

TIME-GAMMA TABLE for **777** **DEVELOPING TIMES ARE IN MINUTES**

TYPE OF NEGATIVE GAMMA	F°	SOFT		NORMAL			VIGOROUS				C°
		.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	
X-F PANCHROMATIC (Sheet Film)	90	3½	4½	5½	6	7	8	9	10	11½	32
	80	4¾	5½	6¾	8	9½	11½	14	16½	19	27
	70	9½	11	13	15	17	19½				21
	60	18¾	21½	27	30½	35	39				15
FINE GRAIN PAN (Sheet Film)	90	2	2½	3	3½	4¼	4¾	5½	6½	7½	32
	80	3	3¾	4½	5½	6	6¾	7¾	8¾	11¾	27
	70	6½	8	9½	11	13	15	17½	20		21
	60	12¼	15	20½	27	32½	40				15
X-F ORTHO (Sheet Film)	90	1¾	2½	3¼	4	5	6	7¼	8½	10¼	32
	80	4¼	5½	6¾	8	9¾	11¾	14½	19		27
	70	6¾	9	10½	12½	14½	17½	22			21
	60	8½	12	14	17	20	28½	29			15
ARROW PAN (Sheet Film)	80	3¼	4¼	5	6¼	7½	8¾	10¼	12	15	27
	70	5	6½	8	9½	11½	13¾	16½			21
	60	7¼	9½	12	14½	17½	20½				15
TRIPLE S (Sheet Film)	90	3	3½	4	5	5¾	6½	7¼	8¼	9½	32
	80	4½	6	7½	9	10½	12	13¼	15	16¼	27
	70	5¾	7	8¾	10	12½	15	18			21
	60	6¾	8¾	9¾	10¾	13¼	16				15
ULTRA SPEED PAN Roll Film and Packs	90	2	3¼	4¼	5½	6½	7¾	9	10½	12½	32
	80	5	6	7½	9	11	13½	20			27
	70	7½	9¼	11	13	14½	17	23			21
	60	9¾	13¼	15¼	18	20	24	32			15
SUPERPAN SUPREME Roll Film and Packs	90	1½	2	2½	3	3½	4	4½	5	5½	32
	80	3¾	4¾	5½	6¼	7½	8¾	9½	10¾	12	27
	70	5½	6½	7¾	9	10½	12½	15	17¾		21
	60	8½	10	11¼	13½	16	19	22½	30		15
SUPERIOR PAN No. 2 (35 mm.)	90	1¾	2½	3	3½	4	4¾	5½	6½	7½	32
	80	3¼	4	5	5¾	6¾	8	9	10¼	12	27
	70	4½	5	7	9¼	11½	14				21
	60	6½	7¾	9¾	11						15
SUPERIOR PAN No. 3 (35 mm.)	90	2½	3	4	4½	6½	6½	7¾	8½	10	32
	80	3½	4½	5¼	6½	7½	9	10¾	13		27
	70	7¼	9½	12	14½	17¼	20¾				21
	60	9¾	11¾	14½							15
EK VERICHROME (Roll Film)	90	2½	3½	4½	5	6	7½	9			32
	80	4½	6¼	7½	9	11	14	16			27
	70	5¾	7¾	9¾	11½	14	17	20			21
	60	6¾	8½	10	12½	15	18½	22			15
TRI X (Sheet Film)	90	3	4	4½	5½	6¾	8	9½	11½	14¼	32
	80	4¾	6	7	9	11	14¼				27
	70	6¾	9	12	15	19¾					21
	60	10¼	13¼	18	25						15
SUPER XX Roll Film and Packs	90	2½	3	3½	4	4¾	5¼	6	7	7¾	32
	80	5¾	6¾	7¾	8¾	10	11¾	13¾	16		27
	70	7	8½	10¼	12¾	16	18	22			21
	60	8¼	9¾	11¼	16	23	28	34			15
PLUS X Roll Film and Packs	90	2½	3	3¼	3¾	4¼	4¾	5	5¾	6½	32
	80	4½	5¼	6¼	7	8¼	9¼	10¾	12	13¼	27
	70	7½	8¾	10	11¼	13	15	17			21
	60	13	15	18	19½	24	26½	31			15
AGFA SUPERPAN PRESS (Sheet Film)	90	1¼	1¾	2	2¼	2¾	3	3¼	3¾	4¼	32
	80	2	3	3¾	4¼	5	6	6¾	7¾	8¾	27
	70	3	4	5	6	7	8	9¼	10¾	12¾	21
	60	3¾	4¾	5¾	7¼	8½	9½	11			15
AGFA PLENACHROME (Roll Film)	90			2¼	2½	3	3¼	3¾			32
	80	3	3½	4½	5½	7	8	9			27
	70	6	7½	10	12½	15	19	22			21
	60	8	9½	14	17	19	21	24			15
EK SUPER PANCHRO PRESS	90	2¼	2¾	3¼	4	4½	5	5¾	6½	7¼	32
	80	3	3½	4	4¾	5½	6½	7¼	8½	10	27
	70	5½	6½	7½	8½	9¾	11	12¾	15		21
	60	9½	11½	13½	15½	18					15

