

501 INTRODUCTION

This section outlines the techniques to be followed to add color to an entire background or to selected areas of a fully processed but unsealed Metalphoto plate. A wide variety of colors are available for these processes.

However, it is important to stress that *it is virtually impossible to match colors on anodized aluminum from sheet to sheet because of the inherent variability in the manufacturing process*. As suppliers we cannot guarantee a color match, nor should you as a processor. Consistency in color approximation can best be achieved, however, by carefully following the instructions presented.

510 BACKGROUND COLORING

There are two methods to easily and inexpensively add background color to a Metalphoto plate. Each method starts with a processed but unsealed Metalphoto plate, that is, a black and silver imaged plate that has been exposed, developed, fixed and rinsed.

The first method is a two-step process in which the plate is first dipped in the dye solution and then sealed.

The second method combines the dye step and the sealing step in one solution.

511 FADE RESISTANCE

Dyes that are suitable for coloring anodized aluminum are generally susceptible to fading from exposure to sunlight. The rate of fading is affected by the angle of light, the amount of cloud cover, the amount and type of atmospheric pollution, geographical location and the time of year. In addition to these phenomena, faulty processing increases the propensity for fading.

***IMPORTANT:** The reference here is to outdoor fade resistance. In the average indoor application, most dyes last indefinitely.*

It is impossible to state the exact length of time that a specific color will last since so many uncontrollable factors affect the outdoor life of a dyed plate. While the black image of a properly processed Metalphoto plate is very durable outdoors, most added background colors are not permanent. The single exception to this is sunfast gold which has excellent outdoor permanence. *All other background colors fade and are not recommended for use in applications requiring outdoor permanence.*

See Fig. 511.1 for the relative fade resistance of various colors made by subjecting them to identical weathering conditions.

520 BACKGROUND DYEING PRIOR TO SEALING

Background dyeing is a process in which the open pores of an unsealed plate are partially filled with dye. After dyeing, the plate is sealed. *Background color must be introduced prior to sealing.*

521 INITIAL CONDITIONS

Background dyeing should be done under normal room light. It is difficult to determine the hue and intensity of color if dyeing is attempted under safelight conditions. A fully processed, but not sealed, Metalphoto plate *must* be completely dry prior to dyeing. Exercise care in handling the plates. The unsealed plate surface remains very receptive to fingerprints and other stains until it is sealed. Fingerprint oil and other contamination of the plate surface can create an undyed or unevenly dyed spot.

522 TYPES OF BACKGROUND DYES

There are 3 different types of dyes available depending on your requirements.

1. Standard speed room temperature dyes are relatively slow-acting and are the easiest to handle.

RELATIVE OUTDOOR FADE RESISTANCE OF METALPHOTO WATER SOLUBLE BACKGROUND AND DYE-N-SEAL DYES IN RANK ORDER PER THE FOLLOWING DEFINITIONS:

Excellent	Color is permanent - lasts as long as Metalphoto.
Very Good	Color lasts approximately 1 year.
Good	Color lasts approximately 1/2 year.
Fair	Color lasts approximately 2 months.
Poor	Color lasts less than 1 month.

PART NO.	COLOR	FADE RESISTANCE
7330	Sunfast Gold	Excellent
7350	Copper	Very Good
7555	Dye-N-Seal, Copper	Very Good
7370	Blue	Very Good
7490	Dye-N-Seal, Plaque Gold	Very Good
7320	Gold	Good
7340	Rapid Gold	Good
7360	Green	Good
7415	Bronze	Good
7530	Dye-N-Seal, Blue	Good
7550	Dye-N-Seal, OSHA Green	Good
7540	Dye-N-Seal, OSHA Yellow	Good
7410	Rapid Blue	Fair
7500	Dye-N-Seal, Red	Fair
7380	Red	Poor
7390	Brilliant Red	Poor
7560	Dye-N-Seal, OSHA Orange	Poor
7520	Dye-N-Seal, OSHA Purple	Poor

Fig. 511.1

PROPER OPERATING TEMPERATURES FOR METALPHOTO WATER SOLUBLE BACKGROUND DYES

PART NO.	DYE COLOR	OPERATING TEMPERATURE
7320	Gold	Room Temperature
7330	Sunfast Gold	140-160° F (60-71° C)
7340	Rapid Gold	Room Temperature
7350	Copper	Room Temperature
7360	Green	Room Temperature
7370	Blue	Room Temperature
7410	Rapid Blue	Room Temperature
7380	Red	100-110° F (38-43° C)
7390	Brilliant Red	140° F (60° C)
7415	Bronze	Room Temperature

Fig. 523.1

2. Rapid action room temperature dyes act very fast (in a matter of a few seconds).
3. Dyes such as sunfast gold, brilliant red, and red must be heated to achieve proper results. Sunfast gold is particularly durable under conditions of exposure to sunlight.

523 DYE OPERATING TEMPERATURES

See Fig. 523.1 for operating temperatures for Metalphoto Water Soluble Background Dye solutions.

Use heated dyes (7330, 7380 and 7390) in a tank rather than a tray. Uniform temperature, critical to even dyeing, is difficult to maintain in a tray.

