2

The Negative
Traditional and Alternative Options

OVERVIEW AND EXPECTATIONS

In this chapter, I start you off with a magical excerpt from 1760, Tiphaigne de la Roche's (1729–1774) *Giphantie*. In his poetic literary vision you will see a conception of modern photography nearly eighty years before it was officially described to respective scientific societies in France and England. Also presented in this chapter is a little history of curious individual and scientific connections regarding the conception of the photographic negative. You also are provided with a variety of negative options for alternative processes and will learn how to understand Rochester Institute of Technology (RIT) graduates when they talk about them.

We'll discuss a wide variety of alternative negative production methods, including single stage negative to negative, multistage interpositive to negative, and various types of films that you can utilize for contact printing. This chapter briefly discusses basic exposure and development theory, Pyro development, and Dave Soemarko's contemporary LC–1 and LC–1B process for creating continuous tone negatives with *lith* film. You do not have to hunt around in this chapter for information on working in digital formats, because that subject is discussed in Chapter 3, "The Digital Option."

If you are "white lab coat" impaired then you will appreciate that I have done my best to make this chapter uncomplicated so that you can successfully get underway with alternative process contact negative production. If you want more information I have provided a few references, and the appendices are abundant with data, resources, and recommendations for reading, chemistry, and materials.

A LITTLE HISTORY

Imaginative intellects, artists, and writers throughout recorded history have revealed the concept of a mirror that forever captures the image that it reflects, like Narcissus's image in the water. The Roman poet Publius Papinius Statius (40-96 A.D.) expressed this sentiment within his five-volume epic *Silvae,* but the most notable example of the written premonitions is found in Tiphaigne de la Roche's *Giphantie,* 1760. In the following excerpt, de la Roche describes the imminent discovery of photography.

Figure 2–1
Christopher James, *Rachel with Wings,* Maine, 1995
This negative was made during a cyanotype on fabric mural workshop work project at the Maine Photographic Workshops. I used a Lensless Camera Co. pinhole camera fitted with a Polaroid 4" × 5" back and Polaroid Type 55, Positive/Negative Film. The Type 55 negative was then used to demonstrate the platinum/palladium process.
(Courtesy of the author)

Figure 2–2
Christopher James, *Double Strike/Atlantic*, 1981
A little gift from the picture spirits.
(Courtesy of the author)

A Vision from 1760

That window, that vast horizon, those black clouds, that raging sea, are all but a picture. You know that the rays of light, reflected from different bodies, form a picture, and paint the image reflected on all polished surfaces, for instance, on the retina of the eye, on water, and on glass. The elementary spirits have sought to fix these fleeting images; they have composed a subtle matter, very viscous and quick to harden and dry, by means of which a picture is formed in the twinkling of an eye. They coat a piece of glass with this matter and hold it in front of the objects they wish to paint. The first effect of this canvas is similar to that of a mirror; one sees there all objects near and far, the image of which light can transmit. But what a glass cannot do, the canvas by means of its viscous matter, retains the images. The mirror represents the objects faithfully but retains them not; our canvas shows them with the same exactness and retains them all. This impression of the image is instantaneous, and the canvas is immediately carried away into some dark place. An hour later the impression is dry, and you have a picture the more valuable in that it cannot be imitated by art or destroyed by time … The correctness of the drawing, the truth of the expression, the stronger or weaker strokes, the gradation of shades, the rules of perspective, all these we leave to nature, who with a sure and never erring hand, draws on our canvasses images which deceive the eye.

—Charles Francois Tiphaigne de la Roche,
Giphantie, *Paris, 1760*

In 1614, Angelo Sala wrote of his experiments in which silver nitrate inexplicably turned dark on exposure to sunlight. Shortly thereafter, in the mid 1600s, the Irish scientist Robert Boyle (1627–1691) was playing around in his laboratory when he observed that the silver chloride compound he was working with turned from light to dark. Boyle, unfortunately, thought that the foul air in his lab had caused the reaction and didn't pursue the alternative explanation that ultraviolet (UV) light was responsible for the change. Boyle, by the way, was the gentleman who invented Boyle's Law (1662), the most important physical law of SCUBA diving: *as ambient pressure increases: volume decreases, and vice versa*. Boyle was also a founder of the Royal Society where Talbot eventually had his day in the sun describing his practical photographic discoveries that ironically included the sensitivity of silver chloride to UV light.

Figure 2–3
William Henry Fox Talbot,
***Camera Lucida Drawing*, Italy, 1833**
Talbot, like most English gentlemen, was expected to be adept at drawing as well as science, poetry, and music. Sadly, Talbot couldn't draw well and resorted to using a camera lucida to assist in creating Lake Como honeymoon pictures to show friends. Clearly, the camera lucida did not help, and it was Talbot's difficulty mastering the device that drove him to seek a way to make images in another, and more perfect, way.
(Courtesy of the George Eastman House, Rochester, NY)

In 1802, Thomas Wedgewood (1771–1805) and his friend Sir Humphrey Davy (1778–1829) made what might have been the first photogram. Wedgewood, who was familiar with the work of Heinrich Schulze and Karl Wilhelm Scheele's experiments with the light-sensitive properties of silver salts, began coating paper, glass, and white leather with silver nitrate solutions and laying stencils on these surfaces in sunlight. During exposure the silver salt sensitizer turned gray, purple brown, and, eventually, black in the areas that were not filtering, or blocking, the light. You can replicate this same effect by exposing a piece of silver gelatin printing paper to the sun. Wedgewood's "Sunprints" required only a simple water wash to remain visible and were successful enough that his friend Davy decided to document their creations. There was, however, a paradox within the discovery. The light that Wedgewood needed to make an image would also destroy the image when he tried to show it off. In spite of this, Wedgewood found that he could exhibit his stencil photograms by the low illumination of candlelight, allowing his accomplishments to be duly recorded. Although there is evidence that some of these prints were still viable until the 1890s, I do not believe that any are in existence today.

By the early or mid 1800s, artists were employing photogram techniques with both creative and practical scientific intentions. Notable at this time were Sir John Herschel (1792–1871) with his flower extract Anthotypes; Anna Atkins (1799–1871) for her wonderful cyanotype studies of algae; the Scotsman Mongo Ponton (1801–1880), who employed potassium dichromate as a light-sensitizing solution for his "shadowgraphs"; and William Henry Fox Talbot (1800–1877), who was making *Photogenic* drawings with waxed-paper negatives.

News of the invention of "photography" by Daguerre (thanks in part to a naive business decision made by Niépce's son Isadore) disrupted the peace of mind of Fox Talbot. Talbot was pretty sure that he had invented photography and that the initial idea had come to him on a honeymoon trip to Lake Como in 1833. While futilely attempting to use a drawing aid contraption called a *camera lucida*, Talbot had mused that it would be quite charming to imprint the reality he was observing in a way that wouldn't require the hand-eye dexterity of drawing. When the honeymoon was over, he set to work.

In 1834, Talbot saturated a piece of writing paper in a diluted solution of common table salt (sodium chloride)

Figure 2–4
William Henry Fox Talbot (1800–1877), *Photogenic Drawing, Feathers, Lace, and Leaves*, 1839
An example of one of Talbot's many silver iodide (salted paper) experiments, which he referred to as Photogenic Drawings.
(Courtesy of the Gernsheim Collection, Ransom Center, University of Texas–Austin)

and then, after it had dried, he applied a second coating consisting of silver nitrate. This wasn't a completely serendipitous inspiration—a good number of people had been working with the chemistry for a while. When the silver nitrate solution dried, a light-sensitive compound of silver chloride had formed (see Chapter 5, "The Salted Paper Process"). These *Sciagraphs*, or *Photogenic Drawings*, were photograms of lace, feathers, and botanical specimens and were preserved with a bath of salted water. It is interesting to note that during this period, Talbot recalled a remark by Sir Humphrey Davy in which Davy indicated that his experiments with the iodide of silver (actually a sub-iodide) showed it to be more sensitive than silver chloride in producing a light-sensitive reaction. During a residence in Geneva, in 1834, Talbot tried working with Davy's information and discovered that the opposite was true and that Davy's silver iodide formula was not sensitive to light in the least. Talbot immediately began to use this knowledge as a way to *fix* his silver chloride images by dipping them in a bath of alkaline iodide following exposure. Unfortunately, although this treatment stopped the darkening of the print, it caused the opposite effect of fading the image after several days if the print were subjected to light.

