PHOTOGRAPHERS' FORMULARY

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Instructions for using Developer DI-13 with Kodak TMax 100

There is certainly no shortage of film developers on the market but new ones keep appearing regularly. In a few instances these new products really do offer some unique advantages but, in general, there are more similarities than differences in the way film developers work.

Basically this developer, too, is conventional; but it is not a general-purpose formula: It was designed specifically for extreme compaction development (for very contrasty subjects), and should be used *only* with Kodak's TMax 100 film.

TMX is an appropriate film for this purpose because its gradation characteristics can be modified to an unusual degree by the kind of development it receives. In most popular developers TMax 100's characteristic curves are fairly conventional; in some cases they exhibit a slight boost in highlight contrast, in other cases the curves are gently shouldered, indicating some reduction in contrast in the highlights. In almost all instances this fine film produces excellent shadow separation and its speed loss, even when developed to low contrast, is typically minimal.

In a few developers, though, the curves take on an unusually free form that typically shows up as a rather abrupt increase in slope at about mid-range. In some cases this is accompanied by a slight hump in the lower portion of the curve but these effects are seldom very pronounced in curves that represent normal or near-normal contrast. In a very few developers (TMax RS is one example) TMX produces classically ideal straight-line "curves" without appreciable local emphasis.

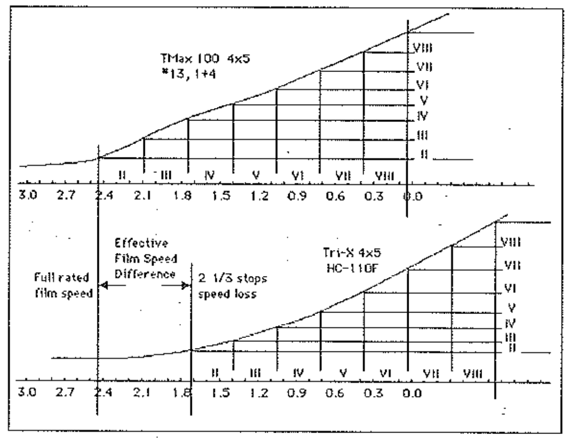
Why DI-13 is different

But straight-line curves are not always desirable: the natural tendency of the B&W photographic process is to decrease contrast in the extremes of tone and increase mid-range contrast rather dramatically. The printing paper's characteristics are to blame for much of this, but the film curve's contour contributes to this gradation problem, too.

To counteract this typical tone distortion the lower section of the film curve (the shadow region) should exhibit a relatively steep gradient; the mid-range gradient should flatten out to temper the normal harsh contrast in the middle grays, then the upper portion of the curve should take a modest upturn again to insure good highlight separation. Unfortunately, there are limits to our control of curve shape, but the combination of TMax 100 and DI-13 takes a modest step toward this ideal.

Two other design criteria have also been satisfactorily realized: TMax 100 can be used at its full rated film speed when developed to "normal" contrast in DI-13, and the speed loss resulting from reduced development is remarkably small. In addition, DI-13 works quite slowly so that development times for even extreme compactions are long enough to insure uniform development, and can be timed accurately.

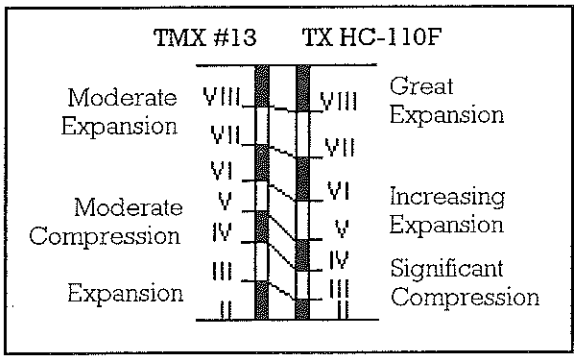
Two actual film curves are shown here to illustrates the unique characteristics of TMX/DI-13.



In this admittedly "worst-case scenario" DI-13 and TMax 100 are compared with Tri-X and HC-110F—a combination that, when developed to low overall contrast, tends to produce weak shadows and harsh highlights, with a pronounced loss of film speed. The films were exposed at their normal rated speeds and given normal development. TMax has maintained its full rated speed of 100 (actually almost 125) but Tri-X has lost about 2 stops and is working at an effective speed of about 80.

