

2. ISSUE

(243) Is there any photographic evidence of a gunman or gunmen in Dealey Plaza at the time of the President's assassination?

3. MATERIALS AND PROCEDURES

(244) The available photographic materials were reviewed by the Panel and contractors. Those considered most relevant to the question of gunmen in Dealey Plaza (e.g., materials alleged to show a gunman: weapon, flash of light, puff of smoke) were selected for image enhancement, provided that they were judged to have sufficient potential for meaningful improvement.^u

(245) Based upon this review, the following photographic materials were selected for image enhancement.^v

Dillard - 35 millimeter, black and white transparencies.

Powell - 35 millimeter, color transparency.

Hughes - 8 millimeter, color-motion-picture film.

Willis - 35 millimeter, color transparency.

Moorman - Polaroid print.

Zapruder - 8 millimeter, color-motion-picture film.

Nix - 8 millimeter, color-motion-picture film.

(246) Three different categories of image enhancement technology were available to the Panel: Photo-optical/photochemical, digital image processing, and autoradiography.^w The selection of a particular technology depended upon the nature of the photograph and the type of clarification considered necessary.

4. CONCLUSIONS

(247) a. Evidence of changes in the open sixth-floor window of the Texas School Book Depository is visible. The changes are of two types:

(248) (1) There is an apparent rearranging of boxes within 2 minutes after the last shot was fired at President Kennedy;

^uIn general, a minimum requirement was that the material be original and transparent film. See pars. 39-41, *supra*.

^vA list of the most important photographic materials reviewed by the Panel is set forth in par. 42, *supra*.

^wSee pars. 9-38, *supra*.

(249) (2) There is an appearance or impression of motion in the open sixth-floor window a few seconds prior to the assassination. While the pattern of motion is not necessarily inconsistent with movement by a human being, it was nevertheless considered probably to be photographic artifacts.

(250) b. There is no visible evidence of anyone at the closed windows adjacent to the open sixth-floor window of the Texas School Book Depository. Motion in these windows was also attributed to photographic artifact.

(251) c. There is no definitive visible evidence of any gunmen in the streets, sidewalks, or areas adjacent to Dealey Plaza, nor was any evidence discerned of a flash of light or puff of smoke.

5. ANALYSIS

(252) The following section describes the processing and analysis of the Dealey Plaza photographic evidence undertaken by the Photographic Evidence Panel. Each of the major subdivisions of this section contains a synopsis of the issues in question, a summary of the relevant photographic evidence, and a discussion of the special processing operations used to enhance the evidence. The evidence in question is identified by using the photographer's name - for example, a motion picture taken by Orville Nix will be referred to as the Nix film. In the case of multiple pictures by the same photographer, frame numbers are also used.*

(a) The Texas School Book Depository

(253) Evidence from sources other than photography led the Warren Commission to conclude that the shots that struck the President had come from an open window on the sixth floor of the Texas School Book Depository.⁸² Several sources of photography exist that show the window before and after the fatal shots. These were examined for evidence of a gunman.

(254) The following photographs of the Texas School Book Depository were subjected to image enhancement:

- (1) The Dillard photographs (2).
- (2) The Powell photograph.
- (3) The Hughes motion-picture film.

*This system has been used by others who have analyzed the evidence, including the Warren Commission and the commentators and critics of the Warren Commission.

(255) The Dillard and Powell photographs and Hughes film were taken from a region of the intersection of Houston and Elm Streets in Dealey Plaza. Dillard, a professional photographer, was riding in a press car in the presidential motorcade. At the time he took his pictures of the Depository, the car was approaching Elm and Houston.⁸³ Powell was standing considerably to the right of Dillard, near the southeast corner at Elm and Houston, and his picture therefore shows the window from a much more oblique angle.⁸⁴ Hughes was standing near the southwest corner of Houston and Main Streets⁸⁵; thus, his motion picture film was taken from a much greater distance than Dillard and Powell photographs.

(256) The time at which the photographs of Dillard and Powell were taken is only approximate. Dillard stated that his second picture was taken a few seconds after the last shot that he heard.⁸⁶ Powell has estimated that he took his picture about 30 seconds after the last shot.⁸⁷ A shadow analysis performed by the panel confirmed that these photographs were taken at the same approximate time, with Dillard's first and Powell's second.⁸⁸ The Hughes film ended 2 to 10 seconds before any shots were fired, as indicated by the position of the presidential limousine in the film.⁹

1. DILLARD AND POWELL PHOTOGRAPHS

(257) Examination of both the Dillard and Powell photographs of the sixth floor windows shows an open window with deep shadows in the region behind it. The deep shadows indicate that film was underexposed in these regions; that is, too little light reached the film for a clear recording of any details in the room behind the window.

(258) A number of enhancement processes were applied to the photographs in order to bring out any details obscured within the underexposed regions. They were as follows:

(259) (1) Photographic enhancement (using photo-optical and photochemical techniques) of the underexposed regions of the Dillard photograph undertaken at the Rochester Institute of Technology (RIT).⁸⁹

(260) (2) Autoradiographic enhancement of the underexposed regions of the Dillard photograph at Stanford Research Institute, Inc. (SRI).⁹⁰

(261) (3) Computer enhancement of the underexposed regions of the Powell photograph at the University of Southern California and The Aerospace Corporation.⁹¹

⁹The Panel did not consider it necessary to refine these estimates of the time the taking of the photographs because it would not have helped to resolve the issue of whether these photographs depicted any gunmen.

(262) In addition, the Dillard photographs were scanned and digitized for possible computer enhancement. Nevertheless, no such enhancement was performed because the Panel decided that the autoradiographic technique had more potential for success.

(263) The photographic and computer process made visible details that had been obscured in the underexposed regions of the photographs. Both the photographic enhancement by RIT and the autoradiographic enhancement by SRI revealed a feature in the fifth floor window immediately beneath the sixth floor window. Figure IV-1 (JFK Exhibit F-153) shows one of the original Dillard photographs, and Figure IV-2 is an autoradiographic enhancement. The detail revealed by the processing appears to be a circular light fixture hanging from the ceiling of the fifth floor room, with a light bulb in the center of the fixture.²

(265) The Panel concluded that the light fixture revealed in the fifth floor window served as a "benchmark" against which the sixth floor enhancement could be judged. Accordingly, the enhancement of a recognizable object in the fifth floor window gave the Panel confidence in its judgment there were no recognizable human forms in the enhancement of the sixth floor windows.

(266) Although human faces or forms were not visible in the enhanced photographs, inspection of Figures IV-2 and IV-3 reveals a difference in the boxes visible through the sixth floor window. In the Dillard photograph, only two boxes are immediately visible, one each at the left and right of the window frame. Nevertheless, the Powell photograph shows several additional boxes. There are two possible explanations for this difference:

(267) (1) The Powell photograph may reflect only an apparent change in the boxes; the different angle from which Powell viewed the depository may have caused a different set of boxes within the room to be frames within the window.

(268) (2) The boxes were moved during the time that elapsed between the Dillard and Powell photographs.

(269) Since the precise positions of Dillard and Powell at the time of the photographs were unknown, it was not possible to calculate precisely the region within the sixth floor room that would have been visible to each photographer. In the Dillard photograph, the two boxes at the left and right of the window frame appear to be in the full light of the sun, with no shadows cast on them by the frame of the partially opened window. In the Powell photograph, it also appears that the boxes are in full sunlight, with no shadow cast on them by the window frame.

²The Panel observed all enhanced images under optimum viewing conditions. Reproduction of the enhanced images for this report results in a degradation in quality. The Panel's decisions were reached on the basis of the image quality of the original enhanced photographs, and not on the quality of images as reproduced in this report. See par. 28 supra.

(270) A simple trigonometric calculation shows that the two boxes at the left and right lie approximately 6 inches from the plane of the window (see addendum A). If full sunlight is falling on the additional boxes in question in the Powell photograph, they must also lie close to the plane of the window.²² For this reason, the Panel concluded that the additional boxes visible in the Powell photograph were moved during the interval between the Dillard and Powell photographs.

(271) An additional issue relating to the sixth floor windows was the possible presence of a human face or form in the adjacent windows. None was found by the Panel.

2. HUGHES MOTION PICTURE FILM

(272) The Hughes film shows the presidential limousine for a total of 88 frames as it is proceeding down Houston Street towards the Texas School Book Depository. The open sixth floor window of the depository is visible in the upper left corner of the film frames. An object, approximately rectangular in shape, is visible in the open window. When the film is viewed as a motion picture, the object distinctly appears to be moving.

(273) The 88 frames were processed for computer enhancement and motion analysis at The Aerospace Corporation.²² The scans were centered on the portion of the frames that showed the open sixth floor window and the closed windows adjacent to it. After scanning, the images were viewed on a precision television soft-copy video-display computer system that was used to adjust the contrast of the displayed images.

(274) Figure IV-4 (JFK Exhibit F-121) shows a single unenhanced frame of the Hughes film. It was the judgment of the Panel that the object in the open window was partially in the sun and partially in the shadows. This judgment is based upon the enhancement of selected frames of the Hughes film by computer contrast alteration.

(275) As the contrast of any single frame was changed by computer, the shape of the object in the open sixth floor window also changed. When an object is in both the sun and shadow and an exposure is chosen that will record the sunlit features, the shadowed features will be underexposed. A computer can be used to alter the contrast and correct for the underexposure so that the object within the shadows is more directly visible. In this case, the processing also changes the shape of the image.

²²If the additional boxes in the Powell photograph were so far back into the room that the difference in viewing angle made them apparent in the Powell photograph and not in Dillard's, then they would not appear to be in full sunlight. Since at the time of the assassination it was late fall, the midday sun was south of directly overhead and therefore would have been entering those windows of the Texas School Book Depository facing directly south.

(276) It was theorized that the contrast of each frame of the unenhanced Hughes film was not constant in the region of the sixth floor window, and that this was causing an apparent change of shape that appeared to be motion in the film sequence. The panel used computer displays to inspect the 88 frames of the Hughes film without enhancement and computer calculations to measure the contrast. Both the visual inspections and contrast measurements established that the contrast of the sixth floor window images was changing from frame to frame.

(277) Inspection of each frame of the Hughes film revealed other photographic anomalies. The sixth floor window of the depository is near the edge of the film frame, and consequently it is less in focus than objects near the center of the image. Objects at the edge of a film frame were also less bright than objects at the center (a phenomenon called "vignetting"). Further, as film moved through the camera, it may not have been resting at the exact point of focus, resulting in an image that was slightly out of focus. The Panel judged that one or more of these effects were present in the frames of the Hughes film and that they, too, could lead to a perception of motion when the film is viewed as a motion picture.

(278) The Aerospace Corporation used computer processing to reduce these effects as much as much as possible. First, common points in all 88 frames were "registered" in the computer so that each frame possessed the same coordinates in the computer. Next, the photographic contrast was adjusted to be as equal as possible between all frames. This was done by picking a bright point that was the same in each frame (the white edge of the windowsill was picked), and a dark point that was the same in each frame (a region in the window, away from the region of apparent motion, was picked). Each frame was then manipulated by computer so that all the bright and dark regions were the same for all frames.

(279) This equalization of contrast caused much of the apparent motion to disappear. In the computer-processed images, most of the motion perceived in the original film was not visible. Since some changes in focus were still visible, this anomaly was corrected by slightly altering the physical dimensions of those images that were most out of focus.

(280) The computer processing eliminated much, but not all, of the perceived changes. The extent of the remaining changes was quantified by using the computer image display at The Aerospace Corporation. The operator of a computer display can position a computer-generated dot on the video screen; the computer can then read the coordinates of the dot onto the screen. In this case, the dot was placed by the operator at a position that was judged to be the center of the object in the open sixth floor window. For each frame, the computer then read and recorded the coordinates of this dot. To minimize human statistical error in positioning the dot, identification of the center of the object was repeated several times for each frame and the results were averaged. Finally, the computer calculated the change in the position of the center of the object from frame to frame.

(281) The results of this motion analysis can be seen in Figures IV-5-6 (JFK Exhibits F-159 and 159-A). Figure IV-6 shows the center of the object as determined by the motion of the dot. Each arrowhead position on the exhibits indicates the location of the center of the object for the

particular frame number designated. The direction of the motion between frames can be discerned by going from each arrowhead to the next sequentially numbered arrowhead. The length of each arrow is proportional to the actual distance the center of the object moved between frame identifications, and the thickness of each line is proportional to the amount of time (indicated by the decimal number) that it took to move that distance. Figure IV-5 shows the actual change in the shape of the object for frames 55, 56, 59, and 61.

(282) The Panel interpreted these exhibits as demonstrating that the perceived motion was apparent rather than real. This conclusion was based on the following considerations:

(283) (1) The pattern of motion does not display a consistent direction, but appears to be attributable either to random motions or to purposeful, consistent motion of a very complex type;

(284) (2) When the time interval between positions is considered, the motions appear to be quite rapid. For example, motions of 18 inches per second can be calculated. While such rapid motions are not impossible, they are considered improbable when considered along with the complexity of the motion as revealed in Figure IV-6.

(285) (3) In one two-frame sequence, the object disappeared: It is present in frame 59, but not in frame 60, and then is visible again in frame 61. This abrupt disappearance and reappearance is not consistent with human motion and can be explained only as a photographic anomaly.

(286) In summary, a pattern of changes in the object in the sixth floor window is visible in the computer processed images of the Hughes film. Nevertheless, the Panel did not attribute this pattern of changes to the motion of any recognizable object such as a person. While the overall pattern of changes is not necessarily inconsistent with human motion, the Panel still concludes that the perceived motions are attributable to photographic artifact.

(287) The closed sixth floor windows adjacent to the open sixth floor window were also examined. The same type of artifacts were present.

