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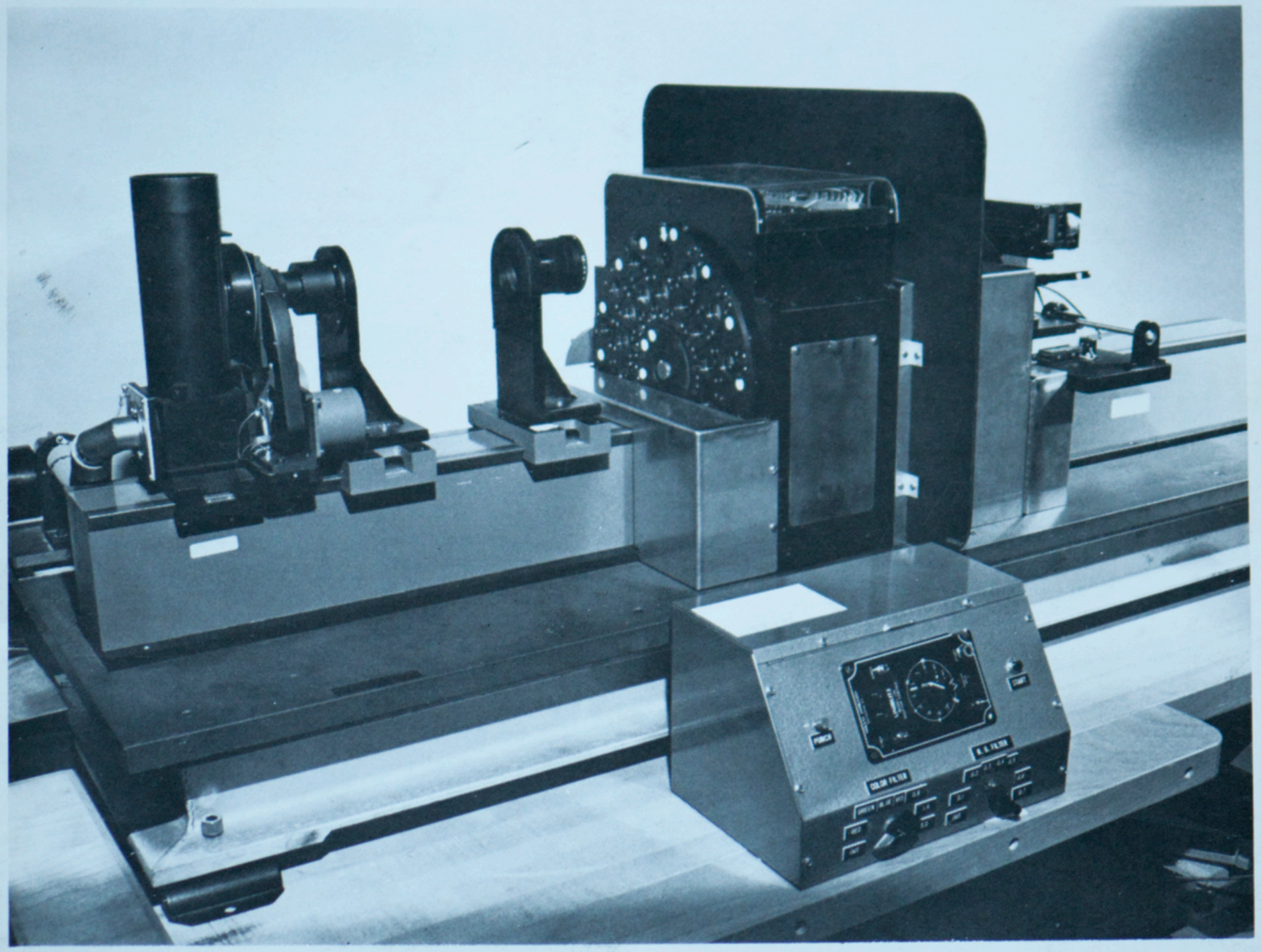

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Authenticity Study of the Oswald Back-Yard Photography in the J. F. Kennedy Assassination Investigation

L. Stroebel, A. Davidhazy, and R. Francis

Abstract The House Select Committee on Assassinations assigned a panel of photographic experts the task of determining if three photographs of Lee Harvey Oswald are authentic. Tests of the validity of the various claims of fakery included examining the original photographs, comparing photographs in the Oswald camera and other cameras of the same make, and replicating the work done by the FBI and a photographic expert for a television network documentary. Image attributes considered in the analyses included camera scratch marks, film aperture marks, graininess patterns, lens aberrations, linear perspective, darkness and position of shadows, and on- and off-axis image shapes. The photographic results discredit the claims of fakery.

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Three photographs of Lee Harvey Oswald holding a rifle in a back yard were entered as evidence during the Warren Commission investigation of the John F. Kennedy assassination. Oswald contented that his head had been superimposed on another man's body, and in the intervening 15 years a number of writers and commentators have claimed that there are various discrepancies in the photographs that suggest fakery.

The House Select Committee on Assassinations assigned a panel of photographic experts the task of reviewing all of the photographic evidence relevant to the assassination, including the back-yard photographs. This paper describes the work done to determine the validity of the various claims of fakery in the Oswald photographs.

Although there are photographs of three different poses of Oswald, only one negative has been recovered—for the pose identified here as view "A." Three prints have been found of view "B," one of which is full frame, including the border of the negative. Only a single print has been located of view "C."

