Tricks of The Repair and Restoration Trade: Now You See It, Now You Don’t

by Philip R. Lichtman

T rick No. 55 Ultraviolet inspection. Ultraviolet (UV) lamps are widely used to detect repairs, restorations, and fraudulent alterations in objects of art. The most common procedure is to shine a UV ("black light") lamp on the object in a darkened room and look for anomalies. Less frequently, but to even better effect, the anomalies are photographed.

Rug repairs which are undetectable in normal lighting can become glaringly obvious under UV illumination because modern dyes and yarns reflect light differently than the original materials do. In daylight or lamplight, a repairer can compensate for these differences because he or she can see them and select matching repair yarns. However, the repairer can't see UV light, and therefore is unable to include this spectral range in the match. Consequently, if the room is darkened and a UV lamp is played over the rug, the close match attained in normal light disappears and the UV mismatch is all that's left.

We can't see UV, which occupies a portion of the electromagnetic spectrum beyond the deepest violet our eyes can detect. However, most commercial UV lamps are "long-wave UV" illuminants which put out quite a lot of near-UV light as well as UV. This appears as a very deep blue-violet, and when it shines on a repair the new work is often revealed simply because all the other colors, with their masking or distractive effects, are absent.

Furthermore, the actual UV component of the lamp's radiation causes many synthetic dyes to fluoresce. Fluorescence is a process whereby the electrons in the illuminated materials absorb the UV light, change energy state, and give off colors which are visible to us. When this occurs, repairs can become spectacularly obvious. For example, a modern Turkish rug I inspected has pink areas which, when viewed under UV, fluoresce a brilliant lime green, absolutely impossible to miss.

Illustration 164

Illustrations 164 and 165 show what you might see in a typical UV inspection session. Illustration 164 portrays part of a northwest Persian long rug in normal or "white" light. Illustration 165 shows how the same area appears to the eye when it is bathed in the light of a commercial long-wave UV lamp (Blak-Ray® Model B-100A, UVP, Inc., Upland, CA, 909-946-3197). The picture was taken indoors with the Polaroid camera described in Trick No. 7, Rug News, Dec. 97, using Polacolor Pro 100 film exposed for 120 seconds under the Blak-Ray lamp with the lens wide open and the exposure wheel set at the red "75" mark. Close inspection of the photo will reveal significant differences right and left of the vertical centerline. These disparities don't correspond to features in Ill. 164, and betray recent repairs. I deliberately picked this pair of photographs because the UV picture, atypically, is a very close approximation to what you would have seen. Usually a photograph will reveal much more repair work than a visual inspection can. This is because film is sensitive to the deep UV radiation we can't even begin to see. Therefore it not only picks up the effects visible to us, but also a lot more. The UV light reflected from the rug finds its way through the camera lens and impinges on the film, which reacts to these invisible rays by forming images that, when developed, are in colors we can see. They are false colors—if they were real UV "colors" we couldn't see them at all—but they are immensely useful. Many of the spectacular views transmitted by the Hubble Space Telescope, and the yellow-green fluoroscopic images you may have seen in a doctor's office, are also in false colors.

Illustration 166

So far I've discussed visual inspection by long-wave UV lamp and photographic inspection by long-wave UV lamp. In both cases, there's a mixture of near-UV and actual UV illumination. The logical next step is to exclude the near-UV and see what happens. Just as the green, yellow, and red components of white light mask discrepancies that become obvious with a mixture of near-UV and UV, the near-UV can mask what one might find in unadulterated UV.

Illustrations 166 and 167 present such a case. Illustration 166 shows the bottom end of a yellow-ground Kuba runner photographed outdoors in full sunlight with a 35 mm. camera (Trick No. 7, referenced above). Illustration 167 shows the same area under the same conditions except with a UV filter (B+W 403 UG1) placed over the lens, a 1/4 second exposure time at f/2, and Kodak Royal Gold print film at ASA 1,000. The filter screens out every bit of visible light. Everything you see in Ill. 167 is attributable to invisible UV. The mottled pale whitish patch are areas of re-piling, made very obvious by this UV technique. Note that the contrast is low and the range of false colors very limited. This is typical of UV color photographs, and sometimes black-and-white does as well or better, as will be described below.

When using a UV filter, which won't transmit any visible light, it's necessary to aim and focus the camera with the filter removed. Then the filter is replaced to make the photograph. Of course, this makes a tripod mandatory. Generally speaking, UV will focus at a slightly different point than visible light, and you may have to experiment with focal settings to get the sharpest possible images. This involves making test exposures, noting the focal distance setting each time, as well as the setting required to get a sharp image in visible light. After developing the test roll you'll be able to estimate a correction factor that will be useful in future "shoots." Also bear in mind that your camera's exposure control circuits probably don't understand UV light, so you'll have to use manual settings. Again, these will have to be determined by experiment and whenever you take UV pictures be sure to try a wide range of exposure times to ensure that at least one picture will turn out well. Sometimes exposures of many seconds are required.