BRONSON MOTION PICTURE FILM

(288) The original 8 millimeter movie film of the Texas School Book Depository taken by Charles L. Bronson a few minutes before the assassination was not made available to the committee until December 2, 1978. At that time, it was reviewed by several of the committee's photographic contractors and members of the Photographic Evidence Panel. Based upon this preliminary review, the scientists believe that, as in the Hughes film, the apparent motion in the sixth floor southeast corner windows seems to be random and therefore is not likely to have been caused by humans. Nevertheless, no firm conclusions could be reached without applying digital image processing, which was not possible because of time and money constraints. The Panel suggests that the good quality of this film makes it advisable that image enhancement be considered (possibly by the Department of Justice) if further investigative efforts are undertaken.⁹³

(b) The grassy knoll

(289) To the right of the presidential limousine as it proceeded down Elm Street in Dealey Plaza is a small knoll. An assortment of trees, bushes, and concrete works is located on it. Several persons present in the plaza at the time of the assassination stated they thought shots were fired from the region of this knoll⁹⁴ and commentators and critics of the Warren Commission have asserted that there is photographic evidence that supports the claims of a gunman firing from the area.⁹⁵

(290) The following photographic evidence pertaining to the grassy knoll was subjected to enhancement:

- (1) Willis No. 5 photograph;
- (2) Moorman No. 2 photograph;
- (3) Nix motion picture film; and
- (4) Zapruder motion picture film.

(291) The Willis No. 5 photograph was taken from the south side of Elm Street, near the intersection of Houston and Elm Streets.⁹⁶ The Moorman picture was taken from a point on the south curb of Elm Street, midway between Houston Street and the exit from Dealey Plaza.⁹⁷ The Nix film was taken from the other side of Dealey Plaza near the intersection of Main and Houston Streets.⁹⁸ Zapruder was standing on a concrete abutment by the retaining wall in the grassy knoll area.⁹⁹

(292) The Zapruder and Nix films span an interval that includes the fatal shot to the head, and therefore no ambiguity as to the time they were taken exists. The time at which the Willis and Moorman photographs were taken is, however, difficult to establish. From the position of the President and Mrs. Kennedy in the limousine in the Moorman photograph, the Panel believes that the photograph was taken at the time of the fatal head shot, corresponding with frame 313 of the Zapruder film.^{bb} The Willis photograph appears to have been taken several seconds earlier, at approximately Zapruder frame 202.

1. THE WILLIS PHOTOGRAPH

(293) Preliminary visual inspection of the Willis photograph showed extensive blurring of all features of this picture near the retaining wall on top of the grassy knoll. The blurring is most clearly seen in the freeway sign, which is in the line of sight between the retaining wall and the

^{bb}Zapruder frame numbers are used as the basic time references because this film spans the most comprehensive interval of time. See par. 146, *supra*.

Willis camera. (See Fig. IV-7, JFK Exhibit F-155.) It was caused by motion that was complex and not uniform over the entire image. The Panel judged that the motion was probably a combination of rotation about a point to the lower left of the optical axis, and that a component of linear translation (that is, motion in straight line) in the motion was also possible.

(294) The Willis photograph was scanned for possible input into a computer. Since it is in color, the scan had to be a full-color scan. Then the knoll area from the scan was presented on a full-color computer video display. The display and manipulation were performed at the University of Southern California.¹⁰⁰

(295) The retaining wall at the top of the knoll was subsequently enlarged by a computer operation similar to enlargement by photo-optical and photo-chemical techniques. This computer display made visible an object whose size and shape were consistent with a human being, positioned just inside the retaining wall. (See Fig. IV-8, JFK Exhibit F-160.) The object possessed colors with a distinct resemblance to flesh tones, as revealed on the color display. The Panel perceived the object to be that of a badly blurred image of a person dressed in dark clothing, standing or leaning just inside the retaining wall.

(296) Since the image was badly blurred, an attempt was made to use the computer to remove the blur. Blur removal can be accomplished if its extent is not too great.¹⁰¹ Unfortunately, the image was so severely degraded in the region of the retaining wall that deblurring efforts were not successful.

(297) The next computer processing step was to make measurements of the color values of the object behind the retaining wall in order to compare the perceived flesh tones with those of a person at another location in the Willis photograph. The photograph was scanned in color: Separate measurements were made of the three primary colors, red, green and blue, from which other colors can be made.

(298) Regions measured at The Aerospace Corporation included the flesh tones of the object near the retaining wall and of Marilyn Sitzman, the secretary to Abraham Zapruder, who is visible in the Willis photograph. Sitzman's flesh tones were measured both in shadow and sunlight. At the University of Southern California, flesh tones were measured for the object at the retaining wall and for several people: A policeman, a bystander, and a child. In addition, measurements were made of Mrs. Kennedy's hat, which was pink in color and had a flesh tone appearance on the video display.¹⁰²

(300) The Aerospace Corporation measurements show the flesh tones of the object near the retaining wall to be comparable to the known flesh tones of Zapruder's secretary. USC's measurements also showed similarity between the flesh tones of the object and those known persons; however, the similarities were not as strong as those found by Aerospace. The measurements of Mrs. Kennedy's hat were found to be distinguishable from the measurements of known flesh. Nevertheless, the differences of Mrs. Kennedy's hat from known flesh

measurements were only marginally greater than differences of flesh tone measurements from each other.¹⁰³

(301) Based on these measurements, as well as visual analysis, the Panel concludes that the object was most probably an adult person standing behind the wall. First, the general shape and structure of the object, including the location of the flesh tones, appear to be human. Second, the height of the object in relation to the known height of the wall is consistent with that of an adult of average height (5'6" to 6' tall). Third, the measured values of the flesh tones of the object are comparable with those of people in the photograph. Fourth, an additional Willis photograph, No. 6, taken after the presidential limousine had exited Dealey Plaza but showing approximately the same field of view as No. 5, no longer shows the object near the retaining wall, or anywhere else; it has disappeared. (See Fig. IV-9.) The mobility of the object greatly increased the likelihood of its being a person.

(302) Since the Panel concluded that the object was probably a person, the next question was whether there was any evidence of a weapon associated with this individual. Visible near the region of the hands is a very distinct straight-line feature extending from lower right to upper left. The Panel notes, however, that the image is badly blurred in this region and that the direction of the blurring is the same as the southeast-northwest orientation of the linear feature near the hands. The blur would stretch any small point object on the wall into a linear object. As the blur could not be clarified, the Panel could reach no conclusion as to the existence of a rifle or any other weapon in relation to the person standing behind the retaining wall.

2. THE MOORMAN PHOTOGRAPH

(303) The Moorman No. 2 photograph is a black and white Polaroid print that has suffered from handling during the intervening years. A number of large and small defects were visible on the photograph when the Panel examined it. It, too, shows the grassy knoll and the retaining wall in the same region where the person was identified in Willis No. 5. (See Fig. IV-10, JFK Exhibit F-129.) It also shows another region of the knoll which critics of the Warren Commission have identified as important: The stockade fence. This fence runs toward the railroad overpass from the region of the retaining wall. Various critics have claimed that gunfire was directed at the President from behind the fence.¹⁰⁴ Finally, this is the area from which the committee's acoustics analysis indicates a shot originated.¹⁰⁵

(304) Since the Moorman photograph is opaque rather than a negative transparency, a conventional image scanner (one designed for transparencies) could not be used to sample it for computer input. Given its condition, the Panel judged that there was little merit to using computer processing. Instead, to enhance the quality of the image, a high-quality negative copy was made at the Rochester Institute of Technology. A series of photo enlargements was made from this negative. The contrast and brightness were altered in these to bring out any objects or details that might be visible in the shadows or underexposed regions.¹⁰⁶ These photographic enhancements were focused on the region of the retaining wall.

(305) These efforts were not successful. The Moorman photograph was so underexposed in the region of the retaining wall that the alterations in contrast produced no significant increase in detail. The Panel could find no evidence of a person in position on the retaining wall corresponding to that identified in the Willis No. 5 photograph.

(306) The Panel did not carry out any enhancement work on the Moorman photograph in the area of the stockade fence because this area was judged to be of even lesser quality than the retaining wall area, which had yielded negative results. This decision, however, as well as the decision not to apply digital image processing to this item, was made long before the committee's acoustic analysis was finalized. Although it is extremely unlikely that further enhancement of any kind would be successful, this particular photograph should be reexamined, in light of the findings of the acoustics analysis.

3. THE NIX FILM

(307) The final photographic source relating to the grassy knoll retaining wall is the Nix motion picture film. Several frames coinciding with the fatal head shot frames of the Zapruder film were selected for scanning and input into the computer. The scanning was performed at the Los Alamos Scientific Laboratory; the scanned data was then sent to The Aerospace Corporation for enhancement by computer. The mode of enhancement was an edge and detail sharpening process that has the effect of making the photograph appear more in focus.¹⁰⁷ Fig. IV-11 (JFK Exhibit F-161) shows both original and enhanced images of the Nix film, centered around the region of the retaining wall.

(308) The enhanced Nix film shows an object that can be construed as having a shape similar to that of a person. It is also possible to interpret this object as being of the same general shape as the person identified at the wall in the Willis No. 5 photograph. Nevertheless, the person in the Willis photograph displayed distinct flesh tones in the computer display of the image. No such pattern of flesh tones is visible in the enhanced (or original) Nix frames.

(309) The Panel could not conclude that the object near the retaining wall in the Nix film was the same person visible in the Willis No. 5 photograph. This image was not identified by the Panel as human being. It was more likely the results of a pattern of light and shadows cast on an object in the background behind the retaining wall by the nearby trees.

(310) The area of the retaining wall image in the Nix frames was also examined for the presence of a flash of light or a puff of smoke from a discharging rifle, which some bystanders claimed to have seen. No evidence of either was found.

(311) The Panel also examined another controversial aspect of the Nix film. As Nix panned his camera from right to left following the motion of the presidential limousine, the background of the grassy knoll came into view. In it, beyond the retaining wall and running along the crest of the knoll, is a region of deep shadow that is broken by patches of light. For a number of frames there appears to be a brightly lit object whose shape some have interpreted to be that of

a man sighting a rifle toward the presidential limousine. The right "arm" of this object is rigidly extended outward from the "body," with the left "arm" tucked in more tightly, as if supporting a rifle stock. There is, between and above these arms, a shape that looks like a "head." That object has been interpreted to be a rifleman in the classic military posture for firing a rifle.¹⁰⁸

(312) Magnification of the classic gunman object showed it to be indistinct and blurry. It was decided to process these images by computer techniques that would bring the image more "into focus" by making its features sharper. Computer enhancement work was carried out at both The Aerospace Corporation and the Los Alamos Scientific Laboratory.¹⁰⁹

(313) It was recognized that the limitation on improving the images would be the noise in the frames. Since several frames showed the region in question, it was decided to apply a "frame-averaging" technique. This process involves registering the frames and then adding them together to reduce noise, then enhancing the resulting product. This technique can greatly improve the quality of an enhancement.¹¹⁰ Aerospace applied an enhancement process to the individual frames identical to the one applied to the Nix film for the person-at-the-wall image (See Fig. IV-12, JFK Exhibit F-163)¹¹¹; Los Alamos Scientific Laboratory applied a more sophisticated technique known as MAP restoration.¹¹²

(314) Figure IV-13 (JFK Exhibit F-162) shows the original and enhanced version of one Nix frame as produced at the Los Alamos Scientific Laboratory; the original is shown at the top, the enhanced version at the bottom. A total of eight frames were registered, added and enhanced to produce the lower image. Eight frames, considered to have the least blur or noise, were selected.

(315) After examining the enhanced image, the Panel concludes that the so-called classic gunman object was not a gunman. First, there is no evidence of human flesh tones in the "head" and "hands"; whereas the people in the Nix film have distinct flesh tones, the object here is almost uniformly white. Second, the white tones are identical in appearance with the white tones of the light regions of the shadow patterns cast on the wall of the structure behind the retaining wall by sunlight filtering through the nearby trees. Third, in the enhanced image, the shadow pattern above and to the right of the object is seen to be connected to the object itself.

(316) The Panel concludes that the most probable explanation is that the image is a chance pattern of sunlight on the structure behind the retaining wall. The Panel's conclusion was strengthened by an observation at The Aerospace Corporation that in one frame the "right arm" of the object disappears, only to reappear in the next frame. Such behavior would be virtually impossible for a person, but is conceivable for tree branches casting a shadow pattern on a wall.

(317) The Panel also examined the classic gunman object for evidence of a flash of light or puff of smoke. To enhance any phenomena as transient as these, the frames were differenced, that is, registered frames were subtracted from each other sequentially in time. This technique makes transient phenomena highly visible.¹¹³ No evidence of any flash or smoke was found.

(318) The Panel also reviewed a previous report by the Itek Corporation.¹¹⁴ Itek measured the relative displacement of the classic gunman in successive frames of the Nix film as the camera panned from right to left. The extent to which an object shifts in successive frames can be used to calculate the distance from camera to object by applying the basic principles of photogrammetry. Itek calculated the distance from the camera to the object in this way and found that the calculations placed the object very near shelter 3 of Pergola 2 in Dealey Plaza.¹¹⁵ Further study by Itek of the ground elevation in relation to the retaining wall showed that a line of fire toward Dealey Plaza would require that a rifle near this structure be 9 feet above ground. Itek concluded that the classic gunman object was a pattern of light and shadow on shelter 3. The Panel agrees with these conclusions.