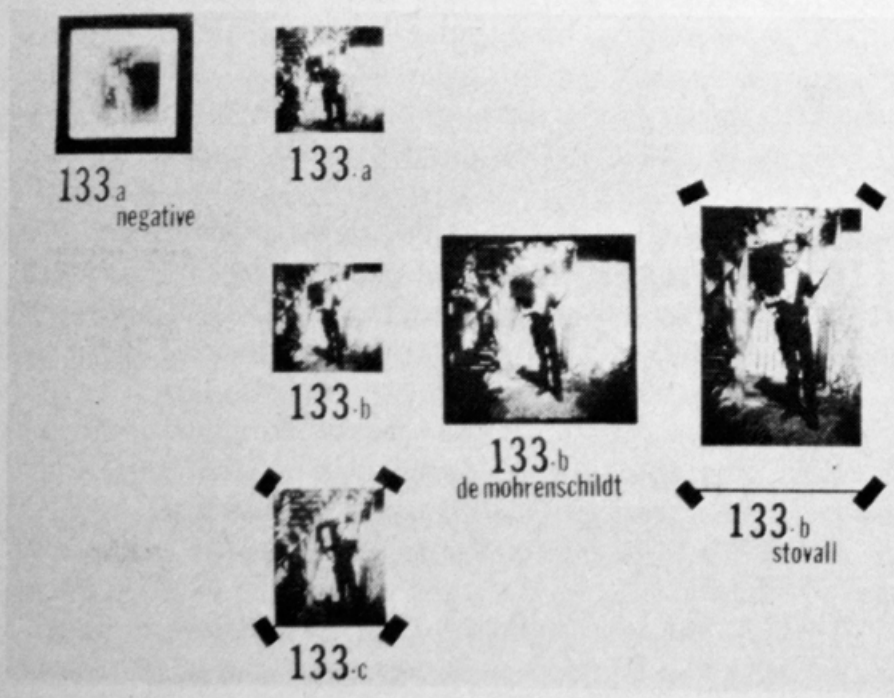

Figure 1. Five original prints and one negative of Oswald in a back yard have been recovered.

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Figure 2. Two models of the Imperial Reflex camera. Oswald's camera is the same as the standard model on the right.

This print was cropped to fit a vertical format, and the enlarger was not focused sharply (Fig. 1).

The most obvious differences between the views are that Oswald is holding the rifle in his right hand for view "A" and in his left hand for the other two. Also, he is holding the papers under his chin in view "B" and off to his side in view "C."

The so-called Oswald camera, owned by Oswald's wife who testified she used it to make the back-yard photographs, is an Imperial Reflex Duo Lens camera that uses 620 size film. Two models of the Imperial Reflex camera, obtained from the International Museum of Photography at the George Eastman House in Rochester, New York, are shown in Fig. 2. The Os-

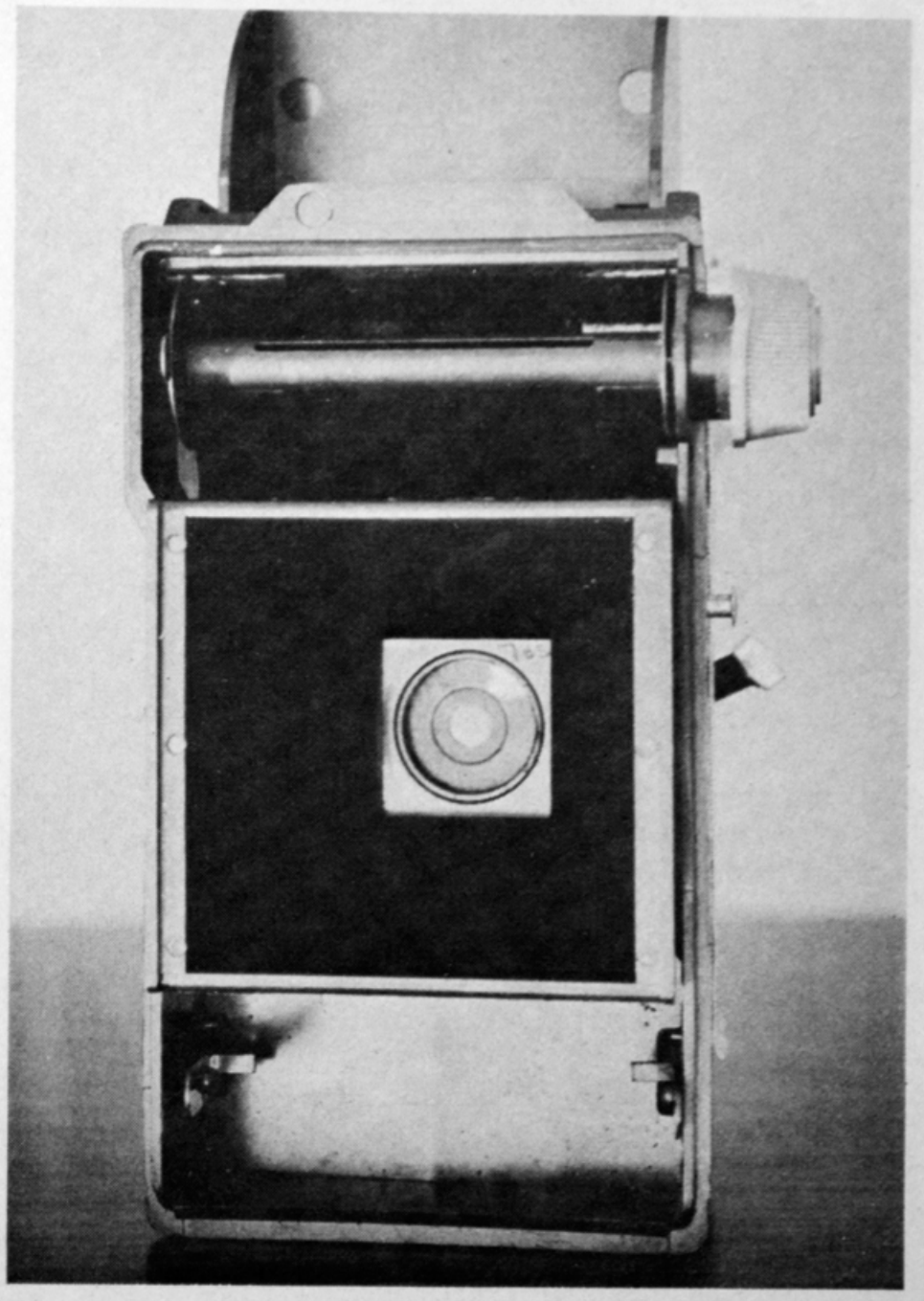

Figure 3. Dimples produced by injection molding distorted the edges of the film support on both sides.

Figure 4. Dissimilar frame-line irregularities from the original negative of Oswald and a negative exposed in another Imperial Reflex camera.

Figure 6. One of a series of enlarged prints of the head area made to examine the grain pattern for evidence of fakery.