Introduced in 1938 . . .

HAROLD HARVEY FORMULA

777
PANTHERMIC
DEVELOPER

. . . has proved

its worth through dependable performance.

It has earned an ever increasing number of users and has become a standard for fine grain all over the world. Careful manufacture from only the best grades of materials, chemical and sensitometric tests throughout production, assure the user a well standardized, dependable product.

*T. M. Reg. U. S. Pat. Off.

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DESCRIBING 777

THE TEMPERATURE RANGE . . . is one of the most valuable features of 777, for anywhere on earth, in summer or in winter, films may be safely processed at whatever the room temperature happens to be. There is never need for chilling the developer, the stop bath, the hypo or the wash water and, the solutions may be at quite different temperatures one from the other so long as the temperature of either does not exceed the limit of 90°F, 32°C. If instructions are followed there is no danger of the emulsion frilling or reticulating while processing under the above conditions, or in drying thereafter. The normal working temperature is 80°F, 27°C and the lowest recommended is 60°F, 15°C.

FINE GRAIN . . . is a term of broad meaning, without established standards for its measurement and definition. With 777 however, it is easily seen that the grain, or size of the individual particles, is exceedingly small and the graininess, or their distribution, is smooth and free of clumping. An unusual feature of 777 finegrain is; its character remains practically constant regardless of working temperature. Although the grain produced at 90° is actually coarser than that obtained at 60°, the difference is scarcely detectable other than by microscopic examination.

RESOLUTION . . . or the detail-seeing power of an emulsion is a function of its graininess, thus the character of image structure obtainable with 777 makes its use particularly desirable whenever maximum sharpness is required on any negative. Finegrain development is naturally a fundamental requirement for optimum results from miniature camera negatives. With negatives of larger sizes, the increased resolution and sharpness produced by 777 is at once apparent, and its use is a sage precaution whenever it is probable that enlarging demands will be made upon sectional areas.

SPEED, GRADATION, DENSITY AND COLOR . . . Emulsion speed is not sacrificed for the sake of fine grain. 777 has speed characteristics approximately equal to those of the average, normal grained, M-Q and other developers. Under most conditions of use increased exposures are not required, however, when used at temperatures below 70°F, 21°C, some increase may be desirable.

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If circumstances demand exposures under normal, good results can be obtained. 777 has the ability and power to develop negatives to any contrast from the lowest to the highest, therefore any desired scale of gradation can be obtained. As with high and low temperatures, difference in graininess between negatives developed to high and low contrasts is scarcely detectable. The densities obtained with 777 will appeal to users of large negatives, as they are suitable for contact as well as projection printing. Negatives are neutral in color, free from dichroic and surface images.

THE REPLENISHER SYSTEM . . . incorporated in 777 is original in technique and unique in fine-grain development. The Replenisher itself is not the Base Developer in more concentrated form nor, as with conventional replenishers, is it used as a "kick-up" added to an almost exhausted developer in order to prolong its life; it is added to the Base after each use and in ratio to the area of film just developed, while the total volume of working solution is held constant.

In theory, a quart of one developer is converted into a quart of a second; and the latter, with its absorbed by-products and expended chemical energy compensated for, is equal in characteristics to the first developer in unused condition. In practice, the above theory has been realized to a very gratifying extent. During the base-replenisher transition and after the conversion is complete, the rate of development, the film speed and other characteristics remain constant to very close limits. The realization of this replenisher required a tremendous amount of research.