Trays, tanks or other containers used for the coloring step should be stainless steel, plastic or glass. Stainless steel tanks are recommended for the dyes that have to be heated.

524 MIXING OF DYES

All Metalphoto Water Soluble Background Dye packages make up 1 gallon of working strength dye.

Metalphoto Water Soluble Background Dyes are mixed as follows:

Dissolve the contents of 1 package of dye in approximately 1 quart of deionized or distilled water that has been preheated to a near boil. Stir until all of the dye is in solution. Add the balance of deionized or distilled water to bring the total solution volume to 1 gallon.

Deeper (darker) colors can be achieved by

1. Increasing dye solution concentration (i.e., mix with less water.)

2. Lengthening immersion time in the dye solution.

3. Warming dye solutions normally used at room temperature. If these methods do not produce the desired depth of color, pre-If the pH of the dye solution is too low, add drops of 1% solution of sodium hydroxide.

treatment of the plate with a caustic solution may give the desired result. *However, try the first three methods first.* To pre-treat the plate, prepare a solution of 0.25 ounce of sodium hydroxide in one gallon of deionized water. Use at room temperature. Immerse a fully processed, thoroughly dry, but unsealed Metalphoto plate in the solution for one minute. Remove, rinse and dry. *The immersion time of one minute is critical, as longer times may damage the plate by etching away the anodic layer.* The plate is now ready to be dyed (see Section 525).

CAUTION: *Sodium hydroxide, in either its dry form or in concentrated solutions, will burn the skin. Use rubber gloves and handle with extreme care.*

Lighter shades can be achieved by diluting the dye solution with deionized water and/or decreasing immersion time.

The use of partial packages of dye is not recommended. Some of the colors are produced by combining several individual dyes in a precise ratio.

Failure to use the entire contents of a package may produce a variation in the expected color.

Color hue is affected by the pH of the dye solution.

Adjustments to the pH of the solution may be necessary. The proper pH for each Metalphoto Water Soluble Background Dye is shown in Fig. 524.1.

METALPHOTO PART NO.	COLOR	pH
7320	Gold	5.0
7330	Sunfast Gold	4.5
7340	Rapid Gold	6.0
7350	Copper	4.5
7360	Green	6.0
7370	Blue	5.0
7410	Rapid Blue	4.5
7380	Red	5.0
7390	Brilliant Red	5.0
7415	Bronze	5.0

Fig. 524.1

If the pH is too high, add drops of acetic acid. In order to get a proper pH reading, the solution must be completely mixed or stirred after the correcting drops are added and then check with a pH meter. *The importance of proper pH control in dyeing cannot be overemphasized.*

Once the dye solution has been adjusted to the proper pH, it is ready for use. For maximum color consistency, pH should be monitored and maintained. A change of less than 0.5 in pH can significantly alter the hue and color intensity of dyed plates.

525 DYEING PLATES

Plates to be dyed must be completely dry before dyeing. Plates that are partially dry will dye inconsistently.

IMPORTANT: It is also possible to dye plates that are completely wet. This is not recommended, however, because it is difficult to control the amount of water and its uniformity on the plate surface. Varying concentrations of water on a plate cause inconsistent dilution of the dye. In addition, the dye solution concentration decreases and pH changes due to water carried in on the plate cause further lack of control.

Immerse a totally dry plate in a tray or tank of dye solution until the desired hue is obtained. Remember that a tank rather than a tray should be used for the dye solutions that require heating. If a tray must be used, keep the plate off the bottom of the tray to prevent uneven heating. Use two 1/4 inch strips of Metalphoto bent into S shapes as a spacer for this purpose.

After the desired hue is obtained, remove the plate and *immediately* rinse both sides thoroughly under running tap water. This rinse

531 PREPARATION OF DYE-N-SEAL SOLUTIONS

removes excess dye solution from the surface of the plate, stopping the dyeing action and reduces contamination of the sealing bath.

After rinsing, allow the plate to air dry. To seal, immerse the plate in a vigorously boiling Metalphoto sealing solution for 10 minutes. After sealing, follow instructions for post sealing treatments covered in Sections 610 and 650. It is essential that the proper sealing procedure is used. Loss of dye or uneven coloring can result if proper procedures are not followed, or if the sealing bath is depleted from use or is contaminated.

To review, plates must be dry before sealing and the sealing solution must be boiling vigorously when the plates are immersed. *Seal no more than 4 plates at a time to minimize a drop in temperature that is caused by immersion of room temperature plates in boiling sealing solution.*

530 DYE-N-SEAL (BACKGROUND DYEING CONCURRENTLY WITH SEALING)

The Dye-N-Seal process combines two operations, background dyeing and sealing. It is important to follow the instructions carefully to insure properly dyed and sealed plates.

In the Dye-N-Seal process there are two competing reactions that must be managed. The anodic layer on the plate is being penetrated by dye solution while the surface of the plate is being sealed thus preventing any further penetration of dye. Deviations from recommended procedures can cause unacceptable color hue variations.

Consistency of color is achieved by saturating the surface layer of the plate with dye before it is sealed. Dye concentration must be maintained above a critical minimum level while managing the rate of sealing to achieve this consistency.