4. ZAPRUDER FRAME 413 - PHOTOGRAPHY OF ALLEGED HEAD IN THE BUSH

(319) When the presidential limousine accelerated and pulled out of Dealey Plaza after the shooting, Zapruder continued to follow it with his camera. As the car passes him, going from left to right in front of him, a bush becomes visible in the lower right of the film frame, moving into the field of view from the right and traveling to the left as Zapruder panned the camera to the right. For a number of frames, an object that resembles a head is visible within the bush. In Zapruder frame 413 the object is very distinct and clear. Extending from the region of the head is a distinct linear feature. Critics have claimed that this linear feature is a rifle and that the head is of a gunman hiding behind the retaining wall and firing into Dealey Plaza.¹¹⁶

(320) The head in the bush is visible only in a few frames. From Zapruder's position on an abutment, which was connected to the retaining wall that lay to the right of the presidential limousine (as it proceeded down Elm Street), his camera was the only one positioned so as to look through the bush and to the limousine in a geometry that shows the head, bush and limousine in the same line of sight. Zapruder frame 413, which shows the head object most clearly, was exposed approximately 5 1/2 seconds after the fatal shot the President's head at frame 313.^{cc}

(321) Since the head-like object is visible for several frames coming in from the right and moving to the left as the camera pass right, the Panel concluded that the object was real and not a chance arrangement of leaves. In frame 413, the head appears to be wearing a hat, such as a tennis hat, with a pulled-down brim. The "hat" is not visible in any other frames, however, and the Panel concludes that the "hatbrim" in frame 413 was only a coincidental juxtaposition of leaves near the head.

(322) Frame 413 was scanned for input to a digital computer at the Los Alamos Scientific Laboratory.¹¹⁷ After scanning, the image was presented on a color video image display. The Panel again concluded that the object was a head. Flesh tones were visible on the back of the

^{cc}The time elapsed is readily calculated based on the camera framing rate of 18.3 frames per second.

neck and ears. A hairline at the back of the neck was distinct and visible. The hair appeared to be fair in color; the head was either close-cropped or balding.

(323) Having found the object to be a head, placement of the head and bush in relation to Zapruder became of great importance. Placing the bush was simple because the Nix film shows Zapruder and the bush in a series of frames. By using photogrammetric techniques, the USGS was able to place the presidential limousine at the time of frame 413.¹¹⁸ A line of sight drawn between Zapruder and the presidential limousine passes directly through the bush, as seen in the survey map of Dealey Plaza (see Fig. II-10, JFK Exhibit F-133).

(324) To determine where the head lies on the line between Zapruder and the presidential limousine, computer enhancement of frame 413 was undertaken by the Los Alamos Scientific Laboratory.¹¹⁹ The image was processed by a technique that is designed to bring details into focus, the same technique used on the classic gunman frames of the Nix film. The result of the processing is seen in Figure IV-14 (JFK Exhibit F-164), where the original and enhanced images are displayed. From the enhanced image, measurements could then be made to determine the head location.

(325) Accordingly, this photograph was then studied photogrammetrically. A basic principle in optics states that the size of an image is inversely proportional to the distance of the object from the camera that created the image.¹²⁰ Using this principle, the distance of an object from a camera can be calculated by comparing the size of its image to the image size of a similar object at a known distance. The size of the image of the head in the bush was compared to the size of the image of a head in the presidential limousine. A simple calculation can determine where the head in the bush was located on the line of sight between Zapruder and the limousine (see addendum B).

(326) The head of the Secret Service agent climbing into the presidential limousine was used for the calculation. Several measurements were made. The closest to Zapruder that the head in the bush can lie was in the middle of the sidewalk that runs from the top of the grassy knoll down to the street. The farthest away would be 10 to 15 feet beyond the sidewalk.^{dd}

(327) Based on this analysis, an inspection of Dealey Plaza survey map (Fig. II-10, JFK Exhibit F-133) revealed that the head in the bush was not in the bush at all. The bush lies between Zapruder and head, with the head itself an appreciable distance away from the bush. Accordingly, there was no evidence of a person actually hiding behind the bush.

(328) Having located the head, the linear feature purported to be a rifle was examined. The computer-enhanced image shows a number of linear features similar to the one near the head, all extending in the same general direction as the alleged rifle. Further, close inspection of the enhanced image shows that the narrow part of the linear feature (the alleged "barrel" of the rifle)

^{dd}See addendum B, par. 340 *infra*.

passes in front of the leaves in the bush. Since the head lies far on the other side of the bush, it was geometrically impossible for an actual rifle barrel near this head to be situated in front of any leaves in this bush.

(329) The Panel concluded that the linear feature was not a rifle barrel; it was only one of a number of twigs in the bush, all characterized by the same general direction and spacing in the natural growth patterns of the bush.

(330) Additional processing work was done at the Los Alamos Scientific Laboratory to study the region of the linear feature.¹²¹ This processing, which was based on the knowledge that similar objects reflect light in similar ways, has been applied by NASA in analyzing satellite photographs of the earth for natural resources.¹²² The technique developed by NASA is known as spectral ratioing and involves a comparison of color measurements of the color values.¹²³ The objective is to compare the different amounts of red, green, and blue light reflected by an object. This is done by obtaining a computer scan of the photograph's red, green, and blue components and then measuring each one.

(331) When the Los Alamos Scientific Laboratory applied this spectral ratio technique to Zapruder frame 413, it found that the ratios in the region of the thick part of the linear feature (the "rifle stock") were identical to the ratios of the light reflected from the presidential limousine.¹²⁴ On that basis, the Panel concluded that the "rifle stock" was only a hole in the bushes looking through to the limousine, which by virtue of being coincident with a twig, created the false impression of a rifle. Thus, no evidence of a gunman was discerned by the Panel.

B. Photograph Authentication

1. THE OSWALD BACKYARD PHOTOGRAPHS^{cc}

(a) Introduction^{ff}

(347) One of the most publicized questions to emerge in relation to the Kennedy assassination involves the authenticity of photographs showing Lee Harvey Oswald standing in his backyard,

^{cc}This section prepared under the direction of C. S. McCamy and Cecil Kirk, with the assistance of David Eisendrath. For related public hearing testimony of McCamy and Kirk, Sept. 14, 1978, see HSCA-JFK Hearings, vol. II, pp. 349, 397.

^{ff}A glossary of terms is available in Appendix A of "The Backyard Pictures," Report to the House Select Committee on Assassinations by Dr. Leslie Stroebel, Mr. Andrew Davidlasy, and Dr. Ronald Francis, October 1978 (JFK Document No. 12902 [Hereinafter referred to as RIT Technical Report]). See par. 445 infra.

with a holstered pistol strapped to his waist, holding a Mannlicher-Carcano rifle and two newspapers. These have become known as the backyard photographs.

(348) Oswald himself, when shown the pictures at Dallas police headquarters after his arrest, insisted they were fakes. Through the years, many critics have argued the same thing. In part, the controversy was stimulated by a Life magazine cover of a copy of one picture, retouched to enhance its quality.

(349) If the backyard photographs are valid, they are highly incriminating of Oswald because they apparently link him with the murder weapon. If they are fakes, how they were produced poses far-reaching questions in the area of conspiracy. "Faked" backyard photographs would indicate a degree of conspiratorial sophistication that would almost necessarily raise the possibility that a highly organized group had conspired to kill the President and make Oswald a "patsy."

(1) History of the Backyard Photographs

(350) In the early afternoon of November 23, 1963, Dallas detectives obtained a warrant to search the Paine residence in Irving, Texas, where Marina Oswald had been living.¹²⁵ The search concentrated primarily on a garage in which possessions of the Oswalds were stored. Among the belongings, Dallas police officials found a brown cardboard box containing personal papers and photographs, including two snapshots and two negatives of Oswald holding a rifle.¹²⁶ (Only one negative was made available to the Warren Commission; the other has never been accounted for.)¹²⁷

(351) On the evening of November 23, 1963, Lee Harvey Oswald was shown an enlargement of one of the pictures. (That photograph was later designated by the Warren Commission as CE-133-A.) According to the officers present, Oswald denied that he had ever seen the photograph and claimed that someone has superimposed his head on another person's body. Oswald was then shown the print (later designated as CE-133-B), which he also claimed was a trick photograph.¹²⁸

(352) Marina Oswald was later questioned by the FBI about the photographs. She said that she had taken them in the backyard of the Oswald residence on Neeley Street in Dallas.¹²⁹ She gave, however, two different versions of when the pictures were taken. She first told the FBI it was late February or early March 1963.¹³⁰ Her testimony to the Warren Commission reflected the same thing.¹³¹ In an FBI interview made after her initial appearance before the Warren Commission, however, she said that the first time she saw the rifle was toward the end of March; she recalled having taken the photographs 7 to 10 days thereafter, in late March or early April.¹³²

(353) Other evidence available to the Warren Commission supports her later version. A rifle and a revolver were shipped to Oswald from different mail order houses on March 20.¹³³ The left-wing newspapers Oswald is holding were dated March 11 and March 24 and were mailed

on March 7 and March 21, respectively, both by second-class mail. According to postal authorities, both newspapers would have arrived in Dallas by March 28.¹³⁴ In addition, Marina claimed she remembered taking the photographs on a Sunday, about 2 weeks before Oswald allegedly shot at Gen. Edwin Walker on April 10.¹³⁵ From this information, the Commission deduced the likely date on which the photographs were taken to be Sunday, March 31, 1963.¹³⁶

(354) In connection with the Warren Commission's investigation, Lyndal L. Shaneyfelt, an FBI photographic expert, performed an analysis on the two backyard prints designated CE-133-A and B, a negative, designated CE-749 (the original negative of CE-133-B), the Imperial reflex duo lens camera (designated CE-750) that Marina Oswald testified she had used to take the pictures¹³⁷ and the alleged assassination weapon (designated CE-139). His analysis and conclusions are as follows:

(355) (1) The photographs CE-133-A and B were taken with Oswald's Imperial Reflex Duo Lens camera.¹³⁸ Every camera has unique irregularities that are reflected on the margins of negatives made by it. Shaneyfelt determined that the margin irregularities of the original 133-B negative were identical to those of a negative that he exposed in the camera.

(356) Although he could not document absolutely the origin of CE-133-A because its negative was not available, Shaneyfelt concluded that both prints were taken with the same camera since they showed virtually identical background and lighting conditions.¹³⁹

(357) (2) The backyard photographs CE-133-A and B are authentic. Shaneyfelt examined them under magnification and found no characteristics of compositing or retouching.¹⁴⁰ Initial public controversy regarding the authenticity of the backyard photographs arose after copies of CE-133-A, which appeared to differ in detail from the original photograph as well as from each other, particularly with respect to the configuration of the rifle, were published in Life, Newsweek and other news publications.¹⁴¹ He testified that the apparent variations in the magazine versions were caused by retouching, a common practice in the reproduction of photographs for publication.¹⁴²

(358) (3) The rifle in the backyard photographs is probably the rifle found in the Texas School Book Depository. Shaneyfelt photographed the rifle, attempting to duplicate the lighting and rifle's position in CE-133-A, and found the configurations match those of the rifle in the backyard photograph. Although he found a notch in the photographs, he did not find enough peculiarities to state categorically that the rifles were identical.¹⁴³

(359) Despite the Warren Commission's efforts to show that the backyard photographs were genuine, critics have persisted in doubting their authenticity. In general, the critics base their allegations of fakery on their observations of shadow inconsistencies, an indication of a grafting line between the mouth and chin, inconsistent head and body proportions, or a disparate square-shaped chin.¹⁴⁴

(360) This position has received support from scientists who had not previously been associated with Warren Commission critics. For example, Malcolm Thompson, a British forensic photography expert, questioned in public the authenticity of the photographs in a 1978 British Broadcasting Corporation (BBC) television documentary.¹⁴⁵ At the request of the BBC, he had examined copies of the backyard photographs and concluded they were fakes.⁸⁸ Similarly, a photographic analyst with the Canadian Department of Defense reached the conclusion that these photographs were composites.¹⁴⁶

**(2) Additional photographic evidence recovered by the House
Select Committee on Assassinations**

(361) Marina Oswald, in addition to giving two different versions as to when the backyard pictures were taken, gave different versions of the number of pictures taken. At first, she testified she had taken one picture¹⁴⁷; later she said it was two.¹⁴⁸ In addition, Marguerite Oswald testified soon after the assassination she and Marina destroyed yet another picture in which Oswald was shown holding the rifle over his head with both hands.¹⁴⁹

(362) The committee obtained an 8"x10" print of an additional view of Oswald holding the rifle in a pose different from CE-133-A or B. This photograph, a first generation print,^{hh} was given to the committee on December 30, 1976, by Mrs. Geneva Dees of Paris, Texas. According to Mrs. Dees, it had been acquired by her former husband, Roscoe White, now deceased, while employed with the Dallas Police at the time of the assassination.¹⁵⁰ The Panel designated this recently discovered photograph as 133-C (Dees).

(363) The committee obtained another first generation print of CE-133-A on April 1, 1977 from the widow of George de Mohrenschildt.¹⁵¹ In the manuscript of his book, which he was writing at the time of his death in 1977, he stated that he and his wife had found the photograph in February 1967 among personal belongings they had stored in Dallas before departing for Haiti in May 1963.¹⁵²

(364) Two additional first generation prints, one of 133-A and one of 133-C, were obtained from former Dallas Police Detective Richard S. Stovall on April 14, 1978.¹⁵³ Stovall was among the police officers who discovered the backyard photographs during the search of the Paine premises.¹⁵⁴

⁸⁸The text of a statement by Mr. Thompson is available in app. B to RIT Technical Report. See par. 445 *infra*.

^{hh}A first generation print is one made from the original negative.

(b) Issue

(365) Is there any evidence of fakery in the photographs of Lee Harvey Oswald that show him standing in a backyard holding a rifle in one hand and two left-wing newspapers in the other?