The 777 replenisher system permits the development of a definite area of emulsion in a definite quantity of developer and requirements can therefore be easily calculated in advance.

CONSTANCY OF RESULTS . . . For a litre or a quart each of Base Developer and Replenisher, processing 21 rolls of 35mm film or their equivalent area in other sizes, speed variation is plus or minus 12% or less, and developed contrast variation is practically zero.

This is probably the first published statement of accuracy for any photographic developer, and although the stated tolerances are by no means guaranteed, it is felt that they may be accepted in good faith and fully realized by the user if instructions are followed and reasonable care used in processing.

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Tests made under conditions of constant agitation and development of the same emulsion for equal or equivalent time-temperature periods, have shown typical variations to be approximately as follows: With the first roll developed to a gamma of 1.0 and having a relative speed of 100; the sixth shows a gamma of 1.0 and a relative speed of 109; the twelfth, gamma 1.0, speed 93; the twenty-first, gamma 1.0, speed 90.

As speed variation is slight and is manifest as overall density difference, and contrast is controlled to exceedingly close limits, there is very little to choose between the first, twenty-first or following films developed in 777; in fact, it provides the simplest and least expensive means of standardizing photographic results, for constancy of negative characteristics greatly simplifies the production of highest quality prints.

EXTENDED REPLENISHMENT . . . The foregoing statement of accuracy is based upon the recommended solution life for general amateur use of 21 films per unit of Base Developer plus one litre or quart of Replenisher. It is however, often desirable and perfectly feasible to continue replenishment over long periods of time and for a great quantity of films, such as for very active amateur, professional and photofinisher use. After the base developer has been almost superseded by the replenisher the working solution apparently develops well stabilized characteristics, and many users have reported tanks of 777 continually replenished over a period of years with perfectly satisfactory results.

The criterion for extended replenishment is active use of the working solution and consequent frequent replenishment. For such use, a minimum of one film a week per unit of working solution is recommended. If long intervals elapse between replenishments some deterioration from exposure to air and the effect of time may naturally be expected. If this becomes seriously noticeable, a new base developer should be started.

USE WITHOUT REPLENISHMENT . . . The 777 Base Developer may, upon occasion, be used without replenishment, however, speed and gamma will both drop with each successive film, development time being constant. Increasing time of development with each film will not remedy the loss, for increasing time results in increasing contrast only. This will accomplish matching of the highlight densities, but the slope of the characteristic curve will be steeper and there will be correspondingly less and less shadow detail recorded, less speed obtained.

Compared to the typical results from tests of replenished 777, given under "Constancy" above, those obtained with unreplenished Base were as follows: With the first roll developed to a gamma of 1.0 and having a relative speed of 100; the sixth showed a gamma of 0.79 and a speed of 47; the twelfth, gamma 0.74, speed 32; the twenty-first, gamma 0.20, speed 2. Careful comparison of the two results is interesting, as they would be similar with any other developer not effectively replenished.

The use of unreplenished 777 is advisable and the 500cc-17 oz. boxes of Base Developer are recommended for one-time use by amateurs and travelers having only an occasional film to develop. A second film may be processed without increasing development time and without noticeable difference in results, provided it is developed soon after the first. A third film would most likely show noticeably less density and contrast, but if circumstances demand its processing, results may not be objectionable, however, three films should be the limit attempted in these units of unreplenished Base. The 777 Base tubes are a convenient source of fresh and perfectly standardized fine-grain developer to satisfy occasional requirements.

THE REPLENISHMENT TABLE . . . gives the quantities required for all popular sizes of films and plates, and the square inch proportion is also given so that requirements for any desired area can be computed. The table is based upon average energy requirements and, for the standard run of 1 ltr. or qt. of Replenisher to 1 of Base, the quantities given will be satisfactory regardless of the gamma to which any film is developed. If, however, on extended replenishment a majority of the negatives are developed to high gammas, more replenishment will naturally be necessary because of the increased energy demand.

