gradually, there is no practicable method of removing the stains. Do not take the plates out of the fixing-bath too soon, and do not use the same bath for too many plates. (See also p. 23.)

A white crystalline deposit appears on the surface of the negative. This consists of hypo (or alum) crystals and indicates very imperfect washing. Wash the plate at once and wash it thoroughly.

A white powdery deposit on the surface of the negative may consist of very fine crystals (see above) or may be due to the use of very hard water. It may be removed more or less completely by washing in water which must be rendered slightly acid, if, and only if, the effect is due to hard water.

A rough white deposit on the surface of a negative generally occurs only when an alum bath has been used, and may be due to insufficient washing between the alum and the hypo, with the consequence that alumina has been formed by the interaction of the alum and the hypo. The deposit may sometimes be removed by soaking the negative in slightly acidified water.

Clear circular or irregular spots with a slight depression in the gelatine film, with or without an unfixed central spot, are due to air-bubbles adhering to the film, or to the accidental presence of oil or grease in the developer or dishes, or to solid particles of some greasy substance, such as paraffin-wax from the stoppers of bottles, in the developer. Spots of this class may also be produced by scum on the surface of a mixed developer that has been allowed to stand. Once formed the only way to deal with them is to spot them out, but as the scum or grease is easily visible on the surface of the developer the formation of such spots should be avoided by rejecting or filtering the developer.

Double images arise from making two exposures on the same plate. Sometimes however there is an ill-defined duplicate of one image. This is due to a minute hole in the camera-front. Take the camera into sunlight and set it up in the sun. Put the cap on the lens, wrap the focusing cloth well round the camera and after your head has been under the cloth for some time you will be able to locate the hole.

Blurred image may be due to (1) imperfect focusing; (2) shaking the camera during exposure; (3) drawing the slide shutter with the lens open; (4) motion of the object during exposure; (5) imperfect register between the focusing screen and the dark slides.

Reversed image, that is, positive instead of negative, may be, but rarely is, due to very prolonged exposure, as when the shutter sticks, or if the lens is open when it is supposed to be closed. It is, however, commonly caused by the admission of light to the plate during development, and is specially liable to occur during the prolonged development of a badly under-exposed plate in too strong a safelight.

Speed Numbers of ILFORD PLATES & FILMS

Plates.	H. & D.
ORDINARY	70
TOPOGRAPHICAL	100
CHROMATIC	135
SCREENED CHROMATIC	270
SPECIAL RAPID	270
RAPID CHROMATIC	400
AUTO-FILTER	400
ZENITH	650
ISO-ZENITH	700
GOLDEN ISO-ZENITH	1,400
PRESS ORTHO	700
DOUBLE-X-PRESS	1,500
SPECIAL RAPID PANCHROMATIC	400
SOFT GRADATION	700
HYPERSENSITIVE	2,500
INFRA-RED (WITH FILTER)	20
Films.	
SELO ROLL FILMS	350
SELOCHROME	700
SELO PANCHROMATIC	1,200
Ilford Flat Films.	
PORTRAIT MEDIUM	350
PORTRAIT ORTHO-FAST	700
HYPERCHROMATIC	1,500
PANCHROMATIC	400
HYPERSENSITIVE PANCHROMATIC	2,000
COMMERCIAL ORTHO	250
FINE GRAIN ORDINARY	45
THIN FILM HALF TONE	10

Ilford Limited supply Wedge Screens for use in testing photographic plates and papers at prices to be had on application.

ILFORD COLOUR FILTERS

ALPHA (Pale Yellow) for use with Ilford Panchromatic Plates and Films. Increase of exposure $1\frac{1}{2}$ to 2 times. Gives sufficient correction for blues and greens in landscape work generally. This filter may also be used with Chromatic and Rapid Chromatic Plates giving slightly less correction than the Iso Filter, but only requiring an increase of exposure of $2\frac{1}{2}$ to 3 times; with the Screened Chromatic, increase of exposure $2\frac{1}{2}$ times; with the Auto-Filter and Iso-Zenith Plates and Selochrome Roll Films, increase of exposure 4 times. This filter can also be supplied in the form of a sky filter.

BETA (Pale Green) for use with Ilford Panchromatic Plates and Films. Increase of exposure 3 times. Gives fairly good correction for all colours with minimum increase of exposure. It is suitable for near foreground subjects in which there is much red and yellow; it may also be used to give an approximately correct result in copying coloured pictures and in the photography of coloured objects where the exposure necessitated by the Gamma Filter would be too long.

GAMMA (Yellow Green) for use with Ilford Panchromatic Plates and Films. Increase of exposure 6 times. Is designed to give as perfect correction for all colours as possible. Its principal use is in copying coloured pictures, in the photography of coloured objects, stained glass windows, etc., and for obtaining the grey printer in 4-colour process work.

DELTA (Yellow) for use with Ilford Panchromatic Plates and Films. Increase of exposure 4 times, giving a very strong rendering of clouds where over-correction of the foreground is permissible. It should be noted that the Alpha Filter is sufficient to give excellent cloud rendering in ordinary landscapes. This Filter is somewhat deeper in colour than the Iso Filter.

ISO (Yellow) for use with Ilford Chromatic and Rapid Chromatic Plates. Increase of exposure 4 to 5 times. Gives the maximum correction of blues and greens in landscapes when using these plates. This filter can also be supplied in the form of a sky filter.

