
The Black Art of Bluescreening

How to Combine Video Footage without Getting the Blues

By Jim Heid, Macworld, May 1998

The recent Dustin Hoffman-Robert DeNiro political satire *Wag the Dog* shows not only the effect but also the process of keying, or bluescreening. You film a woman scurrying in front of a solid-blue background and then process that footage to create a mask that replaces all areas of blue with footage of Albania's war-torn streets.

Those scenes make bluescreening look easy, and for the kind of big-budget Hollywood producer that Hoffman plays, it is. For the rest of us, bluescreening can be a one-way ticket to the blues. There are potential pitfalls in nearly every step of the process, any one of which can lead to an illusion-shattering halo of dancing pixels around your subject.

It is possible to do professional-level bluescreening with desktop digital-video gear. A successful bluescreening endeavor starts with proper production techniques and ends with the right software tools, according to Beth Corwin and Tom Wolsky, formerly with ABC News and the proprietors of South Coast Productions (socoast1@aol.com), a Mac-based video-production house located on California's rugged Mendocino coast. They shared their bluescreening expertise with me so that I can share it with you.

Set Up Your Set

The first phases in a bluescreening job are the most critical. One of the biggest favors you can do for your bluescreening software is to build and illuminate your set in the proper way and shoot your video with bluescreening's critical requirements in mind.

Get the Right Blue

You can't use any old shade of blue as your backdrop; you need a deep, rich blue designed for keying.

If you're building a set, you can cover the background with keying paint; one source, Markertek Video Supply (914/246-3036, www.markertek.com), sells it for \$38 a gallon. Another solution is keying fabric. It works well outdoors, and it's great for head-to-toe shoots (hang it from a wall and drape it onto the floor). Markertek sells 102-inch widths for \$29.99 per yard. Professional video-supply houses also sell bluescreen paper (a 9-foot-wide, 12-foot-long roll usually goes for around \$38). A third option is Elite Video's (501/321-0440, www.elitevideo.com) \$210.95 Portable Chroma-Key Background, a 5'-by-7'-foot blue background that folds into a pouch.

Light It Right--the Background

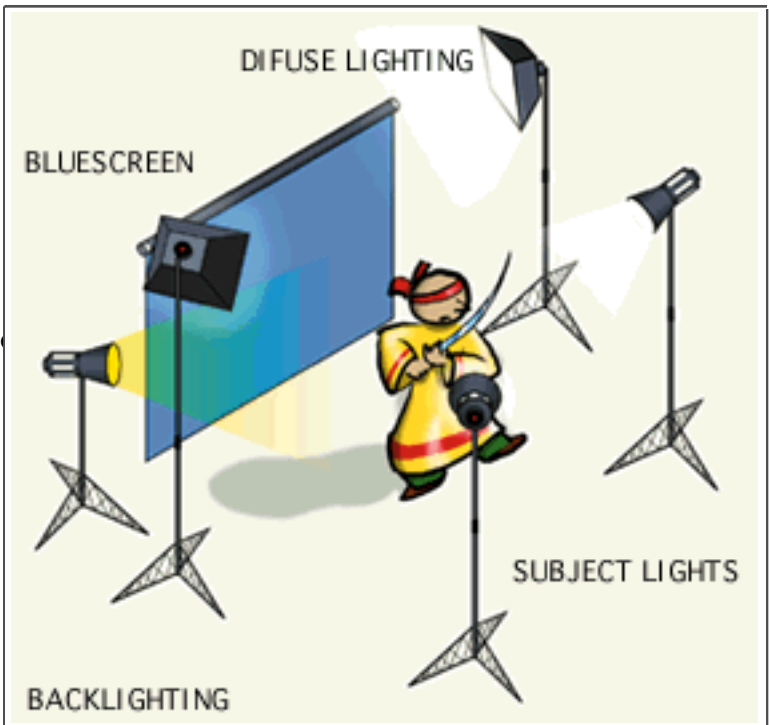
Bluescreening has critical lighting requirements. To get good results, it's essential to light the colored background separately from the subject and as evenly as possible.

If part of the background is brighter than the rest, the range of colors your keying software must address grows dramatically--and with it your chances for poor results. Many video professionals swear by Chimera's (303/444-8000, www.chimeralighting.com) Lightbanks. These large diffusers (or softboxes) work with your video lights to cast a soft light that doesn't create distinct shadows.

To ensure even illumination, use a photographer's light meter, take readings on the entire background, and adjust your lights as needed. Many midrange and high-end video cameras have manual-exposure modes, in which the cameras display light-meter readings in their viewfinders.

Bluescreen Basics

Bluescreening software examines a video clip to locate all the pixels whose color matches the background against which you shot the subject, and then replaces those pixels with pixels from another piece of footage. Lighting the screen and subject properly helps to ensure good results in the compositing process.