The exact amount of replenisher increase must be determined by experience. If a falling-off in density becomes noticeable on successive films, it is suggested that the quantity of replenisher be at first doubled, then reduced to a point where densities remain constant. This procedure will also compensate energy losses due to long use in open or lightly covered tanks. Replenishment should never be less than the quantities given in the table, for it may be impossible to maintain the working solution volume. A 35mm or 120 roll of film normally carries off slightly more than 3/4 oz. of developer in the emulsion, and there are other losses in handling the solutions, plus those caused by time and slight oxidation.

DEVELOPMENT TIME . . . for any required gamma and at any given temperature remains constant throughout the developer life.

GAMMA . . . is a mathematical expression indicative of the developed contrast of negatives and serves as a basis for comparing gradation characteristics of sensitized materials and developers. When the opacity of the negative image is directly proportional to the amount of light reflected from various object areas, then the gamma of the negative is "1.0". When the negative opacity ratios are lesser than those of the light, the gamma is less than 1.0, and vice versa.

Negatives intended for printing on normal grades of papers are usually developed to a medium gamma of about 0.8 and film speed ratings are generally based upon the expectation of the negatives being so developed.

TIME-GAMMA TABLES . . . for the most popular films are supplied with developer packages. They give the correct time of development in which to obtain a desired gamma at the major temperatures within the developers' range. It will be noted that time becomes shorter as temperature increases and vice versa, so temperatures intermediate to those given will require approximately proportional times.

Remember that the standard working temperature of this developer is 80°F, 27°C, and therefore, conditions permitting, it is practical to heat the solution to that temperature or above; emulsion speed and shorter developing time being gained thereby. For purposes of accuracy, the tables are for constant agitation throughout development. If intermittent agitation is preferred, increased times are necessary; 20-30% for agitation at one minute intervals, the exact increase depending upon individual habits.

NOTICE . . . Because of changing film characteristics and the introduction of new brands, the 777 time-gamma tables are no longer printed in the instruction book, but are supplied on separate sheets with developer packages. This arrangement permits change of the tables whenever necessary and the loose sheets have been found more convenient for darkroom reference. The Photolab Index, published by Morgan & Lester, N. Y. is recommended as a source of information in regard to other negative materials. That outstanding reference work carries 777 time-gamma tables in graphic form and for a great variety of materials. Additional information can also be obtained by writing to this company.

THE KEEPING QUALITIES . . . of unused 777, dry or liquid, are excellent provided the product is sealed from air. A user has reported that a spare bottle of 777 Base, having remained on his shelf for ten years, was tried out of curiosity and produced perfect results. The cause of such keeping was undoubtedly perfect sealing of the bottle cap. Oxidation and consequent loss of developing power will naturally occur in loosely capped bottles or uncovered tanks. As the oxidation product of 777 is red, it is readily detected and any Base or Replenisher solution that has developed a deep, wine-red color, should be regarded with suspicion and discarded.

As the working solution is generally kept in a full bottle or covered tank it is less subject to oxidation than the Replenisher. The latter, if stored for long periods in a bottle half or more filled with air, is very subject to oxidation. The Replenisher should preferably be stored in full bottles and only purchased in quantities sufficient to meet known requirements.

MIXING AND USING 777

REQUIRED EQUIPMENT . . . is simple. The Base Developer should preferably be kept in a clear glass bottle with wide neck to facilitate pouring back and forth; and the Replenisher in a single, or several smaller bottles of colored glass with narrow neck. All cans or corks should fit tightly in order to prevent air leakage and consequent oxidation during storage. There should be a large graduate with engraved calibrations for mixing the solutions and a small one for accurately measuring the Replenisher portions; a receptacle such as a Pyrex beaker for dissolving the developing agent in hot solution; a glass stirring rod and a funnel. The thermometer used for taking solution temperatures should be of laboratory grade.

IDENTIFICATION . . . of Base Developer and Replenisher solutions is important. For your convenience in this respect, printed labels are supplied with dry 777 and these should be applied immediately the solutions are bottled. There is also a label to calibrate the original solution level. Liquid 777 Base is supplied in clear glass bottles and the Replenisher in blue glass so that, should the labels become detached, solutions remain identified by the bottle color. Base Developer is also indicated by a symbol in the shape of a minus sign and Replenisher by a plus.

