Paterson's FX39 developer for new mono films

Examined and tested by Derek Watkins

Without doubt, the most significant advance in black and white films in the last decade was the introduction by Kodak of **T-grain** emulsion technology in their T-Max range of films at *photokina 1986*. This has since been followed by similar developments from Ilford, Agfa and Fuji with their **Delta**, **APX** and **new Neopan** ranges respectively. The Ilford films use what they call Delta grain technology, while the Agfa films don't strictly use this kind of technology, but more a semi-high-tech approach.

These films use a different form of grain precipitation technique from conventional films such as Tri-X and FP4. It's a high technology technique that was originally evolved to give better performance in colour films, which have multiple layers of emulsion, each faster than the one one top of it. This is, of course, because the light becomes progressively more attenuated as it passes through the successive layers of emulsion. And, as we all know, the faster the emulsion, the coarser the grain.

When Kodak introduced their T-grain technology - the T stands for Tabular - they made a significant advance in reducing the granularity of colour films.

Conventional emulsions are made up of crystals of silver halide that are cubic in structure. The larger these crystals, the faster the film and the grainier the image appears. Tabular crystals, on the other hand, are thin and flat, as their name implies. This gives a larger surface area than the cubic crystal and means that for any given volume, the effective sensitivity to light is greater. In other words, fast films using T-grain technology appear to be less grainy than equivalent films using conventional emulsions.

The Ilford Delta grain technology is similar in many ways, but in this case each crystal in the emulsion is made up of three layers. The core layer is responsible for controlling the speed of the film, the middle layer is for development control and results in improved granularity, and the outer layer ensures that the film develops quickly.

The good news - and the not so good?

Kodak soon realised that if their T-grain technique could be used to improve the graininess of colour films, it could equally well give similar benefits to black and white materials. Hence the T-Max range, which gave the first breakthrough in black and white film technology since Ilford introduced **XP-1**, and that was really colour film technology.

So the good news is that T-grain technology gives finer grain speed for speed than conventional films. What this means in practical terms is that you can use an ISO 400 film and get results that you'd normally expect from an ISO 100 film in terms of sharpness and grain. Or you can use a 35mm camera and get results you'd normally expect from a medium format roll film camera. But at what expense? In truth, not a great deal.

The main disadvantage of T-grain films seems to be a tendency, especially in the slower ISO 100 emulsions, to have less latitude to under-exposure. This is combined with an inclination towards higher contrast.

This explains, in part at least, why Kodak has retained its conventional Plus-X and Tri-X films instead of simply replacing them with T-Max 100 and T-Max 400. Ilford has done the same by not replacing FP4 and HP5 with Delta 100 and Delta 400.

Also, of course, the conventional films have built a big loyal following over the years, and many photographers, having invested a lot of time and expense perfecting their technique with conventional films, don't want to have to repeat the process with new technology materials. Especially if their perception is that the new films don't really offer anything significantly new for the type of work they do.

Development

Fortunately, the problems of high contrast and, to a lesser extent, lack of under-exposure latitude, can be cured by the use of a suitable developer. Although all the manufacturers state that their high-tech films can be processed in standard developers, you'll get better results by using a brew that's specially formulated for T-grain and similar films.

To underline this point, Kodak introduced a special T-Max developer at the same time that they launched their T-Max films.claiming improved shadow detail and the ability to push-process the films.

Other independent developer manufacturers have followed suit, although most of the developers they've produced have been of the compensating type. Either that, or they recommend the use of existing compensating developers. Among these are Paterson **Aculux FX-24**, Tetenal **Ultrafin Plus**, Fotospeed **FD10**, Speedibrews **Celer-Stellar**, and the ubiquitous Agfa **Rodinal**.

All of which brings me to the subject of this review, a new developer by Paterson that's specifically designed to produce control the characteristics of T-grain, Delta grain and similar films. It's called **FX-39** and, like all the FX and Paterson Acu series of developers it's been formulated by **Geoffrey Crawley**, former editor of *The British Journal of Photography* and long-time collaborator with Paterson.