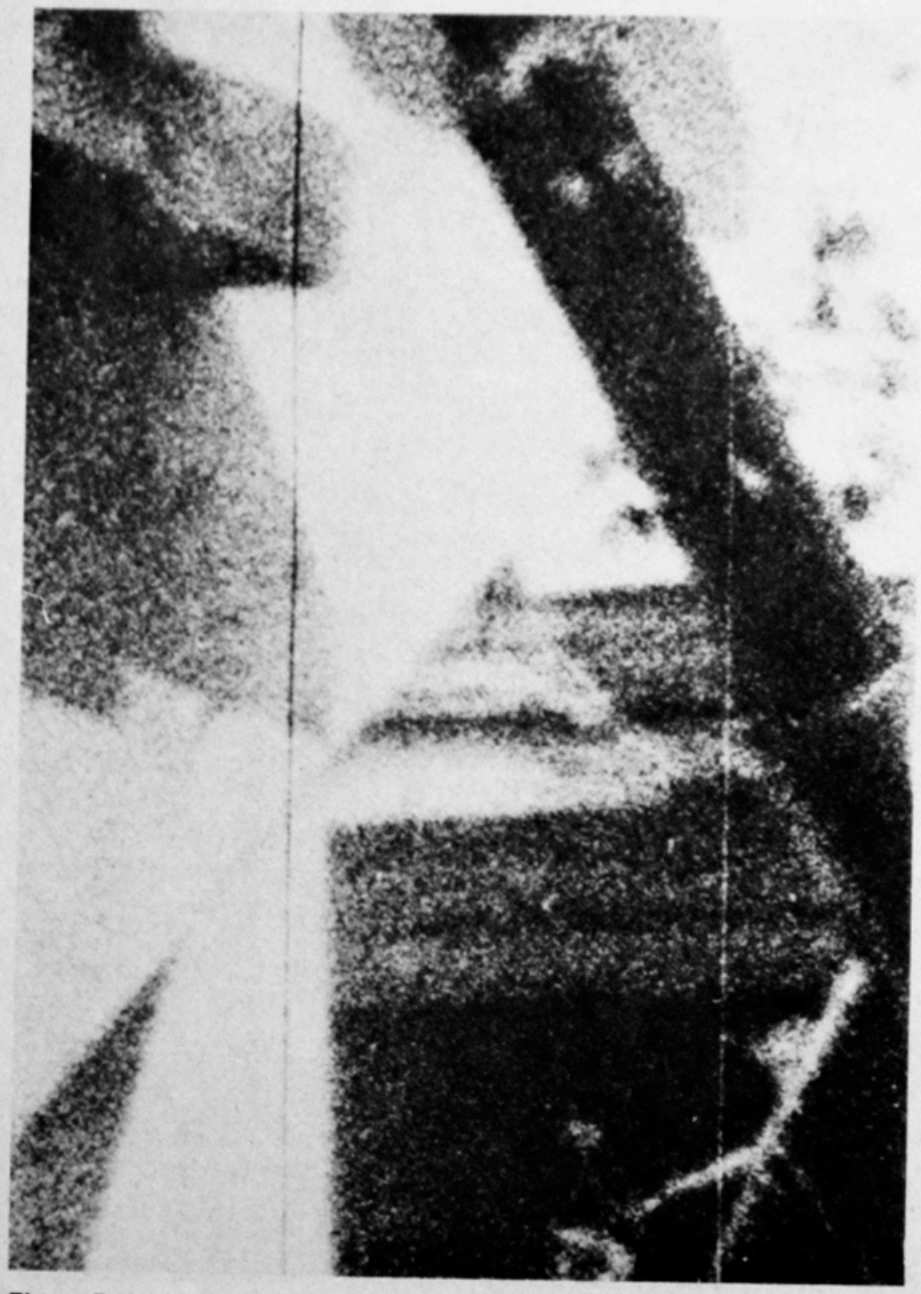

Figure 5. A closeup view of one of three prominent scratches on the original negative of Oswald.

wald camera is the same as the standard model on the right. The refinements on the Deluxe model on the left are purely cosmetic. The camera has no focusing adjustment, no control over the aperture size, and a single shutter speed. The body was made of plastic by injection-molding, which left three dimples on each side of the film aperture (Fig. 3). The dimples distorted the edges of the film support on both sides. These irregularities are recorded on each negative exposed in the camera.

Fakery and conspiracy would be strong possibilities if it could be proved that the photographs of Oswald had NOT been made with the Oswald camera. It is normally impossible to determine the specific camera used to expose a given negative, but fortunately the Oswald camera left clear identification markings on the film in the form of irregularities in the edges of the film aperture and longitudinal scratches. Since some scenarios of assassination conspiracy involved the FBI, it was necessary to replicate their photographic work done along these lines.

To compare the edge markings on two different photographs, a high-contrast *positive* film image was made from one and a slightly smaller high-contrast *negative* film image was made from the other. A contact print made from a sandwich of the two films displays the irregularities of the two images side-by-side as the two edges of a black line. The outside edge of the black line from a print that the FBI reported it made from the Oswald negative, and the inside edge from a print made at RIT from that negative, supplied by the National Archives, agree closely. The irregularities also were very similar between a print from film the FBI reported it exposed in the Oswald camera and the original negative of Oswald. All