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LIQUID 777 . . . is supplied ready to use and should not be diluted.

THE DRY PACKAGES . . . are opened by cutting off the metal tops as near the end as possible. Before opening, hold the tubes in vertical position and tap them a few times in order to settle the contents below the cutting line. Each tube encloses a smaller container which holds the developing agent. This small tube is imbedded in the bulk alkali, so be careful to pick it out before dissolving the alkali.

MIXING DRY 777 . . . First, dissolve the bulk alkali in about three-quarters the total volume of water, which may be at any convenient temperature, but preferably not below 70°F, 21°C. Next, dissolve the developing agent from the small, inner container in slightly less than one-quarter the total volume of water at, or near, boiling temperature; add to the alkali solution and adjust to final volume with plain water. The developing agent may be put in a suitable small receptacle and boiling water added, or it may be added to cold water and then raised to boiling temperature. The 777 developing agent is practically insoluble in cold, but will dissolve almost instantly in boiling water. The solutions may be used immediately after cooling to 90°F, 32°C, or below.



DEVELOPING IN DAYLIGHT TANKS . . . After the tank is loaded, closed, and the white light on, take the temperature of the working developer; consult time-gamma table for the required developing time, and pour in the developer. If possible, keep the reel in motion throughout development. When development is completed, quickly dump the contents of the tank into an empty graduate, and refill with the Stop Bath; allow to remain 30 seconds, pour off, replace with hypo—and proceed with fixation, washing and drying as in regular practice. Now, before returning the used developer to its bottle, carefully measure the required amount of replenisher and pour it into the bottle first. Then pour back the developer up to the mark only, and discard any remainder in the graduate. Proceed as above for each successive film developed.

Before starting development have all materials ready at hand. It is also advisable to put the tank in a clean dish during development in order to catch any solution spilled over, for it may be needed to regain the original working level. Be

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sure to empty the contents of the dish into the graduate at the same time as the tank or its developer may become contaminated with short stop or hypo.

IN PROFESSIONAL SIZE TANKS . . . It will not be necessary to empty the tank of the working developer after each use, but it should be equipped with a neat-fitting cover of the floating type, and preferably a second cover. In such use, after each batch of negatives is developed, compute and measure the necessary amount of replenisher, then dip-out a quantity of the working developer and add the replenisher, and then pour back the working developer up to the original level, discarding any remainder. This procedure should be repeated with each batch of film.

PREFERRED DARKROOM METHOD . . . No matter what type of tank is employed, it is best to use separate tanks for the short stop and hypo, the larger the better for the hypo. To develop proceed as follows . . . fill the tank with the working developer and take the temperature in the tank; then consult the time-gamma chart. Darken the room, load the reel, start development, timer, agitation as usual. When development is nearly complete it is safe to inspect by a standard safelight. When development is finished, transfer the reel to the short stop tank for at least thirty seconds; then to the hypo tank and agitate a while before turning on the white light. Now, measure the required amount of replenisher and add it to the partially empty working bottle, then pour back the used developer up to the marked level and discard any remainder.



AGITATION . . . during development is a matter of great importance and it should preferably be continued in the stop and fixing baths. Constant agitation is essential to the exact repetition of results and for obtaining optimum gradation characteristics, as it increases the supply of fresh solution to the denser areas where more silver is being produced and where more chemical energy is required for full and proper action.

When a negative is processed vertically in still developer flow marks caused by eddy currents

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and gravity will be very evident, and such marks will also occur if the negative is moved through the developer, or the developer flowed over the negative, in one direction only. Laboratory tests reveal the fact that perfectly even development is indeed a difficult matter. For best results the negative should move through an ample supply of developer in at least two alternate directions and the solution should be actively turbulated the while.

Tanks in which roll films are developed on a reel permit satisfactory agitation by turning of the reel in alternate directions. 35mm film may be vigorously agitated, but larger sizes are more supple and must be moved gently or adhesion between layers may occur. With all sizes, a wedge of waxed wood or plastic material is advisable to lock the outer end of the film securely in its groove. No matter what the agitation, every effort should be made to standardize the procedure. Constant agitation not only assures better negatives, but shortens developing time appreciably.