(c) Materials and Procedures

(366) The Photographic Evidence Panel examined Warren Commission Exhibits CE-133-A and 133-B, the two backyard pictures seized from the Oswald residence by Dallas Police in 1963; CE-749, the original negative to CE-133-B, and CE-134, an enlargement of CE-133-Aⁱⁱ. In addition to these Warren Commission exhibits, the Panel analyzed the four photographs recently discovered by the committee:

(367) (1) A photograph designated as 133-A-de Mohrenschildt recovered from the estate of the late George de Mohrenschildt¹⁵⁵;

(368) (2) A photograph designated as 133C-Dees, obtained from the Dees widow¹⁵⁶;

(369) (3) Photographs designated as 133A-Stoval and 133C-Stovall, obtained from Stovall.¹⁵⁷ (See Fig. IV-15, JFK Exhibit F-178, for a display of all of these photographic materials except CE-134, which is shown in Fig. IV-22.)

(370) These items were selected because of the Panel's policy of working just with first generation prints and original negatives.¹⁵⁸ Only these types of materials contain the most reliable photographic information; subsequent generation materials tend to lose detail in highlight and shadows areas, suffer deterioration of tonal quality, and are prone to include new defects that may impair the accurate representation of the photographic image. CE-133-A, CE-133-B, 133A-de Mohrenschildt, 133C-Dees, 133C-Stovall and CE-134 were identified by the Panel as first generation prints. CE-749, the original negative to CE-133-B, was the only negative recovered from the possession of the Dallas Police Department; consequently, it was the only original negative available to the Panel for analysis. There is no official record explaining why the Dallas Police Department failed to give the Warren Commission the other original negative.¹⁵⁹

(371) In addition to studying the various backyard picture materials, the Panel examined CE-750, which was alleged to be Lee Harvey Oswald's camera.¹⁶⁰ to determine whether it was used to take the backyard photographs. Next, the negatives and photographs were both visually inspected and compared with known photographs of Oswald. The Panel's visual inspection included the use of magnifiers and microscopes. As an aid in this process, a series of enlargements of varying exposures and contrast ranges was made of CE-133-A and 133-B, thereby producing prints which ranged from very light to very dark. (See Figs. IV-16 and IV-

ⁱⁱCE 134 was examined by two Panel members after the final Panel conference in July 1978.

17, JFK Exhibits F-192 and F-193.) The detail in the darkest parts of the pictures could be most clearly seen in the lighter prints. The details in the lightest area could be most clearly seen in the darker prints. In this way, the Panel had the best opportunity of detecting any evidence of falsification anywhere in the pictures.

(372) In a further effort to locate unnatural edges or lines, as well as differences in grain structure and contrast variations, the Panel used digital image processing.^{jj} The negative of CE-133-B was placed on a microdensity scanner so that light passing through the film could be measured. Such measurements were made on microscopic square areas that were positioned in a square-by-square pattern, but the actual squares were smaller than the silver grains on the negative. The measuring instrument determined how light or dark each microscopic square area was and expressed this as a number in a scale of 1,024 grades of density. As the film was scanned, the number for each square area was stored in the memory of a computer. The computer could subsequently recall the numbers, and cause a beam of light to expose a tiny spot on a piece of unexposed photographic film. Each small area was exposed to a magnitude corresponding to the relative lightness or darkness of the area on the original negative. When the exposed film was developed, it provided an enhanced copy of the original image.

(373) The computer was also programmed to manipulate the data stored in its memory. It could produce a copy different from the original in some specified way: It could vary the contrast; it could enlarge the image; or it could produce a more complicated derivation. It could be programmed to search for edges between dark and light areas and to print a line on the copy at the place corresponding to the edge on the original.

(374) The backyard pictures were also visually inspected with stereoscopic techniques that permitted the prints to be viewed in three dimensions.^{kk} This was possible because the camera's movement between exposures 133-B and 133-A resulted in two views, only a short distance apart, of a single scene. When these two pictures are viewed together in a stereo viewer, they give rise to a three-dimensional image.^{lll}

(375) This analytic technique is useful in the detection of fakery because photographs of prints (i.e., a photographic copy of a photograph), when viewed in stereo, will not project a three-dimensional image unless made from different viewpoints along one axis.^{ll} Further, any retouching of an original photograph of a scene can be detected because when two photographs of that scene are viewed in stereo, the retouched item will appear to lie either in front of or

^{jj}This principle of stereoscopy is discussed in pars. 76-78 *supra*.

^{kk}See pars. 16-34, *supra*.

^{ll}Identical photographs or photographs made from the same camera position will not generally exhibit stereoscopic characteristics. Nevertheless, if a camera is stationary and photographs of a subject that moves are viewed stereoscopically, the subject may exhibit three-dimensional properties, while the background will not.

behind the plane in which it should be lying. It is virtually impossible to retouch one or both images of a stereo pair with enough skill to escape detection when viewed stereoscopically.

(376) Finally, in addition to these methods of visual inspection, the materials were studied photogrammetrically. "Photogrammetry is the science of ascertaining the positions and dimensions of objects from measurements of photographs of these objects."¹⁶² In the Oswald backyard pictures, photogrammetry was given particular emphasis in studying critical shadow areas.

(d) Conclusion

(377) The Panel detects no evidence of fakery in any of the backyard picture materials.

ATTACHMENT B

BRITISH BROADCASTING CORP.
Lime Grove Studios, London, February 9, 1978.

Representative RICHARD PREYER
House of Representatives,
U.S. Capitol,
Washington, D.C.

DEAR CONGRESSMAN PREYER: I wanted to send this transcript along to you immediately. We initiated a detailed analysis of the Oswald holding the rifle photos by Detective Superintendent Malcolm Thompson who ran the Police Forensic Science Laboratory Identification Bureau for 25 years. He is also an ex-president of the Evidence Photographers International Council and a fellow of the Institute of Incorporated Photographers, the Royal Photographic Society and the Institute of Professional Investigators. In short, he knows what he's talking about.

As you will see, he is sure that it is a fake photo - a montage of three separate pictures. Naturally, I'll be using him in our film, but I wanted your committee to have this information directly.

I'll be returning to New York on February 20, and we'll be having a prescreening in Washington sometime thereafter. We'll be in touch with your office to work out a convenient time and place for you and any committee or staff who might be interested.

My best,

DAVID OSTERLUND.

PANORAMA KENNEDY

ROLL 1A

INTERROGATOR. Mr. Thompson, would these photographs be acceptable as evidence in a British court of law?

MR. THOMPSON. No. I have examined these photographs and have established without doubt that there is retouching on them and it is a basic principle with a forensic photographer that he would never, never retouch a photograph in any form of litigation.

INTERROGATOR. What would happen in a British court of law if photographs like this were produced as evidence in a murder case?

MR. THOMPSON. If they were produced in a murder case then the defending counsel without doubt would have an expert examine them and if retouching was found on them then they would not be included in the evidence.

INTERROGATOR. Are you saying that if photographs like this were produced in a British court of law in a case, they would be thrown out.

MR. THOMPSON. I do. Yes. They would be thrown out.

INTERROGATOR. What leads you to feel that?

MR. THOMPSON. Well, primarily the retouching is very, very obvious in certain parts of the picture, but more in particular in a perpendicular pillar here which should be a straight line. When one comes to a point, the subject's chin, one finds that there is a bulge in a line. Without doubt that shows this area between the head and the pillar has been retouched and the retoucher has just not been careful enough to maintain the retouching he should, which is within the pillar, in what should be a shadow area. Now that is photograph B.

In photograph A we do see the pillar as a straight pillar; it is not as if the wood has a flow at that point there. The flaw is created in photograph B due to the fact that the retouching has extended over onto the pillar.

INTERROGATOR. I wonder if you could go through the two photographs and list for me what you regard as the discrepancies in those photographs.

MR. THOMPSON. The backgrounds are very, very similar to the point that either the camera was on a tripod when the pictures were taken or we are speaking about a common negative having been used to produce the two backgrounds. They look dissimilar, there is a horizontal shift and a vertical shift in the two pictures, but that purely and simply, I think, is meant to mislead the viewer.

When one measures the pictures, photograph A is enlarged slightly greater than photograph B but even allowing for that, the shadow detail in the static areas of the picture, that is in particular on the staircase here, the shadows are so exact that there is no doubt in my mind, it is either a common negative used to produce the two prints or two successive negatives with the camera on a tripod and neither camera or tripod moved in any way between the two exposures.

There is a discrepancy up in this area here. At this point I can only assume that someone has cut out this area and changed its position slightly, it is fractional but in this picture here we see the horizontal part of the neighboring house with a highlight in this area, whereas in this picture here the horizontal part can be seen far below the section the angle caused by the upright

pillar and the step. You can see a fractional difference there whereas in this picture the fractional difference does not exist.

Again with that if we take a dark triangle here between the roof of the house next door and skyline then that d - - - angle finishes up level with the shadow of the staircase there, and in the other picture the diactoral angle is below the shadow of the staircase. Similarly, the vine passing up through here is in a lower position at that point in that picture then it is in that picture.

I then come to the conclusion that part has been raised in photograph B and retouching done down here to fill up the small gap created. That is again borne out by the fact that here in photograph A the picture finishes up dark and in photograph B at that point the picture finishes up gray.

So much for the background. If we take the body, the body shadows don't relate to the other shadows in the picture and one can only come to the conclusion that this body has been placed in the background and photograph, but all the shadows here are swinging to the left, whereas this shadow slightly to the left but also behind the body is common to both pictures, but when one examines the shadow content one sees the gun at an angle to the body which does not relate to the angle in the shadow. The gun is reaching far more out to the right, more in a horizontal position here in relation to the body shadow than the gun is actually being held by the person.

INTERROGATOR. So you think that those shadows have actually been touched in?

MR. THOMPSON. They have been touched in.

Again, there is something peculiar about this hand. The entire hand and arm is very, very unnatural. It possibly could have been stuck in afterward; but I can't relate physiologically the position of that arm to the body.

The butt of the rifle I think is the telltale in this picture here where we see very, very little of the butt actually protruding beyond the trouser line and yet down here having been painted in is a very, very large butt, I say very large in relation to the length of the shadow and we can measure the length of that shadow in relation to the height of the person and measure off the butt of the gun as against the shadow of the butt and that is to me unnatural.

The head itself, I have seen photographs of Oswald and his chin is not square. He had a rounded chin. Having said that, the subject in this picture has a square chin, but again it doesn't take any stretch of the imagination to appreciate that from the upper lip to the top of the head is Oswald and one can only conclude that Oswald's head has been stuck on to a chin, not being Oswald's chin.

Then to cover the montage, retouching has been done both to the right, that is Oswald's right and Oswald's left and when we consider this area of retouching here - compare it with what we see in photograph A we have a shadow cast by this wooden pillar. I have measured those and even allowing for the difference and degree of enlargement between photograph A and photograph B the area we see in shadow here is far in excess of what it should be and, of course, that is the area to which I referred earlier on where the pillar coming down does not continue in a straight line but has this bulge in it.

INTERROGATOR. Are there other things about the face itself which would make you suspicious?

MR. THOMPSON. Yes, again we have a shadow underneath the nose. In photographs A and B you see Oswald's face in different posture and yet the shadow under the nose hasn't moved, or if it has moved, it is only fractional compared with the actual movement we see in the face, and one comes to the conclusion that is the same picture used for both faces; possibly in this face here he has got a scowl on his face and there has been retouching done in the chin area, which is what one would expect if my conclusion is correct, that this face has been added onto the chin.

He has a very, very thick lower lip here which is not consistent with Oswald's lip and again the shadow underneath the lip is a horizontal shadow, that is consistent in both, even allowing for the fact that we have a slight tilt in the head of photograph B as against that in photograph A.

INTERROGATOR. Is it easy to make a photo montage like this?

MR. THOMPSON. Yes; it is very, very common in the advertising world, professional photography; advertising photographers do montages all the time because it is the easiest way of obtaining the effect they want, as against to set up that effect; it might be an impossible effect to set up, they have got to resort to a photo montage to do it.

801 Take 1

INTERROGATOR. What about the arm?

MR. THOMPSON. The arm in photograph B just doesn't look natural, in fact it looks as if it has been stuck on the body.

INTERROGATOR. How easy is it to make a photo montage like this, how would people go about it?

MR. THOMPSON. It's not difficult. If one has a background scene, the subject photographed against a white background making it simpler to cut out the subject from the back.

INTERROGATOR. How do you think this photo montage was achieved?

MR. THOMPSON. The montage could be achieved by a photograph of the background and a photograph of a body against a white background and having been cut away from that white background and then matted as we see it here and then being in possession of a photograph of Oswald's head, merely mounting that onto the top of the body, stuck down and touched in such a way that your lines are not going to be too cut and dried between the body and the background and then rephotographed onto a negative and then from that negative, of course, producing as many prints as you like and possibly rephotographing the print from the negative in order to soften down the background, and that would develop each time the photograph was copied.

INTERROGATOR. Is that very easy to do?

MR. THOMPSON. It is not difficult at all; don't ask me to do it, I am a forensic photographer. The last thing I would do is to retouch or indulge in any form of montage. My duty would be to present to the court what I know about the case and illustrate what I know about it in straightforward photography; they do resort to photo montages, in particular the advertising profession.

INTERROGATOR. Would the investigator agencies in America like the FBI and the CIA have that sort of professional expertise themselves?

MR. THOMPSON. I would hope they don't have it because it is not part of their duties as forensic photographers to produce anything in court which has been retouched.

INTERROGATOR. Yes; but regardless of your hopes, I am asking whether you believe that the professional agencies in America have that sort of photographic expertise?

MR. THOMPSON. I wouldn't think they have it, but most certainly it wouldn't be difficult to get access to it. Every moderate studio in America has its retoucher in the same way as the biggest studios in Britain have their retoucher, but in America you do have photographic artists, a profession all to itself, and they are spread all throughout the United States; access to one of those persons, it's mostly ladies who do it and do an extremely good job in producing from a black and white picture, anything from anything as far as an oil painting from photographs.