During the "brilliant summer of 1835" Talbot created the first camera-made paper negative that could be used to generate a positive photographic print. He sensitized writing paper with repeated alternating baths of salt (sodium chloride) and silver nitrate. While the silver chloride sensitized paper was still wet, Talbot placed it in one of his "mousetrap" cameras (a name his patient wife, Constance, had given to the machines) and made an exposure in sunlight. At one point, after a particular exposure had failed to yield an image, Talbot decided to resensitize the paper again with a solution of gallo nitrate of silver (silver nitrate, acetic acid, and gallic acid) and saw to his amazement that his failed exposure's latent image was emerging. He preserved the image with a bath of potassium bromide, and, after it had dried, used the print as a contact negative with a newly sensitized piece of paper. He initially called the results of this process *Talbotypes* or *Calotypes* (1840), and a year later, after a few improvements, Talbot placed a very restrictive patent on the process, effectively putting the brakes on the new medium. In 1844, Talbot published a second photographically illustrated book (*Anna Atkins* was the first), *The Pencil of Nature*.

Around 1843, something very interesting happened to the new medium of photography. A portrait painter by the name of David Octavius Hill (1802–1870) entered into a business partnership with scientist Robert Adamson (1821–1848). Hill had accepted a daunting commission to paint a group portrait of the 400-plus people who had recently founded the Free Church of Scotland. Because it wasn't practical to paint hundreds of people from life, Hill adopted Talbot's Calotype as a means of recording each person's portrait to use as a visual guide for his massive painting. To accomplish the task, Hill secured the services of Adamson as his technical expert for the project. Because both were from Scotland, they were geographically free of the patent restrictions that Talbot had placed

Figure 2–5
Portrait of William Henry Fox Talbot (1800–1877)
(Courtesy of the Gernsheim Collection, Ransom Center, University of Texas–Austin)

on his Calotype, and between 1843 and 1847 they made nearly 2,000 images. (Adamson died in 1848 at the age of 27.) What was really unprecedented about their collaborative work was its artistic scope. As a result of Hill's obsession with making photographic images that recorded the *true* essence of the subjects, he and Adamson were, in my opinion, the first individuals to introduce the concept of artistic *intention* in harmony with the new science of photography.

In March 1851, Frederick Scott Archer (1813–1857) changed the landscape of photography forever. Prior to 1851, the principal photographic options available, providing you didn't want your images to be botanical studies rendered in cyanotype blue, were the Daguerreotype and the paper-negative Talbotype/Calotype. The Daguerreotype was known for its precious detail and presentation,

Figure 2–6
David Octavius Hill and Robert Adamson, *The Rev. Thomas Henshaw Jones, 1843/1848* (Calotype)
The painter David Octavius Hill (1802–1870) had accepted a commission to paint a group portrait of the over 400 people who had recently founded the Free Church of Scotland. Hill turned to the Calotype as a means of recording each person's likeness and secured the services of Robert Adamson (1821–1848) as his technical support. Between 1843 and 1847 they made nearly 2,000 images. What was really unprecedented about their collaborative work was its artistic scope and Hill's obsession with making images that recorded the subjectively true essence of the subjects; they had introduced the concept of artistic "intent" in harmony with the new science of photography.
(Courtesy of the George Eastman House, Rochester, NY)

the exceedingly long time it took to make exposures, and that it was a one-of-a-kind product. The Calotype image existed on paper and was reproducible, but the image quality was inferior because of the contact paper negative required to make a print. The desirable solution to this limited menu would be a single imaging system that could be simultaneously reproducible, finely detailed, and fast enough to consider recording actual life.

In 1845–1846, Christian Frederick Schönbein (1799–1868) discovered nitrated cotton (*guncotton*) by com-

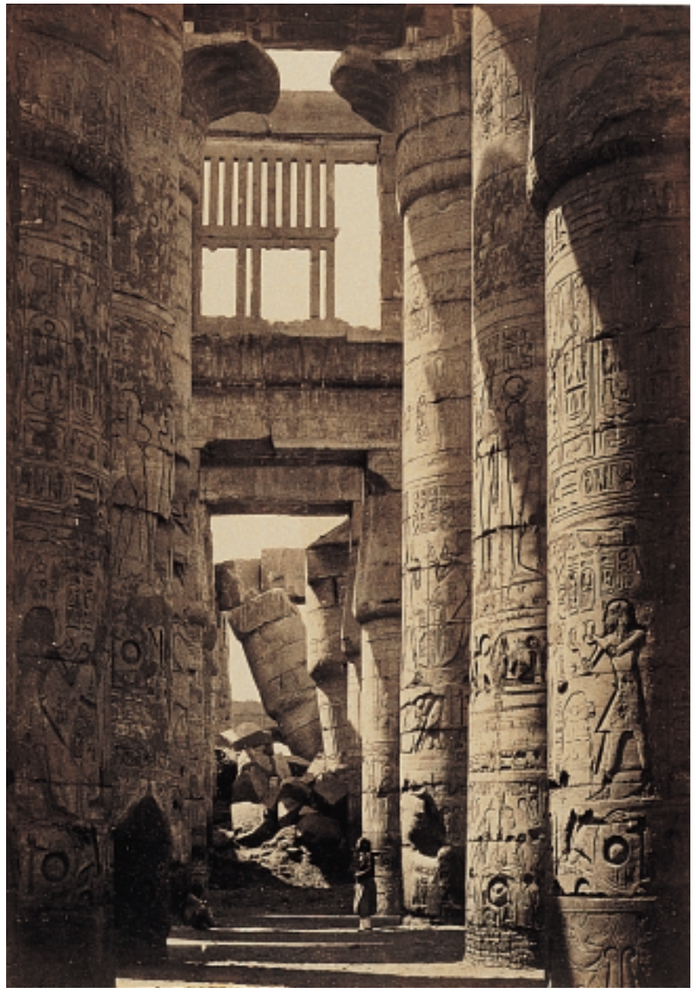

Figure 2–7
Francis Frith (1822–1898), *Interior of the Hall of Columns, Karnac Temple,* Luxor, Egypt, 1857–1858 (From a wet collodion negative)
Between 1856 and 1860 Frith made several trips to the Middle East, including one of over 1,500 miles up the Nile River. Working with the wet collodion process in a portable darkroom, Frith endured temperatures of over 120°F and the problems of sand, dust, and flies settling into his fresh, and tacky, collodion emulsions.
(Courtesy of the Royal Photographic Society)

mingling cotton fibers in a mixture of sulfuric and nitric acids. Ironically, in 1847, a young medical student in Boston by the name of John Parker Maynard formulated a durable, skinlike, medical dressing from the guncotton called *collodion* that could be used to treat wounds from Schönbein's explosives. In 1850, Gustave Le Gray proposed the idea that Parker's collodion solution could be applied to photographic purposes because it was the near-perfect vehicle for holding a light-sensitive solution on glass. Shortly after, in March 1851, Frederick Scott Archer described an application of salted collodion on sheets of glass for the purpose of making glass plate negatives. Archer detailed a process where potassium iodide was combined with a solution of diluted collodion applied to a glass plate, which was then immersed in a silver nitrate bath resulting in a light-sensitive layer of silver iodide. This sensitized glass plate was exposed in a camera immediately after being withdrawn from the silver nitrate, developed in a solution of pyrogallic acid, and fixed in sodium thiosulfate. The advantages were immediately evident. The process provided a sharp, reproducible glass negative and was far more sensitive, especially in the wet state, permitting exposure times in seconds rather than minutes. This exposure speed allowed the subject of a portrait to exhibit a bit of candid behavior. It was also democratically priced, being a fraction of the cost of the Daguerreotype. Incidentally, shortly after Archer published his experiments, enterprising photographers realized that an underexposed wet collodion negative, when laid on a dark background and viewed in reflective light, would appear as a positive. This visual phenomenon led directly to the even more democratically available Ambrotype and tintype processes.