BACKLIGHTING
Blue light reflecting off the background and onto your subject can make clean keying impossible. To avoid this spill, backlight your subject using a pale-yellow light.

SUBJECT LIGHTS
Light the rest of your subject as you see fit, but pay attention to where shadows fall.

DIFFUSE LIGHTING
To reduce the variation in color range, set up several lights to illuminate the background. Diffuse lights help to keep the illumination levels even.

Shooting your subject outdoors is one way to get realistic-looking lighting. It also helps keep lighting across the bluescreen even--especially on overcast days.

Light It Right--the Foreground

For bluescreening, it's a good idea to backlight your subject, using straw- or yellow-colored light. Doing so helps wash out any blue light that reflects off the background and onto the subject, where it causes a halo effect when keyed.

Know the Shadows

Shadows and lighting direction are also important. Say you plan to combine close-ups of a kid pedaling a stationary bicycle with footage shot from a moving car. A surefire way to get amateurish results is to light the shots inconsistently: for example, having the cyclist's shadows fall to the left while the outdoor shadows fall to the right.

When superimposing a subject over an outdoor scene, be sure the subject doesn't cast shadows on the bluescreen itself. If, however, you're superimposing over something flat (say, a weather map), shadows on the screen can add realism.

Dress for Success

Be sure your subject isn't wearing--or doesn't contain--colors similar to your background's. Blue is by far the most common color for keying backgrounds, so try to avoid blue clothing for your subject. But green screens are also popular. If you must shoot a blue-eyed model wearing blue velvet, go with a green background.

Camera Concerns

Your set is all set; it's time to address the camera-related issues of bluescreening.

Quality Counts

The desktop-video mantra--shoot in the highest-quality format you can afford--also applies to bluescreening. Low-quality formats such as VHS generate more noise than high-quality ones: Hi8 (good), Beta SP (better), and digital videocassette (best). Noise tends to show up around the edges of your subject, and that translates into poor composites.

Keep It Steady

A tripod is a must. And if you're shooting a talking head, seat your subject in a chair so that the head doesn't move around excessively.

Balance the White Before shooting, use your camera's white-balance feature, which adjusts the camera's circuitry for proper color balance given the lighting you're using. Most midrange and high-end camcorders have a manual white-balance feature. Use it instead of automatic white balance. First configure your camera, lights, and set as they will be when you shoot the subject. Next, focus on a sheet of white paper; zoom in so that it fills the frame. Now press the white-balance button.

Stop Down a Bit

If your camera offers manual f-stop control, stop down the aperture a bit. Shooting with the lens wide open can cause the edges of the frame to darken, complicating

your keying software's job. But don't increase your depth of field too much. To reduce minor variations in lighting on the blue screen, you want the subject to be in tack-sharp focus but the background to be a bit blurry.

Keying Tools

When you digitize your video, use as little compression as possible so as not to introduce artifacts at the edges of your subject. Now you're ready to combine bluescreen footage with a background.

Today's popular video editors and effects programs all offer keying features, and one third-party plug-in--Ultimatte Corporation's (818/993-8007, www.ultimatte.com) \$1,495 Ultimatte--provides the kind of industrial-strength keying that used to be found only on high-end dedicated video workstations. "The Keys to Bluescreen Keying" shows how the two most popular programs approach keying. Remember, the most important bluescreening techniques are applied when you're behind the camera--not behind the mouse.

JIM HEID's latest book is *HTML & Web Publishing Secrets* (IDG Books Worldwide, 1997).

Sidebar

Ultimate Keying with Ultimatte

Ultimatte Corporation, which won an Oscar in 1995 for its Ultimatte keying technology, now offers plug-ins for Adobe After Effects, Adobe Premiere, and Media 100 systems, for both the Mac OS and Windows.

With Ultimatte, you take a "screen-correction shot" of your bluescreen set prior to shooting the bluescreen sequence. The Ultimatte software uses this shot to compensate for flaws in the background, such as uneven lighting and smudges. The software also has a "grain-killer" feature that filters out the video noise that can cause problems at image edges.

Ultimatte excels at hard jobs, such as keying through glass and smoke or retaining shadows. It's pricey and complex, but nothing does a better job.

Sidebar

Crop for Cleaner Keying

If you're shooting a

If you're shooting a full-figure shot, don't worry about filling the entire frame with blue. Just make sure the area immediately surrounding your subject is blue and evenly lit, and then shoot away. Afterwards, create a mask or a "garbage matte" that crops out the rest of the frame.

Adobe Premiere

To create a rectangular mask, drag the handles in the Transparency dialog box's preview window.

Adobe After Effects

First, double-click on the bluescreen footage in the Time Layout window. A Layer window opens, containing the footage. To create a rectangular mask, drag the mask handles in the Layer window. To create an irregularly shaped mask, use the pen tool in After Effects' Tools palette.