INTERROGATOR. How quickly could you make a photographic montage like that?

MR. THOMPSON. I would guess and say that you need at least 4 hours to produce it and that is working hard and possibly a team working at it, not just one man, but I have no personal experience of how long it takes.

INTERROGATOR. Would you be prepared to produce yourself those photographs as evidence in court?

MR. THOMPSON. After having examined them, definitely not. I couldn't resort to producing anything in court which was other than just the original print from the original negative, even to the point if there was a flaw in the negative, I'd be prepared to leave that in the final enlargement for the court purposes. If I was asked during the trial or hearing, then I could explain away quite simply as it being a flaw in the negative and possibly have the negative there as evidence. There is no need to retouch anything in a forensic photograph and certainly in Britain forensic photographers would just not retouch anything.

INTERROGATOR. Do you believe that those photographs are fakes?

MR. THOMPSON. I think they are a fake and possibly the shadow detail and its relation to the static scene and the body are the giveaway, plus the fact there is retouching in sufficient salient places to make one appreciate that something peculiar has gone on in relation to the head and the body and the areas surrounding it.

INTERROGATOR. Can you describe what your method was in order to try and determine that it was fake?

MR. THOMPSON. One measures the pictures first to ascertain the degree of enlargement, there is no use comparing distances on a picture unless you are certain that the two pictures you are comparing are of the same degree of enlargement. In this case they weren't of the same degree of enlargement and that created slight difficulty in relating one subject to another.

After having done that, a very close examination of the fine detail present in the pictures brought me to my conclusion.

INTERROGATOR. Was your method to look for discrepancies?

MR. THOMPSON. Exactly, that has been my life's work, looking for the unusual and comparing one thing with another to see similarities or dissimilarities.

INTERROGATOR. And what in general has been your conclusion in looking at those two photographs?

MR. THOMPSON. In general I have come to the conclusion that we have a montage of three pictures to make one end product as we see it here today.

INTERROGATOR. Does it strike you as strange that the police did not find those photographs, despite an intensive search on the day of the assassination and only found them the next day?

MR. THOMPSON. Well, searches of premises are always difficult things to carry out; one has got to be systematic. There is only one way to carry out a proper search of a scene of crime or any other premises which might be of interest to the police, and that is there are two officers doing it and one officer systematically follows round, doubling what the other officer has done, and that way then two pairs of eyes should be better than one pair and nothing of importance should be missed.

INTERROGATOR. So does it strike you as strange that in their search, after all connected with the assassination of a president, that they should find such damning evidence the next day?

MR. THOMPSON. It does, it does seem unusual. One would think that the officers involved would be highly experienced officers, would know and have been trained to carry out the search of premises.

INTERROGATOR. Is there any possibility in your mind that those two photographs are genuine?

MR. THOMPSON. I don't think there is any possibility; having examined them for a considerable time it is my considered opinion that they are not genuine.

INTERROGATOR. Thank you very much.

ROLL 2A

802 Take 1

INTERROGATOR. After examining these photographs, what is your professional opinion on them?

MAN. My opinion is those photographs are faked.

INTERROGATOR. What makes you think that?

MAN. The amount of retouching that is done and possibly more in particular the relationship between the shadows of the background and the shadows in the front of the body in the picture.

INTERROGATOR. Would you ever be prepared to produce those photographs in a British court of law?

MAN. No. I certainly would never contemplate using pictures which had been retouched or spotted in any way in a court of law. My task would be purely and simply to illustrate the evidence I was giving by straightforward photography. Any blemishes in my pictures then most certainly I would leave them in there and finish the enlargements and be able to explain to the court which exactly had happened, have the negative in my pocket as a protection if necessary. There is no need to spot pictures and forensic photographers in this country will just not resort to any form of retouching of any picture.

INTERROGATOR. Is there any possibility in your view that those photographs are genuine?

MAN. There is no possibility in my view that they are genuine, they have been retouched and I consider the picture to be the result of a montage.

INTERROGATOR. Thank you.

2. AUTHENTICATION OF THE KENNEDY AUTOPSY PHOTOGRAPHS AND X-RAYS

(a) Introduction

(512) Authentication of the autopsy photographs allegedly taken of President Kennedy was considered essential because of the discrepant descriptions that have been given of the wounds incurred by the President. The description of the size and location of the President's head wounds, for example, by eyewitnesses at Parkland Hospital, differed dramatically from the testimony of the autopsy doctors and the account set forth in the Warren Report.¹⁹⁵ More recently, the panel of medical experts convened by then-Acting Attorney General Ramsey Clark described Kennedy's head entrance wound as approximately 10 centimeters higher than the location reported by the Warren Commission.¹⁹⁶ As a result of these discrepancies, it was essential to verify that the autopsy photographs and X-rays did, in fact, depict Kennedy, and that these materials had not been altered in any way.

(b) Issues

(513) 1. Do the postmortem photographs and X-rays in the custody of the National Archives purporting to depict President Kennedy, in fact, depict him?

(514) 2. Is there any evidence that either President Kennedy's autopsy photographs or X-rays have been altered?

(c) Materials examined

(515) Twenty-seven original color transparencies and the twenty-five original black and white negatives were examined. These depicted the subject's head and upper torso from various positions.^{mm} In addition, 8"x10" color and black and white photographic prints generated from these transparencies were evaluated.

(516) The X-ray materials consisted of the following items:

(517) 1. An attempted anteroposterior projection of a skull identified as:

^{mm}A more detailed description of these photographs is provided in pars. 570-571, 583-595 infra.

21296 (numbers upside down).
 U.S. Naval Hospital.
 NNMC Bethesda, Md.
 November 22, 1963.

- (518) 2. Right lateral projection of a skull with the same identification symbols.
- (519) 3. Left lateral projection of a skull with the same identification symbols.
- (520) 4. Three radiographs of three fragments of bone unidentified by symbols.
- (521) 5. An anteroposterior projection of a chest with the same identification symbols as Nos. 1-3 above. This radiograph was obtained with the thoracic cage intact, that is before autopsy.
- (522) 6. An anteroposterior projection of a chest with the same identification as No. 5 above. This radiograph was obtained after the thorax had been opened and the lungs and mediastinal had been removed.

(d) Procedures

(523) Independent of the Panel's analysis, the photographs and X-rays were reviewed by the three physicians who performed the autopsy, the leader of the X-ray team that took the postmortem X-rays, and by the photographer who took the autopsy pictures. These individuals indicated that the photographs and X-rays accurately portrayed Kennedy's various wounds.¹⁹⁷

(524) The Panel's board of consulting forensic anthropologists and a forensic odontologist compared the photographs and X-rays with pre-mortem photographs and X-rays of Kennedy. Pre-mortem materials were studied for the purpose of discerning unique anatomic features whose presence in the postmortem photographs and X-rays would verify that the individual depicted was, in fact, Kennedy.

(525) The photographic materials and X-rays were examined visually by the Panel.^{mm} This review included both microscopic examination and viewing relevant photographs in a stereoscope, a special device that allows pairs of photographs to be viewed in three dimensions. Because stereoscopy provides an excellent means by which altered or doctored photographs can be detected,^{oo} primary reliance was placed upon this analytical technique.^{pp}

^{mm}Because the Department of Defense was unable to locate the camera and lens that was used to take these photographs, the Panel was unable to engage in an analysis similar to the one undertaken with the Oswald backyard pictures that was designed to determine whether a particular camera in issue had been used to take the photographs that were the subject of inquiry.

^{oo}The principle of stereoscopy is discussed in detail in pars. 75-79, 434-36 supra.

(526) Finally, the autopsy X-rays, in addition to being reviewed by the Panel, were analyzed for evidence of fakery by a radiologist who had particular expertise in the area of image enhancement.

(e) Conclusion

(527) 1. The postmortem photographs and X-rays in the custody of the National Archives purporting to depict Kennedy do, in fact, depict him.

(528) 2. There is no evidence that either the Kennedy autopsy photographs or X-rays have been altered.

(d) Comparison of photographs of Joseph Milteer with that of an unidentified Dallas motorcade spectator

1. INTRODUCTION

(611) An unidentified motorcade spectator who bears a strong resemblance to Joseph Milteer, a militant right-wing organizer who is alleged to have been a possible coconspirator in the assassination, appears in the background of a photograph that was taken by Associated Press photographer James W. Altgens less than a minute before the assassination occurred.²⁰² The presidential limousine can be seen passing the Dal Tex Building on Houston Street just before the vehicle turned south onto Elm Street in front of the Texas School Book Depository Building. The spectator in question is seen standing on the east side of Houston Street, just beyond the limousine. He is a white male appearing to be about 60 ± 10 years of age. Immediately to his right is a taller man wearing a dark hat, coat and necktie. (See Figure IV-40, JFK Exhibit F-124.)

(612) Milteer's possible involvement in the assassination was first brought to public attention by Harold Weisberg, the author, who described a taped conversation that allegedly took place in Miami, Florida 13 days before the assassination between Milteer and a Miami police informant, Willie A. Somersett (both now deceased).²⁰³ During the taped discussion, a voice identified as that of Joseph Milteer says that a plan to kill the President is "in the working" and describes how the President could be shot "(f)rom an office building with a high-powered rifle."²⁰⁴ FBI documents describe subsequent interviews, both with a "reliable informant,"²⁰⁵ relating further incriminating comments by Milteer regarding the events of the assassination,²⁰⁶ and with Milteer, who denied any involvement.²⁰⁷ These FBI documents were retained in the

^{pp}While several of the autopsy photographs and X-rays were enhanced through the use of digital image processing, the resulting enhanced photographs and X-rays were used exclusively by the autopsy panel for determining the nature and cause of wounds. They were found to be unnecessary in the analysis to detect possible fakery, since the original materials, when viewed stereoscopically, were of sufficient quality to resolve this issue.

Warren Commission files, but the Commission is said not to have investigated this matter further.²⁰⁸

(613) Assassination critics raise the possibility that Milteer was an active participant in a conspiracy and present in Dealey Plaza at the time of the assassination as evidenced by the Altgens photograph.²⁰⁹ The man the critics claim is Milteer also appears in a few frames of the Bell, Nix and Muchmore motion picture films.

2. ISSUE

(614) By comparing known photograph of Milteer with photographs of the motorcade spectator in Dealey Plaza, is it possible to determine whether the spectator, in fact, is Milteer?

3. MATERIALS

(615) (a) The photographs of Joseph Milteer consist of the following items:

Figure IV-41. - Two undated 5 x 7-inch black and white studio portraits stamped "Modern Studio, 219 W. Adams Street, Jacksonville, Florida." In these the subject appears to be about 40 ± 5 years old. As Milteer was born in 1902, these photographs probably date from the 1940's or early 1950's.

Figure IV-42. - A 3 x 3-inch snapshot of Milteer seated in a chair. A 1957 calendar appears in the background.

Figure IV-43. - A 3 x 4-inch black and white photograph. This photograph is undated, but judging from the subject's apparent age is obviously later than Figure IV-41 photographs and probably also later than Figure IV-42.

Figure IV-44. - A 3.5 x 5.5-inch black and white photograph of Milteer standing beside an unidentified elderly woman. It is undated, but is said to have been taken in the early 1970's when Milteer was about 70 years old.

(616) (b) Prints of the spectators were made from the original Altgens negative. (See Fig. IV-45, JFK Exhibit F-563.) In addition, both the Altgens negative and relevant frames of the Bell film were subjected to digital image processing.^{210qq} (See Fig. IV-46.)

^{qq}Computer enhancement of the spectator as seen in the Bell film did not produce usable results.

4. CONCLUSIONS

(617) Milteer resembles the Kennedy motorcade spectator in age and general facial configuration. The spectator appears to have worn eyeglasses similar in general style to those favored by Milteer. The spectator, however, does not resemble Milteer in upper lip thickness: he is also partially bald, whereas Milteer apparently had a full head of hair in the photograph that was taken several years after the assassination. (See Fig. IV-44.) Most significantly, Milteer's reported stature of 64 inches places him about 6 inches under the spectator's estimated stature.²²¹

(618) In the absence of evidence that (1) Milteer had become extensively bald by 1963 or was wearing a hairpiece in the post-assassination photograph, or that (2) Milteer's stature estimate of 64 inches is incorrect, the motorcade spectator could not have been Joseph Milteer.

(e) The three tramps

1. INTRODUCTION

(660) Immediately after the assassination, law enforcement officers conducted a search of the area behind the grassy knoll in which several railroad boxcars were situated. As a result of this search, approximately six to eight persons who appeared to be derelicts were taken either to the nearby Dallas County Sheriff's office, or to the Dallas Police Department for questioning. All were released without being booked, fingerprinted or photographed.²²² Among these "derelicts" were three men who, according to the arresting officers, had been found in a boxcar approximately one-half mile south of the assassination scene.²²³ As the police led the three derelicts through Dealey Plaza to the sheriff's office, they were photographed by several press photographers.²²⁴

(661) When allegations of a CIA connection with President Kennedy's death emerged in the years following the assassination, these photographs received wide publicity in newspapers, television and in the April 28, 1975 issue of Newsweek magazine.²²⁵ It was claimed that two of the derelicts or "tramps" as they had come to be called, bore striking resemblances to Watergate burglars E. Howard Hunt and Frank Sturgis respectively.²²⁶ Allegations have been made that Hunt, who had been a CIA employee in 1963, and Sturgis, who, while not an employee, had been involved in the CIA-related activities, had been together in Dallas on November 22, 1963 and had participated in the assassination as part of a CIA conspiracy.²²⁷

(662) In 1975 the Rockefeller Commission, investigating CIA activities within the United States and allegations concerning CIA complicity in the Kennedy assassination, requested the FBI to compare known photographs of Hunt and Sturgis, taken near the time of the assassination, with photographs of the tramps each was said to resemble.²²⁸ After a photographic analysis of

²²¹See *infra*, pars. 625-659.

facial and statural characteristics of the men in question, the FBI concluded that "neither E. Howard Hunt nor Frank Sturgis appear as any of the three 'derelicts' arrested in Dallas, Texas, as shown in the photographs submitted."²²⁹ In response to the 1975 Newsweek story, the CIA also conducted a physiological comparison of the Hunt and Sturgis photographs with the tramp photographs, and reached the same conclusion as the FBI.²³⁰

(663) Nevertheless, Warren Commission critics still view this issue as unresolved and the identity of the three tramps is still regarded as an important part of the conspiracy theories.²³¹ In addition to the Hunt and Sturgis connection, three other individuals, Thomas Vallee, Fred Lee Chrisman, Daniel Carswell, who have been named as possible co-conspirators, have been suggested as likely tramp candidates.