To prepare a Dye-N-Seal solution, dissolve the contents of 1 Dye-N-Seal package in 2 gallons of boiling deionized or distilled water in a clean, stainless steel sealing tank. Remove 1 quart of this solution to use for subsequent replenishment. After 1 quart of concentrate is removed, add deionized or distilled water to this Dye-N-Seal solution to make a total of 3-1/2 gallons of working solution. For optimum results, *Dye-N-Seal solutions should have a pH of 5.5*. Heat the working solution to a rolling boil for use. Note that 3-1/2 gallons is the correct operating level for a Metalphoto 10" x 12" Sealing Tank. It is recommended that a separate sealing tank be used for Dye-N-Seal, rather than the sealing tank normally used to seal regular black and silver Metalphoto plates.

532 DYEING PLATES WITH DYE-N-SEAL

As with background dyeing prior to sealing, plates must be completely dry prior to immersion in Dye-N-Seal solution. During sealing, raise and lower the plates once or twice for greater uniformity of dye penetration. (*Fig. 532.1*) Remember that the solution must be at a rolling boil prior to immersion. Remove the plates from the Dye-N-Seal solution after 10 minutes and rinse immediately. Follow all other post sealing treatment steps covered in Sections 610 and 650. Dye-N-Seal solutions evaporate at a fairly rapid rate because they are constantly boiling. For this reason, water that is lost must be replaced to maintain proper solution level and dye concentration. Add deionized or distilled water only. Do not add concentrate for this purpose. The dye concentrate saved from the mixing step is used to replenish the bath when a *color hue* change is noted. Use the concentrate in small amounts until all of it has been used. Once all of the concentrate has been used, discard the bath if



Fig. 532.1

any further color hue changes are noticed. As a general rule, 30, 10" x 12" plates can be dyed per 1 gallon of Dye-N-Seal solution. *Do not add a portion of a new Dye-N-Seal package to an old batch.* Doing so alters both dye and sealing additive concentrations resulting in improperly colored or sealed plates. After a batch of Dye-N-Seal solution is discarded, drain the tank and wash it thoroughly. As a guide to aid in producing consistent color hue, cut off a dyed strip from the first batch of Dye-N-Seal plates and tape above the tank for comparison. As in the case of background dyeing prior to sealing, heed the following tip. *Seal no more than 4 plates at a time, to minimize a drop in temperature caused by immersing room temperature plates in boiling Dye-N-Seal solution.*

540 SELECTIVE COLORING

There are several methods by which color can be added to parts of a plate. The techniques described in this section are very effective in the production of plaques, prototype nameplates and panel fronts.

541 POLYCOLOR

The polycolor process is a coloring technique to add two or more colors on a single plate, even if the colors are butted to one another.

542 EXPOSURE

PolyColor plates should be opened only under yellow or dimmed white light conditions. Unused but opened packages should be kept in a cool, dry location. Exposure should be made through a positive image film, emulsion side down, using an ultraviolet light source such as a mercury vapor application of warm air.

546 STRIPPING

lamp rated at least 650 watts. A typical exposure to such a source at a distance of 45 to 60 cm (18-24 in) would be four to six minutes. A 1000 watt ultraviolet source at the same distance requires only two to three minutes exposure. A step wedge should be used to determine the proper exposure. Six solid steps should appear from a 21 step exposure guide.

543 DEVELOPMENT

Develop exposed plates under running or spraying cold tap water. Continue the process until the unexposed areas appear clear or no longer exhibit the blue color of the photosensitive resist coated layer. Gently wipe the plate with a damp sponge to remove surface water. This process should require no more than one minute to complete.

544 DRYING

Allow the developed plate to dry in a vertical position or use a heat gun to gently direct warm air over the entire plate. The plate must be completely dry before the dyeing operation.

545 DYEING

Examine the developed plate to make sure that the hardened resist completely covers areas which are not to be dyed. Correct any voids in those areas by carefully applying a drop or two of PolyColor Resist. Dry the spots completely with a hot air gun. Apply dye solution to an appli-pad or equivalent absorbent rag and rub over the unexposed areas. Allow the dye to penetrate at least 30 seconds before carefully removing as much excess dye solution as is possible using a clean appli-pad, paper towel or equivalent absorbent rag. This step helps even out the dye and prevents streaking. Allow the dyed areas to dry or force dry by

Immerse the dyed plate in the PolyColor stripper solution for at least one minute. This time may need to be increased to two or three minutes depending upon the number of plates processed previously in the stripper solution.

Allow the excess stripper to drain from the plate into the tray containing the stripper solution. Rinse the plate under warm, running tap water and then, while still running water on the plate, use a clean sponge to thoroughly wipe any residual dye or resist from the surface of the plate. Give the plate a final rinse. Wipe the surface of the plate with a clean paper towel and allow the remaining moisture to air dry or force dry using warm air.

547 RECOATING

Photosensitive resist can be reapplied to a dry, stripped plate using our PolyCoater, InstaCoater machine, a wire wound rod or an equivalent coating instrument. A good dry thickness for a coated resist layer is approximately 0.06 mm (0.002 in).