Due to the obvious improvements, Talbot's patented process was abruptly replaced as the process of choice. Feeling injured, Talbot filed a suit against portrait photographer Silvester Laroche (1809–1886), claiming that the wet collodion process Laroche was using had a direct link to his Calotype process and was thus an infringement on his patent. In December 1854, the bewildered court disagreed. Because there was little point in using the fuzzy Calotype now that Archer's sharp and reproducible wet collodion process was patent free, Talbot decided not to renew his claim, and photography became democratic. The irony of this history is that Archer's generosity to the medium allowed many entrepreneurs to make their fortunes with his invention while Archer himself experienced poverty and hardship until the end of his life.

In 1871, an Englishman by the name of Dr. Richard Leach Maddox (1816–1902) produced the first successful silver bromide, dry plate emulsion. In other words, it was possible to make a negative on a glass plate at any time and not just when the plate was wet with the sensitized collodion emulsion. It also was no longer necessary to take your darkroom with you when you went out to make some pictures. Maddox's achievement, free to the world like Archer's wet collodion, was described in an issue of the *British Almanac*, and one of its readers was a young man named George Eastman (1854–1932) whose occupation at the time was coating and developing wet plate collodion glass plates.

Eastman theorized that if photographers could use a dry plate negative system, then their cameras could be smaller and negative development would be less cumbersome and complicated. He also surmised that image development could wait until the end of the shooting experience rather than having to be done immediately following the exposure. He set to work on the inspiration in 1877 and in 1879 was granted a patent for his dry plate

Figure 2–8
Fred Church, *George Eastman (1854–1932) Aboard the S.S.Gallia with a Kodak #2,* 1890
The beauty of Eastman's Kodak system was that it eliminated the psychological barriers of the technical and allowed the amateur to make photographs without the need of chemistry or a darkroom. Eastman's motto, "You press the button, we do the rest," transformed photography by establishing a comprehensive photofinishing industry that was accessible to everyone.
(Courtesy of the George Eastman House, Rochester, NY)

system. This was followed, in 1884–1885, by his significant idea of creating the world's first commercially produced flexible roll film system. In this discovery, Eastman utilized very thin and flexible celluloid as the substrate for his emulsion. Celluloid was invented in 1861 and originally consisted of pyroxlene with naphtha, amyl acetate, oil, and camphor. As had been the case with the majority of photographic discoveries, the original seed for the idea belonged to another. The concept of using celluloid as a support for a sensitized emulsion had first occurred to a gentleman by the name of John Carbutt, a man most remembered for his stereographs while in the employment of the Union Pacific Railroad (*Glimpses of the Great West*, 1864–1867).

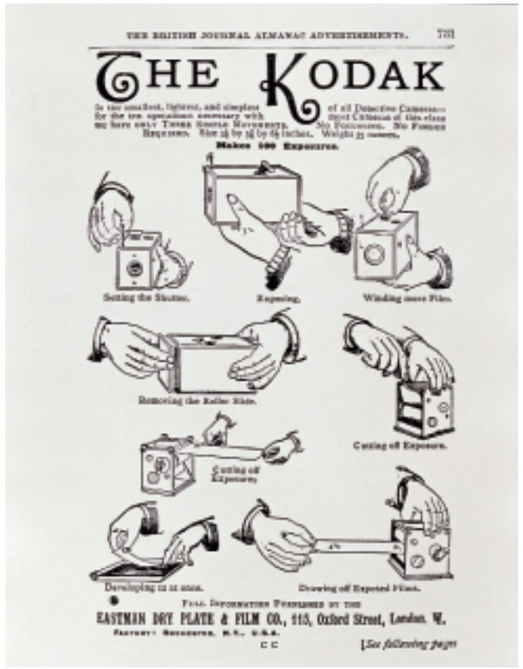

Figure 2–9
***Advertisement for the Kodak #1*, British Journal Photo Almanac, 1890**
(Courtesy of the George Eastman House, Rochester, NY)

In 1888, Eastman began to manufacture the Kodak 1A camera, loaded it with a roll of flexible film able to record 100 images, and sold it for under $25. The owner of the camera would shoot the film, send the camera back to Kodak with the exposed film still inside, and get a freshly loaded camera (not necessarily the same one that was sent in with the exposed film) and two circle-shaped images of each exposure. The beauty of Eastman's Kodak system was that it eliminated the psychological barriers of the technical and allowed the amateur to make photographs without the need of technical instruction, chemistry, or darkroom. Eastman's idea revolutionized the medium of photography by creating a complete photo-finishing industry that was defined by its advertising motto, "You press the button, we do the rest."

As an aside, there is good story that the word Kodak was invented by a group of linguists and language experts at the request of George Eastman. Legend has it that Eastman wanted a name for his company that had no meaning, or similar spelling, in any language on earth. The one that the language experts came up with was *Kodak*.

In the early 1900s, the photogram reemerged. Christian Schad used torn paper as a photogram source to make negative images. Schad, a principal member of the Cubist movement (inspired by Paul Cézanne and adapted by Pablo Picasso and Georges Braque), used photography to address the same issues being explored in contemporary Cubist painting: to illustrate the emotional force of three-dimensional objects, seen two-dimensionally at once from many vantage points of place and time. Examples of the graphic power of a photogram can be seen in the work of Lucia and Laslo Moholy-Nagy, Alexander Rodchenko, Georgy Kepes, and Man Ray.

An Appropriate Moment to Explain Things

Let me try to make this simple. If you are standing on the beach in the moonlight, and the lunar light is illuminating your body, the odds are excellent that there is a shadow of you nearby. That shadow against a field of sand is essentially a *negative of you* in the moonlight, and the best way to describe it is to begin with the concept of a photogram.

The term *photogram* is used to describe a direct shadow pattern—the result of exposing a layer, or layers, of transparent, translucent, or opaque objects directly on a photosensitive emulsion. The effect is like a negative in that the degrees of transparency in the layers allow light to pass through to a sensitized emulsion according to their respective densities. The most transparent objects allow the greatest exposure, whereas the least transparent prevent exposure. A photogram on paper is different from a negative because it is a one-of-a-kind image.

This is pretty elementary, but all negatives have visible zones of film density that describe the amount of silver that has been exposed and developed on the film. Clear or thin areas of the negative have the least exposed and developed silver and are primarily dependent on development. Dark and dense areas of the film have a great deal of exposed and developed silver and are most dependent on exposure. The center of this equation is an 18% gray (average film density of around .65) that is relative to any exposure made according to a light meter's normal 18% gray, Zone 5, recommendation.

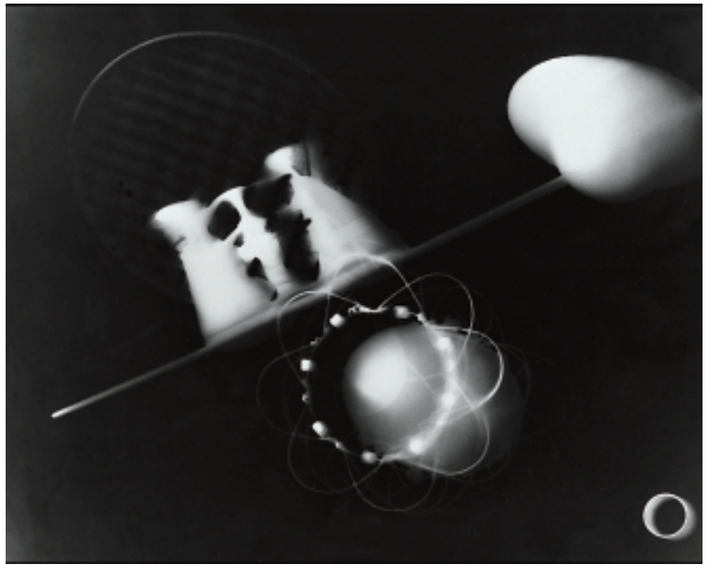

Figure 2–10
Man Ray (Emmanuel Radnitsky) (1890–1976), *Rayograph*, 1950
Man Ray moved to New York City with his family and was soon exposed to modern art through Alfred Steiglitz's 291 Gallery. Sharing similar sentiments, he became friends with Marcel Duchamp and Francis Picabia, and together they formed the New York Dada movement. Ray preferred the tools of science and machine to make his art, working extensively with the cliché-verre negative and photograms that he called Rayographs.
(Courtesy of Artists Rights Society)

The recommended development times given to films are important to you in that the longer the film is developed, the greater the contrast for that particular film. When your film is being processed and being "pushed" beyond a normal development time, the areas that have received the least exposure (your shadows) will not darken to the same degree as the more exposed areas (your highlights). Up to a point, the extended development's effect on the highlight areas of the negative will create an ever-increasing comparative contrast with the shadow areas. A basic rule of thumb: for more contrast in your negatives, underexpose and overdevelop (*push*) the film. Pushing the film means to develop the film so that the contrast is greater than it would be if the film were to be processed for a normal time. For less contrast, overexpose and underdevelop (*pull*) the film. Pulling basically means to develop film so that the contrast is reduced relative to what the contrast would be if the film were developed for a normal time. After development, the resulting negative will exhibit a menu of tonal values that many large format photographers refer to as *zones*. In a negative, these zones are given calibrated values with numbers that can be applied to the lightest low-density shadows (low density equals degrees of transparency) and the darkest high-density highlights of the negative. When all of these assigned values and numbers are stirred together you begin to encounter assorted theories about the *Zone System*, which, thank your lucky stars, we will not go into in this book.

