Metalphoto Processing
Guiding Principles

Overview:

A durable, black Metalphoto image is the result of a number of interrelated processing steps. Because there is a degree of "forgiveness" within each step, and because Metalphoto has a track record that spans decades, it is easy to underestimate the fact that when running Metalphoto, converters are engaged in and responsible for an industrial, photochemical process. The process is not difficult. Neither, however, can it be underestimated.

Beginning with exposure and concluding with sealing, each of the processing steps is critical and each must be monitored, maintained and controlled in order to achieve the quality and durability characteristics for which Metalphoto is known.

The sections that follow are presented for the purpose of focusing attention on the guiding principles of Metalphoto processing. They are intended to be straightforward supplements to information contained in the Metalphoto Imaging Guide. Please think of this as a tool to be used for reference, for training or as a checklist of sorts. Our ultimate objective is to provide your organization with more complete understanding of what is happening within each step of the Metalphoto manufacturing process. With improved knowledge comes a real opportunity for you to improve quality, increase productivity and enjoy a generally improved Metalphoto processing experience!

Exposure:

Selective exposure to light is the foundation upon which durable Metalphoto images are created. When a Metalphoto plate is exposed to light, what is actually occurring is the activation of light-sensitive material contained within the pores of the aluminum. To visualize this, think of the latent image that one often sees on a Metalphoto plate after it has been exposed but before it has been developed. The fact that the plate has been activated is what allows the latent image to be seen.

Within limits, it is true that greater exposure results in greater or more complete activation. The reverse is also true. That is, less exposure results in less complete activation. The extension of this is the following:

1. Metalphoto plates that have been fully exposed can be thought of as being fully activated. With full activation comes maximum potential for the converter to achieve dark and durable Metalphoto images.
2. Metalphoto plates that receive less exposure are relatively less activated. It follows that less activated plates have relatively less potential for dark and durable images.

The following table indicates typically required exposure recommendations for Metalphoto line shots depending on light source:

Metalphoto Product	Exposure Guide for Metalphoto Line Shots by Light Type			
	BME Series Vacuum Frames (BME-3; BMFS-6)		NuArc 26-1K (Mercury Vapor w/Filter)	NuArc 26-1KS (Metal Halide w/Filter)
	650W Quartz	1000W Quartz		
Metalphoto Silver Background	15 sec	10 sec	0.8 Light Units	0.8 Light Units
Metalphoto Black Background	30 sec	20 sec	1.5 Light Units	1.5 Light Units
Metalphoto Plus Sunfast / Classic Gold Gold Background	60 sec	40 sec	1.5 Light Units	1.5 Light Units
Metalphoto Plus Sunfast / Classic Gold Black Background	120 sec	80 sec	3.0 Light Units	3.0 Light Units
Metalphoto Plus – Red Red Background	90 sec	60 sec	2.0 Light Units	2.0 Light Units
Metalphoto Plus – Red Black Background	150 sec	100 sec	4.0 Light Units	4.0 Light Units
Metalphoto Plus – Other Pre-colored Background	30 sec	20 sec	1.5 Light Units	1.5 Light Units
Metalphoto Plus – Other Black Background	60 sec	40 sec	3.0 Light Units	3.0 Light Units

With respect to the above, please note the following:

1. The recommendations assume suitable film quality in terms of density, cleanliness and overall condition.

2. The recommendations assume cleanliness and good working condition of your light bulb, your light source in general, the glass plate of your vacuum frame and your vacuum frame in general.

3. The recommendations assume a distance of 24 inches from the light to the exposure plane. Exposure effectiveness is significantly reduced as the distance from the light to the exposure plane increases beyond 24 inches.

4. The recommendations apply to Metalphoto line shots only. Metalphoto bar codes and halftones are to be treated separately.

5. The recommendations are guidelines from which you may need to deviate in that as with all raw materials, Metalphoto plates are variable from batch to batch (with respect to photographic sensitivity). In addition, of course, it is impossible to account the array of exposure devices actually in use.

Zip Processing:

After a Metalphoto plate has been exposed or activated, the image is developed and fixed by means of Zip Processing. Image development occurs when the rolls of a Zip Processor apply developer to an active Metalphoto plate. Image fixing occurs when the rolls of the Zip Processor apply fixer to the plate.

Image development refers to the blackening of a Metalphoto plate in an area that has been previously exposed to light. When processing exposed plates through a Zip Processor, converters need always to be aware that the fresher the chemistry, the blacker the image. Using weak or depleted developing fluid automatically limits the level of blackness one can achieve. With that in mind, converters are wise to consider the following:

1. Zip Developer begins to oxidize when it is poured from its container. For that reason, it is recommended that converters begin each week with a clean Zip Processor and fresh chemistry. Depending on the number of plates processed, in fact, it may be that chemistry should be changed even more frequently. The rule of thumb is that any doubt about the status or strength of developer is a reason to change. In the scheme of things, developer is inexpensive and it rarely pays to stretch.

2. High volume converters should attempt to monitor the number of plates being put through a given loading of chemistry. The reason for this is that Zip Developer depletes or weakens with use. If it weakens beyond a certain point, the ability to produce a strong and long lasting black image becomes compromised. The 14-7 Zip Processor, for example, holds one quart of developer. At the time that fresh chemistry is put into the unit, therefore, the number of plates should be tracked such that not more than the equivalent of approximately fifty 12" x 20" plates are processed. When that number is reached, and possibly even sooner, the chemistry should be changed out.