When using the PolyCoater, feed plate, face up, in the long direction into feed rolls. Support the plate until the coating rolls grab it. As the plate emerges from the coating rolls, support it so that the plate bends slightly as it passes over the fiber scrub roll. After the plate is free of the machine, tap the trailing edge on absorbent cloth or paper towels to remove excess resist. Dry plate face up.

Add resist to maintain a constant level in the sump. Do not allow the delivery pump to suck air, since this will create bubbles.

To use the InstaCoater machine, position the plate, top surface up, so that the leading edge is just ready to enter the roll assembly. Pour a thin puddle of resist along the leading edge of the plate and turn on the machine. Allow Concentrate in water.

the plate to exit the roll assembly and tap the trailing edge on a paper towel to remove excess resist. Turn off the machine. Do not clean or wet the rolls between coatings. On subsequent coating, allow the rolls to wet with the resist puddle before allowing the plate to run through the roll assembly. This step is necessary to obtain an even coating. The roll and other surfaces of the machine should be thoroughly cleaned under warm water at the end of a coating session.

To use a wire wound rod or equivalent coating instrument, place the plate on a smooth, flat surface, preferably a vacuum hold down. Pour a puddle of resist at the top edge of the plate. Rapidly and evenly pull the wire wound rod down the plate, applying gentle pressure on both ends of the rod.

Dry the plate in a forced air oven, if available, at a temperature not above 65°C (150°F) for a period sufficient to effect complete drying.

Typical drying time is five minutes. Our PolyDryer will dry the coating evenly in a single pass through the drying chamber. Air drying is possible, but requires a long time.

Forced air drying can be accomplished with a heat gun by laying the PolyColor plate on a flat metal plate and directing warm air on the coating using rapid circular motions at a distance of at least 45 cm (18 in). Do not direct heat at one section for prolonged periods of time as this will degrade the resist layer.

Exposure, development, dyeing and stripping of this recoated plate are carried out as outlined previously. Depending upon coated thickness, the exposure time may need to be increased to cause proper hardening of the resist layer.

548 SEALING

Seal the finished plate at least 20 minutes in a boiling solution made from Metalphoto Liquid Sealing Concentrate or No-Nickel Sealing

550 INSTACOLOR

The InstaColor process is a selective coloring technique recommended for producing critical reproduction quality and edge definition. Essentially, the InstaColor process selectively protects areas on a processed but unsealed Metalphoto plate, allowing the remaining areas to be colored with one or more dye solutions. The InstaColor process basically involves:

1. An unsealed, but otherwise fully processed and dried Metalphoto plate is coated with InstaColor Resist.
2. After the resist coating is dried, the plate is exposed through a dense film negative to ultraviolet light.
3. After exposure, the plate is developed producing selected areas on the plate that are receptive to dyeing. *The exposed area on the plate resists dyeing.*
4. Next, the exposed and developed plate is colored with the appropriate dye.
5. After dyeing, the remaining InstaColor Resist is removed.
6. The process is completed by sealing the plate in the usual manner. The result is a two-color plate.

551 PREPARING PLATES PRIOR TO COATING

Metalphoto plates must be processed through all steps except sealing prior to using the InstaColor process. Cleanliness is critical as fingerprints and other contaminants cause uneven or spotty dyeing. To see if the plate is clean, immerse it in water. Withdraw and hold it in a vertical position for 30 seconds. Water on the surface should remain as a continuous film across the plate without breaking for the entire 30 seconds. If it doesn't, clean

that the resist flows in the opposite direction for about 30 seconds. (Fig. 554.3) Now

the surface of the plate with a wet sponge. Rinse and test again. (Fig. 551.1)



Fig. 551.1

552 SAFELIGHT AND STORAGE CONDITIONS

InstaColor Resist is photosensitive and must be stored in a light-proof container. InstaColor processing must be done under safelight conditions. See Section 311 for exact requirements.

553 COATING INTRODUCTION

Coating a plate with InstaColor Resist can be done by immersion in a tray, tank or coater.

554 IMMERSION COATING IN A TRAY

Pour InstaColor Resist directly from the bottle into a tray. It is supplied at the proper concentration for use. *DO NOT DILUTE.*

Place a completely dry plate face up in the resist for 30 seconds. Rock the tray gently to break air bubbles that might form on the surface of the plate. Be sure the entire plate is covered with resist. (Fig. 554.1)

Grasp a corner of the plate and remove it from the tray. Suspend the plate vertically and allow the excess resist to drain for about 30 seconds. (Fig. 554.2) Then turn the plate 180° so

place the plate at an angle of about 15° face up and allow it to dry. (Fig. 554.4)
(See Section 556 on resist drying.)