Just for your information, the ability of the normal photographic paper to render highlight densities is maximized in the vicinity of a 1.2 average density reading in the negative. In platinum/palladium printing, for instance, the process has the ability to render a much greater range of densities in the negative; thus the compelling need to have a negative to match the almost linear curve of a perfect platinum negative. It is possible for the Pt/Pd process to render highlight densities beyond a densitometer reading of 2.0.

When working in non-silver and alternative processes it is necessary to create a negative, or a positive, that will match the size of your finished print; one that can be contact printed in direct sun or ultraviolet (UV) light. Most photographic artists have an occasional desire to make big and impressive images. Being able to produce an enlarged duplicate negative is one of the only ways that you can carry around a small camera and eventually make large enough negatives for alternative contact printing. For all but the most dedicated large format photographers, this is a true bonus.

What Does Negative Density Mean?

Let's say that when you're reading the directions for platinum/palladium you come across some information that asks you to try having a negative with an average density range of **1.5**. The majority of readers will say, "O.K." and read on hoping for the best—unless that number is one that they have looked into before or they have a little experience with densitometers and parametric curves.

- The 1.5 number comes from measuring the value for the thinnest shadow with detail with a densitometer and giving it a number. Let's say that the number you calibrate with the densitometer is **0.35**.
- Next, you will measure the value for the densest highlight with detail. Let's say this new number has value **1.85**.
- To find the average density of this negative all that you have to do is subtract the thinnest shadow number from the densest highlight number. In this convenient example you will come up with the number that was recommended to you for the process. (**1.85 minus 0.35 = 1.5**)

Another reason for enlarging your negatives is that in the real world your original negative will not have the correct tonal values for a particular process. For instance, platinum/palladium negatives will make you smile if they exhibit a healthy contrast and an average negative density of 1.5 to 1.7, printable only on a silver gelatin paper with a grade of 0. In another example, gum bichromate prints may require a negative set of the same image, with each having a different average density. Making an enlarged duplicate negative is an option for some ambitious "gumists," while others will simply alter their exposure times or pigment to sensitizer ratios. Also, in non-silver contact printing, burning and dodging are not practical techniques, and making adjustments during the interpositive phase (step #1 of a two-step process) will yield corrections that you might make during a normal paper exposure.

Duplicating can be either a single-stage negative-to-negative process using a film such as Kodak's SO-132 or a multistage negative to interpositive to negative with a film such as a two-step Ortho or Arista's Premium Halftone Supreme (APHS) (see Appendix H). In a multistage duplication process using lith film, you can increase the density range in the interpositive step and go for the contrast in the negative step. Refer to Dave Soemarko's LC–1 and LC–1B system for long tonal scale lith film interpositives and negatives later in this chapter.

NEGATIVE PRODUCTION OPTIONS

Commercial Labs

If you need perfection, can't do it yourself, or can't afford the materials or time, you might consider hiring a commercial lab, or service bureau, to make a negative for you. Consult the *Yellow Pages* and the resource listings in Appendix H, and ask those who work with these businesses who they would recommend. It is important that you hire a service bureau that is familiar with the needs of alternative process artists.

The Copy Machine

Most commercial copy services are capable of producing an enlarged duplicate film of whatever flat 2-D source you give to them. The quality is often inferior, but that particular look may be exactly what you are searching for. Check your local library as well because they often have a machine that will produce a crude, medium-size transparency.

The Desktop Printer and Film Recorders

Desktop scanners and printers seem to get more sophisticated and affordable every few months and are now able to provide extremely high quality and resolution on film acetate. It is inevitable that within a very short time these units will be able to produce negative and positive films, directly from Photoshop or a digital camera, that rival the results from professional service bureaus, or for that matter, the view camera itself. Newer technologies make the idea of producing extremely high-quality negatives, directly from digital camera data, an increasingly viable option. One additional option, provided you or your institution can handle the price tag, is looking into getting a digital film recorder such as an Imapro-45. These units can take digital files and output them to transparencies or to color and black and white negatives at 35 mm, 120 mm, and 4″×5″. In combination with a color processor, such as an RA-4, negatives can be enlarged to the limits of the processor.

For a process like gum bichromate, a film negative of 72 to 300 dpi (dots per square inch) will likely be more than adequate to make a successful gum. For a process that can handle a more sophisticated resolution, such as Pt/Pd, you may want something in the 600 dpi and higher range. It is a good idea to purchase an extra hard drive if this concept fits your requirements. A single, reasonably complicated, digital negative file at 600 dpi can easily consume 50 megabytes of disk space. (See Chapter 3, "Digital Options," for details.)

Figure 2–11
Christopher James, *Mona and the Whale*, 2001
This image is an example of playing around with a variety of techniques. The detail of da Vinci's *Mona Lisa* was placed on a photocopy machine, and when the exposure light went in one direction, Mona and the art history text went in another. The laser copy print was then photographed and an enlarged duplicate negative was made on S0-332 direct duplicating film. The new negative could then be used for any alternative contact process or additional digital manipulation following a scan—as is the case in this print's continuing evolution. *(Courtesy of the author)*

Acrylic Films from Printed Sources

To make an unusual acrylic and flexible positive/negative to use in a contact printing or enlarging process, try appropriating magazine reproductions printed on "*clay-coated*" paper (high-quality inks and paper stock) and utilizing them as conventional images, distorted images, montage and/or collage sources. Clay coating, in this sense, defines an ink-printed page where a fine mist of clay dust or talc is sprayed on freshly printed sheets of paper to prevent them from sticking together during the print run. Another image-source that is less common but one