FILTERING . . . It is normal for a precipitate consisting of finely divided silver to accumulate in the 777 working solution with use. This precipitate starts forming an hour or so after each use and a portion may plate on the walls of the bottle or container, the major part settling out as a black sludge. This silver is inert and has no adverse effect on the film or development, but it is good practice to filter it out from time to time. It is also normal for the working solution to acquire a yellow or orange color with use, but this color is harmless, being derived mostly from dyes used in film backing materials. It should not be mistaken for oxidation of the solution. It is always good practice to occasionally filter both developer and hypo solutions; particularly for 35mm films.

A STOP BATH . . . is generally preferred but is not necessary or always recommended. With 777, the bath may be considered only in the light of its effect in preserving the acidity of the hypo solution and thereby prolonging its useful life. The acid in the stop bath neutralizes developer absorbed in the emulsion and the alum prevents softening during the action, permanent hardening being accomplished by the alum in the fixing bath. Treatment of the film for half a minute is sufficient.

The following stop bath keeps well and will do for several films. It is simple, not critical as to measurements and potassium, sodium or ammonium alum may be used . . .

White alum	½ oz.	15 gm
Acetic Acid 28%	1 fl. oz.	30 cc
Water	1 qt. U. S.	1 litre

ROLL FILMS . . . are usually processed on reels in daylight tanks. With these tanks use of a stop bath is recommended because the amount of hypo accommodated is small and its proper action may be affected by developer residues in the emulsion and tank.

CUT SHEET FILMS . . . when developed on hangers, are generally fixed in tanks containing ample quantities of hypo solution, therefore use of a stop bath is optional. It is of course desirable but not always safe, for it has been found that the backing material used on some cut sheet films of recent manufacture will reticulate after short immersion in hot stop bath. For all films other than 35mm, which have no back coating, skipping the stop bath is advised when processing at temperatures above 84°F, 29°C.

WARNING . . . 777 exhibits a strong tanning action on emulsions up to and slightly above 90°F, 32°C, but this action is temporary in nature and no permanent hardening of the gelatin takes place. The bath following the developer must therefore contain an alum in order to prevent emulsion softening as absorbed developer is displaced. At temperatures above 72°F, 22°C, films should never be transferred to plain water or to an acid-water stop bath, or to an ordinary acid-hypo, for the gelatin will then be very subject to reticulation and at high temperature it may be destroyed in a few moments.

FIXING AND HARDENING . . . despite the fact that hypo is cheap, using the fixing bath only once is a safe but wasteful practice. Modern fixing baths are capable of processing a large area of film and they should not be discarded until they have justified their composition. Following is the formula recommended for 777; it does an excellent job and has a long useful life:

A. Water, very warm	1 gal. U. S.	4 litres
Hypo	2 lbs.	1 kg.
B. Water, room temp.	1 qt. U. S.	1 litre
Sodium Sulfite Anhyd.	2 oz.	60 gm
Acetic Acid, 28%	6 fl. oz.	200 cc
Boric Acid, crystals	1 oz.	30 gm
Potassium Alum	2 oz.	60 gm

There is no simple test to determine its state of exhaustion so when to renew the bath is a matter of the users' judgment. So long as the solution remains unclouded, clears film in a reasonable time and hardening is satisfactory, there is no need to discard it, however, when clearing time becomes noticeably long by all means start with a fresh bath. Leave film in the bath for at least double the time required for it to clear.

The chemicals should all be mixed in the order given or, the hardener part (B) may be prepared separately and kept as stock to be added in equivalent proportion to lesser quantities of hypo solution as required. It will also serve as an excellent stop bath capable of processing several films if diluted about 10:1 with water.

In hot weather, and in the tropics, the addition of about a tablespoonful of Listerine or Hexyl-resorcinol S.T. 37 solution to each gallon of hypo is recommended. This will inhibit bacterial or fungus growth and help maintain clarity of the solution.

The above formula may be obtained in prepared ready to mix form as Defender 1-H Hypo.

WASHING AND DRYING . . . The wash water may be at any temperature not above 90°F, 32°C, and a considerable drop below developer and hypo temperatures will make no difference in results. At the limit temperature, a washing time of 10 minutes will be ample, with increase to 25-30 minutes at 60°F, 15°C.