The difference in curve shapes is also obvious in this illustration. The TMax curve has a distinct hump (suggesting increased local contrast) in the low range, but levels out a bit in mid-range before turning up a little in the highlights. The gradation effect is suggested by the zone spacing in the "negative" (on the vertical axis of the graph). Notice that zones II, III, VII, and VIII are quite wide, indicating moderately high contrast, while zones IV, V, and VI are relatively narrow, suggesting reduced contrast. By comparison, the Tri-X "negative" shows significantly reduced contrast in the deep shadows, with progressively increasing contrast toward the high values.

These characteristics are dramatized in the following illustration which compares the two "negatives" side by side. A significant feature of this illustration is the relative position of the middle values. The TMax rendering suggests rather light, subtly-detailed mid-tones compared with relatively dark and somewhat harsh rendering of these values in the Tri-X negative.



In print form the differences are not as dramatic as they appear here but when unmanipulated prints are made from matched negatives, as represented by the preceding curves, the print images have a distinctly different "look" that's consistent with the description in the diagram above.

How to prepare and store DI-13

DI-13 is packaged in powder form to make 1 liter of stock solution. Dissolve the contents of packet A (the larger packet of white powder) in about 750 ml. of hot (125°–150°F) water. Avoid contact with the powder; it contains a caustic ingredient so, as is the case in preparing any photographic chemical solution, hand and eye protection is recommended.

Tap water is usually suitable but if your water quality is questionable, distilled water is recommended. Stir the solution until the chemicals have dissolved completely, then add the contents of packet B (the smaller packet of cream-colored powder) and continue stirring until the solution is clear and there is no trace of undissolved powder in the bottom of the mixing container. This may take a few minutes because the chemicals dissolve slowly but it's important to get everything into solution.

Finally, add cold water to make a liter of stock. The solution may turn orange when you add the water but this is a normal effect; the color will fade in just a minute or two and the stock solution will be clear with just a slight pinkish-tan cast.

We strongly suggest that you make a special effort to protect this developer from prolonged contact with air. Although in our tests the DI-13 stock solution— stored in full, tightly-capped glass containers—has retained its activity virtually unchanged for up to 6 months, it will lose strength noticeably if allowed to stand for more than a week or two in a partially-full bottle.

For this reason we recommend that you store the stock solution in several small bottles, rather than one large one. A bottle set consisting of 1—500 ml., 1—250 ml., 1—100 ml., and 3—50 ml. bottles is almost ideal but it you want to go to smaller units it will probably be even better.

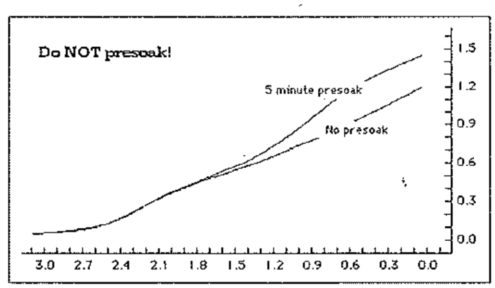
The point here, of course, is that you should use up the contents of the smallest containers first; then refill them from the next larger size, emptying the larger container completely. In this way there'll never be more than 50 ml. at risk and the remaining stock solution should remain healthy and reliable for several months. Incidentally, this is a good way to treat *all* developer stocks, not just this one.

How to use DI-13

DI-13 is intended to be used as a one-shot developer. Normal dilution is 1+5 although a 1+4 mixture provides a bit more reserve strength and somewhat shorter development times. Because this formula is intended primarily for extreme compaction development (for subject ranges of up to 10 or more stops), the times have been adjusted for that use. You *can* use DI-13 for subjects of normal or slightly lower-than-normal contrast, but the development times are inconveniently long and some of the gradation benefits of that low-range "hump" in the curve are lost.

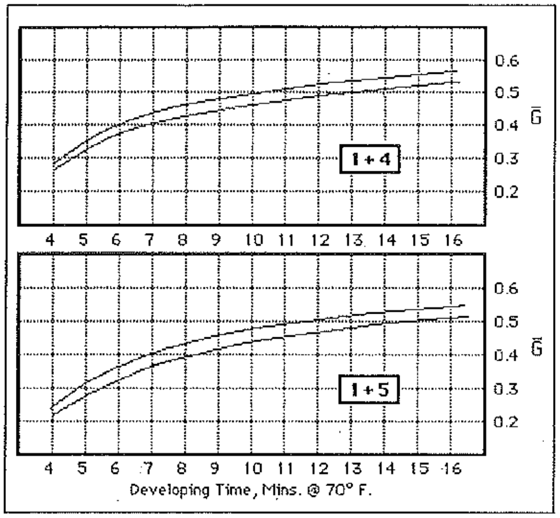
We recommend using DI-13 in the BTZS sheet film tubes, which permit unusually vigorous and efficient agitation. If the developer is used for rollfilm development in a typical small tank with intermittent agitation the development times given in the charts on the next page will probably have to be extended significantly. However, Jobo users can probably use these chart times without modification.