555 IMMERSION COATING IN A TANK

Pour InstaColor Resist directly from the bottle into a tank. *DO NOT DILUTE*. Immerse a fully processed but unsealed, dry plate in the resist for 30 seconds. Withdraw the plate slowly and at a consistent speed and hold it over the tank to let the excess drain for about 30 seconds. (Fig. 555.1) Turn the plate 180° so that the resist flows in the opposite direction for about 30 seconds and place it at about a 15° angle to dry, face up. (Figs. 554.2-4)

556 DRYING

As soon as the resist sets or starts to gel (2 to 3 minutes of air drying) drying can be hastened by using a conventional film or plate drying cabinet, *providing plates are positioned horizontally*. Keep cabinet temperature at approximately 125°F. If forced air is used in the cabinet, make sure dust does not blow on the resist. The use of a heat gun is not recommended due to the chance of overheating areas of the plate causing drying lines which become visible after sealing.

557 ROLL COATING

There are three coaters for low viscosity resist coating:

1. The InstaCoater (Metalphoto Part No. 7820) is best used for short runs of 12" x 20" or smaller plates. Primarily a hand assisted coater, the operator pours PolyColor or InstaColor resist on the plate and then feeds it through the InstaCoater for a consistent, even coating. After air or hand held dryer-assisted drying, the plate is ready for exposure, development and coloring.

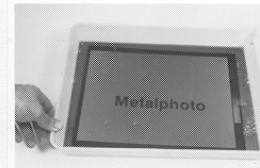


Fig. 554.1



Fig. 554.2

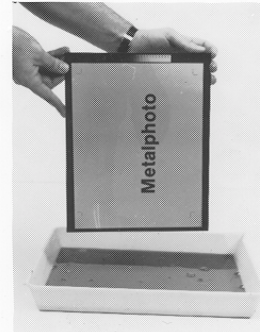


Fig. 554.3

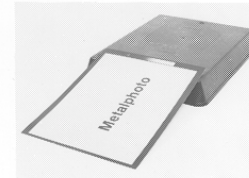


Fig. 554.4

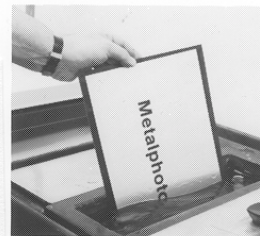


Fig. 555.1

- The 14-4 Insert Coater (Metalphoto Part No. 9210) accomplishes the same end result as the InstaCoater and works the same way. It installs easily in a Metalphoto 14-4 Zip Machine as a replacement for the normal Metalphoto processing rolls.
- Consider the PolyCoater (Metalphoto Part No. 7850) and PolyDryer (Part No. 7852) for more extensive production of PolyColor, InstaColor or other resist coated plates. Allowing semi-automatic coating and drying of plates up to 21" wide, it is excellent not only for PolyColor or InstaColor resist but also for any low viscosity water soluble coating needs.

558 COATED PLATE SHELF LIFE

Coated plates can be exposed as soon as the resist is completely dry, or stored for up to 3 to 6 months before using, if kept in a cool, light-tight, dry place.

559 LIGHT SOURCE SELECTION

InstaColor Resist coated plates must be exposed by high intensity ultraviolet light in the range of 300 to 400 nanometers (3000 to 4000 angstroms). Recommended light sources are pulsed xenon, mercury vapor, arc lamps, or closely spaced, fluorescent black light tubes. Recommended is our 26-1 KS NuArc exposure system. Exposure time is dependent on the UV output of the light source and the distance between the light source and the exposure plane. Typically, exposure times average 2 to 3 minutes.

560 CALIBRATION

To calibrate a particular exposure lamp for use with InstaColor plates, cut a test strip from a portion of a plate and expose it. It is best to draw a vacuum for InstaColor exposures, although pressure frames work reasonably well. It is important to continue

through a Stouffer 21 Step Wedge. The correct exposure time is the time required to produce at least 7 steps on a properly coated plate after exposure and developing.

IMPORTANT: *Shorter exposure times can lead to breakdown of the resist in the developer. When such a plate is dyed, dye may penetrate those areas that are not intended to be colored.*

561 EXPOSURE

After the light source is calibrated, the system is ready for production. Adding a second color to a plate using InstaColor usually means that the position relationship between the second color and the image already on the plate is important. While not absolutely necessary, it is helpful to use registration marks for aligning the image already on the plate with the exposure required for the second color. It is also helpful, once film is aligned with the image on the plate, to tape the film to the plate (make sure no tape is in the image area of the plate). Use a transparent tape such as Scotch Magic Tape. Place a Stouffer 21 Step Wedge next to the film on the resist coated part of the plate. Film size should be smaller by 1/2" in one dimension to accommodate the inclusion of the Stouffer 21 Step



Fig. 561.1

using a Stouffer 21 Step Wedge on *each plate* to make sure exposure times and processing technique are proper. Failure to follow this practice may lead to wasted materials.

IMPORTANT: *If the exposed areas of an InstaColor plate accept dye during the dyeing step described in Section 563, the exposure used was probably inadequate. Another indication of underexposure is peeling of exposed resist during the rinsing step.*

562 DEVELOPING THE EXPOSED INSTACOLOR RESIST

InstaColor Resist is developed in a 0.3% solution of hydrogen peroxide. Hydrogen peroxide can be purchased at local drugstores or chemical supply houses. Typically, the drugstore variety is a 3% solution that must be diluted with 9 equal parts of water to make up a working strength solution. If 30% hydrogen peroxide is purchased from a chemical supply house, it must be diluted 100 to 1.