After washing, blot off the surface of the film and hang it in an airy place to dry. Miniature films are best blotted by hanging up one end, holding the other in a suitable clip, and gently swabbing one side at a time with a wad of wet and squeezed-out absorbent cotton, viscose sponge or chamois. If a fiber or so remains on the surface of the negative, leave it until the film is dry, when it may easily be dusted off. Such fibers will not imbed themselves in properly hardened film.

Quick drying is to be avoided as it may increase graininess by inducing stresses in the emulsion. Modern films have two coating layers, and if the outer is dried too fast, it may slip on the under coat and disarrange the image structure.

Soaking the film in water containing a wetting agent is not recommended for high temperature processing, as such treatment causes the gelatin to swell and take up more water. This may result not only in slower drying, but in some loss of hardness.

OTHER CONSIDERATIONS

NEGATIVE MATERIALS . . . As 777 makes the use of even the high speed materials practicable for salon size enlargements from 35mm film, some discussion of negative materials is appropriate.

The slow speed and extra fine grain films generally have inherently high contrast and poor shadow characteristics, and consequently a rather short scale of gradation. Despite their fine grain such films are not the most desirable for pictorial photography, but are definitely valuable for more technical subjects where the finest structure and utmost image resolution is necessary. These films have American speed ratings of 24 or thereabouts.

The medium speed panchromatic films, around speed 50 to daylight, are the most popular and are considered the most satisfactory for all around general use. Finegrain results with such films in 777 are outstanding.

The high speed pans, in speed group 100 to daylight, 64 to artificial, have exceptionally desirable characteristics for pictorial photography and for all work by artificial light. Their high speed permits faster exposures, which means less chance of camera movement and, in turn, sharper negatives; or a smaller stop for greater depth of field; or better results in poorer light. Of equal importance is the improved gradation obtainable, for these films have inherently soft characteristics, a long scale of gradation and better ability to render detail in the deep shadows. Of late, the grain characteristics of high speed films have been improved so that there is very little difference, at least in 777, between these and the medium speed materials. Those who have not tried the faster films are urged to do so, for much is to be gained by their use. Their finegrain results in 777 leave nothing to be desired.

It is well to bear in mind that no negative material is stable in characteristics and that is why expiration dates are printed on the boxes. Actually, film speed starts dropping, and fog level rising, when the material leaves the manufacturers' refrigerated storage; and the rate of drop thereafter depends very much upon heat, humidity, etc. There is nothing much to worry about however, as the keeping quality of films is excellent considering their nature, and modern emulsions may be used with good results after their expiration date provided speed drop is compensated for. The medium have better keeping qualities than the higher speed pans, so are some-

what preferred for use in the tropics and for long travels.

The following is offered only as a suggestion for decreasing film speed to compensate for age losses, particularly with high speed materials kept under casual conditions: If a film of 100 speed is 14 mos. from expiration date, use a speed of 90; if 8 mos., use speed 64; at 2 mos., use speed 50; at expiration or after, use 50 or less. Even though speed does not drop so much, a full exposure is always safest.

EXPOSURES . . . are best computed by the aid of a good photo-electric meter and usually at the standard speed setting for the film. Such exposures, developed to a medium contrast of about gamma 0.8, will yield the best average of good negatives of most subjects. Simple use of the meter to indicate exposure from readings of the mid-shadow areas, avoiding sky or bright lights, is assumed.

Study of graphs will reveal that, as the photographic image develops, the contrast of the film density ratio between any two areas of different subject brightness, increases and at the same time the developed image progresses further and further into the shadow regions. If therefore, a normal exposure as described above were developed only to about gamma 0.8, the highest density in the negative would be too low and insufficient shadow detail would be visible, or, if developed to a high gamma of 1.2, there would be more shadow detail but the highlights would be too dense, or too blocked, to print well.

When development to high contrasts is required, it is advisable to decrease exposure by at least 50% in order to keep the maximum densities down to more printable levels. On the other hand, for low contrast development exposures should be increased by 50 to 100% or more in order to record the full shadow detail and obtain an overall density sufficient to render a full scale of values. The soft, rich and long scale negatives so obtained are particularly desirable for a great many pictorial subjects.