AVIOL II (Pale Yellow) absorbs the whole of the ultra-violet and a little of the extreme visible violet. This is useful for cutting haze in aerial photography and such cases. Increase of exposure $1\frac{1}{2}$ with Ilford Panchromatic Plates and Films, about 3 with Ilford Chromatic and Rapid Chromatic Plates, and 5 with non-colour-sensitive plates and films.

H.W. For use with Ilford Panchromatic Plates and Films giving daylight effect with artificial illumination. Increase of exposure 6 times.

If a negative is taken through this filter of a subject illuminated by metal filament lamps (or half-watt lamps), the result would be approximately the same as if it were taken through a Gamma Filter with daylight illumination.

TRI-COLOUR FILTERS for three-colour work, Red, Green, and Blue.

MICRO FILTERS (M). A set of nine specially selected contrast and correction filters enabling the user to display the structure of his specimens in any desired manner.

INFRA-RED FILTER for use with Ilford Infra-red Plates.

These and other filters for special purposes can be supplied at prices quoted on application.

Filters can be supplied in metal fittings to order either to fit inside the cells or hoods of lenses or outside as caps. Exact measurements with a rough sketch should be sent with order and if a cap is required a line should be pencilled around the part to be fitted. In all cases the best plan is to send the portion of the lens to which the filter is to be fitted.

ILFORD

DARKROOM SAFELIGHTS

are distinguished from other so-called "safelights" by their diffusing screen which is remarkable for its high diffusing power and its small absorption of light. As the carrying medium of the filters is gelatine, care must at all times be taken not to overheat them. No trouble will be experienced if the safelights are used in a properly ventilated lantern. A 20 W. incandescent lamp is a suitable illuminant.

These safelights in 10 x 8 size or upwards are intended for use with electric, or small incandescent gas-lamps. In the case of small sizes, or with candle- or oil-lamps, safety is increased at the expense of ease in working. For fast plates the "S" safelight would be quite satisfactory with candle, or oil-lamps.

It is, of course, understood that users will exercise ordinary care and will not unnecessarily expose fastest plates to the light.

Reasonable safety, combined with the maximum of light, makes these safelights superior to any on the market.

For use with darkroom lamps of the indirect lighting type, which include a diffusing system, the Ilford darkroom light filters can be supplied, if required, bound up with plain glass instead of with diffusing screens.

"S" for use when working with slow non-colour-sensitive plates, Lantern Plates and Bromide Papers.

"F" for use with the fastest non-colour-sensitive plates and films.

"X" **Darkroom Safelight.** This safelight is of greenish colour and is very pleasant to work by. It may be used with any fast non-colour-sensitive emulsion, but has been specially designed for use with Ilford Double Coated X-Ray Films for which it has a somewhat higher degree of safety, for the same luminosity, than our "F" safelight.

"ISO" for use with all Colour-sensitive Plates and Films except Panchromatic.

"G" Deep Bluish Green. This safelight is produced to meet the demand of some workers who dislike attempting to work in absolute darkness and others who prefer a Green light to a deep ruby light. Very special care, however, is necessary in handling Ilford Panchromatic Plates and Films even by so weak a light as is passed by this safelight.

BRIGHT GREEN. This addition to the series of Darkroom Safelights has been made for the assistance of those who wish to desensitize their Panchromatic Plates and Films before developing them. The use of this safelight enables the development of a Panchromatic Plate or Film, *after desensitizing*, to be carried out with perfect safety and convenience.

Size 10 x 8 inches, price 5/6 each.

Size 12 x 10 inches, price 8/6 each.

Any other size to order.

ILFORD PUBLICATIONS

The following booklets and pamphlets are issued gratis, and will be sent post free on application, or copies may be obtained from any photographic dealer.

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| ILFORD X-RAY FILMS* | A short treatise on X-Rays of particular interest to the radiologist and radiographer. |
| THE MAKING OF SLIDES AND TRANSPARENTIES ON ILFORD LANTERN PLATES | This booklet gives full instruction for the making of slides and transparencies on all grades of Ilford Lantern plates. |
| ILFORD BROMIDE AND CLORONA PAPERS AND HOW TO USE THEM | Giving full details for the successful manipulation of all grades of Ilford Bromide, Clorona and Bromoil papers. |
| ILFORD EXPOSURE TABLES | A complete monthly guide of exposures. |
| SELTONA BOOKLET | An invaluable guide for those who make their own prints by daylight on collodion self-toning paper. |
| ENTONE BOOKLET | Gives much helpful information for making successful prints on gelatino-chloride self-toning paper. |
| SELO 16 MM. PANCHROMATIC CINÉ FILM | Users of 16 mm. cinematograph film will find this booklet invaluable. It contains full details of Selo Panchromatic Cinematograph film and Selo processing services. |

The following leaflets are also available and will be gladly forwarded on request.

SELTONA.
ENTONE.
SELOCHROME FILM PACK.
SELO ROLL FILM.
SELO GASLIGHT.
BROMIDE.

CLORONA.
SELOCHROME.
ILFORD HYPERSENSITIVE PANCHROMATIC PLATE.
ILFORD INFRA-RED PLATE.
ILFORD BROMIDE AND CLORONA PAPERS.

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