(664) In an attempt to identify or exclude Hunt, Sturgis and these other individuals as one of the derelicts arrested by the Dallas Police Department, forensic anthropologists were asked to examine and compare photographs of the tramps and the suspected individuals.

2. ISSUES

(665) Can any of these individuals be positively identified or excluded as one of the three tramps?

3. MATERIALS

(666) Three tramps.--A series of 8"x10" black and white copy prints depicting one or more of the tramps were examined. (See Figs. IV-50 - IV-56.) These were taken by press photographers as the detainees were being escorted through Dealey Plaza by Dallas police officers. A number of enlargements of the heads of the three individuals were also provided.

(667) Photographs of the following individuals were examined and compared with those of the tramps:

(668) Daniel Carswell.--Two photographs, one an 8"x10" black and white lateral view (1963) and the other a 3"x3" color frontal view (1969), were reviewed.

(669) Fred Lee Chrisman.--The only available photograph was a single undated black and white 8"x10" print.

(670) E. Howard Hunt.--Twenty-six black and white photographs that span the assassination period and vary widely in type, pose, and quality examined.

(671) Frank Sturgis.--A series of 38 black and white photographs, ranging widely in quality and varying from casual snapshots to studio photographs, were studied. They are undated but, based upon the subject's age and clothing styles, they appear to span the period of the assassination.

(672) Thomas Vallee.--One 8"x10" black and white frontal view was analyzed.

4. CONCLUSIONS

(673) Daniel Carswell, E. Howard Hunt, Frank Sturgis, and Thomas Vallee were not the tramp(s) with whom they were being compared. Fred Chrisman strongly resembles one of the tramps, but without analysis of additional photographic materials, no positive identification can be made.

5. ANALYSIS

(674) The three tramps have been arbitrarily identified "A," "B," and "C" according to their positions, from left to right, in Figure IV-50. All three are white males of medium stature and physique. Tramp A appears to be approximately 35 ± 5 years old, tramp B about 30 ± 5 years, tramp C, the eldest, about 50 ± 10 years. Tramp B is the tallest, exceeding A and C (who are approximately equal height) by about 3 to 5 inches. None of the men have any striking facial abnormalities or disfigurements. Their hands, shown in several photographs, display no abnormalities or amputations that might serve as clues to identification. Judging from his apparent gait, tramp A may have been slightly bow-legged. Tramp C appears to have been somewhat splayfooted.

(675) All three men are shabbily dressed, befitting their apparent status as vagrants. Tramp A, however, is the better attired, wearing well-fitting jeans and a tweed-like sports jacket, although this judged by 1963 styles was several years out of date. Tramp B is wearing ill-fitting slacks and a double-breasted suit coat. Tramp C, from his battered fedora to his worn-out shoes, has managed to achieve a sartorial effect similar to what one would expect had he been fired from a cannon through a Salvation Army thrift shop.

(676) While such clothing might be a disguise, their footwear seems consistent with their classification as vagrants. All three men are shod in worn, low-cut oxfords that appear to be leather-soled. Tramp C's shoes seem to be several sizes too large for him.

Tramp A

(677) Enlarged photos of this tramp were compared with those of Thomas Vallee who, a few weeks before the assassination, had been arrested in Chicago after making threats on the life of President Kennedy, Frank Sturgis, the anti-Castro soldier of fortune who participated in some of the illegal activities associated with the Watergate scandals, and Daniel Carswell. (See Fig. IV-57, JFK Exhibit F-172.)^{ss}

^{ss}Originally Sturgis was compared only with tramp B (see HSCA JFK Hearings, vol. IV, pp. 374-77); the anthropologists were later asked to extend their comparison to include tramp A.

(678) Table I compares the facial indices of tramp A with those of Vallee, Sturgis, and Carswell. The figures enclosed in parenthesis along with indices of Vallee and Sturgis represent the difference between their indices and that of tramp A. Thus for the nasal index (No. 4), that of Vallee is 68, 3 points less than that of tramp A. This would suggest that Vallee had a slightly narrower nose (relative to its length) than that of the tramp. Nevertheless, when consideration is given to the possibility of variation in the index caused by the inevitable errors involved in taking measurements from the rather poor quality tramp photographs, such a difference is not too impressive. In contrast, the same index for Sturgis exceeds that of tramp A by 15 points, indicating that, compared to the tramp's, his nose was much broader in relation to its length. This difference is considerable, and far outweighs any variation caused by technical error.

(679) When the differences in the other indexes of the series were similarly examined, it was determined that generally the values of Vallee's indices more closely approximated those of the tramp than the indices of either Sturgis or Carswell. Four of Vallee's indices differ by less than 5 points from tramp A's and the largest difference is 7 points. These results were indicative of a fair resemblance between Vallee and tramp A. Sturgis' indices vary between 2 and 15 points from those of the tramp's. The average deviation of all seven indices is 4 for Vallee, 7 for Carswell, and 8.6 for Sturgis. Therefore, on the basis of metric analysis, Vallee's resemblance to the tramp is more impressive than that of either Sturgis or Carswell. An average deviation of 5 or less may be considered as evidence of a strong resemblance between the subjects of analysis.

(680) In addition to this facial index analysis, the subject's morphological features were also closely examined. Strong differences in their features were discerned between those of tramp A and Vallee, Sturgis, and Carswell.

Sturgis

(681) 1. Hair. - Both Sturgis and tramp A have dark hair with a strong transverse wave. Tramp A's bilateral recession of the hairline, however, is more advanced than is observed on any of the Sturgis photographs. Sturgis also has a short, low part line extending from the apex of lateral hairline recession to the right side of the head - a feature not present in tramp A.

(682) 2. Forehead. - Tramp A's forehead is characterized by a strong vertical interciliary sulcus (frown line) that extends upward to a point about three-quarters of the distance between the level of his eyebrows and hairline. This sulcus is a little to the left of the midline of his forehead so that its lower end is located very close to the medial (inner) end of his left eyebrow. This wrinkle, of course, is probably somewhat accentuated by the tramp's deep frown. In several photographs of Sturgis shown in a similar facial expression, however, this deep furrow is not observed. Instead, Sturgis has a short, almost dimple-like, vertical interciliary line situated slightly to the right of the midline of his forehead.

(683) 3. Eyebrows. - The eyebrows of both men are similar in form (low, weakly arched). In the tramp, however, they are more narrowly separated than in Sturgis. In the former, they

are heavy throughout their length; in the latter, the lateral (outer) half of the eyebrows is scantily hair.

(684) 4. Nasal form. - Tramp A's nasal profile is straight, ending in a sharp and angular nasal tip. His nasal tip is horizontal or perhaps slightly depressed. Sturgis has a slightly convex nasal profile with a full, fleshy, and slightly elevated tip.

(685) 5. Mouth. - The Tramp has a relatively wide mouth with thin, membranous lips. Each end of the mouth terminates in an oblique furrow (angulus oris sulcus). Sturgis' mouth is narrower with full lips; the angular furrows at the ends of the mouth are not as prominent as those of the Tramp.

(686) 6. Chin. - The chin of the Tramp is low, moderately projecting and has a relatively narrow, slightly squared lower border. Sturgis' chin is very deep, strongly projecting with an extremely wide, square, lower border. It is also distinguished by a well-marked median cleft - a feature not observed in the Tramp.

(687) 7. Ears. - The Tramp's ears are more projecting than those of Sturgis. The ear lobes of the Tramp are attached; Sturgis has free lobes. In the Tramp, the intertragal notch is extremely narrow, whereas in Sturgis, it is wide.

(688) 8. Physique. - Throughout the numerous series of photographs, Sturgis is characterized by a massive, muscular body build with some suggestion of a tendency toward corpulence. The Tramp, while well-muscled, is thin and wiry. In somatotypic terms, Sturgis would be classified as an endomorphic mesomorph; the Tramp as a mesomorphic ectomorph. Stated more plainly, Sturgis is built like a defensive guard, the tramp like an offensive quarterback. No statural data on either man was available but if it were assumed that they were of equal height, Sturgis would probably outweigh Tramp A by at least 20 to 40 pounds.

(689) To summarize, Frank Sturgis differs strongly from Tramp A in numerous metric and morphological features as well as in overall physique. Most of these features relate more to the underlying skeletal framework than to superficial soft tissues and, therefore, could not be effectively altered by disguise. For example, the massively squared, deep chin of Sturgis could not be altered into the low, more gracile chin of Tramp A. In conclusion, Frank Sturgis can be excluded as a candidate for the identification of Tramp A.

(690) Vallee. - As noted previously, Thomas Vallee resembles Tramp A more strongly in facial indices than Sturgis. There are also some similarities between the Tramp and Vallee in morphological traits. Thus, the contour of the hairline, the projection and general shape of the ears (except for the lobes) and the height and contour of the chin are much alike. Offsetting these resemblances, however, are the following features:

(691) 1. Forehead. - The strong vertical interciliary furrow of the Tramp is not present in Vallee.

(692) 2. Eyebrows. - These are laterally sparse in Vallee, but are heavy throughout in the Tramp.

(693) 3. Mouth. - Vallee has a small mouth, whereas the Tramp's is relatively wide. The upper lip is longer in Vallee. The angular furrows marking the corners of the mouth in the Tramp are not present in Vallee.

(694) 4. Ears. - The Tramp has attached lobes, Vallee's lobes are free.

(695) 5. Nose. - The strongest morphological differences between Vallee and the Tramp are in nasal structure:

(a) Nasal root - Very broad in Vallee, narrow in Tramp A.

(b) Nasal bridge - Wide, low, and concave in Vallee; narrow, salient and straight in Tramp A.

(c) Nasal tip - Rounded and extremely elevated in Vallee; angular and slightly depressed in Tramp A.

(d) Nostrils - In Vallee, the margins of the nostrils recede upward to such an extent that their interiors are fully exposed. This condition is sufficiently extreme to be classified as a disfiguring trait. The nostril margins are of normal configuration in Tramp A.

(e) In Vallee, two wart-like growths are present in the nasal region. The smaller is located just above the lower margin of the left nostril; the larger growth is on the cheek immediately adjacent to the margin of the left nostril. Neither feature is observed in the photographs of Tramp A, although the larger of these two structures is sufficiently sharp to allow visualization if it were present in the photograph.

(696) In conclusion, despite some strong metric resemblance between these two individuals, they are sufficiently dissimilar in morphological features to exclude Vallee as being Tramp A.

(697) Of the three men who have been proposed as Tramp A, the resemblance between the latter and Carswell is the least impressive. As noted previously, they diverge in facial index values by an average of 7.0 points. Carswell's face is relatively long and narrow; Tramp A's is short and broad. This length difference is especially expressed in the lower face with Carswell's chin and upper lip being very long when compared to the Tramp's. Carswell's nose is also much longer, relative to its breadth. Difference in ear structure are also striking. In the Tramp, the lobes are attached whereas in Carswell the lobes are "welded" - that is, they attach to the sides of cheek with no discernible lobe at all. The antihelix of the ear (the elevated ridge just in front of and parallel to the outer margin of the ear) is well-developed in Tramp A, but very poorly developed in Carswell.

Tramp B

(698) Photos of Frank Sturgis and Daniel Carswell^a were compared with those of Tramp B. (See Figure IV-58.) Table II compares the facial indices of Tramp B with those of Sturgis and Carswell.

Sturgis

(699) In terms of these indices, Sturgis most closely resembles Tramp B in mouth height relative to lower face height (No. 5), the length of his ear lobe relative to the total ear length (No. 6), and the total ear length relative to face height (No. 7). He is more divergent in the remaining indices. The average deviation between the six facial indices analyzed here is 4.0 points. This is low enough to make it impossible to rule out Sturgis on the basis of metric traits alone.

(700) The following morphological differences, however, between Sturgis and Tramp B indicate that they are not the same person:

(701) 1. Hair. - Sturgis is very dark brunette with strongly waved hair; Tramp B has medium-dark hair with a slight wave.

(702) 2. Hairline. - The hairline of Tramp B shows more bilateral recession than is observed in Sturgis.

(703) 3. Nose. - Tramp B has a concave nasal profile with a rounded, slightly bulbous, nasal tip. Sturgis' nasal profile is slightly convex and the nasal tip is less bulbous than that of the Tramp.

(704) 4. Chin. - The most striking difference between the two men is the form of the chin. Sturgis' is massive and square; Tramp B has a small and rounded chin.

(705) 5. Ears. - Tramp B's ears are considerably more projecting than those of Sturgis which are rather close set.

(706) 6. Physique. - Tramp B appears to be considerably more linear in body build than Sturgis, who is broad and stocky in physique.

^aOriginally, Carswell was compared only with Tramp A (see HSCA - JFK Hearings, vol. IV, pp. 374-77); the anthropologists were later asked to extend their comparison to Tramp B.