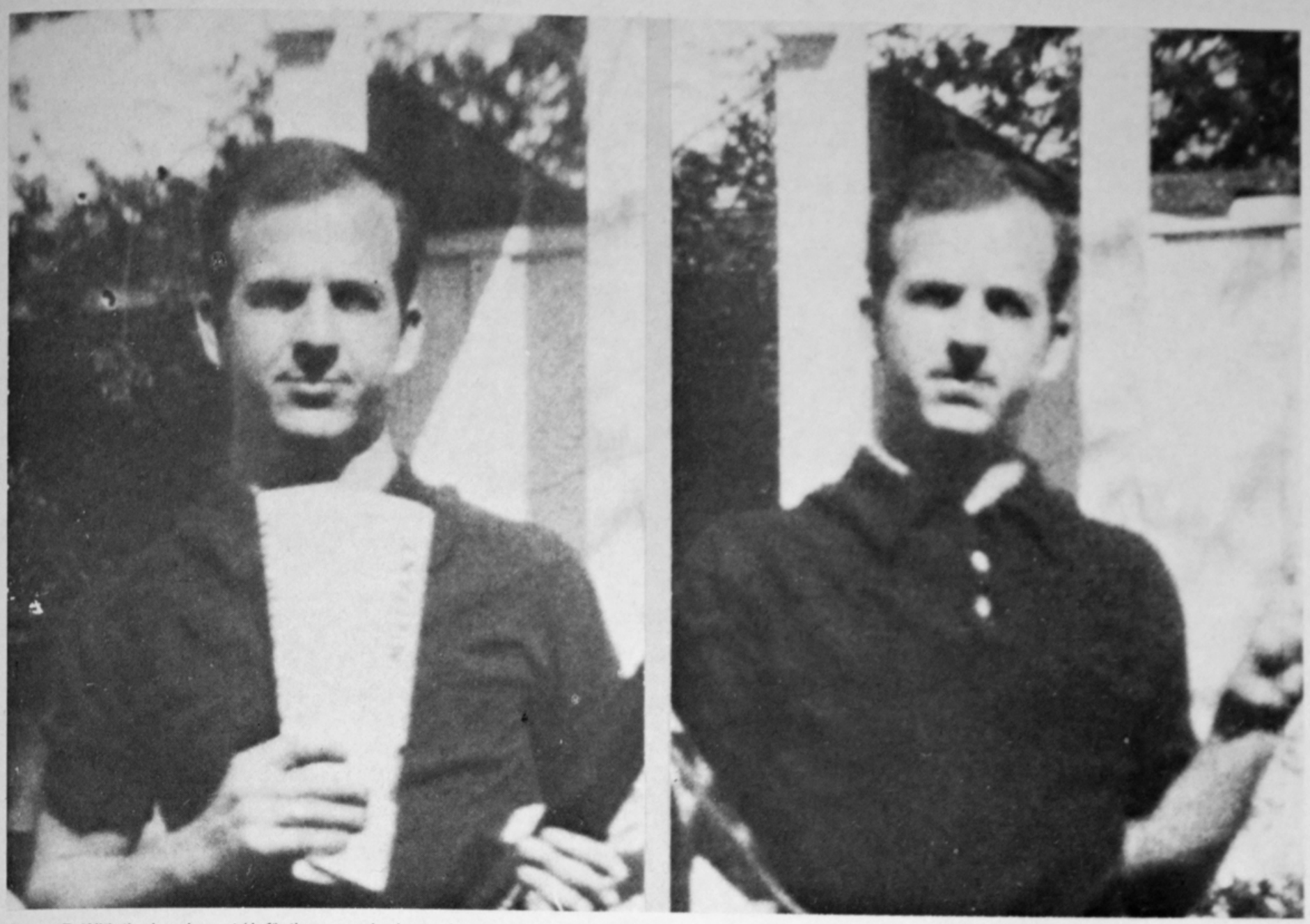

Figure 7. With the head erect (*left*), the nose shadow points toward the center of the mouth. With the head tilted (*right*), the nose shadow still points toward the center of the mouth.

negatives exposed in the Oswald camera revealed an unusual projection just below the bottom dimple on the left side.

Markings on film exposed in the Oswald camera at RIT also closely matched those on the original Oswald negative with respect to irregularities at the corner in addition to the prominent projection below the lower dimple. Markings on film exposed in the two Imperial Reflex cameras obtained from the George Eastman House did not match the markings on the Oswald negative at these locations (Fig. 4).

Although the image of Oswald is reasonably sharp in the original negative, there is an obvious loss of sharpness near the edges of the negative for objects at the same distance from the camera. A photograph of a brick wall taken at RIT with the Oswald camera, with the camera a little closer to the wall than the distance Oswald was from the camera, revealed unsharpness at the center and the edges, with a sharp ring about halfway between. This sharpness pattern suggests curvature of field, with the sharpest focus behind the wall in the center and in front of the wall at the edges.

Four essentially continuous scratches were detected on the Oswald negative in addition to other faint transient scratches. A closeup view shows one of the scratches clearly in Fig. 5. Film exposed in the Oswald camera at RIT revealed similar scratches, three on the left and one on the right. When 8 by 8 inch prints were made, the scratches were located 36, 45, 52, and 112mm from the left edge on both the Oswald photograph and the test photograph. One of the two cameras obtained from the George Eastman House had a badly warped back and produced scratches, but in different locations from those on the Oswald negative. The other camera produced no obvious scratches.

Enlarged prints were made of the head area on the original negative of Oswald to determine if there was any evidence of retouching or a composite image as weould be revealed by a disruption of the grain pattern. Nothing was detected that suggested fakery either on the normal-contrast image or on high-contrast images made at different density levels (Fig. 6).

In the view on the left in Fig. 7 Oswald's head is erect and the nose shadow points toward the center of his mouth. In the view on the right his head is tilted and the nose shadow still points toward the center of his mouth. This oddity was cited by Model and Groden in their book *JFK: The Case for Conspiracy*, and also by Malcolm Thompson, former head of the Police Forensic Science Laboratory Identification Bureau in England. Thompson appeared in a documentary film that supported the conspiracy hypothesis, produced by the British Broadcasting Corporation and shown on network television in the United States and in Canada. Both the book and the documentary film used the stationary nose shadow as evidence that a single photograph of Oswald's head had been added to someone else's body in the three back-yard photographs.

When a manikin head is tilted by placing a pencil under one side, the nose shadow indeed shifts noticeably in the other direction (Fig. 8, top two photographs). The nose shadow can be restored to its original position by rotating the manikin to the viewer's left, but it is no longer facing the camera (Fig. 8, bottom left). Shifting the camera to the viewer's left (or shifting the manikin to the right) produces a photograph where (*a*) the head is tilted, (*b*) the nose shadow points to the center of the mouth, and (*c*) the manikin is facing the camera (Fig. 8, bottom right). A comparison of the two photographs