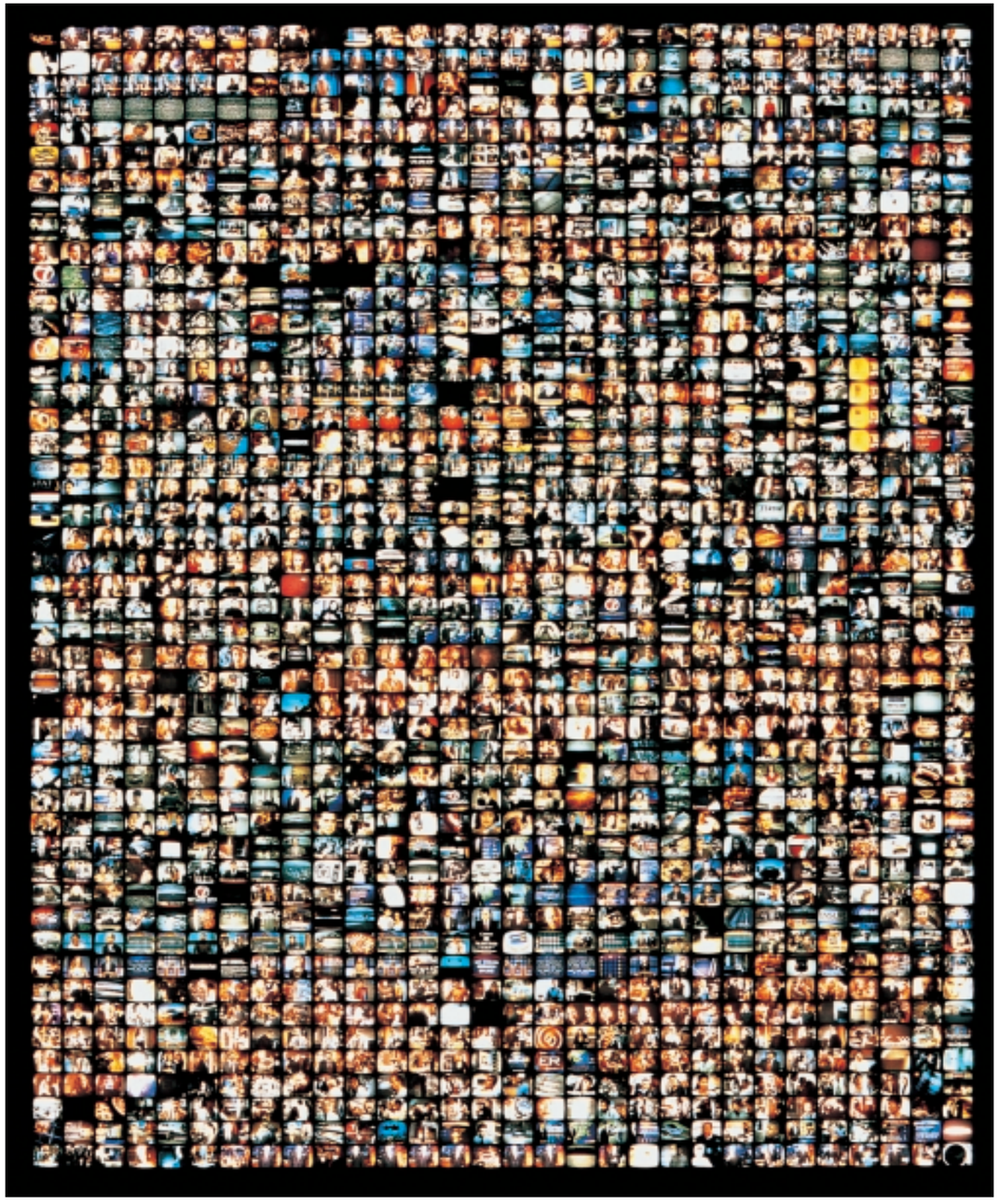

Figure 2–12
Matt Belanger, *NBC*, 1999
Matt, a former student of mine at the Art Institute of Boston, created this very large digital montage as part of a series dealing with television and popular culture. The works, covering a range of topics from MTV to the Home Shopping Club, were printed out as Iris prints and consumed hard drives for storage.
(Courtesy of the artist)

Figure 2–13
Christopher James, *Acrylic Lift, Part A*
This image is of an acrylic lift I made during a workshop demonstration. It was created by painting four to six separate and thin layers of acrylic gloss medium on an image in a magazine. Following the coatings, the magazine page is left to soak in a bath of warm soapy water until the paper dissolves, leaving only a flexible transparent film base of acrylic with an ink impression.
(Courtesy of the author)

Figure 2–14
Christopher James, *Acrylic Lift, Part B*
(Toned cyanotype from acrylic lift)
This image shows one example of how an acrylic lift can be used as a negative source for an alternative process. In this example, I used the lift for a cyanotype, which I then toned with sequential baths of sodium carbonate and tannic acid following the initial clearing stages.
(Courtesy of the author)

that allows you to use your own images is the laser transfer copy print. When making copies, ask that your black and white images be copied in color formatting because this will give you additional layers, beyond a single black, of thermographic dyes to transfer.

Basic Materials for Acrylic Lifts

- High-quality printed magazines (*Time*, *Vogue*, *Esquire*, etc.)
- Acrylic Gloss/Gel Medium
- A clean and dry coating surface (Masonite or Plexiglas® sheet)
- Brush (foam or watercolor type)
- Hot water in a tray with a little detergent
- Hairdryer

The Technique

With a foam brush, apply an even and thin coat of acrylic gloss medium over the magazine image you wish to make an acrylic lift from. Brush the first coat in a single direction, dry it completely with a hairdryer, and then recoat the image in the opposite direction. Repeat these steps until you have 4 to 6 thin coats. Applying thick coatings or continuing to coat once the medium has begun to "set up" will result in a milky, translucent image, so work quickly. Once you have successfully completed these multiple coatings it will be time to separate the ink graphic from the paper support by immersing the coated image in a tray of hot, soapy water. This will eventually cause the paper support to break down and will leave you with the ink image supported in the flexible, transparent acrylic skin. If you get impatient, you can gently rub the paper

Figure 2–15
Frank Varney, *Lily*, 1998
For this image, Frank Varney attached a 300 mm pinhole zone plate to an old Calumet view camera and shot with Polaroid Type 55 Positive/Negative film. Selenium was used to intensify the near infrared quality of the image. *(Courtesy of the author)*

support with your fingertips. The positive acrylic image will appear cloudy at first but will dry clear if you haven't overbrushed in the coating steps.

Once you have removed all of the paper from the image, the acrylic "image-skin" can be applied directly to paper, wood, or glass with a thin acrylic medium or diluted glue wash. It can also be used as a contact positive for any alternative process. The image can be cut, stretched, montaged, collaged, digitized and remade on acetate, and played with as you see fit. As you might expect, the *positive* acrylic image, printed as a contact film, will yield a *negative* print. To make a positive print image it is necessary to make a film internegative in the darkroom (see Direct Duplicating Films) or in a digital imaging program where you can scan and "invert" the positive to a negative ink-jet film acetate. You may also try contact printing the acrylic lift onto an RC paper and using the negative RC paper print as a paper negative.

Polaroid Type 55 Positive/Negative Film

If you don't want to work with any of the previous options and can be happy with a 4″×5″ negative, consider using Polaroid Type 55 Positive/Negative Film. This ingenious film can be shot in either a conventional 4″×5″ camera or in a pinhole camera that accepts a 4″×5″ Polaroid back. The Lensless Camera Co. and the Pinhole Resource make wonderful, not prohibitively expensive, pinholes in many focal lengths and types of wood (see Appendix E).

Polaroid Type 55 P/N yields both a positive print and a negative. It is important to remember when working with Type 55 that you should be trying to produce a great negative rather than a great positive. It is rare to have both simultaneously. My advice is to use the positive as a way of evaluating the composition and context of your image and to focus your attention on making the best negative for the process you intend to use it for. Often this will mean a thin, washed-out positive that you will be reluctant to show and a negative that is rich and tonally appropriate for the process you are using.

Type 55 film can be cleared successfully in standard hypo-clearing baths and washed for permanence. When I work with Type 55 away from the lab I fill a plastic food storage container with hypo-clearing bath for transport and water wash the exposed film when I return to the studio. In workshops near the ocean, seawater (not from breaking surf where sand is likely to be in the solution) is also a successful clearing bath but the negatives surely will require a clean water wash later on. Be cautious of the fragile Type 55 negative. Be sure to remove the metal strip and developer pod before placing it in the clearing agent. As an added note, when working away from the lab, please bring along a trash bag to throw away all of the refuse that is left once you have gone through all of Polaroid's packaging and packets. Also, be very careful when you separate all of the pieces that make up the pod, positive, negative, and protective outer layers. It is very easy to rip or scar the negative at this stage. Finally, Type 55 P/N is the best film to use in a workshop or class environment due to its ability to allow instantaneous adjusts with exposure and instant gratification for the student. The negatives are more than satisfactory for any process you will be engaged in, and the very nature of the film's immediacy greatly accelerates a learning curve for students in an alternative process class.

Some Good Sources for More on the Subject

See Appendix H for additional information on these recommended texts.

- Dick Arentz, *Outline for Platinum/Palladium Printing*
- Dan Burkholder, *Making Digital Negatives for Contact Printing*
- Phil Davis, *Beyond the Zone System Handbook*
- David Fokos, *How to Make Digital Negative for Black and White Fine-Art Photographs*
- Dick Sullivan and Carl Weese, *The New Platinum Print*

A Quick Nod to Conventional Films

Shooting large format negatives in camera is still one of the best options for generating the perfect negative. As mentioned earlier, the amazing improvements in digital cameras, printers, and technology will likely challenge conventional film and wet lab technique in the very near future. In the meantime, however, conventional black and white films such as Kodak's Tri-X and T-Max or Ilford's HP5 + and FP4 can be purchased in a vast assortment of sizes and can be manipulated to your specifications through exposure and development.