Carswell

(707) Carswell's resemblance to the Tramp based upon the facial indices was not nearly as impressive. Two of his facial indices, forehead height relative to total face height (No. 1) and lobe length relative to ear length (No. 6) differ from those of the Tramp by 12 and 13 points, respectively. These differences strongly exceed any divergence that might be introduced by technical error. The average deviation between the values of all six indices is 5.8 points. This deviation is sufficiently high to exclude Carswell as Tramp B on metric features alone.

(708) Strong differences in morphological features are also observed between Carswell and Tramp B. Carswell has a longer face relative to its breadth than the Tramp. Carswell's nose is thin with a sharply defined tip whereas the Tramp has a short, relatively broad nose with a rather bulbous tip. Carswell has a longer chin than the Tramp. The most striking difference between the two men is in the shape of their ears. Carswell's are essentially lobeless, that is, the lower margins of the ear attach directly to the cheek; Tramp B has well-developed lobes. In Carswell, the antihelix (the elevated ridge just in front of and parallel to the outer margin of the ear) is very weakly developed; in the Tramp, this structure is strongly developed and prominent.

(709) In conclusion, both Carswell and Sturgis can be excluded as being Tramp B.

Tramp C

(710) Photographs of Fred Lee Chrisman, a right-wing activist implicated in the Garrison investigation, and E. Howard Hunt, a principal figure in the Watergate burglaries and an employee of the U.S. Central Intelligence Agency at the time of the Kennedy assassination, were compared with Tramp C. (See Fig. IV-59.) The indices of Hunt, Chrisman, and Tramp C are compared in Table III.

(711) In comparing Hunt with Tramp C, the average difference in the six indices of the men is 9.0, a value sufficiently high to suggest no particularly strong resemblance in facial proportions. In addition, in comparing the photographs of the Tramp to those of Hunt taken in the late 1950's and early 1960's, the following morphological differences were noted.

(712) 1. Forehead. - Tramp C has several well-developed transverse frontal sulci and a strong vertical interciliary sulcus. These are not observed in Hunt who, even in photographs taken in later years, has only slightly developed transverse frontal and interciliary furrows.

(713) 2. Nose. - The Tramp has a relatively broad nose with bulbous, fleshy nasal tip. The nasal tip is not depressed. Hunt has a narrow nose with a salient nasal bridge and an angular, moderately depressed nasal tip.

(714) 3. Mouth. - Tramp C has thick, full membranous lips; Hunt is thin-lipped.

(715) 4. Cheek. - Tramp C has well-developed nose-labial folds whereas in Hunt these are only incipiently developed in his photographs taken at about the time of the assassination.

(716) 5. Ear. - From his photographs, it is apparent that Hunt underwent surgery to correct his rather projecting ears. The date of this operation was not determined, but from the photographs it would appear to have been within a few years before or after the assassination. In degree of projection, the Tramp's ears appear to more closely match Hunt's pre-surgical condition.

(717) Two features not influenced by the surgery are strongly different in the two men. One of these is the helix, the fold of the flesh that forms the outer rim of the ear. In the Tramp, this fold is wide and prominent whereas it is narrower and more weakly developed in Hunt. The second difference is in the antihelix, the secondary fold that roughly parallels the helix inside the ear. This structure is strongly developed in the Tramp and, in fact, its lower portion appears to extend beyond the helix. In Hunt, the antihelix is weakly developed.

(718) 6. Scars. - In the Tramp there is a pit-like, ovoid scar about 1 centimeter in diameter located immediately above the lateral end of his right eyebrow. This feature is not observed in any of the Hunt photographs provided for examination.

(719) 7. Age. - In general facial tone, age lines and other features, Tramp C appears to be at least a decade older than Hunt.

(720) From the observed differences in metric and morphological features, E. Howard Hunt can be confidently excluded as being Tramp C.

(721) Chrisman. - A comparison of a single undated full-face photograph of an individual identified as Fred Lee Chrisman was also made with those of Tramp C. His mouth is slightly open and he appears to have been speaking at the time the photograph was made. The subject is a white male who appears to be about 60 ± 5 years of age. In general, the index difference between Chrisman and Tramp C is low, ranging between two and six points with a mean difference of four index points. This is less than one-half the average index difference (nine) observed between E. Howard Hunt and Tramp C. Such a low value suggests a strong resemblance between Tramp C and Chrisman in general facial configuration.

(722) Tramp C appears to be approximately a decade younger than Chrisman.^{uu} The similarities in morphological traits between Tramp C and Chrisman are nevertheless impressive.

(723) 1. Hairline. - Although Tramp C is wearing a hat, it is positioned far enough back on his head to reveal his hairline. It appears to be continuous and uninterrupted by a part or any

^{uu}Therefore, to obtain a more definitive interpretation, it would be helpful to establish the date of the Chrisman photograph.

strong recession due to balding. It is thus of the same general configuration observed in Chrisman.

(724) 2. Forehead. - Both Chrisman and Tramp C are characterized by several strongly developed transverse frontal sulci "worry lines." These are more accentuated in Chrisman as would be consistent with his apparent greater age. Unfortunately, these wrinkles are not shown with sufficient clarity in the Tramp to allow a detailed comparison of their pattern. Differences observed in this region include the circular, pit-like scar located immediately lateral to the other end of the left eyebrow of Tramp C and the strong vertical interciliary sulcus of the Tramp, neither of which are discernible in the Chrisman photograph.

(725) 3. Eyebrows. - In both men, the eyebrows are low and weakly arched. In the Tramp, however, they appear to be more widely separated than they are in Chrisman.

(726) 4. Eyes. - Both men have heavy medial eyefolds which tend to obscure the upper lids, lending their eyes a "hooded" aspect. Also both display well-developed oblique palpebral sulci that gives them a somewhat "baggy-eyed" appearance.

(727) 5. Nose. - In Tramp C, the nasal root appears to be somewhat broader than in Chrisman. In both men, the lower nasal region is characterized by a full, fleshy tip.

(728) 6. Mouth. - Both men have relatively small mouths. The membranous portion of Chrisman's upper lip appears to be extremely thin whereas that of the Tramp is moderately full. The nasolabial fold is strongly developed in Tramp C but not present in Chrisman.

(729) 7. Chin. - Both men have prominent chins with squared lower margins. In both, platysmal folds have developed to give them a rather "jowly" appearance.

(730) 8. Ears. - No morphological inconsistencies in the ears of the two men are observed.

(731) In brief, Chrisman resembles Tramp C rather strongly in both metric and morphological features. These similarities, derived from the analysis of a single undated photograph of Chrisman, are in no way sufficient to establish a positive identification. Nevertheless, they are strong enough to suggest that further analysis, based on more fully documented Chrisman photographs, should be considered, unless independent evidence excludes Chrisman's presence in Dallas on November 22, 1963.

1. INTRODUCTION

(732) Various conspiracy theories have centered around the hypothesis that a double of Lee Harvey Oswald played a part in the assassination of President Kennedy. The theorists themselves appear to disagree on the origin and role of this "Second Oswald." Nevertheless, all agree that in at least one stage of his career between the time Oswald defected to the Soviet Union and the assassination, he was impersonated by a double.²³² To investigate this

possibility, the anthropology consultants examined a series of Oswald photographs ranging in time from his Marine Corps enlistment to his arrest in Dallas after the assassination.

2. ISSUE

(733) Is there any photographic evidence of an Oswald imposter?

(734) The collection of photographs pertaining to the Kennedy assassination and Warren Commission investigation includes several dozen of Oswald (or, possibly, his double). As one might expect, they vary widely in pose, facial expression, lens-subject distance, and image quality. From these, it was possible to select nine in which (1) the facial features were fairly well-defined, (2) the pose was either nearly full-face or true profile, and which (3) represented the subject during various key episodes of his life from the time he was a Marine until the assassination. (See Figs. IV-60, IV-61, JFK Exhibits 556-557.) In addition, two photographs of definitely poorer quality were selected for analysis. These were two of the controversial "backyard photographs"; they differ from the others in that the direction of lighting was from almost directly overhead and the facial image was somewhat more poorly defined. (See Figs. IV-18 and IV-20.)

(735) In addition to the Oswald photographs, data were included from three photographs of Billy Lovelady, taken in the early 1960's. Lovelady was a fellow employee of Oswald at the Texas School Book Depository and his strong physical resemblance to Oswald was a source of controversy and confusion regarding the "man in the doorway" photograph.^{vv} The inclusion of Lovelady's facial indices in our analysis provides a convenient control or yardstick to measure the variation observed in the facial indices derived from the Oswald photographs.

4. METHODS

(736) This analysis is based on 15 indices derived from 16 measurements of the head and face.^{ww} The measurements were taken to the nearest 1 millimeter from 8-by-10-inch black and white enlargements of the subject's face. The indices for both Oswald and Lovelady are given in Table I. There are some missing values for the three profile view of Oswald. This is because certain measurements necessary for calculating these indices cannot be obtained from a profile photograph. Also, a few indices could not be calculated for the full-face photographs because lighting, image clarity, or other factors would not permit the necessary measurements to be made with sufficient accuracy.

(737) In order to reduce this complex set of individual values to more meaningful statistics, one of the methods long employed by anthropologist was used to compare both living and fossil

^{vv}See para. 759 *infra*.

^{ww}See Addendum A, para. 746-748 *infra*.

populations. The method selected was Penrose's distance statistic, which has an advantage over more sophisticated multivariate methods in that it is fairly simple to compute, but still gives an acceptable approximation of the morphological differences between the groups.²³³ The use of more elaborate methods did not seem justified in view of the small sample sizes involved.

(738) This method reduces a set of complex variables that characterize two or more groups to a pair of coefficients that reflect the group's overall difference in size and shape.

(739) To apply this method to the present problem, the index data was grouped chronologically to represent Oswald at various significant periods of his life:

1. Marine Corps.
2. Russia.
3. Backyard (Dallas).
4. New Orleans.
5. Arrest (Dallas).

(740) The data were then studied to determine whether the face of the individual shown in the Oswald photographs, taken during any one of the first four of these periods (Marine Corps, Russia, backyard, New Orleans), differed morphologically from the face of the man who was arrested in Dallas after the assassination. If such a difference was found, it might suggest that a double was involved.

5. CONCLUSION

(741) There are no biological inconsistencies in the Oswald photographs examined that would support the theory that a second person, or double was involved. The variation observed is that expected in an array of photographs taken by different cameras with varying lens, camera angles, lighting, and other technical differences.

(742) It is not, however, possible totally to dismiss the "second Oswald" hypothesis on the basis of this negative finding. For example, it is possible that a double - if one existed - may not have been included in the series of photographs examined. There is also a possibility, however remote, that such a double was such a perfect twin of Oswald that no detectable metric or morphological differences are discernible in the photographic record.

INTRODUCTION

(749) Several Warren Commission critics have alleged that substantial differences exist in the reported heights and facial characteristics among different photos and other measurements purported to represent Lee Harvey Oswald.²³⁴ For example, differences of as much as 2 inches in height exist between an early Marine Corps induction photo of Oswald in front of a height chart (see Fig. IV-63, JFK Exhibit F-166), reported height measurements of Oswald,²³⁵ measurements of the Oswald corpse in Dallas, and another height chart photograph of Oswald

(see Fig. IV-64). The Marine photograph, which allegedly depicts Oswald with a 13-inch head (measuring from the bottom of his chin to the top of his head), is also said to be inconsistent with his true facial measurements.²³⁶ (See Fig. IV-63.) On this basis, it has been alleged that these differences are evidence of different individuals purporting to be Lee Harvey Oswald.²³⁷

2. ANALYTICAL APPROACH

(751) Two members of the photographic evidence panel was directed to take an independent series of photographs involving an individual of known height standing against a height chart. For each series of pictures, each person was to be photographed at different distances in relation to the height chart. The vertical orientation of the camera and its distance to the height chart was also subject to change at the photographer's discretion, but the camera was kept essentially horizontal at all times so that optical axis was level, that is parallel to the ground.

(752) In addition, the forensic anthropologists on the photographic evidence panel were asked to provide information concerning discrepancies between measured and reported heights.

3. CONCLUSION

(753) No probative weight should be given to an Oswald imposter theory based upon differences in Oswald's body measurements that have been detected from photographs of him standing against a height chart.

(g) Comparison of photographs of Lee Harvey Oswald and Billy Nolan Lovelady with that of a motorcade spectator

(759) A widely publicized photograph taken by Associated Press photographer James W. Altgens within a few seconds after President Kennedy was first shot shows a spectator who bears a strong physical resemblance to Lee Harvey Oswald standing at the west end of the Texas School Book Depository entranceway. (See Fig. IV-66, JFK Exhibit F-559.) Altgens has stated that he took the picture of the presidential limousine, with the Texas School Book Depository entranceway in the background, just after he heard a noise "which sounded like the popping of a firecracker."²⁴³

(760) In evaluating the evidence that Oswald was in the sixth floor, southeast corner window of the Texas School Book Depository at the time of the shooting, the Warren Commission considered the allegation that the man shown in the doorway in the Altgens photograph was Oswald. The Commission concluded that the spectator was not Oswald, but rather another Texas School Book Depository employee, Billy Nolan Lovelady.²⁴⁴ This conclusion was based upon Lovelady's identification of himself in the Altgens photograph²⁴⁵ and upon statements of other persons who were present in the Texas School Book Depository entranceway at the same time.²⁴⁶

(761) Warren Commission critics have charged that there was insufficient basis for this conclusion,²⁴⁷ and have faulted the Commission for presenting " . . . no supporting visual evidence by which one can appraise the resemblance between Lovelady and the man in the doorway, or Lovelady and Oswald, although nothing less hangs on the accurate identification of the doorway man than Oswald's possible total innocence of the assassination."²⁴⁸

(762) This issue has also persisted because of reported discrepancies in connection with the clothing worn by the Altgens figure and Billy Lovelady on November 22, 1963.²⁴⁹ In media prints of the Altgens photograph, the man appears to be wearing a long-sleeved shirt similar to the one in which Oswald was arrested.²⁵⁰ (See Fig. IV-67.) According to a memo written by FBI Director J. Edgar Hoover to the Warren Commission after Lovelady had been interviewed and photographed in 1964 by FBI agents,²⁵¹ Lovelady was reported to have been wearing a short-sleeved red and white, vertically striped shirt. (See Fig. IV-67.) Lovelady later explained that when he was interviewed and photographed by the FBI, he had not been told to wear the same shirt he had worn on the day of the assassination and that, in fact, he had been wearing a long-sleeved, plaid shirt when he was standing in the Texas School Book Depository doorway.²⁵² (See Fig. IV-67.)