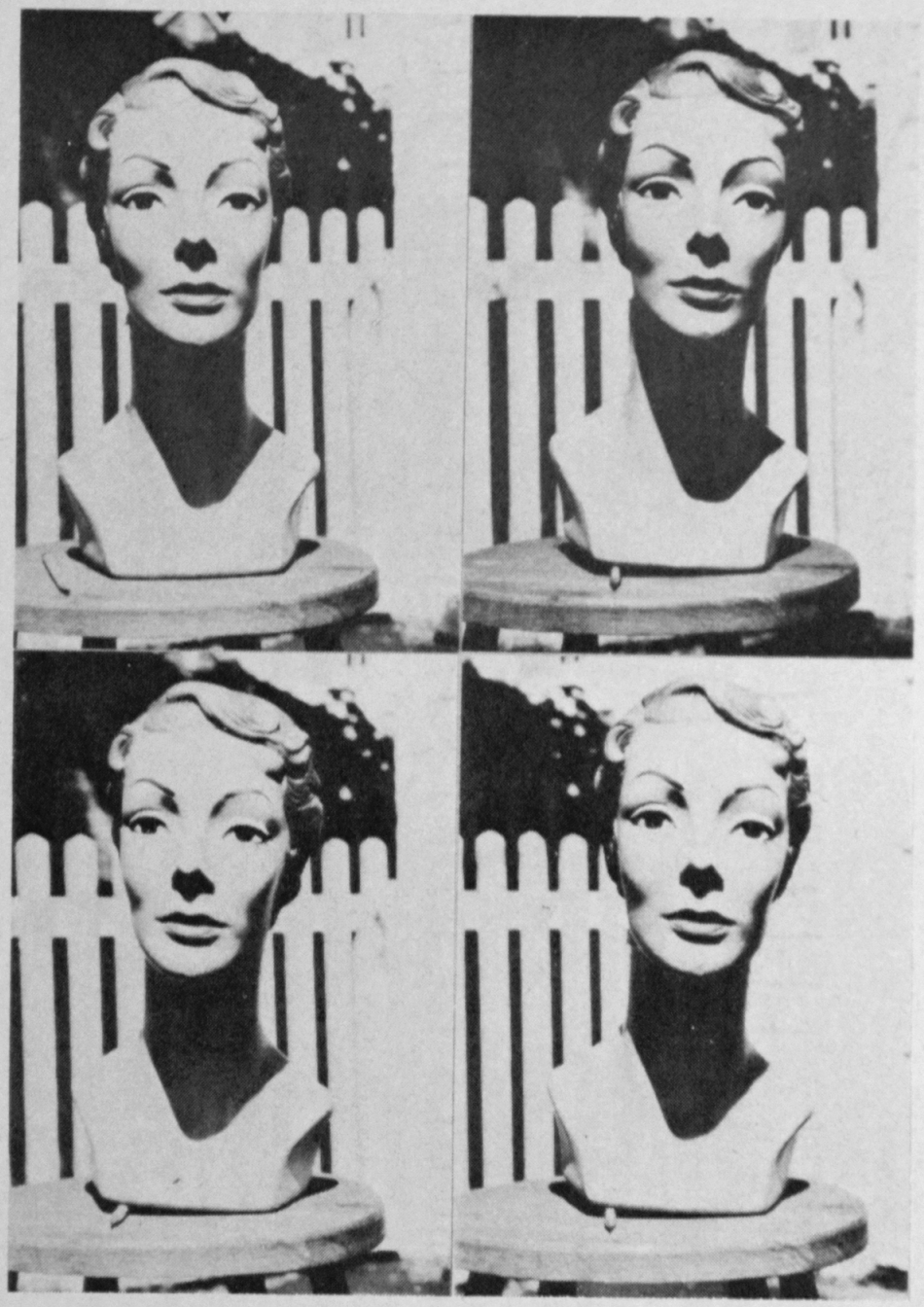

Figure 8. Tilting a manikin head causes the nose shadow to shift noticeably to the viewer's right (*top*). Rotating the manikin head restores the nose shadow to the original position (*bottom, left*) and moving the camera to the left restores the full front view (*bottom, right*).

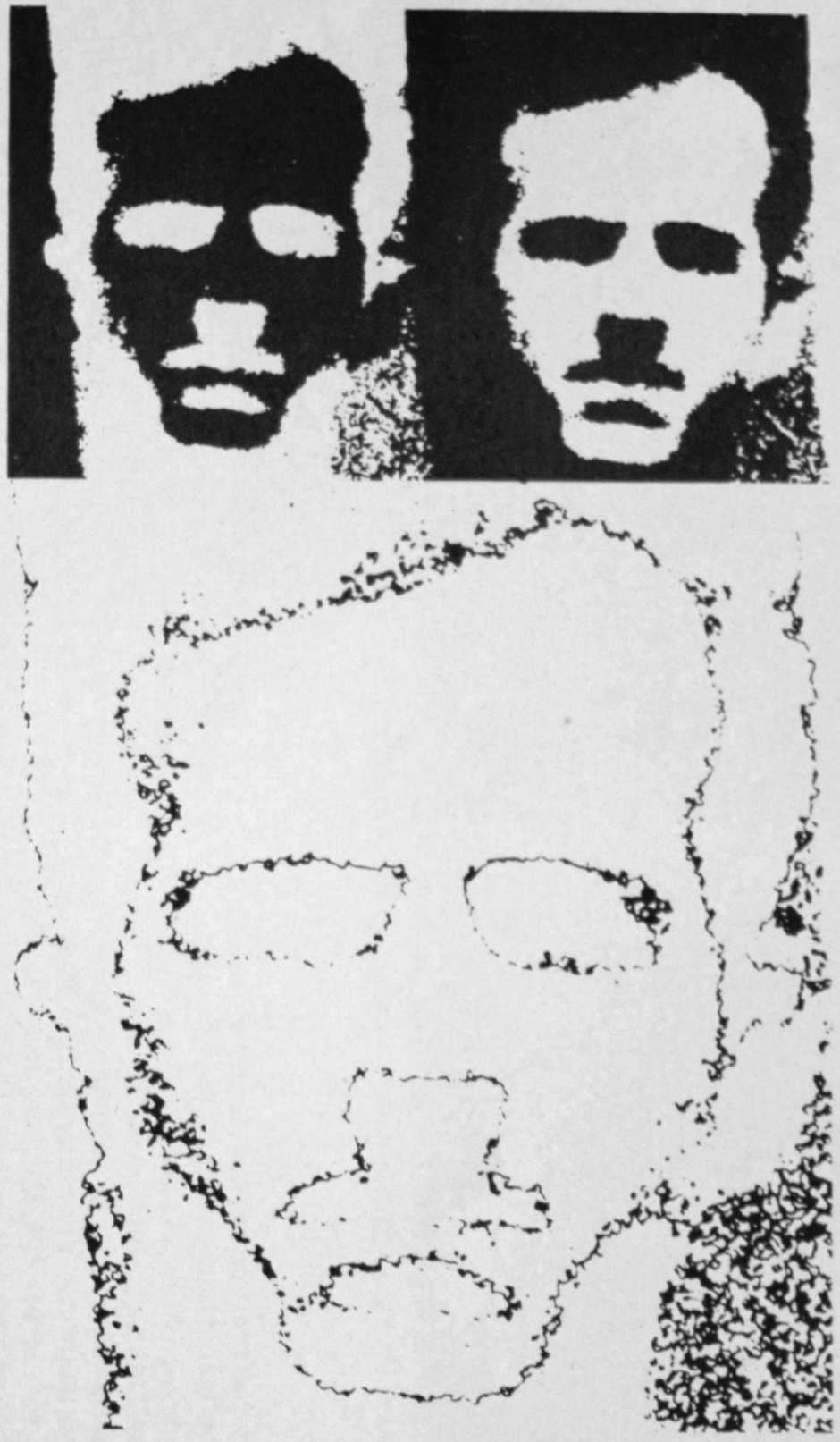

Figure 9. Combining positive and negative transparencies from the same photograph produces a fine-line effect.