Paterson FX-39

Basically, FX-39 is a high-definition or acutance developer with good compensating characteristics. This has the effect of increasing the density of the weaker areas of the negative, effectively strengthening shadow detail, and, at the same time, suppressing the denser areas to reduce the contrast in the highlights. The result is a less contrasty negative with strong shadows and delicately graduated highlights.

Acutance developers have been around for some fifty years now. They were first made popular by a German photographer named Willi Beutler, who evolved a developer containing just three chemicals that is still available commercially as **Neofin**, made by Tetenal in Germany.

Acutance developers produce an overall contrast that's lower than that produced by conventional fine grain developers, thanks to their compensating characteristics. But there's an increase in contrast locally in areas of fine detail.

This is achieved by a cross-diffusion process. Comparatively fresh developer from low density areas of the negative diffuses across into the relatively exhausted developer in the denser areas. This causes the edge of the dark area to develop more.

At the same time, exhausted developer from the dense areas diffuses into the fresher developer in the less dense areas and retards development at the edge of these thin areas. The overall result is an increase of contrast at the edge where the dense and less dense areas meet, and this gives an apparent increase in sharpness.

Paterson has been producing acutance developers for many years, all of which have been formulated by Geoffrey Crawley. Perhaps the best known is Acutol. Although not a Beutler type developer it gives similar results, but increases the effective film speed by about half a stop.

Another characteristic of acutance developers is that they have a relatively gentle action that produces an image which is mainly confined to the surface of the emulsion rather than going deep into it. The advantage of this is that halation and irradiation are reduced, and this makes the most of modern thin emulsion films.

FX-39 in detail

Paterson FX-39 is a one-shot developer supplied in concentrated liquid form. So it's easy to prepare. Just take one part of the developer concentrate and dilute with nine parts of water. If you find the development times too short to control accurately, you can use the developer diluted 1+14 instead. This also has the added benefit of increasing the compensating effect for very contrasty subjects.

Although designed primarily for processing high-tech grain films, FX-39 is ideally suited to developing conventional films with speeds up to ISO 200. Indeed, Paterson give times for conventional ISO 400 films, too, but recommend that the developer is used at a dilution of 1+5 for these.

The developer enables T-grain and Delta grain films to be rated at the manufacturers' recommended speeds without loss of shadow detail which, as I explained earlier, is one of the sensitive issues in films of this type. Conventional films, which have a greater tolerance to under-exposure, can usually be rated at 1/2 to 2/3 stop faster than the manufacturer's recommended speed without loss of shadow detail.

If you increase the normal development time by 50% you will, of course, increase the contrast of the resulting negatives. But you'll also increase the effective speed of high-tech grain films by about 100%. In other words, you can rate T-Max 100 and 100 Delta at ISO 200, or the ISO 400 films at ISO 800.

But the real benefit comes when you use Kodak's T-Max P3200 film, which you can rate at ISO 6400 with this extended development technique. In fact, it should be possible to push this film even further by increasing the development time or temperature, in much the same way that Kodak give times for effective speeds up to ISO 50,000 in their own T-Max developer. However, these ratings must be the subject of individual tests using your own camera and metering techniques.

Development times

The standard development times given by Paterson produce negatives with a G-bar (contrast index, or gamma) of 0.57, which will give good prints on grade 2 paper when using a condenser enlarger or grade 3 with a diffusion enlarger. For increased film speed, or for films shot on subjects of low contrast, the increased development time produces negatives with a G-bar of 0.7.

If you use this development time simply to get increased effective film speed, you may find that you need to print on to paper a grade softer than usual to compensate for the increased contrast. Alternatively, you can use this longer development time to produce negatives that will print well on to grade 2 paper with a diffusion enlarger, instead of moving up a grade.