Conventional standards for exposure and processing in silver gelatin printing are often lacking when applied to many alternative processes. There are only a few commercial films that are truly ideal for many non-silver applications. These are films where the full range of detailed blacks (thinnest parts of the negative) and highlights (the thickest parts of the negative) are explored to the extreme ranges that are possible with a delicate process like platinum/palladium. This single subject, that of film and its relationship to image making, could easily take an entire book to explain, as you will discover if you go looking for one. I personally don't have the deep interest, knowledge, page space, or time to devote to this topic and so I will offer some resources. Be warned: It is very easy to get drawn into the realm of compulsive technique in this genre. The history of alternative process is full of individuals who made stunningly beautiful prints that were, in the end, devoid of life, imagination, and inspiration.

Figure 2–16
Jean Baptiste Camille Corot, *Corot par lui-meme (Self-Portrait),* 1858
A fascinating bit from the same time period: the French painter Jean Baptiste Camille Corot (1796–1875) tried his hand at processes utilizing bichromates and colloids and made cliché-verre prints on glass using pure albumen as his sizing agent. He also made colloidal etchings by coating glass plates with wet, sensitized collodion emulsion. The plate was exposed to light, which darkened the entire plate. Corot then etched into the darkened emulsion and, when finished, contact printed the plate to a piece of sensitized paper for a paper print. Corot and others also utilized a technique in which they would burn a tallow candle close to a glass plate, leaving a soot-blackened sheet of glass. The soot was then drawn into with a variety of art-making tools to create a negative plate of lines and textures. The etched soot on the glass was then used as a contact negative in conjunction with a sensitized sheet of paper.
(Courtesy of the Detroit Institute of Art Museum, © 1978, Founders Society Purchase, Joseph H. Boyer Memorial Fund)

More Negative Options: The Cliché-Verre

Cliché-verre (in French, among other things, *cliché* means negative in relation to photography and *verre* means glass) is a term describing a handmade negative on a transparent base of glass or acetate. It is usually created by applying liquid resists such as paint, syrup, asphaltum, varnish, oils, or ink. The painted glass is either contact printed or projected to a light-sensitive emulsion, whereupon the painted areas filter the light to make an image. The degrees of transparency (zones of density) in the resists allow light to pass through according to density; less resist equals more exposure and vice versa.

The cliché-verre was reinvented by Adalbert Cuvelier in 1853 and used by artists to make reproducible plates for their drawings. Among the most notable of those artists was Jean Baptiste Camille Corot (1795–1875) who used completely exposed and sensitized glass plates as a transparent etching base/negatives for making paper prints of his drawings.

In the nineteenth century, artists who were disciples of the "Barbizon School" of landscape painting coated sheets of glass with hard and soft etching grounds or with black soot by burning a tallow candle underneath the glass. In either case, the dark opaque coating was then scratched and drawn into with traditional etching tools, brushes, and fingers. The result was essentially a graphic line art negative with the remaining ground/soot functioning as a light-resistant mask. The etched and scratched lines in the ground allowed light to pass to a bi-chromated colloidal emulsion underneath the plate as a way of making an image on paper. For a quick idea of how this works, take a piece of glass or acetate sheet film and play on it with paint, inks, and resists. Then with a pin, nail, razor blade, comb, etching needle, or pencil, scratch away at the resist. When you're done, use the resulting image as a contact negative with a conventional silver gelatin paper and you'll get the idea immediately.

You can also make a camera obscura-like drawing by directing an image from a slide projector or enlarger to a prepared coated glass plate, acetate, or sheet of vellum. In the projected light, trace your image by following, or abstracting, the lines and forms being projected. When you're done drawing, you have options. Among them are contact printing to a piece of silver gelatin enlarging paper or as a contact negative in any alternative process. Additionally, this technique is a terrific way to include text in your imagery. Simply create the text in your computer, print it out on an acetate, and use it as a cliché -verre layer during exposure.

Figure 2–17
Tim Butler, *Family Farm*
This image is from Tim Butler's series on the death of the family farm in America. To make the image, Tim rigged up a slide projector that was powered by a car battery.
(Courtesy of the artist)

Projection

The use of light projection, through either a positive or negative transparency, is another option when dealing with film as the primary force in a final image. I think of both variations as "alternative" image-making, adhering to my lifelong belief that any creative process that makes use of light, to leave its mark and intention, can be thought of as photography.

Negative (or positive) projections can be used in installations and performances. A negative projection from a slide projector can be a time-saving tool in printing large images coated with liquid emulsion. Superimposing these negative projections, in conjunction with other media, can also allow for the creation of entirely new perspectives of content and intention. Although *positive* transparency projection is not a negative source, in the way we have previously been dealing with film, it offers a wide range of possibilities to the alternative artist. One of the most intriguing uses is the work of my former workshop student, Tim Butler, who uses a projector to make projections on exterior surfaces and to create interior vignettes.

SINGLE-STAGE NEGATIVE-TO-NEGATIVE DUPLICATING FILMS

Kodak SO-132

A film such as Kodak's SO-132 (in the past known as 4168 and SO-339) is a simple, orthochromatic sensitive, long tonal range film that is used like a conventional printing paper. It presently costs about $4 a sheet in an 8″×10″ format and is also available in 4″×5″. SO-132 provides a quick and painless *direct duplication* from an original small negative to an enlarged negative that can be used directly for contact printing. It is quite convenient because you can work with it under normal safelight conditions and develop it in standard paper, or film, chemistry such as Dektol, D–19, D-76, Xtol, and Duraflo RT. It is relatively fast and allows you to get on with your alternative printing without a great deal of technical meandering. The curious thing about this, and other single-stage films, is that they work in an opposite manner from the way you normally do in a darkroom with an enlarger and paper chemistry. Burning negative information on SO-132 will result in thinner values in the finished film, while dodging will result in denser values. It does take getting use to.

I have heard suggestions to the fact that it is important to place a nonreflective black, red, or yellow backing on your easel before making an exposure on this film. The apparent reason for this is that light could reflect off of the normally light background of the easel and bounce back to the film, resulting in fog. I have not experienced this problem, but if I did I would first check the expiration date of my film, followed by testing the overall darkroom brightness by doing a test strip in the safelight conditions. If neither of these cases produced the answer, I would consider the colored backing on the easel.

An average negative with a normal tonal scale will require an exposure time of between 1 and 1½ minutes with the aperture nearly wide open. Development type is a personal choice, but using a 1:2 Dektol (paper chemistry) takes 3 to 4 minutes. Exposing this film without burning (to increase shadow density) or dodging (to increase highlight density) will result in a negative that closely approximates, or improves, your original. To achieve an adequate maximum density with this film, essential for many alternative processes, it is necessary to develop the film aggressively. A few artists use an undiluted high contrast developer like D–19 (72°F) for about 8 minutes. Others simply stay with their traditional paper developers and expose their original negatives with that chemistry in mind. It is possible to play with the contrast potential of SO-132 by using a more concentrated developer than you would normally use for a paper set-up. Conversely, you can decrease the aggressiveness by mixing both film and paper developers. During tray development under safelight conditions you will see your negative come up in the developer in much the same manner that it does with a paper print. This is due to a light coating on the film that will disappear when you place the film sheet into the fixing bath.

T-Max Reversal Chemistry

Another single-stage process yielding a positive transparency is Kodak's T-Max 100, roll or sheet film, exposed for a long tonal scale and processed in T-Max Reversal Chemistry. If you use this film and development technique you will get positive images and may then go to the negative stage on a different two-stage film that may offer additional flexibility for manipulation. This procedure, if going to a lith film, for instance, may result in a significant increase in contrast.

Kodak Precision Line Film LPD7

Kodak Professional Line Film/LPD7 (LPF7) is a high contrast orthochromatic film that can be used for both camera and contact printing exposure. Its benefits include high maximum density, wide exposure latitude, and an abrasion resistant overcoating; it may be used under normal safelight (Kodak 1-A red) conditions. Exposure is normally done with quartz-halogen, tungsten, or pulsed-xenon with filtration, but sunlight is also an option. Development can be accomplished with a wide range of chemistry, including Kodalith Super RT, Kodalith Liquid (1:3), and Kodak RA 2000 and RA 2001, with a normal development time of between 1 and 2 minutes. Consult Kodak's Web site for specific technical data. Bergger BPFB is another line film that you might consider as an option.