Figure 10. Combining positive and negative transparencies from two different views reveals disparities.

of Oswald (see Fig. 7) reveals that the background shifts to the left on the second photograph, so that the tilt of the head was accompanied by a rotation of the head to keep the nose shadow in the same position.

A copy of one of the back-yard photographs that appears in the book *JFK: The Case for Conspiracy* shows a distinct line on the chin. The authors of the book state that Oswald's face had been added to someone else's chin and body, and they refer to this as the world's first chin transplant. With high-contrast film, detail can be either exaggerated or eliminated by the choice of exposure level. The laugh lines from the nose to the corners of the mouth, visible in normal-contrast prints, are not evident in this high-contrast reproduction. A normal-contrast enlargement from the original negative makes the marks on the chin appear much less suspicious, as though they might be due to the imperfect random distribution of grain clusters (see Fig. 7, left). Enlargements of the other two views reveal nothing unusual.

In the BBC documentary, Thompson stated that the Oswald back-yard photographs would not be admitted as evidence in a British court of law because: "I have examined these photographs and have established without doubt that there is retouching on them. . ." He states as an example that the area between the head and the post has been touched in, which through carelessness produced an indentation on the edge of the post (see Fig. 7, right). Normal-contrast and high-contrast enlargements reveal a wire or branch in the background running through this area, which a clumsy retoucher would not have been able to retain. The apparent indentation on the post can be explained as an illusion produced by a shadow of an overhead leaf or branch on the post that matches the luminance of the shadow to the left of the post, which is also on a white surface.

Also in the BBC documentary, Major Piccard of the Photographic Unit, National Defense Headquarters, Ottawa, attempted to prove that one photograph of Oswald's head was used in all three views. He superimposed monochrome color transparencies made from the photographs to show that the colors apparently blended in the head area. A replication of

Figure 11. A high-contrast green negative image from one view combined with a high-contrast magenta positive image from another view reveals the areas of disparity vividly. (Original in color.)

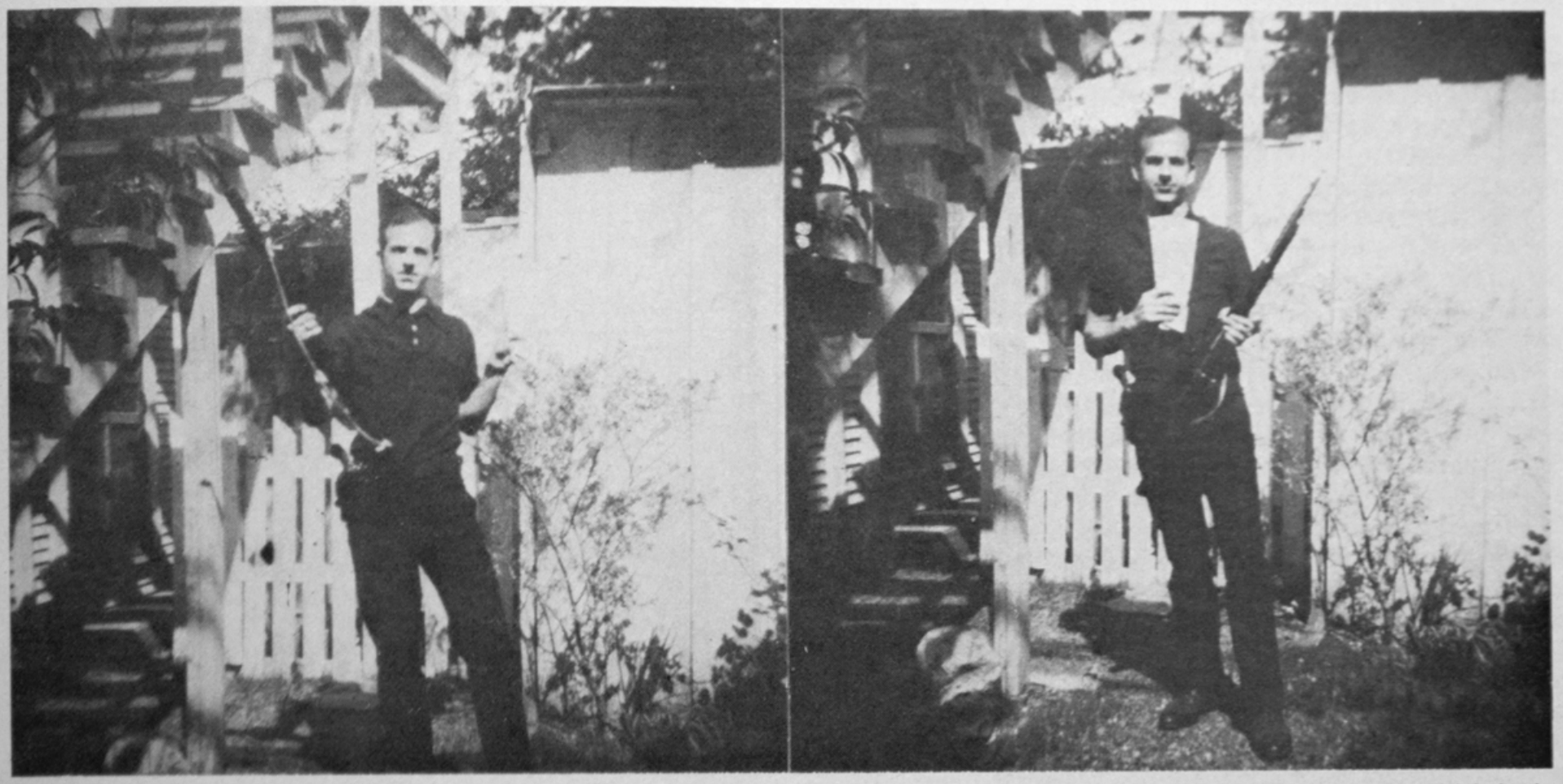

Figure 12. The camera was level for the view on the left, as evidenced by the parallel vertical lines in the background. The camera was tilted down slightly for the view on the right, placing the head farther off the lens axis which resulted in elongation due to the wide-angle effect.