(763) This contradiction was partially resolved by photo-optical work performed by Robert Groden, a Warren Commission critic and photographic consultant to the committee.^{xx} During his work with the committee Groden made photographically enhanced enlargements of the original 35 millimeter black and white Altgens negative and frames of the Bell, Martin, and Hughes color motion picture films, which also showed the spectator in the doorway, and detected a pattern of lines that correspond in pattern and color more closely to Lovelady's plaid shirt than to Oswald's tweed-patterned shirt.²⁵³ (See Figure IV-67.)

(764) Even so, in an effort to resolve the issue even more definitively, the Photographic Evidence Panel's board of forensic anthropologists were requested to study the photograph of the spectator shown standing in the doorway.

2. ISSUE

(765) Is it possible to identify positively as either Lee Harvey Oswald or Billy Lovelady, the man, shown in the Altgens photograph standing by the doorway entrance to the Texas School Book Depository at the time of the President's assassination.

^{xx}Groden initially was among those who claimed the Altgens photograph could not be of Lovelady. See note 249 supra.

3. MATERIALS

Spectator

(766) In order to produce the clearest possible photographic images of the spectator in question, the Photographic Evidence Panel had black and white prints made from the original Altgens 35 millimeter negative at various contrast, density levels and enlargements.^{yy254} They included various enlargements of the spectator's face such as that shown in Figure IV-68. The anthropologists were furnished with a number of these prints.

Oswald

(767) A series of photographs of Lee Harvey Oswald, ranging from the time of his U.S. Marine Corps enlistment in 1956 to his arrest in Dallas in 1963, were provided to the anthropologists. While all were examined, those taken on the day of Oswald's arrest in Dallas received the closest scrutiny. (See, for example, Figure IV-69.)

Lovelady

(768) Photographs of Lovelady were furnished which varied in date from 1959 to 1977. Of most interest were those taken near the time of the assassination. (See, for example, Figure IV-70.)

4. CONCLUSION

(769) Due to the blurred quality of the enlargements of the spectator's image in the Altgens photograph, it was not possible either to identify or exclude positively Lovelady or Oswald. Based on a subjective assessment of the facial features of the spectator, however, it was determined that the man in the doorway bears a much stronger resemblance to Lovelady than to Oswald. Thus, assuming it is either Oswald or Lovelady, and not a third party, it appears highly improbable that the spectator is Oswald and highly probable that he is Lovelady.

^{yy}The Altgens negative was not subjected to digital image processing because the image was blurred to the resolution limitations of the camera system, and, consequently, the Photographic Evidence Panel believed that computer assisted enhancement techniques would not aid in identifying the man in the doorway.

015086

January 3, 1979

The Honorable
Chairman Louis Stokes
Select Committee on Assassinations
U.S. House of Representatives
Washington, D.C. 20515

Dear Sir:

Enclosed please find the formal dissenting view dealing with the work of the Committee's scientific medical and photographic panels and my report on related photographic materials which I feel were inadequately covered in the public hearings.

As a photographic consultant to the Committee, I feel that these views should be expressed for the record and for history. I will be including photographic materials relating to the various reports herewith enclosed.

Sincerely,

signed
Robert J. Groden

I. THE "BACKYARD" PHOTOGRAPHS

Among the areas in which I disagree with the way the photo evidence was presented and treated was using only Jack White's arguments in the area of the Neely Street photographs. You were all aware that some of the arguments presented were no longer issues and that some of them never really were. The true issues were not accurately dealt with in the hearings. These were the discrepancy of the head to body size as well as the height-to-rifle length ratio and the visual retouching of the skin and surrounding area. At the July 19 panel meeting I didn't argue the point because of my desire to attend the rest of the meetings. But in my opinion no matter what the panel members concluded, the backyard photographs are beyond question fakes.

Disregarding all of the other evidence supporting the fact of forgery, the visual areas of retouching cannot be easily dismissed.

For the record, the methods used here was, almost without doubt, simply posing a man (or possibly different men for each photograph) in the backyard with the rifle, pistol and publications as part of this original picture. The only item added was the head of Lee Oswald from the middle of the chin up. The argument that all of the backgrounds are the same is, I feel, impractical, and the same goes for the idea of adding the shadows after the fact.

In spite of the fine work Jack White has done on the rifles, I don't believe using him alone to present "all the issues" dealing with the Neely Street photographs can ever be justified.

II. THE NIX AND MOORMAN PICTURES

Dr. Hunt's "analysis" of the Moorman No. 2 Polaroid photograph and the Nix film were in extreme error and the questioning insufficient to accurately deal with these items.

The best variation of the Moorman No. 2 Polaroid are the prints made from either of the original high resolution negatives in the possession of UPI and AP. Dr. Hunt didn't even see, scan, or study them. He used the original print which faded 15 years ago. You can hardly see the President in the foreground, and images in the background have long since nearly vanished, including the "assassin" behind the retaining wall on the grassy knoll, the man behind the stockade fence and other shapes which raise questions as to others on the knoll. The man who appears in Willis No. 5 and the Zapruder film is clearly seen behind the wall in the Moorman No. 2.

Also overlooked is the fact of the Western-most wall edge changing shape depending on which negative was used to create any given specific point.

The first Moorman print on the other hand is not now as was originally described by all who saw it before the FBI confiscated it. It has now lost the sixth floor, which was there originally in the photograph, as well as the eastern end of the TSBD and the "assassin's" window.

I intended to present evidence that as was the case with the Neeley Street photographs, the Moorman pictures as they exist now are fakes. For instance, Mary Moorman took three consecutive photographs. The committee looked at the first and the third of the three and they both show evidence of retouching. None of this was dealt with by Dr. Hunt. Hunt couldn't see the man behind the wall because he no longer appears in the original print. His entire image has faded to white.

As for the Nix film, Hunt couldn't see a gun flash because the frame corresponding to Zapruder frame No. 312 was not scanned and is the only frame showing the flash. This is the frame just before the head explosion frame. It is doubtful that Dr. Hunt would even know where to look for the muzzle flash even if he had the correct frame since we have had no interaction at all on this matter.

III. THE WALKER BULLET

The shot taken at General Walker was referred to several times during the public hearings as being fired by Oswald. This is a terribly misleading assumption.

It is still questionable whether the Mannlicher-Carcano can be linked to Oswald. But even if it was his, it could not have fired the "Walker bullet." Oswald's alleged rifle fired 6.5-mm ammunition, copper jacketed, while the Walker bullet was a steel jacket 30.06.

Oswald has never been linked with another rifle during that period of time.

IV. TIMING AND NUMBER OF SHOTS

Although testimony given at the time of the public hearings would lead one to believe that it was the general consensus of the photographic panel that the time and number of the shots had been established, and that there was little question as to this conclusion, this was of course not the case. The vote was presented split, but the ballot was not clearly defined. No one was asked if they thought a shot struck before Zapruder frame number 190, nor were they asked if they felt shots struck both before and after the road sign.

One important result of that panel meeting was my discovery of a shot fired in the mid-to-late 150's of the Zapruder film.

Seven years ago, I discovered that President Kennedy was responding to a shot that missed by frame 158. But at the panel meeting I found that by frame 163, Governor Connally was also responding to the sound of the same shot. This, coupled with the overall timing of the shot sequence of the police tape, gives us a whole new perspective of the shot timing.

In the face of the current evidence it seems that this is the actual timing and firing order of the shots:

1. From behind. Missed. Fired in the 150's. Possibly hit the concrete by the manhole cover, the south curb of Elm Street, or the pavement on Elm Street. (There is Warren Commission testimony of this.)
2. From the front. Hit the President in the neck. Penetrated deep within the President's body and was removed during the autopsy by Commander Humes. (See FBI receipt for the bullet.) Struck the President between frames 188 and 189.
3. From behind. Struck the President in the back, 4 inches below the shoulder line to the depth of an inch or an inch and a half and did not traverse the body. This bullet probably fell out of the President's body either during the time the body was in Parkland Hospital or while en route to Bethesda for the autopsy. Upon striking the President in the back, the transfer of momentum pushed the President forward and downward by several inches. This is one of the few occurrences on film that can be accurately measured but has gone totally overlooked by the photo panel. The hit occurs at frame 227, and the forward motion lasts just for over a half dozen frames.
4. From behind. Hit Governor Connally in the back. There are two possible times for this hit. The first is at frame 227 when the Governor's right arm spins toward his left. The second occurs at frame 238 when there is a violent drop to the Governor's right shoulder and his checks puff out, his hair becomes disheveled. There is an outside possibility that these two pronounced movements may represent separate shots. The first to Connally's right wrist and the second to his back with either striking his left thigh.

V. JOSEPH MILTEER

The matter of Joseph Adams Milteer is by no means put to rest by comparing the height of the man in the Altgens photo to Milteer's known height or the unknown relative heights of the other people in the crowd standing near him.

If the man in the crowd is Milteer it is just the icing on the cake. You have the Miami tapes as well as the Miami police reports and the FBI files on Milteer. He is strongly involved in both the Kennedy and King cases. He is proof of a conspiracy and that the FBI and Warren Commission participated in an active collaborated coverup by burying all of the Milteer evidence in the National Archives and never mentioning his name even once in the Warren Report or the 26 volumes of evidence. Milteer is a prime suspect in both the John Kennedy and Martin Luther King murder plots.

Resting the Milteer case on the height of the crowd men would be a gross error in judgment.

VI. THE ACOUSTICS TESTS

There seems to be a problem in the way the acoustics tests were done:

1. Only two firing points were considered for acoustical matching - the "Oswald window" and behind the stockade fence. By using the audio signals and echo patterns from only these two points, the testing machinery could eliminate any other shot, echo pattern or sound below the dB threshold used, related to shots from behind the retaining wall, the southern knoll, the Dal Tex Building, the Records building, other depository window or the roof, or any other possible firing point from the final conclusions, thereby destroying the use or value of the tests.
2. By not removing the new overhead road signs and replacing the old Stemmons Freeway sign, new elements are introduced that will alter the results of the tests and eliminate from consideration possible shot sounds and echo patterns altered by these new elements.
3. Different ammunition was used in the testing. First, older ammunition of the type allegedly used by Oswald was used. Then, newer ammunition was used that gave a different sound even audibly to the witnesses and the testing machinery is far more sensitive than the human ear to such changes.

In spite of the many inconsistencies in the testing procedure, there was still evidence of a possible four shots from at least two different directions.

It must be noted here that the first acoustical tests done on the Dallas police tape found very strong evidence of at least seven shots which is confirmed by the visual and concrete evidence at the time of the assassination.

VII. REPORT ON ISSUES RELATING TO THE AUTHENTICITY OF THE AUTOPSY X-RAYS AND PHOTOGRAPHS OF PRESIDENT JOHN F. KENNEDY

During the public hearings in September, witnesses from the committee's scientific panel stated that in their opinion the autopsy photographs and X-rays of President Kennedy were genuine, citing that evidence as the fact that the film used was produced in 1963.

The importance of the photographs and X-rays cannot be over-estimated. Every scientific panel - photographic, medical, acoustics, ballistics, N.A.A., et cetera - all depend upon the autopsy materials for their testing and conclusion.

The basic conclusions from all except the acoustics panel is that two shots struck the President from behind.

On the surface it would seem that the autopsy materials bear out this conclusion. That, however, may not be the case.

There is evidence that raises grave questions about the authenticity of the items being relied upon by the Select Committee and its panels. Moreover, there is medical data in the photos and X-rays which is apparently being ignored.

1. THE PROBLEM WITH AUTHENTICITY

The fact that the HSAC panels have been unable to establish in-authenticity of these items may not reflect their authenticity but rather the skill with which they were forged.

In considering the matter of authenticity of some of the autopsy photographs, my main concern is the large head exit wound and its exact and general location as described by the vast majority of trained medical personnel at Parkland Hospital and reported by many of the Dallas witnesses. The main issue here is that such a wound may have been photographically eradicated from the only visual record of the President's body following the assassination via the simple technique of photo-compositing. If done with care, this would be undetectable.

On this point, some of the photo panel's tests would be meaningless. For example, one test the panel claims proves authenticity is that the film in evidence was manufactured in 1963. It seems that if anyone were to plot the forging of these pictures that they would not wait until the film used in the other (genuine) autopsy photographs would be out of date, and that they would certainly use the same film that would have been originally used in the entire autopsy series. All this test proves is that the forgeries could have been produced in late 1963 or early 1964.

For the record, my visual inspection of the autopsy photographs and X-rays reveals evidence of forgery in four of the photographs: Color chromes No. 42 and No. 43, showing the rear of the head and No. 15 and No. 16 which appear to be the same shots in black and white (made from black and white duplicate negatives of No. 42 and No. 43).

Within the circumference of the President's head, there is an irregular line. Within this line the hair appears black and wet. On the outside of the line it is auburn and completely dry. In later generations of these photographs, a large degree of contrast buildup becomes apparent at the line's edge and the line becomes clearly defined. This phenomenon is characteristic of crop lines in matte insert processes used for retouching and repositioning of photographs.