Regardless of the development method you choose, **do *not* presoak** the film! Presoaking will increase highlight contrast significantly and distort the film curve shape, seriously corrupting the gradation characteristics of this materials combination.



The ratio of developer volume to film area affects development to some extent. We recommend that you use no less than 55 ml. (about 2 ounces) of the working solution (1+5 or 1+4) for each 4" x 5" sheet of film. If your tank equipment requires more than this, determine the appropriate development times by trial, then maintain that volume-to-area ratio in all your subsequent work.

The following charts plot development times vs. average gradient (G-bar). The topmost line in



each chart represents times that are appropriate for use in very low flare conditions; the lower lines represent times that compensate for average camera and lens flare.

If you calculate your exposures and development times using the (now discontinued) Radio Shack PC-6 pocket computer, or the similar Casio FX795P that's available from *Darkroom Innovations*, refer to the topmost (no flare) lines in the graphs. The exposure/development program that runs in these little computers provides automatic compensation for average flare affect, so no additional adjustment is normally necessary. Use the lower chart lines to include some flare compensation if you determine exposures with your meter alone.

The computer program supplies its development information in two forms: it calculates the subject range in stops; and also determines the appropriate average gradient value.

Calculating average gradient values

If you are working manually—without the program—you can estimate the appropriate value of average gradient by dividing the Scale Index (SI) of your paper by the subject range. Both values must be in the same terms: convert the SI from a log value to stops by dividing it by 0.3; convert the range in stops to a log value by multiplying it by 0.3.

For example, if your SI is 1.1 (a log value) and the subject range is 8 stops, divide 1.1 by (8 x 0.3) = 1.1/2.4 = 0.458 or about 0.46. Find 0.46 on the average gradient scale of one of the charts (we'll use the 1+5 dilution for this illustration) and read across to the lower line, then down to find the developing time—about 11:15 minutes, at 70°F., with constant, vigorous agitation.

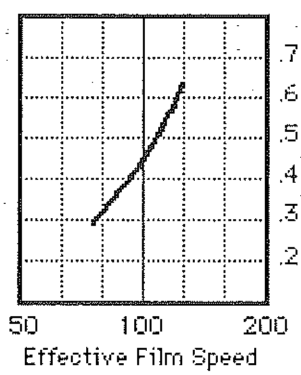
Estimating Scale Index values

Scale Index values indicate the effective contrast characteristic of your printing paper. If you don't know what your SI is you can probably estimate it fairly satisfactorily. If your paper package (or the instruction sheet) includes an "ISO Range" number you have a good clue: just divide that number by 100. For example, if the ISO Range number is 90 the equivalent SI is 0.9. If you can find a reference to the paper's Exposure Scale (ES) in any published literature, use that number as the SI, since they're frequently similar.

If you can't find either of these references, you'll have to make an educated guess: If you print with a grade #2 paper using a condenser enlarger, try an SI of about 0.9; if you use a diffusion enlarger, start out with an SI value of about 1.15. Some adjustment will probably be necessary but these numbers will get you started.

Exposure adjustment

TMax 100 film is quite conservatively rated and DI-13 preserves film speed very well, even for short development times. For these reasons you may find that your negatives are a little denser than they need to be. Your meter and your metering method may influence your personal rating of these materials but we suggest the effective speed values in this chart as a starting point.



If you use the FX795P and discover that you're consistently overexposing with these materials, *don't* change the ISO value because that will alter the built-in development and reciprocity compensations for the film. Instead, enter a value less than 1 when the program asks for a filter factor. Enter 0.5 to reduce the exposure by 1 stop; enter 0.7 for a reduction of about 1/2 stop. The program will then take care of any further adjustment that's appropriate for the subject range.

This product will be replaced if defective in manufacture or packaging, but except for such replacement it is sold without warranty or liability of any kind.

For more information about the use of this developer, the FX79SP, or other products available from Darkroom Innovations, call 1-800-933-3275 (US), or (210) 492-3236.

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