Figure 13. Superimposed enlarged transparencies of a manikin head on-axis and off-axis reveal differences in shape.

this demonstration revealed that, indeed, the only place where color differences were obvious was in the background where there were large areas of disparity. We hypothesized that differences, if they existed, would be revealed more dramatically with high-contrast images. Combining high-contrast positive and negative silver images from the same photograph produces a fine-line effect (Fig. 9). Differences between two images are revealed either as broken lines or as thicker lines (Fig. 10). All three combinations—AB, BC, and AC—show dramatic differences.

High-contrast *color* images provide even more information concerning the nature of the differences, even when reproduced in black-and-white (Fig. 11). The superimposed color images also reveal a difference in height to width proportions of the images of Oswald's head.

The camera was level in view "A," as evidenced by the parallel vertical lines in the background (Fig. 12, left), but was tilted down in view "B," placing the head farther away from the lens axis and therefore elongating it because of the wide-angle effect (Fig. 12, right). A similar wide-angle effect was illustrated with photographs of a manikin head, taken with an Imperial Reflex camera. The differences in the shape of the heads are obvious when the images are superimposed (Fig. 13).

We reasoned that the only way a fake photograph could be made to avoid detection is to make a high-quality composite print and then copy it with the Oswald camera, which would impose the edge markings, scratches, uniform grain pattern, and curvature of field of an original negative on the copy negative. The 8 by 10 in. original print shown in Fig. 14 was

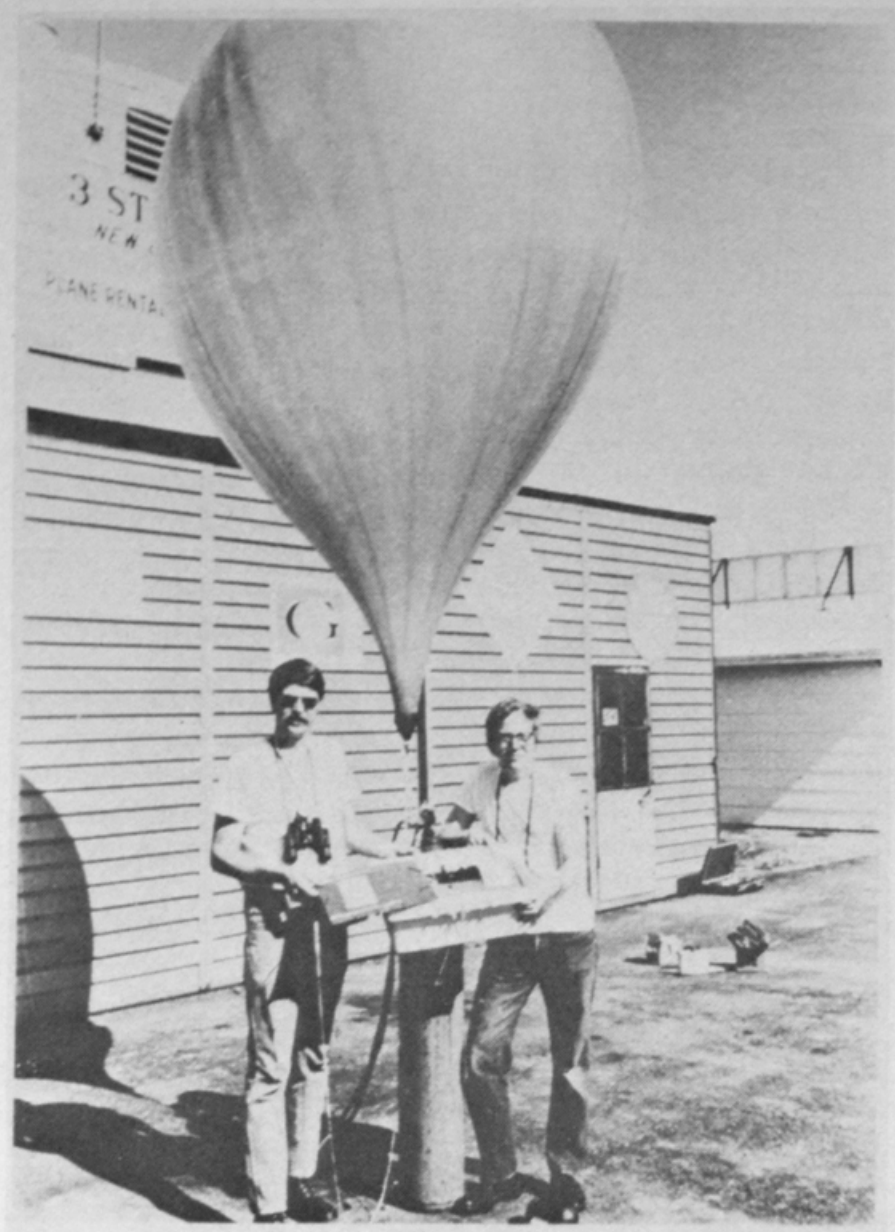

Figure 14. An original 8 by 10 in. print made from a 4 by 5 in negative. This print was copied with the Oswald camera equipped with a supplementary lens to determine if the copy would be acceptable as an original photograph.

copied with the Oswald camera, using a +4 diopter supplementary lens over the camera lens. The copy print shown in Fig. 15 is acceptable as an original photograph, although close examination reveals excessive pincushion distortion produced by the supplementary lens. The left border of the original