A bluescreen background doesn't need to fill the entire frame (left). You can create a garbage matte to crop in on your subject (right).

Sidebar

The Keys to Bluescreen Keying

All of the video editors available today provide at least some degree of support for compositing with bluescreen footage. The key point that differentiates products is their ability to deal with the most-difficult compositing jobs: unevenly lit backgrounds and tricky subject matter, such as smoke, glass, and wisps of hair.

High-end keying applications such as Adobe After Effects' \$1,995 Production Bundle (408/ 536-6000, www.adobe.com) and Ultimatte's Ultimatte plug-in are much better able to handle these challenges than are the more basic keying features that are built into Adobe Premiere and the base version of After Effects.

Keying in Adobe Premiere

Premiere's built-in keying features are rudimentary but work well with properly shot footage.

1 Configure the Clips

After digitizing your clips, import them and then drag them to the Construction window as noted here.

Put the footage containing the replacement background in Track A or Track B. Put the bluescreen footage in one of Premiere's superimpose tracks.

2 Adjust Keying Settings

With the clips in place, you're ready to create the composite. With the bluescreen footage selected, choose Transparency from the Clip menu.

For video shot in front of a blue background, choose Blue Screen. Use Green Screen for green backgrounds. For problematic backgrounds, you can also use the Chroma key type, which provides more control over color range than these two.

The Sample area displays a preview of the effect.

Adjust the Threshold and Cutoff sliders until the blue background becomes transparent, thus revealing the new background.

Drag the slider under the Sample box to view different sections of the bluescreen clip. Whenever you make an adjustment to the keying settings, it's a good idea to drag through the movie to see how the adjustment affects the entire clip.

The controls just under the slider let you change the way the background appears in the Sample box (or Preview window), which is useful for fine-tuning keying settings. Click on the leftmost control (the icon made up of black and white triangles) to change the background to black or white, click on the next control to the right (the checkerboard icon) to display a checkered background, and click on the next control to the right (the curled page icon) to display the actual composite.

To display the preview in Premiere's Preview window instead of the Sample box, click on the up-arrow. To zoom in on the preview in the Sample box, use the magnifying glass, and to reposition the preview, use the grabber hand.

To display only the mask through which the background will show, check Mask Only. This is a good way to double-check your keying settings.

Smoothing can help clean up edge artifacts. The Low setting smooths edges slightly, while the High setting blurs them more.

Performance Tip When creating the preview in the Transparency Settings dialog box, Premiere first applies any filters that you've assigned to the clips. This can slow preview performance. If the filters you plan to use don't involve changing the brightness or color balance of the clips, you can avoid this slowdown. Just apply your transparency settings before you assign any filters.

Keying in After Effects

The keying features in Adobe After Effects' base version didn't do as good a job with my sample footage as Premiere did. The pricier Production Bundle, however, offers industrial-strength keying.

BASE VERSION

1. Configure the Clips

With the bluescreen footage and background imported and in a Composition, select

the bluescreen footage and choose Color Key from the Effect menu's Keying submenu.

2. Adjust Keying Settings

Click on the eyedropper, and then click on the blue background in the Comp window (not shown).

Adjust the Color Tolerance slider until the background turns transparent while the subject remains opaque.

Edge thinning increases the transparent area and helps to get rid of blue artifacts.

Edge feathering softens the edges of the mask through which the background shows.

PRODUCTION BUNDLE

The Production Bundle offers several advanced keying effects. Linear Color Key is the best place to start; for footage containing smoke or semitransparent areas such as glasses, the Color Difference Key often does a better job.

1. Configure the Clips

With the bluescreen footage and background in a Composition, select the bluescreen footage and choose Linear Color Key from the Effect menu's Keying submenu.

2. Adjust Keying Settings

To specify the color to be made transparent, click on the Key Color eyedropper tool and then click on the color in the left-hand preview.

The right-hand preview shows the results of your adjustments. Use the View pop-up menu to choose what you want to see: the final output, the source footage only, or the matte only.

Drag the Matching Tolerance slider to establish the color range to be made transparent. (The middle eyedropper between the preview windows broadens the range; the bottom one narrows it.)

Tip To have the preview update dynamically, press the option key while dragging.

Fine-tune the key's edge sharpness and transparency. (You'll fix any blue edges in step 3.)

3. Apply Spill Suppression

Spill Suppressor cleans up the edges of the key, which may have some blue-colored light, called spill, on them. Make sure the bluescreen-footage clip is selected, and then choose Spill Suppressor from the Effect menu's Keying submenu.

Click on the eyedropper and then on the spill color. (Generally, click on a color close to the subject's edges.)

Start with a value of 100; reduce it if necessary until the spill is gone.

Tip Regardless of which After Effects version you use, always make keying adjustments with After Effects' resolution and effects-quality settings at their highest values. Lower-resolution settings yield faster previews but aren't accurate enough for fine-tuning keying settings.

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