Single films may of course be developed to any wanted gamma so their exposures can be varied accordingly; but with roll films, all the frames thereon naturally develop to the same gamma, so all subject matter should be kept as appropriate as possible and exposed at the same film speed. In working with roll film it is easier to adjust the

film speed used for computing exposures to suit the desired type of negatives and intended development. For instance: a film rated at speed 100 should be exposed at 100 and developed to gamma 0.8 when subject matter is average; for subjects of high brightness range such as sunlit streets, interiors, etc., expose at speed 64 and develop to gamma 0.6-0.65; for low subject brightness ranges, grey days, etc., expose at 150 and develop to gamma 1.2, in each case basing exposures on mid-shadow readings.

PRINTING . . . The negatives described above will print to best advantage in enlargers having a condenser and frosted lamp illumination. Enlargers with condenser illumination generally require negatives of lower contrast and those with diffuse illumination, negatives of higher contrast, to produce images of like effect on the easel; therefore the preferred gamma of negative development is subject to the printing equipment.

The ideal negative is one which permits the maker to readily obtain the picture visualized, and the realization of such negatives can only be achieved after considerable trial and experience. The most direct approach to the achievement is a developer which can be depended upon to give repeatable results with the least amount of fuss and bother. When the production of good negatives becomes standardized, more time and thought are freed to the pleasurable business of making prints. Good negatives can be printed in many manners and moods, and it is only in the print that an exposure becomes a picture.

THESE INSTRUCTIONS . . . are admittedly long in text, but are presented with the thought that the reader desires complete information on the developer and its use. The author, who is the originator of 777, has endeavored to include the answers to many questions asked by users over a period of years and this has made necessary the inclusion of notes on films, exposures and enlargers. It is hoped that the advice given herein will be accepted in good spirit, and that it will be of benefit to some in obtaining better . . . prints.

REPLENISHMENT TABLE

Roll Film

Size	Exposures	Replenisher
35 mm.	36	1½ oz. 45 cc.
1½" x 2½"	8	1 oz. 30 cc.
2¼" x 2¼"	6	1 oz. 30 cc.
2¼" x 3¼"	8	1½ oz. 45 cc.
2¼" x 4¼"	8	2 oz. 60 cc.

Packs, Sheet Films, Plates

Size	Exposures	Replenisher
2¼" x 2¼"	12	1½ oz. 45 cc.
2¼" x 3¼"	12	2¼ oz. 65 cc.
2¼" x 4¼"	12	3 oz. 90 cc.
3¼" x 4¼"	12	4¼ oz. 120 cc.
9 cm. x 12cm.	12	5 oz. 140 cc.
4" x 5"	12	6 oz. 170 cc.

Any Area

Add 1 oz. or 30cc of replenisher for each 40 sq. in. or 260 sq. cm. of film developed.

777 IS NOW SUPPLIED IN

Dry

21 FILM UNIT

To make 1000cc, 34 oz. U.S. each of Developer and Replenisher; for developing 21 rolls of 35mm or 120 film, or their equivalent area in other sizes.

6 FILM UNIT

To make 500cc, 17 oz. U.S. of Developer and 250cc, 8½ oz. U.S. of Replenisher; for developing 6 rolls of 35mm film.

1000cc REPLENISHER

To extend the life of the 21 Film Unit for an additional 20 films, or for larger replenishment requirements.

250cc REPLENISHER

To extend the life of the 6 Film Unit for an additional five films.

TRAVELTUBE

Containing three 500cc boxes of developer only; for processing 6 or more films without replenishment; for travel and occasional requirements.

THE FOLLOWING SIZES . . .

- 1 Gallon DEVELOPER
- 1 Gallon REPLENISHER
- 5 Gallon DEVELOPER
- 5 Gallon REPLENISHER

For cut sheet film, professional, and photo-finishing requirements.

(1 U.S. gallon=3.785 Litres)

Liquid

- 32 oz. DEVELOPER
- 16 oz. DEVELOPER
- 16 oz. REPLENISHER
- 8 oz. REPLENISHER

Liquid 777 is ready to use, without dilution.



777
PANTHERMIC

80 B-R-13
80 A-
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HARVEY PHOTOCHEMICALS, INC.

NEWTON, NEW JERSEY

INSTRUCTIONS