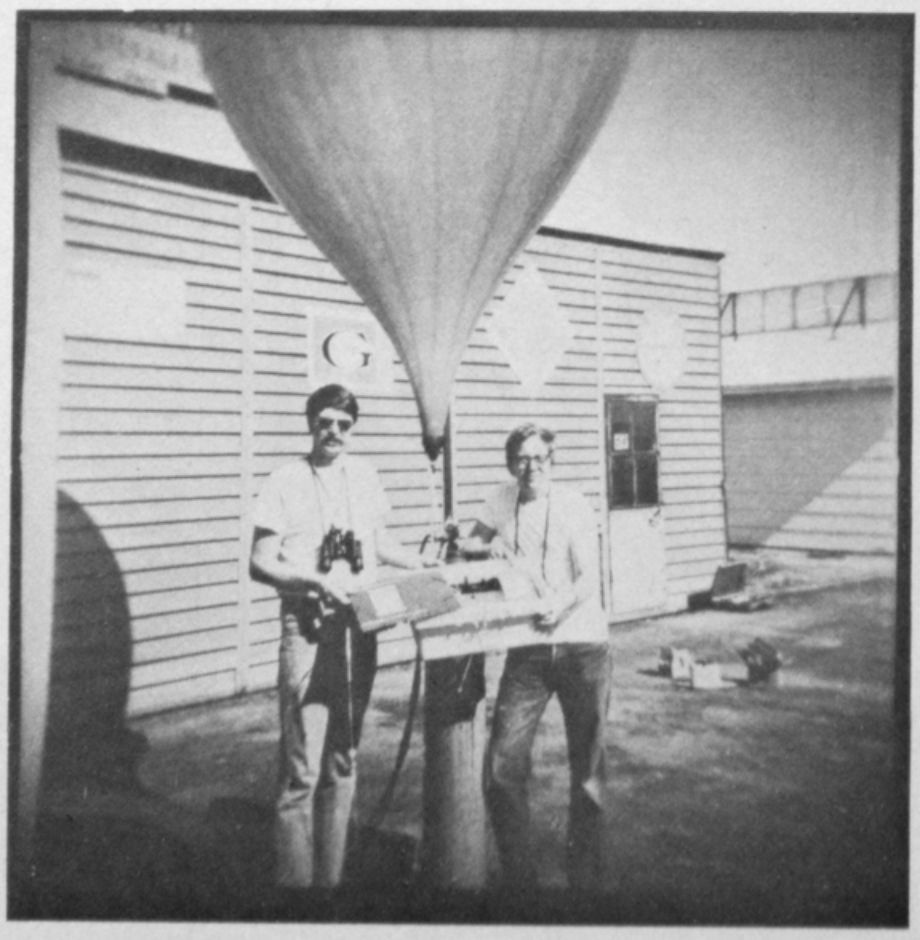

Figure 15. The copy photograph made with the Oswald camera.

print is shown on the copy, also, because of inaccuracy of the twin-lens viewing system. Since the wide-angle effect does not occur when copying two-dimensional objects, however, the height-to-width proportions of Oswald's head would not have changed if this procedure had been used using three prints of a single photograph of Oswald's head.

Conclusions

Various widely publicized claims of fakery involving the Oswald back-yard photographs were tested to determine their validity. Test procedures included examination of the original photographs, making comparison photographs in the Oswald camera and other cameras of the same make, and replicating work done by the FBI and by photographic experts cited in a television documentary. Image attributes considered in the analyses include camera scratch marks, film aperture marks, graininess patterns, lens aberrations, linear perspective, darkness and position of shadows, and on and off axis image shapes. The photographic results discredit the claims of fakery.

Photographic Education for the Eighties

E. Offenbacher

Abstract Most photographic education's curricula are based on past experience. Whereas, previously, recording the image was needed, the stress is now on communication by image. This requires new subjects. Optics will stay; chemistry will be curtailed; electronics will be enlarged; psychology, sociology, education, art, and graphic arts will be added; linkage with the word will be stressed; practical training will include cine and video techniques. Further, the order of studies will be changed. A short period of basic techniques will be followed by practical apprenticeship. Theoretical studies will cover supporting subjects. Then, practical training will take its specific direction, and basic theoretic studies can be determined.

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It may be late in the day to start thinking about photographic education in the eighties. Yet, one gets the impression that most of our curricula of photographic education are based primarily on past experience. Even where new possibilities have been contemplated, they have hardly been taken into active consideration. The word "photography" itself may be one of the psychological stumbling blocks, as many of the modern applications of visual communication are not included under this title. Still, we have not yet coined a new term that would contain the range of possibilities for creating an image. Undoubtedly, photography's task to produce a document in its own right is and will remain its basic feature. However, whereas originally this document was recorded to be viewed later, whenever wished, more recently the emphasis is on images as means for direct communication. As such, they sometimes can hardly be called documents. For instance, the image viewed on the televeision screen is ephemeral. As such, it cannot be kept for the viewer's continuing or later inspection.

From all the optical, electronic, and graphic techniques available for communicating by images, those most fitting have to be selected and even intermixed. We must beware, therefore, of training specialists who would know, as the saying goes, more and more about less and less. On the contrary, the "communications technician," as one might call him, must be able to take his choice from this large assortment of visual resources. He must also be capable of using the appropriate equipment and its associated material, according to the result required. Indeed distinct advancements have been made not only in available equipment but in the materials for recording the image as well. Electronic means, and physical properties in a more general way, have brought about a large choice of materials, of which the silver films are only one.

The stress laid on communication as the main purpose for using the image came about first through the illustrated newspaper, then by way of the cinema, and finally via television. They all brought with them the need to become aware of the implications resulting from the combination of the image with the word. Where publicity is concerned, the combination with graphic means must also be taken into account. It therefore will not be sufficient to teach photography, cinematography, graphic arts, communications, and other associated subjects in separate courses, even where offered under the same roof. What is needed, in preparing for the eighties, is an integrated course. Its title shall probably not be "Photography" but "Image Technology." This latter expression should not make us forget the large psychological power of the image and our responsibility in combining it with the word, either printed as a by-line to the picture or imparted acoustically. Possibilities and responsibilities alike must cause us to reconsider our curricula. New subjects will have to be added. However, as our programs usually are already overloaded, some pruning of beloved topics may be indispensable.

Optics will probably have to stay as they are, although certain changes may be necessitated by future progress. Holography could be a good example for a new approach. This very topic is also a warning not to be too hasty in deciding that a new development in image formation will be applicable immediately. Chemistry (at least, as we teach it) will probably have to be changed quite drastically and, at the same time, become more limited. Far from underrating the importance it will retain for imaging in the eighties, we must have a fresh look at it with relation to additional subjects to be taught. For the moment, it would be premature to specify where exactly to prune the subject. The fact that silver itself is becoming more scarce on the world market may give us some indication about the direction in which to prepare ourselves. Just as the researcher in his laboratory tries to limit the use of silver and, in certain cases, to replace it by diazo compounds, our curricula will have to be adapted to new kinds of products soon coming on the market.

It might be still more difficult, yet necessary, to foresee to what degree physics proper would have to be retained or to be added to the teaching of optics and mechanics. Electrophotography might provide a good example, although its

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