Kodak Aerographic Direct Duplicating Film 2422

This blue sensitive film provides fine grain, medium contrast, and is used for high-quality, one-step duplication of negatives or positives. Although this film requires a high-intensity light source, it basically acts like SO-132, and I mention it here as a film that might work very well with sunlight in a contact printing situation or in a pinhole camera. Students of mine have purchased this film by the roll in 250′×9.5″ lengths for that purpose with the success edge going to the pinhole option.

A FEW MULTISTAGE DUPLICATING FILMS

Where it is necessary to make an interpositive before making the final negative, multistage duplicating films often provide higher resolution and are more appropriate when you wish to preserve or create a longer tonal scale from black to white. Some feel that they are also more flexible and allow you to alter the original negative's contrast, shadow, and highlight detail. When making an interpositive it is recommended that you work to ensure that all of your negative's information is translated. It is not as important for you to think about contrast in this stage as it is to think about a fully realized exposure. Contrast can be addressed later in the final interpositive to negative stage with a more aggressive development.

Ilford Ortho Plus

This is an excellent two-step, continuous tone (or high contrast) film with fine grain. This film is a student favorite because of its cost, quality, and simplicity. In the "positive" first-stage Ilford Ortho Plus should be exposed for highlights and developed for shadows, and a conventional paper developer, for 2 to 4 minutes, will be adequate. In the second stage "negative" you will be exposing for shadow details and developing for highlights. If your shadow density looks good but the highlights lack substance, increase the type or strength of your developer, and vice versa. This film behaves like FP4 without the red sensation and can be developed under safelight conditions. Ilford Ortho Plus comes in sheet sizes from 4″×5″ to 10″×12″ and can be developed in ID–11 normally for 6 minutes or 11 minutes for high contrast. You may also use Michrophen, which can be developed in 4 minutes for normal development or 7 minutes for high contrast.

Kodak Commercial Ortho Type 3 Film

This is the most commonly found sheet film used for two-step negative duplication in a class darkroom situation. The first stage yields an interpositive and the second stage contact, with the interpositive, results in a negative. It is easy to find and is relatively inexpensive but known for its extremely high contrast when processed in special Ortho A-B Developer. You can make a more continuous tonal scale by altering the developer (for example, 1/3 Ortho AB, 1/3 HC–110 dilution B or D-76 1:3 and Dektol 2:1). The Kodak Commerical Ortho Type 3 film is fragile and fogs easily under bright safelights. It also is prone to pinholes and must be handled with great care. This film is most often used by students for making gum bichromate negatives.

Kodak Professional Copy Film 4125

PCF 4125 is primarily designed as a copy film for black and white continuous tone originals and where increased highlight tonal separation is desired. It is an orthochromatic film, workable under red safelight, and has both fine grain and medium resolving power as its primary attributes. Processing can be done with HC–110, DK-50 and Duroflo RT, or in a paper developer such as Dektol.

Agfa Gevatone N31P

N31P is an orthochromatic copy film with an anti-Newton ring coating and generally regarded as one of the best due to a good straight line in its characteristic curve. N31P film comes in a variety of sizes and rolls but will be increasingly hard to find when the existing inventory has been purchased. The rumor is that it has been discontinued.

Agfa Gevarex GO 210p

GO 210p is a continuous tone sheet film with a Dmax around 1.5 and can be developed in Dektol 1:2 to 1:9 or in combination with another less active developer. This film has the advantage of offering you variable contrast by utilizing, and adjusting, blue or yellow filters when exposing the film. It can be developed under safelight condi-

tions but be careful of fogging under too bright a safelight and use a cold light head for a longer tonal scale.

Arista Premium Halftone Supreme (APHS)

This two-step lith film can be processed using Dave Soemarko's LC–1 development formula for a long and linear tonal scale. This film, using the LC–1 system, appears to be quite satisfactory for most alternative processes.

Arista Premium Halftone (APH)

A two-step lith film for interpositive to negative production that can be used very successfully with Soemarko's LC–1B low contrast developer formula. It is less expensive than the APHS version and reportedly yields better results when used with the Soemarko's LC–1B formula.

Aristatone Copy Film

The Aristatone copy film is a continuous tone film similar to Gevatone and less expensive. It is available in many sizes and rolls of 30˝ × 100´. A typical application of this particular film is to make a positive and then project that positive onto a sheet of Aristatone film for the negative. Exposure and development times tend to be long. Development in Dektol 1:1 for 3 to 6 minutes will generally yield a strong negative. This film can also be used to make 35 mm black and white positive slides from your negatives.

Kodak 4135 Gravure Positive

This is a standard graphic arts film available through commercial graphic supply houses in a variety of sizes, including rolls.

The Paper Negative

It is possible to use a paper negative for contact printing, but fine detail should not be one of your high priorities. Paper negatives are the result of loading conventional printing papers into a pinhole camera. These paper negatives, if exposed on an RC paper, for instance, will often produce excellent images when contact printed with an alternative process or with another piece of conventional printing paper. You may also wish to try a paper negative that can be generated on an ink-jet printer.

When using a paper negative with an alternative process you must be prepared for fairly long exposure times. Successful images are generally quite soft due to the fuzziness of the final print. Be sure there is no writing on the back of the RC paper negative or those logos will become part of your image. Knowing that, consider writing on the back of the RC paper negative to include script in your image. Remember to pay attention to the way your type will read when you're loading your contact frame. Should you wish to approximate Talbot's Calotype paper negative experiments, consider making a paper negative (from a film positive) on a piece of writing paper or vellum and then soaking the paper negative in olive oil and wiping it dry. The olive oil will make the paper far more translucent and will give you a better shot at a readable and successful final image. You may also wish to consider using an ink-jet paper negatives by "inverting" your image and using the paper print as your negative. Again, consider oiling the ink-jet print but be sure that you don't oil the front of the print unless you are making the print with ink that is moisture resistant. One last idea that has its roots in the history of the medium is to wax your paper negative before printing. There are a lot of old cut and paste, graphic design, wax machines laying about these days due to the fact that very few designers cut and paste with real pieces of paper anymore. Run your paper negative through the hot wax and rollers, and it will be a bit more translucent.

Exposure and Development: Average Negative Densities

For each non-silver, or alternative, process there is a slightly different negative requirement that will yield the best results. Platinum and palladium negatives, for instance, enjoy a very long sloping tonal scale between shadow and highlight density. The ideal negative here is one with healthy contrast in the neighborhood of a 1.5 to 1.7 density range. In general, paper grades and average negative densities can be approximated with the following comparative combinations. An average negative density (AND) of 1.5 is best printed on a grade 0 paper. An AND of 1.3 on a grade 1; an AND of 1.1 on a grade 2; an AND of .90 on a grade 3; an AND of .70 on a grade 4; and an AND of .60 (or less) on a high contrast grade 5. As always, any of these approximate recommendations are only relevant depending on what you intend to make with your negatives, and exposure of both interpositive and negative stages should be adjusted to the intentions of the artist.

In multiple stage duplication, the films listed can be processed in Ortho (high contrast) developers for a high contrast look or in a variety of film and/or paper developers for more continuous tonalities and a longer tonal scale. If you are chemically astute, you may modify existing developers or make up your own. Many of the Ortho-type films can be processed in film developers such as HC–110 dilution B (3:1) or D-76 for 4 to 5 minutes by itself or in combination with conventional paper developers. Freestyle Sales sells a solution called Clayton Extended Plus Developer that can be used for either films or papers. Clayton Extended Plus can be quite successful in giving a longer tonal scale with Ortho-type films through dilution strengths in the 1:15 range. It is essential that you experiment with many different combinations of film and developer and ask other artists for their personal recommendations and preferences.

Pyro

If you are extremely compulsive about your negatives, you can become a disciple of the "Cult of Pyro." By joining, you will become a "Pyro-maniac" and may indulge yourself in the wondrous world of Pyro developers. Essentially, Pyro chemistry provides the user with a very long tonal scale negative that is a favorite of platinum/palladium printers.