Of course, you don't have to use the developer at just the two development times to produce G-bars of 0.57 and 0.7, you can develop to any G-bar you like to give negatives of the density range to suit your own particular way of working. A series of charts in the instructions with the developer gives the development times for G-bars between 0.3 and 0.8 for a whole range of films. The chart for Ilford 400 Delta Professional is in Figure 1:

Developing to any particular G-bar may well have an effect on the speed at which you rate your film. It's as well to carry out a series of tests to establish the best speed at which to work once you've found the most suitable development time.

Paterson recommends a working temperature of 20 degrees C (68 degrees F), but in practice the developer seems to work well at any temperature from about 15 degrees C (59 degrees F) to 30 degrees C (86 degrees F).

Whatever development time and temperature you decide to use, the agitation pattern is the same. Give continuous agitation for the first 30 seconds, by inverting your tank over and back about 15 times. Follow this with 5 second - two inversions of the tank - every minute for the rest of the development time.

The recommended development times for high-tech and semi high-tech films are given in the following table.

	NORMAL CONTRAST (G-bar 0.57)	INCREASED CONTRAST (G-bar 0.7)
AGFA		
APX 25	5.5 (8 @ 1+14)	9.5
APX 100	7.5	11
APX 400	11	15
ILFORD		
DELTA 100	6.5	10.5
DELTA 400 PRO	9.5	15
KODAK		
T-MAX 100	8.5	11.5
T-MAX 400	9.5	11.5
T-MAX 3200	12.5	16
FUJI		
NEOPAN 400	10.5	13
NEOPAN 1600	6.5	10

All the times in the table are in minutes at 20 degrees C (68 degrees F).

Testing FX-39

Since the purpose of this review was to test the Paterson FX-39 developer, not high-tech films, I chose just two films to see what the developer could do. The introduction of FX-39 coincided with new ISO 400 films from Ilford and Kodak, so these were the ones I used. And it seems to me that the benefits of high-tech films are greater for high emulsion speeds than for the slower ones, anyway.

I set up a Kodak Grey Card and exposed each of the films to give a range of densities from which I could construct characteristic curves. Those for Ilford 400 Delta Professional are shown in Figure 2:

Those for Kodak T-Max 400 Professional were similar. The Ilford films were developed for 9.5 minutes and 15 minutes at 20 degrees C (68 degrees F), and the Kodak films for 9.5 and 11.5 minutes respectively.

The curves clearly show the effect of increasing the development time to give a G-bar of 0.7. The higher contrast given by the longer development time means that an average subject should now be printed on grade 1 paper instead of grade 2, if you're using a condenser enlarger, or grade 2 instead of grade 3 if your enlarger

is a diffusion one.

Then I took photographs of a variety of real subjects to see how the films behaved in practice. Many high definition developers have a tendency not to produce fine grain negatives. However, FX-39 isn't one of them. And combined with the inherently fine grain of high-tech films, the results are quite spectacular.

The higher contrast combined with weak shadows for which high-tech films have acquired a reputation were missing when the films were developed in FX-39. This meant that the films held on to their true speed ratings without losing precious shadow detail.

Sharpness was excellent. It was easy to believe that negatives produced on my trusty Olympus OM-1 could have been shot on my Mamiya 645.

Just out of curiosity, I shot a roll each of Kodak T-Max 100 and Ilford 100 Delta and put them through FX-39. The results were even better than the ISO 400 films, but with even finer grain that's only to be expected.

I think Paterson has a real winner with this new developer. Its high definition characteristics give negatives with a real bite to them. And its compensating effect means that you can produce printable negatives even with extended development. In short then, FX-39 seems to have tamed the tendency of high-tech grain films to lose shadow detail and become too contrasty with extended development. It's restored the characteristic curve to more closely match that of a conventional film, but with improved grain and sharpness.

FX-39 is made by The Paterson Photax Group Limited, The Gate Studios, Borehamwood, Herts WD6 1DQ, England. Tel: (+44) 181 905 1177.

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