A UV filter appears to be opaque, but in fact it is quite transparent to dangerous UV light. Don't ever look at the sun through a UV filter. The transmitted UV light can do severe, permanent, and immediate damage to your eyes, even though you can't see it.

Illustration 168

Although misusing the Blak-Ray lamp isn't nearly as dangerous as looking at the sun through a UV filter, never look directly into the lamp, and limit the time you stare at anything illuminated by it. It isn't what you can see that will hurt you, but the invisible UV radiation that you can't sense.

In some cases, high contrast black-and-white film can show more than color film with its inherently low UV contrast. Illustration 168 is a visible-light picture of the Kuba runner, similar to Ill. 166 except made indoors with the Polaroid camera using Polacolor 64 Tungsten film and a 250-watt BCA photo bulb, as detailed in Trick No. 7, referenced above. For comparison, Illustration 169 is an indoor UV photo of the same field, using the same camera loaded with black-and-white Polaroid 107 film (3,000 ASA). Illumination was the Blak-Ray lamp held at a distance of a few feet and waved rapidly back and forth to cover the field evenly.

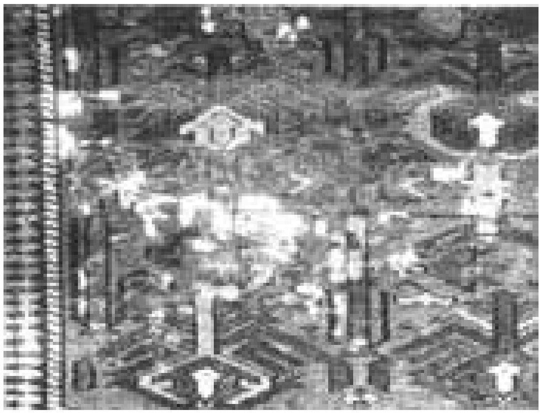

Illustration 169

This combination results in exaggerated contrast, causing repiled or rewoven spots to show up startlingly well. Polaroid 107 is a particularly valuable film for UV photography due to its extreme speed and very high contrast. In Illustration 169, the repaired areas are almost white. In fact, the effectiveness of this black-and-white technique makes the use of color almost moot, except in rare cases where subtle shadings are visible in false color but not black-and-white. Exposure times of under ten seconds are generally sufficient.

Illustration 170

Illustration 170 shows a quirky twentieth-century Turkish mihrab rug, probably Melas, after restoration. Ill. 171 is a black-and-white UV photo of the middle of the rug where the two medallion diamonds join. Many repairs—individual knots as well as large areas—are revealed as being new work, which appears white. Ill. 171 was made with the technique employed for Ill. 169, described above.

In summary, visual inspection in a darkened room with a good long-wave UV lamp will enable you to spot a lot of repair work immediately. Color UV photographs can detect such anomalies at least as well as a visual inspection and, especially if sunlight and a UV filter are used, sometimes much better. However, making them is a lot of work. Therefore, when I need pictorial UV documentation, I'm inclined to start out with the UV lamp and Polaroid 107. This is usually sufficient, and sometimes best.

If you want more information on this subject, try to obtain a copy of Kodak Publication No. M-27, Ultraviolet & Fluorescence Photography, Eastman Kodak Co., Rochester, NY, revised 1974. n

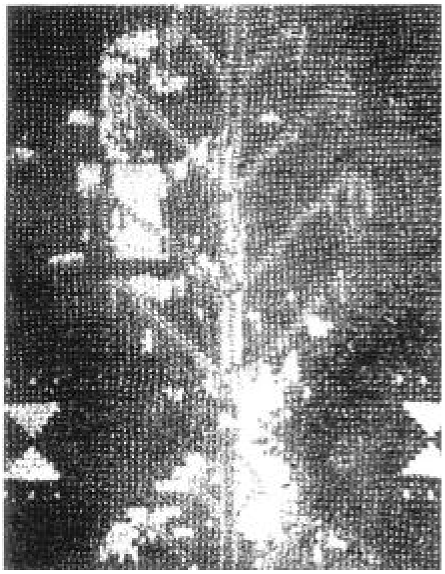

Illustration 171

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Illustration 164. Detail of a northwest Persian long rug.

Illustration 165. The area of Ill. 164 as it would be seen by the light of a long-wave UV lamp (photographed with Polacolor Pro 100 film).

Illustration 166. Bottom end of a Kuba runner.

Illustration 167. The same area as in Ill. 166 photographed with a 35 mm camera in sunlight through a UV filter that blocks all visible radiation.

Illustration 168. Another detail of the Kuba runner.

\Illustration 169.The same area as in Ill. 168 photographed with Polaroid 107 black-and-white film in the light of a long-wave UV lamp.

Illustration 170. A restored Turkish prayer rug, probably Melas.

Illustration 171. Detail of the rug shown in Ill. 170, photographed with Polaroid 107 black-and-white film in the light of a long-wave UV lamp.

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