When an exposed piece of film is developed in one of the Pyro formulas, the negative's sensitive silver halide reduction to a metallic state is not all that is taking place. The silver being reduced to its metallic state not only forms a negative but delivers a greenish/yellow stain that functions like a tanning agent, hardening the gelatin into a microscopic bas-relief. This yellow/green Pyro stain works as a filter to UV light and allows films like high contrast lith to yield a long, and very smooth, tonal gradation curve. For more on the complicated subject of Pyro—and to join the "cult"—I suggest investigating Gordon Hutchings, *The Book of Pyro*, published by Bitter Dog Press.

DAVE SOEMARKO'S LC-1 AND LC-1B LOW CONTRAST DEVELOPER FORMULAS FOR LITH FILM

First off, it's not a simple task to place density and adjust for the contrast when making an enlarged duplicate interpositive on a high contrast film. The traditional controls of exposure, development time, and developer dilution fall shorter still when the requirement is placed on an inherently high contrast product such as a lith film.

Traditionally, an artist who wanted a continuous tone lith film would attempt to trick the film into providing a longer tonal scale by processing it in a diluted Dektol paper developer in the 1:4 to 1:10 range (a ratio of 1:4 indicates one part developer mixed with 4 parts water). Others would make esoteric mixtures of both paper and film developers in an effort to control the tonal scale and still be able to use this inexpensive film. Everyone encountered the same problems.

- High contrast (high density) and loss of highlight and/or shadow separation (low density)
- Inconsistent densities between the test strips and the final positive and negative film
- An uneven or mottled appearance throughout the tonal scale
- The need to constantly refresh the developer to maintain consistency

Dave Soemarko's self-assigned task was to develop a working technique where he could control the interpositive (the first stage of the two-step process) in making an enlarged duplicate negative. The beauty of Soemarko's formula is that it allows the artist to get that low contrast interpositive, needed for the final negative step, in an orderly and consistent manner. His LC–1 interpositive technique also allows you to use lith film and develop it so that it has a very long tonal scale from toe to shoulder. Being able to use lith film is a bonus because it comes in a wide array of sheet sizes and rolls, and it is affordable, even on a student's budget. The film in the first test is Arista Premium Halftone Supreme (APHS), which is readily available. In a more recent test, Soemarko worked with Arista Premium Halftone (APH), which is less expensive than APHS but yields similar (some think better) results. The APH test is described at the conclusion of this section.

Dave goes into a lot of detail in Judy Seigel's *Post-Factory Photography Journal* describing his entire investigation and how he arrived at his formulas. If you're interested in seeing how his mind works, refer to that specific issue, #2. Following is a description of the salient points of the process. LC–1 is made from 2 stock solutions and water and is manipulated to suit the particular stage of the process you're dealing with: interpositive or negative.

Standard LC-1 Formula

STOCK A

750 ml Distilled water (125°F)
3.0 g Metol
60 g Sodium sulfite
3.0 g Hydroquinone
Distilled cold water to make 1 liter of Stock A

STOCK B

10 g Sodium bisulfite
Distilled cold water to make 1 liter of Stock B

Once the separate stock solutions have been made they are mixed together in equal or unequal amounts and diluted with additional water to make a 10-part formula. An example of this would be a 2:1:7 formula: 2 parts of Stock A, 1 part of Stock B, and 7 parts water.

In a developer with a stronger alkalinity such as Dektol, which contains sodium carbonate, the processing speed is faster. The contrast of values is greater, and this combination results in accelerated exhaustion of the developer, which, in turn, leads to uneven development. With Soemarko's LC–1 formula and a mix of the preceding 2:1:7 solution, Dave made multiple tests with the same exposure and development and found that each negative was nearly identical to the other. There were no mottling or uneven values, proving that the development was well controlled. He presoaked his film for 3 minutes and processed for 5 to 7 minutes and achieved a gradation of 21 steps. The interpositive was low in contrast, indicating that he could place all of the tonal separation in the original negative into the interpositive and go for the higher contrast positive in the negative stage by extending his development time. This low contrast of the interpositives assists in the values not being compressed when making the negative.

For a second example with the same negative, Dave changed his formula to 2:2:6, a proportional mix that indicated an increase in the sodium bisulfite portion of the formula. Because sodium bisulfite is an acid, the contrast is reduced. In his test, the interpositive development was slower and the toe shoulder curve was nearly linear. If you find unevenness in your developed film simply add more of the Stock A to your 10-part formula. Density will increase with this change. If you wish to maintain the same low contrast, you will need to add more of Stock B.

The Rule

The more acid (bisulfite) in the formula, the less active the developer, and the less contrast in the film. The reverse of this rule is also true.

An example of this showing a modification to the 10-part formula is indicated in the following way. You have a formula of 2:2:6 giving you the right contrast but showing unevenness in the film. You would want to compensate for this, and so you would change the formula to 4:4:2. This new proportion eliminates the unevenness but may give you too much contrast for the interpositive. An additional modification to a 4:5:1 formula, with a little extra bisulfite, makes a less active developer and reduces the contrast formula, providing the correct results. For almost any interpositive on lith film, a formula of 2:1:7 or 2:2:6 is going to give you good results with a 5-minute development.

The principle is the same for making both the interpositive and the final negative. In the interpositive, a low-density range is sought as a way of adjusting the overall density levels of the negative and having both the top and bottom end of the scale usable. In the final interpositive negative stage, the tonal range is attached to the process and you would likely want to use a formula indicating a stronger developer or a LC–1 formula of 2:0:8 with a 6-minute development.

The two-stock LC–1 formula is particularly useful if you are testing a different high-contrast lith film. Once you have worked out the combination and dilution that works best for your film type it is simple to combine the Stock A and B parts and then dilute them with water before use. Combining Stocks A and B makes the solution less alkaline and extends its storage life.

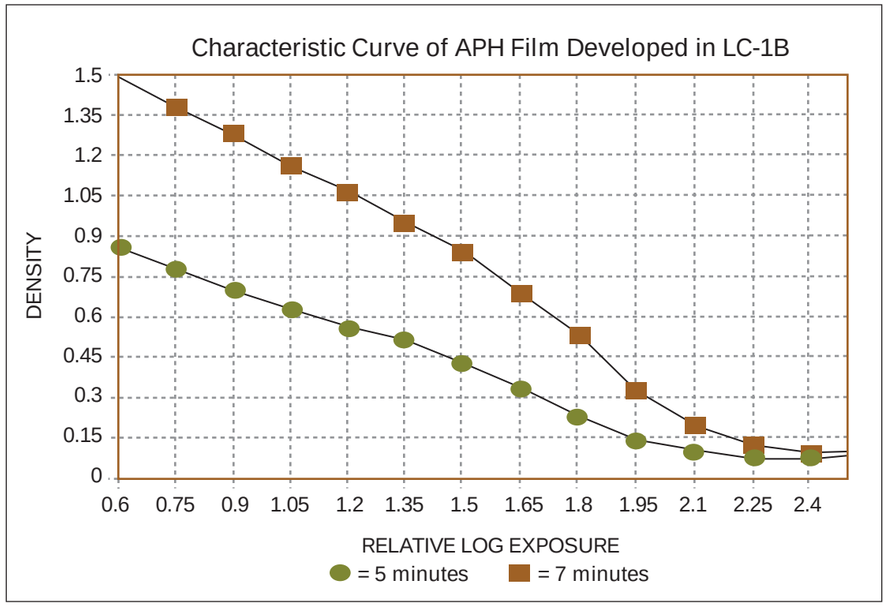

Figure 2–18
Soemarko's LC-1B Curve Chart
(Courtesy of the artist)

Figure 2–18 shows the characteristic curves for APH lith film developed with the LC–1B formula at 68˚F with continuous agitation for 5 and 7 minutes development times. Note that the film can be developed for linear characteristics or the more typical S-curve characteristic. By closely monitoring the exposure and development, you are able to place the tonalities in the negative to the desired section of the characteristic curve.

Soemarko's LC-1B Low Contrast Formula for APH Film for Both Interpositive and Negative Production

750 ml Distilled water (125°F)
4 g Metol
80 g Sodium sulfite
4 g Hydroquinone
20 g Sodium bisulfite
Distilled cold water to make 1 liter of stock solution

To use: Dilute between 1:5 and 1:10. Develop film between 5 and 10 minutes at 75°F. The LC-1B is similar to an LC-1 dilution of 2:3:5 but with more sulfite and bisulfite added in proportion.