IMPORTANT: *30% hydrogen peroxide can burn skin on contact. Use rubber gloves and proper face protection when handling 30% hydrogen peroxide.*

Do not use warm water to dilute hydrogen peroxide. To avoid partial dissolution of the resist coating, use only **COLD** water (the colder the better, but temperature must be below 75°F) to dilute hydrogen peroxide.

IMPORTANT: *Prepare working strength developer solution on a daily basis. Storage of dilute peroxide is not recommended. Therefore, dilute only enough peroxide for one day's production.*

Pour the working strength hydrogen peroxide solution into a tray. Place the exposed plate. At this point, the resist on the exposed area of the plate hardens, preventing this area from accepting dye. Areas on the plate that

in the peroxide solution for 15 to 30 seconds. Within this period an image will appear. Complete development by rinsing the plate in cold tap water for 30 seconds, or by sponging very gently for 30 seconds in a tray with a continuous flow of cold water. (Fig. 562.1)

After rinsing, wipe the excess water from the plate with a clean, flat sponge using full strokes across the plate. (Fig. 562.2) Now thoroughly dry the plate with a warm forced-air dryer. (Fig. 562.3)



Fig. 562.1



Fig. 562.2



Fig. 562.3

are unexposed (not struck by light) accept dye.

Inspect the plate for uncoated spots or voids in the exposed area. Any such areas can be touched up as follows. To prepare a small bottle of touch-up resist, remove a small amount of resist from its light-safe bottle and expose it to regular room light for an hour or two. The touch-up solution can now be used to repair any voids, weak spots or other imperfections discovered. Simply apply touch-up solution with a cotton swab or small artist's paint brush to the touch-up site. Dry all repaired spots thoroughly prior to the next step.

563 DYEING INSTACOLOR PLATES

To prepare a solution of Solvent Soluble InstaColor Dye, dissolve the entire contents of 1 package of InstaColor Dye powder in 1 quart of water-free isopropyl alcohol. The quantity of dye per package is formulated for use with anhydrous isopropyl alcohol only. **DO NOT USE RUBBING ALCOHOL** since it contains a significant amount of water which destroys the effectiveness of the dye.

IMPORTANT: *Isopropyl alcohol is a flammable solvent. Do not use it near arc lights or other open flames. Make sure you have adequate ventilation.*

Stir the dye solution to be sure that all of the dye powder has completely dissolved in the solvent.

Apply a small amount of the dye to an applicator pad as many times as possible. Cap the dye container to avoid solvent evaporation. Swab the areas of the plate to be dyed with straight passes, starting and ending off the image area, until the color is the shade and intensity desired. (Fig. 563. 1) Allowing the alcohol to dry between applications permits the dye to completely penetrate the pores. Remove excess dye on the plate by wiping the entire plate with a damp sponge.



Fig. 563.1



Fig. 563.2



Fig. 564.1

(*Fig. 563.2*) The area that is dyed should have an even color. If there are streaks, or if a more intense shade is desired, make sure the plate is completely dry and then repeat the color swabbing process described above. Use of a dip tank for dyeing is recommended if large, solid areas are to be dyed. This technique minimizes streaking usually present when trying to swab dye over large solid areas. Evaporation of solvent is a problem when tank dyeing with Solvent Soluble InstaColor Dye solutions. To minimize this problem, use a narrow-mouthed, Type 316 stainless steel tank and make sure the tank is covered when not in use. To dye in a tank, immerse the plate for 2 minutes at room temperature. Then remove the plate, rinse, and sponge off the excess dye with a clean, damp sponge.

To dye with PolyColor Dyes, use the solutions as supplied and apply the dye with a pad folded from an appli-pad. Dry the dyed area with a heat gun to remove the solvent. Wipe off the excess dye before re-applying dye for increased color.

564 INSTACOLOR RESIST CLEANING

Dried InstaColor Resist still present on the non-image area of the plate must be removed prior to sealing. Use UltraColor Cleaner for this purpose. UltraColor Cleaner is packaged as a dry powder and must be diluted 1 package per 1 gallon of deionized or distilled water. To clean off the dried InstaColor Resist, soak the plate in a solution of UltraColor Cleaner for 1 to 2 minutes. Scrub the softened resist with a nylon bristle brush and rinse. (*Fig. 564.1*) If the resist is not removed by this technique, immerse the plate in very hot water and scrub with a brush again. ing may result. (*Fig. 570.2*) After the desired shade is achieved, remove the pool of dye using a clean, damp sponge like a blotter. (*Fig. 570.3*) This allows the excess

CAUTION: USE ONLY A NYLON BRISTLE BRUSH FOR THIS STEP. TOO VIGOROUS BRUSHING WITH OTHER MATERIALS WILL DAMAGE THE ANODIC LAYER. After all of the dried resist is removed, rinse the plate in running tap water and wipe or sponge dry. The plate is now ready for sealing. See Section 600.

570 HAND COLORING (FREE HAND)

Selective color can be applied to a Metalphoto plate free hand with a brush or cotton swab. This coloring method is particularly useful when only a few plates have to be run and edge definition is not important. As long as the areas to be colored are not close together, it is possible to apply several colors to a plate with relative ease.