3. Immediately after a plate exits the Zip Processor, normal operating procedure should be to wash the plate with clean water and a clean, soft sponge. Make sure the entire plate gets sponged and make sure that both sides are thoroughly rinsed. Washing the plate in this manner insures that you have taken steps to remove fixer, of course, but also trace amounts of silver that may remain on the plate. The need for complete and thorough rinsing is important. Fixer that remains on a plate can not only bleach a Metalphoto image; it may also contaminate and compromise the effectiveness of your sealing bath.

Finally, with respect to Zip Processing, it is imperative that the rolls of your Zip Processor be kept clean. Standard practice, depending on use, should be to remove the rolls once a week for the purpose of scrubbing them with hot water and a clean Scotch-Brite pad. It is important that the pad be clean, and not contaminated from previous use. In scrubbing, the objective is to remove silver particles and residue that build naturally on the rolls through use. If silver and/or chemical residue is allowed to build (on the rolls), it is well known that the appearance of a plate can suffer. Symptoms that one might see include small black spots or trails in the aluminum background, background fog and the appearance of roll marks on the plates.

Image Intensification:

Image intensification is an optional step within the Metalphoto production process. The function of image intensification is to enhance the heat and UV fade resistance of a (black) Metalphoto image. In addition, image intensification enhances the performance and readability of Metalphoto bar codes in both the short and long term.

As is the case with Zip Developer, it is important to note that image intensifier depletes with use. That being the case, immersion time for effective intensification is variable and attention must be paid to the number of plates going through a bath as well as the amount of black area on a plate. Please refer to pages 4.6 and 4.7 of the Metalphoto Imaging Guide for details.

Sealing:

The final step in the Metalphoto production process is perhaps the most crucial in terms of creating a long lasting and durable plate. Before proceeding, one should note that the objective of sealing is to quickly and completely close the pores of the anodized aluminum such that the image is sub-surface and truly trapped within the aluminum. With that in mind, the following may be said:

1. As a matter of practice, plates should be sealed on the same day they are imaged. Plates that are imaged, but not sealed until the following day, may suffer from (black) image fade due to the presence of atmospheric oxidizing agents.

2. Plates that are ineffectively or only partially sealed may suffer from (black) image fade due to UV attack, chemical attack or exposure to heat or airborne oxidizers. Factors or process conditions that might lead to a situation in which plates are not fully sealed include the following:

A) Insufficient time at rolling boil:

When using nickel acetate sealing concentrate additive, complete sealing is achieved when plates are immersed for 10-15 minutes at a rolling boil. With non-nickel concentrate, sealing time must be extended to a minimum of 15 minutes at a rolling boil. Regardless of which additive you are using, the key to proper sealing is time at rolling boil. When plates are immersed in a boiling tank, the mass of metal going in serves to cool the bath. The temperature of a bath that was boiling beforehand, for example, may be reduced to less than boiling when plates are added. When that happens, it takes time, naturally, for the bath temperature to recover. It is also true that the greater the mass (i.e. more or thicker plates), the longer the recovery time.

When we say ten or fifteen minutes at a rolling boil, please note that we are referring to the time after which a bath has returned to boil. In other words, if your target has been to boil plates for twelve minutes, and if the bath temperature falls beneath boiling for three minutes when plates are immersed, your total sealing time should be fifteen minutes (three minutes of recovery time and twelve minutes at rolling boil).

B) Sealing Bath Depletion:

Metalphoto sealing baths consist of deionized or distilled water and sealing concentrate additive. The function of the sealing concentrate additive is to promote more rapid sealing. Sealing baths, however, weaken with use. That is to say that a bath weakens, depletes or is used with every plate sealed. In our experience, for example, a twenty-five gallon nickel acetate sealing bath will effectively seal approximately 600 12" x 20" Metalphoto (black / aluminum) plates. Because the effective life of a bath is limited in this way, it is important to monitor the number of plates going through a bath.

The numbers change if you are using non-nickel sealing additive. Because the non-nickel additive depletes more quickly (than nickel acetate additive), you will be able to safely and effectively seal only about 300 12" x 20" Metalphoto (black / aluminum) plates.

If a sealing bath is pushed beyond the point of depletion, the resulting plates will be partially sealed or, in the worst case, not at all sealed. In that event, the black image that was obtained as a result of exposure, developing and fixing will be susceptible to image fade due to oxidation, UV exposure, chemical attack, etc.

C) Sealing Bath Contamination:

As was mentioned above, a Metalphoto sealing bath consists of deionized or distilled water and sealing concentrate additive. Deionized water is purified water in the sense that minerals and chemicals, which occur naturally or which have been added to ground or tap water, have been removed. If a sealing bath is made with something other than deionized water, the potential for contamination is great. And if a bath does, in fact, become contaminated due to mineral or chemical concentration, sealing effectiveness can be severely limited and the problem of only partially sealed plates will begin to affect your operation.

To close this section, it should be well understood that complete and proper sealing is critical if one is to achieve the outstanding durability characteristics for which Metalphoto is known.

Summary:

- The Metalphoto production process consists of a number of interrelated steps. Each is important and each must be controlled in order to achieve the quality and durability characteristics for which Metalphoto is known.

- This document was created for the purpose of communicating the guiding principles of Metalphoto processing to our converting customers. The information contained is supplemental to the Metalphoto Imaging Guide, which continues to be our primary technical document.

- Adherence to these principles provides the converter with an opportunity to improve quality, increase productivity and enjoy a generally improved Metalphoto processing experience.