To prepare dye solutions for hand coloring, mix the powder from 1 package of Metalphoto Water Soluble Background Dye in 1 pint of deionized or distilled water. (Note the difference of dye concentration between hand coloring solutions and regular background dyeing solutions. Hand coloring solutions must be more concentrated, as indicated, to work properly.) Stir the solution thoroughly to insure that all of the dye is dissolved. It may be necessary to warm the water somewhat to aid the dissolving process. Prior to hand dyeing, Metalphoto or UltraColor plates must be processed through all steps except sealing and must be completely dry.

Hand dyeing is done with an artist's brush or cotton swab, depending on the detail required.

Starting with a dry plate, use a brush to outline the area to be colored with a thin ring of color forming a dam. (*Fig. 570.1*) Deposit a "blob, or pool" of dye in this dammed area. Work this bubble around evenly, maintaining a "bubble" on the plate. Do not allow the pool to dry around the edges, or uneven dye-

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dye to be absorbed into the sponge. Dry the plate with a heat gun, and repeat the process for any additional colors. (Fig. 570.4)

Several colors may be added. Avoid touching the surface of the plate. Skin oil and other contamination causes uneven or spotty dyeing.

Inspect the color on the plate after rinsing but before sealing. If the color is too weak, dry the plate thoroughly and apply more color. Follow all of the preceding steps. If some dye accidentally gets on an area of the plate that shouldn't have dye, it can be removed by applying a concentrated, liquid dishwashing detergent with a cotton swab.

CAUTION:

Once detergent touches the plate, dye will never penetrate the anodic layer in that spot again. After clean-up, rinse the plate thoroughly in running tap water.

Hand coloring can also be done with Pantone Pens available in a variety of colors at most art supply stores. They are manufactured by Letraset, 33 Christiana Street, Moonachie, New Jersey 07074. These pens are intended to be used in small areas only, as they can leave streaks over larger areas.

Not all Pantone Pens are "safe" for this purpose as some tend to "run" during sealing. We recommend testing the pens prior to using them for this purpose.

After hand coloring, the plate is ready for sealing. See below for sealing instructions.

580 SEALING

Seal plates that have had color added by any of the preceding coloring techniques for 10-15 minutes in a boiling sealing solution with Metalphoto Liquid Sealing Concentrate or No-Nickel Sealing Concentrate. Follow all



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other instructions for sealing and post-sealing techniques covered in Section 600. *Do not attempt to seal selectively colored plates in deionized or distilled water for 30 minutes.* This method of sealing removes an excessive amount of dye, yielding poor results.

590 RESIST ASSISTED SELECTIVE COLORING

Another method used for selective coloring employs the use of InstaColor Resist. This method is particularly useful in the production of “framed” areas on a plate. Remove a small amount of InstaColor Resist from its light-safe container and expose it to room light for an hour or two. Apply this resist with a cotton swab or paint brush to areas of the plate that are not going to be dyed. (Fig. 590.1) Dry the resist thoroughly. The plate is now ready for dyeing. (Fig. 590.2)

After dyeing, remove the resist by holding the plate under a continuous flow of tap water and *gently* scrubbing the resist with a *nylon bristle brush or a clean sponge*. Once the resist is removed, the plate is ready for sealing. See Section 600 on sealing dyed plates.



Fig. 590.1



Fig. 590.2



SCREEN PRINTING ON ECONALUM® & METALPHOTO® USING POLYCOLOR® SCREEN PRINTING INKS

INTRODUCTION

EconAlum is open-pored, non-photosensitive, anodized only aluminum that is used with PolyColor Screen Printing Inks to produce selective color plates. With EconAlum, images are screen-printed into the pores of the aluminum sheet. After printing, sheets are sealed in the same way as Metalphoto plates. That is, they are immersed in a boiling sealing tank for approximately fifteen minutes for the purpose of closing the anodic pores. When sealed, the image is sub-surface in nature, making it extremely resistant to moisture, abrasion, solvents and a wide range of chemicals.

Standard Metalphoto black and silver plates may also be selectively colored using PolyColor Screen Printing Inks. When printing Metalphoto plates, colors are screened after the plates have been exposed, developed and fixed, rinsed and dried. After having been printed, the plates are ready to be sealed.

EQUIPMENT

Both Metalphoto and EconAlum may be printed using automatic or semi-automatic screen-printing presses. Our recommendation is that you contact NazDar, Lawson, or a screen-printing supply dealer in your area for additional information and specific equipment recommendations.

BASIC MATERIAL HANDLING

EconAlum sheets should be stored in a dry, cool area. Sheets should be kept in the box until they are to be used. In that EconAlum sheets are open-pored out of the pouch, they are susceptible to fingerprinting. As a result, they should be handled by the edges so as to prevent contamination in the printable area.

SCREEN PREPARATION

SCREEN MESH:

It is recommended that one of the following be used:

- Nylon 196 - 306 mesh
- Polyester 160 - 305 mesh
- Stainless Steel 145 – 270 mesh

MESH CLEANING:

All screens new and used must be cleaned properly to insure good adhesion of stencil, to prevent stencil breakdown and to eliminate dirt in open stencil areas.

1. Screens previously used with PolyColor Screen Printing Inks must be washed out with denatured alcohol before washing out blockout and stencil.
2. To clean blockout and stencil, wet screen with Emulsion Remover. Allow to soak for 30 seconds then clean thoroughly using a high-pressure screen washout hose. Areas that are stained with ink may be washed out with solvents at this time.

New screens (or used screens cleaned per steps 1 and 2 above) must be cleaned and treated for final preparation before mounting stencils. Wet mesh, sprinkle on abraded and scrub with brush to shrink (new mesh) and clean. Rinse mesh well and let dry.

PRODUCTION PROCESSES

STENCILS:

There are two methods for producing stencils, direct and indirect. We suggest the indirect method for economy. Contact Ulano or your local screen-printing supply dealer for specific instructions on stencil preparation.

EXPOSURE:

Stencil film can be exposed using the following light sources:

- Metal Halide (Best)
- High Pressure Mercury Vapor
- Pulse Xenon (Less Desirable)
- Quartz Iodide

PROCESSING STENCILS:

Follow manufacturer's directions for exposing, washing out, mounting, blockout and stretching.

PREPARATION OF POLYCOLOR SCREEN PRINTING INKS:

Inks and Reducer are part of the Metalphoto product line. The function of Reducer is to thin PolyColor ink to a printable viscosity. We recommend that you thin the ink as received approximately 15% by volume. That means approximately six parts ink to one part Reducer.

When reduced, coverage of 2000-3000 square feet per gallon may be anticipated.

Clear PolyColor Screen Printing Ink may be used to lighten the color of pigmented inks or as a resist for CLEAR copy when tinting with water-soluble background dyes.

Be sure to stir inks well before placing onto the screen. When mixing inks for various colors, begin with pigmented ink (blue, red, yellow, black, etc.). The pigmented ink may be lightened with clear ink and thinned later with reducer. Once ink has been properly mixed and stirred, it may be poured onto the screen against the back edge of the frame after raising the frame slightly. This lets the ink flow toward the floodbar and not forward into the printable area.

When air bubbles appear on set-up plates, it is probably the result of too much ink being deposited on the plate. This can be resolved by increasing the angle of the squeegee to a position almost perpendicular to the screen. This is most likely to occur when using a round edged squeegee. The sharp squeegee when placed at an angle is more likely to give less ink.

If there is a break in production longer than 3-5 minutes, the floodbar should travel to the back of the screen. The printable area should be washed down with a liberal amount of reducer to prevent drying of the ink in the screen.

PRINTING:

Use a separate container to thin the ink. Do NOT mix in the original container. Do NOT dilute more ink than is necessary to complete the job. Use enough ink to flood the image. If long runs are to be made, ink can be added to the screen as needed.

DRYING:

After each impression is made, the sheet is pulled out and placed on a drying rack. To speed drying a heat gun may be used. For long runs a conveyerized oven may be used. In situations where the ink is thin and bleed is occurring, the heat drying system will minimize bleed.

PolyColor Screen Printing Inks air dry in thirty minutes at 72F. Force drying requires 30 seconds at 200F. Longer drying times may be required for background prints and at times of high relative humidity.

SEALING ECONALUM SHEETS:

Make sure that the sealing tank is filled with distilled or deionized water and a proper amount of Metalphoto Nickel-Acetate Sealing Concentrate. The water level should be high enough to completely cover the EconAlum sheets. Seal sheets at a rolling boil for approximately 15 minutes. When sealing heavy gauge plates (.032+), limit the number of plates sealed at a time. Additional plates will cause the water temperature to drop, which may cause bleeding.

Sealing may also be accomplished using Dye-N-Seal colors. Dye-n-Seal may be used where background color is desired after a particular screen color has been printed into the anodic layer. Dye-N-Seal may also be used when only clear ink has been screened into the pores. This will give clear letters with background color. As with all Metalphoto coloring systems, the sheets must be sealed at a rolling boil.

REMOVAL OF EXCESS INK AFTER SEALING:

Use denatured alcohol to remove excess ink from a sealed sheet. Satin finish sheets may now be polished using Metalphoto polish. Matte finish and #4 finish sheets should not be polished.

SCREEN WASH-UPS:

After the production run has been completed and you are ready for wash-up of the screens, exercise care to avoid damaging screens and stencils that may be needed again for additional parts. Screens may be cleaned using denatured alcohol or acetone.

NOTE: These solvents may be flammable or toxic. Use proper precautions such as ventilation and spark suppression. FOLLOW THE PRECAUTIONS ON THE LABEL WHEN USING ANY SOLVENT.

When washing the screen, pressure may be exerted on the top of the screen. Only light pressure should be used on the bottom side of the screen, especially when you have small copy or when you have screened background color. This means that all of the characters are unsupported. Wash the flood bar and squeegee thoroughly.

TECHNICAL SUPPORT

If you have questions about EconAlum or PolyColor Screen Printing Inks, contact Horizons Imaging Systems Group at (800) 482-7758.